Avaya Aura® Contact Center Planning and Engineering

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Contents

Chapter 1: New in this release

The following sections detail what is new in *Avaya Aura® Contact Center Planning and Engineering* (NN44400-210).

Features

See the following sections for information about feature changes:

Avaya Aura® Contact Center server types

The Avaya Aura® Contact Center Release 6.3 DVD Installer supports a range of new server types. Each new server type installs a combination of Avaya Aura® Contact Center applications suitable for a specific contact center function. Some Contact Center servers support only voice contacts, some Contact Center servers support only multimedia contacts, and some Contact Center servers support both voice and multimedia. Avaya Aura® Contact Center Release 6.3 offers a range of servers for both Avaya Aura® Unified Communications platform and Avaya Communication Server 1000 based solutions. Avaya Aura® Contact Center Release 6.3 also provides multimedia only solutions, and a Multimedia Complement to Avaya Aura® Call Center Elite.

Each Avaya Aura® Contact Center server type requires one Windows server. Avaya Aura® Contact Center server types are not supported co-resident with each other on the same server.

Avaya Aura® Contact Center Release 6.3 no longer supports the installation of individual Contact Center components or applications.

The Avaya Aura® Contact Center Release 6.3 DVD contains a Windows and a Linux version of Avaya Media Server. You can use the Contact Center DVD Installer to install the Windows version of Avaya Media Server as a component of a Voice and Multimedia Contact Server. You can also access the Linux version of Avaya Media Server directly from the DVD folder

structure and install it standalone on a Linux server. Avaya Aura® Contact Center Release 6.3 does not support the installation of standalone Avaya Media Server on Windows.

Avaya Aura® Contact Center server specifications

Avaya Aura® Contact Center Release 6.3 defines a range of minimum server specifications to support the new server types.

For more information about the minimum server specifications, see Server Specifications on page 331.

Avaya Aura® Solution for Midsize Enterprise platform support

Avaya Aura® Contact Center Release 6.3 supports integration with the Avaya Aura® Solution for Midsize Enterprise (ME) platform Release 6.1 and 6.2.

The Avaya Aura® Solution for Midsize Enterprise Solution Template delivers the following applications for use as virtual machines running on the Avaya Aura® System Platform:

For Avaya Aura® Solution for Midsize Enterprise (ME) platform Release 6.1:

- Avaya Aura® Communication Manager 6.0.1
- Avaya Aura® Session Manager 6.1
- Avaya Aura® System Manager 6.1
- Avaya Aura® Presence Services 6.1
- Avaya Aura® Utility Services 6.1
- Avaya Aura® Application Enablement Services 6.1

For Avaya Aura® Solution for Midsize Enterprise (ME) platform Release 6.2:

- Avaya Aura® Communication Manager 6.2
- Avaya Aura® Session Manager 6.2
- Avaya Aura® System Manager 6.2
- Avaya Aura® Presence Services 6.1
- Avaya Aura® Utility Services 6.2
- Avaya Aura® Application Enablement Services 6.1.2.0.32

Avaya Aura® Contact Center supports campus High Availability with the Avaya Aura® Solution for Midsize Enterprise (ME) Release 6.2 platform.

Licensing

Avaya Aura® Contact Center Release 6.3 supports Avaya WebLM licensing. For more information, see About the license file on page 71.

For a remote WebLM server, Avaya Aura® Contact Center License Manager supports only the Virtualized Environment deployment of Avaya WebLM server.

There are new licenses in Avaya Aura® Contact Center for the Agent Greeting and Offsite Agent features.

Chapter 2: Introduction

This document describes how to determine the engineering requirements of the Avaya Aura® Contact Center Release 6.3 component applications, servers, and solutions.

Avaya Aura® Contact Center supports the following platforms and solution types:

- SIP-enabled Avaya Aura® Unified Communications platform Release 6.1 and 6.2.
- AML-based Avaya Communication Server 1000. Application Module Link (AML) is an internal protocol used by Avaya Aura® Contact Center to communicate directly with Avaya Communication Server 1000 (CS 1000).
- Multimedia complement to an Avaya Aura® Call Center Elite voice-based call center. Install this server to add multimedia contact routing support to a new or existing Avaya Aura® Call Center Elite voice-based solution. This server supports contact routing for web communications, fax messages, SMS text messaging, and email messages, with additional support for peer-to-peer Instant Messaging (IM).
- No Switch Configured. Select this option when installing Avaya Aura® Contact Center to support only multimedia contacts. Install this server type when there is no existing voice-based call center, or when integration with a voice contact center is not required.

Avaya Aura® Contact Center features the following server types:

Voice and Multimedia Contact Server — Install this server to provide context sensitive and skill-based routing for customer voice and multimedia contacts. This server provides routed contact support for email messages, web communications, voice mail messages, scanned documents, fax messages, and SMS text messages. Each SIP-enabled Voice and Multimedia Contact Server requires one or more Avaya Media Server in the contact center solution. Avaya Media Server supports SIP-based voice contact routing, and it provides conferencing, announcements, dialogs, and Agent Greeting capabilities in SIP-enabled contact centers. A Voice and Multimedia Contact Server has the following components:

- Contact Center Manager Server
- Contact Center License Manager
- Contact Center Manager Server Utility
- Contact Center Manager Administration
- Communication Control Toolkit
- Contact Center Multimedia
- Optional Avaya Media Server Windows version (only in SIP-enabled solutions)

In a small to medium solution using a Voice and Multimedia Contact Server, agents download and install Avaya Aura® Agent Desktop software from the Voice and Multimedia Contact Server.

Voice Contact Server Only — Install this server to provide context sensitive and skill-based routing for customer voice contacts. Each SIP-enabled Voice Contact Server requires one or more Avaya Media Server in the contact center solution. Avaya Media Server supports SIP-based voice contact routing, and it provides conferencing, announcements, dialogs, and Agent Greeting capabilities in SIP-enabled contact centers. A Voice Contact Server has the following components:

- Contact Center Manager Server
- Contact Center License Manager
- Contact Center Manager Server Utility
- Contact Center Manager Administration
- Communication Control Toolkit

In a solution where agents use Avaya Aura® Agent Desktop to log on and handle customer calls, each Voice Contact Server requires one Multimedia Contact Server. In a SIP-enabled voice contact center solution, agents must use Avaya Aura® Agent Desktop to log on and handle customer calls. Therefore each SIP-enabled voice solution using a Voice Contact Server also requires one Multimedia Contact Server. In an Avaya Communication Server 1000 AML-based voice-only solution, where agents use Avaya Aura® Agent Desktop to log on and handle customer calls, each Voice Contact Server requires one Multimedia Contact Server. In an Avaya Communication Server 1000 AML-based voice-only solution, where agents use their desk phones to log on and handle customer calls, and where the agents do not use Avaya Aura® Agent Desktop, a Multimedia Contact Server is not required.

Multimedia Contact Server Only — Install this server to increase the number of contact center agents in your enterprise solution. When installed, this server provides the multimedia contact processing capabilities, and the Voice Contact Server processes only voice contacts. In a solution using a Multimedia Contact Server, agents download and install Avaya Aura® Agent Desktop software from the Multimedia Contact Server. Administrators configure Agent Desktop features and functions using the CCMM Administration utility installed on the Multimedia Contact Server.

A Multimedia Contact Server has the following components:

- Contact Center Multimedia

AACC Multimedia Complement for Elite — Install this server to add multimedia contact routing support to a new or existing Avaya Aura® Call Center Elite voice-based solution. This server supports contact routing for web communications, fax messages, SMS text messaging, and email messages, with additional support for peer-to-peer Instant Messaging (IM). In an Elite Complement solution, agents download and install Avaya Aura® Agent Desktop software from the Multimedia Complement for Elite server. Administrators configure Agent Desktop features and functions using the CCMM Administration utility installed on the Multimedia Complement for Elite server.

A Multimedia Complement for Elite server has the following components:

- Contact Center Manager Server
- Contact Center License Manager

- Contact Center Manager Server Utility
- Contact Center Manager Administration
- Communication Control Toolkit
- Contact Center Multimedia

No Switch Configured Multimedia Only — Install this server to provide multimedia contact routing. This server supports contact routing for web communications, fax messages, SMS text messaging, and email messages, with additional support for peer-to-peer Instant Messaging (IM). Choose this server type when there is no existing voice-based call center, or when multimedia integration with a voice contact center is not required. In a multimedia only solution, agents download and install Avaya Aura® Agent Desktop software from the No Switch Configured Multimedia Only server. Administrators configure Agent Desktop features and functions using the CCMM Administration utility installed on the No Switch Configured Multimedia Only server. A Multimedia standalone server has the following components:

- Contact Center Manager Server
- Contact Center License Manager
- Contact Center Manager Server Utility
- Contact Center Manager Administration
- Communication Control Toolkit
- Contact Center Multimedia
- Avaya Media Server Windows version

Network Control Center Server Only — Install this server to add networking, network skill-based routing, and consolidated reporting support for a number of Voice and Multimedia Contact Servers operating as a single distributed contact center. Use this server to configure contact routing between the Voice and Multimedia Contact Server nodes of a distributed contact center solution. A Network Control Center Server has the following components:

- Contact Center Manager Server
- Contact Center License Manager
- Contact Center Manager Administration

Knowledge Worker Server Only — Install a Knowledge Worker server to provide Computer-Telephony Integration (CTI) functionality and call data handling capabilities. A Knowledge Worker Server has the following components:

- Communication Control Toolkit Knowledge Worker version
- Contact Center License Manager

Security Framework Server — Install this server to provide identity management, authorization, and single sign-on (SSO) authentication for contact center solution users. Security Framework provides session management and integrates with your directory services infrastructure (for example, Active

Directory) to reduce administrative costs and eliminate the redundant user information associated with application solutions. A Security Framework Server has the following components:

- Security Framework

Avaya Media Server on Linux — Install this server to provide additional media processing capabilities, and to support Avaya Media Server High Availability. Avaya Media Server supports SIP-enabled voice contact routing, and it provides conferencing, announcements, dialogs, and Agent Greeting capabilities in SIP-based contact centers. Avaya Media Server High Availability is not supported on the Windows operating system. Each SIP-enabled Contact Center requires one or more Avaya Media Server. For small to medium contact centers without High Availability, choose a server type with co-resident Avaya Media Server for Windows. For large contact centers, or contact centers requiring High Availability, install one or more standalone Avaya Media Server Linux-based servers.

Related resources

Avaya Mentor videos

Avaya Mentor is an Avaya-run channel on YouTube that includes technical content on how to install, configure, and troubleshoot Avaya products.

Go to http://www.youtube.com/AvayaMentor and perform one of the following actions:

- Enter a key word or key words in the Search Channel to search for a specific product or topic.
- Scroll down Playlists, and click the name of a topic to see the available list of videos posted on the site.

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Chapter 3: Contact Center overview

This section provides an overview of the Avaya Aura® Contact Center application suite and the supported platforms.

Contact Center components

The Contact Center application suite consists of the following main components:

- Contact Center Manager Server (CCMS)—The core contact center component, which provides intelligent call routing. You can use Contact Center Manager Server to identify each agent's unique abilities, or skillsets. All incoming calls are routed to the agent with the appropriate skillset. Rules for treating and routing calls can be simple or complex.
- Avaya Media Server—This is a software based media processing platform for the Contact Center. All media processing is performed in software on the host CPUs. The Avaya Aura® Contact Center DVD contains an enhanced version of Avaya Media Server which contains an additional component that provides three services required by SIP-enabled Contact Center:

  Conference—This service is used to create an Avaya Media Server conference and anchor customer calls, announcements, and agent calls to the Avaya Media Server conference.

  Announcement—This service is used to play treatment (ringback, announcements) into the Avaya Media Server conference.

  Dialog—This service is used to play and collect DTMF digits entered in the Avaya Media Server conference.

  In addition, Avaya Media Server supports the Agent Greeting feature of Contact Center.

  The Media Server is the termination and origination point for Real-time Transport Protocol (RTP) streams between the customer, media treatments, and eventually the agent.

  Avaya Media Server requires licenses for the conference, announcement, and dialog features. Agent Greeting licensing is required to configure this optional feature. When installed co-resident with Contact Center Manager Server, Avaya Media Server uses the Contact Center License Manager, otherwise Avaya Media Server uses the Avaya Media Server License Server.

- Contact Center Manager Administration (CCMA)—A component that provides browser-based access to the contact center for administrators and supervisors.
- Contact Center License Manager (LM)—A component that provides centralized licensing and control of all Contact Center suite components and features across the Contact Center suite.
- Contact Center Manager Server Utility—A component used to monitor and maintain Contact Center Manager Server activity. The Contact Center Manager Server Utility provides functionality and performs tasks that are not available through the Contact Center Manager Administration application.
- Network Control Center (NCC) server (optional)—The server in a Contact Center Manager network that manages the Network Skill-Based Routing (NSBR) configuration and communication between servers. This component is required when multiple servers in Contact Center Manager Server sites are networked and operate as a single distributed contact center. It runs the Network Control Center software application, which is a feature of the Contact Center Manager Server software.
- Communication Control Toolkit (CCT)—A client/server application that helps you implement Computer Telephony Integration for installed and browser-based client integrations. This application delivers a single cross-portfolio, multiple-channel API that facilitates the integration of contact center and knowledge worker solutions with your client applications.
- Contact Center Multimedia (CCMM) —A client/server contact center application that expands contact center email capabilities to view, respond to, and track requests over the Internet. Unlike a conventional email system, which directs email contacts to a single email account, Contact Center Manager Server directs contacts to a skillset, or a group of qualified agents. The contact is handled by the first available agent in the skillset. If more than one agent is available, the contact is routed to the agent with the highest priority for the skillset.

  Contact routing ensures a contact center can measure and control the volume of contact traffic. Supervisors and administrators can view real-time displays of contact center activities, as well as run historical reports.
- Security Framework—Provides an identity management security framework that enables integration with the directory services infrastructure (for example Active Directory) for authentication and authorization of application users. The identify framework helps to reduce administrative costs and eliminates the redundant user information associated with per-application solutions. Single Sign-On (SSO) is a core feature of the framework which minimizes the necessity for end users to provide credentials after they log on. SSO with the desktop is supported, minimizing the need to authenticate after logging on to the desktop.
- Orchestration Designer (OD)—A graphical workflow application that you can use to program Avaya Aura® Contact Center applications. OD provides a graphical editor to create Contact Center Task Flow Executor (TFE) flows.

SIP-enabled Contact Centers

Session Initiation Protocol (SIP) is a signaling protocol widely used to control communication sessions such as voice and video calls over Internet Protocol (IP). SIP works in the application layer of the Open Systems Interconnection (OSI) communications model. SIP can establish multimedia sessions or Internet telephony calls, and modify, or terminate them. SIP is designed to be independent of the underlying transport layer. It is a text-based protocol, incorporating many elements of the Hypertext Transfer Protocol (HTTP) and the Simple Mail Transfer Protocol (SMTP) for direct inspection by administrators.

Avaya Aura® Contact Center supports SIP-enabled contact centers based on the Avaya Aura® Unified Communications platform.

SIP-enabled contact centers with a Contact Center Multimedia server can support multimedia contact types such as email. SIP-enabled contact centers with a Microsoft Office Communications Server (OCS) or Avaya Aura® Presence Services can also support Instant Messaging.

Avaya Aura® Unified Communications platform SIP-enabled contact center

Avaya Aura® Contact Center uses industry-standard SIP and CSTA (TR/87 over SIP) interfaces to communicate with other SIP-enabled devices. Avaya Aura® Contact Center uses a SIP Gateway Manager (SGM) component to support SIP. SIP Gateway Manager (SGM) is a Contact Center Manager Server component and a stand-alone SIP element.

The Avaya Aura® Unified Communications platform supports SIP. Integrating Contact Center with the Avaya Aura® Unified Communications platform using SIP infrastructure supports communication between customers and contact center agents. This integration gives Contact Center access to and control of Communication Manager phones. Avaya Aura® benefits from Contact Center skill-based routing, call treatments, reporting, and the graphical Orchestration Designer. Avaya Aura® Agent Desktop (AAAD) supports Avaya Aura® Communication Manager phones and continues to support voice, email, and Web chat contact types.

The following Avaya Aura® Unified Communications platform components are supported with Contact Center:

- Avaya Aura® Communication Manager (Avaya Aura® CM)
- Avaya Aura® Session Manager (SM)
- Avaya Aura® Application Enablement Services (AES)

Avaya Aura® System Platform is a real-time virtualization technology that enables unmodified versions of Avaya Aura® Communication Manager, Avaya Aura® Session Manager, and Avaya Aura® Application Enablement Services to be deployed on a single server.

The following diagram shows a typical SIP-enabled contact center based on an Avaya Aura® Unified Communications platform.

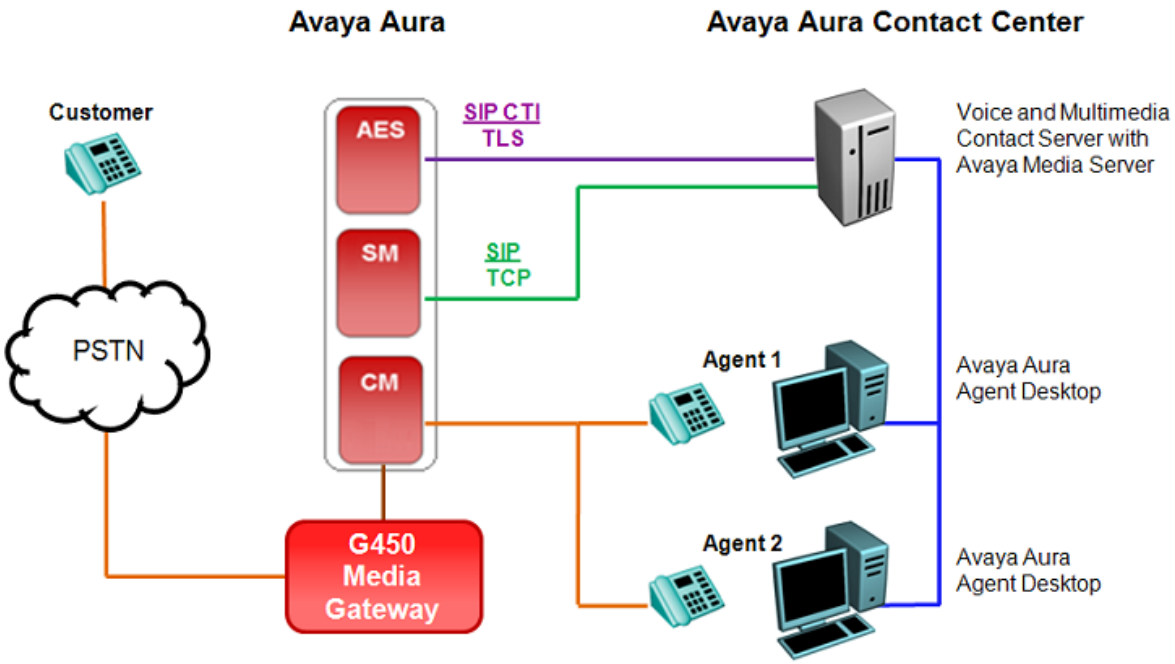


Figure 1: Typical SIP-enabled contact center using the Avaya Aura® Unified Communications platform

Avaya Aura® Communication Manager is an IP Telephony platform for enterprise. It delivers centralized call control for resilient and distributed networks and it supports a wide range of servers, gateways, analog, digital, and IP-based communication devices. Avaya Aura® Communication Manager has advanced built-in capabilities, including mobility applications, and conference calling.

Integrating Avaya Aura® Contact Center with the Avaya Aura® Communication Manager using SIP infrastructure gives Contact Center access to and control of Communication Manager stations (phones).

Avaya Aura® Session Manager provides connectivity, integration, and a smooth migration path to SIP-based communications. It is used to deploy SIP telephony alongside existing analog, digital, and IP telephones. Multi-vendor telephony can be integrated for greater collaboration and productivity. The software is centrally managed and supports SIP trunking, SIP stations, and other SIP-based applications.

Calls to the Avaya Aura® Unified Communications platform can be redirected to Contact Center for processing, treatments, and routing to appropriate skillsets. To achieve this the Avaya Aura®

Session Manager (SM) server must be configured to trust the Contact Center Manager Server. To determine which calls to the Avaya Aura® platform are redirected to the Contact Center Manager Server for processing, you must configure a routing entry and contact details for the Contact Center Manager Server in Session Manager.

Avaya Aura® Application Enablement Services (AES) are a set of enhanced telephony APIs, protocols, and Web services. These applications support access to the call processing, media, and administrative features available in Communication Manager. They enable off-the-shelf and custom integration with communications and business applications such as Avaya Aura® Contact Center.

The AES server uses Transport Layer Security (TLS) communication channels for the SIP CTI connection with Contact Center. TLS is a public key encryption cryptographic protocol that helps secure a communications channel, providing privacy and safety. With public key cryptography, two keys are created, one public and one private. Anything encrypted with either key can be decrypted only with the corresponding key. Thus if a message is encrypted with the server's private key, it can be decrypted only using its corresponding public key, ensuring that the data must have come from the server.

You can obtain a root certificate from your Certificate Authority. A root certificate is an unsigned public key that identifies the Root Certificate Authority (CA). Add the root certificate to the AES server and then use it to generate a Certificate Signing Request (CSR). Send the CSR and the Common Name (CN) of the AES server to your CA. The CA verifies the identity of the request and issues a signed certificate (a private key) for use by the AES server.

You must apply the root certificate and the signed client certificate from your Certificate Authority to the AES server. You must use the same Certificate Authority on the Avaya Aura® Contact Center and you must then apply the same root certificate to Contact Center. The Contact Center, like the AES server, must then generate a Certificate Signing Request (CSR) and get it signed by a Certificate Authority before it can establish a secure TLS SIP link. The AES and Contact Center can then communicate securely using a TLS SIP connection.

For more information about configuring an Avaya Aura® Unified Communications platform-based contact center, see *Avaya Aura® Contact Center Configuration – Avaya Aura® Unified Communications Platform Integration* (NN44400-521).

SIP-enabled contact center call flow

The following diagram shows how a typical customer call is processed in a SIP-enabled contact center.

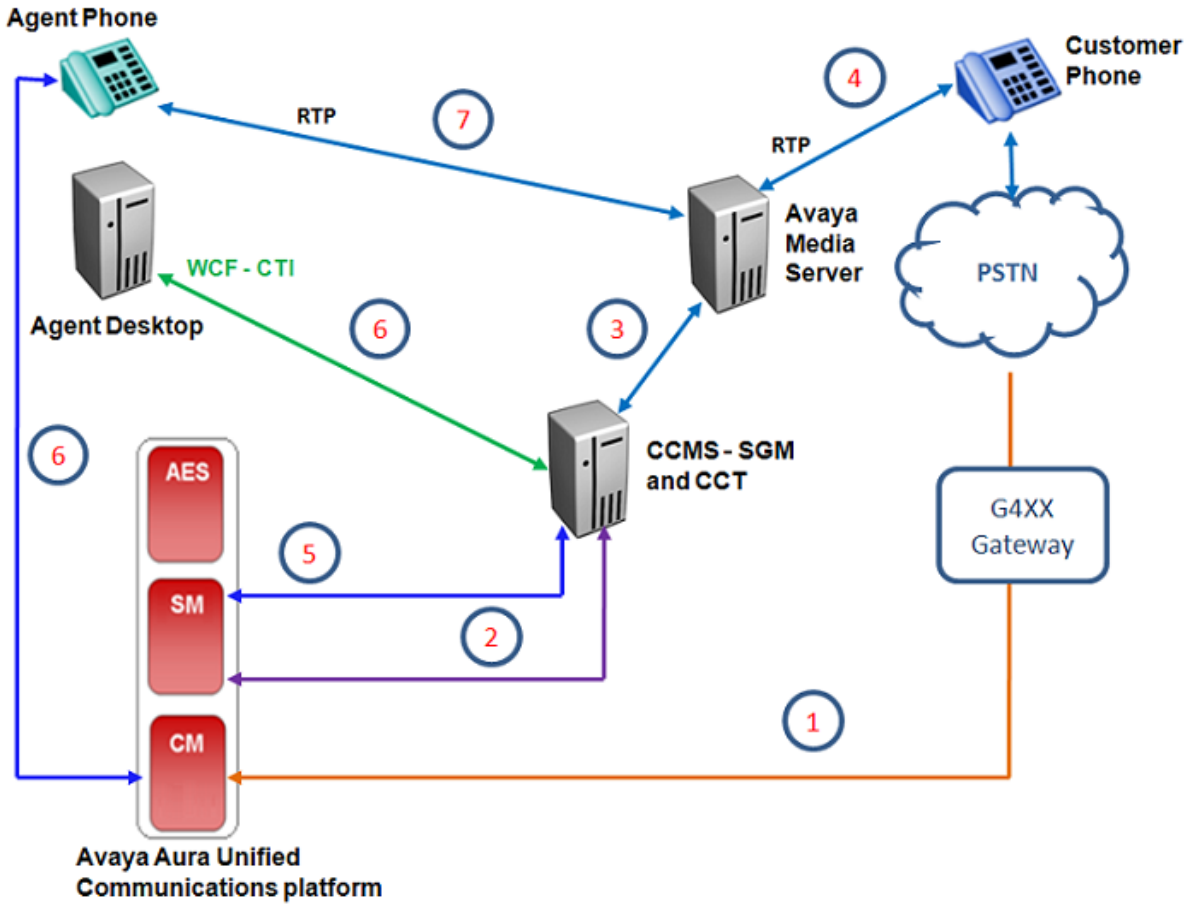


Figure 2: SIP-enabled contact center typical call flow example

The following list of steps outline how a typical customer call is handled in a SIP-enabled contact center:

1. A customer calls the contact center. Communication Manager examines the incoming called number, and routes the call to a signaling group destined for Session Manager.
2. Session Manager routes the call to Avaya Aura® Contact Center based on matching dial patterns, Linux regular expressions and associated routing policies, entity links, and SIP entities. Session Manager sends a SIP INVITE message to Contact Center.
3. When the SIP INVITE message arrives at the Contact Center Manager Server (CCMS), it matches it with one of its configured Route Point URIs and anchors the customer call on an Avaya Media Server conference port.
4. The Avaya Media Server establishes a Real-Time Transport Protocol (RTP) media and voice path with the customer. CCMS treats the customer's call using this conference port for the remainder of the call lifetime.

5. When CCMS has identified a suitable agent to handle this call, it sends a SIP INVITE message to Session Manager. When the SIP INVITE message arrives at the Session Manager, it is sent to the Communication Manager in control of the destination agent H.323 desk phone.
6. Communication Manager sends a H.323 request to the agent desk phone to indicate that a new call has arrived. The agent phone rings and Communication Manager sends a SIP 180 Ringing message back to CCMS using the Session Manager. CCMS uses this trigger to inform the Avaya Aura® Agent Desktop that a call is alerting on the desk phone. In this way, both the agent desk phone and the Avaya Aura® Agent Desktop software client show the customer call as ringing.
7. At this point, the agent can answer the call using Avaya Aura® Agent Desktop or using the desk phone.
    - If the agent answers the customer call using the desk phone, a SIP 200 OK message is sent from Communication Manager to the Session Manager and on to the CCMS server. CCMS then notifies the Avaya Aura® Agent Desktop client software using Computer Telephony Integration (CTI) that the call has been answered.
    - If the agent answers the customer call using the Avaya Aura® Agent Desktop client software, CCMS sends a TR87 AnswerCall request to Communication Manager using the Application Enablement Services. This causes the agent desk phone to go off hook and answer the call. Communication Manager sends a SIP 200 OK message through Session Manager to CCMS and CCMS using CTI notifies the Avaya Aura® Agent Desktop client software that the customer call has been answered.

    In either case, when the call is answered, Real-Time Transport Protocol (RTP) is sent from the agent desk phone to the Avaya Media Server. Avaya Media Server conferences the agent and the customer, the customer and the agent can now communicate. The agent has answered the customer's phone call.

SIP Network Components

A SIP network consists of different SIP-specific logical components. The following are some examples of the SIP network components found in a typical SIP-enabled Avaya Aura® Contact Center solution:

SIP Proxy server

A SIP proxy is an intermediary entity that acts as both a server and a client for the purpose of making requests on behalf of other clients. A proxy interprets, and, if necessary, rewrites specific parts of a request message before forwarding it.

SIP Voice Proxy server

The SIP Voice Proxy server provides support for inbound and outbound calls, such as routing a call to an agent telephone. In an Avaya Aura® Contact Center solution, the SIP Voice Proxy Server is an Avaya Aura® Session Manager.

SIP CTI Proxy server

The SIP CTI Proxy server provides support for SIP Computer Telephony Integration (CTI) so that Avaya Aura® Agent Desktop can acquire and control agent telephones for call control. In an Avaya Aura® Contact Center solution, a SIP CTI Proxy Server is an Avaya Aura® Application Enablement Services server.

SIP Endpoint

The SIP communication model realizes a big part of the functions in the terminal device. An example of a contact center SIP Endpoint is the Avaya 96x0 SIP desk phone.

SIP Entity

Avaya Aura® Contact Center is registered as a SIP Entity with the SIP Voice Proxy. The SIP Voice Proxy routing policy and dial pattern resolve which calls are routed to Avaya Aura® Contact Center for treatment and agent assistance. SIP Gateway Manager (SGM) is a Contact Center Manager Server component and a standalone SIP element used by Contact Center to communicate with other SIP-enabled devices.

The Contact Center Manager Server – SIP Gateway Manager (SGM) handles calls from the SIP Voice Proxy and it is the gateway to the call processing components in the contact center.

SIP User Agent (UA)

The SIP User Agent represents a terminal device in a SIP network. It signals and manages SIP connections that it initiates with other user agents or proxy servers. SIP user agents (UA) are endpoints. User Agents can be considered as intelligent stateful entities, consisting of a SIP user agent client (UAC) and SIP server (UAS). SIP endpoints can terminate or originate SIP sessions, which can contain user-to-user information (for example, Instant Messaging) or negotiation messaging to set up other parallel information streams or redirect these streams to other entities through the SIP session negotiation information (SDP).

A SIP User Agent:

- Terminates (SIP UAS) or originates (SIP UAC) SIP sessions.
- Addressed through logical address of record, such as pat@cc.avaya.com.
- Registers (generally) the current position with a central proxy server or registrar at initiation so that the proxy knows how to resolve the Address of Record (AOR) to an actual IP address.

Example of contact center SIP User Agents are:

- Agent (SIP telephone or SIP client software) - Typical Agent address: sip: 3794@135.166.107.38
- Supervisor Agents (SIP telephone or SIP client software)

- Avaya Media Server
- Avaya Aura® Communication Manager

SIP BBUA

A SIP Back-to-Back User Agent (BBUA) is an entity that intercepts and modifies messaging between a UAS and a UAC with the purpose of providing intelligent call control for the local party. The Avaya Aura® Contact Center - SIP Gateway Manager (SGM) component acts as a BBUA intercepting the incoming customer calls, providing call treatments, and assistance to customers.

SIP Domain

A SIP Domain is logical space where SIP devices exist, authenticate and communicate. In a SIP network a destination address consists of both a user and a domain. This is referred to as a Uniform Resource Identifier (URI). The user portion of the URI is the destination that is being communicated to and the domain portion is the logical grouping that the destination belongs to. A SIP domain may conceptually represent an individual service, a company, or a business.

When a SIP application initiates a call, the SIP message looks like this "INVITE 1234@aacc.com". This application wants to call number "1234" in the "aacc" company or domain. This SIP message is first processed by the local proxy server (SIP proxy). The local proxy server uses the domain part of the SIP request to determine how to route this message to its destination. If the SIP message's domain matches with the SIP domain configured on the SIP proxy, the SIP proxy handles the call within the same domain. Otherwise, SIP proxy forwards it to a different domain.

The SIP domain name may be the same or different to the Active Directory domain name. Typically in a contact center solution, the Contact Center SIP domain name matches the corresponding Active Directory domain name.

Contact Center SIP Domain

The Avaya Aura® Contact Center SIP domain name must match the Avaya Aura® Session Manager SIP domain name. When integrating Avaya Aura® Contact Center and the Avaya Aura® Unified Communications platform, the Avaya Aura® Contact Center "Local SIP Subscriber Domain Name" must match the Avaya Aura® Session Manager SIP "Routing Domain" name configured for contact center.

Typically the Avaya Aura® Contact Center "Local SIP Subscriber - Domain Name" also matches the local Windows Active Directory domain name.

The following diagram shows a typical SIP domain in an Avaya Aura® Unified Communications platform and Avaya Aura® Contact Center integration.

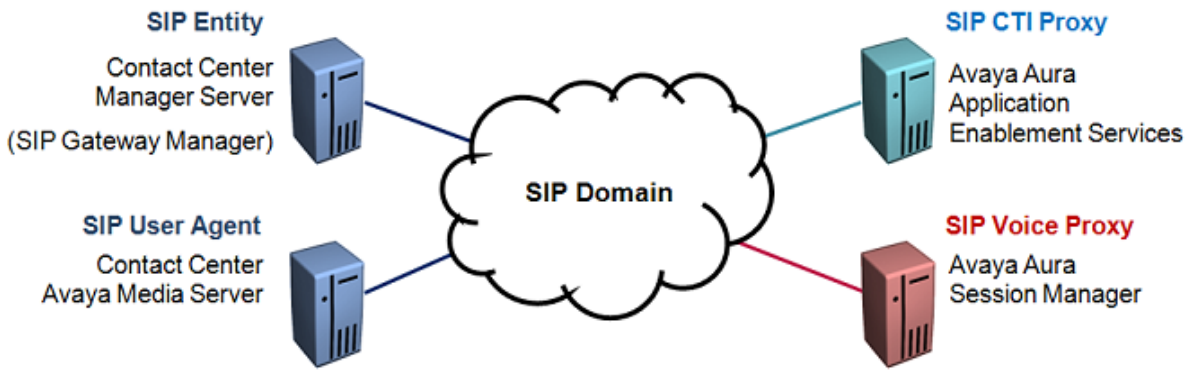


Figure 3: Example of a typical Contact Center SIP domain

In the Avaya Media Server Element Manager (EM), you organize media within a content namespace. The content namespace name must match the contact center SIP domain name; that is, the Avaya Media Server content namespace must match the "Local SIP Subscriber Domain Name" in Contact Center Manager Server - Server Configuration. You must create one locale-specific content group for treatments such as announcements. The locale-specific content group must match the Local SIP Subscriber MS Locale in Contact Center Manager Server - Server Configuration.

Contact Center Services for Avaya Media Server uses the SIP domain of the RequestURI in the incoming INVITE to look up the content store to fetch prompts and treatments, hence the need to match these up. The locale value is supplied in the INFO messages Contact Center sends to Avaya Media Server to play prompts and treatments.

All SIP User Agents, for example Agent, Supervisor Agents, and Avaya Media Server, must be configured to have a URI in this same domain.

Avaya Communication Server 1000 AML-based contact center

In AML-based contact centers, Contact Center Manager Server (CCMS) controls Avaya Communication Server 1000 Controlled Directory Numbers (CDNs). The CCMS server communicates with the Avaya Communication Server 1000 Call Server using an Application Module Link (AML) protocol over an Embedded LAN (ELAN). Each CCMS requires a dedicated Avaya Communication Server 1000 Call Server to support contact center voice calls. Using a CCMS to control contact center calls ensures CCMS can support skill-based routing, call treatments, and reporting. In AML-based contact centers, TDM-based phones connect directly to the Call Server.

Application Module Link (AML) is an internal protocol used by Contact Center Manager Server to communicate directly with Avaya Communication Server 1000.

The following diagram shows a typical AML-based contact center.

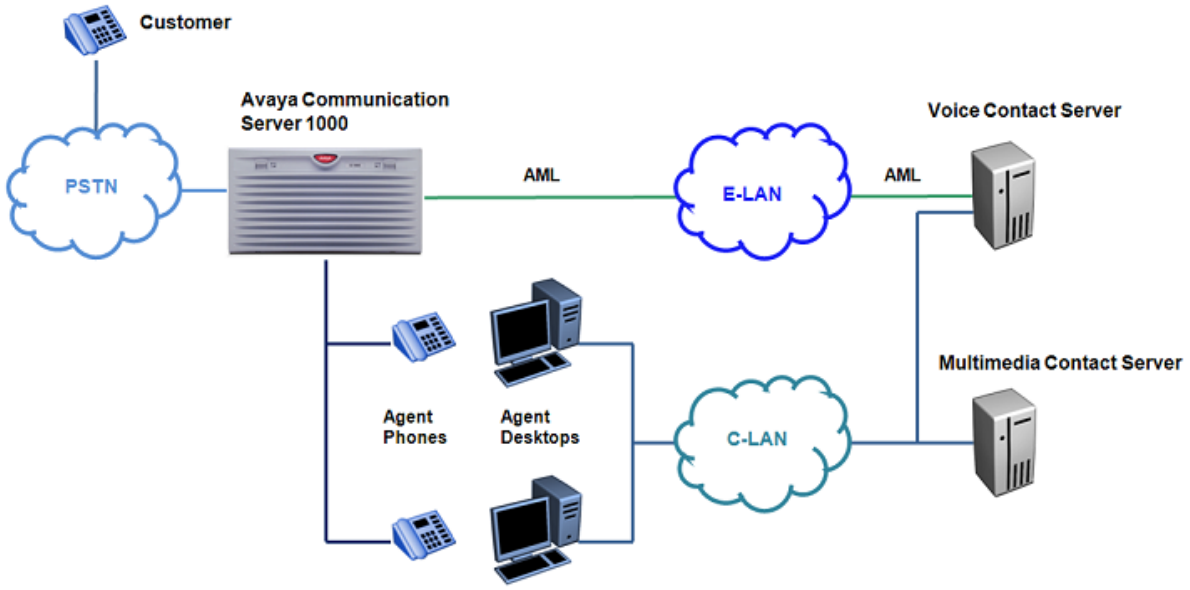


Figure 4: Example of a typical Avaya Communication Server 1000 AML-based contact center

CDNs and SIP Route Points

In an AML-based contact center, a Controlled Directory Number (CDN) and the associated agents are configured on the Avaya Communication Server 1000 Call Server. A CDN is a special directory number used to queue calls arriving at an Avaya Communication Server 1000 (CS 1000). Contact Center Manager Server (CCMS) controls the CS 1000 CDNs. Use Contact Center Manager Administration (CCMA) to configure which CS 1000 CDNs the CCMS server controls. When CCMS starts up, it acquires the configured CS 1000 CDNs. When a customer call arrives at an acquired CDN, CS 1000 notifies CCMS and waits for routing instructions. The CCMS Task Flow Executor component uses Orchestration Designer flow applications to control, treat, and route the CDN customer call.

SIP-enabled contact centers do not support CDNs. The SIP Route Point is on the CCMS server and not on the PABX or switch. In a SIP-enabled contact center, the CCMS SIP Gateway Manager (SGM) component emulates and controls the SIP Route Points. SIP Route Points are configured in Contact Center Manager Administration using a Uniform Resource Identifier (URI), for example sip:60000@siptraffic.com. When a customer call arrives at a Route Point, the CCMS Task Flow Executor (TFE) component uses Orchestration Designer flow applications to control, treat, and route that Route Point customer call.

The CDNs used in AML-based solutions and the Route Points used in SIP-enabled solutions perform the same role. They are both logical addresses used by Avaya Aura® Contact Center to accept incoming voice contacts or as a point to which voice contacts are routed. They both enable Avaya Aura® Contact Center to control, queue, treat, and route customer contacts. They are both configured in Contact Center Manager Administration and associated with an application in Orchestration Designer.

Avaya Aura® Contact Center also supports Open Queue Route Points. These Route Point identifiers are used as the entry points for multimedia contacts. Open Queue Route Points are configured in Contact Center Manager Administration.

Contact Center Multimedia components

Contact Center Multimedia is part of the Contact Center Manager suite of applications. Contact Center Multimedia provides outbound, email, and Web communication features for the contact center.

Contact Center Multimedia consists of the following components:

- Contact Center Multimedia database—This component is installed on the Contact Center Multimedia server and is an InterSystems Caché database that stores all contact center activity. All incoming email, Web requests, and associated responses are stored in a structured format within the database. Information about Outbound campaigns are also stored in this database.
- Email Manager—This component is installed on the Contact Center Multimedia server. The Email Manager connects to the email server at regular intervals. During each connection, all configured mailboxes are accessed. Email from the customer is read from the email server, processed, and stored in the database. Outgoing email, generated from the email responses stored in the database, is sent to the email server.
- Outbound Campaign Management Tool—This component is installed on the Contact Center Multimedia server and is accessed using the Contact Center Manager Administration application. The Outbound Campaign Management Tool is used to create, modify, and monitor outbound campaigns. An outbound campaign is a series of outbound calls for one specific purpose, for example, a customer survey, or a sales promotion. Use the Outbound Campaign Management Tool for the following activities:
    - define campaign parameters
    - import and review call data
    - create agent call scripts
    - monitor campaign results
    - export campaign data

The Contact Center Manager Administration report tool provides information about agent and skillset states in real-time displays and historical reports.

- Web communications—The Web communications component includes a set of Web Services on the Contact Center Multimedia server for communication between the agent and the customer. A set of sample Web pages are installed on the Contact Center Web site showing how Web Services are used to implement Web pages to provide Web Chat (click to chat) and Scheduled Callback (click to talk) features.
- Agent Desktop interface—This component is installed on the Contact Center Multimedia server. Agents use Internet Explorer to connect to the Contact Center Multimedia server to retrieve the Agent Desktop interface. The Communication Control Toolkit pushes email, Web requests, outbound contacts, and voice calls to the Agent Desktop interface. The Agent Desktop interface uses Web services to retrieve email, Web requests, outbound campaign information, and customer details and history from the Contact Center Multimedia database. Web services are also used to send email replies and save outbound call details in the Contact Center Multimedia database.

  Email contacts are presented to agents through the Agent Desktop interface, where agents can;

  - verify customer information
  - access historical email to and from the customer
  - create responses to customer inquiries
  - provide a closed reason (if configured)

  When an outbound campaign is running, contacts are presented to agents through the Agent Desktop interface, where the agents can;

  - preview contact information
  - review call scripts (if configured)
  - save scripts
  - select a disposition code
- Contact Center Multimedia Administrator—This component is installed on the Contact Center Multimedia server. The Contact Center Manager Administration provides administrative and management capabilities.

Multimedia contacts processing

Contact Center Multimedia receives multimedia contacts through two external interface points: the email server and the External Web server.

Email server contacts

Email server contacts are retrieved from a POP3 capable email server using the Inbound Message Handler (IMH). The IMH runs at regular intervals. You can configure the settings for

the IMH (such as the time between intervals and the number of email retrieved from each mailbox during each run) through the Contact Center Manager Administration.

The IMH logs on to the mailboxes on the email server as listed in the Email Manager. It parses email in the mailboxes and stores them in the Contact Center Multimedia database. Any attachments associated with an email are stored in the Inbound attachment folder, as specified in the Contact Center Manager Administration. After an email is successfully stored in the Contact Center Multimedia database, it is deleted from the email server.

The IMH passes a received email to the Contact Center Multimedia rules engine, which applies rules relevant to the email based on the To address, and invokes the Outbound Message Handler (OMH) to send automatic responses, if any.

External Web server transactions

Contact Center Multimedia receives contacts from the External Web server through the Contact Center Multimedia Web services. The Web services provide a Java API. This enables contacts to be written into the Contact Center Multimedia database, retrieved from the database, and have their status queried.

Contacts received through the Web services do not pass through the Rules Engine. The External Web server determines the skillset and priority assigned to the contact.

A set of sample pages is distributed with Contact Center Multimedia to provide Java Server Pages (JSP) script examples of how a Web server can access the Web services. You must create your own Web pages, with customized look, feel, and business logic.

Integration with Contact Center Manager Server

The Contact Center Multimedia system is integrated directly with Contact Center Manager Server through the OAM interface and through Open Queue. The OAM interface enables Contact Center Multimedia to access the information in Contact Center Manager Server about configured agents, supervisors, skillsets, and mapping these users to skillsets.

Contact Center Manager Server supports Open Queue. Contact Center Manager Server processes Open Queue contacts at a rate of 20 contacts per second. This ensures Contact Center Manager Server does not get overloaded.

Contact Center client components

The Contact Center client components consist of the following components:

- Contact Center Manager Client—Client PCs used to administer the server and to monitor contact center performance using a browser-based interface. The number of these computers is usually proportional to the number of agents in the contact center.
- Avaya Aura® Agent Desktop—Agent Desktop is a single-interface client application used by contact center agents to interact with customers. Agent Desktop agents can respond to customer contacts through a variety of media, including phone, outbound contacts,

email, Web communication, Fax messages, voice mail messages, scanned documents, SMS text messages, and instant messaging.

Chapter 4: Supported solutions

This section provides information about Avaya Aura® Contact Center application deployment strategies, migration procedures, and functionality.

Supported deployment types

Avaya Aura® Contact Center supports the following platforms and solution deployment types:

- SIP-enabled Avaya Aura® Unified Communications platform based contact center.
- AML-based Avaya Communication Server 1000 contact center. Application Module Link (AML) is an internal protocol used by Avaya Aura® Contact Center to communicate directly with Avaya Communication Server 1000 (CS 1000).
- Multimedia complement to an Avaya Aura® Call Center Elite voice-based call center. Install this server to add multimedia contact routing support to a new or existing Avaya Aura® Call Center Elite voice-based solution. This server supports contact routing for web communications, fax messages, SMS text messaging, and email messages, with additional support for peer-to-peer Instant Messaging (IM).
- No Switch Configured based contact center. Select this option when installing Avaya Aura® Contact Center to support only multimedia contacts. Install this server type when there is no existing voice-based call center, or when integration with a voice contact center is not required.
- Avaya Aura® Contact Center Knowledge Worker solution for AML-based Avaya Communication Server 1000. Install this server to provide Computer-Telephony Integration (CTI) functionality and call data handling capabilities. Knowledge Worker solutions support only voice calls, they do not support multimedia contacts. Knowledge Worker solutions do not support routed voice contacts or skill-based routing.

Important:

Avaya Aura® Contact Center Release 6.3 does not support Avaya Communication Server 1000 SIP-enabled contact center for new installations.

Installation configurations

The Avaya Aura® Contact Center DVD installer supports a range of server types. Each server type installs a combination of Avaya Aura® Contact Center applications suitable for a specific contact center function.

The following table lists the server types supported by each voice platform:

Voice platform	Server type	Components
SIP-enabled Avaya Aura® Unified Communications platform	Voice and Multimedia Contact Server without Avaya Media Server	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia
	Voice and Multimedia Contact Server with Avaya Media Server	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia • Avaya Media Server Windows version
	Voice Contact Server Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit
	Multimedia Contact Server Only	• Contact Center Multimedia

Voice platform	Server type	Components
	Avaya Media Server on Linux	• Avaya Media Server on Linux
AML-based Avaya Communication Server 1000	Voice and Multimedia Contact Server	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia
	Voice Contact Server Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit
	Multimedia Contact Server Only	• Contact Center Multimedia
	Knowledge Worker Server Only	• Communication Control Toolkit Knowledge Worker version • Contact Center License Manager
Avaya Aura® Call Center Elite	AACC Multimedia Complement for Elite	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia
No voice platform	No Switch Configured Multimedia Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility

Voice platform	Server type	Components
		• Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia • Avaya Media Server Windows version
All voice platform types	Network Control Center Server Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Administration
All voice platform types	Security Framework Server	• Security Framework

Select the server types appropriate for your voice platform, required features, and required maximum agent count. Avaya Aura® Contact Center High Availability support requires additional Contact Center servers.

Each Avaya Aura® Contact Center server type requires one server. Avaya Aura® Contact Center server types are not supported co-resident with each other on the same server.

Installation configurations for Avaya Aura® Unified Communications platform

The following table lists the Avaya Aura® Contact Center server types supported with the Avaya Aura® Unified Communications platform:

Server type	Components
Voice and Multimedia Contact Server without Avaya Media Server	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia
Voice and Multimedia Contact Server with Avaya Media Server	• Contact Center Manager Server • Contact Center License Manager

Server type	Components
	• Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia • Avaya Media Server Windows version
Voice Contact Server Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit
Multimedia Contact Server Only	• Contact Center Multimedia
Avaya Media Server on Linux	• Avaya Media Server on Linux
Network Control Center Server Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Administration
Security Framework Server	• Security Framework

Each SIP-enabled Avaya Aura® Unified Communications platform contact center solution must contain the following:

- One Voice and Multimedia Contact Server with Avaya Media Server. This server type is suitable for small to medium contact centers not using High Availability. [Requires one Contact Center Windows server.]

  OR

- One Voice and Multimedia Contact Server without Avaya Media Server and one or more Avaya Media Server on Linux servers. These server types are suitable for small to medium contact centers not currently using High Availability. [Requires one Contact Center Windows server, and one or more Contact Center Linux servers.]

  OR

- Two Voice and Multimedia Contact Servers without Avaya Media Server and two or more Avaya Media Server on Linux servers. These server types are suitable for small to medium contact centers using High Availability. [Requires two Contact Center Windows servers, and two or more Contact Center Linux servers.]

  OR

- One Voice Contact Server, one Multimedia Contact Server, and one or more Avaya Media Server on Linux servers. These server types are suitable for large contact centers not currently using High Availability. [Requires two Contact Center Windows servers, and one or more Contact Center Linux servers.]

  OR

- Two Voice Contact Servers, two Multimedia Contact Servers, and two or more Avaya Media Server on Linux servers. These server types are suitable for large contact centers using High Availability. [Requires four Contact Center Windows servers, and two or more Contact Center Linux servers.]

The following server types are optional:

- Optional Network Control Center Server Only. [Requires one Contact Center Windows server.]
- Optional Security Framework Server. [Requires one Contact Center Windows server.]

Installation configurations for Avaya Communication Server 1000 platform

The following table lists the Avaya Aura® Contact Center server types supported with the Avaya Communication Server 1000 platform:

Server type	Components
Voice and Multimedia Contact Server	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia
Voice Contact Server Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit
Multimedia Contact Server Only	• Contact Center Multimedia

Server type	Components
Knowledge Worker Server Only	• Communication Control Toolkit Knowledge Worker version • Contact Center License Manager
Network Control Center Server Only	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Administration
Security Framework Server	• Security Framework

Each AML-based Avaya Communication Server 1000 platform contact center solution must contain the following:

- One Voice and Multimedia Contact Server. This server type is suitable for small to medium contact centers not currently using High Availability. [Requires one Contact Center Windows server.]

  OR

- Two Voice and Multimedia Contact Servers. These server types are suitable for small to medium contact centers using High Availability. [Requires two Contact Center Windows servers.]

  OR

- One Voice Contact Server and one Multimedia Contact Server. These server types are suitable for large contact centers not currently using High Availability. [Requires two Contact Center Windows servers.]

  OR

- Two Voice Contact Servers and two Multimedia Contact Servers. These server types are suitable for large contact centers using High Availability. [Requires four Contact Center Windows servers.]

The following supported server types are optional:

- Optional Network Control Center Server Only. [Requires one Contact Center Windows server.]
- Optional Security Framework Server. [Requires one Contact Center Windows server.]

For AML-based Avaya Communication Server 1000 platform knowledge worker solutions (non contact center solutions), use the following:

- One Knowledge Worker Server Only. [Requires one Contact Center Windows server.]

Installation configurations for Avaya Aura® Call Center Elite

The following table lists the Avaya Aura® Contact Center server types supported with Avaya Aura® Call Center Elite:

Server type	Components
AACC Multimedia Complement for Elite	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility • Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia

Each Avaya Aura® Call Center Elite Multimedia Complement contact center solution must contain the following:

- One AACC Multimedia Complement for Elite server. This server type is suitable for multimedia only contact centers not using High Availability. [Requires one Contact Center Windows server.]

  OR

- Two AACC Multimedia Complement for Elite servers. These server types are suitable for multimedia only contact centers using High Availability. [Requires two Contact Center Windows servers.]

Installation configurations for Multimedia only

The following table lists the Avaya Aura® Contact Center server types supported when there is no voice platform, No Switch Configured:

Server type	Components
No Switch Configured- Voice and Multimedia Contact Server	• Contact Center Manager Server • Contact Center License Manager • Contact Center Manager Server Utility

Server type	Components
	• Contact Center Manager Administration • Communication Control Toolkit • Contact Center Multimedia • Avaya Media Server Windows version

Each multimedia only contact center solution must contain the following:

- One No Switch Configured - Voice and Multimedia Contact Server. This server type is suitable for multimedia only contact centers not using High Availability. [Requires one Contact Center Windows server.]

  OR

- Two No Switch Configured - Voice and Multimedia Contact Servers. These server types are suitable for multimedia only contact centers using High Availability. You must uninstall Avaya Media Server software from both servers before enabling High Availability. [Requires two Contact Center Windows servers.]

Supported migration options

You can migrate the information from previous versions of Avaya NES Contact Center and Avaya Aura® Contact Center to the new Avaya Aura® Contact Center Release 6.3 server types by using software migration procedures. Migration procedures move all historical, statistical, and configuration information from a previous release of Contact Center to the new release of Contact Center.

The following contact center components and servers can migrate to a Voice and Multimedia Contact Server without Avaya Media Server:

- Migrate data from an existing Release 6.2 co-resident server with Contact Center Manager Server, Contact Center Manager Administration, Communication Control Toolkit, and Contact Center Multimedia to a new Avaya Aura® Contact Center Voice and Multimedia Contact Server without Avaya Media Server Release 6.3.
- Migrate data from an existing Release 6.2 Contact Center Manager Server server, Contact Center Manager Administration server, Communication Control Toolkit server, and Contact Center Multimedia server to one new Avaya Aura® Contact Center Voice and Multimedia Contact Server without Avaya Media Server Release 6.3.

- Migrate data from Avaya NES Contact Center 6.0 or 7.0 to one new Voice and Multimedia Contact Server without Avaya Media Server Release 6.3.
- Migrate a Release 6.3 Voice and Multimedia Contact Server without Avaya Media Server to a new server. For example, to move Voice and Multimedia Contact Server without Avaya Media Server software from one server to a new larger and faster server.

The following contact center components and servers can migrate to a Voice Contact Server:

- Migrate data from an existing Release 6.2 co-resident server with Contact Center Manager Server, Contact Center Manager Administration, and Communication Control Toolkit to a new Avaya Aura® Contact Center Voice Contact Server Release 6.3.
- Migrate data from an existing Release 6.2 Contact Center Manager Server server, Contact Center Manager Administration server, and Communication Control Toolkit server to one new Avaya Aura® Contact Center Voice Contact Server Release 6.3.
- Migrate data from Avaya NES Contact Center 6.0 or 7.0 to one new Release 6.3 Voice Contact Server.
- Migrate a Release 6.3 Voice Contact Server to a new server. For example, to move Voice Contact Server software from one server to a new larger and faster server.

The following contact center components and servers can migrate to a Multimedia Contact Server:

- Migrate data from an existing Release 6.2 Contact Center Multimedia server to one new Avaya Aura® Contact Center Multimedia Contact Server Release 6.3.
- Migrate data from Avaya NES Contact Center 6.0 or 7.0 to one new Multimedia Contact Server Release 6.3.
- Migrate a Release 6.3 Multimedia Contact Server to a new server. For example, to move Multimedia Contact Server software from one server to a new larger and faster server.

The following contact center components and servers can migrate to a Voice and Multimedia Contact Server with Avaya Media Server:

- Migrate data from an existing Release 6.2 single-server with Contact Center Manager Server, Contact Center Manager Administration, Communication Control Toolkit, Contact Center Multimedia and Avaya Media Server to a new Avaya Aura® Contact Center Voice and Multimedia Contact Server with Avaya Media Server Release 6.3.
- Migrate data from an existing Release 6.2 Contact Center Manager Server server, Contact Center Manager Administration server, Communication Control Toolkit server, Contact Center Multimedia server, and Avaya Media Server server to one new Avaya Aura® Contact Center Voice and Multimedia Contact Server with Avaya Media Server Release 6.3.
- Migrate a Release 6.3 Voice and Multimedia Contact Server with Avaya Media Server to a new server. For example, to move Voice and Multimedia Contact Server with Avaya Media Server software from one server to a new larger and faster server.

The following contact center components can migrate to an Avaya Aura® Contact Center Multimedia Complement for Elite Server:

- Migrate a Release 6.3 Multimedia Complement for Elite Server to a new server. For example, to move Multimedia Complement for Elite Server software from one server to a new larger and faster server.

The following contact center components can migrate to an Avaya Aura® Contact Center No Switch Configured Multimedia Only Server:

- Migrate a Release 6.3 No Switch Configured Multimedia Only Server to a new server. For example, to move No Switch Configured Multimedia Only Server software from one server to a new larger and faster server.

The following contact center components or servers can migrate to an Avaya Aura® Contact Center Knowledge Worker Server:

- Migrate data from an existing Communication Control Toolkit Knowledge Worker server to a new Avaya Aura® Contact Center Knowledge Worker Server.
- Migrate data from an Avaya NES Contact Center 6.0 or 7.0 Communication Control Toolkit Knowledge Worker server to an Avaya Aura® Contact Center Knowledge Worker Server.
- Migrate a Release 6.3 Avaya Aura® Contact Center Knowledge Worker Server to a new server. For example, to move Knowledge Worker Server software from one server to a new larger and faster server.

The following contact center components or servers can migrate to an Avaya Aura® Contact Center Network Control Center Server:

- Migrate data from an existing Network Control Center Server to a new Avaya Aura® Contact Center Network Control Center Server.
- Migrate data from an Avaya NES Contact Center 6.0 or 7.0 Network Control Center server to an Avaya Aura® Contact Center Network Control Center Server.
- Migrate a Release 6.3 Avaya Aura® Contact Center Network Control Center Server to a new server. For example, to move Network Control Center Server software from one server to a new larger and faster server.

The following Avaya Media Server migrations are supported:

- Avaya Media Server on Windows to Avaya Media Server on Windows
- Avaya Media Server on Linux to Avaya Media Server on Linux

Migrating Avaya Media Server from Windows to Linux is not supported. Migrating Avaya Media Server from Linux to Windows is not supported.

Migrations can occur only on the same switch types. Migrating Avaya Aura® Contact Center from Avaya Communication Server 1000 to Avaya Aura® Unified Communications platform is

not supported. Migrating Avaya Aura® Contact Center from Avaya Aura® Unified Communications platform to Avaya Communication Server 1000 is not supported.

Important:

When you migrate configuration information from the old server to the new server, do not run the two application servers simultaneously. Both applications are configured the same, so they attempt to access and control the same resources. Continuing to run the old applications in the Contact Center can result in unpredictable behavior.

Co-resident upgrade procedures

The Contact Center migration procedure requires that you migrate all existing co-resident applications at the same time.

Security Framework deployments

If you plan to use a single security domain for single-sign on for multiple applications in your network, you must determine and configure all applications to access the primary security server. The following list describes where to host the primary security server based on the deployed applications:

- Avaya Communication Server 1000 Release 7.0.

  If the Avaya Communication Server 1000 Release 7.0 application is on your network, it must host the primary security server.

- Contact Center — Security Framework Server

For example, if your network uses Avaya Communication Server 1000 and you want to enable the single-sign on feature for all applications including Contact Center you must configure Avaya Communication Server 1000 Release 7.0 to host the primary security server, or security domain in your network.

If you do not want to configure your application as part of the single security domain, follow the documentation for your specific application to configure the security server for the application.

If you configure a backup security server in your network configuration, use the same configuration as described for the primary security application.

Application start order

Due to the multiple component configuration of most contact centers, it is important to note the start order of the components. Contact Center Manager Server is the main component. It must be running first, before Contact Center Manager Administration, Contact Center Multimedia, and Communication Control Toolkit can communicate with it.

Contact Center Manager Administration administers the Contact Center Manager Server and the Contact Center Multimedia, so it is the last component that is required to be running.

No dependency exists between Contact Center Multimedia and Communication Control Toolkit in terms of startup sequence.

Communication Control Toolkit cannot work until Contact Center Manager Server is working. If Communication Control Toolkit starts first, it repeatedly attempts to connect to Contact Center Manager Server. After Contact Center Manager Server starts and is working, Communication Control Toolkit connects to it and starts working.

Platform Vendor Independence checking utility

To check whether a proposed server meets the basic requirements for Platform Vendor Independence, the Contact Center Installer runs a Platform Vendor Independence utility before the software is installed. The Platform Vendor Independence utility generates warnings and suggestions when the proposed server does not satisfy the minimum or suggested requirement.

If major problems are detected, the Platform Vendor Independence utility reports a Fail message. The installation cannot proceed until you fix the problems.

Use the Platform Vendor Independence utility in conjunction with the guidelines stated in this document.

The Platform Vendor Independence utility is included in the Contact Center product installation DVD. The utility runs automatically before the software is installed to verify the system.

Chapter 5: Product Compatibility

This section provides information about product compatibility with Avaya Aura® Contact Center and differences between supported telephony switches.

Avaya Aura® Unified Communications platform

Contact Center uses industry-standard SIP and CSTA (TR/87 over SIP) interfaces to communicate with SIP-enabled systems such as the Unified Communications platform. Integrating Contact Center with the Avaya Aura® Unified Communications platform using SIP infrastructure supports communication between customers and contact center agents. This integration gives Contact Center access to and control of Avaya Aura® Unified Communications phones. The Avaya Aura® Unified Communications platform benefits from Contact Center skill-based routing, call treatments, reporting, and the graphical Orchestration Designer. Avaya Aura® Agent Desktop supports Avaya Aura® Unified Communications phones and continues to support voice, email, and Web chat contact types.

Avaya Aura® Contact Center supports the following Avaya Aura® Unified Communications components:

Avaya Aura® component	Release
Standalone Avaya Aura® Communication Manager	6.0.1
Standalone Avaya Aura® System Manager	6.1
Standalone Avaya Aura® Session Manager	6.1
Standalone Avaya Aura® Application Enablement Services	6.1.0.20
Standalone Avaya Aura® Communication Manager	6.2-02.0.823.0
Standalone Avaya Aura® System Manager	6.2.12.0
Standalone Avaya Aura® Session Manager	6.2.0.0.620120
Standalone Avaya Aura® Application Enablement Services	6.1.2.0.32
Standalone Avaya Aura® Communication Manager	6.2-02.0.823.0
Standalone Avaya Aura® System Manager	6.2.12.0
Standalone Avaya Aura® Session Manager	6.2.0.0.620120

Avaya Aura® component	Release
Standalone Avaya Aura® Application Enablement Services	6.2
Avaya Aura® Solution for Midsize Enterprise	6.1
Midsize Enterprise Communication Manager	6.0.1
Midsize Enterprise Session Manager	6.1
Midsize Enterprise Application Enablement Services	6.1.0.20
Avaya Aura® Solution for Midsize Enterprise	6.2.0.0.3105
Avaya Aura® Solution for Midsize Enterprise Communication Manager	6.2-02.0.823.0
Avaya Aura® Solution for Midsize Enterprise Session Manager	6.2.0.0.620120
Avaya Aura® Solution for Midsize Enterprise Application Enablement Services	6.1.2.0.32
Avaya Aura® Unified Communications Virtualized Environment (VE)	6.2 FP1

Important:

PABX products and other products in your solution follow independent life cycle dates. Depending on their life cycle state, full support may not be available on older versions of these products. In a case where Avaya Aura® Contact Center patches require a dependent patch on the PABX, that patch may not be available on an old switch release that is in End of Manufacture Support life cycle state. Please refer to life cycle bulletins specific to the products and versions in your solution.

Important:

Avaya Aura® Contact Center Release 6.3 does not support the Avaya Aura® Midsize Business Template (MBT) or Avaya Aura® Unified Communications Release 5.2 platforms for new installations. Existing Avaya Aura® Contact Center solutions using MBT or Avaya Aura® 5.2 may be expanded or upgraded.

Avaya Aura® Contact Center supports the following Avaya Aura® Call Center Elite releases:

Platform	Supported Releases	Concurrent voice agents	Concurrent multimedia agents
Avaya Aura® Call Center Elite	3.x , 4, 5.x , 6.0.1, 6.2	Per Avaya Aura® Call Center Elite on Communication Manager release limit.	3000

For more information about integrating Contact Center with the Avaya Aura® Unified Communications platform and the required patch levels for each component, see *Avaya Aura®*

Contact Center Configuration – Avaya Aura® Unified Communications Platform Integration (NN44400-521).

Avaya Aura® Unified Communications phones

Avaya Aura® Contact Center supports the following H.323 phones:

- Avaya 1600 Series IP deskphones
- Avaya 4600 Series IP deskphones
- Avaya 9600 Series IP deskphones
- Avaya 96x1 Series IP deskphones
- Avaya one-X® Communicator Release 5.2 or later
- Avaya Aura® Agent Desktop embedded softphone. Ensure you provision an IP_Agent license on the Communication Manager for each softphone used by the contact center.

Avaya Aura® Contact Center supports the following digital phones:

- Avaya 24xx Series deskphones
- Avaya 64xx Series deskphones

Avaya Aura® Contact Center supports the following SIP phones:

- Avaya 96x0 Series IP deskphones
- Avaya 96x1 Series IP deskphones
- Avaya 9608 IP deskphone
- Avaya 9611G IP deskphone
- Avaya 9621G IP deskphone
- Avaya 9641G IP deskphone

Avaya Aura® Contact Center supports SIP phones for DTMF functionality. Avaya Aura® Contact Center supports SIP phones for High Availability functionality.

Avaya Aura® Agent Desktop supports three voice modes; Desk Phone, My Computer (softphone), Other Phone (Telecommuter mode).

- For each Agent Desktop agent, supervisor, or agent supervisor using My Computer (softphone) or Other Phone (Telecommuter mode), provision one IP_Agent license on the Communication Manager.
- For each Agent Desktop agent, supervisor, or agent supervisor using Desk Phone mode, the corresponding Communication Manager station consumes one IP_Phone license.
- Agent Desktop agents or agent supervisors that handle only multimedia contacts do not require Communication Manager licenses.

Avaya Communication Server 1000

Avaya Aura® Contact Center supports the Avaya Communication Server 1000 telephone switching platform.

Avaya Aura® Contact Center supports for the following Avaya Communication Server 1000 AML-based switches:

AML-based switch	Supported versions
Avaya Communication Server 1000 E	7.0, 7.5, 7.6
Avaya Communication Server 1000 E SA Co-res	7.0, 7.5, 7.6
Avaya Communication Server 1000 E SA	7.0, 7.5, 7.6
Avaya Communication Server 1000 E HA	7.0, 7.5, 7.6
Avaya Communication Server 1000 M Single Group	7.0, 7.5, 7.6
Avaya Communication Server 1000 M Multi Group	7.0, 7.5, 7.6
Avaya Communication Server PBX 11C - Chassis	7.0, 7.5, 7.6
Avaya Communication Server PBX 11C - Cabinet	7.0, 7.5, 7.6
Avaya Communication Server PBX 61C	7.0, 7.5, 7.6
Avaya Communication Server PBX 51C	7.0, 7.5, 7.6
Avaya Communication Server PBX 81C	7.0, 7.5, 7.6

Important:

PABX products and other products in your solution follow independent life cycle dates. Depending on their life cycle state, full support may not be available on older versions of these products. In a case where Avaya Aura® Contact Center patches require a dependent patch on the PABX, that patch may not be available on an old switch release that is in End of Manufacture Support life cycle state. Please refer to life cycle bulletins specific to the products and versions in your solution.

Important:

Avaya Communication Server 1000 Release 7.0 is End of Manufacture Support for Software (EoMS).

Important:

Existing Avaya Aura® Contact Center installations with Avaya Communication Server 1000 Release 5.0, 5.5, or 6.0 are supported; however new Avaya Aura® Contact Center Release

6.3 orders support only Avaya Communication Server 1000 Release 7.0, Release 7.5, and Release 7.6.

Important:

Avaya Aura® Contact Center Release 6.3 does not support SIP-enabled Avaya Communication Server 1000 for new installations. Existing SIP-enabled Avaya Communication Server 1000 contact center installations may be expanded or upgraded.

For more information about the Avaya Communication Server 1000 AML-based switch, see *Avaya Aura® Contact Center Configuration – Avaya CS1000 Integration* (NN44400-512).

Engineer the Avaya Communication Server 1000 PABX so it can support Contact Center, in particular engineer PABX resources to support the required agent numbers and call volume. For more information, see Communication Server 1000M Large System Planning and Engineering (NN43021-220) and Communication Server 1000E Planning and Engineering (NN43041-220).

The Avaya Communication Server 1000 Home Location Code (HLOC) cannot exceed 3999. For more information about configuring HLOC, see *Avaya Aura® Contact Center Configuration – Avaya CS1000 Integration* (NN44400-512).

Avaya Communication Server 1000 packages and patches

The following Avaya Communication Server 1000 packages are required in SIP-enabled solutions using an Avaya Communication Server 1000.

CS 1000 packages: 77, 153, 164, 242, 243, 324, 41, 42, 43, 50, 114, 155, 214, 215, 218, 247, 311, 324

The following Avaya Communication Server 1000 patches are required in SIP-enabled solutions using an Avaya Communication Server 1000 Release 5.0, 5.5, or 6.0. These patches are not required in SIP-enabled solutions using Avaya Communication Server 1000 Release 7.0, 7.5 or 7.6.

CS 1000 Patch	Comment
MPLR29656	Required for call control and reporting
MPLR28954	Required for TR87 control on CS 1000 Release 6.0 only
MPLR28884	Required to fix one-way speech path on SIP REFER
MPLR27991	Required to fix SIP REFER issue on Signaling Server
MPLR29656	Required to get correct cause for OriginatedEvent only when using CS 1000 Release 5.5

Avaya Communication Server 1000 phones

Contact Center Manager Server supports the following Avaya Communication Server 1000 phones:

- Avaya 39xx Digital Deskphone
  - Avaya 3904 Digital Deskphone
  - Avaya 3905 Digital Deskphone
- IP phones and Softphones
  - Avaya 1120E IP Deskphone
  - Avaya 1140E IP Deskphone
  - Avaya 1150E IP Deskphone
  - Avaya 1200 Series IP Deskphone
  - Avaya 2002 IP Deskphone
  - Avaya 2004 IP Deskphone
  - Avaya 2007 IP Deskphone
  - Avaya 2050 IP Softphone

The following conditions apply:

- Support of specific types of phones can change with each software release of the call server (Avaya Communication Server 1000). Consult the Avaya Communication Server 1000 documents for an up-to-date list of supported phone types for the software release in use.

Avaya Communication Server 1000 AML features

Avaya Aura® Contact Center supports AML-based Avaya Communication Server 1000 switches.

The following table outlines the features supported by the Avaya Communication Server 1000 AML-based switches. Application Module Link (AML) is an internal protocol used by Avaya Aura® Contact Center to communicate directly with Avaya Communication Server 1000.

Table 1: Avaya Communication Server 1000 AML-based features

Feature	Avaya Communication Server 1000 (AML)
Agent features	
Agent logon location	The agent can log on at any ACD phone.
Length of Agent ID	4 to 16 digits

Feature	Avaya Communication Server 1000 (AML)
Validation of agent login	Contact Center Manager validates agent login.
Agent non-ACD DN	Personal DN follows agent (FWD)
Call presentation features	Contact Center Manager phone Union Break Time, Call Forcing, Alternate Call Answer, Host Delay Time for each agent
Walkaway trigger	Headset removal
Phone features	
Conference	6-way Conference
Transfer and conference	Separate transfer, conference, simple
Entry/reporting of activity (Line of Business) code	Supported
Blind transfer to CDN	Supported
Agent transfer/ conference from InCalls to second agent InCalls key	Not applicable
Completion of transfer while far end is ringing (including blind transfers)	If the far end address is out-of-provider (not monitored by CCT), the remote connection state transitions immediately from the Alerting state to Established.
Telephone switch resource features	
Telephone switch interface	AML connection
Number of digits for CDN	15
Number of characters for CDN URI	Not applicable
Number of digits for DNIS	7
Number of characters for DNIS URI	Not applicable
Number of digits for agent ID	5
Number of digits for activity (Line of Business) code	3 to 32
Trunk and route statistics and displays	Supported
Synchronization of deleted resources	Reported by telephone switch
Monitoring of link status	Telephone switch brings down link after 20 non response calls
Handling of resources upon link failure	Retained
Recovery after link failure	Issues call release messages

Feature	Avaya Communication Server 1000 (AML)
Order of call presentation	Telephone switch alternates Contact Center Manager CDN and NACD ACD calls
Treatments	
IVR	Supports integrated IVR with Avaya CallPilot®
Caller-entered data for external IVR	Not supported
Give IVR script command	Supported
IVR statistics, displays	Supported
RAN	Supported
Controlled option for treatments	Supported. Return to CDN without answer supervision.
Automatic ringback	Supported
Automatic treatment resumption	Supported
Networking features	
Ability to network multiple Contact Center Manager Servers	Supported
Networking statistics and displays	Supported
Other features	
Call information	Directly supports call information (for example, CLID, DNIS, trunk, NPA)
Hardware dongle	Not required
Call ID reuse	Depends on telephone switch configuration
Language support	Multilanguage support
Reporting of internal and external DN calls	Reported separately
Trigger for pegging of outgoing DN call	Call connection
ACD and NACD calls	Reported separately
Taking skillsets out of service manually	Not applicable
Emergency key	Supported

Product compatibility

This section describes product compatibility with Avaya Aura® Contact Center.

Voice services: Avaya Aura® Experience Portal, Avaya CallPilot® and Avaya MPS

The following table lists Avaya products and versions that are compatible with Contact Center.

Table 2: Contact Center voice services product compatibility

Product name	Supported releases
Avaya IVR-CTI Integration server (MPS)	3.5
Avaya Agent Greeting	3.0X and later (for CS 1000 AML only.) (On SIP-enabled Contact Center, Agent Greeting is an integrated feature.)
Avaya Voice Portal	5.1 and later
Avaya Aura® Experience Portal	6.0
Avaya CallPilot®	5.0 SU 11 and later
Avaya MPS 500	3.5
IRA (formally MIRAN)	2.0, 3.0
Avaya MPS 1000	3.5
Avaya Media Server (SIP-enabled contact center)	7.5
IP Media Services (IP RAN and music on CS 1000)	Avaya Media Server 7.0 or later
Remote Agent Observe	(Avaya Communication Server 1000 AML only)

Avaya CallPilot® and Avaya MPS are not supported in a SIP-enabled Contact Center. For the SIP-enabled Contact Center the Avaya Media Server component provides media services.

Other product release compatibility

The following table lists other products supported with Contact Center Manager Server and Avaya Communication Server 1000.

Table 3: Product compatibility with Contact Center

Product name	Supported releases
Remote Office 9150	1.3.4

Product name	Supported releases
Remote Office 9110, 9110, IP adapter	1.3.4

For Remote Office, the switch release determines which product version is relevant.

Avaya Aura® Experience Portal

Avaya Aura® Experience Portal is an open standards-based self-service software platform which offers industry leading reliability and scalability to help reduce costs and simplify operations.

Avaya Aura® Experience Portal software is deployed on standard Linux servers and it supports integration with SIP-enabled systems, including Avaya Aura® Communication Manager and Avaya Aura® Contact Center.

The Avaya Aura® Experience Portal system consists of an Experience Portal Manager (EPM), which controls the Experience Portal system and Media Processing Platform (MPP) servers, which process all calls. The Experience Portal system typically includes an Automatic Speech Recognition (ASR) server, Text-to-Speech (TTS) speech servers, and application servers.

Avaya Aura® Contact Center supports the following types of integration with Avaya Aura® Experience Portal:

- Front-end Avaya Aura® Experience Portal with SIP-enabled Contact Center
- Back-end Avaya Aura® Experience Portal with SIP-enabled Contact Center using SIP header information
- Back-end Avaya Aura® Experience Portal with SIP-enabled Contact Center using Context Creation
- Front-end Avaya Aura® Experience Portal with Contact Center - Web Service Open Interfaces

In a front-end Avaya Aura® Experience Portal integration, the customer call is processed first by Avaya Aura® Experience Portal and then by Avaya Aura® Contact Center. In a back-end Avaya Aura® Experience Portal integration, the customer call is processed first by Avaya Aura® Contact Center and then by Avaya Aura® Experience Portal. Avaya Aura® Contact Center supports front-end and back-end Avaya Aura® Experience Portal integration in a single solution.

The following mechanisms support transferring calls and call data between Avaya Aura® Experience Portal and Contact Center:

- Landing Pads. Contact Center Web Service Open Interfaces enable self-service systems to transfer a call into Avaya Aura® Contact Center by reserving a Landing Pad. Contact Center Web Service Open Interfaces allow custom data to be passed with the call. To

enable Contact Center Landing Pads you must configure Contact Center Web Service Open Interfaces.

- SIP header information. SIP includes a number of message headers in each SIP message. These headers contain information that enables the receiver to process and use the message. In a contact center solution, SIP headers may be used to transfer small amounts of call-related information between SIP-enabled applications. Avaya Aura® Contact Center supports the User-to-User Information (UUI) SIP header and the Avaya custom P-Intrinsics SIP private header. Avaya Aura® Contact Center Web Service Open Interfaces do not support SIP headers.
- SIP INFO message body using Context Creation: If your call-related context information does not fit in a SIP User-to-User Information (UUI) header or in the larger P-Intrinsics header, you can use the sample Context Creation application to pass more context information from Avaya Aura® Experience Portal to Avaya Aura® Contact Center. This sample Context Creation application can return multiple values from Avaya Aura® Experience Portal, rather than the single value returned by the sample Play and Collect application. The Context Creation sample application can return call-related context information in a SIP INFO message body. A SIP INFO message body holds and transfers much more information than a SIP header.

In an Avaya Communication Server 1000 AML-based solution, Avaya Aura® Contact Center supports Landing Pads for integration with Avaya Aura® Experience Portal. AML-based solutions do not support SIP header Information or Contact Intrinsics as call attached data.

In an Avaya Communication Server 1000 SIP-enabled solution, Avaya Aura® Contact Center supports the following methods of integration with Avaya Aura® Experience Portal:

- Landing Pads
- SIP header Information
- SIP INFO message using Context Creation

In an Avaya Aura® Unified Communications platform based solution, Avaya Aura® Contact Center supports the following methods of integration with Avaya Aura® Experience Portal:

- Landing Pads
- SIP header information
- SIP INFO message using Context Creation

The following table shows the call transfer mechanism supported by each platform type:

Transfer method	CS 1000 AML-based Contact Center	CS 1000 SIP-enabled Contact Center	Avaya Aura SIP-enabled Contact Center
Landing Pads	Yes	Yes	Yes
UUI SIP header	No	Yes	Yes

Transfer method	CS 1000 AML-based Contact Center	CS 1000 SIP-enabled Contact Center	Avaya Aura SIP-enabled Contact Center
P-Intrinsic SIP header	No	Yes	Yes
SIP INFO message using Context Creation	No	Yes	Yes

The following table shows the additional licensing requirements for each Avaya Aura® Contact Center and Avaya Aura® Experience Portal integration type:

Transfer method	CS 1000 AML-based Contact Center	CS 1000 SIP-enabled Contact Center	Avaya Aura SIP-enabled Contact Center
Landing Pads	OI Open Queue, and OI Universal Networking.	OI Open Queue, and OI Universal Networking.	OI Open Queue, and OI Universal Networking.
Front-end Avaya Aura® Experience Portal	N/A	No additional licenses required.	No additional licenses required.
Back-end Avaya Aura® Experience Portal	N/A	No additional licenses required.	No additional licenses required.
SIP INFO message using Context Creation	N/A	No additional licenses required.	No additional licenses required.

Important:

Avaya Aura® Contact Center Release 6.3 does not support SIP-enabled Avaya Communication Server 1000 for new installations. Existing Avaya Aura® Contact Center solutions using SIP-enabled Avaya Communication Server 1000 may be expanded or upgraded.

The following table shows the maximum amount of data supported by each transfer type:

Transfer method	CS 1000 AML-based Contact Center	CS 1000 SIP-based Contact Center	Avaya Aura SIP-based Contact Center
Landing Pads	Maximum Call Attached Data is 4096 bytes. Maximum 5 ASCII	Maximum Call Attached Data is 4096 bytes. Maximum 5 ASCII key-	Maximum Call Attached Data is 4096 bytes. Maximum 5 ASCII key-value pairs of Contact Intrinsics.

Transfer method	CS 1000 AML-based Contact Center	CS 1000 SIP-based Contact Center	Avaya Aura SIP-based Contact Center
	key-value pairs of Contact Intrinsics.	value pairs of Contact Intrinsics.	
UUI SIP header using ASAI	N/A	96 bytes maximum.	96 bytes maximum.
P-Intrinsics SIP header	N/A	Depends on your solution. Note 1	Depends on your solution. Note 1
SIP INFO message body using Context Ceation	N/A	8K bytes total maximum: • Maximum of 10 ASCII key-value pairs. • And 4729 characters of Call Attached Data (CAD) within the CC application.	8K bytes total maximum: • Maximum of 10 ASCII key-value pairs. • And 4729 characters of Call Attached Data (CAD) within the CC application.

Note 1 The following limitations apply to P-Intrinsics SIP header information:

- The amount of P-Intrinsics information associated with a call depends on the other SIP headers in the call and on the call flow path. Typically, Contact Center supports up to 10 ASCII key-value pairs of P-Intrinsics.
- If your solution has an Avaya Aura® Communication Manager in the incoming call path, the Refer-To header for blind transfers is limited to 1500 bytes overall.
- If your solution has an Avaya Aura® Communication Manager in the call path, for improved P-Intrinsics support, Avaya recommends Communication Manager Release 6.0.1 SP8 or later.

Avaya Aura® Contact Center supports ASCII key-value pairs with a key name of up to 25 characters and a value size of up to 80 characters.

Chapter 6: Licensing considerations

The Contact Center License Manager provides central control and administration of licensing for Avaya Aura® Contact Center.

You can choose Essential licensing for a single-server, single-site, voice-only contact center with up to 100 agents.

You can choose Nodal Enterprise licensing mode for a single contact center installation or Corporate Enterprise licensing mode for a network of Contact Center installations. You can also maintain a secondary License Manager, which takes over licensing if the primary License Manager fails. Avaya Aura® Contact Center supports upgrading from an entry-level, voice-only Essential license to a full-featured multimedia Enterprise license.

You use Nodal NCC or Corporate NCC licensing when you install a Network Control Center.

This section describes the Essential, Nodal Enterprise, and Corporate Enterprise licensing modes, how to interpret your license file, where to install and configure the Contact Center License Manager for your contact center, and the licensing grace period.

Contact Center License Manager supports the following licensing mechanisms:

- **PLIC license file**: You can install a suitably configured PLIC license file on the Contact Center License Manager server. Contact Center License Manager then uses this PLIC license file to control Avaya Aura® Contact Center licensed features.
- **WebLM license file**: You can install a suitably configured WebLM license file on the Contact Center License Manager server. Contact Center License Manager then uses this WebLM license file to control Avaya Aura® Contact Center licensed features.
- **Avaya WebLM server**: Contact Center License Manager supports the Virtualized Environment deployment of a remote Avaya WebLM server. Install and commission a suitably licensed WebLM server in your solution. Contact Center License Manager then obtains licenses from this remote WebLM server, and uses these licenses to control Avaya Aura® Contact Center licensed features.

WebLM does not support Corporate Licensing.

Enterprise licensing

Before installing Contact Center Manager Server, you must know whether you are going to use Essential, Nodal Enterprise or Corporate Enterprise licensing.

The Contact Center License Manager component is installed on the following Contact Center server types:

- Voice and Multimedia Contact Server
- Voice Contact Server
- Network Control Center Server
- Knowledge Worker server
- AACC Multimedia Complement for Elite

The following table shows where to install Contact Center License Manager for a given license type.

Table 4: Contact Center License Manager installation location

	Essential Nodal	Enterprise Nodal Standard	Enterprise Nodal Networked	Enterprise Corporate Standard	Enterprise Corporate Networked	CCT Knowledge Worker
Contact Center License Manager location	Voice and Multimedia Contact Server OR Voice Contact Server	Voice and Multimedia Contact Server OR Voice Contact Server	Voice and Multimedia Contact Server OR Voice Contact Server	Voice and Multimedia Contact Server OR Voice Contact Server	Voice and Multimedia Contact Server OR Voice Contact Server OR Network Control Center Server	Knowledge Worker server

Nodal Enterprise licensing

The options in the license file apply to a single installation of Contact Center Manager Server (CCMS), Contact Center Manager Administration (CCMA), Contact Center Multimedia (CCMM), and Communication Control Toolkit (CCT). When you choose Nodal Enterprise licensing, all licensing options for the applications in the Contact Center node are in a single license file managed by the License Manager.

Corporate Enterprise licensing

You can use Corporate Enterprise licensing to distribute licenses to multiple servers so they can share licenses from a single pool.

For example, if you have two sites: Galway and Auckland. Both sites share 100 Voice Agents. The Contact Center License Manager is on the Galway Voice and Multimedia Contact Server. When the day starts, all of the voice agents in Galway request licenses from the license server. One hundred licenses are issued in Galway. As Galway closes, the Auckland day starts. As the Galway agents log off, the licenses are made available for the agents in Auckland.

In this example, you require only 100 Voice Agent licenses to share across the two sites.

Each license that the Contact Center License Manager grants to Contact Center Manager Server, Contact Center Manager Administration, Contact Center Multimedia, or Communication Control Toolkit is refreshed by the respective application. This ensures that licenses always return to the Contact Center License Manager pool if the applications fail. The refresh mechanism requires an available network connection to the Contact Center License Manager.

Note:

WebLM does not support Corporate Licensing.

Managing two License Manager servers

In a Corporate Licensing environment, you can configure two Contact Center License Managers: a primary Contact Center License Manager and a secondary Contact Center License Manager. Only one Contact Center License Manager can be active at one time. The primary Contact Center License Manager actively maintains the licenses. The secondary Contact Center License Manager runs as a standby Contact Center License Manager to provide redundancy in a corporate environment. You can configure the secondary Contact Center License Manager as the Standby Contact Center License Manager for the Contact Center License Manager components so that it is not actively used for licenses unless the active Contact Center License Manager fails.

Configure your preferred active Contact Center License Manager as the primary license manager.

For Corporate License environments that have a Network Control Center Server, the primary License Manager software is on the Network Control Center Server.

Configure the secondary License Manager on any Voice and Multimedia Contact Server or Voice Contact Server. You cannot install the primary and secondary License Manager software on the same server.

The following conditions apply:

- You cannot configure a Standby License Manager in a Nodal licensing environment.
- Do not use the Standby License Manager for load balancing issues.

Essential licensing

Essential licensing supports entry-level, voice-only, single-site, single-server contact centers. All Essential licensing options are in a single license file managed by the co-resident License Manager.

Avaya Aura® Contact Center supports upgrading from an entry-level, voice-only Essential license to a full-featured multimedia Enterprise license.

AML-based contact centers

In an AML-based contact center, Essential licensing supports a single co-resident server with the following applications:

- Contact Center Manager Server
- Contact Center Manager Administration
- Communication Control Toolkit
- Contact Center License Manager
- Contact Center Manager Server Utility
- Orchestration Designer

When using Essential licensing, engineer the server to accommodate all these Avaya Aura® Contact Center applications co-resident on the single-server.

Application Module Link (AML) is an internal protocol used by Contact Center Manager Server to communicate directly with Avaya Communication Server 1000.

SIP-enabled contact centers

In a SIP-enabled contact center, Essential licensing supports a single co-resident server with the following applications:

- Contact Center Manager Server
- Contact Center Manager Administration
- Communication Control Toolkit
- Contact Center License Manager
- Contact Center Multimedia
- Avaya Media Server

- Contact Center Manager Server Utility
- Orchestration Designer

When using Essential licensing in a SIP-enabled contact center, Contact Center Multimedia and Avaya Media Server must be installed co-resident with Contact Center Manager Server on the single-server. The server must be engineered to accommodate all these Avaya Aura® Contact Center applications installed co-resident on the single-server.

Essential licensing features and interfaces

Essential licensing supports entry-level, voice-only, single-site, single-server contact centers. Essential licensing supports the following features:

- Up to 100 voice-only agents
- Single server deployment
- Single site deployment
- Skills based routing - voice only
- Integrated reporting
- Universal Queue
- Voice-only contacts
- Graphical call flows
- Integrated Music, RAN
- AML-based voice services (including Avaya CallPilot®)
- Default Play prompts/Collect Digits (only in a SIP-enabled contact center)
- Optional Dialog (basic IVR) ports (only in a SIP-enabled contact center)
- CCMA and CCT basic Web Services

Essential licensing does not support the following features:

- Multimedia contacts
- Networking
- Predictive Outbound
- High Availability Standby Server (Campus and Geographic)
- Report Creation wizard (RCW)
- Text based scripts
- SOA Web Services

- Agent Greeting integrated feature (using CS 1000 AML Agent Greeting product is supported)
- Offsite Agent

Essential licensing does not support the following interfaces:

- Host Data Exchange (HDX)
- Database Integration Wizard (DIW)
- MLS HER (Host Enhanced Routing)
- SOA Web Services (Open Queue and Open Networking)

Essential licensing does not support the following historical reports:

- Call-by-Call
- Multimedia
- Networking
- Outbound
- Predictive Outbound

Enterprise and Essential licensing comparison

Essential licensing supports entry-level, voice-only, single-site, single-server contact centers. Essential licensing supports a subset of the Enterprise licensed features and interfaces.

The following table compares Essential and Enterprise licensed features.

Table 5: Comparison of Essential and Enterprise licensed features

Features and Interfaces	Essential	Enterprise
Voice contacts	Yes	Yes
Multimedia contacts	No	Yes
Maximum Voice Agents	< 101	CS 1000 AML: < 5000 Avaya Aura® 6.1 or 6.2 SIP: < 3000 Avaya Aura® ME: < 600
Maximum Multimedia Agents	Not supported	3000
Multi-site contact center	No	Yes
Multi-server contact center	No	Yes
High Availability Standby Server	No	Yes

Features and Interfaces	Essential	Enterprise
Networking	No	Yes
Network Control Center	No	Yes
Predictive Outbound	No	Yes
Report Creation wizard (RCW)	No	Yes
SOA Web Services	No	Yes
AML-based voice services (including Avaya CallPilot®)	Yes	Yes
Host Data Exchange (HDX)	No	Yes
Database Integration Wizard (DIW)	No	Yes
MLS HER (Host Enhanced Routing)	No	Yes
SOA Web Services (Open Queue and Open Networking)	No	Yes
Graphical call flows	Yes	Yes
Integrated reporting	Yes	Yes
Skills based routing	Voice-only	Yes
Universal Queue	Yes	Yes
Integrated Music, RAN	Yes	Yes
Default Play prompts/Collect Digits	Yes	Yes
Optional Dialog (basic IVR) ports	Yes	Yes
Unified Reporting	No	Yes
Historical reports - Call by call	No	Yes
Historical reports - Contact Summary Reporting (CSR)	No	Yes
Historical reports - Access & Partition Management	No	Yes

Avaya Aura® Contact Center supports upgrading from an entry-level, voice-only Essential license to a full-featured multimedia Enterprise license.

About the license file

The Contact Center License Manager offers flexible licensing options and supports licensing of features at the node (Nodal License) or network (Corporate License) level. You can use

either a local license file or a license file installed on Avaya WebLM server, to provide Avaya Aura® Contact Center licenses to License Manager.

The license file provides a single point of administration for licensing, and includes keycodes for Contact Center Manager Server, Contact Center Manager Administration, Contact Center Multimedia, and Communication Control Toolkit. This single file reduces the number of separate keycodes that you must maintain. If you require additional features, or if your requirements change, you can replace the existing licensing file.

You can generate an Avaya Aura® Contact Center (AACC) license file using the following:

- Contact Center License Manager server MAC address.
- Avaya WebLM host ID. When using the Virtualized Environment deployment of a remote Avaya WebLM server, use the Avaya WebLM host ID.
- Avaya Communication Server 1000 Serial ID. The Avaya Communication Server 1000 Serial ID is also known as the Site ID.

The following table shows the license file generation methods for each type of Avaya Aura® Contact Center solution.

Table 6: License file generation method

	Essential Nodal AML	Essential Nodal SIP	Enterprise Nodal AML	Enterprise Nodal SIP	Enterprise Corporate	CCT Knowledge Worker
CS 1000 Serial ID	Yes	No	Yes	No	No	Yes
LM server MAC address	Yes	Yes	Yes	Yes	Yes	Yes
WebLM host ID	No	Yes	No	Yes	No	No
Note: The license mechanism is dependent on the order tool path used.						

You can generate an AML-based nodal license file from either the contact center server subnet NIC MAC address (CLAN NIC MAC address) or the Avaya Communication Server 1000 serial ID. You can generate a SIP-enabled nodal license file from the contact center server subnet NIC MAC address. You can also generate a SIP-enabled nodal license file from the Avaya WebLM host ID.

Important:

A corporate license file can be generated only from the LM server subnet Network Interface Card (NIC) MAC address. WebLM does not support Corporate Licensing.

Contact Center License Manager supports two license file mechanisms: PLIC or WebLM.

You can obtain a PLIC license file from the Avaya Keycode Retrieval System (KRS), or you can obtain a WebLM license file from the Avaya Product Licensing and Delivery System (PLDS).

- Avaya Aura® Contact Center uses a PLIC license file in Avaya Communication Server 1000 AML-based contact centers.
- Avaya Aura® Contact Center can use either a PLIC license file or a WebLM license file in Avaya Aura® Unified Communications platform SIP-enabled contact centers.

If your PLIC license file is installed on an Avaya Aura® Contact Center server, AACC stores the license file in the `D:\Avaya\Contact Center\License Manager\bin` folder on the server. The file name is plservrc. If you use a WebLM license, AACC imports the .xml content into the plservc.xml file in `D:\Avaya\Contact Center\apache-tomcat\webapps\WebLM\licenses`. If you use a license file on a remote WebLM server, AACC does not import the license file to the AACC server; WebLM stores the license file on the WebLM server.

Licensing mechanisms

When you install the License Manager for Contact Center, you use one of two licensing mechanisms depending on your system configuration: Key Recovery System (KRS) or WebLM. You can view the licensed features for both licensing mechanisms using the License Manager Configuration Utility.

At startup, Contact Center identifies the license mechanism and releases the licenses to use.

Key Recovery System (KRS) uses an .lic file to store keys for licensed features.

WebLM uses an .xml file to store keys for licensed features. Avaya Aura® Contact Center supports WebLM in nodal contact centers.

You can switch from the KRS to WebLM system using the License Manager Configuration utility. For the procedure to change licensing systems, see *Avaya Aura® Contact Center Server Administration* (NN44400-610).

WebLM licensing mechanism

Each Avaya Aura® Contact Center License Manager includes a local instance of WebLM. When the License Manager service starts, it checks for a PLIC license file. If License Manager does not find a PLIC license file, it extracts WebLM license keys either from the local WebLM instance or a remote WebLM server. License Manager then converts the WebLM license keys

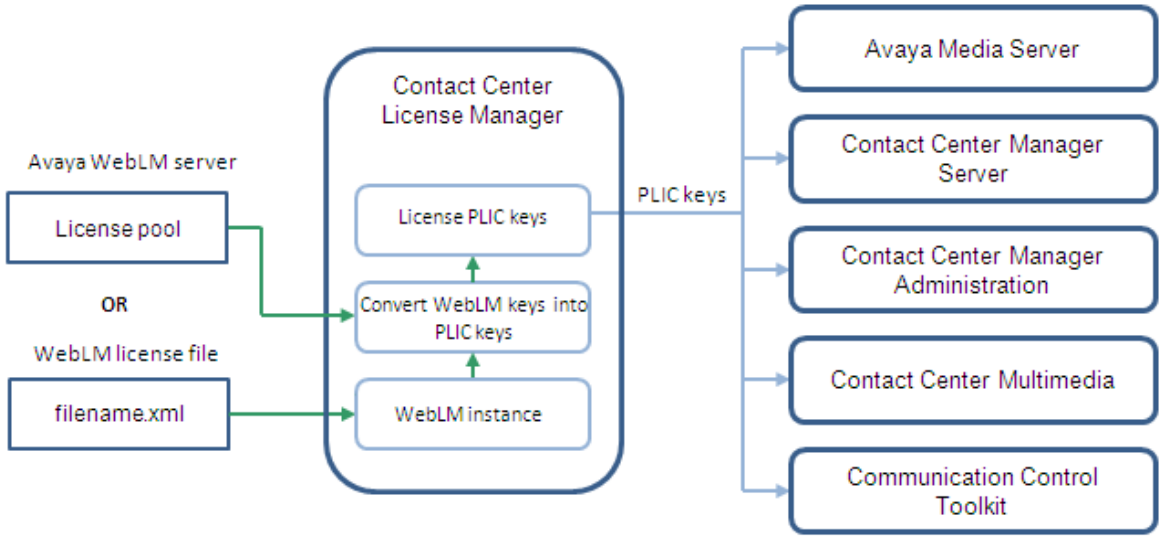
into local PLIC license keys and distributes the keys the Avaya Aura® Contact Center applications as required.

For a remote WebLM server, Avaya Aura® Contact Center License Manager supports only the Virtualized Environment deployment of Avaya WebLM server.

Contact Center License Manager supplies license keys to Contact Center Manager Server, Contact Center Manager Administration, Communication Control Toolkit, and Contact Center Multimedia as required.

When you configure an Avaya Media Server as a Media Server in Contact Center Manager Administration, Contact Center License Manager pushes the license keys to that Avaya Media Server. You must restart that Avaya Media Server so it can acquire these licenses. Do not configure WebLM licensing on Avaya Media Server servers.

The following diagram shows how Contact Center License Manager works with either a WebLM license file or an Avaya WebLM license server.



Contact Center License Manager supplies PLIC license keys to Avaya Aura® Contact Center (AACC) applications.

Local WebLM license file:

The identifier allowed for local installations is the MAC address of the Contact Center server running License Manager.

Important:

The MAC address can be the MAC address of any NIC on the server. However, Avaya recommends that you use the contact center subnet NIC MAC address. If the MAC address used in the license file does not match the MAC address of any NIC on the server, Contact Center License Manager cannot start.

License files on Avaya WebLM server:

Where the Avaya WebLM server deployment is an OVA implementation in a virtualized environment, the identifier is the host ID of the Avaya WebLM server.

When AACC License Manager requests licenses from a remote Avaya WebLM server, it reserves all the AACC licenses available on that server. As a result, AACC PLDS licenses are unsuitable for a WebLM Enterprise model. AACC supports only the PLDS standard license file (SLF) type.

To activate your AACC license file on PLDS, you require the Avaya WebLM host ID. You must install and commission Avaya WebLM server, and determine the correct license host ID from the WebLM user interface, before activating your AACC license.

KRS Corporate Enterprise license file

A license key in the product name identifies the Corporate Enterprise license.

Note:

WebLM does not support Corporate Licensing.

In Corporate Enterprise licensing mode you can use a secondary License Manager for redundancy. Both the primary and secondary License Managers can use the same license file. A Corporate Enterprise license is supported only in Avaya Communication Server 1000 based solutions. Avaya Aura® Unified Communications platform based solutions do not support Corporate Enterprise licensing.

KRS Nodal Enterprise license file

Nodal licensing indicates that the licenses are distributed only to that node. You cannot share nodal licenses. A license key in the product name identifies the Nodal Enterprise license.

Avaya Communication Server 1000 server (AML)

The serial ID of the Avaya Communication Server 1000 server is the identifier for Nodal Avaya Communication Server 1000 AML-based installations.

You must enter the serial ID correctly during the installation. If the serial ID does not match the ID used to generate the license file, the Contact Center License Manager Server cannot start.

Important:

A corporate license file can be generated only from the contact center subnet NIC MAC address. The nodal license file can be generated from either the server subnet NIC MAC address or the Avaya Communication Server 1000 serial ID.

Communication Control Toolkit Knowledge Worker Server

If you plan to use a Communication Control Toolkit Knowledge Worker Server, the license identifier is the CS 1000 Serial ID or the MAC address of the server.

The MAC address can be any MAC address of the NICs; however, Avaya recommends that you use the contact center subnet MAC address. If the MAC address does not match the MAC address in the license file, the Contact Center License Manager cannot start.

SIP server

The identifier allowed for SIP installations is the MAC address of the Contact Center Manager Server running License Manager.

Important:

The MAC address can be any NIC MAC address; however, Avaya recommends that you use the contact center subnet MAC address. If the MAC address does not match the MAC address in the license file, the Contact Center License Manager cannot start.

Mixed Corporate node

In all Corporate installations, if all servers connect to an Avaya Communication Server 1000, servers use the MAC address as the identifier.

The MAC address can be any NIC MAC address; however, Avaya recommends that you use the contact center subnet MAC address. If the MAC address does not match the MAC address in the license file, the Contact Center License Manager cannot start.

Interpretation of the license file

Contact Center licensing includes both agent and feature licensing.

Agent licenses

Agent licenses determine the number of agents that can log on to Contact Center. Agent licenses are available for both Nodal and Corporate Licensing.

Licensing is available for the following types of agents:

- voice agent
- outbound agent
- email agent (covering FAX messages, SMS text messages, voice mail messages, and scanned document messages)
- Web communications agent (or Web chat agents)
- Instant messaging agent
- offsite agent

Feature licenses

The following feature licenses are available:

- Open Queue
- Networking
- Universal Networking
- Progressive and Preview Outbound
- Predictive Outbound
- Report Creation Wizard (supported with SIP)
- Standby Server (High Availability) Campus and Geographic
- Call Recording enablement
- Open Interfaces Open Queue
- Open Interfaces Universal Networking
- Multiplicity (Included by default with multimedia agents)
- Web Based Statistics
- Agent Greeting

Supported License Manager servers

This section describes some of the licensed features in Contact Center. You cannot use Avaya NES License Manager Release 7.0 with Avaya Aura® Contact Center (AACC).

The following table shows the supported Contact Center License Manager servers.

Table 7: Contact Center License Manager servers

Compatible with	NES CC 6.0 Licenses	NES CC 7.0 Licenses	AACC Licenses
NES CC 6.0	Yes	Yes	Yes
NES CC 7.0	No	Yes	Yes
AACC 6.X	No	No	Yes

Licensed features

This section describes some of the licensed features in Contact Center. You must use License Manager for Contact Center applications. You cannot use Avaya NES License Manager Release 7.0 with Avaya Aura® Contact Center.

Open Queue

With Open Queue, you can queue voice and multimedia contacts in Contact Center and then route the contacts to agents by using the Avaya Aura® Agent Desktop. Configure Open Queue by using the Contact Center Manager Server Configuration utility. Open Queue is included by default with multimedia agents. Open Queue is available as an optional extra with the SOA Development Kit.

Universal Networking

Universal Networking is the networking between contact centers based on disparate telephony systems. Avaya Aura® Contact Center Release 6.3 supports Universal Networking on the following PABX types:

- Avaya Aura® Unified Communications platform 6.1 and 6.2 (systems using Session Manager)
- Avaya Communication Server 1000 AML-based systems

Universal Networking refers to the following features:

- network Skill-Based Routing between specified switch types supported by Contact Center
- attached data transport during agent-initiated transfers or conferences when under the control of the Communication Control Toolkit

Configure the Universal Networking feature by using the Contact Center Manager Server Configuration utility.

Important:

On SIP-based contact centers, Universal Networking supports only CDN landing pad implementations: it does not support DNS implementations.

Progressive and Preview Outbound

Only licensed users can access the Outbound Campaign Manager Tool using Contact Center Manager Administration.

The Outbound Campaign Manager Tool is compatible only with Contact Center Multimedia/ Outbound.

For more information about the Outbound feature, see *Avaya Aura® Contact Center Manager Administration – Client Administration* (NN44400-611).

Predictive Outbound

Licensed users can use the Multimedia server and Predictive Outbound solutions software to create predictive outbound campaigns where calls are made and agents are assigned to the outgoing calls.

Report Creation Wizard

Report Creation Wizard provides a simplified method to customize historical reports within Contact Center.

Report Creation Wizard is a user-based license. License Manager controls the maximum concurrent Report Creation Wizard users.

Contact Center Manager Administration includes a one-user license for the Report Creation Wizard feature. You can order additional licenses in groups of 5 up to a maximum of 25 licenses (that is, 5, 10, 15, 20, or 25 licenses).

For more information about Report Creation Wizard, see the *Avaya Aura® Contact Center Performance Management* (NN44400-710).

Standby Server (High Availability)

Avaya Aura® Contact Center supports High Availability for fault tolerant and mission critical contact centers. High Availability is a licensed feature.

Call Recording enablement

Avaya Aura® Contact Center supports SIP-enabled call recording. Avaya Aura® Contact Center requires a single Call Recording Super User license per Contact Center node.

Contact Center License Manager license identifiers

License identifiers connect a license file to a particular server or to a particular installation. License Manager converts WebLM identity keys into local PLIC license keys and distributes the keys the Avaya Aura® Contact Center applications as required. Avaya Aura® Contact Center applications continue to consume PLIC license keys.

The following table lists all Avaya Aura® Contact Center specific WebLM license identifiers and compares them to the PLIC license identifiers. WebLM does not support Corporate licenses.

In a PLIC license file, the license identifier has the letter *N* appended when the license type is nodal, and the letter *C* appended when the license type is corporate enterprise. For example, the license identifier for the Maximum Inbound Voice Networked Agents (LM_LOC_VOA) appears as LM_LOC_VOAN in a nodal license file, and as LM_LOC_VOAC in a corporate enterprise license file.

Table 8: License identifiers

PLIC license identifier	Description	WebLM license identifier
NODAL CORPORATE	Installation	–
–	Solution Type	VALUE_CCTR_TYPE
–	Base system	VALUE_CCTR_BASE
LM_ESSENTIAL or LM_ENTERPRISE	Offer type	VALUE_CCTR_OFFER
LM_NET_VOA LM_NETWORKING	Maximum Inbound Voice Networked Agents	VALUE_CCTR_IN_VOICE_AGENT_NET
LM_LOC_VOA	Maximum Inbound Voice Standard Agents	VALUE_CCTR_IN_VOICE_AGENT_STD
LM_VOD	Maximum Contact Center devices	VALUE_CCTR_CTIDT_CC
LM_ADSOFT	Maximum Agent Desktop Softphones	VALUE_CCTR_AGENT_DESKTOP_SOFTPHONE
LM_SUPER	Maximum supervisors	VALUE_CCTR_SUPERVISOR
LM_ENTERPRISE LM_MULP LM_OB LM_IM_PRESENCE LM_CONTACTREC inst::auth LM_OI	Maximum Contact Center Manager Standard nodes	VALUE_CCTR_CCM_STD_NODE
LM_ENTERPRISE LM_HETERO LM_HET_ADM LM_MULP LM_OB LM_OI LM_IM_PRESENCE	Maximum Contact Center Manager Network nodes	VALUE_CCTR_CCM_NET_NODE

PLIC license identifier	Description	WebLM license identifier
LM_CONTACTREC inst::auth		
LM_MMP	Maximum Contact Center Multimedia nodes	VALUE_CCTR_CCMM_NODE
LM_CCT	Maximum Communication Control Toolkit nodes	VALUE_CCTR_CCT_NODE
LM_NETWORKING LM_NET_EMA LM_LOC_EMA	Maximum email agents	VALUE_CCTR_EMAIL_AGENT
LM_NETWORKING LM_NET_EMA LM_LOC_EMA	Maximum SMS agents	VALUE_CCTR_SMS_AGENT
LM_NETWORKING LM_NET_WCA LM_LOC_WCA	Maximum Web chat agents	VALUE_CCTR_WEB_CHAT_AGENT
LM_OB LM_NETWORKING LM_NET_PRA LM_LOC_PRA LM_NET_OBA LM_LOC_OBA	Maximum Preview/ Progressive Outbound agents	VALUE_CCTR_VOICE_PPOB
LM_NETWORKING LM_NET_IMA LM_LOC_IMA LM_IM_PRESENCE	Maximum Instant Message agents	VALUE_CCTR_IM
LM_STANDBY	Maximum CCM Standby Servers	VALUE_CCTR_CTIDT_RED_CCM
LM_MMS	Maximum CCMM Standby Servers	VALUE_CCTR_CTIDT_RED_CCMM
LM_CCT_STN	Maximum CCT Standby Servers	VALUE_CCTR_CTIDT_RED_CCT
LM_OI LM_OIOpenQ LM_OIOpenN	SOA Development Kit	VALUE_CCTR_DEV_KIT
LM_RCW_USER	Maximum Report Creation Wizard user licenses	VALUE_CCTR_REPORT_WIZ

PLIC license identifier	Description	WebLM license identifier
LM_NETWORKING LM_NET_GRE LM_LOC_GRE ccag-recording::sess ag-recording::sess	Maximum Agent Greeting licenses	VALUE_CCTR_AGT_GREET
LM_OFF_SITE	Maximum Offsite agent seats	VALUE_CCTR_OFFSITE_AGT
__sip-conf::sess	Maximum SIP ports	VALUE_CCTR_SIP_PORTS
__sip-annc::sess	Maximum Announcement ports	VALUE_CCTR_ANNOUNCE_PORTS
__sip-dialog::sess	Maximum Dialog ports	VALUE_CCTR_DIALOG_PORTS
–	Maximum Geographical Standby Servers	VALUE_CCTR_CTIDT_RED_GEOG
–	Maximum Network Standby Servers	VALUE_CCTR_RED_NET
LM_CCS350 LM_HET_ADM	Maximum Network Control Center Servers	VALUE_CCTR_NCC_SVR
–	Maximum Network Control Center Standby Servers	VALUE_CCTR_NCC_RED_SVR
LM_WBSTAT	Web Statistics	FEAT_CCTR_WEBSTAT
LM_OQ	Open Queue	FEAT_CCTR_OQ
LM_OIOpenN	Open Interfaces Open Networking	FEAT_CCTR_OIOPEN
inst::auth	Maximum Avaya Media Server Instances	VALUE_CCTR_AMS_INSTANCE
plicd	Maximum License Managers	VALUE_CCTR_PLICD
ccoa::sess	Maximum Offsite Agent	VALUE_CCTR_AAOA

PLIC license identifier	Description	WebLM license identifier
BasicPortsCC::sess	Maximum Basic Port	VALUE_CCTR_BASIC_PORT
LM_CONTACTREC	Contact Recording	VALUE_CONTACT_REC

Licensing grace period

If a communication error occurs between a Contact Center application and the Contact Center License Manager, normal operation of the Contact Center application continues for a grace period.

The grace period is 30 days. If a communication problem occurs between Contact Center Manager Server and Contact Center License Manager, 30 days are available for the Contact Center Manager Server to continue normal operation. After the communication problem is resolved, the grace period adds back 20 minutes every 20 minutes until the grace period is back up to 30 days. For example, if the communication problem is resolved in two days, the grace period counts backs up to 30 days after two days of successful connection to the Contact Center License Manager.

If, at any stage, the grace period expires, Contact Center Manager Server shuts down and is locked. You cannot restart Contact Center Manager Server without resetting the grace period.

You can reset the grace period to 30 days at any time. When a communication error is detected, an event is fired to the Server Utility detailing that an error occurred, the time already elapsed in the grace period, and a lock code that you must return to Avaya to reset the grace period.

Important:

Avaya Media Server does not support grace period. In a SIP-enabled Contact Center using PLIC licensing, where Avaya Media Server is co-resident with Contact Center Manager Server, Avaya Media Server stops if Contact Center Manager Server goes into grace period. If Avaya Media Server is standalone, or if Contact Center uses WebLM licensing, Avaya Media Server maintains normal operation.

Emergency license files

If you cannot fix the connection between the Contact Center License Manager and Contact Center Manager Server within the 30-day grace period, contact your Avaya customer service representative to determine if you need to activate an emergency license file on your system.

The emergency license file expires after 30 days and is used only to ensure temporary operation of the Contact Center Manager Server.

You must install the emergency license file through the Contact Center License Manager configuration tool. If you use corporate licensing, you may need to change the Contact Center Manager Server configuration if the Contact Center License Manager is installed on a different server than it was previously.

License manager statistics

Contact Center License Manager produces historical reporting data to support the analysis and management of concurrent license usage in the network. Historical data is available in 15-minute intervals daily, weekly, or monthly. License utilization is reported on a client basis, with the IP address of the client used to denote individual clients.

The Contact Center License Manager reports the following statistics:

- Timestamp—The time the data is written to the database.
- IP Address—The IP address of the Contact Center Manager Server, Contact Center Manager Administration, Contact Center Multimedia, and Communication Control Toolkit.
- License identifier—The name of the license.
- Maximum allocation during interval—The maximum number of licenses allocated to the server during the 15-minute interval.

If an interval has 10 licenses issued for a feature, then 10 is written to the database table. If another 5 licenses are issued in the next interval, then 15 is written to the database table. However, at the end of the interval, if only 14 licenses were issued, but 15 were issued at some stage during the interval, then a value of 15 is written to the database.

The data is written to the database on the server on which you installed the License Manager for each 15-minute interval. These statistics are consolidated daily, weekly, and monthly.

The License Manager reports any errors by writing error data to the database. The data is stored on a site-by-site basis where the site identifier is the IP address of the server.

A report template is available to generate reports using this statistical information. The data is available from the following database views:

- iLicenseStat—interval statistics
- dLicenseStat—daily statistics
- wLicenseStat—weekly statistics
- mLicenseStat—monthly statistics

Real-time statistics

You can use the Real Time Usage tab in the Contact Center License Manager utility to view a snapshot of the licenses issued by the License Manager.

Avaya Media Server licensing

Avaya Media Server requires licenses for the conference, announcement, dialog, and (optionally) Agent Greeting features.

When installed co-resident with Contact Center Manager Server, Avaya Media Server uses the Contact Center License Manager and the license server on Avaya Media Server is disabled. When not co-resident with Contact Center Manager Server, Avaya Media Server uses the Avaya Media Server License Server and the Contact Center Services for Avaya Media Server licenses must be applied using the Avaya Media Server Element Manager.

You can configure the following licenses for Avaya Media Server:

- Advanced SIP Contact Center Service (for each port)—Voice Conversation space, observe, barge-in; Announcements, Tones, and Give RAN/Scripted Music.
- Premium SIP Contact Center Service (for each port)—Voice Conversation space, observe, barge-in; Announcements service - Tones, Give RAN/ Scripted Music; Dialog service/Give IVR - advanced treatments including play prompts, collect digits, Web page push, canned applications like EWT/PIQ, send IM, and VXML invocation.

Chapter 7: SIP Contact Center configuration requirements

This section describes the configuration requirements for a SIP-enabled Avaya Aura® Contact Center.

General requirements

This section describes the general requirements for a SIP-enabled contact center.

SIP-enabled Contact Center feature limitations

SIP-enabled Avaya Aura® Contact Center has the following limitations:

- In a SIP-enabled Contact Center using an Avaya Communication Server 1000, Call Forward (CFW) is not supported. CFW must be disabled on Agent phones. Call Forward is not supported on agent phones. Call Forward All Calls and Call Forward No Answer are not supported. The Call Presentation Class of Service settings may be used to direct calls back to the application.
- In a SIP-enabled Contact Center using a Communication Manager, Avaya Aura® Contact Center supports a limited configuration of the Communication Manager - Coverage Path feature. For more information, see *Avaya Aura® Contact Center Configuration – Avaya Aura® Unified Communications Platform Integration* (NN44400-521).
- In a SIP-enabled Contact Center, blind (single-step) transfers are not supported. However, early transfer completion is supported. Early transfer completion is the ability to complete a supervised (two-step) transfer while the far end is still ringing. In a SIP-enabled Contact Center, references to blind transfer mean supervised transfer with early transfer completion.
- Each SIP-enabled Avaya Communication Server 1000 agent phone supports a single key.
- Trunk information in Historical Reports is not supported.
- Host Enhanced Routing is not supported.
- The “Let call ring” call presentation class is not supported. The call may ring for a maximum of 32 seconds, because of a SIP signaling timeout.
- Call Force Delay for Instant Message (IM) contacts is not supported.
- The Instant Messaging CDN alias and number must be configured the same.

- Walk-away is not supported.
- Agents must not use their desk phone or Agent Desktop to phone, transfer a call, or conference a call to a phone number that is:
  - routed to a CDN (Route Point). For example, a Virtual Directory Number (VDN) routed to a CDN (Route Point).
  - converted to a CDN (Route Point). For example when using digit manipulation on the call server.
  - call forwarded to a CDN (Route Point).

Agents may use their desk phone or Agent Desktop to transfer a call, conference or phone directly to a CDN (Route Point). Agents may phone directly to a CDN (Route Point). Agents may transfer a call directly to a CDN (Route Point). Agents may conference a call directly with a CDN (Route Point).

Dependent platform and switch compatibility

The following table displays the SIP-enabled platforms available and the release compatibility.

Table 9: SIP-enabled switch compatibility

Platform	Release
Avaya Aura® Unified Communications platform	6.1, 6.2
Avaya Communication Server 1000 + Signaling Server + Network Routing Service (NRS)	7.0
Avaya Communication Server 1000 + Session Manager 6.1	7.5, 7.6

Important:

Avaya Aura® Contact Center Release 6.3 does not support the Avaya Aura® Midsize Business Template (MBT) or Avaya Aura® Unified Communications Release 5.2 platforms for new installations. Existing Avaya Aura® Contact Center solutions using MBT or Avaya Aura® 5.2 may be expanded or upgraded.

Important:

Avaya Aura® Contact Center Release 6.3 does not support SIP-enabled Avaya Communication Server 1000 for new installations. Existing SIP-enabled Avaya Communication Server 1000 contact center installations may be expanded or upgraded.

Upgrade path

Avaya does not support migrations and upgrades from AML-based (non-SIP) Contact Center products to SIP-enabled Avaya Aura® Contact Center.

Digital Signal Processing Considerations

This section introduces Digital Signal Processing (DSP) in a SIP-enabled contact center.

Voice over Internet Protocol

Voice over Internet Protocol (VoIP) is an internet technology and communications protocol that delivers voice and multimedia communications over IP networks. Voice over IP is widely used as a flexible and cost-effective alternative to the Public Switched Telephone Network (PSTN).

- Signaling—Voice over IP is used by industry standard protocols and proprietary Avaya signaling protocols. The Avaya Communication Server 1000 PABX uses a proprietary signaling protocol called Unistim for phone set signaling. Avaya Aura® Contact Center uses industry standard signaling protocols such as SIP and H.323.
- Media—VoIP supports many media variants such as audio, video, and Instant Messaging. Communication systems use codecs to encode media streams for transmission and to decode the media for playback. Codecs encode and decode media such as VoIP audio (G.711, G.729, G.726).

Communication endpoints must each use a common VoIP signaling protocol and media codec in order to communicate with each other. Communication endpoints that do not share common signaling and media protocols must transverse a gateway that performs the translation to both signaling and media.

Example 1:

Communication systems that use both H.323 and SIP endpoints:

- Signaling: the gateway translates from H.323 to SIP.
- Media: H.323 and SIP endpoints commonly share G.711 codecs – transcoding is not required so no Digital Signal Processors (DSPs) are used.

Example 2:

Communication systems that use both Integrated Services Digital Network (ISDN) and SIP endpoints:

- Signaling: the gateway translates from ISDN D-Channel signaling to SIP signaling and visa versa.
- Media: a DSP is required to transcode ISDN Pulse-code modulation (PCM) audio into G.711 audio for SIP communications.

Avaya Aura® Contact Center uses SIP signaling. Contact Center uses Avaya Media Server to handle the VoIP audio media. Avaya Aura® Contact Center uses the Avaya Media Server software DSP capabilities to handle VoIP media on its behalf. Contact Center communicates with the Avaya Media Server using SIP. Avaya Media Server communicates with the PABX using SIP signaling and media. Calls enter Avaya Aura® Contact Center through SIP signaling. Agents are joined to customers using SIP. Avaya Media Server provides conference facilities, telephony ringback and busy tones, music playing for scripted music and IVR capability (play & collect digits).

When a customer phones a contact center, their (VoIP audio media) call is initially terminated on an Avaya Media Server conference port, on a dedicated customer conference bridge.

A Contact Center Task Flow Executor (TFE) script application uses the Avaya Media Server to insert call treatments such as ringback into the conference bridge for the customer to hear. Customers are normally connected to an appropriate agent using this same conference bridge and the call ends up as a simple two-party conference on Avaya Media Server. Contact Center TFE typically instructs Avaya Media Server to play a few seconds of ringback tones into the conference bridge the customer is anchored on, so the customer can hear their phone call progress. The Task Flow Executor (TFE) may then instruct Avaya Media Server to play a welcome greeting to the customer. In Interactive Voice Response (IVR) solutions, Avaya Media Server may use a play and collect application to play a message asking the customer to enter digits from their phone set. Avaya Media Server then collects these digits.

Once a Contact Center agent is identified, they are called up by Avaya Aura® Contact Center to join the same Avaya Media Server conference as the caller, thereby creating a simple two-party conference.

Avaya Aura® Contact Center supports TDM and VoIP voice communication device protocols.

- TDM—The Time Division Multiplex (TDM) protocol is used by Plain Old Telephone sets (POTS), PSTN, ISDN, ATM, and others.
- VoIP—Avaya Aura® Contact Center supports VoIP for H.323 and SIP. The VoIP protocol is used by Skype, Avaya 9641 deskphone, Microsoft Office Communicator and others.

PABX Digital Signal Processors

Digital Signal Processors (DSPs) may be used to transcode or convert media from one protocol to another. Transcoding is the direct digital-to-digital conversion from one encoding type to another. The Avaya Communication Server 1000 PABX Media Gateway Controller (MGC) card has a 96 channel DSP daughter board that it uses to transcode TDM media to IP media and vice versa.

A Digital Signal Processor is consumed each time a TDM user and an IP agent are connected. A DSP is consumed each time a TDM PSTN user call is connected to an agents's IP deskphone. A DSP is also consumed each time an agent with an IP deskphone calls a TDM-based user or customer. In a SIP-enabled contact center each TDM endpoint consumes a DSP. Local IP endpoints do not consume a DSP.

The Avaya Aura® G450 Media Gateway Chassis has DSP daughter boards (MP-20 and MP-80) for transcoding media from one protocol to another.

You must engineer your Avaya Aura® Unified Communications platform or Avaya Communication Server 1000 PABX with a sufficient number of Digital Signal Processor channels to handle the TDM and VoIP transcoding in your contact center solution.

Each contact center is different – the number of agents, the number of supported simultaneous customer calls supported, the blend of TDM and VoIP traffic, and customer expectations determine the number of DSPs required. It is important that there are sufficient DSPs to support the intended Avaya Aura® Contact Center deployment. Avaya recommends that you engineer the DSP quantities to minimize call blocking scenarios.

Avaya Aura® Shuffling

If you are using an Avaya Aura® Unified Communications PABX, enable the Shuffling feature to avoid unnecessary DSP usage. Avaya Aura® Shuffling (Direct IP-IP Audio Connections) attempts to renegotiate the media on an established SIP call, to update the anchor point of the media processor, thereby reducing the total number of Digital Signal Processor (DSP) channels required.

On your Communication Manager, configure “Direct IP-IP Audio Connections? y” on every agent station, and on the SIP Signaling group configuration screens.

Important:

Avaya Aura® Communication Manager consumes DSPs if shuffling is turned off on either the SIP Signaling groups, or any of the agent IP stations. Enable shuffling on all agent stations (phones) and on the SIP signaling group.

PABX DSP consumption examples

The following examples examine a variety of contact center solutions, and show how to calculate the number of Digital Signal Processor (DSP) channels required for that solution type.

- Each TDM customer consumes one DSP. Customer calls typically enter Avaya Aura® Communication Manager or Avaya Communication Server 1000 on the TDM side of the PABX. These calls require transcoding from TDM to VoIP for Avaya Media Server and Avaya Aura® Contact Center. For example, if you have 10 TDM calls waiting, and 5 TDM calls answered by agents with IP desk phones, your PABX is consuming 15 PABX DSP channels.
- Each TDM agent consumes one DSP channel while on a Contact Center call. Customer calls can enter Communication Manager or Avaya Communication Server 1000 on the VoIP side of the switch. If your contact center uses TDM agents then these calls require transcoding from VoIP to TDM for the TDM agents. For example, if you have 10 TDM calls waiting, 5 TDM calls answered by 2 TDM agents, and 3 IP Agents, your solution is consuming 10+5+2=17 DSP channels.
- If a customer call arrives into an enterprise through SIP, and is finally transferred to a TDM user, for example using ISDN, then Avaya Aura® Communication Manager or Avaya Communication Server 1000 consumes one DSP channel to tandem this call from VoIP to TDM.
- If a customer call arrives into an enterprise via TDM (PSTN - ISDN), and is finally transferred to a TDM user, for example using ISDN, Avaya Aura® Communication Manager or Avaya Communication Server 1000 normally optimizes the call so the call no longer tandems though DSPs, and all DSP resources are released.
- If a customer call originates on a SIP carrier, the call enters the contact center through the SIP voice proxy. Avaya Aura® Contact Center supports SIP Enablement Services, Session Manager, and Avaya NES Networking Routing Service as SIP voice proxies. The SIP proxy routes the call directly to Avaya Aura® Contact Center which anchors the call on an Avaya Media Server. VoIP agents handle this call. There is no DSP requirement for this call scenario.

These are some examples of calculating the number of Digital Signal Processor (DSP) channels required for your solution type. For more details, see your PABX documentation.

Avaya Communication Server 1000 DSP

Engineer the Avaya Communication Server 1000 system so it is capable of supporting SIP, in particular engineer the DSP hardware resources to support TDM and IP transcoding. Incoming PSTN calls require one DSP per call. Agents with TDM phones each require another DSP. For more information, see *Communication Server 1000M Large System Planning and Engineering* (NN43021-220) and *Communication Server 1000E Planning and Engineering* (NN43041-220).

Avaya Aura® Unified Communications platform DSP

Engineer the Avaya Aura® Unified Communications platform and G450 Media Gateway so they are capable of supporting SIP, in particular engineer the DSP hardware resources to support TDM and IP transcoding. Incoming PSTN calls require one DSP per call. Agents with TDM phones each require another DSP. For more information, see *Administration for the Avaya G450 Media Gateway*.

Dialed Number Identification Service (DNIS)

A Dialed Number Identification Service (DNIS) is a method by which the Contact Center system recognizes the phone number that a caller dials. Agents can receive contacts from customers calling in on different DNISs and customize their response according to the DNIS. Based on the DNIS, the system can direct contacts to a controlled CDN and supply different treatments.

DNIS Options in SIP-enabled contact centers

Session Manager and Avaya Communication Server 1000 support DNIS information for Contact Center using the To header technique.

- Incoming SIP Invite message with DNIS information in the To header on page 94
- Avaya Communication Server 1000 systems on page 94
- Session Manager systems on page 95

Session Manager and Midsize Business Template support DNIS information for Contact Center using the Virtual Directory Number “DNIS” prefix technique.

- Incoming SIP Invite message with DNIS information in the History-Info header on page 94
- Midsize Business Template systems on page 94
- Session Manager systems on page 95

Incoming SIP Invite message with DNIS information in the To header

If the incoming SIP Invite message to Avaya Aura® Contact Center contains a REQUEST URI that differs to the To address URI, Contact Center deems the To address to contain the DNIS information of the call.

Session Manager and Avaya Communication Server 1000 support DNIS information for Contact Center using this To header technique.

Avaya Communication Server 1000 systems

Avaya Communication Server 1000 provides DNIS information in the SIP To header of the incoming SIP Invite message to Avaya Aura® Contact Center.

You must apply the Avaya Communication Server 1000 patch MPLR30797 to support this functionality.

Incoming SIP Invite message with DNIS information in the History-Info header

If the SIP REQUEST URI message username and the To address URI username are the same, then Avaya Aura® Contact Center looks for DNIS information in the SIP “History-Info” message headers. The only way Contact Center can identify valid DNIS information in the “History-Info” header is if one of the “History-Info” headers contains the case sensitive keyword “DNIS”.

Midsize Business Template systems

Midsize Business Template systems cannot provide DNIS information in the To address, but they can provide DNIS information in the SIP “History-Info” header of the incoming SIP Invite message.

On the Midsize Business Template—Communication Manager create a Virtual Directory Number (VDN) for each DNIS required. The VDN name must contain the capitalized keyword “DNIS”.

The following example shows the Virtual Directory Number “DNIS” naming convention. The example VDN name shown is configured to be “DNIS8456464”. The VDN name contains a “DNIS” prefix followed by a unique identification number. This unique identification number does not have to match the extension number.

```
display vdn 8456464                                          Page   1 of   3
                          VECTOR DIRECTORY NUMBER

                            Extension: 845-6464
                                 Name*: DNIS8456464
                          Destination: Vector Number        64
                  Attendant Vectoring? n
                 Meet-me Conferencing? n
                   Allow VDN Override? n
                                  COR: 1
                                  TN*: 1
                             Measured: none


        VDN of Origin Annc. Extension*:
                            1st Skill*:
                            2nd Skill*:
                            3rd Skill*:



* Follows VDN Override Rules
```

Figure 5: Example of configuring VDN name with DNIS prefix

Contact Center retrieves the DNIS number from the incoming SIP Invite message by parsing the URI that Communication Manager builds into the ‘History-Info’ header. The URI is based on the value of the VDN ‘extension’ field.

For example:

History-Info: “DNIS8456464” <sip:8456464@sipccocs.com>;index=1.2.

In this example Contact Center retrieves a DNIS number of “8456464” from the URI in the “History-Info” header. Contact Center then uses this DNIS number to route or treat the call.

Session Manager systems

In solutions that use a Communication Manager and a Session Manager, the DNIS information can be provided in the SIP ‘To’ header of the incoming SIP Invite message by configuring an adaptation on the Session Manager.

If necessary, DNIS information can also be provided in the History-Info header using the Virtual Directory Number “DNIS” prefix naming convention. On the Communication Manager create

a Virtual Directory Number (VDN) for each DNIS required. The VDN name must contain the capitalized keyword “DNIS”.

Office Communications Server 2007 hardware requirements

The following table provides the hardware requirements of the Office Communications Server (OCS) network portion of the SIP Contact Center solution and details the OCS server types required to achieve the corresponding agent capacity. These values are based on scaling down the Microsoft-issued statistics for user capacity in an OCS configuration. The Microsoft figures in the third column are based Microsoft-stated 5 percent usage level.

This table does not account for non-Contact Center activity on the part of the OC client users. (for example, if other users use the OCS network and servers for non-Contact Center activity).

Table 10: OCS server requirements

Topology	Servers	Number of OC users (Microsoft numbers)	Scaled maximum number of Contact Center agents
Standard Edition (SE)	1 SE Front End server 1 Access Edge server	< 5000	< 200
Enterprise Edition (EE) Consolidated	4 Front End servers 1 Backend SQL server 1 Access Edge server	< 30 000	< 1500
Enterprise Edition Expanded Mid-range SQL	4 Front End servers 2 IIS servers 1 Backend SQL server 1 Access Edge server	< 50 000	< 1500
Enterprise Edition Expanded High-end SQL	8 Front End servers 2 IIS servers 1 Backend SQL server 1 Access Edge server	< 125 000	< 1500

The following table describes the reference hardware for the servers in the OCS network.

Table 11: OCS server hardware requirements

Component	Front End servers (SE or EE), Access Edge, or IIS server	EE Backend SQL server (mid-range)	EE Backend SQL server (high-end)	A/V Access Edge Conferencing
CPU	Dual processor, dual core 2.6 GHz	Dual processor, dual core 2.6 GHz	Quad processor, dual core 2.6 GHz	Dual processor, dual core 2.6 GHz
Disk	2 x 18 GB For collocated Standard Edition server, add 2 x 36 GB, 15K RPM, RAID 0 for database log files and 2 x 36 GB, 15K RPM, RAID 0 for database data.	2 x 18 GB For collocated Standard Edition server, add 2 x 36 GB, 15K RPM, RAID 0 for database log files and 2 x 36 GB, 15K RPM, RAID 0 for database data.	Drive 1 (2 x 18 GB) for OS and Page File Drive 2 (4 x 36GB, 15K RPM, RAID 0+1) for database log file Drive 3 (4 x 36GB, 15K RPM, RAID 0+1) for database log file Drive 4 (8 x 36GB, 15K RPM, RAID 0+1) for database files	2 x 18 GB
Cache	1 MB Layer 2 for each core	1 MB Layer 2 for each core	2 MB Layer 2 for each core	1 MB Layer 2 for each core
Memory	2 GB (4 GB for Standard Edition Server or Consolidated Enterprise Edition Server)	2 GB (4 GB for Standard Edition Server or Consolidated Enterprise Edition Server)	16 GB	4 GB
Network	GBit NIC	GBit NIC	GBit NIC	2 x GBit NIC

Chapter 8: High Availability server requirements

Avaya Aura® Contact Center supports High Availability (HA) resiliency for Contact Center Manager Server (CCMS), Communication Control Toolkit (CCT), Contact Center Multimedia (CCMM), Avaya Media Server, and Contact Center Manager Administration (CCMA). Avaya Aura® Contact Center supports campus High Availability for fault tolerant and mission critical contact centers. You can configure your contact center to have no single point of failure. Avaya Aura® Contact Center supports the following levels of campus high availability:

- Mission Critical High Availability for SIP-enabled contact centers
- Hot-standby High Availability for AML-based contact centers
- Warm standby High Availability

This section provides information about Standby server, Remote Geographic Node server, and network requirements.

This section also describes how to optimize the Mission Critical Contact Center High Availability (HA) feature for your network.

Mission Critical High Availability

Avaya Aura® Contact Center Mission Critical High Availability is supported with a number of Contact Center solutions running on the Avaya Aura® Unified Communications platform. While these Avaya Aura® Contact Center solutions are similar in behavior, differences are seen depending on the platform components of each solution. Avaya Aura® Contact Center supports Mission Critical High Availability solutions:

- Mission Critical HA with Avaya Aura® platform resiliency
- Mission Critical HA without Avaya Aura® platform resiliency
- Mission Critical HA with Midsize Enterprise 6.2

To achieve the highest level of Mission Critical High Availability, with Avaya Aura® platform resiliency, you must have a SIP-enabled contact center with the following:

- Two Voice Contact Servers that include Contact Center Manager Server (CCMS), Communication Control Toolkit (CCT), and Contact Center Manager Administration (CCMA) configured as a High Availability pair.
- Two Multimedia Contact Servers configured as a High Availability pair. High Availability also supports CCMM co-resident with CCMS, CCT, and CCMA on a Voice and Multimedia Contact Server. You can use two Voice and Multimedia Contact Servers configured as a High Availability pair instead of two Voice Contact Servers and two Multimedia Contact Servers. A Voice and Multimedia Contact Server supports fewer agents than a separate Voice Contact Server and Multimedia Contact Server.
- Two or more Avaya Media Server Linux-based servers, configured as a High Availability pair.

  Avaya Media Server High Availability is supported only on Linux-based servers in Mission Critical High Availability solutions.
- Two Avaya Aura® Session Manager instances, Release 6.1 or 6.2.
- Two Avaya Aura® Application Enablement Services servers configured as a High Availability pair.
- Two Avaya Aura® Communication Manager servers configured as a High Availability pair.
- Redundant Ethernet switches.
- A Windows Active Directory Domain Controller and Domain Name System (DNS).

To achieve Mission Critical High Availability without platform resiliency, you must have a SIP-enabled Contact Center with the following:

- Two Voice Contact Servers that include Contact Center Manager Server (CCMS), Communication Control Toolkit (CCT), License Manager, and Contact Center Manager Administration (CCMA) configured as a High Availability pair.
- Two Multimedia Contact Servers configured as a High Availability pair. High Availability also supports CCMM co-resident with CCMS, CCT, and CCMA on a Voice and Multimedia Contact Server. You can use two Voice and Multimedia Contact Servers configured as a High Availability pair instead of two Voice Contact Servers and two Multimedia Contact Servers. A Voice and Multimedia Contact Server supports fewer agents than a separate Voice Contact Server and Multimedia Contact Server.
- Two or more Avaya Media Server Linux-based servers, configured as a High Availability pair.

  Avaya Media Server High Availability is supported only on Linux-based servers in Mission Critical High Availability solutions.
- One Avaya Aura® Session Manager (SM) instance, one Avaya Aura® Application Enablement Services (AES) server, and one Avaya Aura® Communication Manager (CM) server. Avaya Aura® Virtualized Environment (VE) 6.2 is supported in Mission Critical High Availability solutions without platform resiliency.

- Redundant Ethernet switches.
- A Windows Active Directory Domain Controller and Domain Name System (DNS).

Note:

This is the least resilient Mission Critical HA solution, as there is no platform resiliency. If an outage occurs on any of the Unified Communications components in this solution, the contact center agents can experience downtime, loss of call control, or call loss.

To achieve Mission Critical High Availability using Midsize Enterprise you must have a SIP-enabled Contact Center with the following:

- Two Voice Contact Servers that include Contact Center Manager Server (CCMS), Communication Control Toolkit (CCT), License Manager, and Contact Center Manager Administration (CCMA) configured as a High Availability pair.
- Two Multimedia Contact Servers configured as a High Availability pair. High Availability also supports CCMM co-resident with CCMS, CCT, and CCMA on a Voice and Multimedia Contact Server. You can use two Voice and Multimedia Contact Servers configured as a High Availability pair instead of two Voice Contact Servers and two Multimedia Contact Servers. A Voice and Multimedia Contact Server supports fewer agents than a separate Voice Contact Server and Multimedia Contact Server.
- Two or more Avaya Media Server Linux-based servers, configured as a High Availability pair.

  Avaya Media Server High Availability is supported only on Linux-based servers in Mission Critical High Availability solutions.
- Two Midsize Enterprise 6.2 servers, configured for High Availability.
- Redundant Ethernet switches.
- A Windows Active Directory Domain Controller and Domain Name System (DNS).

In a Mission Critical HA solution, all of the above components must be in the same network subnet or campus network location. All Avaya Aura® Contact Center servers (CCMS, CCMA, CCT, and CCMM) must be in the same Windows Active Directory domain. All Avaya Aura® Contact Center servers must be registered with the same Windows Active Directory Domain Controller. All Avaya Aura® Agent Desktop clients must be registered in this domain, or in domains with a two-way trust relationship with this Contact Center server domain.

Avaya Aura® Contact Center supports Mission Critical High Availability (HA) resiliency for Contact Center Manager Server (CCMS), and Communication Control Toolkit (CCT). Avaya Media Server on the Linux operating system supports High Availability (HA) resiliency. Avaya Media Server High Availability is supported only on Linux-based servers. Contact Center Multimedia (CCMM) also supports High Availability.

One set of Contact Center applications (a CCMS, a CCT, and an optional CCMM) actively processes scripts and contacts. This set of applications is called the active set. Another set of Contact Center applications in the same contact center system monitors and shadows the active applications in the system. The standby applications track the state of active calls but do not process calls. The standby CCMS monitors the active CCMS. The standby CCT

monitors the active CCT. The standby CCMM monitors the active CCMM. Each active and standby pair of applications forms a resilient or replication pair. If any of the active applications fail, the standby applications recognize the failure and start processing contacts.

Contact Center Administrators use the active server in daily operation. Configuration changes made to the active system during normal operation are automatically copied to the standby applications, therefore the standby applications are configured and ready to take over processing from the active system. Statistical data is also automatically copied to the standby applications. Data is replicated to the standby applications in real-time.

Hot-standby High Availability

To achieve Hot-standby High Availability with no single point of failure you must have an AML-based contact center with the following:

- Two Voice Contact Servers that include Contact Center Manager Server (CCMS), Communication Control Toolkit (CCT) and Contact Center Manager Administration (CCMA) configured as a High Availability pair.
- Optionally, two Multimedia Contact Servers configured as a High Availability pair. High Availability also supports CCMM co-resident with CCMS, CCT, and CCMA on a Voice and Multimedia Contact Server. You can use two Voice and Multimedia Contact Servers configured as a High Availability pair instead of two Voice Contact Servers and two Multimedia Contact Servers. A Voice and Multimedia Contact Server supports fewer agents than a separate Voice Contact Server and Multimedia Contact Server.
- Avaya Communication Server 1000 High Availability PBX.
- Redundant Ethernet switches.

All of the above components must be in the same network subnet or campus network location.

Avaya Aura® Contact Center supports hot-standby High Availability (HA) resiliency for Contact Center Manager Server (CCMS), Communication Control Toolkit (CCT), and Contact Center Multimedia (CCMM).

One set of Avaya Aura® Contact Center applications (a CCMS, a CCT, and an optional CCMM) actively processes scripts and contacts. This set of applications is called the active set. Another set of Contact Center applications in the same contact center system, runs in hot-standby mode. This standby set of Contact Center applications monitors and shadows the active applications in the system and does not process calls. The standby CCMS monitors the active CCMS. The standby CCT monitors the active CCT. The standby CCMM monitors the active CCMM. Each active and standby pair of applications forms a resilient or replication pair. If any of the active applications fail, the standby applications recognize the failure and start processing contacts.

Contact Center Administrators use the active server in daily operation. Configuration changes made to the active system during normal operation are automatically copied to the standby

applications, therefore the standby applications are configured and ready to take over processing from the active system. Statistical data is also automatically copied to the standby applications. Data is replicated to the standby applications in real-time.

Warm standby High Availability

Avaya Aura® Contact Center supports the following Warm standby High Availability solutions.

Avaya Aura® Call Center Elite voice and Avaya Aura® Contact Center multimedia complement configuration:

- Two AACC Multimedia Complement for Elite servers configured as a High Availability pair.
- Avaya Aura® Call Center Elite.
- Redundant Ethernet switches.
- This configuration is supported only for Campus High Availability.

Avaya Aura® Contact Center Multimedia in standalone configuration:

- Two No Switch Configured — Voice and Multimedia Contact Server with Avaya Media Server servers configured as a High Availability pair.
- Redundant Ethernet switches.
- This configuration is supported only for Campus High Availability.

All of the above components must be in the same network subnet or campus network location.

Warm standby High Availability solutions do not support geographic redundancy.

Avaya Aura® Contact Center supports Warm standby High Availability (HA) resiliency for Contact Center Manager Server (CCMS), Communication Control Toolkit (CCT), and Contact Center Multimedia (CCMM).

One set of Avaya Aura® Contact Center applications (a CCMS, a CCT, and an optional CCMM) actively processes scripts and contacts. This set of applications is called the active set. Another set of Contact Center applications in the same contact center system, runs in standby mode. This standby set of Contact Center applications monitors and shadows the active applications in the system and does not process calls. The standby CCMS monitors the active CCMS. The standby CCT monitors the active CCT. The standby CCMM monitors the active CCMM. Each active and standby pair of applications forms a resilient or replication pair. If any of the active applications fail, the standby applications recognize the failure and start processing contacts.

Contact Center Administrators use the active server in daily operation. Configuration changes made to the active system during normal operation are automatically copied to the standby

applications, therefore the standby applications are configured and ready to take over processing from the active system. Statistical data is also automatically copied to the standby applications. Data is replicated to the standby applications in real-time.

Avaya Communication Server 1000 and Contact Center High Availability

Avaya Aura® Contact Center supports High Availability when using an Avaya Communication Server 1000 PABX. The level of High Availability supported depends on your entire solution, including the Avaya Communication Server 1000 release and installation type.

In AML-based Hot-standby High Availability solutions, if a Contact Center application or server fails, calls in progress between a customer and an agent are maintained, but agents must manually log back on again after the switchover.

The following table lists the level of Contact Center application High Availability supported for each Avaya Communication Server 1000 release and installation type.

Table 12: Avaya Communication Server 1000 High Availability support level summary

CS 1000 Release	HA Level	Agent experience after switchover
7.0, 7.5, 7.6	Hot-standby HA	Agents log back on.
Important: If a Contact Center application or server fails, voice calls in progress between a customer and an agent are maintained in Hot-standby High Availability.		

Avaya Aura® Unified Communications platform and Contact Center High Availability

Avaya Aura® Contact Center supports High Availability when using an Avaya Aura® Unified Communications platform. The level of High Availability supported depends on your entire solution, including the Unified Communications platform release, patch level, and installation type.

Contact Center High Availability supports:

- Avaya Aura® Communication Manager (Avaya Aura® CM) 6.2, Avaya Aura® Session Manager (SM) 6.2, and Avaya Aura® Application Enablement Services (AES) 6.1.2.0.32 or 6.2.

  OR

- Avaya Aura® Communication Manager (Avaya Aura® CM) 6.0.1, Avaya Aura® Session Manager (SM) 6.1, and Avaya Aura® Application Enablement Services (AES) 6.1.

  OR

- Avaya Aura® Solution for Midsize Enterprise (ME) 6.2

Note:

The Avaya Aura® Solution for Midsize Enterprise (ME) 6.2 does not support geographic High Availability. Both ME servers must be in close proximity (within 100 meters) so that they can be connected with an Ethernet crossover cable.

For more information about Contact Center High Availability and the Unified Communications platform, see *Avaya Aura® Contact Center Fundamentals* (NN44400-110). For more information about the Unified Communications platform, including the required patch levels, see *Avaya Aura® Contact Center Configuration – Avaya Aura® Unified Communications Platform Integration* (NN44400-521).

The following table lists the level of Contact Center application High Availability supported for each Avaya Aura® Unified Communications platform release and installation type.

Table 13: Avaya Aura® Unified Communications platform HA support level summary

PABX	Release	HA Level	Agent experience after switchover
Avaya Aura® CM/SM/AES	6.0.1/6.1/6.2	Mission Critical HA	Agent logon state is maintained.
ME	6.2	Mission Critical HA	Agent logon state is maintained.

Important:

If a Contact Center application or server fails, voice calls in progress between a customer and an agent are maintained in Mission Critical High Availability.

High Availability levels supported

The level of Contact Center application High Availability supported depends on your entire solution, including the PABX platform.

The following table lists the level of Contact Center application High Availability supported for each PABX release and installation type.

Table 14: Contact Center application High Availability support level summary

PABX	Release	AML/SIP	HA Level	Agent Experience after switchover
Avaya Aura® CM/SM/AES	6.0.1/6.1/6.2	SIP	Mission Critical HA	Agent logon state is maintained.
ME[Note 1]	6.2	SIP	Mission Critical HA	Agent logon state is maintained.
CS 1000	7.0, 7.5, 7.6	AML	Hot-standby HA	Agents log back on.

[Note 1] In total, if the active ME server fails, it can take up to ten minutes for a switchover/failover on the ME to complete. If an active Contact Center application fails, the switchover to the standby server completes in seconds.

Important:

If a Contact Center application or server fails, voice calls in progress between a customer and an agent are maintained in High Availability solutions.

Standby server requirements

The standby server specification must match the active server. The standby server must have the same hard disk partitions, the same amount of memory, and the same CPU type. The standby server must have the Contact Center software installed on the same partitions as the active server. The active and standby servers must have the same patch level and the same operating system updates.

Important:

In a SIP-enabled contact center using an Avaya Aura® Unified Communications platform and High Availability resiliency, the active and standby CCMS servers must both have TLS certificates in place to communicate securely with the Avaya Aura® Unified Communications platform and to support High Availability switchover.

Remote Geographic Node server requirements

The High Availability feature supports Remote Geographic Nodes. Remote Geographic Nodes are similar to the standby servers but they are used only to shadow data from the active server —they have no other responsibility. Remote Geographic Nodes do not automatically take over

if the active system fails. If the standby server and active server are in the same building, then a Remote Geographic Node on remote site provides additional data protection by maintaining a remote copy of the configuration and statistical information.

The Remote Geographic Node server must match the active server. The Remote Geographic Node server must have the same hard disk partitions, the same amount of memory, the same CPU type, and the same Operating System patches. The Remote Geographic Node server must have the Contact Center software installed on the same partitions as the active server and it must be patched to the same level. The active and standby servers must have the same patch level and the same operating system updates.

High Availability Network Timeout optimization

This section describes how to optimize the Contact Center Mission Critical High Availability feature for your network.

Avaya Aura® Contact Center supports High Availability for fault tolerant and mission critical contact centers. In High Availability contact center solutions, the Active server actively processes scripts and contacts. A Standby server in the same contact center solution monitors and shadows the Active server. Each Active and Standby pair of servers forms a High Availability resilient or replication pair. If the Active server fails, the Standby server detects the failure and starts processing calls.

The level of Contact Center application High Availability you achieve depends on your complete enterprise contact center solution, including the underlying network infrastructure. In a Mission Critical High Availability solution, the Active and Standby servers are constantly communicating with each other and monitoring system components. The High Availability - System Management and Monitoring Component (SMMC) monitors network communications, network latency, and contact center components. If a Contact Center component or network link fails, SMMC detects this failure and takes appropriate action.

If a network communication failure occurs, the Active and Standby servers use a Trusted IP address to diagnose network connectivity faults. Avaya recommends that you use the IP address of some part of your IT infrastructure, that is always available to respond to a ping request, as the Trusted IP address.

If SMMC on the Active server cannot communicate with SMMC on the Standby server, SMMC pings the Trusted IP address to determine if the network outage is local or remote. If the Active server SMMC can communicate with the Trusted IP address, the network outage is remote and the Active server continues processing contacts. If the Active server SMMC cannot communicate with the Trusted IP address, the network outage is local. Therefore the Active server stops processing contacts, and SMMC on the Standby server enables processing calls.

If SMMC on the Standby server cannot communicate with the Active Server, but can communicate with the Trusted IP address, SMMC enables call processing on the Standby server.

To support the Mission Critical HA switchover of contact center voice calls, SMMC must quickly determine if communication delays are due to normal network latency or if the delays are indicative of a network outage. SMMC balances the need for a rapid response to network outages with the need to avoid unnecessary switchovers. SMMC uses a network latency threshold (defined in milliseconds) to differentiate between normal network latency and a network outage.

- Network communication delays shorter than the threshold are treated as expected delays.
- Network communication delays longer than the threshold are treated as potential network outages, and SMMC considers corrective action.

You must configure the High Availability SMMC “Network Timeout” threshold value high enough to be tolerant of normal network latency, but low enough to be responsive if a network failure occurs.

High Availability Network Timeout calculation

The High Availability-System Management and Monitoring Component (SMMC) uses a Network Timeout threshold value to distinguish between normal network latency and a potential network outage. The SMMC Network Timeout is the length of time SMMC network connectivity tests can continue to fail consecutively before corrective action is considered.

SMMC tests network connectivity between High Availability components every 100 milliseconds (100ms) by default. The High Availability SMMC-Network Timeout value sets the maximum length of time these network connectivity tests can continue to fail consecutively before corrective action is considered. The default Network Timeout is 400ms.

For example:

If SMMC Network Timeout is set to 400ms, High Availability requires 4 consecutive failed network connectivity tests before the remote system is marked as unreachable. In this case, if switchovers are enabled, an attempt to switch over is made.

It is important that you determine the optimum SMMC Network Timeout threshold value for your contact center network. If the threshold is set too high, High Availability may not recognize network outages and switchovers may not occur when necessary. If the Network Timeout threshold is set too low, frequent and unnecessary switchovers may occur. This is basically a matter of determining how long SMMC waits before declaring a network delay as a potential network outage and taking the appropriate action.

SMMC tests network connectivity between High Availability components and it records the details of these connectivity tests in trace log files. The SMMC trace log files contain sufficient statistical data about SMMC communications in your network to characterize the network behavior for a High Availability contact center solution. You can use this SMMC statistical communications data to optimize your solution configuration.

You use the Network Log Analyzer utility (NetworkLogAnalyser.exe) to analyze the SMMC trace log files and determine the optimum Network Timeout value for your network.

The Network Log Analyzer utility (NetworkLogAnalyser.exe) is installed on each CCMS server in the SMMC utility default location:

```
D:\Avaya\Contact Center\Manager Server\CCSMMC\util
```

For additional help and instructions about using the Network Log Analyzer utility, open a command prompt in the SMMC utility directory and type “NetworkLogAnalyser.exe -h”. The SMMC utility directory also contains a Microsoft Excel spreadsheet “network-analysis.xlsm”.

To determine the optimum HA SMMC Network Timeout threshold value:

1. Install the Active and Standby servers in your enterprise contact center network.
2. Using the HA utility, configure the HA servers using the default Network Timeout value of 400ms.
3. Do not select “Enable Switchover”.

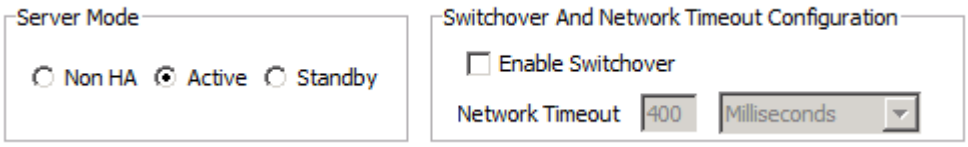


Figure 6: Example of High Availability utility with the default Network Timeout setting

4. Leave the servers running for a number of days and do not disturb the network subnet where the HA nodes are installed and running.
5. After a few normal busy days, retrieve the Active server SMMC log files from the folder `D:\Avaya\Logs\Common Components\SMMC`:

```
– CC_SMMC_NM_X.log
```

6. Copy the SMMC log files into the same folder as the Network Log Analyzer utility.
7. On the Active server, at the command prompt, type:

```
NetworkLogAnalyser.exe CC_SMMC_NM_1.log CC_SMMC_NM_2.log...
```

8. The Network Log Analyzer utility processes the SMMC statistical network data in the log file and recommends a Network Timeout value. For example:

```
$> NetworkLogAnalyser.exe CC_SMMC_NM_1.log

....

....

===== OUTAGES PACKET DATA ANALYSIS END ====

Recommendation:

---------------

Network Timeout= 2x Max(Outage_Duration)= 2x 325ms = 650ms
```

While processing the statistical data, the Network Log Analyzer utility also produces a coma-separated file (network-analysis.csv) that can be imported in to Microsoft Excel using the “network-analysis.xlsm” spreadsheet.

9. Using the HA utility, re-configure the Active server Network Timeout value. In the above example the recommended Network Timeout value is 650 ms, enter this optimized Network Timeout value in the HA configuration utility.
10. Select HA “Enable Switchover”.

Your High Availability settings are now optimized to your enterprise contact center network. The High Availability - System Management and Monitoring Component (SMMC) is now configured to be responsive to network outages, without causing unnecessary switchovers.

Campus network requirements

Contact Center supports the Active/Standby High Availability model. The active server processes contacts. The standby server takes over if the active server fails or is shutdown for maintenance.

A Managed IP address is a virtual IP address that is attached to a Network Interface Controller (NIC) on the active server. Each High Availability application server is assigned a static IP address. After the active server in each replication pair is determined, the active server attaches the Managed IP address to its network interface. The Managed IP address is assigned only to the active server. All other contact center applications and clients connect to that active application using the Managed IP address. If the standby server takes over call processing and becomes the active application, it hosts this same Managed IP address. The active server stops hosting the Managed IP when it stops being the active server. When the standby server starts-up to take over call processing, it attaches the Managed IP address to it’s network interface.

The Managed IP address of the High Availability pair, the IP address of the active server, and the IP address of the standby server must all be in the same network subnet IP address range. For example, if the active server IP address is 172.1.1.X and the standby server IP address is 172.1.1.Y, then the Managed IP address for the High Availability pair must be 172.1.1.Z. The network subnet IP address range is controlled by the subnet mask.

Dynamic Host Configuration Protocol (DHCP)

Avaya Aura® Contact Center server applications (CCMS, CCMA, CCT, CCMM, and LM) do not support Dynamic Host Configuration Protocol (DHCP). All Avaya Aura® Contact Center servers must have a static IP address.

Network resiliency

Use Link Aggregation Control Protocol (LACP) and NIC Teaming to eliminate network points of failure in the contact center solution.

Link Aggregation Control Protocol

Link Aggregation Control Protocol (LACP) provides a method to control the bundling of several physical ports together to form a single logical channel. LACP allows a network device to negotiate an automatic bundling of links by sending LACP packets to the peer (directly connected device that also implements LACP).

NIC teaming

NIC teaming is the process of grouping together several physical NICs into one single logical NIC, which can be used for network fault tolerance and transmit load balance. The process of grouping NICs is called teaming. By teaming more than one physical NIC to a logical NIC, high availability is maximized. If one NIC fails, the network connection does not cease and continues to operate on other NICs.

Typically, you configure Network Interface Card (NIC) teaming using hardware specific utilities supplied by your server or hardware manufacturer. For more information about configuring NIC teaming, see your server documentation.

Campus High Availability supports LAN environments where the round trip delay between the Active and Standby servers is less than 80ms, with less than 0.5% packet loss.

Geographic network requirements

In a Geographic High Availability environment the active and Remote Geographic Node servers are typically located in different subnets (WAN).

The main advantages of Geographic High Availability are:

- Support for database shadowing over WAN.
- Added resiliency and Disaster Recovery in the event of primary site failure.

Avaya recommends using Link Aggregation Control Protocol (LACP) and NIC Teaming to eliminate network points of failure in the contact center solution.

Dynamic Host Configuration Protocol (DHCP)

Avaya Aura® Contact Center server applications (CCMS, CCMA, CCT, CCMM, and LM) do not support Dynamic Host Configuration Protocol (DHCP). All Avaya Aura® Contact Center servers must have a static IP address.

Network resiliency

Use Link Aggregation Control Protocol (LACP) and NIC Teaming to eliminate network points of failure in the contact center solution.

Link Aggregation Control Protocol

Link Aggregation Control Protocol (LACP) provides a method to control the bundling of several physical ports together to form a single logical channel. LACP allows a network device to negotiate an automatic bundling of links by sending LACP packets to the peer (directly connected device that also implements LACP).

NIC teaming

NIC teaming is the process of grouping together several physical NICs into one single logical NIC, which can be used for network fault tolerance and transmit load balance. The process of grouping NICs is called teaming. By teaming more than one physical NIC to a logical NIC, high availability is maximized. If one NIC fails, the network connection does not cease and continues to operate on other NICs.

Typically, you configure Network Interface Card (NIC) teaming using hardware specific utilities supplied by your server or hardware manufacturer. For more information about configuring NIC teaming, see your server documentation.

Geographic High Availability supports WAN environments where the round trip delay between the Active and Remote Geographic Node servers is less than 80ms, with less than 0.5% packet loss.

Chapter 9: Server virtualization support

Avaya Aura® Contact Center supports server virtualization. In a virtualized environment, a single physical computer runs software that abstracts the physical computer's resources so that they may be shared between multiple virtual computers. In virtualization, the term host server refers to the actual physical hardware server on which the virtualization takes place. The term guest refers to a virtual machine on the host server.

This section provides information about engineering and commissioning Avaya Aura® Contact Center using virtualization.

The benefits of using virtualization include the following:

- Decrease hardware, power, and cooling costs by running multiple operating systems on the same physical server.
- Lower management overhead costs by reducing the hardware footprint in the contact center.
- Guarantee high levels of performance for the most resource-intensive applications.
- Consolidate hardware resources with a production-proven and secure server virtualization platform.

Avaya Aura® Contact Center supports the following virtualization environments:

- VMware vSphere Release 4.1 (ESXi and ESX) and 5.0 (ESXi)
- Microsoft Hyper-V

Important:

Avaya Media Server is supported only on VMware vSphere Release 5.0 (ESXi version).

Using virtualization in a contact center enterprise solution requires careful up-front planning, engineering, and implementation. While the technical and business advantages are clear, virtualization imposes extra considerations when designing the contact center solution architecture. Virtualization supports security and fault isolation. Environmental isolation allows multiple operating systems to run on the same machine. While virtualization offers these forms of isolation, virtualization environments do not provide performance isolation. The behavior of one virtual machine can adversely affect the performance of another virtual machine on the same host. Most modern virtualization environments provide mechanisms that you can use to detect and reduce performance interference. You must carefully engineer your virtualized contact center solution to avoid performance interference.

If you plan to install non-Avaya Aura® Contact Center software applications on the other guests of a host server with Contact Center installed, you must carefully analyze the impact of these applications on the contact center solution and provide extra performance isolation to safeguard Contact Center functionality.

Deploy Avaya Aura® Contact Center on an enterprise-grade virtual environment with the most recent hardware that supports hardware-assisted virtualization. Avaya recommends that you apply virtualization

planning, engineering, and deployment with full organizational support for virtualization rather than organically growing a virtualization infrastructure.

Avaya Aura® Contact Center migrations

Avaya Aura® Contact Center Release 6.3 supports migration from physical to virtual servers, and from virtual to physical servers. This is dependant on the server you are migrating to satisfying the server specifications. For more information on migration, see *Avaya Aura® Contact Center Upgrade and Patches* (NN44400-410).

VMware support

Avaya Aura® Contact Center supports VMware vSphere Release 4.1 and 5.0. VMware vSphere allows multiple copies of the same operating system or several different operating systems to run as guests on a large x86-based host hardware server. You must ensure that each guest (virtual machine) on which you plan to install Contact Center software satisfies the capacity requirements and specifications for your contact center. Use the guidelines in Server Specifications on page 331 to determine the capacity requirements and specifications for your contact center configuration.

Avaya Aura® Contact Center does not support the following:

- VMware VMotion
- VMware High Availability
- VMware Fault Tolerance
- VMware Suspend and Resume

Navigation:

The following table shows Avaya Aura® Contact Center VMware support for each server type and platform.

Table 15: Avaya Aura® Contact Center VMware support by server type

Voice Platform	Server type	Guest OS	Supported
SIP-enabled Avaya Aura® Unified Communications platform	Voice and Multimedia Contact Server without Avaya Media Server	Windows	Yes
	Voice Contact Server Only	Windows	Yes
	Multimedia Contact Server Only	Windows	Yes
	Voice and Multimedia Contact Server with Avaya Media Server	Windows	No
	Avaya Media Server	Linux	Yes[Note 1]
AML-based Avaya Communication Server 1000 (CS 1000)	Voice and Multimedia Contact Server without Avaya Media Server	Windows	Yes
	Voice Contact Server Only	Windows	Yes
	Multimedia Contact Server Only	Windows	Yes
	Knowledge Worker Server Only	Windows	Yes
Avaya Aura® Call Center Elite	AACC Multimedia Complement for Elite	Windows	Yes
No voice platform (No Switch configured)	Voice and Multimedia Contact Server with Avaya Media Server	Windows	No
All voice platform types	Network Control Center Server Only	Windows	Yes
All voice platform types	Security Framework Server	Windows	Yes

- **Note 1:** Where Avaya Media Server on Linux is installed as a VMware guest on the same VMware host as Avaya Aura® Contact Center, Avaya Aura® Contact Center supports only two guests on the host server; one guest for Avaya Media Server (Linux), and another guest for the Voice and Multimedia Contact Server (Windows). No other guests are supported on this VMware host.

The Windows version of Avaya Media Server is not supported on VMware.

The following are some examples of Avaya Aura® Contact Center solutions using VMware.

Examples of small to medium size SIP-enabled Contact Center solutions

The following diagram shows a virtualized Avaya Aura® Contact Center example solution. This solution is based on the SIP-enabled Avaya Aura® Unified Communications platform. The diagram shows a Voice and Multimedia Contact Server on a Windows virtual machine. Avaya Media Server is installed on a physical Linux server.

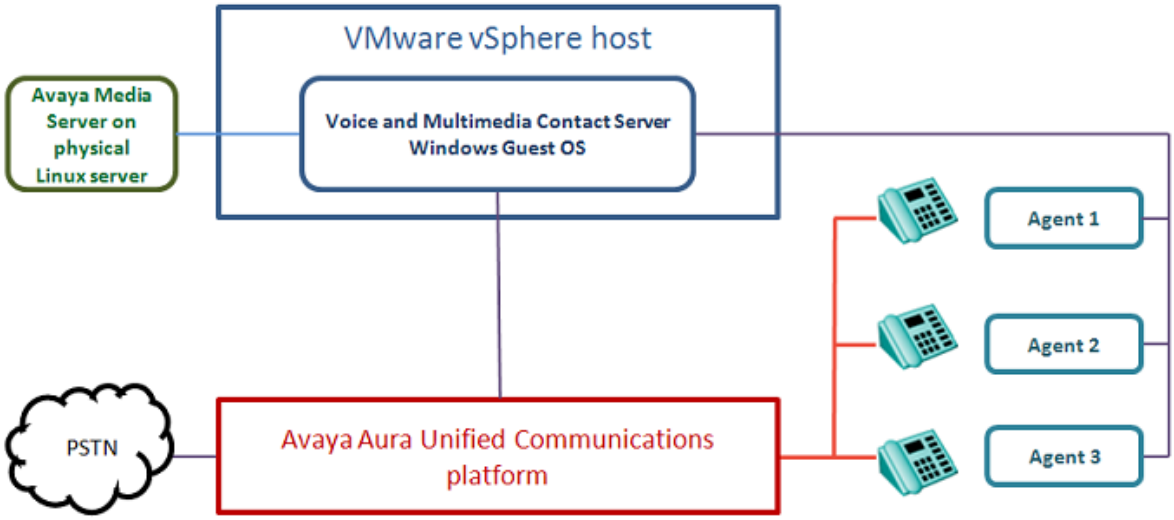


Figure 7: A typical SIP-enabled solution with virtualized Avaya Aura® Contact Center

The following diagram shows another virtualized SIP-enabled example solution. The diagram shows a Voice and Multimedia Contact Server on a Windows virtual guest. Avaya Media Server is installed on a virtual Linux guest. Avaya Media Server and the Voice and Multimedia Contact Server are installed on separate VMware host servers.

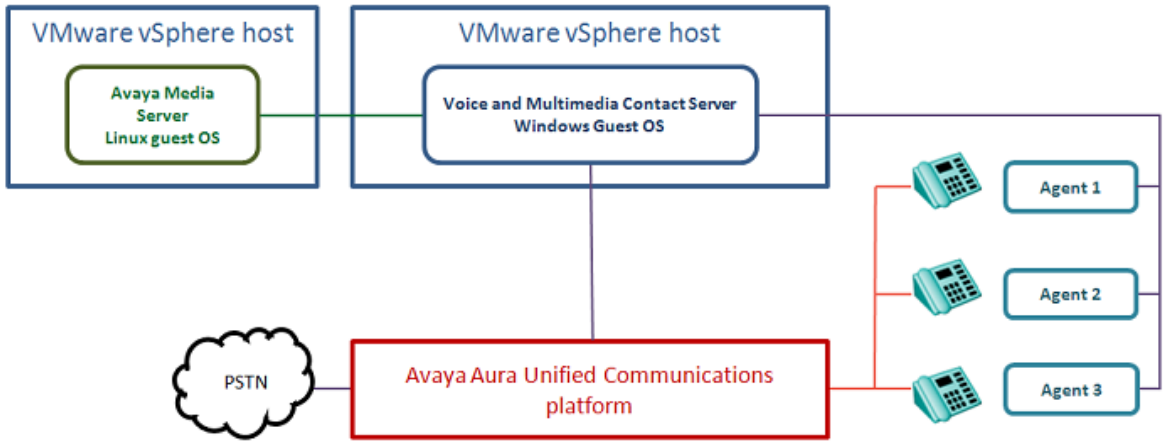


Figure 8: An example solution with Avaya Media Server and Avaya Aura® Contact Center on separate VMware host servers

For these small to medium size solution types, Avaya Aura® Contact Center supports Security Framework and Network Control Center as VMware guests on the same host as the Voice and Multimedia Contact Server.

Examples of large SIP-enabled Contact Center solutions

The following diagram shows a virtualized Avaya Aura® Contact Center example solution with a large agent count. This solution is based on the SIP-enabled Avaya Aura® Unified

Communications platform. The diagram shows a Voice Contact Server on a Windows virtual machine, and Multimedia Contact Server on another Windows virtual machine. Avaya Media Server is installed a physical Linux server. Depending on the number of agents required, a large SIP-enabled solution may require more than one physical Avaya Media Server.

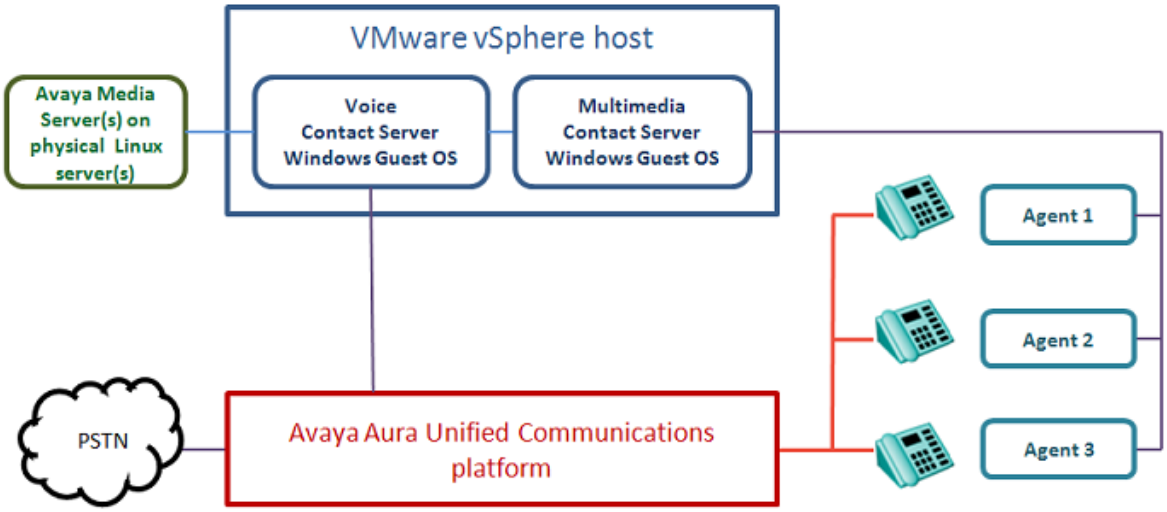


Figure 9: A typical SIP-enabled solution with virtualized Avaya Aura® Contact Center (large solution)

The following diagram shows another virtualized large SIP-enabled example solution. The diagram shows a Voice Contact Server on a Windows virtual machine, and Multimedia Contact Server on another Windows virtual guest. Avaya Media Server is installed on a virtual Linux guest. In this example, the Voice Contact Server and the Multimedia Contact Server are virtualized on one VMware host server. Avaya Media Server is virtualized on a separate VMware host server. Depending on the number of agents required, a large SIP-enabled solution may require more than one virtual Avaya Media Server.

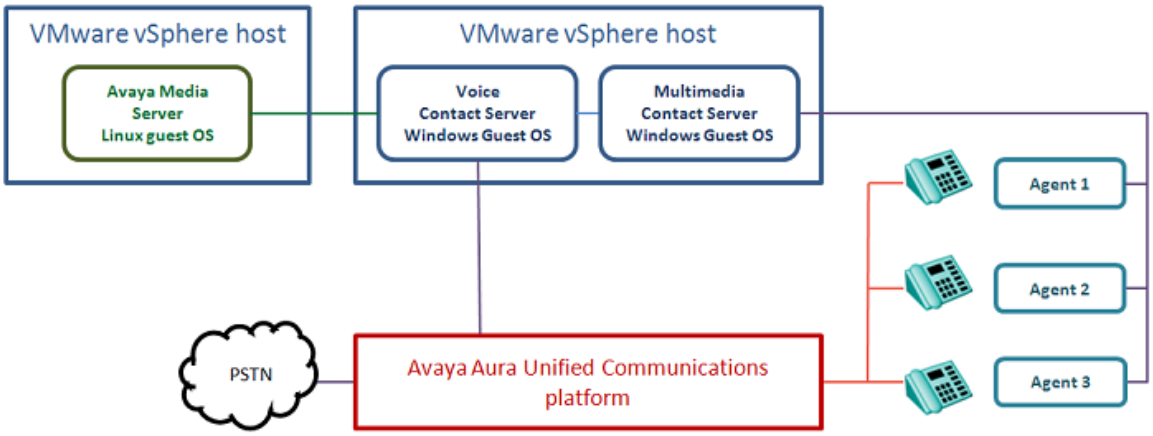


Figure 10: A typical large solution with Avaya Media Server and Avaya Aura® Contact Center on separate VMware host servers

Avaya Aura® Contact Center also supports Voice Contact Server and Multimedia Contact Server virtualized on separate VMware host servers.

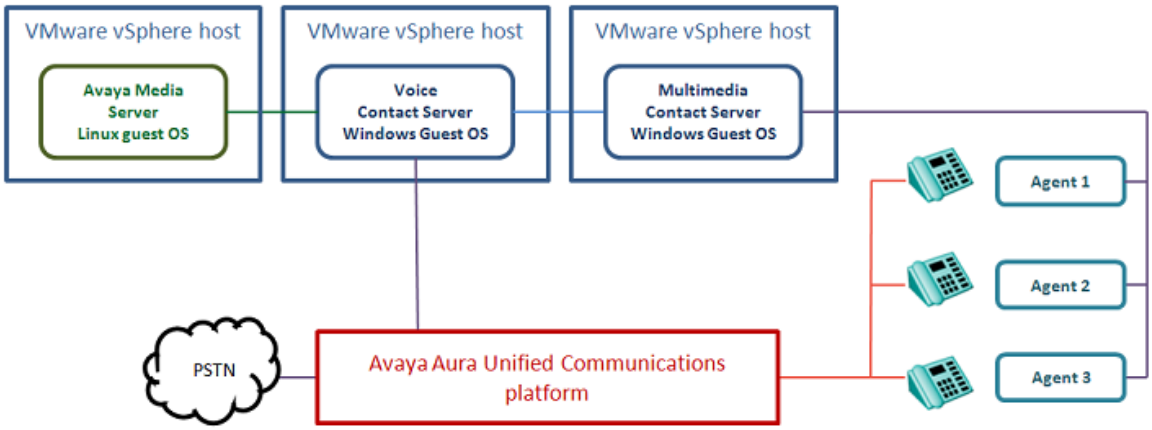


Figure 11: A typical large solution with all contact center servers on separate VMware host servers

For these large solution types, Avaya Aura® Contact Center supports Security Framework and Network Control Center as VMware guests on the same host as the Voice Contact Server or the Multimedia Contact Server.

Example of Avaya Media Server and Avaya Aura® Contact Center on the same VMware host server

The following diagram shows a typical virtualized solution with Avaya Aura® Contact Center and Avaya Media Server on the same VMware host server. This solution is based on the SIP-enabled Avaya Aura® Unified Communications platform. The diagram shows a Voice and Multimedia Contact Server on a Windows guest operating system (OS). Avaya Media Server

is installed on a Linux guest. In this example solution, Avaya Media Server and Avaya Aura® Contact Center are on the same VMware host server.

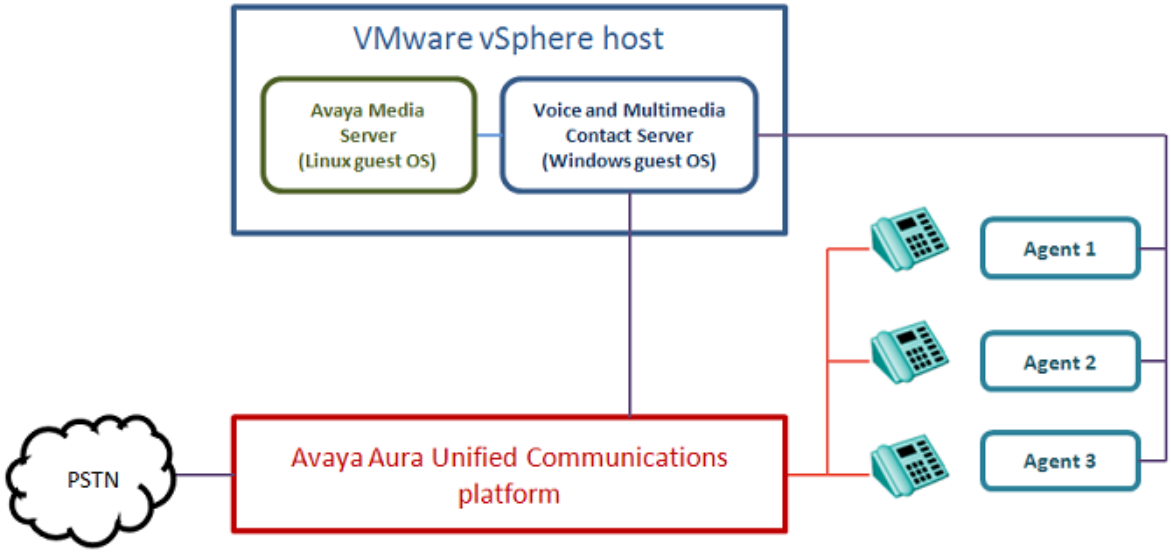


Figure 12: A typical solution with Avaya Media Server and Avaya Aura® Contact Center on the same VMware host server

When Avaya Aura® Contact Center and Avaya Media Server are virtualized on the same VMware host server, the host server supports only:

- One Avaya Aura® Contact Center Voice and Multimedia Contact Server without Avaya Media Server running on a guest operating system (Windows Server 2008 Release 2, 64-bit, Service Pack 1).
- One standalone Avaya Media Server server running on a guest operating system (Red Hat Enterprise Linux 6.x 32-bit only).

This configuration supports only two guests on the host; one guest for the Voice and Multimedia Contact Server (Windows), and another guest for Avaya Media Server (Linux). No other guests are supported on this VMware host.

Avaya Aura® Contact Center does not support Security Framework or Network Control Center as VMware guests on the same host server as Avaya Media Server. Avaya Aura® Contact Center supports Security Framework and Network Control Center as VMware guests on a different VMware host. For more information about the VMware specifications for this type of solution, see Avaya Media Server and Contact Center on one VMware host on page 347.

Example of a CS 1000 AML-based medium size Contact Center solution

The following diagram shows a typical virtualized Avaya Aura® Contact Center solution. This solution is based on the Avaya Communication Server 1000 platform. The diagram shows a Voice and Multimedia Contact Server on a Windows virtual machine.

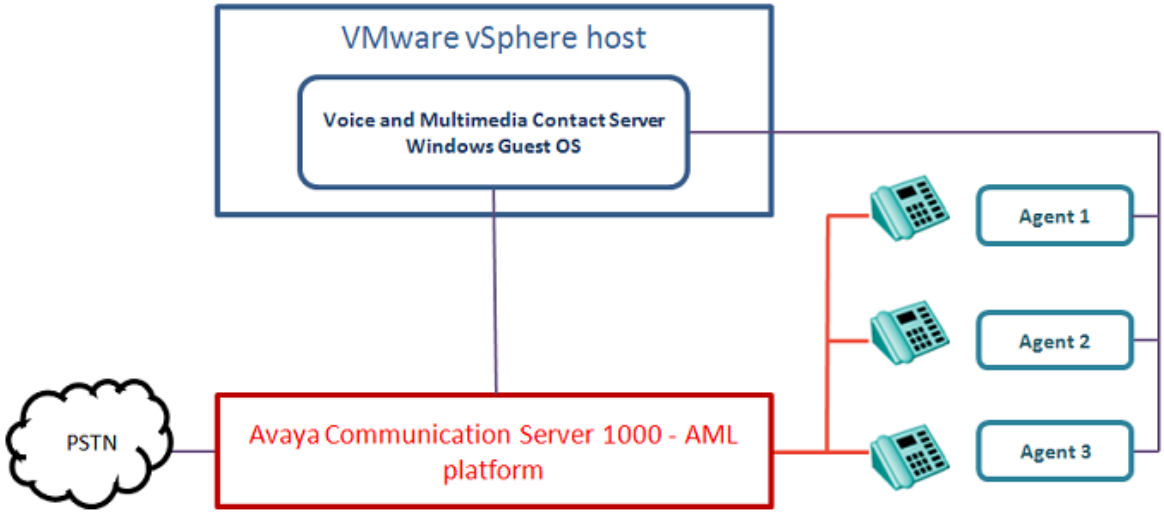


Figure 13: A typical CS 1000 AML-based solution with virtualized Contact Center (small to medium solution)

For this solution type, Avaya Aura® Contact Center supports Security Framework and Network Control Center as VMware guests on the same host as the Voice and Multimedia Contact Server.

Examples of CS 1000 AML-based large Contact Center solutions

The following diagram shows a typical virtualized Avaya Aura® Contact Center solution. This solution is based on the Avaya Communication Server 1000 platform. The diagram shows a Voice Contact Server on a Windows virtual machine, and Multimedia Contact Server on another Windows virtual machine.

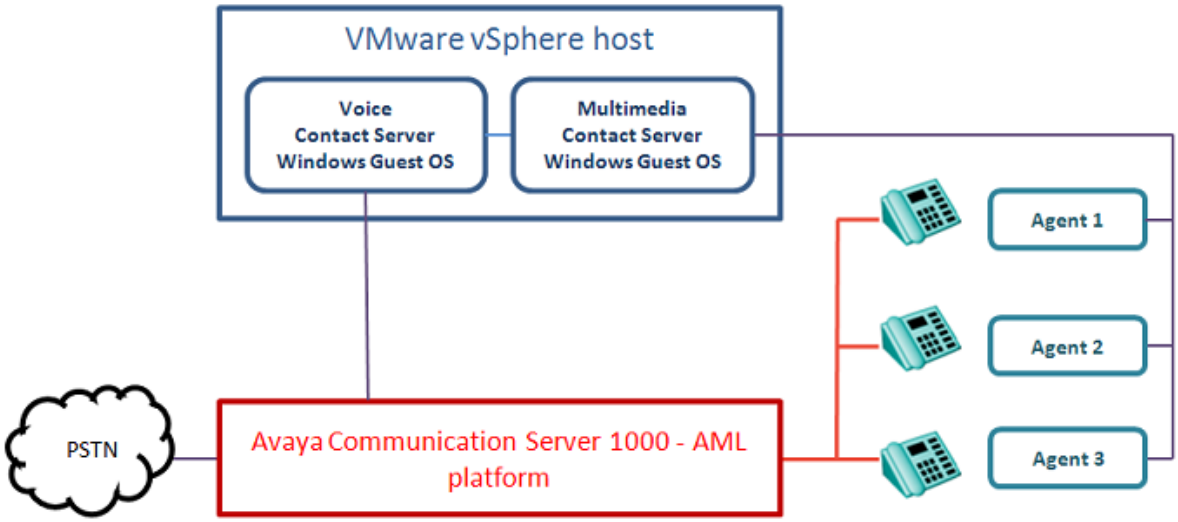


Figure 14: A typical CS 1000 AML-based solution with virtualized Contact Center (large solution)

Avaya Aura® Contact Center also supports Voice Contact Server and Multimedia Contact Server virtualized on separate VMware host servers.

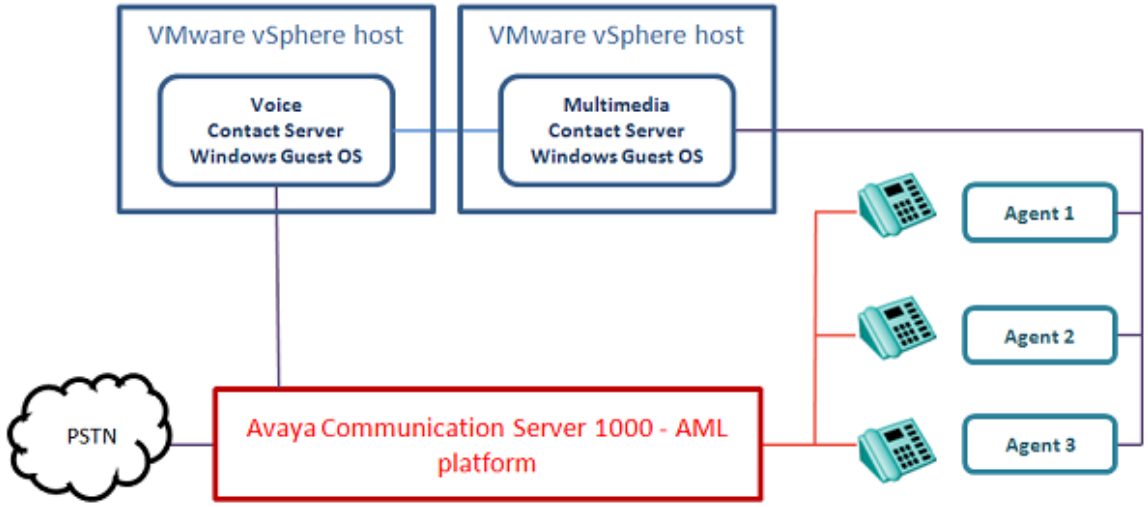


Figure 15: A typical CS 1000 based solution with contact center servers on separate VMware host servers

For this solution type, Avaya Aura® Contact Center supports Security Framework and Network Control Center as VMware guests on the same host as the Voice Contact Server and the Multimedia Contact Server.

Example of a Call Center Elite based Contact Center solution

The following diagram shows a typical virtualized Avaya Aura® Contact Center solution. This solution is based on the Avaya Aura® Call Center Elite voice-based call center. The diagram

shows AACC Multimedia Complement for Elite software on a Windows guest operating system (OS).

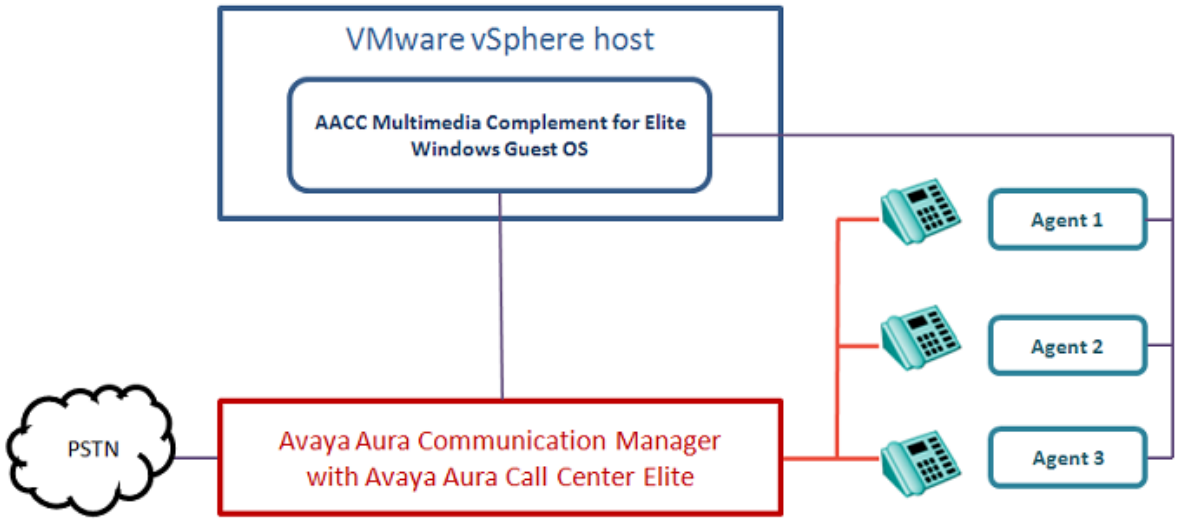


Figure 16: virtualized Contact Center solution

For this solution type, Avaya Aura® Contact Center supports Security Framework and Network Control Center as VMware guests on the same host as the AACC Multimedia Complement for Elite server.

VMware vSphere Host considerations

When configuring virtual machines (guests) on your host system, the total resources needed by the virtual machines running on the host server must not exceed the total capacity of the host. It is good practice to under-commit CPU and memory resources on the host. If the host CPU capacity is overloaded, Contact Center does not function correctly.

Important:

Avaya Aura® Contact Center is not supported on an over-committed host where the total virtual resources from all virtual machines hosted exceeds the physical resources of the host.

Hardware-Assisted Virtualization

Most recent enterprise-level processors from Intel and AMD support virtualization. There are two generations of virtualization support: the first generation introduced CPU virtualization; the second generation included CPU virtualization and added memory management unit (MMU) virtualization. For the best performance, make sure your system uses processors with at least second-generation hardware-assist features.

Hardware-Assisted CPU Virtualization (Intel VT-x and AMD AMD-V)

The first generation of hardware virtualization assistance includes VT-x from Intel and AMD-V from AMD. These technologies automatically trap sensitive interrupts, eliminating the overhead required to do so in software. This allows the use of a hardware virtualization (HV) virtual machine monitor (VMM).

Hardware-Assisted MMU Virtualization (Intel EPT and AMD RVI)

More recent enterprise-level processors also include a feature that addresses the overheads due to memory management unit (MMU) virtualization by providing hardware support to virtualize the MMU. VMware vSphere 4.1 and 5.0 support this feature both in AMD processors, where it is called Rapid Virtualization Indexing (RVI) or nested page tables (NPT), and in Intel processors, where it is called Extended Page Tables (EPT).

Storage Area Network (SAN)

A Storage Area Network (SAN) is a dedicated storage network that provides access to consolidated block level storage. SANs are used to make storage devices such as disk arrays, accessible to servers so that the devices appear as locally attached to the operating system.

When Avaya Aura® Contact Center is installed on virtual machines it supports a SAN. You must monitor the Contact Center demand on the SAN storage device. Adhere to your vendor-specific SAN configuration recommendations to ensure the SAN storage device meets the demands of Contact Center.

Disk drive provisioning

Provision sufficient hard disk drive space on the host server to support all the guest virtual machines, an ISO library, and provision additional space for snapshot image storage.

VMware Contact Center Guest Operating Systems

Provision each Avaya Aura® Contact Center virtual machine with at least the same specification as is listed for the physical server. The virtual machine must have at least the same amount of allocated memory and hard disk space as an equivalent physical server. The virtual hard disk must have the same size partitions as an equivalent physical server. For improved disk performance, configure the virtual hard disk to use the preallocated mode. The networking requirements of each virtual machine are the same as the networking requirements of an equivalent physical server.

Install the most recent version of the VMware Tools on each guest operating system.

For improved performance, follow these recommendations:

- Disable screen savers and Window animations on the virtual machines. Screen savers and animations all consume extra physical CPU resources, potentially affecting consolidation ratios and the performance of other virtual machines.
- Schedule backups and virus scanning programs in virtual machines to run at off-peak hours and do not schedule them to run simultaneously in multiple virtual machines on the same VMware host.

For more useful information of this type, read *Performance Best Practices for VMware vSphere* for the version of VMware vSphere you are using.

Overview of commissioning Contact Center with VMware

About this task

This section outlines how to engineer and install a virtualized environment to support Avaya Aura® Contact Center.

1. Read *Performance Best Practices for VMware vSphere* for the version of VMware vSphere you are using.
2. Each Contact Center server required equates to one guest virtual machine. The specification of each virtual machine must be at least the same as the specification of an equivalent physical Contact Center server.
3. Read your hardware provider's documents covering virtualization support.
4. Combine the individual Contact Center virtual machine specifications to determine the minimum specification for the Contact Center VMware vSphere host server hardware.
5. Obtain server hardware that meets the Contact Center host hardware specification and supports VMware vSphere.
6. Install the most recent BIOS available for your host server.
7. On the host server, disconnect or disable unused or unnecessary physical hardware devices such as: COM ports, LPT ports, USB controllers, Network interfaces, Storage controllers.
8. On the host server, enable all available Virtualization Technology options in the hardware BIOS:

   —For Intel based hosts: Enable Intel virtualization (VT-x) and if available enable Extended Page Tables (EPT).

   —For AMD based hosts: Enable AMD virtualization (AMD-V) and if available enable Rapid Virtualization Indexing (RVI).
9. If the host hardware and BIOS support hyper-threading, vSphere automatically makes use of it. For the best performance enable hyper-threading on the host server.
10. Install VMware vSphere software on the host server.
11. Using the vSphere client, configure each Contact Center guest virtual machine with the CPU, memory, and disk space required for your contact center configuration.
12. On each Contact Center guest virtual machine, completely disable time synchronization to the host time.
13. Add the Avaya Aura® Contact Center DVD Release 6.3 image to the vSphere ISO library.
14. Prepare each guest virtual machine for Avaya Aura® Contact Center:

- If you are installing a Contact Center application (CCMS, CCMA, CCT, LM or CCMM), configure disk partitions and install guest Windows Server 2008 Release 2 operating system.
- If you are installing Avaya Media Server, configure disk partitions and install guest Red Hat Enterprise Linux 6.x 32-bit operating system.

15. On each Avaya Aura® Contact Center guest virtual machine, perform the Contact Center server preparation procedures.
16. Install Avaya Aura® Contact Center software on the guest operating system.
17. Commission and deploy each Contact Center virtual machine as normal.
18. Capture the initial CPU and memory usage, as baseline performance metrics.
19. Continue to monitor the CPU and memory of each Avaya Aura® Contact Center guest virtual machine.
20. Continue to monitor all the resources of the vSphere host server, focusing on CPU, memory, and disk drive resources.

Performance monitoring and management

You must continuously monitor and measure the performance of the Contact Center host server. You can use VMware vSphere vCenter to measure the critical host performance metrics in real-time. VMware vCenter aggregates and archives performance data so that data can be visualised and reported on.

Configure VMware vCenter statistics collection to collect 5 minute and 30 minute Interval Duration data for the host at Statistics Level 3. Retain the 5 minute Interval Duration data for 3 days and retain the 30 minute Interval Duration for 1 week.

Generate performance reports using vCenter Report Performance and archive these reports to provide a baseline performance reference. Generate and store 1-day and 1-week reports. Store the associated vCenter Report Summary with the performance reports. You must analyze performance reports after changes to the host to assess the impact of the change on the host.

Monitor, acknowledge, and resolve VMware vCenter alarms. In particular, you must immediately investigate and resolve host CPU usage and host memory usage alarms.

In addition, the command-line tools “esxtop” and “resxtop” are available to provide a fine-grained look at real-time metrics. There are a number of critical CPU-related counters to watch out for:

- If the load average listed on the first line of the CPU Panel is equal to or greater than the number of physical processors in the system, this indicates that the system is overloaded.
- The usage percentage of physical CPUs on the PCPU line can indicate an overloaded condition. In general, 80 percent usage is a reasonable ceiling in production

environments. Use 90 percent as an alert to the VMware administrator that the CPUs are approaching an overloaded condition, which must be addressed.

- %RDY - The percentage of time a schedulable entity was ready to run but is not scheduled to a core. If %RDY is greater than 10 percent, then this can indicate resource contention.
- %CSTP - The percentage of time a schedulable entity is stopped from running to allow other vCPUs in the virtual machine to catch up. If %CSTP is greater than 5 percent, this usually means the virtual machine workload is not using VCPUs in a balanced fashion. High %CSTP can be an indicator of a system running on an unconsolidated snapshot.

For more information about using esxtop or resextop, see the *VMware Resource Management Guide*.

Memory Reservations

Use VMware Reservations to specify the minimum amount of memory for a Contact Center virtual machine. VMware Reservations maintain sufficient host memory to fulfill all reservation guarantees. ESX does not power-on a virtual machine if doing so reduces the amount of available memory to less than the amount reserved. Using reservations may reduce the total number of virtual machines that can be hosted on a VMware host server. After all resource reservations have been met, ESX allocates the remaining resources based on the number of shares and the resource limits configured for your virtual machine.

High Availability and virtualization

The Avaya Aura® Contact Center High Availability feature supports virtualization.

Avaya Aura® Contact Center supports High Availability and virtualization where:

- The Active, Standby, and Remote Geographic Node servers are all virtualized on separate VMware host servers.
- The Active and Standby servers are virtualized on separate VMware host servers, and the Remote Geographic Node is installed on a physical server.
- The Active and Standby servers are installed on physical servers, and the Remote Geographic Node is installed on a virtual server.

Important:

Avaya Aura® Contact Center supports High Availability only where the Primary and Backup Avaya Media Servers are installed on physical servers. Virtualized Avaya Media Servers do not support High Availability.

VMware Snapshot considerations

VMware snapshots save the current state of the virtual machine, so you can return to it at any time. Snapshots are useful when you need to revert a virtual machine repeatedly to the same state, but you don't want to create multiple virtual machines.

Important:

VMware snapshots are not supported on a virtualized Avaya MS server.

Important:

VMware snapshots are not a replacement for Avaya Aura® Contact Center database backup (and restore) procedures and practices. You must continue to perform regular and frequent Contact Center backups. For more information, see *Avaya Aura® Contact Center Routine Maintenance* (NN44400-514).

The following considerations apply when using snapshots with Avaya Aura® Contact Center on VMware:

- Snapshots must be taken during an Avaya Aura® Contact Center maintenance window. Do not take a snapshot of a Contact Center virtual machine while Contact Center is running. Snapshots have a negative impact on the performance of a virtual machine over time. You must consolidate snapshots at the end of the maintenance window.
- Create a snapshot for the Contact Center virtual machines all at the same time. Likewise, when you restore a snapshot, restore all snapshots to ensure the data is consistent across the Contact Center suite.
- In solutions using the Avaya Aura® Contact Center — High Availability feature, take a snapshot of the Active and Standby virtual machines at the same time. The Active and Standby virtual machines must be hosted on different host servers.
- When restoring snapshots, carefully consider the possible impact from out-of-date antivirus definitions, missed Microsoft Windows OS and security updates, and lapsed domain accounts on the contact center. Isolate the restored virtual machine until these issues are resolved.
- By default, a Windows Server 2008 machine account password is changed every 30 days. This is an important consideration when reverting to a snapshot of a virtual machine that has been in use for more than 30 days, as it may cause the machine to lose its connection to the Windows domain. If this issue occurs, rejoin the Windows Server 2008 virtual machine to the domain.

Time synchronization considerations

VMware time synchronization controls whether the virtual machine time is periodically resynchronized with the host server while it is running. Even if the VMware time synchronization

check box is unselected, VMware Tools by default synchronize the virtual machine's time after a few specific events that are likely to leave the time incorrect, and this causes Avaya Aura® Contact Center to fail.

In an Avaya Communication Server 1000 (CS 1000) AML-based solution, the time of the CCMS server must be synchronized with the time of the CS 1000 PABX. Therefore in a CS 1000 AML-based solution, follow the VMware instructions (KB 1189) to completely disable host time synchronization on the Contact Center Manager Server virtual machine.

Important:

In an Avaya Communication Server 1000 AML-based solution, you must disable Contact Center Manager Server virtual machine time synchronization to the VMware host server time.

Troubleshooting VMware

Virtualization platform performance issues can result with Contact Center performance problems. The virtualization platform includes the host and the running virtual machines on the host. The Contact Center performance problems can include (but are not limited to) high CPU usage, link instability, defaulted or abandoned calls.

You must logically and systematically investigate any Contact Center performance issues to rule out virtualization performance problems. All deviations from the published specifications must be investigated and resolved before the Contact Center software investigation is initiated. For more information, refer to the VMware vSphere documentation.

To support troubleshooting VMware resourcing issues, collect information about the following VMware Key Performance Indicators (KPIs).

VMware vSphere Host KPIs:

- Physical CPU
  - PCPU - Physical CPU usage.
  - CPU load average - Average CPU load average of host.
- Physical Memory
  - SWAP/MB - Memory swap usage statistics.

VMware vSphere Virtual Machine (VM) KPIs:

- vCPU
  - CPU RDY - Time VM was ready to run, but was not provided CPU resource.
  - CPU WAIT - Percentage of time spent in the blocked or busy wait state.
  - AMIN - Reservation allocated.

- ASHRS - CPU shares allocated.
- CPU CSTP - Amount of time a Symmetric Multi-Processing (SMP) VM was ready to run, but was delayed due to co-vCPU scheduling contention.

• Disk I/O

- GAVG - Average guest operating system read latency per read operation.
- DAVG/rd - Average device read latency per read operation.
- DAVG/wr - Average device write latency per write operation.
- RESETS/s - Number of commands reset per second.
- ABRTS/s - Number of disk commands aborted per second.

• Network

- %DRPTX - Percentage of packets dropped when transmitting.
- %DRPRX - Percentage of packets dropped when receiving.

• Memory

- MCTLSZ - Amount of physical memory reclaimed memory balloon statistics.

Hyper-V support

Avaya Aura® Contact Center supports Microsoft Hyper-V.

The following table shows Avaya Aura® Contact Center Hyper-V support for each server type and platform.

Table 16: Avaya Aura® Contact Center Hyper-V support by server type

Voice Platform	Server type	Virtual OS	Support
SIP-enabled Avaya Aura® Unified Communications platform	Voice and Multimedia Contact Server without Avaya Media Server	Windows	No
	Voice Contact Server Only	Windows	Yes
	Multimedia Contact Server Only	Windows	Yes
	Voice and Multimedia Contact Server with Avaya Media Server	Windows	No
	Avaya Media Server	Linux	No
AML-based Avaya Communication Server 1000 (CS 1000)	Voice and Multimedia Contact Server without Avaya Media Server	Windows	No
	Voice Contact Server Only	Windows	Yes

Voice Platform	Server type	Virtual OS	Support
	Multimedia Contact Server Only	Windows	Yes
	Knowledge Worker Server Only	Windows	Yes
Avaya Aura® Call Center Elite	AACC Multimedia Complement for Elite	Windows	No
No voice platform (No Switch configured)	Voice and Multimedia Contact Server with Avaya Media Server	Windows	No
All voice platform types	Network Control Center Server Only	Windows	Yes
All voice platform types	Security Framework Server	Windows	Yes

Avaya Media Server is not supported on Microsoft Hyper-V.

Each supported Contact Center server type must be installed stand-alone in its own single virtual machine instance on Hyper-V.

Hyper-V disk controller support

Microsoft Hyper-V virtual machines use a virtual IDE controller for the Operating System disk partition, even when the underlying Hyper-V server hardware uses a SCSI disk controller. When you install Avaya Aura® Contact Center software on a physical server, the DVD installer *System Readiness Checks* utility examines the physical server hardware for suitability. When you install Avaya Aura® Contact Center software on a virtual machine, the DVD *System Readiness Checks* utility examines the virtual machine for suitability. Avaya Aura® Contact Center does not support IDE controllers, therefore when installing Avaya Aura® Contact Center software on a Hyper-V virtual machine, the *System Readiness Checks* utility may display a “Hard dive type – IDE” warning message. You can ignore this warning if the underlying physical Hyper-V Server hardware uses one of the supported disk controllers: SCSI, SATA, or SAS.

Virtual Machine hardware requirements

Provision the Virtual Machine with the same (or higher) specification as is listed for the physical server, plus an additional CPU overhead of 15 percent over the recommended value in the physical server specification.

The Virtual Machine must have the same amount of allocated hard disk space as the equivalent physical server and the hard disk must have the same size partitions as the equivalent physical server. The networking requirements in Contact Center are the same as the networking requirement of each virtual machine.

You must configure the allocated memory on the Virtual Machine to support Contact Center. For more information, see Server Specifications on page 331.

Chapter 10: Determining capacity requirements

Your contact center infrastructure must meet the minimum requirements specified in this section before you attempt to install the Avaya Aura® Contact Center software.

Maximum capacity overview

The following table specifies the maximum overall capacity values supported by a multi-server Contact Center solution.

Table 17: Overview of maximum multi-server Contact Center capacity figures

Switch Type	Number of active agents	Calls per hour
Avaya Aura® 6.1 or 6.2 - SIP	3000	45 000
Avaya Aura® Virtualized Environment (VE) 6.2 - SIP	2000	30 000
Avaya Aura® Solution for Midsize Enterprise 6.1 or 6.2 - SIP	600	10 000
Avaya Aura® 5.2 - SIP	1000	15 000
Avaya Aura® Midsize Business Template 5.2.1 - SIP	300	6000
Avaya Communication Server 1000 - AML	5000	100 000
Avaya Communication Server 1000 - SIP	1500	30 000
No Switch - Multimedia only	3000	12 000
Multimedia Complement to Avaya Aura® Call Center Elite	3000	12 000

The following conditions apply to the table:

- The capacities supported on a server are limited by the server platform. Use the guidelines in Server Specifications on page 331 to determine the capacity of your server.
- These values are supported by Contact Center. Capacity values are also limited by telephone switch capacity. To find the limits for your telephone switch, check your telephone switch documentation.

Important:

Avaya Aura® Contact Center Release 6.3 does not support the Avaya Aura® Midsize Business Template (MBT) or Avaya Aura® Unified Communications Release 5.2 platforms for new installations. Existing Avaya Aura® Contact Center solutions using MBT or Avaya Aura® 5.2 may be expanded or upgraded.

Important:

Avaya Aura® Contact Center Release 6.3 does not support SIP-enabled Avaya Communication Server 1000 for new installations. Existing SIP-enabled Avaya Communication Server 1000 contact center installations may be expanded or upgraded.

For the complete list of capacity limits, see Maximum agent capacity and call rate values on page 136.

Single server capacity

The capacity (in terms of active agents and calls per hour) supported by a single server is less than the capacity supported by a multi-server Contact Center solution.

Table 18: Single server capacity limits

Switch Type	Voice agents	Calls per hour	Multimedia agents	Multimedia contacts per hour
Avaya Aura® 6.1 or 6.2 - SIP	300	6000	300	1200
Avaya Aura® Virtualized Environment (VE) 6.2 - SIP	300	6000	300	1200
Avaya Aura® Solution for Midsize Enterprise 6.1 or 6.2 - SIP	300	6000	300	1200
Avaya Aura® 5.2 - SIP	200	4000	200	1200
Avaya Aura® Midsize Business Template 5.2.1 - SIP	200	4000	200	1200
Avaya Communication Server 1000 - AML	1000	20 000	600	2400

Switch Type	Voice agents	Calls per hour	Multimedia agents	Multimedia contacts per hour
Avaya Communication Server 1000 - SIP	200	4000	200	1200
Multimedia Complement to Avaya Aura® Call Center Elite	N/A	N/A	3000	12 000

The number of agents a single server can support depends on the server specification, use the guidelines in Server Specifications on page 331 to determine the hardware requirements for your single server.

In a SIP-enabled contact center, the single server is the Voice and Multimedia Contact Server with Avaya Media Server.

In an AML-based contact center, the single server is the Voice and Multimedia Contact Server without Avaya Media Server.

Multi-server configurations

The number of servers required in a contact center solution depends on the number of active agents and on the server specifications.

The following table specifies the number of servers required for a specific number of voice and multimedia agents in an Avaya Aura® Unified Communications platform based contact center.

Table 19: SIP-enabled Contact Center application server capacity limits

Avaya Aura® 6.1 or 6.2	Voice multi server	Voice + MM multi server	Voice + MM multi server	Voice + MM multi server
SIP voice agents	600	1000	2000	3000
Multimedia agents	N/A	600	1000	3000
Number of AACC servers	1	2	2	2
Number of Avaya MS servers	1	1	2	3
Total number of servers (Non-HA)	2	3	4	5
Total number of servers (HA)	4	6	8	10

The following conditions apply to the Avaya Aura® Release 6.1 and 6.2, SIP-enabled Contact Center table:

- A Voice Contact Server supports up to 3000 active voice agents, depending on your PABX switch type.
- A Multimedia Contact Server supports up to 3000 multimedia agents.
- With the exception of the Multimedia-only option, the number of multimedia agents refers to the number of voice agents who can also be enabled for multimedia support.

The following table specifies the number of servers required for a specific number of voice and multimedia agents in an AML-based contact center.

Table 20: AML-based Contact Center application server capacity limits

CS 1000 AML-based	Voice multi server	Voice multi server	Voice + MM multi server	Voice + MM multi server	Voice + MM multi server
AML voice agents	1000	5000	1000	3000	5000
Multimedia agents	N/A	N/A	600	1000	3000
Total number of servers (Non-HA)	1	2	2	3	3
Total number of servers (HA)	2	4	4	6	6

The following conditions apply to the AML-based Contact Center table:

- A Voice Contact Server supports up to 5000 active voice agents.
- A Multimedia Contact Server supports up to 3000 multimedia agents.
- With the exception of the Multimedia-only option, the number of multimedia agents refers to the number of voice agents who can also be enabled for multimedia support.

Application Module Link (AML) is an internal protocol used by Contact Center Manager Server to communicate directly with Avaya Communication Server 1000.

Email limits and capacity values

The following table specifies the maximum email and mailbox capacity values supported by Contact Center.

Table 21: Contact Center email and mailbox capacity figures

Parameter	Maximum
Email servers	
POP3 servers	5
SMTP servers	5
Mailboxes	

Parameter	Maximum
Maximum number of Mailboxes which can be configured	3000
Maximum number of fax mailboxes which can be configured	50
Maximum number of voicemail mailboxes which can be configured	50
Maximum number of SMS mailboxes which can be configured	50
Maximum number of Scanned Document mailboxes which can be configured	50
Rule Groups	
Maximum number of Rule Groups	3000
Maximum number of Rules in a Rule Group	50
Rules	
Maximum number of Rules	10 000
Maximum number of Auto-Suggests assigned	5
Maximum number of Search Criteria	5
Prepared Responses	
Maximum number of Prepared Responses	5000
Maximum number of Response Categories	50
Maximum number of Prepared Responses Assigned to a Rule	5
Sender Groups	
Maximum number of Sender Groups	100
Maximum number of addresses per Sender Group	50
Keyword Groups	
Maximum number of Keyword Groups	3000
Maximum number of Keywords per Keyword Group	50
Barred Outgoing Addresses	50

Maximum agent capacity and call rate values

The following table specifies the maximum capacity values supported by Contact Center.

The following conditions apply to the table:

- The capacities supported on a server are limited by the server platform. Use the guidelines in Server Specifications on page 331 to determine the capacity of your server.
- These values are supported by Contact Center. Capacity values are also limited by telephone switch capacity. To find the limits for your telephone switch, check your telephone switch documentation.
- Avaya Aura® Contact Center Release 6.3 does not support the Avaya Aura® Midsize Business Template (MBT) or Avaya Aura® Unified Communications Release 5.2 platforms for new installations. Existing Avaya Aura® Contact Center solutions using MBT or Avaya Aura® 5.2 may be expanded or upgraded.
- Avaya Aura® Contact Center Release 6.3 does not support SIP-enabled Avaya Communication Server 1000 for new installations. Existing SIP-enabled Avaya Communication Server 1000 contact center installations may be expanded or upgraded.

Table 22: Contact Center capacity figures in detail

Parameter	SIP maximum	AML maximum
General parameters		
Number of logged-on voice agents: Configurations with greater than 1500 agents require special consideration for contact center subnet bandwidth and disk requirements. The maximum of 5000 logged on agents is only applicable for the Avaya Communication Server 1000 Release 7.0, 7.5, or 7.6.	• Avaya Aura® 6.1 or 6.2 Unified Communications platform based SIP: 3000 • Avaya Aura® Virtualized Environment (VE) 6.2 based SIP: 2000 • Avaya Aura® Solution for Midsize Enterprise based SIP: 600 • Avaya Aura® 5.2 Unified Communications platform based SIP: 1000	5000

Parameter	SIP maximum	AML maximum
	• Avaya Aura® Midsize Business Template based SIP: 300 • Avaya Communication Server 1000 based SIP: 1500	
Number of logged-on multimedia agents. (No voice agents on Contact Center in this configuration)	• Avaya Aura® Unified Communications platform based SIP: 1000 • No switch configured - Multimedia only: 3000 • AACC Multimedia Complement for Elite: 3000 • Avaya Aura® Solution for Midsize Enterprise based SIP: 600 • Avaya Aura® Midsize Business Template based SIP: 300 • Avaya Communication Server 1000 based SIP: 1500	3000
Number of agents defined in the system	10 000	10 000
Number of phones: Communication Server 1000	10 000	10 000
Number of supervisors logged on	600	600
Number of supervisors defined in the system The number of configured supervisors defined in the system is not limited, but Avaya tests only up to 600 configured supervisors.	600	600
Number of scripts The number of scripts defined in the system is not limited, but Avaya tests only up to 1500 scripts.	1500	1500

Parameter	SIP maximum	AML maximum
Number of active scripts The product contains three predefined scripts. Therefore, you can create 997 scripts.	1000 (997)	1000 (997)
Maximum script size—Master_Script (characters)	100 000	100 000
Maximum script size—other scripts (characters)	50 000	50 000
Number of applications (that is, exit points from the Master_Script) The product contains five predefined applications. Therefore, you can create 800 applications for Release 6.0 or 1000 applications for the current release.	805 (800)	1005 (1000)
Number of call variables	100	100
Number of skillsets The maximum includes both local skillsets and network skillsets.	1500 (1496) The product contains four predefined skillsets. Therefore, you can create 1496 skillsets.	1500 (1493) The product contains up to seven predefined skillsets, depending on what is licensed on your server. Therefore, you can create 1493 skillsets.
Number of skillset priority levels	48	48
Number of skillsets for each call	20	20
Number of activity codes The product contains three predefined activity codes. Therefore, you can create 9997 activity codes.	10 000 (9997)	10 000 (9997)
Inbound voice calls per hour The number of inbound calls per hour assumes a hold time of three minutes. For shorter call durations, higher call rates can be supported.	Avaya Communication Server 1000 based SIP: 30 000 Avaya Aura® solution based SIP: 60 000	100 000
Stand-alone Multimedia server Inbound Multimedia contacts per hour (for stand-alone server)	12 000	12 000

Parameter	SIP maximum	AML maximum
Co-resident Multimedia server Inbound Multimedia contacts per hour	1200	2400
Stand-alone Multimedia server new contacts backlog	20 000 The email backlog is limited to 20000 contacts. Where the volume of email exceeds this, email messages remain on the mail server until such time as the queue volume falls. Only then does Contact Center EmailManager retrieve the additional backlog from the mail server. Reporting on such contacts commences from this point.	20 000 The email backlog is limited to 20000 contacts. Where the volume of email exceeds this, email messages remain on the mail server until such time as the queue volume falls. Only then does Contact Center EmailManager retrieve the additional backlog from the mail server. Reporting on such contacts commences from this point.
Co-resident Multimedia server new contacts backlog	4000	4000
Number of waiting contacts	3000	3000
Call resources parameters		
Number of IVR queues (Communication Server 1000)	150	150
Number of IVR ports	1000	1000
Number of ACCESS ports (Communication Server 1000)	NA	191
Number of routes	513	513
Avaya only tested 1000 trunk members. Avaya has no plans to test the 4400-trunk limit. Number of trunks (Communication Server 1000)	4400	4400
Number of CDNs	1000	1000
Number of RAN and music routes	512	512
Number of DNISs	10 000	10 000
Web Communications		
Number of concurrent Web Communication sessions.	500	500

Parameter	SIP maximum	AML maximum
Contact Center supports up to 500 concurrent Web Communication (Web chat) sessions between agents and customers. This can be configured as 500 individual agents each handling a single Web chat contact, or 100 agents handling five concurrent web chat sessions, or any multiplicity configuration not exceeding 500 concurrent chat sessions. For capacity requirements beyond 500 sessions, use Routed IM and integration with Avaya Presence Services or Microsoft OCS. Avaya DevConnect provides an example application demonstrating how Routed IM can be incorporated into your Website, thereby eliminating the need for the end users to be registered on your IM server.		
Number of assigned active agents per supervisor for observe and barge-in.	25	25
Number of Instant Messages (IMs) per hour	100 000 (If an average instant message contact in the contact center consists of the agent and customer exchanging 10 messages, the contact center supports 10 000 IM contacts per hour)	N/A
Number of presence changes per hour	200 000	N/A
Assignment parameters		
Number of agents in an agent-to-supervisor assignment	1000	1000
Matrix size for agent-to-skillset assignments This parameter is the supported matrix size for displaying agent-to-skillset assignments. An agent-to-skillset assignment	5000	5000

Parameter	SIP maximum	AML maximum
contains a matrix with a row for each agent in the assignment, and a column for each skillset to which the agents belong. The matrix size is the number of agents multiplied by the number of skillsets. This parameter works in conjunction with the Number of agent-to-skillset reassignments in an agent-to-skillset assignment parameter. Even though this window allows a 5000 element matrix to be displayed, non-blank elements in the matrix must not exceed the parameter. Number of agent-to-skillset reassignments in an agent-to-skillset assignment (that is, the maximum number of agent-to-skillset reassignments in a single agent-to-skillset assignment is 1000).		
Number of agent-skillset reassignments in an agent-to-skillset assignment In an agent-to-skillset assignment, you can change an agent's status for multiple skillsets. For example, you can put the agent James Jones on Standby for the skillset Bookings, and give him priority 1 for the skillset European Vacations. Thus, you have two reassignments for the agent James Jones in the agent-to-skillset assignment.	1000	1000
Networking parameters		
Number of call processing nodes in the network (including local node) The number of configured nodes is 30; however, only 20 nodes can be configured in the routing table.	30	30

Parameter	SIP maximum	AML maximum
Number of network skillsets The maximum includes the predefined skillsets, local skillsets, and network skillsets.	1500	1500
Number of skillsets per agent	150	150
Number of sites in the routing table for a network skillset	20	20
Number of network skillsets to which a call is queued	10	10
Number of agent reservation requests per call	30	30
Number of remote applications (applications accessible over the network)	6000	6000
Network calls per hour for which CBC data is collected	10 000	10 000
Number of target nodes	20	20
Database parameters		
Number of client PCs and RTI applications connected to the database	100	100
Number of other applications connected to the database	100	100
Number of Fault Management messages in database	7500	7500
Maximum number of report clauses The database server supports a maximum of 255 clauses on a single SQL statement.	255	255
Third-party interface parameters		
Number of MLS applications	Not applicable	16
Number of MLS DN registrations across all MLS applications	Not applicable	11 000
Number of MLS calls per hour The number of MLS calls per hour at 58,000 and 68,000 assumes a hold time of three minutes. For shorter call	Not applicable	58 000

Parameter	SIP maximum	AML maximum
durations, higher call rates can be supported.		
Number of HDX connections When configured, Database Integration Wizard (DIW) uses a single HDX connection.	10	10
Number of RTI client systems/ applications	100	100
Other parameters		
Number of scripts activated under load Script activation supports activation cascading, where the activation of a parent script forces activation of all lower level scripts. Do not use this feature on a system under load. Under load, activate scripts from the lowest level up, with the Master script activated last.	1	1
Steady state CPU	70%	70%
Number of CCMS servers per Communication Server 1000	3 (Only to support phased migration between Contact Center releases)	3
Number of AML-based application servers per Communication Server 1000	Not applicable	16
Number of Phonebook entries on Avaya Aura® Agent Desktop	10 000	10 000

Contact Center Manager Server Call load

Call complexity and call rate determine the CPU or memory resources required to process the call load.

Call complexity

Call complexity is the number of each type of service used by a call.

Expected resource consumption

Over a period of time, you can use the average number of each type of service for each call to estimate the expected resource consumption. For example, if a typical call queues to an average of two skillsets, the expected resource cost for each call is two times the cost of queueing a call to one skillset (provided that the costs are a linear function of call rate).

Cost of call services

To estimate the resource consumption on Contact Center Manager Server for different call rates, you must define the cost of a basic call, as well as the costs associated with the most typical call operations.

The following conditions apply:

- The cost of a basic call is the resource consumption incurred due to basic call processing (assuming that the agent answers immediately).
- The default value for call rate is based on a holding time of three minutes.

The following table lists common call services and indicates the typical cost used for each call in the hybrid or typical call model for the Avaya Communication Server 1000 and SIP.

Table 23: Call service and cost per call

	Avaya Communication Server 1000 - AML	SIP
Parameter	Services for each call	Services for each call
Basic Call	1	1
Queue to Skillset	2	2
Queue to Agent	0	0
Give Controlled Broadcast (S/S)	1	N/A (see Notes)
Voice Services Collect Digits	0	0
Give IVR	1	2
Give RAN	2	2
Give Music	1	1
HDX Send Info	1	1
Voice Services Collect Digits	0	0
Give IVR	1	2
Give RAN	2	2
Give Music	1	1
HDX Send Info	1	1
HDX Request/Response	1	1

	Avaya Communication Server 1000 - AML	SIP
Intrinsics	5	6
If/Then's Executed	5	5
Proportion of Calls Transferred	5%	5%
Proportion of Calls Conferenced	5%	5%
Proportion of Calls Transferred to a DN	N/A	N/A
MLS Screen Pops	1.2	N/A
MLS Messages	0	N/A
Queue to Network Skillset	2	N/A (see Notes)

Call load table notes:

- The number of services for call is an average value taken over all inbound calls (or outbound calls, if that is the context).
- Give Controlled Broadcast (S/S) and Queue to Network Skillset for SIP are not supported in this release.

Call rate

Call rate is the average rate of calls processed by the server. The call rate is measured in Calls Per Hour (CPH) and is a function of the average Call Arrival Rate and Mean Holding Time (MHT).

Mean Holding Time is the time the agent spends serving a call. MHT is the sum of:

- average talk time
- time required for post-call processing, when the agent is not available to handle other calls
- inter-call interval (including union break time, if any)

Under heavy call loading, or during the busy time, when there is no agent idle time, Mean Holding Time is equal to Mean Time Between Calls (MTBC). (These definitions apply to both inbound and outbound calls.)

Call rate, number of active agents, and MHT are related. Given the same call rate, the more agents there are, the longer the MHT can be. For example, if the call rate is 60 CPH and only one agent is available, the MHT cannot be more than 1 minute. On the other hand, if there are 60 agents for the same call rate, then each agent can take up to an hour, on average, for a call.

Contact Center Manager Server Capacity estimation

This section shows how the Contact Center Manager Server capacity varies with different call loads and standard workloads on a stand-alone server. The performance metrics are the outputs from the capacity models, which are based on controlled measurements (calibration measurements), as well as high-capacity testing validation results.

Rated capacity for call processing for different processors

Rated capacity is the maximum load that can be sustained at steady state, such that the average CPU use does not exceed 50 percent. The capacity limits for different hardware platforms and different Mean Holding Times (MHT) are shown in the following table.

This information applies to Avaya Communication Server 1000, but does not apply to SIP.

For these calculations, the following assumptions are made:

- There is one Web client for 10 agents logged onto the system. For *n* agents logged onto the system, the number of Web clients is equal to Ceiling (n/10).
- The Contact Center Manager Server networking is not enabled.
- The RSM is on.
- There is no Standby Server available.
- There is no networking available.
- There are no Real-time API applications.
- The call complexity model is the standard one given in Contact Center Manager Server Call load on page 143.
- All parameters are scaled according to number of agents logged on to the system.

Table 24: Rated capacity for call processing

Processor	MHT (minutes)	Agents	Peak call rate (CPH)
Dual Xeon 2.8 GHz	2	2454	73 620
	3	2719	54 380
	4	2868	43 020
Dual Xeon 3.4 GHz	2	2846	85 280
	3	3128	62 560
	4	3286	49 290

Processor	MHT (minutes)	Agents	Peak call rate (CPH)

Important:

The benchmark CPU is the Intel E5440. You must ensure individual processors are comparable to this as a minimum. Some new processors may run at lower clock speeds, like the Intel 56xx series, but can offer superior performance to the E5440 specification. You can compare CPU performance using CPU benchmarking Web sites, for example www.cpubenchmark.net.

Peak sustainable capacity

The following table shows the upper limit on processing calls with the same standard call model and assumptions used in the previous section.

Table 25: Peak sustainable call rates

	Peak sustainable call rates for different standard workloads at 50 percent CPU use (CPH)		
Processor	**1000 active agents**	**2000 active agents**	**3000 active agents**
Dual Xeon 2.8 GHz	120 000	97 500	28 125
Dual Xeon 3.4 GHz	No practical upper limit	135 000	67 500

Important:

The benchmark CPU is the Intel E5440. You must ensure individual processors are comparable to this as a minimum. Some new processors may run at lower clock speeds, like the Intel 56xx series, but can offer superior performance to the E5440 specification. You can compare CPU performance using CPU benchmarking Web sites, for example www.cpubenchmark.net.

Contact Center Multimedia disk storage requirements

This section describes the database files used by Contact Center Multimedia and provides database capacity calculations for a stand-alone Contact Center Multimedia server.

For more information about database requirements, see *Avaya Aura® Contact Center Installation* (NN44400-311).

Required database files

When you install the Contact Center Multimedia server component, you install the following files required to operate the database:

- CACHE.DAT in the `Avaya\Contact Center\Databases\CCMM\MULTIMEDIA \DATA` folder. This stores the Contact Center Multimedia data.
- `Avaya\Contact Center\Journal` folder is created during installation. This folder contains the Database Journal Files, which are used for Geographic Redundancy.
- `Avaya\Contact Center\ShadowJournals` folder is created during installation. This folder is used if Geographic Redundancy is configured and this server is running as the Redundant server.

During the installation you can select the drive letter that these folders or files are on. The folder information is fixed.

The CACHE.DAT file grows dynamically as the volume of data in the database grows. Initially it is just under 45 MB. One million contacts take approximately 20 GB of space.

The Journal files are deleted after seven days. Therefore, the maximum size of this folder is determined by the number of contacts that arrive in a seven-day period. The space taken is in proportion with the one million available contacts in 20 GB space.

Email attachment storage

Email attachments are stored in the attachment folder. The disk space required to store attachments is calculated as

Disk space for email attachments in MB

= number of email messages per day

* percent with attachment

* average attachment size in MB

* number of days before purging

Example

Following is the disk storage calculation for a contact center that receives 9000 email messages every day, where 30 percent of the email messages have an attachment averaging 0.5 MB in size, and attachments are stored for 10 days before they are deleted.

Disk space for email attachments in MB

= 9 000 * 0.3 * 0.5 * 10

= 13500 MB

Maximum number of days before purging or archiving

The maximum number of days before you must purge or archive the database can be determined given the total amount of disk space in GB available (TGA):

$$ndp_{Max} = \left\lceil \frac{2\,000\,000 * TGA}{5 * ntx + 12 * nts + 12 * nemd} \right\rceil$$

where

- *ndp* is the maximum number of days before you must purge or archive the database
- *ntx* is the number of transaction records each day
- *nts* is the number of text chat sessions each day
- *nemd* is the number of email sessions each day, which is calculated as (# of email/agent/day)*(# of agents)
- [] is the ceiling function (least integer greater than or equal to the expression)

Important:

When you purge the database, you permanently remove the information from the database. Also, you can use the Dashboard utility to monitor the services in your system. For more information, see *Avaya Aura® Contact Center Server Administration* (NN44400-610).

Example

If, on an average daily basis, there are 20 000 transaction records, 4000 text chat sessions, and 5000 email sessions with no attachments, the maximum number of days that can be tolerated before purging for a 10 GB (10.24) disk space availability is given as

$$ndp_{Max} = \left\lceil \frac{2\,000\,000 * 10.24}{5 * 20\,000 + 12 * 4000 + 12 * 5000} \right\rceil = \lceil 98.5 \rceil = 99$$

Communication Control Toolkit capacity

The call capacity is 100 000 simple calls per hour (CPH) with data for a maximum of 5000 agents.

CCT-IVR is an optional component that supports an additional 16 000 CPH running on the IVR lines.

Communication Control Toolkit is supported only on Windows Server 2008. CCT-IVR is supported only on Windows Server 2003. They are therefore not supported co-resident.

Agent counts are 5000 agents (5000 terminals, 10 000 addresses) if call data is not required or 1600 agents (1600 terminals, 3200 addresses) if call data is used. Self Service supports an additional 1000 IVR lines.

The performance of a standalone Communication Control Toolkit server depends on a number of factors, including:

- number of resources (terminals, addresses, and users)
- number of clients
- number of calls per hour, call duration, and call complexity—transfers, conferencing, and attached caller-entered data all increase call complexity, and, therefore, the resources required to process a call
- amount of call-attached data (see the following section)
- hardware configuration (processor speed, memory, and disk space available)
- type of solution (Communication Control Toolkit, CCT-IVR, or both)
  - A solution running both Communication Control Toolkit and CCT-IVR requires more system resources than a system running only Communication Control Toolkit or CCT-IVR. Communication Control Toolkit is supported only on Windows Server 2008. CCT-IVR is supported only on Windows Server 2003. They are therefore not supported co-resident.

Call Attached Data considerations

Call attached data in Communication Control Toolkit uses one of three formats: binary, string, and key-value pairs. The string and key-value pair formats contain meta-data (the markup that describes their structure) when they are attached to TAPI as CallData. Because the size limit for TAPI call data is 4096 bytes, when these formats are used on systems that use the TAPI connector, the effective storage capacity of Call Data is reduced by the size of the meta-data.

The formatting meta-data overhead of string (Str) formatted data is 34 bytes, reducing the effective CallData storage capacity in TAPI to 4062 bytes (4061 characters plus the terminating null character).

The formatting meta-data overhead of the key-value pair (KVP) formatted data is 34 bytes for each key-value pair.

For example, for a 5-character key and a 5-character value, the actual data that is attached to TAPI is

34 (base formatting)

+ 16 (1 key-value pair)

+ 10 (the key and the value)

+ 1 (terminating null character)

= 61.

Adding a second similar key-value pair increases the number of bytes by 26 (16 for the key-value pair + 10 for the key and the value).

Attached data stored in the binary (bin) format is stored in TAPI CallData without formatting meta-data. The full 4096 bytes of TAPI CallData is used.

In SIP-enabled contact centers, Call Attached Data (CAD) is not available on the remote leg of a transfer or conference until the transfer or conference is complete.

CTI application performance impact

Meridian Link Services (MLS) can be used in a contact center environment. It is an intelligent signaling link offering computer-telephony integration (CTI) applications access to Avaya Communication Server 1000 call processing functions.

If you use MLS with Communication Control Toolkit, there is an impact on Contact Center Manager Server performance.

Access from an external client PC

When you use an external client PC to access Contact Center Manager Administration (CCMA) on a single server, Avaya recommends that you limit the number of on-demand and scheduled historical reports run on the co-resident server. Running historical reports can increase the CPU use on the server.

Access from a browser on the Contact Center Manager Server server

When you access Contact Center Manager Administration from a browser on the Contact Center Manager Server server, Avaya recommends that you limit the number of ad hoc and scheduled historical reports run on the single server. Running historical reports can increase the CPU use on the server.

In addition, Avaya recommends that you limit the number of real-time displays that you start. Viewing real-time displays also increases the CPU use on the server.

SIP capacity estimation

The following table shows the peak sustainable capacity, or upper limit, on processing calls using the standard call model.

Table 26: SIP capacity

	Peak sustainable call rates for different standard workloads at 50 percent CPU use (CPH)		
Processor	**100 active agents**	**500 active agents**	**1500 active agents**
Quad Xeon 2.8 GHz	100 000	50 000	25 000

Important:

The benchmark CPU is the Intel E5440. You must ensure individual processors are comparable to this as a minimum. Some new processors may run at lower clock speeds, like the Intel 56xx series, but can offer superior performance to the E5440 specification. You can compare CPU performance using CPU benchmarking Web sites, for example www.cpubenchmark.net.

Landing Pads

The Avaya Aura® Contact Center Web Service Open Interfaces enable self-service systems and third-party applications to transfer a call into a contact center by reserving a Landing Pad on the target contact center; it also allows custom data to be passed with the call. When the Landing Pad is reserved, the call must be transferred to the contact center within 20 seconds.

Typically the time between a successful Landing Pad reservation and actual call arriving at the Landing Pad is between 2 and 4 seconds, depending on the call setup-time over your network.

If one call takes 4 seconds to setup, then the theoretical maximum for equally spaced calls is 900 calls per hour for each Landing Pad.

3600/4 = 900 calls per hour for each Landing Pad.

You must also consider the peak call rate and configure the number of Landing Pads in your Contact Center to handle the anticipated peak call rate. Avaya recommends that you configure one Landing Pad per simultaneous call, if you want to handle 70 simultaneous calls then configure at least 70 Landing Pads.

Configure at least one Landing Pad per simultaneous call.

If the peak call rate increases above the rate configured for, calls are not lost, but your customers may experience delays in service.

Open Interfaces Web Service data limits

The Avaya Aura® Contact Center Open Interfaces Web Service enables self-service systems and third-party applications to transfer a call into a contact center by reserving a Landing Pad on the target contact center; it also allows custom data to be passed with the call. Avaya Aura® Contact Center script or flow applications also use the Open Interfaces Web Service to read, edit, and update call based User-to-User Information (UUI) data.

The Avaya Aura® Contact Center Open Interfaces Web Service supports 50 ASCII character maximum for User-to-User Information (UUI) access and editing.

Outbound capacity

Contact Center Outbound components have the following capacity:

- Outbound Campaign Management Tool monitors a maximum of 100 simultaneous outbound campaigns with a maximum of 20 000 contacts (email or outbound) per campaign.
- Agent Desktop processes a maximum of 2500 contacts (email or outbound) per hour to a maximum of 3000 agents.
- InterSystems Caché database server and its associated Web services store information for 1 000 000 contacts in a database that is saved on a 20 GB disk.
- Open queue can queue up to 20 000 contacts at one time for routing and reporting. Contact Center Manager Server processes Open Queue contacts at a rate of 20 contacts per second. This ensures Contact Center Manager Server does not get overloaded.

Chapter 11: Common server requirements

This section specifies the server hardware and software requirements common to all Avaya Aura® Contact Center server types installed on the Microsoft Windows operating system.

The requirements in this section apply to the following Contact Center servers:

- Voice and Multimedia Contact Server with Avaya Media Server
- Voice and Multimedia Contact Server without Avaya Media Server
- Voice Contact Server Only
- Multimedia Contact Server Only
- Multimedia Complement for Avaya Aura® Call Center Elite
- No Switch Configured - Voice and Multimedia Contact Server with Avaya Media Server (Multimedia only)
- Network Control Center Server Only
- Knowledge Worker Server Only
- Security Framework Server

The requirements in this section apply to the Contact Center applications:

- Contact Center Manager Server (CCMS)
- Contact Center Manager Network Control Center (NCC)
- Contact Center Manager Administration (CCMA)
- Contact Center Multimedia (CCMM)
- Contact Center Outbound
- Communication Control Toolkit (CCT)
- Orchestration Designer (OD)
- Security Framework
- Avaya Media Server (coresident on Windows server)

You can install Contact Center applications and server types on servers that

- meet the minimum hardware specifications in this document
- meet the operating system and third-party software guidelines in this document
- meet the other guidelines in this document, for example the network and platform requirements

For information about the Avaya Media Server on Linux server requirements, see Avaya Media Server on Linux configuration requirements on page 269.

Server naming requirements

Server names must adhere to RFC1123 (Requirements for Internet Hosts), which specifies that a host name must adhere to the following:

- Use only characters a to z, A to Z, and 1 to 9 can be used in a host name.
- You can use a hyphen (-), but not to start or end the host name.
- Host names must be 6 to 15 characters in length.
- Host names must not start with a number.
- Do not use the underscore character (_) and period character (.).
- Do not use spaces in the host name.

Fully qualified domain names must not exceed 255 characters.

Each Contact Center server must be able to resolve the host name or computer name of all other Contact Center servers within the configuration. If you have a Domain Name Service (DNS) server, make sure an entry exists for each Contact Center server. If you do not have a DNS server, you must manually update the HOSTS file on each server with the host name or computer name of all other Contact Center servers to ensure that all clients can interpret the server names.

Common server disk partitioning requirements

The section describes the common Contact Center server hard disk drive partitioning requirements for Windows 2008 servers. The type, number, and size of the disk drive partitions required depends on your solution type, agent count, and the size of your contact email attachments.

- Each Contact Center server must have the operating system on the C partition. Do not store Contact Center patches, trace logs, database backups, or email attachment folders on this partition.
- Avaya does not guarantee the support for future Windows 2008 Server Service Packs, which may require more disk space. Avaya recommends that you create an operating system partition large enough to accommodate future Service Packs.
- Each Contact Center server must have an application partition, usually the D partition. Contact Center installs the component application software on this partition. Do not store database backups, trace log files, or other data on the this partition.

- The Contact Center server DVD drive is typically assigned to the E partition letter.
- Apart from Security Framework, each Contact Center server must have one or more database partitions. Do not store database backups, trace log files, or other data on the database partition.
- You can locate the operating system disk partition, the Contact Center application disk partition, and the Contact Center database partitions on the same physical hard disk drive, if required, and if sufficient disk space is available. However, Avaya recommends that you locate the databases and the Contact Center applications on different hard disk drives for optimal system performance and reliability.
- The maximum size of the Contact Center Multimedia or Contact Center Manager Server database is limited to the size of the database disk partition. To increase the database partition size, use the Windows Server 2008 Server Manager - Disk Management utility to extend the volume of the database partition. Increasing the database partition does not increase the overall Contact Center contact storage limits. Do not store database backups, trace log files, or other data on the database partition.

Important:

Increasing the CCMM database partition does not increase the overall contact storage limits in system.

- Partitioned sizes on all database drives must be in increments of 1 GB (equivalent to 1024 MB).

Table 27: Avaya Aura® Contact Center server disk partitioning requirements

Drive partition letter	Partition letter	Notes
Operating system partition	C:	NTFS partition on disk 0. This must be partitioned as the primary partition. The Windows 2008 Release 2 Server operating system is installed here.
Application partition	typically D:	An additional NTFS partition on disk 0 or an NTFS partition on a different disk.
DVD ROM drive	typically E:	DVD ROM.
Database partition	typically F:	CCMS Database.
(Optional) Database partition	typically G:	Optional CCMM Database and multimedia attachments partition.

For more information about Avaya Aura® Contact Center server disk partition specifications, and to select a suitable server disk partition specifications for your servers, see Server Specifications on page 331.

Operating system requirements

The following table provides the operating system compatibility for Avaya Aura® Contact Center.

Table 28: Avaya Aura® Contact Center operating system requirements

Operating system	International versions supported	Minimum service pack required
Windows Server 2008 Release 2, Standard Edition and Enterprise Edition, 64-bit, Service Pack 1. **Note:** Only the 64-bit version is supported.	English French German Italian LA Spanish Brazilian Portuguese Russian Simplified Chinese Traditional Chinese Japanese Korean	Service Pack 1

All nodes in an Avaya Aura® Contact Center networking deployment, including the Network Control Center server, must be installed on operating systems from the same language family. Contact Center Manager Administration does not support displaying names from two different languages families. For example, a single Contact Center Manager Administration does not support one node with a French operating system and another node with a Russian operating system.

Operating system installation and configuration

Contact Center Manager Server runs on the Windows components installed by default in Windows Server 2008 with the following exceptions:

Important:

These exceptions apply to a stand-alone server only.

- The Simple Network Management Protocol (SNMP) service must be installed on your server. Installation enables you to use an SNMP management system for remote monitoring. This service is not installed by default, so you must select it when you install or configure the operating system.
- When Contact Center Manager Server is used in an Avaya Communication Server 1000 AML environment, you must disable all time synchronization features of the operating system to avoid potential call processing outages.

Do not install additional services on your server that are not installed by default or described in this document.

Microsoft security hotfixes

You must operate your server with the most current Microsoft patches.

- Review the *Contact Center Portfolio Service Packs Compatibility and Security Hotfixes Applicability List* (available from Technical Support Web site) for the list of applicable Microsoft security hotfixes to apply.
- Back up the entire server, and then shut down all Contact Center services before you apply any Microsoft security hotfixes using the Microsoft instructions.
- Apply Microsoft security updates on a timely basis.

Operating system updates

Operating system updates includes service updates and service packs.

Service updates

Given the number of operating system security service updates and the complexity inherent in any network, create a systematic and accountable process for identifying and applying service updates. To help create such a process, you can follow a series of best practices guidelines, as documented in the National Institute of Standards and Technology (NIST) Special Bulletin 800-40, Procedures for Handling Security Patches.

This bulletin suggests that if an organization has no central group to coordinate the storage, evaluation, and chronicling of security service updates into a library, then system administrators or the contact center administrator must fulfill this role. In addition to these guidelines, whenever possible, follow Microsoft recommendations regarding newly discovered vulnerabilities and that you promptly install Microsoft security service updates.

Whenever possible, Avaya incorporates the most recent operating system security recommendations and service updates in an integrated solutions testing strategy during each test cycle. However, due to the urgent nature of security service updates when vulnerabilities are discovered, follow Microsoft guidelines as they are issued, including any Microsoft installation procedures and security service update rollback processes that may be in place.

Finally, you must perform a full system backup before you update the system to ensure that a rollback is possible, if required. If a Contact Center application does not function properly after you apply a Microsoft security service update, you must remove the service update and revert to the previous version of the application (from the backup you made before applying the

service update). For added security, always determine whether Avaya verified the Microsoft service update for compatibility with Contact Center Manager.

For more information about updating, see the *Contact Center Portfolio Service Packs Compatibility and Security Hotfixes Compatibility List* on www.avaya.com/support.

Service packs

Avaya has a policy to implement co-residency testing of all new operating service packs for compatibility with the suite of Contact Center applications as soon as they are available. In practice, because a service pack can contain a significant amount of new content, Avaya requires that you wait until compatibility testing is complete before you apply the service pack. Note that operating system service packs are typically tested with the most recent Contact Center application SP and, therefore, an upgrade to a new service pack requires an upgrade to the most recent Avaya SP.

Before you upload a new service pack, you must perform a full system backup (for system rollback as in the updating scenario).

Important:

Service pack compatibility for all Contact Center applications is documented in the *Contact Center Portfolio Service Packs Compatibility and Security Hotfixes Applicability List* on the Web site at www.avaya.com/support.

Java Runtime Environment updates

Contact Center supports only specific versions of Java Runtime Environment (JRE). The Contact Center Installer installs a supported JRE version, and Contact Center service packs install required JRE updates. During installation, the Contact Center DVD Installer disables JRE automatic updates on the contact center servers.

Important:

Updating to an unsupported version of JRE can cause the contact center to stop working and can require the reinstallation of the contact center server.

Dynamic Host Configuration Protocol support

Avaya Aura® Contact Center server applications (CCMS, CCMA, CCT, CCMM, LM, and Avaya Media Server) do not support Dynamic Host Configuration Protocol (DHCP). All Avaya Aura® Contact Center servers must have a static IP address.

Avaya Aura® Agent Desktop client computers support both DHCP and static IP addresses.

Third-party software requirements

Due to the mission-critical, real-time processing that Contact Center applications perform, you must not install any other application class software on the server. You can install certain utility class software on the server, providing it conforms to the guidelines in this section.

Application class software generally requires a certain amount of system resources and must not be installed on a server running Contact Center applications. The installation of third-party applications can cause Contact Center applications to operate outside of the known engineering limits and can create potential unknown system problems (for example, CPU contentions, increased network traffic loading, disk access degradations).

Certain third-party utility class software applications, such as hardware diagnostics or backup tools, generally require less system resources during the normal operation of Contact Center applications and are permitted. Exceptions are utilities such as screen savers, which can cause system problems and degrade performance.

Antivirus software is classified as a utility and is subject to the generic guidelines in the following section.

Generic guidelines for utility-class software applications

The following are generic guidelines for utility-class software:

- During run-time, the utility must not degrade the contact center application beyond an average percentage of CPU use (see each specific application section in this document for the recommended maximum CPU usage level). Furthermore, the utility must not lower the minimum amount of free hard disk space required by contact center application and the Windows Operating system.
- The utility must not cause improper software shutdowns or out-of-sequence shutdowns.
- The utility must not administer the contact center application.
- If the utility has a database, it must not affect the contact center application database.
- Disk compression utilities must not be used.
- Memory tweaking utilities used to reclaim memory that is unused by Microsoft must not be used.
- The installation or uninstallation of the third-party software must not impact or conflict with the contact center application (for example, it must not cause DLL conflicts). If such conflicts are discovered, a server rebuild may be necessary.
- The implementation personnel must perform tests to ensure these conditions and recommendations are met before you place the Contact Center application into production. Support personnel may ask for the results of the testing during fault diagnosis.

As part of fault diagnosis, the distributor or end user may be asked to remove third-party software.

- HyperTerminal must not be installed on the Communication Control Toolkit Server as it interferes with the operation of the Communication Control Toolkit Telephony Server.

Additional guidelines for the use of antivirus software

Your security policies may require the installation of antivirus software on the application server.

The Contact Center supported antivirus products are:

- Symantec AntiVirus 11.0.5, 11.0.6, or 12
- McAfee 8.8
- Microsoft ForeFront 2010

You may deploy antivirus products from other vendors subject to the following guidelines:

- Infected file quarantine policy on the server and client: antivirus software can be configured to clean up the detected virus automatically and files must be quarantined if infected files cannot be cleaned. Contact Avaya to verify whether the quarantine file is part of our product files or dependent system file. If a virus is detected, remove the server from the network immediately during virus eradication to prevent further virus propagation.
- Do not connect a contact center application platform directly to the Internet to download virus definitions or updated files. Furthermore, Avaya recommends that you do not use a contact center application client PC to connect to the Internet. Instead, download virus definitions and updated files to another location on the customer network and manually load them from this interim location onto the contact center application platform.
- Perform the previous steps to download Contact Center application service packs (SP). This method limits access to the Internet, and thus reduces the risk of downloading infected files.
- Scan all SP files, DVD-ROMs, and floppy disks before you upload or install to the server. This practice minimizes any exposure to infected files from outside sources.
- Capacity considerations: running virus scan software can place an additional load on a contact center application platform. The implementation personnel must run the performance monitor tool on the server to gauge CPU usage. If the antivirus software scan causes the platform average CPU usage to exceed the recommended percentage for longer than 20 minutes, the antivirus software must not be loaded onto the contact center application platform.

- Product Support do not provide support on the configuration of antivirus software, but offer guidance where possible. Direct questions or problems on antivirus software to the appropriate vendor.
- If performance or functionality issues are raised to Avaya support personnel as part of the fault diagnosis, you may be asked to remove third-party utility software or antivirus software.

Simple Network Management Protocol (SNMP) alerting on virus confirmation

Avaya Aura® Contact Center does not support this feature.

Remote support access tool

Avaya requires you to install an Avaya Secure Access Link (SAL) server to provide remote support. SAL is a remote-access architecture that provides simplified network management and increased security, reliability and flexibility. SAL gives you complete control of when and how Avaya, or any other service partner, can access your equipment.

You use the Remote Desktop Connection feature in Windows along with the SAL. Remote Desktop Connection is supported in console or admin mode only. Refer to the Microsoft Web site for details about how to verify that you are connected to the console/admin session (session 0).

Hardware requirements

The following sections describe the additional hardware requirements for all servers.

Redundant Array of Independent Disks (RAID)

Avaya Aura® Contact Center supports RAID-1 and RAID-5. RAID technology provides disk data redundancy as well as error detection and correction. For maximum security and mission-critical solutions, Avaya recommends that all Contact Center servers contain a RAID-1 controller. RAID-1 and RAID-5 are the only levels and types of RAID supported.

Storage Area Network (SAN)

A Storage Area Network (SAN) is a dedicated storage network that provides access to consolidated block level storage. SANs are used to make storage devices such as disk arrays, accessible to servers so that the devices appear as locally attached to the operating system.

When Avaya Aura® Contact Center is installed on a physical server it does not support a SAN. When Avaya Aura® Contact Center is installed on a virtual machine it supports a SAN.

Uninterruptible Power Supply

The use of an Uninterruptible Power Supply (UPS) with a server is permitted. A UPS provides the following benefits:

- Reduction in data loss—A UPS shuts down the server gracefully if an interruption in AC power occurs. A graceful shutdown prevents data corruption and reduces the risk of data loss.
- Reduction in power dips and spikes—The UPS regulates AC power supplied to the server.

Data backups running at the time of shutdown are unusable.

UPS requirements

The UPS must meet the following requirements:

- Provides at least 10 minutes of power to stop all services and shut down the server.
- Fits physically within the workplace.
- Affects environment minimally.
- Applies power to the server when line voltage reaches a stable state.
- Recharges before powering up the server if the server is down for a long time.
- Is compatible with the operating system running on the server.
- Meets all local regulatory requirements. For the European market, the UPS must generate a pure sine wave AC waveform.
- Has hot-swappable batteries. Replacement or capacity upgrades of the batteries must not interrupt service.
- Does not affect the Contact Center application software. UPS software must not replace software or drivers installed on the server with different versions. Install only the basic software functions necessary for UPS operation. Do not install advanced features as they can affect the Contact Center application software.
- If you install Smart UPS software on the server, it must conform to the guidelines in this document for third-party utilities. The UPS solution provider must perform the documentation, testing, and support of server shutdown and startup with UPS software.

Chapter 12: Voice and Multimedia Contact Server without Avaya Media Server configuration requirements

This section provides the configuration requirements for a Voice and Multimedia Contact Server without Avaya Media Server. Install this server to provide context-sensitive and skill-based routing for customer voice and multimedia contacts. This server provides routed contact support for voice calls, email messages, Web communications, voice mail messages, scanned documents, fax messages, and SMS text messages. SIP-enabled Voice and Multimedia Contact Server also supports Instant Message (IM) contact routing. This server provides extensive tools for agent management, real-time and historical reporting, and graphical tools to create contact flows and treatment rules. Use this server for license management, High Availability configuration, networking, Open Interfaces Web Service and third-party application interfaces integration.

This server includes the following Avaya Aura® Contact Center components:

- Contact Center Manager Server (CCMS)
- Contact Center Manager Administration (CCMA)
- Communication Control Toolkit (CCT)
- Contact Center License Manager (LM)
- Contact Center Manager Server Utility (SU)
- Avaya Aura® Contact Center Orchestration Designer (OD)
- Contact Center Multimedia (CCMM)

Voice and Multimedia Contact Server without Avaya Media Server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

Voice and Multimedia Contact Server without Avaya Media Server supports High Availability.

If you access Contact Center Manager Administration from a browser on the server, Avaya recommends that you limit the number of on-demand and scheduled historical reports run on the server. Running historical reports can increase the CPU usage on the server. In addition, Avaya recommends that you limit the number of real-time displays that you start. Viewing real-time displays also increases the CPU usage on the server.

You can use the instance of Contact Center Manager Administration on this server to manage the agents and supervisors associated with this server or with remote CCMS servers up to the maximum supervisor capacity for this server.

In a small to medium solution using one of these servers, agents download and install Avaya Aura® Agent Desktop software from this server.

In a voice-only solution, multimedia contacts are not supported. Therefore, in a voice-only solution without multimedia licenses, the CCMM Administration utility blocks access to the multimedia features and functions. In a voice-only solution that uses Avaya Aura® Agent Desktop, use the CCMM Administration utility to configure Avaya Aura® Agent Desktop features and functions.

To enable the multimedia features in the CCMM Administration utility, obtain and install a multimedia-enabled Avaya Aura® Contact Center license. Once you have obtained a multimedia license, install the new license file on the server, and reconfigure the Contact Center Manager Server server and license settings. You must also refresh all the servers in Contact Center Manager Administration. Once you have installed a multimedia-enabled license, the system enables all the multimedia features and functions.

Common Server Requirements: The Voice and Multimedia Contact Server without Avaya Media Server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Voice and Multimedia Contact Server without Avaya Media Server hardware specification depends on your solution type, agent count, and call flow rate. You can install the Voice and Multimedia Contact Server without Avaya Media Server software on a physical server or on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by Voice and Multimedia Contact Server without Avaya Media Server.

Table 29: Voice and Multimedia Contact Server without Avaya Media Server supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Aura SIP	No	Yes	Yes	No	No	Yes
CS 1000 AML	No	Yes	Yes	No	No	Yes

For more information about Avaya Aura® Contact Center server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

Communication Control Toolkit components

The Communication Control Toolkit simplifies integration. The transport components provide firewall friendliness, Network Address Translation (NAT), and Citrix support. The server components enable open telephone switch connectivity.

The Communication Control Toolkit consists of Avaya developed software and third-party components, as described in this section.

Important:

Q Signaling (QSIG) Path Replacement and Trunk Anti Tromboning is not supported in Communication Control Toolkit.

Client application

Client applications are third-party components and can include the following:

- software phones
- agent telephony toolbars with screen pop-ups
- intelligent call management applications

The Communication Control Toolkit API provides five levels of API that you can use to develop a range of client applications.

An easy-to-use graphical API delivers Windows Form Controls (Win Forms), that you can import into a project for rapid development of form-based toolbars. The Win Forms provide graphical API abstractions that enable rapid development of Communication Control Toolkit-enabled applications.

The Communication Control Toolkit API also provides abstraction layers to COM client interfaces.

Important:

TAPI legacy clients are not supported.

Communication Control Toolkit server

The component that manages client sessions consists of the following subcomponents:

- Contact Management Framework—An infrastructure component that manages the states of contacts, agents, terminals, and addresses.
- TAPI Connector—An application that converts Communication Control Toolkit requests to TAPI API calls, and TAPI events to Communication Control Toolkit events. The TAPI

Connector resides between the TAPI Service Provider and the Contact Management Framework.

- TAPI Service Provider—A Microsoft TAPI client responsible for CTI operations of all lines controlled by the Communication Control Toolkit platform initialized by TAPI. This service is installed only in AML-based solutions.
- Communication Control Toolkit API—An API that controls voice resources. The API is published as Microsoft .NET types and distributed as a Windows assembly, which is referenced by application developers.

Communication Control Toolkit supported functionality

The tables in this section indicate which functions are supported by Communication Control Toolkit. Avaya Aura® Agent Desktop is a client of Communication Control Toolkit so they support the same features.

Important:

If your phone supports Multiple Appearance Reduction Prime (MARP) of Multiple Appearance Directory Number (MADN) you must disable the configurations. These configurations are not supported in Communication Control Toolkit.

Important:

In SIP-enabled contact centers, agents must not use their desk phone or Agent Desktop to phone, transfer a call, or conference a call to a phone number that is:

- routed to a CDN (Route Point). For example, a Virtual Directory Number (VDN) routed to a CDN (Route Point).
- converted to a CDN (Route Point).
- call forwarded to a CDN (Route Point).

Agents may use their desk phone or Agent Desktop to transfer a call, conference or phone directly to a CDN (Route Point).

The following tables list the basic Communication Control Toolkit call control functions.

Table 30: Basic Communication Control Toolkit and Avaya Aura® Agent Desktop functions

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Make Call	Yes	Yes
Hold Current Call	Yes	Yes

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
	The CS 1000 Swap Hold switch feature is not supported. For CS 1000, the Auto Hold Allowed (AHA) feature must be configured.	The CS 1000 Swap Hold switch feature is not supported.
Unhold Call	Yes (Retrieve Call)	Yes (Retrieve Call)
Drop Current Call (Release)	Yes	Yes
Blind Transfer Call	No	Yes
Initiate Supervised Transfer	Yes	Yes
Complete Transfer	Yes	Yes
Initiate Conference Call	Yes (up to six parties on CS 1000)	Yes (up to six parties)
Complete Conference Call	Yes	Yes
Call Forward	No	Yes
Cancel Call Forward	No	Yes
Join Conference	No	No
Deflect Calls	No	No
Get Status	Yes	Yes
Get Call Capabilities	Yes	Yes
Get Data	Yes	Yes
Delete Data	Yes	Yes
Append Data	Yes	Yes
Make Set Busy (Do Not Disturb)	No	Yes (on Agent Terminals only)
Get/Set UUI	No	No (UUI attached as call data)
Send DTMF (for example, credit card number to IVR)	Yes	Yes DTMF is not supported in Knowledge Worker solutions.
Mute/Unmute	Yes (on Contact Center calls only)	No
Consult	Yes	Yes (but must designate as transfer or conference)

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Park/Unpark	No	No
Message Waiting Indicator	No	No
HER (Host Enhanced Routing)	No	Yes
Answer	Yes	Yes

The fast transfer functionality does not support completing a fast transfer call to an external trunk number. This functionality is for predictive dialing environments in which the application sends a MakeCall request to an external customer number and, when the customer answers, the application sends the FastTransfer request to blind transfer the customer to a live agent.

The following table lists the Contact Center specific functions supported by Avaya Aura® Agent Desktop and Communication Control Toolkit .

Table 31: Contact Center-specific functions

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Agent Login	Yes	Yes
Agent Logout	Yes	Yes
Set Ready	Yes	Yes
Set Not Ready	Yes	Yes
ACD Set Activity Code	Yes	Yes
ACD Set Not Ready/Reason Codes	Yes	Yes
Work Ready Key support	No	No
Agent Whisper	No	No
Observe call	Yes	No
Set Call treatment	Yes	Yes
Barge In	Yes	No
Call Supervisor	Yes	Yes
Emergency Key	Yes	Yes
Redirect to another skillset	No (must transfer to a CDN)	No
Return a call to the queue skillset that it came from	No	No
Redirect to another skillset	No	No

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Return a call to the queue skillset that it came from	No	No

The following table indicates which events are delivered by Communication Control Toolkit.

Table 32: Communication Control Toolkit events

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Ringing Event	Yes	Yes
Dialtone Event	No	No
Busy Event	No	No
Offering Event	Yes	Yes
Ringback Event	Yes	Yes
Inbound Connected Event	Yes	Yes
Outbound Connected Event	Yes	Partial
Connected Event	Yes	Yes
Disconnected Event	Yes	Yes
Held Event	Yes	Yes
Unheld Event	Yes	Yes
OnHold Pending Conference Event	Yes	Yes
Onhold Pending Transfer Event	Yes	Yes
Transferred Event	Yes	Yes
Conference Event	Yes	Yes
Initiated Transfer Event	Yes	Yes
Initiated Conference Event	Yes	Yes
Session Disconnect Event (includes shutdown)	Yes	Yes
Device Forward Event	No	No
Status Change Event	Yes	Yes
Notice Message Waiting Event	No	No
Notice No Message Waiting Event	No	No
Agent Logged out Event	Yes	Yes
Agent Logged in Event	Yes	Yes

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Agent Ready Event	Yes	Yes
Agent Not Ready Event	Yes	Yes
Agent Busy Event	No	No
Agent Work Ready Event	No	No
Activity Code Entered	Yes	Yes
WalkAway Activated	No	No
WalkAway Return	No	No
Emergency Invoked	No	No
Call Supervisor Invoked	No	No

Client Terminal Relationships

AML-based Communication Control Toolkit supports a maximum of 5000 client-to-terminal relationships.

- A client monitoring a voice device (see voice terminal control capacity specification below)
- A client monitoring a multimedia terminal (see CCMM terminal control capacity specification below)

If a client monitors voice and multimedia terminals, each pair of voice + multimedia terminals are counted once; for example,

1 voice terminal + 1 multimedia terminal = 1

2 voice terminals + 1 multimedia terminal = 2

2 voice terminals + 2 multimedia terminals = 2

2 voice terminals + 3 multimedia terminals = 3

AML-based Communication Control Toolkit supports a maximum of 5000 CTI client-to-telephony device relationships where the CTI client-to-telephony device relationship is defined as a CTI client (CCT client or TAPI client) that monitors and controls a telephony device. A telephony device refers to one of the following:

- A CCT Voice Terminal (TN)
- A CCT RoutePointAddress (CDN)
- CCMM terminal control capacity

Communication Control Toolkit clients can monitor or control a multimedia terminal. A multimedia terminal is created dynamically when a Contact Center agent that is configured with one or more multimedia contact types logs on.

The following are some examples of configurations.

- 5000 CCT clients, each monitoring and controlling a single Terminal (5000 CTI clients x 1 telephony device = 5000)
- 1 CCT client monitoring and controlling 5000 Terminals (1 CTI client x 5000 telephony devices = 5000)
- 100 CCT clients, each monitoring and controlling 10 Terminals (100 CTI clients x 10 telephony devices = 1000)

Voice and multimedia

- 2750 CCT clients, each monitoring and controlling a single voice terminal + 600 CCT Clients each controlling a single multimedia terminal
- 2750 CCT clients, each monitoring and controlling a single voice terminal + 600 CCT Clients, each monitoring a single voice terminal and a single multimedia terminal

Email message memory requirements

In contact center solutions that support the email contact type, you must engineer your server to support email attachments.

The maximum attachment size formulas use the following variables and the approximate values, to calculate how much memory to reserve to process an email message.

Variable	Description	Value
Encoding adjustment	The factor by which the attachment size increases when the attachment is encoded and attached to an email message.	1.3 (this can vary slightly based on the encoding used)
Memory adjustment	The factor by which the encoded size increases when an email message is loaded into the internal representation of the email message in memory.	1.2 (this factor decreases slightly, the larger the email is, but it remains as a fixed value)
Buffer memory	The memory, which is fairly static, required by the parts of the application not involved in processing inbound email messages.	20 MB

When the following sections specify an attachment size, they mean the total size of all attachments of an email message. Also, the size of the body of an email lowers the supported attachment size by the size of the content of the message. In most cases, the content of an email is negligible compared to large attachments.

JVM size – Buffer memory / Memory adjustment / Encoding adjustment = Maximum attachment size

JVM sizes (MB)	Maximum attachment sizes (MB)
128	69.2
256 (default)	151.3
512	315.4
1024	643.6

Minimum JVM size formula

Attachment size * Encoding adjustment * Memory adjustment + Buffer memory = Minimum JVM size

Attachment sizes (MB)	Minimum JVM sizes (MB)
10	35.6
20	51.2
30	66.8
40	82.4
50	98
60	113.6
70	129.2
80	144.8
90	160.4
100	176
500	800

Calculating disk storage requirements

This section lists the database files used by Contact Center Multimedia and provides database capacity calculations.

Required database files

Contact Center Multimedia includes the following database files:

- CACHE.DAT in the *<Database Drive>*:Avaya\Contact Center\Databases \CCMM\MULTIMEDIA\DATA folder. This stores the two CACHE.DAT Contact Center Multimedia folders and files, one for code and one for data.
- Avaya\Contact Center\Databases\Journals folder is created during installation. This folder contains the Database Journal Files used for Geographic Redundancy.
- Avaya\Contact Center\Databases\ShadowJournals folder is created during installation. This folder is used if Geographic Redundancy is configured and this server is running as the Redundant server.

During the installation you can select the drive letter that these folders or files are on. The folder information is fixed.

The CACHE.DAT file grows dynamically as the volume of data in the database grows. Initially it is just under 45 MB. One million contacts take approximately 20GB of space.

The Journal files are deleted after seven days. Therefore, the maximum size of this folder is determined by the number of contacts that arrive in a seven-day period. The space taken is in proportion with the one million available contacts in 20GB space.

Email attachment storage

Email attachments are stored in the attachment folder. The disk space required to store attachments is calculated as

```
Disk space for email attachments in MB
   = number of email messages per day
   * percent with attachment
   * average attachment size in MB
   * number of days before purging
```

Example

Following is the disk storage calculation for a contact center that receives 9000 email messages every day, where 30 percent of the email messages have an attachment averaging 0.5 MB in size, and attachments are stored for 10 days before they are deleted.

```
Disk space for email attachments in MB
   = 9 000 * 0.3 * 0.5 * 10
   = 13500 MB
```

Network configuration

This section describes network configuration information for Communication Control Toolkit.

Network interface card binding order

Configure the binding order of the network interface cards so that the NIC connected to the contact center subnet is first, followed by others such as the virtual adapters for remote access.

Maximum acceptable use

Total usage of the Enterprise IP network must not exceed 30 percent in a shared network environment. Communication Control Toolkit use of the Enterprise IP network can be as high as 9 percent for a system with 500 agents. Ensure that the Enterprise IP network has enough spare capacity to accommodate Communication Control Toolkit traffic in addition to your traffic.

Contact modeling limitations in a network environment

Some limitations exist in the information you can model the Communication Control Toolkit when you deal with networked call scenarios.

Contact modeling

Conference calls that involve parties from more than one networked switch cannot be completely represented on each Communication Control Toolkit (CCT) system. Each CCT system can model only the parties that it has direct visibility with. For instance, consider a conference call involving parties A, B, and C, where A and B are on CCT 1 and party C is on CCT 2. If party B is the conference controller (initiated the conference with party C), then from the perspective of CCT 1 shows a three-party call with parties A, B, and C involved. However, the perspective of CCT 2 shows only a two-party call with B and C involved with B as the calling address and C as the called address.

Third-party software requirements

This section describes the third-party software requirements for the Voice and Multimedia Contact Server.

Warning:

You must install and actively manage a spam filter to remove spam messages from all contact center mailboxes. Unsolicited bulk spam messages to your Contact Center, if not filtered out, may impact performance or may cause damage to your contact center solution.

Important:

If your contact center uses an Avaya Aura® Communication Manager, Avaya Aura® Agent Desktop client computers do not support the following applications running concurrently with Avaya Aura® Agent Desktop:

- Avaya one-X® Communicator
- IP Agent
- IP Softphone
- Any other non-Avaya softphone applications
- Avaya one-X® Agent. In a Multimedia-only Contact Center deployment, where the Contact Center agents are configured for Multimedia contact types only, running Avaya Aura® Agent Desktop concurrently with Avaya one-X® Agent on a client computer is supported.

Third-party backup software

Two types of backups are available on Contact Center Manager Server:

- Full (offline) backup
- Database (online) backup

Use third-party backup software only for full (offline) backups. To create a full backup, you must use a third-party backup utility such as Microsoft backup utility. See the third-party documentation for information about the full backup procedure, and *Avaya Aura® Contact Center Server Administration* (NN44400-610) for information about procedures that you must perform before a full backup. If you use a third-party backup utility, it must comply with the general third-party software guidelines specified in Third-party software requirements on page 161.

You must shut down all Contact Center Manager Server services before you perform a full backup. Some third-party backup utilities can provide an online backup of all files, Contact Center Manager Server does not support an online backup from these third-party backup utilities.

Avaya recommends that you back up your database daily.

If you plan to back up your Contact Center Multimedia database across the network, be aware that disk capacity affects the speed of the backup and restore. To reduce the speed of a database back up or restore, follow disk capacity requirements on the remote locations.

Voice and Multimedia Contact Server antivirus software

This section describes the Voice and Multimedia Contact Server antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- `F:\Avaya\Contact Center\Database\`
- `<additional database drive>:\Avaya\Database\`
- TSM_OAM log folder location
- `D:\Avaya\Contact Center\Manager Server\iccm\bin\data`
- `D:\Avaya\Contact Center\Manager server\iccm\data`
- `D:\Avaya\Contact Center\Manager Server\iccm\sdm\log`
- OAMContainer*.log located at `D:\Avaya\Contact Center\Common Components\CMF`
- `D:\Avaya\Contact Center\Manager Server\bin\tools2.exe`—File access errors occur in the Scan Activity log if you do not exclude this file from scanning.
- `D:\Avaya\Contact Center\Manager Server\iccm\logs` (SIP logs)
- `D:\Avaya\Contact Center\Manager Server\iccm\sgm\config\` (SIP log configuration files)
- `D:\Avaya\Contact Center\Common Components\CMF`
- The folder where you store Server Packs and patches

Contact Center Multimedia interacts with an external email system and enables agents to send attachment files from their computers to the Contact Center Multimedia server. Both methods of retrieving data are potential sources of software infection.

Avaya recommends the following guidelines for antivirus software:

- Antivirus software must be installed on the email server to ensure that problems are caught at source.
- Agent computers require antivirus software to ensure that attachments sent to the Contact Center Multimedia server do not have a virus. Contact Center Multimedia does not block

specific attachment file types. Third-party antivirus software must be installed on the Portal Server according to guidelines in this document for such utilities.

- Exclude the Contact Center Multimedia partition from being scanned.
- If firewalls on individual computers are enabled on the Agent Desktop computer, the Report Listener may be flagged as trying to access the Internet. The properties must be configured to allow access for the Report Listener to Contact Center Multimedia through the firewall.
- You must not enable the Microsoft Updater to Auto-Run. Microsoft Updater is configured to alert level so you can schedule updates for off- peak hours.

Warning:

Running a Virus Scan on the Contact Center Multimedia attachment folder, which contains thousands of files, can use significant CPU time on a server and can cause drastic slowdown in agent's response times. Avaya recommends that you run scans, if necessary, during off-peak hours.

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in `<Install_Directory>:\Avaya\Cache\CacheSys`. Databases and journal files are installed in `<Install_Directory>:\Avaya\Contact Center\Databases`.

Port requirements

This section lists the ports used by the Voice and Multimedia Contact Server components.

Contact Center Manager Server uses ports for communication between its own components. Most ports do not have implications for external network components like firewalls; however some ports may be used externally and therefore can affect an external firewall. In particular, port 10000 is a hard-coded port used to enable interoperability between Contact Center applications and external third-party applications (applications developed using the Real-Time Data (RTD) API).

No third-party application installed on Voice and Multimedia Contact Server can use the ports listed in the following table as it can cause the Contact Center Manager Server application to malfunction.

The following table shows the ports that Contact Center Manager Server uses.

Table 33: Contact Center Manager Server port usage

CCMS port number	Functionality
445	TCP port used Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1550	HDX CAPI
1972	Caché database, and Caché shadowing
4422	HDX NameService
12668–12670	TraceControl
10000	Hardcoded Toolkit Name Service
10001–10082	Networking
10038	NCP_CHANNEL—This channel is used to communicate between the NCP of one node to the NCP of another node. The NCP on one node sends sanity messages to the other node through this port.
10039	ASM_CHANNEL—Different modules like NCP and TFE send messages to ASM through this channel.
10040	NCP_ASM_CHANNEL—ASM uses this channel to send messages to NCP.
10060	ASM_Service—The ASM service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to the ASM service through this port.
10062	NCP_Service—The NCP service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to NCP on this port.
3998	License Manager destination port—This is the first of 10 consecutive ports required for license management.
3999–4007	License Manager client source port
3389	Remote Desktop Connection for support
5060	SIP Proxy
9080–9083	Web Services Open Interfaces
9086	CC Web Statistics
9089	Avaya Aura® Experience Portal Basic Ports application
57012	System Management and Monitoring Component (SMMC) system tray. Used by the High Availability feature.

The following table shows the ports that Contact Center Manager Administration uses.

Table 34: Contact Center Manager Administration port usage

CCMA port number	Functionality
TCP 80	For Internet Explorer communication.
TCP 443	For secure HTTP communication (only applicable if SSL is enabled for secure Internet Information Services (IIS) communication).
TCP Ports 389 and 636	For Active Directory Lightweight Directory Services (AD-LDS) functionality. Port 389 is for LDAP, and port 636 is for SSL. When you install CCMA on a server that runs Window Server 2008, these ports usually appear by default in the Port Configuration for AD-LDS installation window. If the values 50 000 and 50 001 appear instead, port numbers 389 and 636 are already taken. In this case, you can either accept the new values, or choose other ports for security reasons. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
TCP Port 3389	For remote desktop connection.
TCP Port 25 (SMTP)	For the Historical Reporting component to send email notifications when reports are printed and saved.
3899, 6366	For AD-LDS when CCMA is co-resident with Security Framework or Avaya Media Server. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 8200	For the Emergency Help component on the client PC.
UDP ports 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130	For the CCMA server to receive IP multicasting data from CCMS Server (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7 020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130	For the CCMA server to send IP multicasting data to client PCs (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7025, 7035, 7045, 7055, 7065, 7075, 7085, 7095, 7105, 7115, 7125, 7135	For the CCMA server to send IP unicast data to client PCs. This is an optional method of sending the data required for Real-Time Reporting. If you do not use the multicast method, then you must configure the unicast option. You can also use a combination of the two methods.
TCP Port 10000	Used by the Nameservice process on the CCMA server (nbnmsrvc.exe). It permits communication between the CCMA server and the server in Contact Center Manager Server.

CCMA port number	Functionality
	Important: The default port for the third-party software. This conflicts with the default port used by the CCMA Toolkit NameService. To avoid issues with CCMA functionality when using Veritas Backup Exec, you must change the default port of Veritas Backup Exec to another port number that is not being used by the network.
Default UDP port 3998	License Manager destination port.
Default UDP ports 3999 - 4007	License Manager destination source port.

The following table shows the port numbers required for Communication Control Toolkit (CCT).

Table 35: Communication Control Toolkit port usage

CCT port number	Functionality
445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1972	Caché database, and Caché shadowing High Availability solutions.
3000	For TAPI switch connection through MLS (CCMA server). This port is required for the contact center subnet.
3998	License Manager (LM) destination port, which is the first of 10 consecutive ports required for license management.
3999 - 4007	LM client source ports.
5000	To connect to the server in CCMS.
8081	Default port of the Apache Tomcat Server which hosts the CCT Web Administration.
8085	For CCT services to access the CCT database.
8098	For the Contact Management Framework on the CCT server.
8099	For the Contact Management Framework on the CCT server.
8888	For the TAPI switch connection using direct-connect. This port is required only for the ELAN subnet.
8087	For CCT CMF component.
9010	For CCT CMF component.
9085	Hosts the CCT OI REST services

CCT port number	Functionality
9091	Used for CCT OI REST Bayeux port
11110	Used by the CCT Server service for the CMF Web Service - Callback port.
11111	Used by the CCT Server service for the CMF Web Service - Web server port.
29373	Listens for requests from CCT client applications.
29374	Data Access Layer Service listens for requests from CCT Remote Administration Console.

The following table lists the configurable Multimedia ports.

Table 36: Contact Center Multimedia ports

Port	Host	Client	Network interface	Functionality
1972	Contact Center Multimedia	Contact Center Manager Administration Server	Contact Center Multimedia Caché database	Port opened on database for reporting. Caché database, and Caché shadowing in High Availability solutions.
110	Email server	Email Manager	Email server POP3	Receiving email
445	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
995	Email server	Email Manager	POP3 over SSL (optional)	Receiving secure email (optional)
25	Email server	Email Manager	SMTP	Sending email

Port	Host	Client	Network interface	Functionality
80	Contact Center Multimedia Server	Any Web services client (Agent Desktop, OCMT, and third-party Web services)	SOAP protocol	Accessing http Web services
29373	Communication Control Toolkit Server	Agent Desktop	Communication Control Toolkit	Remote access from clients to Communication Control Toolkit server (for Agent Desktop application)
57012	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	High Availability

Chapter 13: Voice Contact Server configuration requirements

This section provides the configuration requirements for a Voice Contact Server. Install this server to provide context-sensitive and skill-based routing for customer voice and multimedia contacts. This server provides extensive tools for agent management, real-time and historical reporting, and graphical tools to create contact flows and treatment rules. Use this server for license management, High Availability configuration, networking, Open Interfaces Web Service and third-party application interfaces integration.

This server includes the following Avaya Aura® Contact Center components:

- Contact Center Manager Server (CCMS)
- Contact Center Manager Administration (CCMA)
- Communication Control Toolkit (CCT)
- Contact Center License Manager (LM)
- Contact Center Manager Server Utility (SU)
- Avaya Aura® Contact Center Orchestration Designer (OD)

Voice Contact Server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

Voice Contact Server supports High Availability.

If you access Contact Center Manager Administration from a browser on the server, Avaya recommends that you limit the number of on-demand and scheduled historical reports run on the server. Running historical reports can increase the CPU usage on the server. In addition, Avaya recommends that you limit the number of real-time displays that you start. Viewing real-time displays also increases the CPU usage on the server.

You can use the instance of Contact Center Manager Administration on this server to manage the agents and supervisors associated with this server or with remote CCMS servers up to the maximum supervisor capacity for this server.

Common Server Requirements: The Voice Contact Server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Voice Contact Server hardware specification depends on your agent count, and call flow rate. You can install Voice Contact Server software on a physical server or on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by Voice Contact Server.

Table 37: Voice Contact Server supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Aura SIP	Yes	Yes	Yes	Yes	Yes	Yes
CS 1000 AML	Yes	Yes	Yes	Yes	Yes	Yes

For more information about Avaya Aura® Contact Center server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

Communication Control Toolkit components

The Communication Control Toolkit simplifies integration. The transport components provide firewall friendliness, Network Address Translation (NAT), and Citrix support. The server components enable open telephone switch connectivity.

The Communication Control Toolkit consists of Avaya developed software and third-party components, as described in this section.

Important:

Q Signaling (QSIG) Path Replacement and Trunk Anti Tromboning is not supported in Communication Control Toolkit.

Client application

Client applications are third-party components and can include the following:

- software phones
- agent telephony toolbars with screen pop-ups
- intelligent call management applications

The Communication Control Toolkit API provides five levels of API that you can use to develop a range of client applications.

An easy-to-use graphical API delivers Windows Form Controls (Win Forms), that you can import into a project for rapid development of form-based toolbars. The Win Forms provide graphical API abstractions that enable rapid development of Communication Control Toolkit-enabled applications.

The Communication Control Toolkit API also provides abstraction layers to COM client interfaces.

Important:

TAPI legacy clients are not supported.

Communication Control Toolkit server

The component that manages client sessions consists of the following subcomponents:

- Contact Management Framework—An infrastructure component that manages the states of contacts, agents, terminals, and addresses.
- TAPI Connector—An application that converts Communication Control Toolkit requests to TAPI API calls, and TAPI events to Communication Control Toolkit events. The TAPI Connector resides between the TAPI Service Provider and the Contact Management Framework.
- TAPI Service Provider—A Microsoft TAPI client responsible for CTI operations of all lines controlled by the Communication Control Toolkit platform initialized by TAPI. This service is installed only in AML-based solutions.
- Communication Control Toolkit API—An API that controls voice resources. The API is published as Microsoft .NET types and distributed as a Windows assembly, which is referenced by application developers.

Communication Control Toolkit supported functionality

The tables in this section indicate which functions are supported by Communication Control Toolkit. Avaya Aura® Agent Desktop is a client of Communication Control Toolkit so they support the same features.

Important:

If your phone supports Multiple Appearance Reduction Prime (MARP) of Multiple Appearance Directory Number (MADN) you must disable the configurations. These configurations are not supported in Communication Control Toolkit.

Important:

In SIP-enabled contact centers, agents must not use their desk phone or Agent Desktop to phone, transfer a call, or conference a call to a phone number that is:

- routed to a CDN (Route Point). For example, a Virtual Directory Number (VDN) routed to a CDN (Route Point).
- converted to a CDN (Route Point).
- call forwarded to a CDN (Route Point).

Agents may use their desk phone or Agent Desktop to transfer a call, conference or phone directly to a CDN (Route Point).

The following tables list the basic Communication Control Toolkit call control functions.

Table 38: Basic Communication Control Toolkit and Avaya Aura® Agent Desktop functions

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Make Call	Yes	Yes
Hold Current Call	Yes The CS 1000 Swap Hold switch feature is not supported. For CS 1000, the Auto Hold Allowed (AHA) feature must be configured.	Yes The CS 1000 Swap Hold switch feature is not supported.
Unhold Call	Yes (Retrieve Call)	Yes (Retrieve Call)
Drop Current Call (Release)	Yes	Yes
Blind Transfer Call	No	Yes
Initiate Supervised Transfer	Yes	Yes
Complete Transfer	Yes	Yes
Initiate Conference Call	Yes (up to six parties on CS 1000)	Yes (up to six parties)
Complete Conference Call	Yes	Yes
Call Forward	No	Yes
Cancel Call Forward	No	Yes
Join Conference	No	No
Deflect Calls	No	No
Get Status	Yes	Yes

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Get Call Capabilities	Yes	Yes
Get Data	Yes	Yes
Delete Data	Yes	Yes
Append Data	Yes	Yes
Make Set Busy (Do Not Disturb)	No	Yes (on Agent Terminals only)
Get/Set UUI	No	No (UUI attached as call data)
Send DTMF (for example, credit card number to IVR)	Yes	Yes DTMF is not supported in Knowledge Worker solutions.
Mute/Unmute	Yes (on Contact Center calls only)	No
Consult	Yes	Yes (but must designate as transfer or conference)
Park/Unpark	No	No
Message Waiting Indicator	No	No
HER (Host Enhanced Routing)	No	Yes
Answer	Yes	Yes

The fast transfer functionality does not support completing a fast transfer call to an external trunk number. This functionality is for predictive dialing environments in which the application sends a MakeCall request to an external customer number and, when the customer answers, the application sends the FastTransfer request to blind transfer the customer to a live agent.

The following table lists the Contact Center specific functions supported by Avaya Aura® Agent Desktop and Communication Control Toolkit .

Table 39: Contact Center-specific functions

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Agent Login	Yes	Yes
Agent Logout	Yes	Yes
Set Ready	Yes	Yes
Set Not Ready	Yes	Yes
ACD Set Activity Code	Yes	Yes

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
ACD Set Not Ready/Reason Codes	Yes	Yes
Work Ready Key support	No	No
Agent Whisper	No	No
Observe call	Yes	No
Set Call treatment	Yes	Yes
Barge In	Yes	No
Call Supervisor	Yes	Yes
Emergency Key	Yes	Yes
Redirect to another skillset	No (must transfer to a CDN)	No
Return a call to the queue skillset that it came from	No	No
Redirect to another skillset	No	No
Return a call to the queue skillset that it came from	No	No

The following table indicates which events are delivered by Communication Control Toolkit.

Table 40: Communication Control Toolkit events

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Ringing Event	Yes	Yes
Dialtone Event	No	No
Busy Event	No	No
Offering Event	Yes	Yes
Ringback Event	Yes	Yes
Inbound Connected Event	Yes	Yes
Outbound Connected Event	Yes	Partial
Connected Event	Yes	Yes
Disconnected Event	Yes	Yes
Held Event	Yes	Yes
Unheld Event	Yes	Yes
OnHold Pending Conference Event	Yes	Yes

Event	SIP-enabled Avaya Aura® & CS 1000	AML-based CS 1000
Onhold Pending Transfer Event	Yes	Yes
Transferred Event	Yes	Yes
Conference Event	Yes	Yes
Initiated Transfer Event	Yes	Yes
Initiated Conference Event	Yes	Yes
Session Disconnect Event (includes shutdown)	Yes	Yes
Device Forward Event	No	No
Status Change Event	Yes	Yes
Notice Message Waiting Event	No	No
Notice No Message Waiting Event	No	No
Agent Logged out Event	Yes	Yes
Agent Logged in Event	Yes	Yes
Agent Ready Event	Yes	Yes
Agent Not Ready Event	Yes	Yes
Agent Busy Event	No	No
Agent Work Ready Event	No	No
Activity Code Entered	Yes	Yes
WalkAway Activated	No	No
WalkAway Return	No	No
Emergency Invoked	No	No
Call Supervisor Invoked	No	No

Client Terminal Relationships

AML-based Communication Control Toolkit supports a maximum of 5000 client-to-terminal relationships.

- A client monitoring a voice device (see voice terminal control capacity specification below)
- A client monitoring a multimedia terminal (see CCMM terminal control capacity specification below)

If a client monitors voice and multimedia terminals, each pair of voice + multimedia terminals are counted once; for example,

1 voice terminal + 1 multimedia terminal = 1

2 voice terminals + 1 multimedia terminal = 2

2 voice terminals + 2 multimedia terminals = 2

2 voice terminals + 3 multimedia terminals = 3

AML-based Communication Control Toolkit supports a maximum of 5000 CTI client-to-telephony device relationships where the CTI client-to-telephony device relationship is defined as a CTI client (CCT client or TAPI client) that monitors and controls a telephony device. A telephony device refers to one of the following:

- A CCT Voice Terminal (TN)
- A CCT RoutePointAddress (CDN)
- CCMM terminal control capacity

Communication Control Toolkit clients can monitor or control a multimedia terminal. A multimedia terminal is created dynamically when a Contact Center agent that is configured with one or more multimedia contact types logs on.

The following are some examples of configurations.

- 5000 CCT clients, each monitoring and controlling a single Terminal (5000 CTI clients x 1 telephony device = 5000)
- 1 CCT client monitoring and controlling 5000 Terminals (1 CTI client x 5000 telephony devices = 5000)
- 100 CCT clients, each monitoring and controlling 10 Terminals (100 CTI clients x 10 telephony devices = 1000)

Voice and multimedia

- 2750 CCT clients, each monitoring and controlling a single voice terminal + 600 CCT Clients each controlling a single multimedia terminal
- 2750 CCT clients, each monitoring and controlling a single voice terminal + 600 CCT Clients, each monitoring a single voice terminal and a single multimedia terminal

Network configuration

This section describes network configuration information for Communication Control Toolkit.

Network interface card binding order

Configure the binding order of the network interface cards so that the NIC connected to the contact center subnet is first, followed by others such as the virtual adapters for remote access.

Maximum acceptable use

Total usage of the Enterprise IP network must not exceed 30 percent in a shared network environment. Communication Control Toolkit use of the Enterprise IP network can be as high as 9 percent for a system with 500 agents. Ensure that the Enterprise IP network has enough spare capacity to accommodate Communication Control Toolkit traffic in addition to your traffic.

Contact modeling limitations in a network environment

Some limitations exist in the information you can model the Communication Control Toolkit when you deal with networked call scenarios.

Contact modeling

Conference calls that involve parties from more than one networked switch cannot be completely represented on each Communication Control Toolkit (CCT) system. Each CCT system can model only the parties that it has direct visibility with. For instance, consider a conference call involving parties A, B, and C, where A and B are on CCT 1 and party C is on CCT 2. If party B is the conference controller (initiated the conference with party C), then from the perspective of CCT 1 shows a three-party call with parties A, B, and C involved. However, the perspective of CCT 2 shows only a two-party call with B and C involved with B as the calling address and C as the called address.

Third-party software requirements

This section describes the third-party software requirements for the Voice Contact Server.

Important:

If your contact center uses an Avaya Aura® Communication Manager, Avaya Aura® Agent Desktop client computers do not support the following applications running concurrently with Avaya Aura® Agent Desktop:

- Avaya one-X® Communicator
- IP Agent
- IP Softphone
- Any other non-Avaya softphone applications
- Avaya one-X® Agent. In a Multimedia-only Contact Center deployment, where the Contact Center agents are configured for Multimedia contact types only, running Avaya Aura® Agent Desktop concurrently with Avaya one-X® Agent on a client computer is supported.

Voice Contact Server antivirus software

This section describes the Voice Contact Server antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- `F:\Avaya\Contact Center\Database\`
- `<additional database drive>:\Avaya\Database\`
- TSM_OAM log folder location
- `D:\Avaya\Contact Center\Manager Server\iccm\bin\data`
- `D:\Avaya\Contact Center\Manager server\iccm\data`
- `D:\Avaya\Contact Center\Manager Server\iccm\sdm\log`
- OAMContainer*.log located at `D:\Avaya\Contact Center\Common Components\CMF`
- `D:\Avaya\Contact Center\Manager Server\bin\tools2.exe`—File access errors occur in the Scan Activity log if you do not exclude this file from scanning.
- `D:\Avaya\Contact Center\Manager Server\iccm\logs` (SIP logs)
- `D:\Avaya\Contact Center\Manager Server\iccm\sgm\config\` (SIP log configuration files)

- D:\Avaya\Contact Center\Common Components\CMF
- The folder where you store Server Packs and patches

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in *<Install_Directory>*:\Avaya\Cache\CacheSys. Databases and journal files are installed in *<Install_Directory>*:\Avaya\Contact Center\Databases.

Port requirements

This section lists the ports used by the Voice Contact Server components.

Contact Center Manager Server uses ports for communication between its own components. Most ports do not have implications for external network components like firewalls; however some ports may be used externally and therefore can affect an external firewall. In particular, port 10000 is a hard-coded port used to enable interoperability between Contact Center applications and external third-party applications (applications developed using the Real-Time Data (RTD) API).

No third-party application installed on Voice Contact Server can use the ports listed in the following table as it can cause the Contact Center Manager Server application to malfunction.

The following table shows the ports that Contact Center Manager Server uses.

Table 41: Contact Center Manager Server port usage

CCMS port number	Functionality
445	TCP port used Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1550	HDX CAPI
1972	Caché database, and Caché shadowing
4422	HDX NameService
12668–12670	TraceControl
10000	Hardcoded Toolkit Name Service
10001–10082	Networking
10038	NCP_CHANNEL—This channel is used to communicate between the NCP of one node to the NCP of another node. The NCP on one node sends sanity messages to the other node through this port.

CCMS port number	Functionality
10039	ASM_CHANNEL—Different modules like NCP and TFE send messages to ASM through this channel.
10040	NCP_ASM_CHANNEL—ASM uses this channel to send messages to NCP.
10060	ASM_Service—The ASM service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to the ASM service through this port.
10062	NCP_Service—The NCP service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to NCP on this port.
3998	License Manager destination port—This is the first of 10 consecutive ports required for license management.
3999–4007	License Manager client source port
3389	Remote Desktop Connection for support
5060	SIP Proxy
9080–9083	Web Services Open Interfaces
9086	CC Web Statistics
9089	Avaya Aura® Experience Portal Basic Ports application
57012	System Management and Monitoring Component (SMMC) system tray. Used by the High Availability feature.

The following table shows the ports that Contact Center Manager Administration uses.

Table 42: Contact Center Manager Administration port usage

CCMA port number	Functionality
TCP 80	For Internet Explorer communication.
TCP 443	For secure HTTP communication (only applicable if SSL is enabled for secure Internet Information Services (IIS) communication).
TCP Ports 389 and 636	For Active Directory Lightweight Directory Services (AD-LDS) functionality. Port 389 is for LDAP, and port 636 is for SSL. When you install CCMA on a server that runs Window Server 2008, these ports usually appear by default in the Port Configuration for AD-LDS installation window. If the values 50 000 and 50 001 appear instead, port numbers 389 and 636 are already taken. In this case, you can either accept the new values, or choose other ports for security reasons. These ports are also used for AD-LDS replication in High Availability solutions.

CCMA port number	Functionality
TCP Port 445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
TCP Port 3389	For remote desktop connection.
TCP Port 25 (SMTP)	For the Historical Reporting component to send email notifications when reports are printed and saved.
3899, 6366	For AD-LDS when CCMA is co-resident with Security Framework or Avaya Media Server. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 8200	For the Emergency Help component on the client PC.
UDP ports 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130	For the CCMA server to receive IP multicasting data from CCMS Server (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7 020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130	For the CCMA server to send IP multicasting data to client PCs (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7025, 7035, 7045, 7055, 7065, 7075, 7085, 7095, 7105, 7115, 7125, 7135	For the CCMA server to send IP unicast data to client PCs. This is an optional method of sending the data required for Real-Time Reporting. If you do not use the multicast method, then you must configure the unicast option. You can also use a combination of the two methods.
TCP Port 10000	Used by the Nameservice process on the CCMA server (nbnmsrvc.exe). It permits communication between the CCMA server and the server in Contact Center Manager Server. **Important:** The default port for the third-party software. This conflicts with the default port used by the CCMA Toolkit NameService. To avoid issues with CCMA functionality when using Veritas Backup Exec, you must change the default port of Veritas Backup Exec to another port number that is not being used by the network.
Default UDP port 3998	License Manager destination port.
Default UDP ports 3999 - 4007	License Manager destination source port.

The following table shows the port numbers required for Communication Control Toolkit (CCT).

Table 43: Communication Control Toolkit port usage

CCT port number	Functionality
445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1972	Caché database, and Caché shadowing High Availability solutions.
3000	For TAPI switch connection through MLS (CCMA server). This port is required for the contact center subnet.
3998	License Manager (LM) destination port, which is the first of 10 consecutive ports required for license management.
3999 - 4007	LM client source ports.
5000	To connect to the server in CCMS.
8080	Default port of the Apache Tomcat Server which hosts the CCT Web Administration.
8085	For CCT services to access the CCT database.
8098	For the Contact Management Framework on the CCT server.
8099	For the Contact Management Framework on the CCT server.
8888	For the TAPI switch connection using direct-connect. This port is required only for the ELAN subnet.
8087	For CCT CMF component.
9010	For CCT CMF component.
9085	Hosts the CCT OI REST services
9091	Used for CCT OI REST Bayeux port
11110	Used by the CCT Server service for the CMF Web Service - Callback port.
11111	Used by the CCT Server service for the CMF Web Service - Web server port.
29373	Listens for requests from CCT client applications.
29374	Data Access Layer Service listens for requests from CCT Remote Administration Console.

Chapter 14: Multimedia Contact Server configuration requirements

This section provides the configuration requirements for a Multimedia Contact Server. Install this server to increase the number of contact center agents in your enterprise solution. When installed, this server provides the multimedia contact processing capabilities, and the Voice and Multimedia Contact Server processes only voice contacts.

This server provides routed contact support for voice calls, email messages, instant messages (IMs), Web communications, voice mail messages, scanned documents, fax messages, and SMS text messages.

This server includes the following Avaya Aura® Contact Center components:

- Contact Center Multimedia (CCMM)

Multimedia Contact Server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system. Multimedia Contact Server supports High Availability.

In a solution using one of these servers, agents download and install Avaya Aura® Agent Desktop software from this server.

In a solution where agents use Avaya Aura® Agent Desktop to log on and handle customer calls, each Voice Contact Server requires one Multimedia Contact Server. In a SIP-enabled voice contact center solution, agents must use Avaya Aura® Agent Desktop to log on and handle customer calls. Therefore each SIP-enabled voice solution using a Voice Contact Server also requires one Multimedia Contact Server.

In an Avaya Communication Server 1000 AML-based voice-only solution, where agents use Avaya Aura® Agent Desktop to log on and handle customer calls, each Voice Contact Server requires one Multimedia Contact Server. In an Avaya Communication Server 1000 AML-based voice-only solution, where agents use their desk phones to log on and handle customer calls, and where the agents do not use Avaya Aura® Agent Desktop, a Multimedia Contact Server is not required.

In a voice-only solution, multimedia contacts are not supported. Therefore, in a voice-only solution without multimedia licenses, the CCMM Administration utility blocks access to the multimedia features and functions. In a voice-only solution that uses Avaya Aura® Agent Desktop, use the CCMM Administration utility to configure Avaya Aura® Agent Desktop features and functions.

To enable the multimedia features in the CCMM Administration utility, obtain and install a multimedia-enabled Avaya Aura® Contact Center license. Once you have obtained a multimedia license, install the new license file on the server, and reconfigure the Contact Center Manager Server server and license settings. You must also refresh all the servers in Contact Center Manager Administration. Once you have installed a multimedia-enabled license, the system enables all the multimedia features and functions.

Common Server Requirements: The Multimedia Contact Server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Multimedia Contact Server hardware specification depends on your solution type, agent count, and call flow rate. You can install Multimedia Contact Server software on a physical server or on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by Multimedia Contact Server.

Table 44: Multimedia Contact Server supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Aura SIP	Yes	Yes	Yes	Yes	Yes	Yes
CS 1000 AML	Yes	Yes	Yes	Yes	Yes	Yes

For more information about Avaya Aura® Contact Center server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

Email message memory requirements

In contact center solutions that support the email contact type, you must engineer your server to support email attachments.

The maximum attachment size formulas use the following variables and the approximate values, to calculate how much memory to reserve to process an email message.

Variable	Description	Value
Encoding adjustment	The factor by which the attachment size increases when the attachment is encoded and attached to an email message.	1.3 (this can vary slightly based on the encoding used)

Variable	Description	Value
Memory adjustment	The factor by which the encoded size increases when an email message is loaded into the internal representation of the email message in memory.	1.2 (this factor decreases slightly, the larger the email is, but it remains as a fixed value)
Buffer memory	The memory, which is fairly static, required by the parts of the application not involved in processing inbound email messages.	20 MB

When the following sections specify an attachment size, they mean the total size of all attachments of an email message. Also, the size of the body of an email lowers the supported attachment size by the size of the content of the message. In most cases, the content of an email is negligible compared to large attachments.

JVM size – Buffer memory / Memory adjustment / Encoding adjustment = Maximum attachment size

JVM sizes (MB)	Maximum attachment sizes (MB)
128	69.2
256 (default)	151.3
512	315.4
1024	643.6

Minimum JVM size formula

Attachment size * Encoding adjustment * Memory adjustment + Buffer memory = Minimum JVM size

Attachment sizes (MB)	Minimum JVM sizes (MB)
10	35.6
20	51.2
30	66.8
40	82.4
50	98
60	113.6
70	129.2
80	144.8
90	160.4

Attachment sizes (MB)	Minimum JVM sizes (MB)
100	176
500	800

Calculating disk storage requirements

This section lists the database files used by Contact Center Multimedia and provides database capacity calculations.

Required database files

Contact Center Multimedia includes the following database files:

- CACHE.DAT in the *<Database Drive>*:Avaya\Contact Center\Databases\CCMM\MULTIMEDIA\DATA folder. This stores the two CACHE.DAT Contact Center Multimedia folders and files, one for code and one for data.
- Avaya\Contact Center\Databases\Journals folder is created during installation. This folder contains the Database Journal Files used for Geographic Redundancy.
- Avaya\Contact Center\Databases\ShadowJournals folder is created during installation. This folder is used if Geographic Redundancy is configured and this server is running as the Redundant server.

During the installation you can select the drive letter that these folders or files are on. The folder information is fixed.

The CACHE.DAT file grows dynamically as the volume of data in the database grows. Initially it is just under 45 MB. One million contacts take approximately 20GB of space.

The Journal files are deleted after seven days. Therefore, the maximum size of this folder is determined by the number of contacts that arrive in a seven-day period. The space taken is in proportion with the one million available contacts in 20GB space.

Email attachment storage

Email attachments are stored in the attachment folder. The disk space required to store attachments is calculated as

```
Disk space for email attachments in MB
   = number of email messages per day
   * percent with attachment
   * average attachment size in MB
   * number of days before purging
```

Example

Following is the disk storage calculation for a contact center that receives 9000 email messages every day, where 30 percent of the email messages have an attachment averaging 0.5 MB in size, and attachments are stored for 10 days before they are deleted.

```
Disk space for email attachments in MB
   = 9 000 * 0.3 * 0.5 * 10
   = 13500 MB
```

Third-party software requirements

This section describes the third-party software requirements for the Voice and Multimedia Contact Server.

Warning:

You must install and actively manage a spam filter to remove spam messages from all contact center mailboxes. Unsolicited bulk spam messages to your Contact Center, if not filtered out, may impact performance or may cause damage to your contact center solution.

Important:

If your contact center uses an Avaya Aura® Communication Manager, Avaya Aura® Agent Desktop client computers do not support the following applications running concurrently with Avaya Aura® Agent Desktop:

- Avaya one-X® Communicator
- IP Agent
- IP Softphone
- Any other non-Avaya softphone applications
- Avaya one-X® Agent. In a Multimedia-only Contact Center deployment, where the Contact Center agents are configured for Multimedia contact types only, running Avaya Aura® Agent Desktop concurrently with Avaya one-X® Agent on a client computer is supported.

Third-party backup software

If you plan to back up your Contact Center Multimedia across the network, be aware that disk capacity affects the speed of the backup and restore. To reduce the speed of a database back up or restore, follow disk capacity requirements on the remote locations.

Multimedia Contact Server antivirus software

Contact Center Multimedia interacts with an external email system and enables agents to send attachment files from their computers to the Contact Center Multimedia server. Both methods of retrieving data are potential sources of software infection.

Avaya recommends the following guidelines for antivirus software:

- Antivirus software must be installed on the email server to ensure that problems are caught at source.
- Agent computers require antivirus software to ensure that attachments sent to the Contact Center Multimedia server do not have a virus. Contact Center Multimedia does not block specific attachment file types. Third-party antivirus software must be installed on the Portal Server according to guidelines in this document for such utilities.
- Exclude the Contact Center Multimedia partition from being scanned.
- If firewalls on individual computers are enabled on the Agent Desktop computer, the Report Listener may be flagged as trying to access the Internet. The properties must be configured to allow access for the Report Listener to Contact Center Multimedia through the firewall.
- You must not enable the Microsoft Updater to Auto-Run. Microsoft Updater is configured to alert level so you can schedule updates for off- peak hours.

Warning:

Running a Virus Scan on the Contact Center Multimedia attachment folder, which contains thousands of files, can use significant CPU time on a server and can cause drastic slowdown in agent's response times. Avaya recommends that you run scans, if necessary, during off-peak hours.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- The folder where you store Server Packs and patches

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in `<Install_Directory>:\Avaya\Cache\CacheSys`. Databases and journal files are installed in `<Install_Directory>:\Avaya\Contact Center\Databases`.

Port requirements

This section lists the ports used by the Multimedia Contact Server components.

The following table lists the configurable Multimedia ports.

Table 45: Contact Center Multimedia ports

Port	Host	Client	Network interface	Functionality
1972	Contact Center Multimedia	Contact Center Manager Administration Server	Contact Center Multimedia Caché database	Port opened on database for reporting. Caché database, and Caché shadowing in High Availability solutions.
110	Email server	Email Manager	Email server POP3	Receiving email
445	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
995	Email server	Email Manager	POP3 over SSL (optional)	Receiving secure email (optional)
25	Email server	Email Manager	SMTP	Sending email
80	Contact Center Multimedia Server	Any Web services client (Agent Desktop, OCMT, and third-party Web services)	SOAP protocol	Accessing http Web services

Port	Host	Client	Network interface	Functionality
29373	Communication Control Toolkit Server	Agent Desktop	Communication Control Toolkit	Remote access from clients to Communication Control Toolkit server (for Agent Desktop application)
57012	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	High Availability

Chapter 15: Voice and Multimedia Contact Server with Avaya Media Server configuration requirements

This section provides the configuration requirements for a Voice and Multimedia Contact Server with Avaya Media Server. Install this server to provide context-sensitive and skill-based routing for customer voice and multimedia contacts. This server provides routed contact support for voice calls, email messages, Web communications, voice mail messages, scanned documents, fax messages, and SMS text messages. SIP-enabled Voice and Multimedia Contact Server also supports Instant Message (IM) contact routing. This server provides extensive tools for agent management, real-time and historical reporting, and graphical tools to create contact flows and treatment rules. Use this server for license management, networking, Open Interfaces Web Service and third-party application interfaces integration.

This server includes the following Avaya Aura® Contact Center components:

- Contact Center Manager Server (CCMS)
- Contact Center Manager Administration (CCMA)
- Communication Control Toolkit (CCT)
- Contact Center License Manager (LM)
- Contact Center Manager Server Utility (SU)
- Avaya Aura® Contact Center Orchestration Designer (OD)
- Contact Center Multimedia (CCMM)
- Avaya Media Server (Avaya MS)

Voice and Multimedia Contact Server with Avaya Media Server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

The Voice and Multimedia Contact Server with Avaya Media Server server does not support High Availability. This server type does not support virtualization.

If you access Contact Center Manager Administration from a browser on the server, Avaya recommends that you limit the number of on-demand and scheduled historical reports run on the server. Running historical reports can increase the CPU usage on the server. In addition, Avaya recommends that you limit the number of real-time displays that you start. Viewing real-time displays also increases the CPU usage on the server.

You can use the instance of Contact Center Manager Administration on this server to create reports only for this server. You can use the instance of Contact Center Manager Administration on this server to

manage agents and supervisors only for this server. Do not use Contact Center Manager Administration on this server to manage or create reports for other servers.

In a small to medium solution using one of these servers, agents download and install Avaya Aura® Agent Desktop software from this server.

In a voice-only solution, multimedia contacts are not supported. Therefore, in a voice-only solution without multimedia licenses, the CCMM Administration utility blocks access to the multimedia features and functions. In a voice-only solution that uses Avaya Aura® Agent Desktop, use the CCMM Administration utility to configure Avaya Aura® Agent Desktop features and functions.

To enable the multimedia features in the CCMM Administration utility, obtain and install a multimedia-enabled Avaya Aura® Contact Center license. Once you have obtained a multimedia license, install the new license file on the server, and reconfigure the Contact Center Manager Server server and license settings. You must also refresh all the servers in Contact Center Manager Administration. Once you have installed a multimedia-enabled license, the system enables all the multimedia features and functions.

Common Server Requirements: The Voice and Multimedia Contact Server with Avaya Media Server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Voice and Multimedia Contact Server with Avaya Media Server hardware specification depends on your solution type, agent count, and call flow rate.

Note:

Voice and Multimedia Contact Server with Avaya Media Server is not supported on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by the Voice and Multimedia Contact Server with Avaya Media Server software.

Table 46: Voice and Multimedia Contact Server with Avaya Media Server supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Aura SIP	No	Yes	Yes	No	No	No

For more information about Avaya Aura® Contact Center server specifications, and to select a server suitable for your agent count and call flow rate, see Server Specifications on page 331.

Avaya Media Server software components

Avaya Media Server is a software-based media processing platform. The Avaya Media Server architecture is uniquely scalable for all core functions of the platform, including media processing, signaling, application execution, and content management.

The Avaya Aura® Contact Center DVD includes the core Avaya Media Server software and an additional component, Contact Center Services for Avaya Media Server. On the Linux operating system, the Avaya Media Server installer and the Contact Center Services for Avaya Media Server installer are separate executables.

Contact Center Services for Avaya Media Server provides three services required by a SIP-enabled Contact Center:

- Conference: This service creates an Avaya Media Server conference to anchor incoming customer calls, and joins treatments and agent calls to the conference as required by the contact center applications.
- Announcement: This service plays treatments (ringback, announcements) into an Avaya Media Server conference.
- Dialog: This service plays prompts to, and collects DTMF digits from, an Avaya Media Server conference.

In addition, Contact Center Services for Avaya Media Server provides the applications needed for the Agent Greeting feature. This feature allows agents to pre-record their personal greetings. The feature plays the greeting automatically when an agent answers a call.

Avaya Media Server media files and media management

Media files are WAV audio files that contain speech, music, or signalling tones. Avaya Media Server supports custom (customer generated) media files and default (canned) media files. You configure the custom media files using the Avaya Media Server Element Manager. You update and configure the default media files directly in the locale specific folders on the Avaya Media Server.

Content Store

The Avaya Media Server Content Store provides a persistent storage capability for configuration data and media files. You use the Avaya Media Server Element Manager Web administration utility to configure and manage the contents of the Content Store. If you have more than one Avaya Media Server, you can designate one server to be the primary Avaya

Media Server. You can then configure the other Avaya Media Servers to replicate (copy) the configuration data and media files from the Content Store on the primary Avaya Media Server. This configures all of the Avaya Media Servers with the same media files and allows them to provide a pool of common media processing resources. Content Store replication also provides storage resiliency, if one Avaya Media Server fails the remaining Avaya Media Servers are configured correctly and can continue processing media and contact center calls.

Custom media

Avaya Media Server stores (customer generated) custom media files in a media Content Store. Typically, a customer records their own announcements and stores the WAV media file recordings in the Avaya Media Server Content Store. The music media files used to provide scripted music in Orchestration Designer applications are another example of custom media.

In an Avaya Media Server cluster-based solution, you configure your custom media files only on the primary Avaya Media Server Content Store. The custom media files are automatically replicated to all other Avaya Media Servers in the cluster.

In Avaya Media Server High Availability-based solutions, you configure your custom media files only on the primary server of the Avaya Media Server Content Store Master Pair. The custom media files are automatically replicated to the backup Avaya Media Server, and to all other Avaya Media Server High Availability pairs configured in the solution.

Custom media organization

In Avaya Media Server Element Manager (EM), you organize custom media within a content namespace. A content namespace is a logical area in the Content Store. The content namespace name must match the contact center SIP domain name; that is, the Local SIP Subscriber Domain Name in Contact Center Manager Server – Server Configuration.

Within the content namespace you use content groups to subdivide the media into logical groups. You must create one locale-specific content group for treatments such as RAN.

Avaya Media Server supports the following locales:

Locale	Language	Country
de_de	German	Germany
en_ca	English	Canada
en_gb	English	United Kingdom
en_ie	English	Ireland
en_in	English	India
en_us	English	United States
es_es	Spanish	Spain
es_mx	Spanish	Mexico
fr_ca	French	Canada
fr_fr	French	France
it_it	Italian	Italy

Locale	Language	Country
ja_jp	Japanese	Japan
ko_kr	Korean	Korea
pt_br	Portuguese	Brazil
ru_ru	Russian	Russia
zh_cn	Chinese (Simplified)	China
zh_tw	Chinese (Simplified)	Taiwan

You can create one or more additional content groups for music. Typically you store different types of music media in different content groups. To use treatments in Orchestration Designer (OD) flow applications or scripts, you create routes in Contact Center Manager Administration (CCMA) that link to the media files in the Avaya Media Server locale-specific content group. To use scripted music in OD flow applications or scripts, you create routes in Contact Center Manager Administration (CCMA) that link to the Avaya Media Server content groups containing the music files. The OD flow applications or scripts reference these routes to access the treatment files and scripted music on the Avaya Media Server.

The following example shows the structure of a content namespace for a contact center based in Canada, which uses English recorded announcements, and has three optional music types; folk, jazz, and rock. The SIP domain for the contact center is ocs-nmclab.com. The locale configured on the CCMS server is en_ca.

The media content namespace structure is as follows:

ocs-nmclab.com <= media content namespace, matches SIP domain name

– en_ca <= locale-specific media content group (announcements)

– folk <= media content group (folk music)

– jazz <= media content group (jazz music)

– rock <= media content group (rock music)

Default media files

Contact Center Avaya Media Server contains a set of country and language specific default media files for all supported locales. The default media files contain numerical values, busy tones and ring-back tones. You can use these default “canned” media files in your Contact Center solution, or you can replace them with your own recordings.

The following are examples of the Avaya Media Server default or canned locale specific media files:

- Single digit playback (zero.wav, one.wav, two.wav ... nine.wav)
- Busy tone wav file (busy.wav)
- Ringback wav file (ringback_xx.wav) where xx is the country portion of the locale (for example, ringback_us.wav, ringback_ru.wav)

The default media files are stored in the Operating System file structure (not in the Avaya Media Server content namespace). The canned media files are stored in Linear 16-bit PCM recording format.

If you choose to create your own recordings, you must replace the existing default media files with files of the exact same name. For example, if you choose to record your own media files for single digit numerals, then you must save the files as one.wav and two.wav to match the existing default media file names. Then you replace the existing default media files with the media files of your own recordings. You must then delete the existing Avaya Media Server transcoded output files. For example, if you are using PCMA transcoding, delete the one.wav and two.wav media files from the locale-specific PCMA folder. This forces Avaya Media Server to pick up your new Linear 16-bit PCM recording and generate a new transcoded output file of your recording.

Default media files are not stored in the Avaya Media Server Content Store, and are therefore not replicated to other Avaya Media Servers. If you update the canned or default media files on one Avaya Media Server, you must copy the updated default media files to all other Avaya Media Servers.

The Asian languages use different WAV file names for the following numbers:

	Zero	One	Two	Three	Four	Five	Six	Seven	Eight	Nine
ja_jp Japanese	zero	ichi	ni	san	yo	go	roku	nana	hatchi	kyu
ko_kr Korean	young	il	yi	sam	sa	o	yuk	chil	pal	gu
zh_cn & zh_tw Chinese	ling	yi	er	san	si	wu	liu	qi	ba	jiu

All audio media files must have a .wav file name extension, for example hatchi.wav, jiu.wav, and seven.wav.

Default media organization

Each Avaya Media Server installation includes a number of default (canned) media files. These default media files are stored in a country and locale specific folder on the Avaya Media Server.

On a Windows operating system, the default location for the default media files is:

```
D:\Avaya\MAS\Multimedia_Applications\MAS\platdata\Announcements
\contactcenter\default\xx\yy\l16
```

Where xx is the country portion of the locale and yy is the language portion of the locale.

On a Linux operating system server, the default location for the default media files is:

```
/opt/avaya/ma/MAS/platdata/Announcements/contactcenter/
default/xx/yy/l16
```

Where xx is the country portion of the locale and yy is the language portion of the locale.

For example, the Linux operating system Avaya Media Server directory locations for Canadian English and French are:

```
/opt/avaya/ma/MAS/platdata/Announcements/contactcenter/
default/ca/en/l16
```

```
/opt/avaya/ma/MAS/platdata/Announcements/contactcenter/
default/ca/fr/l16
```

Media file formats

Avaya Media Server provides optimum playback performance with .WAV files encoded as Linear 16-bit PCM, 8KHz Mono with a sampling rate of 128kbits/sec. Create your announcement and music media files with this encoding before copying them onto the Avaya Media Server server.

Communication Control Toolkit supported SIP functionality

The tables in this section indicate which functions are supported by Communication Control Toolkit. Avaya Aura® Agent Desktop is a client of Communication Control Toolkit so they support the same features.

Important:

In SIP-enabled contact centers, agents must not use their desk phone or Agent Desktop to phone, transfer a call, or conference a call to a phone number that is:

- routed to a CDN (Route Point). For example, a Virtual Directory Number (VDN) routed to a CDN (Route Point).
- converted to a CDN (Route Point).
- call forwarded to a CDN (Route Point).

Agents may use their desk phone or Agent Desktop to transfer a call, conference or phone directly to a CDN (Route Point).

The following tables list the basic Communication Control Toolkit call control functions.

Table 47: Basic Communication Control Toolkit and Avaya Aura® Agent Desktop functions

Event	SIP-enabled Avaya Aura® and CS 1000
Make Call	Yes
Hold Current Call	Yes

Event	SIP-enabled Avaya Aura® and CS 1000
	The CS 1000 Swap Hold switch feature is not supported. For CS 1000, the Auto Hold Allowed (AHA) feature must be configured.
Unhold Call	Yes (Retrieve Call)
Drop Current Call (Release)	Yes
Blind Transfer Call	No
Initiate Supervised Transfer	Yes
Complete Transfer	Yes
Initiate Conference Call	Yes (up to six parties on CS 1000)
Complete Conference Call	Yes
Call Forward	No
Cancel Call Forward	No
Join Conference	No
Deflect Calls	No
Get Status	Yes
Get Call Capabilities	Yes
Get Data	Yes
Delete Data	Yes
Append Data	Yes
Make Set Busy (Do Not Disturb)	No
Get/Set UUI	No
Send DTMF (for example, credit card number to IVR)	Yes
Mute/Unmute	Yes (on Contact Center calls only)
Consult	Yes
Park/Unpark	No
Message Waiting Indicator	No
HER (Host Enhanced Routing)	No
Answer	Yes

The fast transfer functionality does not support completing a fast transfer call to an external trunk number. This functionality is for predictive dialing environments in which the application

sends a MakeCall request to an external customer number and, when the customer answers, the application sends the FastTransfer request to blind transfer the customer to a live agent.

The following table lists the Contact Center specific functions supported by Avaya Aura® Agent Desktop and Communication Control Toolkit .

Table 48: Contact Center-specific functions

Event	SIP-enabled Avaya Aura® and CS 1000
Agent Login	Yes
Agent Logout	Yes
Set Ready	Yes
Set Not Ready	Yes
ACD Set Activity Code	Yes
ACD Set Not Ready/Reason Codes	Yes
Work Ready Key support	No
Agent Whisper	No
Observe call	Yes
Set Call treatment	Yes
Barge In	Yes
Call Supervisor	Yes
Emergency Key	Yes
Redirect to another skillset	No (must transfer to a CDN)
Return a call to the queue skillset that it came from	No
Redirect to another skillset	No
Return a call to the queue skillset that it came from	No

The following table indicates which events are delivered by Communication Control Toolkit.

Table 49: Communication Control Toolkit events

Event	SIP-enabled Avaya Aura® and CS 1000
Ringing Event	Yes
Dialtone Event	No
Busy Event	No
Offering Event	Yes

Event	SIP-enabled Avaya Aura® and CS 1000
Ringback Event	Yes
Inbound Connected Event	Yes
Outbound Connected Event	Yes
Connected Event	Yes
Disconnected Event	Yes
Held Event	Yes
Unheld Event	Yes
OnHold Pending Conference Event	Yes
Onhold Pending Transfer Event	Yes
Transferred Event	Yes
Conference Event	Yes
Initiated Transfer Event	Yes
Initiated Conference Event	Yes
Session Disconnect Event (includes shutdown)	Yes
Device Forward Event	No
Status Change Event	Yes
Notice Message Waiting Event	No
Notice No Message Waiting Event	No
Agent Logged out Event	Yes
Agent Logged in Event	Yes
Agent Ready Event	Yes
Agent Not Ready Event	Yes
Agent Busy Event	No
Agent Work Ready Event	No
Activity Code Entered	Yes
WalkAway Activated	No
WalkAway Return	No
Emergency Invoked	No
Call Supervisor Invoked	No

Email message memory requirements

In contact center solutions that support the email contact type, you must engineer your server to support email attachments.

The maximum attachment size formulas use the following variables and the approximate values, to calculate how much memory to reserve to process an email message.

Variable	Description	Value
Encoding adjustment	The factor by which the attachment size increases when the attachment is encoded and attached to an email message.	1.3 (this can vary slightly based on the encoding used)
Memory adjustment	The factor by which the encoded size increases when an email message is loaded into the internal representation of the email message in memory.	1.2 (this factor decreases slightly, the larger the email is, but it remains as a fixed value)
Buffer memory	The memory, which is fairly static, required by the parts of the application not involved in processing inbound email messages.	20 MB

When the following sections specify an attachment size, they mean the total size of all attachments of an email message. Also, the size of the body of an email lowers the supported attachment size by the size of the content of the message. In most cases, the content of an email is negligible compared to large attachments.

JVM size – Buffer memory / Memory adjustment / Encoding adjustment = Maximum attachment size

JVM sizes (MB)	Maximum attachment sizes (MB)
128	69.2
256 (default)	151.3
512	315.4
1024	643.6

Minimum JVM size formula

Attachment size * Encoding adjustment * Memory adjustment + Buffer memory = Minimum JVM size

Attachment sizes (MB)	Minimum JVM sizes (MB)
10	35.6
20	51.2
30	66.8
40	82.4
50	98
60	113.6
70	129.2
80	144.8
90	160.4
100	176
500	800

Calculating disk storage requirements

This section lists the database files used by Contact Center Multimedia and provides database capacity calculations.

Required database files

Contact Center Multimedia includes the following database files:

- CACHE.DAT in the *<Database Drive>*:Avaya\Contact Center\Databases\CCMM\MULTIMEDIA\DATA folder. This stores the two CACHE.DAT Contact Center Multimedia folders and files, one for code and one for data.
- Avaya\Contact Center\Databases\Journals folder is created during installation. This folder contains the Database Journal Files used for Geographic Redundancy.
- Avaya\Contact Center\Databases\ShadowJournals folder is created during installation. This folder is used if Geographic Redundancy is configured and this server is running as the Redundant server.

During the installation you can select the drive letter that these folders or files are on. The folder information is fixed.

The CACHE.DAT file grows dynamically as the volume of data in the database grows. Initially it is just under 45 MB. One million contacts take approximately 20GB of space.

The Journal files are deleted after seven days. Therefore, the maximum size of this folder is determined by the number of contacts that arrive in a seven-day period. The space taken is in proportion with the one million available contacts in 20GB space.

Email attachment storage

Email attachments are stored in the attachment folder. The disk space required to store attachments is calculated as

```
Disk space for email attachments in MB
   = number of email messages per day
   * percent with attachment
   * average attachment size in MB
   * number of days before purging
```

Example

Following is the disk storage calculation for a contact center that receives 9000 email messages every day, where 30 percent of the email messages have an attachment averaging 0.5 MB in size, and attachments are stored for 10 days before they are deleted.

```
Disk space for email attachments in MB
   = 9 000 * 0.3 * 0.5 * 10
   = 13500 MB
```

Third-party software requirements

This section describes the third-party software requirements for the Voice and Multimedia Contact Server with Avaya Media Server.

Warning:

You must install and actively manage a spam filter to remove spam messages from all contact center mailboxes. Unsolicited bulk spam messages to your Contact Center, if not filtered out, may impact performance or may cause damage to your contact center solution.

Important:

If your contact center uses an Avaya Aura® Communication Manager, Avaya Aura® Agent Desktop client computers do not support the following applications running concurrently with Avaya Aura® Agent Desktop:

- Avaya one-X® Communicator
- IP Agent
- IP Softphone
- Any other non-Avaya softphone applications
- Avaya one-X® Agent. In a Multimedia-only Contact Center deployment, where the Contact Center agents are configured for Multimedia contact types only, running Avaya Aura® Agent Desktop concurrently with Avaya one-X® Agent on a client computer is supported.

Third-party backup software

Two types of backups are available on Contact Center Manager Server:

- Full (offline) backup
- Database (online) backup

Use third-party backup software only for full (offline) backups. To create a full backup, you must use a third-party backup utility such as Microsoft backup utility. See the third-party documentation for information about the full backup procedure, and *Avaya Aura® Contact Center Server Administration* (NN44400-610) for information about procedures that you must perform before a full backup. If you use a third-party backup utility, it must comply with the general third-party software guidelines specified in Third-party software requirements on page 161.

You must shut down all Contact Center Manager Server services before you perform a full backup. Some third-party backup utilities can provide an online backup of all files, Contact Center Manager Server does not support an online backup from these third-party backup utilities.

Avaya recommends that you back up your database daily.

If you plan to back up your Contact Center Multimedia database across the network, be aware that disk capacity affects the speed of the backup and restore. To reduce the speed of a database back up or restore, follow disk capacity requirements on the remote locations.

Voice and Multimedia Contact Server with Avaya Media Server antivirus software

This section describes the Voice and Multimedia Contact Server with Avaya Media Server antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- `F:\Avaya\Contact Center\Database\`
- `<additional database drive>:\Avaya\Database\`
- TSM_OAM log folder location
- `D:\Avaya\Contact Center\Manager Server\iccm\bin\data`

- D:\Avaya\Contact Center\Manager server\iccm\data
- D:\Avaya\Contact Center\Manager Server\iccm\sdm\log
- OAMContainer*.log located at D:\Avaya\Contact Center\Common Components\CMF
- D:\Avaya\Contact Center\Manager Server\bin\tools2.exe—File access errors occur in the Scan Activity log if you do not exclude this file from scanning.
- D:\Avaya\Contact Center\Manager Server\iccm\logs (SIP logs)
- D:\Avaya\Contact Center\Manager Server\iccm\sgm\config\ (SIP log configuration files)
- D:\Avaya\Contact Center\Common Components\CMF
- The folder where you store Server Packs and patches

Contact Center Multimedia interacts with an external email system and enables agents to send attachment files from their computers to the Contact Center Multimedia server. Both methods of retrieving data are potential sources of software infection.

Avaya recommends the following guidelines for antivirus software:

- Antivirus software must be installed on the email server to ensure that problems are caught at source.
- Agent computers require antivirus software to ensure that attachments sent to the Contact Center Multimedia server do not have a virus. Contact Center Multimedia does not block specific attachment file types. Third-party antivirus software must be installed on the Portal Server according to guidelines in this document for such utilities.
- Exclude the Contact Center Multimedia partition from being scanned.
- If firewalls on individual computers are enabled on the Agent Desktop computer, the Report Listener may be flagged as trying to access the Internet. The properties must be configured to allow access for the Report Listener to Contact Center Multimedia through the firewall.
- You must not enable the Microsoft Updater to Auto-Run. Microsoft Updater is configured to alert level so you can schedule updates for off- peak hours.

Warning:

Running a Virus Scan on the Contact Center Multimedia attachment folder, which contains thousands of files, can use significant CPU time on a server and can cause drastic slowdown in agent's response times. Avaya recommends that you run scans, if necessary, during off-peak hours.

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in `<Install_Directory>:\Avaya\Cache\CacheSys`. Databases and journal files are installed in `<Install_Directory>:\Avaya\Contact Center\Databases`.

For Avaya Media Server, you must exclude the following files and folders from scans (both real-time and scheduled):

Avaya Media Server on Windows, default locations to exclude:

- `D:\Avaya\MAS\Multimedia_Applications\MAS\platdata`
- `D:\Avaya\MAS\Multimedia_Applications\MAS\common\log`

If you do not install Avaya Media Server in the default location, adjust these file and folder paths to match your actual installation.

Port requirements

This section lists the ports used by the Voice and Multimedia Contact Server with Avaya Media Server components.

Contact Center Manager Server uses ports for communication between its own components. Most ports do not have implications for external network components like firewalls; however some ports may be used externally and therefore can affect an external firewall. In particular, port 10000 is a hard-coded port used to enable interoperability between Contact Center applications and external third-party applications (applications developed using the Real-Time Data (RTD) API).

No third-party application installed on Voice and Multimedia Contact Server with Avaya Media Server server can use the ports listed in the following table as it can cause the Contact Center Manager Server application to malfunction.

The following table shows the ports that Contact Center Manager Server uses.

Table 50: Contact Center Manager Server port usage

CCMS port number	Functionality
445	TCP port used Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1550	HDX CAPI
1972	Caché database, and Caché shadowing
4422	HDX NameService
12668–12670	TraceControl
10000	Hardcoded Toolkit Name Service

CCMS port number	Functionality
10001–10082	Networking
10038	NCP_CHANNEL—This channel is used to communicate between the NCP of one node to the NCP of another node. The NCP on one node sends sanity messages to the other node through this port.
10039	ASM_CHANNEL—Different modules like NCP and TFE send messages to ASM through this channel.
10040	NCP_ASM_CHANNEL—ASM uses this channel to send messages to NCP.
10060	ASM_Service—The ASM service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to the ASM service through this port.
10062	NCP_Service—The NCP service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to NCP on this port.
3998	License Manager destination port—This is the first of 10 consecutive ports required for license management.
3999–4007	License Manager client source port
3389	Remote Desktop Connection for support
5060	SIP Proxy
9080–9083	Web Services Open Interfaces
9086	CC Web Statistics
9089	Avaya Aura® Experience Portal Basic Ports application
57012	System Management and Monitoring Component (SMMC) system tray. Used by the High Availability feature.

The following table shows the ports that Contact Center Manager Administration uses.

Table 51: Contact Center Manager Administration port usage

CCMA port number	Functionality
TCP 80	For Internet Explorer communication.
TCP 443	For secure HTTP communication (only applicable if SSL is enabled for secure Internet Information Services (IIS) communication).
TCP Ports 389 and 636	For Active Directory Lightweight Directory Services (AD-LDS) functionality. Port 389 is for LDAP, and port 636 is for SSL. When you install CCMA on a server that runs Window Server 2008, these ports usually appear by default in the Port Configuration for AD-LDS installation window. If the values 50 000 and 50 001 appear instead, port numbers 389 and 636 are already taken. In

CCMA port number	Functionality
	this case, you can either accept the new values, or choose other ports for security reasons. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
TCP Port 3389	For remote desktop connection.
TCP Port 25 (SMTP)	For the Historical Reporting component to send email notifications when reports are printed and saved.
3899, 6366	For AD-LDS when CCMA is co-resident with Security Framework or Avaya Media Server. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 8200	For the Emergency Help component on the client PC.
UDP ports 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130	For the CCMA server to receive IP multicasting data from CCMS Server (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7 020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130	For the CCMA server to send IP multicasting data to client PCs (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7025, 7035, 7045, 7055, 7065, 7075, 7085, 7095, 7105, 7115, 7125, 7135	For the CCMA server to send IP unicast data to client PCs. This is an optional method of sending the data required for Real-Time Reporting. If you do not use the multicast method, then you must configure the unicast option. You can also use a combination of the two methods.
TCP Port 10000	Used by the Nameservice process on the CCMA server (nbnmsrvc.exe). It permits communication between the CCMA server and the server in Contact Center Manager Server. **Important:** The default port for the third-party software. This conflicts with the default port used by the CCMA Toolkit NameService. To avoid issues with CCMA functionality when using Veritas Backup Exec, you must change the default port of Veritas Backup Exec to another port number that is not being used by the network.
Default UDP port 3998	License Manager destination port.
Default UDP ports 3999 - 4007	License Manager destination source port.

The following table shows the port numbers required for Communication Control Toolkit (CCT).

Table 52: Communication Control Toolkit port usage

CCT port number	Functionality
445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1972	Caché database, and Caché shadowing High Availability solutions.
3000	For TAPI switch connection through MLS (CCMA server). This port is required for the contact center subnet.
3998	License Manager (LM) destination port, which is the first of 10 consecutive ports required for license management.
3999 - 4007	LM client source ports.
5000	To connect to the server in CCMS.
8081	Default port of the Apache Tomcat Server which hosts the CCT Web Administration.
8085	For CCT services to access the CCT database.
8098	For the Contact Management Framework on the CCT server.
8099	For the Contact Management Framework on the CCT server.
8888	For the TAPI switch connection using direct-connect. This port is required only for the ELAN subnet.
8087	For CCT CMF component.
9010	For CCT CMF component.
9085	Hosts the CCT OI REST services
9091	Used for CCT OI REST Bayeux port
11110	Used by the CCT Server service for the CMF Web Service - Callback port.
11111	Used by the CCT Server service for the CMF Web Service - Web server port.
29373	Listens for requests from CCT client applications.
29374	Data Access Layer Service listens for requests from CCT Remote Administration Console.

The following table lists the configurable Multimedia ports.

Table 53: Contact Center Multimedia ports

Port	Host	Client	Network interface	Functionality
1972	Contact Center Multimedia	Contact Center Manager Administration Server	Contact Center Multimedia Caché database	Port opened on database for reporting. Caché database, and Caché shadowing in High Availability solutions.
110	Email server	Email Manager	Email server POP3	Receiving email
445	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
995	Email server	Email Manager	POP3 over SSL (optional)	Receiving secure email (optional)
25	Email server	Email Manager	SMTP	Sending email
80	Contact Center Multimedia Server	Any Web services client (Agent Desktop, OCMT, and third-party Web services)	SOAP protocol	Accessing http Web services
29373	Communication Control Toolkit Server	Agent Desktop	Communication Control Toolkit	Remote access from clients to Communication Control Toolkit server (for Agent Desktop application)
57012	System Management	System Management	System Management	High Availability

Port	Host	Client	Network interface	Functionality
	and Monitoring Component (SMMC) system tray	and Monitoring Component (SMMC) system tray	and Monitoring Component (SMMC) system tray	

The following table shows the port numbers required for Avaya Media Server on Windows Server 2008.

Table 54: Avaya Media Server port usage–Windows Server 2008

Port	Type	Permit in TCP Filter	Description
80	TCP	Yes	SoapServer
443	TCP	Yes	SoapServer TLS
636	TCP	Yes	UCM TLS port for LDAP Note: This port can not be reconfigured.
1812	UDP	No	UCM RADIUS service
3306	TCP	Yes	MySQL
3389	TCP	Yes	Remote Desktop
3867	SCTP	No	Diameter over SCTP
3868	TCP	No	Diameter over TCP
3869	TCP	No	Diameter over TLS
3998	TCP	Yes	License Server
4001	TCP	No	IvrMP MSLink
4004	TCP	No	Sip UA MSLink
4005	TCP	No	Resource Manager ExtSess
4014	TCP	No	SIP UA cmd i/f
4015	TCP	No	Resource Manager and i/f
5060	TCP	Yes	SIP over TCP
5060	UDP	No	SIP over UDP
5061	TCP	Yes	SIP over TLS
7080	TCP	No	ConfMP MSLink
8080	TCP	Yes	EM/UCM HTTP
8093	TCP	Yes	UCM bind port for JMS
8193	TCP	Yes	UCM TLS port for JMS

Port	Type	Permit in TCP Filter	Description
8443	TCP	Yes	EM/UCM HTTP(s)
11004	TCP	No	DiamC MSLink
11014	TCP	No	DiamC and i/f
19899	TCP	Yes	Resource Manager CPLink
19999	TCP	Yes	IvrMP ssdata
31000	TCP	Yes	UCM clustered JNDI Stub download
31001	TCP	Yes	UCM TLS port for RMI queries on the clustered JNDI
31002	UDP	No	UCM auto discovery clustered JNDI
31003	TCP	Yes	UCM listening port for bootstrap JNP service
31004	TCP	Yes	UCM port for the RMI naming service
45566	UDP	No	UCM selecting primary security server using JGroup protocol
51000	TCP	No	Resource Manager IPC
51001	TCP	No	Legacy MPS Alarm deamon
51002	TCP	No	Voice XML Interpreter IPC
51003	TCP	No	CCXML Interpreter IPC
52005	TCP	Yes	CStore MSLink
52007	TCP	Yes	CStore RTFT
52009	TCP	Yes	IvrMP RTFT

Chapter 16: Multimedia Complement for Elite server configuration requirements

This section provides the configuration requirements for a Multimedia Complement for Elite server. Install this server to add multimedia contact routing support to a new or existing Avaya Aura Call Center Elite voice-based solution. This server supports contact routing for Web chat, SMS text messaging, and email messages, with additional support for peer-to-peer Instant Messaging (IM). Contact Center Multimedia support adds additional communication channels for customers; improving productivity, responsiveness, and flexibility.

This server includes the following Avaya Aura® Contact Center components:

- Contact Center Manager Server (CCMS)
- Contact Center Manager Administration (CCMA)
- Communication Control Toolkit (CCT)
- Contact Center License Manager (LM)
- Contact Center Manager Server Utility (SU)
- Avaya Aura® Contact Center Orchestration Designer (OD)
- Contact Center Multimedia (CCMM)

The Multimedia Complement for Elite server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

The Multimedia Complement for Elite server supports High Availability.

If you access Contact Center Manager Administration from a browser on the server, Avaya recommends that you limit the number of on-demand and scheduled historical reports run on the server. Running historical reports can increase the CPU usage on the server. In addition, Avaya recommends that you limit the number of real-time displays that you start. Viewing real-time displays also increases the CPU usage on the server.

In a solution using one of these servers, agents download and install Avaya Aura® Agent Desktop software from this server.

Common Server Requirements: The Multimedia Complement for Elite server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Multimedia Complement for Elite server hardware specification depends on your solution type, agent count, and call flow rate. You can install Multimedia Complement for Elite software on a physical server or on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by Multimedia Complement for Elite.

Table 55: Multimedia Complement for Elite supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Elite	No	Yes	Yes	No	Yes	Yes

For more information about Avaya Aura® Contact Center server specifications, and to select a server suitable for your agent count and call flow rate, see Server Specifications on page 331.

Email message memory requirements

In contact center solutions that support the email contact type, you must engineer your server to support email attachments.

The maximum attachment size formulas use the following variables and the approximate values, to calculate how much memory to reserve to process an email message.

Variable	Description	Value
Encoding adjustment	The factor by which the attachment size increases when the attachment is encoded and attached to an email message.	1.3 (this can vary slightly based on the encoding used)
Memory adjustment	The factor by which the encoded size increases when an email message is loaded into the internal representation of the email message in memory.	1.2 (this factor decreases slightly, the larger the email is, but it remains as a fixed value)

Variable	Description	Value
Buffer memory	The memory, which is fairly static, required by the parts of the application not involved in processing inbound email messages.	20 MB

When the following sections specify an attachment size, they mean the total size of all attachments of an email message. Also, the size of the body of an email lowers the supported attachment size by the size of the content of the message. In most cases, the content of an email is negligible compared to large attachments.

JVM size – Buffer memory / Memory adjustment / Encoding adjustment = Maximum attachment size

JVM sizes (MB)	Maximum attachment sizes (MB)
128	69.2
256 (default)	151.3
512	315.4
1024	643.6

Minimum JVM size formula

Attachment size * Encoding adjustment * Memory adjustment + Buffer memory = Minimum JVM size

Attachment sizes (MB)	Minimum JVM sizes (MB)
10	35.6
20	51.2
30	66.8
40	82.4
50	98
60	113.6
70	129.2
80	144.8
90	160.4
100	176
500	800

Calculating disk storage requirements

This section lists the database files used by Contact Center Multimedia and provides database capacity calculations.

Required database files

Contact Center Multimedia includes the following database files:

- CACHE.DAT in the *<Database Drive>*:Avaya\Contact Center\Databases \CCMM\MULTIMEDIA\DATA folder. This stores the two CACHE.DAT Contact Center Multimedia folders and files, one for code and one for data.
- Avaya\Contact Center\Databases\Journals folder is created during installation. This folder contains the Database Journal Files used for Geographic Redundancy.
- Avaya\Contact Center\Databases\ShadowJournals folder is created during installation. This folder is used if Geographic Redundancy is configured and this server is running as the Redundant server.

During the installation you can select the drive letter that these folders or files are on. The folder information is fixed.

The CACHE.DAT file grows dynamically as the volume of data in the database grows. Initially it is just under 45 MB. One million contacts take approximately 20GB of space.

The Journal files are deleted after seven days. Therefore, the maximum size of this folder is determined by the number of contacts that arrive in a seven-day period. The space taken is in proportion with the one million available contacts in 20GB space.

Email attachment storage

Email attachments are stored in the attachment folder. The disk space required to store attachments is calculated as

```
Disk space for email attachments in MB
   = number of email messages per day
   * percent with attachment
   * average attachment size in MB
   * number of days before purging
```

Example

Following is the disk storage calculation for a contact center that receives 9000 email messages every day, where 30 percent of the email messages have an attachment averaging 0.5 MB in size, and attachments are stored for 10 days before they are deleted.

```
Disk space for email attachments in MB
   = 9 000 * 0.3 * 0.5 * 10
   = 13500 MB
```

Third-party software requirements

This section describes the third-party software requirements for the Multimedia Complement for Elite server.

Warning:

You must install and actively manage a spam filter to remove spam messages from all contact center mailboxes. Unsolicited bulk spam messages to your Contact Center, if not filtered out, may impact performance or may cause damage to your contact center solution.

Important:

If your contact center uses an Avaya Aura® Communication Manager, Avaya Aura® Agent Desktop client computers do not support the following applications running concurrently with Avaya Aura® Agent Desktop:

- Avaya one-X® Communicator
- IP Agent
- IP Softphone
- Any other non-Avaya softphone applications
- Avaya one-X® Agent. In a Multimedia-only Contact Center deployment, where the Contact Center agents are configured for Multimedia contact types only, running Avaya Aura® Agent Desktop concurrently with Avaya one-X® Agent on a client computer is supported.

Third-party backup software

Two types of backups are available on Contact Center Manager Server:

- Full (offline) backup
- Database (online) backup

Use third-party backup software only for full (offline) backups. To create a full backup, you must use a third-party backup utility such as Microsoft backup utility. See the third-party documentation for information about the full backup procedure, and *Avaya Aura® Contact Center Server Administration* (NN44400-610) for information about procedures that you must perform before a full backup. If you use a third-party backup utility, it must comply with the general third-party software guidelines specified in Third-party software requirements on page 161.

You must shut down all Contact Center Manager Server services before you perform a full backup. Some third-party backup utilities can provide an online backup of all files, Contact Center Manager Server does not support an online backup from these third-party backup utilities.

Avaya recommends that you back up your database daily.

If you plan to back up your Contact Center Multimedia database across the network, be aware that disk capacity affects the speed of the backup and restore. To reduce the speed of a database back up or restore, follow disk capacity requirements on the remote locations.

Multimedia Complement for Elite server antivirus software

This section describes the Multimedia Complement for Elite server antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- `F:\Avaya\Contact Center\Database\`
- `<additional database drive>:\Avaya\Database\`
- TSM_OAM log folder location
- `D:\Avaya\Contact Center\Manager Server\iccm\bin\data`
- `D:\Avaya\Contact Center\Manager server\iccm\data`
- `D:\Avaya\Contact Center\Manager Server\iccm\sdm\log`
- OAMContainer*.log located at `D:\Avaya\Contact Center\Common Components\CMF`
- `D:\Avaya\Contact Center\Manager Server\bin\tools2.exe`—File access errors occur in the Scan Activity log if you do not exclude this file from scanning.
- `D:\Avaya\Contact Center\Manager Server\iccm\logs` (SIP logs)
- `D:\Avaya\Contact Center\Manager Server\iccm\sgm\config\` (SIP log configuration files)
- `D:\Avaya\Contact Center\Common Components\CMF`
- The folder where you store Server Packs and patches

Contact Center Multimedia interacts with an external email system and enables agents to send attachment files from their computers to the Contact Center Multimedia server. Both methods of retrieving data are potential sources of software infection.

Avaya recommends the following guidelines for antivirus software:

- Antivirus software must be installed on the email server to ensure that problems are caught at source.
- Agent computers require antivirus software to ensure that attachments sent to the Contact Center Multimedia server do not have a virus. Contact Center Multimedia does not block specific attachment file types. Third-party antivirus software must be installed on the Portal Server according to guidelines in this document for such utilities.
- Exclude the Contact Center Multimedia partition from being scanned.
- If firewalls on individual computers are enabled on the Agent Desktop computer, the Report Listener may be flagged as trying to access the Internet. The properties must be configured to allow access for the Report Listener to Contact Center Multimedia through the firewall.
- You must not enable the Microsoft Updater to Auto-Run. Microsoft Updater is configured to alert level so you can schedule updates for off- peak hours.

Warning:

Running a Virus Scan on the Contact Center Multimedia attachment folder, which contains thousands of files, can use significant CPU time on a server and can cause drastic slowdown in agent's response times. Avaya recommends that you run scans, if necessary, during off-peak hours.

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in `<Install_Directory>:\Avaya\Cache\CacheSys`. Databases and journal files are installed in `<Install_Directory>:\Avaya\Contact Center\Databases`.

Port requirements

This section lists the ports used by the Multimedia Complement for Elite Server components.

Contact Center Manager Server uses ports for communication between its own components. Most ports do not have implications for external network components like firewalls; however some ports may be used externally and therefore can affect an external firewall. In particular, port 10000 is a hard-coded port used to enable interoperability between Contact Center applications and external third-party applications (applications developed using the Real-Time Data (RTD) API).

No third-party application installed on Contact Center Manager Server can use the ports listed in the following table as it can cause the Contact Center Manager Server application to malfunction.

The following table shows the ports that Contact Center Manager Server uses.

Table 56: Contact Center Manager Server port usage

CCMS port number	Functionality
445	TCP port used Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1550	HDX CAPI
1972	Caché database, and Caché shadowing
4422	HDX NameService
12668–12670	TraceControl
10000	Hardcoded Toolkit Name Service
10001–10082	Networking
10038	NCP_CHANNEL—This channel is used to communicate between the NCP of one node to the NCP of another node. The NCP on one node sends sanity messages to the other node through this port.
10039	ASM_CHANNEL—Different modules like NCP and TFE send messages to ASM through this channel.
10040	NCP_ASM_CHANNEL—ASM uses this channel to send messages to NCP.
10060	ASM_Service—The ASM service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to the ASM service through this port.
10062	NCP_Service—The NCP service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to NCP on this port.
3998	License Manager destination port—This is the first of 10 consecutive ports required for license management.
3999–4007	License Manager client source port
3389	Remote Desktop Connection for support
5060	SIP Proxy
9080–9083	Web Services Open Interfaces
9086	CC Web Statistics
9089	Avaya Aura® Experience Portal Basic Ports application

CCMS port number	Functionality
57012	System Management and Monitoring Component (SMMC) system tray. Used by the High Availability feature.

The following table shows the ports that Contact Center Manager Administration uses.

Table 57: Contact Center Manager Administration port usage

CCMA port number	Functionality
TCP 80	For Internet Explorer communication.
TCP 443	For secure HTTP communication (only applicable if SSL is enabled for secure Internet Information Services (IIS) communication).
TCP Ports 389 and 636	For Active Directory Lightweight Directory Services (AD-LDS) functionality. Port 389 is for LDAP, and port 636 is for SSL. When you install CCMA on a server that runs Window Server 2008, these ports usually appear by default in the Port Configuration for AD-LDS installation window. If the values 50 000 and 50 001 appear instead, port numbers 389 and 636 are already taken. In this case, you can either accept the new values, or choose other ports for security reasons. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
TCP Port 3389	For remote desktop connection.
TCP Port 25 (SMTP)	For the Historical Reporting component to send email notifications when reports are printed and saved.
3899, 6366	For AD-LDS when CCMA is co-resident with Security Framework or Avaya Media Server. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 8200	For the Emergency Help component on the client PC.
UDP ports 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130	For the CCMA server to receive IP multicasting data from CCMS Server (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7 020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130	For the CCMA server to send IP multicasting data to client PCs (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7025, 7035, 7045, 7055, 7065, 7075, 7085, 7095,	For the CCMA server to send IP unicast data to client PCs. This is an optional method of sending the data required for Real-Time Reporting. If you do not use the multicast method, then you must

CCMA port number	Functionality
7105, 7115, 7125, 7135	configure the unicast option. You can also use a combination of the two methods.
TCP Port 10000	Used by the Nameservice process on the CCMA server (nbnmsrvc.exe). It permits communication between the CCMA server and the server in Contact Center Manager Server. **Important:** The default port for the third-party software. This conflicts with the default port used by the CCMA Toolkit NameService. To avoid issues with CCMA functionality when using Veritas Backup Exec, you must change the default port of Veritas Backup Exec to another port number that is not being used by the network.
Default UDP port 3998	License Manager destination port.
Default UDP ports 3999 - 4007	License Manager destination source port.

The following table shows the port numbers required for Communication Control Toolkit (CCT).

Table 58: Communication Control Toolkit port usage

CCT port number	Functionality
445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1972	Caché database, and Caché shadowing High Availability solutions.
3000	For TAPI switch connection through MLS (CCMA server). This port is required for the contact center subnet.
3998	License Manager (LM) destination port, which is the first of 10 consecutive ports required for license management.
3999 - 4007	LM client source ports.
5000	To connect to the server in CCMS.
8081	Default port of the Apache Tomcat Server which hosts the CCT Web Administration.
8085	For CCT services to access the CCT database.
8098	For the Contact Management Framework on the CCT server.
8099	For the Contact Management Framework on the CCT server.
8888	For the TAPI switch connection using direct-connect. This port is required only for the ELAN subnet.

CCT port number	Functionality
8087	For CCT CMF component.
9010	For CCT CMF component.
9085	Hosts the CCT OI REST services
9091	Used for CCT OI REST Bayeux port
11110	Used by the CCT Server service for the CMF Web Service - Callback port.
11111	Used by the CCT Server service for the CMF Web Service - Web server port.
29373	Listens for requests from CCT client applications.
29374	Data Access Layer Service listens for requests from CCT Remote Administration Console.

The following table lists the configurable Multimedia ports.

Table 59: Contact Center Multimedia ports

Port	Host	Client	Network interface	Functionality
1972	Contact Center Multimedia	Contact Center Manager Administration	Contact Center Multimedia Caché database	Port opened on database for reporting. Caché database, and Caché shadowing in High Availability solutions.
110	Email server	Email Manager	Email server POP3	Receiving email
445	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.

Port	Host	Client	Network interface	Functionality
995	Email server	Email Manager	POP3 over SSL (optional)	Receiving secure email (optional)
25	Email server	Email Manager	SMTP	Sending email
80	Contact Center Multimedia	Any Web services client (Agent Desktop, OCMT, and third-party Web services)	SOAP protocol	Accessing http Web services
29373	Communication Control Toolkit	Agent Desktop	Communication Control Toolkit	Remote access from clients to Communication Control Toolkit server (for Agent Desktop application)
57012	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	High Availability

Chapter 17: No Switch Configured Multimedia Only configuration requirements

This section provides the configuration requirements for a No Switch Configured Multimedia Only server. Install this server to provide multimedia contact routing. This server supports contact routing for web communications, fax messages, SMS text messaging, and email messages, with additional support for peer-to-peer Instant Messaging (IM). Choose this server type when there is no existing voice-based call center, or when multimedia integration with a voice contact center is not required.

This server includes the following Avaya Aura® Contact Center components:

- Contact Center Manager Server (CCMS)
- Contact Center Manager Administration (CCMA)
- Communication Control Toolkit (CCT)
- Contact Center License Manager (LM)
- Contact Center Manager Server Utility (SU)
- Avaya Aura® Contact Center Orchestration Designer (OD)
- Contact Center Multimedia (CCMM)
- Avaya Media Server (Avaya MS)

A No Switch Configured Multimedia Only server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

Avaya Media Server High Availability is not supported on the Windows operating system. Avaya Media Server High Availability is supported only on the Linux operating system. If you plan to implement High Availability for the No Switch Configured Multimedia Only solution, you must uninstall Avaya Media Server software from both the primary and the backup Multimedia Only servers.

If you access Contact Center Manager Administration from a browser on the server, Avaya recommends that you limit the number of on-demand and scheduled historical reports run on the server. Running historical reports can increase the CPU usage on the server. In addition, Avaya recommends that you limit the number of real-time displays that you start. Viewing real-time displays also increases the CPU usage on the server.

In a solution using one of these servers, agents download and install Avaya Aura® Agent Desktop software from this server.

Common Server Requirements: The No Switch Configured Multimedia Only server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The No Switch Configured Multimedia Only server hardware specification depends on your solution type, agent count, and call flow rate.

Note:

The No Switch Configured Multimedia Only software is not supported on a VMware guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by No Switch Configured Multimedia Only.

Table 60: No Switch Configured Multimedia Only supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
No Switch	No	Yes	Yes	No	No	No

For more information about Avaya Aura® Contact Center server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

Email message memory requirements

In contact center solutions that support the email contact type, you must engineer your server to support email attachments.

The maximum attachment size formulas use the following variables and the approximate values, to calculate how much memory to reserve to process an email message.

Variable	Description	Value
Encoding adjustment	The factor by which the attachment size increases when the attachment is	1.3 (this can vary slightly based on the encoding used)

Variable	Description	Value
	encoded and attached to an email message.	
Memory adjustment	The factor by which the encoded size increases when an email message is loaded into the internal representation of the email message in memory.	1.2 (this factor decreases slightly, the larger the email is, but it remains as a fixed value)
Buffer memory	The memory, which is fairly static, required by the parts of the application not involved in processing inbound email messages.	20 MB

When the following sections specify an attachment size, they mean the total size of all attachments of an email message. Also, the size of the body of an email lowers the supported attachment size by the size of the content of the message. In most cases, the content of an email is negligible compared to large attachments.

JVM size – Buffer memory / Memory adjustment / Encoding adjustment = Maximum attachment size

JVM sizes (MB)	Maximum attachment sizes (MB)
128	69.2
256 (default)	151.3
512	315.4
1024	643.6

Minimum JVM size formula

Attachment size * Encoding adjustment * Memory adjustment + Buffer memory = Minimum JVM size

Attachment sizes (MB)	Minimum JVM sizes (MB)
10	35.6
20	51.2
30	66.8
40	82.4
50	98
60	113.6
70	129.2

Attachment sizes (MB)	Minimum JVM sizes (MB)
80	144.8
90	160.4
100	176
500	800

Calculating disk storage requirements

This section lists the database files used by Contact Center Multimedia and provides database capacity calculations.

Required database files

Contact Center Multimedia includes the following database files:

- CACHE.DAT in the *<Database Drive>*:Avaya\Contact Center\Databases \CCMM\MULTIMEDIA\DATA folder. This stores the two CACHE.DAT Contact Center Multimedia folders and files, one for code and one for data.
- Avaya\Contact Center\Databases\Journals folder is created during installation. This folder contains the Database Journal Files used for Geographic Redundancy.
- Avaya\Contact Center\Databases\ShadowJournals folder is created during installation. This folder is used if Geographic Redundancy is configured and this server is running as the Redundant server.

During the installation you can select the drive letter that these folders or files are on. The folder information is fixed.

The CACHE.DAT file grows dynamically as the volume of data in the database grows. Initially it is just under 45 MB. One million contacts take approximately 20GB of space.

The Journal files are deleted after seven days. Therefore, the maximum size of this folder is determined by the number of contacts that arrive in a seven-day period. The space taken is in proportion with the one million available contacts in 20GB space.

Email attachment storage

Email attachments are stored in the attachment folder. The disk space required to store attachments is calculated as

```
Disk space for email attachments in MB
   = number of email messages per day
   * percent with attachment
   * average attachment size in MB
   * number of days before purging
```

Example

Following is the disk storage calculation for a contact center that receives 9000 email messages every day, where 30 percent of the email messages have an attachment averaging 0.5 MB in size, and attachments are stored for 10 days before they are deleted.

```
Disk space for email attachments in MB
   = 9 000 * 0.3 * 0.5 * 10
   = 13500 MB
```

Third-party software requirements

This section describes the third-party software requirements for the No Switch Configured Multimedia Only server.

Warning:

You must install and actively manage a spam filter to remove spam messages from all contact center mailboxes. Unsolicited bulk spam messages to your Contact Center, if not filtered out, may impact performance or may cause damage to your contact center solution.

Third-party backup software

Two types of backups are available on Contact Center Manager Server:

- Full (offline) backup
- Database (online) backup

Use third-party backup software only for full (offline) backups. To create a full backup, you must use a third-party backup utility such as Microsoft backup utility. See the third-party documentation for information about the full backup procedure, and *Avaya Aura® Contact Center Server Administration* (NN44400-610) for information about procedures that you must perform before a full backup. If you use a third-party backup utility, it must comply with the general third-party software guidelines specified in Third-party software requirements on page 161.

You must shut down all Contact Center Manager Server services before you perform a full backup. Some third-party backup utilities can provide an online backup of all files, Contact Center Manager Server does not support an online backup from these third-party backup utilities.

Avaya recommends that you back up your database daily.

If you plan to back up your Contact Center Multimedia database across the network, be aware that disk capacity affects the speed of the backup and restore. To reduce the speed of a database back up or restore, follow disk capacity requirements on the remote locations.

No Switch Configured Multimedia Only antivirus software

This section describes the No Switch Configured Multimedia Only server antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- `F:\Avaya\Contact Center\Database\`
- `<additional database drive>:\Avaya\Database\`
- TSM_OAM log folder location
- `D:\Avaya\Contact Center\Manager Server\iccm\bin\data`
- `D:\Avaya\Contact Center\Manager server\iccm\data`
- `D:\Avaya\Contact Center\Manager Server\iccm\sdm\log`
- OAMContainer*.log located at `D:\Avaya\Contact Center\Common Components\CMF`
- `D:\Avaya\Contact Center\Manager Server\bin\tools2.exe`—File access errors occur in the Scan Activity log if you do not exclude this file from scanning.
- `D:\Avaya\Contact Center\Manager Server\iccm\logs` (SIP logs)
- `D:\Avaya\Contact Center\Manager Server\iccm\sgm\config\` (SIP log configuration files)
- `D:\Avaya\Contact Center\Common Components\CMF`
- The folder where you store Server Packs and patches

Contact Center Multimedia interacts with an external email system and enables agents to send attachment files from their computers to the Contact Center Multimedia server. Both methods of retrieving data are potential sources of software infection.

Avaya recommends the following guidelines for antivirus software:

- Antivirus software must be installed on the email server to ensure that problems are caught at source.
- Agent computers require antivirus software to ensure that attachments sent to the Contact Center Multimedia server do not have a virus. Contact Center Multimedia does not block specific attachment file types. Third-party antivirus software must be installed on the Portal Server according to guidelines in this document for such utilities.

- Exclude the Contact Center Multimedia partition from being scanned.
- If firewalls on individual computers are enabled on the Agent Desktop computer, the Report Listener may be flagged as trying to access the Internet. The properties must be configured to allow access for the Report Listener to Contact Center Multimedia through the firewall.
- You must not enable the Microsoft Updater to Auto-Run. Microsoft Updater is configured to alert level so you can schedule updates for off- peak hours.

Warning:

Running a Virus Scan on the Contact Center Multimedia attachment folder, which contains thousands of files, can use significant CPU time on a server and can cause drastic slowdown in agent's response times. Avaya recommends that you run scans, if necessary, during off-peak hours.

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in `<Install_Directory>:\Avaya\Cache\CacheSys`. Databases and journal files are installed in `<Install_Directory>:\Avaya\Contact Center\Databases`.

For Avaya Media Server, you must exclude the following files and folders from scans (both real-time and scheduled):

Avaya Media Server on Windows, default locations to exclude:

- `D:\Avaya\MAS\Multimedia_Applications\MAS\platdata`
- `D:\Avaya\MAS\Multimedia_Applications\MAS\common\log`

If you do not install Avaya Media Server in the default location, adjust these file and folder paths to match your actual installation.

Port requirements

This section lists the ports used by the No Switch Configured Multimedia Only server components.

Contact Center Manager Server uses ports for communication between its own components. Most ports do not have implications for external network components like firewalls; however some ports may be used externally and therefore can affect an external firewall. In particular, port 10000 is a hard-coded port used to enable interoperability between Contact Center applications and external third-party applications (applications developed using the Real-Time Data (RTD) API).

No third-party application installed on server can use the ports listed in the following table as it can cause the Contact Center Manager Server application to malfunction.

The following table shows the ports that Contact Center Manager Server uses.

Table 61: Contact Center Manager Server port usage

CCMS port number	Functionality
445	TCP port used Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1550	HDX CAPI
1972	Caché database, and Caché shadowing
4422	HDX NameService
12668–12670	TraceControl
10000	Hardcoded Toolkit Name Service
10001–10082	Networking
10038	NCP_CHANNEL—This channel is used to communicate between the NCP of one node to the NCP of another node. The NCP on one node sends sanity messages to the other node through this port.
10039	ASM_CHANNEL—Different modules like NCP and TFE send messages to ASM through this channel.
10040	NCP_ASM_CHANNEL—ASM uses this channel to send messages to NCP.
10060	ASM_Service—The ASM service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to the ASM service through this port.
10062	NCP_Service—The NCP service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to NCP on this port.
3998	License Manager destination port—This is the first of 10 consecutive ports required for license management.
3999–4007	License Manager client source port
3389	Remote Desktop Connection for support
5060	SIP Proxy
9080–9083	Web Services Open Interfaces
9086	CC Web Statistics
9089	Avaya Aura® Experience Portal Basic Ports application

CCMS port number	Functionality
57012	System Management and Monitoring Component (SMMC) system tray. Used by the High Availability feature.

The following table shows the ports that Contact Center Manager Administration uses.

Table 62: Contact Center Manager Administration port usage

CCMA port number	Functionality
TCP 80	For Internet Explorer communication.
TCP 443	For secure HTTP communication (only applicable if SSL is enabled for secure Internet Information Services (IIS) communication).
TCP Ports 389 and 636	For Active Directory Lightweight Directory Services (AD-LDS) functionality. Port 389 is for LDAP, and port 636 is for SSL. When you install CCMA on a server that runs Window Server 2008, these ports usually appear by default in the Port Configuration for AD-LDS installation window. If the values 50 000 and 50 001 appear instead, port numbers 389 and 636 are already taken. In this case, you can either accept the new values, or choose other ports for security reasons. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
TCP Port 3389	For remote desktop connection.
TCP Port 25 (SMTP)	For the Historical Reporting component to send email notifications when reports are printed and saved.
3899, 6366	For AD-LDS when CCMA is co-resident with Security Framework or Avaya Media Server. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 8200	For the Emergency Help component on the client PC.
UDP ports 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130	For the CCMA server to receive IP multicasting data from CCMS Server (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7 020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130	For the CCMA server to send IP multicasting data to client PCs (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7025, 7035, 7045, 7055, 7065, 7075, 7085, 7095,	For the CCMA server to send IP unicast data to client PCs. This is an optional method of sending the data required for Real-Time Reporting. If you do not use the multicast method, then you must

CCMA port number	Functionality
7105, 7115, 7125, 7135	configure the unicast option. You can also use a combination of the two methods.
TCP Port 10000	Used by the Nameservice process on the CCMA server (nbnmsrvc.exe). It permits communication between the CCMA server and the server in Contact Center Manager Server. **Important:** The default port for the third-party software. This conflicts with the default port used by the CCMA Toolkit NameService. To avoid issues with CCMA functionality when using Veritas Backup Exec, you must change the default port of Veritas Backup Exec to another port number that is not being used by the network.
Default UDP port 3998	License Manager destination port.
Default UDP ports 3999 - 4007	License Manager destination source port.

The following table shows the port numbers required for Communication Control Toolkit (CCT).

Table 63: Communication Control Toolkit port usage

CCT port number	Functionality
445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1972	Caché database, and Caché shadowing High Availability solutions.
3000	For TAPI switch connection through MLS (CCMA server). This port is required for the contact center subnet.
3998	License Manager (LM) destination port, which is the first of 10 consecutive ports required for license management.
3999 - 4007	LM client source ports.
5000	To connect to the server in CCMS.
8081	Default port of the Apache Tomcat Server which hosts the CCT Web Administration.
8085	For CCT services to access the CCT database.
8098	For the Contact Management Framework on the CCT server.
8099	For the Contact Management Framework on the CCT server.
8888	For the TAPI switch connection using direct-connect. This port is required only for the ELAN subnet.

CCT port number	Functionality
8087	For CCT CMF component.
9010	For CCT CMF component.
9085	Hosts the CCT OI REST services
9091	Used for CCT OI REST Bayeux port
11110	Used by the CCT Server service for the CMF Web Service - Callback port.
11111	Used by the CCT Server service for the CMF Web Service - Web server port.
29373	Listens for requests from CCT client applications.
29374	Data Access Layer Service listens for requests from CCT Remote Administration Console.

The following table lists the configurable Multimedia ports.

Table 64: Contact Center Multimedia ports

Port	Host	Client	Network interface	Functionality
1972	Contact Center Multimedia	Contact Center Manager Administration Server	Contact Center Multimedia Caché database	Port opened on database for reporting. Caché database, and Caché shadowing in High Availability solutions.
110	Email server	Email Manager	Email server POP3	Receiving email
445	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks.	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.

Port	Host	Client	Network interface	Functionality
995	Email server	Email Manager	POP3 over SSL (optional)	Receiving secure email (optional)
25	Email server	Email Manager	SMTP	Sending email
80	Contact Center Multimedia Server	Any Web services client (Agent Desktop, OCMT, and third-party Web services)	SOAP protocol	Accessing http Web services
29373	Communication Control Toolkit Server	Agent Desktop	Communication Control Toolkit	Remote access from clients to Communication Control Toolkit server (for Agent Desktop application)
57012	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	System Management and Monitoring Component (SMMC) system tray	High Availability

The following table shows the port numbers required for Avaya Media Server on Windows Server 2008.

Table 65: Avaya Media Server port usage–Windows Server 2008

Port	Type	Permit in TCP Filter	Description
80	TCP	Yes	SoapServer
443	TCP	Yes	SoapServer TLS
636	TCP	Yes	UCM TLS port for LDAP Note: This port can not be reconfigured.
1812	UDP	No	UCM RADIUS service
3306	TCP	Yes	MySQL
3389	TCP	Yes	Remote Desktop
3867	SCTP	No	Diameter over SCTP
3868	TCP	No	Diameter over TCP

Port	Type	Permit in TCP Filter	Description
3869	TCP	No	Diameter over TLS
3998	TCP	Yes	License Server
4001	TCP	No	IvrMP MSLink
4004	TCP	No	Sip UA MSLink
4005	TCP	No	Resource Manager ExtSess
4014	TCP	No	SIP UA cmd i/f
4015	TCP	No	Resource Manager and i/f
5060	TCP	Yes	SIP over TCP
5060	UDP	No	SIP over UDP
5061	TCP	Yes	SIP over TLS
7080	TCP	No	ConfMP MSLink
8080	TCP	Yes	EM/UCM HTTP
8093	TCP	Yes	UCM bind port for JMS
8193	TCP	Yes	UCM TLS port for JMS
8443	TCP	Yes	EM/UCM HTTP(s)
11004	TCP	No	DiamC MSLink
11014	TCP	No	DiamC and i/f
19899	TCP	Yes	Resource Manager CPLink
19999	TCP	Yes	IvrMP ssdata
31000	TCP	Yes	UCM clustered JNDI Stub download
31001	TCP	Yes	UCM TLS port for RMI queries on the clustered JNDI
31002	UDP	No	UCM auto discovery clustered JNDI
31003	TCP	Yes	UCM listening port for bootstrap JNP service
31004	TCP	Yes	UCM port for the RMI naming service
45566	UDP	No	UCM selecting primary security server using JGroup protocol
51000	TCP	No	Resource Manager IPC
51001	TCP	No	Legacy MPS Alarm deamon
51002	TCP	No	Voice XML Interpreter IPC
51003	TCP	No	CCXML Interpreter IPC

Port	Type	Permit in TCP Filter	Description
52005	TCP	Yes	CStore MSLink
52007	TCP	Yes	CStore RTFT
52009	TCP	Yes	IvrMP RTFT

Chapter 18: Network Control Center server configuration requirements

This section provides the configuration requirements for a Network Control Center server. Install this server to add networking, network skill-based routing, and consolidated reporting support for a number of Voice and Multimedia Contact Servers operating as a single distributed contact center. Use this server to configure contact routing between the Voice and Multimedia Contact Server nodes of a distributed contact center solution.

This server includes the following Avaya Aura® Contact Center components:

- Contact Center Manager Server (CCMS) (Network Control Center version)
- Contact Center Manager Administration (CCMA)
- Contact Center License Manager (LM)
- Avaya Aura® Contact Center Orchestration Designer (OD)

The Network Control Center (NCC) server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

You can use the instance of Contact Center Manager Administration on this server to manage remote Contact Center Manager Server networked and not networked servers. The instance of CCMA on a Network Control Center server can administer and generate reports for a maximum of 20 CCMS servers.

Note:

All nodes in an Avaya Aura® Contact Center networking deployment, including the Network Control Center server, must be installed on operating systems from the same language family. Contact Center Manager Administration does not support displaying names from two different languages families. For example, a single Contact Center Manager Administration does not support one node with a French operating system and another node with a Russian operating system.

Note:

Avaya Aura® Contact Center supports networked calls between AML-based and SIP-enabled nodes. The Network Control Center (NCC) software must be the most recent release, relative to the other nodes on the network. For example, in a network with Avaya Aura® Contact Center Release 6.3 and Avaya Aura® Contact Center Release 6.2 nodes, the NCC must be Release 6.3. All nodes in the network must be Avaya Aura® Contact Center Release 6.2 or later.

Common Server Requirements: The Network Control Center server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Network Control Center server hardware specification depends on your solution type, agent count, and call flow rate. You can install Network Control Center software on a physical server or on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by Network Control Center.

Table 66: Network Control Center supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Aura SIP	Yes	Yes	Yes	Yes	Yes	Yes
CS 1000 AML	Yes	Yes	Yes	Yes	Yes	Yes

For more information about Avaya Aura® Contact Center server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

Third-party software requirements

Due to the mission-critical, real-time processing that Avaya Aura® Contact Center applications perform, you must not install any other application class software on the server. You can install certain utility class software on the server, providing it conforms to the following guidelines, see Third-party software requirements on page 161.

Network Control Center server antivirus software

This section describes the Voice and Multimedia Contact Server antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- `F:\Avaya\Contact Center\Database\`
- `<additional database drive>:\Avaya\Database\`
- TSM_OAM log folder location
- `D:\Avaya\Contact Center\Manager Server\iccm\bin\data`
- `D:\Avaya\Contact Center\Manager server\iccm\data`
- `D:\Avaya\Contact Center\Manager Server\iccm\sdm\log`
- OAMContainer*.log located at `D:\Avaya\Contact Center\Common Components\CMF`
- `D:\Avaya\Contact Center\Manager Server\bin\tools2.exe`—File access errors occur in the Scan Activity log if you do not exclude this file from scanning.
- `D:\Avaya\Contact Center\Manager Server\iccm\logs` (SIP logs)
- `D:\Avaya\Contact Center\Manager Server\iccm\sgm\config\` (SIP log configuration files)
- `D:\Avaya\Contact Center\Common Components\CMF`
- The folder where you store Server Packs and patches

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in `<Install_Directory>:\Avaya\Cache\CacheSys`. Databases and journal files are installed in `<Install_Directory>:\Avaya\Contact Center\Databases`.

Port requirements

This section lists the ports used by the Network Control Center components.

Contact Center Manager Server uses ports for communication between its own components. Most ports do not have implications for external network components like firewalls; however some ports may be used externally and therefore can affect an external firewall. In particular, port 10000 is a hard-coded port used to enable interoperability between Contact Center

applications and external third-party applications (applications developed using the Real-Time Data (RTD) API).

No third-party application installed on Contact Center Manager Server can use the ports listed in the following table as it can cause the Contact Center Manager Server application to malfunction.

The following table shows the ports that Contact Center Manager Server uses.

Table 67: Contact Center Manager Server port usage

CCMS port number	Functionality
445	TCP port used Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1550	HDX CAPI
1972	Caché database, and Caché shadowing
4422	HDX NameService
12668–12670	TraceControl
10000	Hardcoded Toolkit Name Service
10001–10082	Networking
10038	NCP_CHANNEL—This channel is used to communicate between the NCP of one node to the NCP of another node. The NCP on one node sends sanity messages to the other node through this port.
10039	ASM_CHANNEL—Different modules like NCP and TFE send messages to ASM through this channel.
10040	NCP_ASM_CHANNEL—ASM uses this channel to send messages to NCP.
10060	ASM_Service—The ASM service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to the ASM service through this port.
10062	NCP_Service—The NCP service runs on this port. The Service Control Manager can send messages such as START, STOP, and RESTART to NCP on this port.
3998	License Manager destination port—This is the first of 10 consecutive ports required for license management.
3999–4007	License Manager client source port
3389	Remote Desktop Connection for support
5060	SIP Proxy
9080–9083	Web Services Open Interfaces

CCMS port number	Functionality
9086	CC Web Statistics
9089	Avaya Aura® Experience Portal Basic Ports application
57012	System Management and Monitoring Component (SMMC) system tray. Used by the High Availability feature.

The following table shows the ports that Contact Center Manager Administration uses.

Table 68: Contact Center Manager Administration port usage

CCMA port number	Functionality
TCP 80	For Internet Explorer communication.
TCP 443	For secure HTTP communication (only applicable if SSL is enabled for secure Internet Information Services (IIS) communication).
TCP Ports 389 and 636	For Active Directory Lightweight Directory Services (AD-LDS) functionality. Port 389 is for LDAP, and port 636 is for SSL. When you install CCMA on a server that runs Window Server 2008, these ports usually appear by default in the Port Configuration for AD-LDS installation window. If the values 50 000 and 50 001 appear instead, port numbers 389 and 636 are already taken. In this case, you can either accept the new values, or choose other ports for security reasons. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
TCP Port 3389	For remote desktop connection.
TCP Port 25 (SMTP)	For the Historical Reporting component to send email notifications when reports are printed and saved.
3899, 6366	For AD-LDS when CCMA is co-resident with Security Framework or Avaya Media Server. These ports are also used for AD-LDS replication in High Availability solutions.
TCP Port 8200	For the Emergency Help component on the client PC.
UDP ports 6020, 6030, 6040, 6050, 6060, 6070, 6080, 6090, 6100, 6110, 6120, 6130	For the CCMA server to receive IP multicasting data from CCMS Server (needed for Real-Time Reporting and Agent Desktop Displays).
UDP ports 7 020, 7030, 7040, 7050, 7060, 7070, 7080, 7090, 7100, 7110, 7120, 7130	For the CCMA server to send IP multicasting data to client PCs (needed for Real-Time Reporting and Agent Desktop Displays).

CCMA port number	Functionality
UDP ports 7025, 7035, 7045, 7055, 7065, 7075, 7085, 7095, 7105, 7115, 7125, 7135	For the CCMA server to send IP unicast data to client PCs. This is an optional method of sending the data required for Real-Time Reporting. If you do not use the multicast method, then you must configure the unicast option. You can also use a combination of the two methods.
TCP Port 10000	Used by the Nameservice process on the CCMA server (nbnmsrvc.exe). It permits communication between the CCMA server and the server in Contact Center Manager Server. **Important:** The default port for the third-party software. This conflicts with the default port used by the CCMA Toolkit NameService. To avoid issues with CCMA functionality when using Veritas Backup Exec, you must change the default port of Veritas Backup Exec to another port number that is not being used by the network.
Default UDP port 3998	License Manager destination port.
Default UDP ports 3999 - 4007	License Manager destination source port.

Chapter 19: Knowledge Worker Server configuration requirements

This section provides the configuration requirements for a Knowledge Worker Server. Install this server to provide Computer-Telephony Integration (CTI) functionality and call data handling capabilities.

Knowledge Worker Server is supported only in Avaya Communication Server 1000 AML-based solutions. Knowledge Worker solutions support only voice calls, they do not support multimedia contacts. Knowledge Worker solutions do not support routed voice contacts or skill-based routing. A Knowledge Worker terminal cannot log on to an ACD queue or answer calls routed to a queue. A Knowledge Worker terminal can make and answer regular calls.

This server includes the following Avaya Aura® Contact Center components:

- Communication Control Toolkit (Knowledge Worker)
- Contact Center License Manager

Knowledge Worker Server is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

Knowledge Worker Server does not support High Availability.

Common Server Requirements: The Knowledge Worker Server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Knowledge Worker Server hardware specification depends on your solution type, agent count, and call flow rate. You can install Knowledge Worker Server software on a physical server or on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by Knowledge Worker Server.

Table 69: Knowledge Worker Server supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
CS 1000 AML	Yes	Yes	Yes	Yes	Yes	Yes

For more information about Avaya Aura® Contact Center server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

Communication Control Toolkit Knowledge Worker supported functionality

The tables in this section indicate which functions are supported by the Knowledge Worker version of Communication Control Toolkit.

Important:

If your phone supports Multiple Appearance Reduction Prime (MARP) of Multiple Appearance Directory Number (MADN) you must disable the configurations. These configurations are not supported in Communication Control Toolkit.

The following tables list the basic Communication Control Toolkit call control functions.

Table 70: Basic Communication Control Toolkit functions

Event	Avaya Communication Server 1000 (AML-based)
Make Call	Yes
Hold Current Call	Yes The CS 1000 Swap Hold switch feature is not supported.
Unhold Call	Yes (Retrieve Call)
Drop Current Call (Release)	Yes
Blind Transfer Call	Yes
Initiate Supervised Transfer	Yes
Complete Transfer	Yes
Initiate Conference Call	Yes (up to six parties)
Complete Conference Call	Yes

Event	Avaya Communication Server 1000 (AML-based)
Call Forward	Yes
Cancel Call Forward	Yes
Join Conference	No
Deflect Calls	No
Get Status	Yes
Get Call Capabilities	Yes
Get Data	Yes
Delete Data	Yes
Append Data	Yes
Make Set Busy (Do Not Disturb)	Yes (on Agent Terminals only)
Get/Set UUI	No (UUI attached as call data)
Send DTMF (for example, credit card number to IVR)	Yes DTMF is not supported in Knowledge Worker solutions.
Mute/Unmute	No
Consult	Yes (but must designate as transfer or conference)
Park/Unpark	No
Message Waiting Indicator	No
HER (Host Enhanced Routing)	Yes
Answer	Yes

The fast transfer functionality does not support completing a fast transfer call to an external trunk number. This functionality is for predictive dialing environments in which the application sends a MakeCall request to an external customer number and, when the customer answers, the application sends the FastTransfer request to blind transfer the customer to a live agent.

Third-party software requirements

Due to the mission-critical, real-time processing that Avaya Aura® Contact Center applications perform, you must not install any other application class software on the server. You can install certain utility class software on the server, providing it conforms to the following guidelines, see Third-party software requirements on page 161.

Knowledge Worker Server antivirus software

This section describes the Knowledge Worker Server antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Avaya recommends that you exclude the following files and folders from scans (both real-time and scheduled):

- The folder where you store Server Packs and patches

To avoid database integrity problems, Avaya recommends that you exclude all CACHE.DAT files, journal files, the cache.cpf file, and any Caché-related files from antivirus scans.

Caché software is installed in `<Install_Directory>:\Avaya\Cache\CacheSys`. Databases and journal files are installed in `<Install_Directory>:\Avaya\Contact Center\Databases`.

Network configuration

This section describes network configuration information for Communication Control Toolkit.

Network interface card binding order

Configure the binding order of the network interface cards so that the NIC connected to the contact center subnet is first, followed by others such as the virtual adapters for remote access.

Communication Control Toolkit and Avaya Communication Server 1000 Telephony Manager on the ELAN subnet

In situations where both Communication Control Toolkit and Communication Server 1000 Telephony Manager are present, take extra care in the treatment of the ELAN subnet. When connecting the ELAN subnet to a router, follow the Communication Server 1000 Telephony Manager strict guidelines for filtering and routing. Your configuration must meet the

requirements for the Communication Server 1000 Telephony Manager. *Communication Server 1000M and Meridian 1 Large System Planning and Engineering* (NN43021-220) prescribes ELAN engineering details for Contact Center application engineering.

The ELAN subnet is designed and tested for inter-Avaya product communications. These external communications over the ELAN subnet, therefore, present an unknown factor and thereby potential negative impact to the overall operation of the telephone switch and auxiliary processors.

Maximum acceptable use

Total usage of the Enterprise IP network must not exceed 30 percent in a shared network environment. Communication Control Toolkit use of the Enterprise IP network can be as high as 9 percent for a system with 500 agents. Ensure that the Enterprise IP network has enough spare capacity to accommodate Communication Control Toolkit traffic in addition to your traffic.

Knowledge worker environment requirements

In a knowledge-worker environment, Communication Control Toolkit communicates on the contact center subnet and, in turn, the ELAN subnet to the switch.

Port requirements

This section lists the ports used by the Knowledge Worker server components.

The following table shows the port numbers required for Communication Control Toolkit (CCT).

Table 71: Communication Control Toolkit port usage

CCT port number	Functionality
445	Windows File and Printer Sharing for Microsoft Networks. Required when copying data between active and standby servers using Windows File Sharing.
1972	Caché database, and Caché shadowing High Availability solutions.
3000	For TAPI switch connection through MLS (CCMA server). This port is required for the contact center subnet.
3998	License Manager (LM) destination port, which is the first of 10 consecutive ports required for license management.

CCT port number	Functionality
3999 - 4007	LM client source ports.
5000	To connect to the server in CCMS.
8081	Default port of the Apache Tomcat Server which hosts the CCT Web Administration.
8085	For CCT services to access the CCT database.
8098	For the Contact Management Framework on the CCT server.
8099	For the Contact Management Framework on the CCT server.
8888	For the TAPI switch connection using direct-connect. This port is required only for the ELAN subnet.
8087	For CCT CMF component.
9010	For CCT CMF component.
11110	Used by the CCT Server service for the CMF Web Service - Callback port.
11111	Used by the CCT Server service for the CMF Web Service - Web server port.
29373	Listens for requests from CCT client applications.
29374	Data Access Layer Service listens for requests from CCT Remote Administration Console.
57012	System Management and Monitoring Component (SMMC) system tray. Used by the High Availability feature.

Chapter 20: Security Framework configuration requirements

This section provides the configuration requirements for the Security Framework server. Install this server to provide identity management, authorization, and single sign-on authentication for contact center solution users. Security Framework provides session management and integrates with your directory services infrastructure (for example, Active Directory) to reduce administrative costs and eliminate the redundant user information associated with application solutions.

Security Framework is supported only on the Microsoft Windows Server 2008 Release 2 64-bit operating system.

Security Framework Server supports High Availability.

Common Server Requirements: The Security Framework server specifications are in addition to the common server specifications. For more information, see Common server requirements on page 155.

Hardware requirements

The Security Framework server hardware specification depends on your solution type and agent count. You can install Security Framework software on a physical server or on a virtual guest.

Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end. The following table shows the server specification levels supported by Security Framework.

Table 72: Security Framework supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
—	Yes	Yes	Yes	Yes	Yes	Yes

For more information about Avaya Aura® Contact Center server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

Third-party software requirements

Due to the mission-critical, real-time processing that Avaya Aura® Contact Center applications perform, you must not install any other application class software on the server. You can install certain utility class software on the server, providing it conforms to the following guidelines, see Third-party software requirements on page 161.

Security Framework server antivirus software

This section describes the antivirus software requirements.

For antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Several maintenance tasks are automatically activated at 12:00 midnight. Therefore, you must schedule virus scans at a time other than midnight.

Chapter 21: Avaya Media Server on Linux configuration requirements

This sections provides the configuration requirements for an Avaya Media Server Linux server. Each SIP-enabled contact center requires one or more Avaya Media Server in the solution. Avaya Media Server supports SIP-based voice contact routing, and it provides conferencing, announcements, dialogs, and Agent Greeting capabilities in SIP-based contact centers.

Avaya Media Server is supported only in SIP-enabled contact centers.

In an Avaya Aura® Contact Center solution, Avaya Media Server uses standard Session Initiation Protocol (SIP) for signaling, and Real-time Transport Protocol (RTP) to transport audio. In a Contact Center solution, Avaya Media Server does not support Secure Real-time Transport Protocol (SRTP).

Standalone Avaya Media Server is supported only on the Red Hat Enterprise Linux 6.x 32-bit operating system. In a Contact Center High Availability solution, Avaya Media Server is supported only when installed standalone on a Linux operating system.

Avaya Aura® Contact Center does not support standalone Avaya Media Server on Windows for new installations.

Avaya Media Server software components

Avaya Media Server is a software-based media processing platform. The Avaya Media Server architecture is uniquely scalable for all core functions of the platform, including media processing, signaling, application execution, and content management.

The Avaya Aura® Contact Center DVD includes the core Avaya Media Server software and an additional component, Contact Center Services for Avaya Media Server. On the Linux operating system, the Avaya Media Server installer and the Contact Center Services for Avaya Media Server installer are separate executables.

Contact Center Services for Avaya Media Server provides three services required by a SIP-enabled Contact Center:

- Conference: This service creates an Avaya Media Server conference to anchor incoming customer calls, and joins treatments and agent calls to the conference as required by the contact center applications.
- Announcement: This service plays treatments (ringback, announcements) into an Avaya Media Server conference.
- Dialog: This service plays prompts to, and collects DTMF digits from, an Avaya Media Server conference.

In addition, Contact Center Services for Avaya Media Server provides the applications needed for the Agent Greeting feature. This feature allows agents to pre-record their personal greetings. The feature plays the greeting automatically when an agent answers a call.

Avaya Media Server media files and media management

Media files are WAV audio files that contain speech, music, or signalling tones. Avaya Media Server supports custom (customer generated) media files and default (canned) media files. You configure the custom media files using the Avaya Media Server Element Manager. You update and configure the default media files directly in the locale specific folders on the Avaya Media Server.

Content Store

The Avaya Media Server Content Store provides a persistent storage capability for configuration data and media files. You use the Avaya Media Server Element Manager Web administration utility to configure and manage the contents of the Content Store. If you have more than one Avaya Media Server, you can designate one server to be the primary Avaya Media Server. You can then configure the other Avaya Media Servers to replicate (copy) the configuration data and media files from the Content Store on the primary Avaya Media Server. This configures all of the Avaya Media Servers with the same media files and allows them to provide a pool of common media processing resources. Content Store replication also provides storage resiliency, if one Avaya Media Server fails the remaining Avaya Media Servers are configured correctly and can continue processing media and contact center calls.

Custom media

Avaya Media Server stores (customer generated) custom media files in a media Content Store. Typically, a customer records their own announcements and stores the WAV media file recordings in the Avaya Media Server Content Store. The music media files used to provide scripted music in Orchestration Designer applications are another example of custom media.

In an Avaya Media Server cluster-based solution, you configure your custom media files only on the primary Avaya Media Server Content Store. The custom media files are automatically replicated to all other Avaya Media Servers in the cluster.

In Avaya Media Server High Availability-based solutions, you configure your custom media files only on the primary server of the Avaya Media Server Content Store Master Pair. The custom media files are automatically replicated to the backup Avaya Media Server, and to all other Avaya Media Server High Availability pairs configured in the solution.

Custom media organization

In Avaya Media Server Element Manager (EM), you organize custom media within a content namespace. A content namespace is a logical area in the Content Store. The content namespace name must match the contact center SIP domain name; that is, the Local SIP Subscriber Domain Name in Contact Center Manager Server – Server Configuration.

Within the content namespace you use content groups to subdivide the media into logical groups. You must create one locale-specific content group for treatments such as RAN.

Avaya Media Server supports the following locales:

Locale	Language	Country
de_de	German	Germany
en_ca	English	Canada
en_gb	English	United Kingdom
en_ie	English	Ireland
en_in	English	India
en_us	English	United States
es_es	Spanish	Spain
es_mx	Spanish	Mexico
fr_ca	French	Canada
fr_fr	French	France
it_it	Italian	Italy
ja_jp	Japanese	Japan
ko_kr	Korean	Korea
pt_br	Portuguese	Brazil
ru_ru	Russian	Russia
zh_cn	Chinese (Simplified)	China
zh_tw	Chinese (Simplified)	Taiwan

You can create one or more additional content groups for music. Typically you store different types of music media in different content groups. To use treatments in Orchestration Designer (OD) flow applications or scripts, you create routes in Contact Center Manager Administration (CCMA) that link to the media files in the Avaya Media Server locale-specific content group. To use scripted music in OD flow applications or scripts, you create routes in Contact Center Manager Administration (CCMA) that link to the Avaya Media Server content groups containing the music files. The OD flow applications or scripts reference these routes to access the treatment files and scripted music on the Avaya Media Server.

The following example shows the structure of a content namespace for a contact center based in Canada, which uses English recorded announcements, and has three optional music types;

folk, jazz, and rock. The SIP domain for the contact center is ocs-nmclab.com. The locale configured on the CCMS server is en_ca.

The media content namespace structure is as follows:

ocs-nmclab.com <= media content namespace, matches SIP domain name

– en_ca <= locale-specific media content group (announcements)

– folk <= media content group (folk music)

– jazz <= media content group (jazz music)

– rock <= media content group (rock music)

Default media files

Contact Center Avaya Media Server contains a set of country and language specific default media files for all supported locales. The default media files contain numerical values, busy tones and ring-back tones. You can use these default “canned” media files in your Contact Center solution, or you can replace them with your own recordings.

The following are examples of the Avaya Media Server default or canned locale specific media files:

- Single digit playback (zero.wav, one.wav, two.wav ... nine.wav)
- Busy tone wav file (busy.wav)
- Ringback wav file (ringback_xx.wav) where xx is the country portion of the locale (for example, ringback_us.wav, ringback_ru.wav)

The default media files are stored in the Operating System file structure (not in the Avaya Media Server content namespace). The canned media files are stored in Linear 16-bit PCM recording format.

If you choose to create your own recordings, you must replace the existing default media files with files of the exact same name. For example, if you choose to record your own media files for single digit numerals, then you must save the files as one.wav and two.wav to match the existing default media file names. Then you replace the existing default media files with the media files of your own recordings. You must then delete the existing Avaya Media Server transcoded output files. For example, if you are using PCMA transcoding, delete the one.wav and two.wav media files from the locale-specific PCMA folder. This forces Avaya Media Server to pick up your new Linear 16-bit PCM recording and generate a new transcoded output file of your recording.

Default media files are not stored in the Avaya Media Server Content Store, and are therefore not replicated to other Avaya Media Servers. If you update the canned or default media files on one Avaya Media Server, you must copy the updated default media files to all other Avaya Media Servers.

The Asian languages use different WAV file names for the following numbers:

	Zero	One	Two	Three	Four	Five	Six	Seven	Eight	Nine
ja_jp Japanese	zero	ichi	ni	san	yo	go	roku	nana	hatchi	kyu
ko_kr Korean	young	il	yi	sam	sa	o	yuk	chil	pal	gu
zh_cn & zh_tw Chinese	ling	yi	er	san	si	wu	liu	qi	ba	jiu

All audio media files must have a .wav file name extension, for example hatchi.wav, jiu.wav, and seven.wav.

Default media organization

Each Avaya Media Server installation includes a number of default (canned) media files. These default media files are stored in a country and locale specific folder on the Avaya Media Server.

On a Windows operating system, the default location for the default media files is:

```
D:\Avaya\MAS\Multimedia_Applications\MAS\platdata\Announcements
\contactcenter\default\xx\yy\l16
```

Where xx is the country portion of the locale and yy is the language portion of the locale.

On a Linux operating system server, the default location for the default media files is:

```
/opt/avaya/ma/MAS/platdata/Announcements/contactcenter/
default/xx/yy/l16
```

Where xx is the country portion of the locale and yy is the language portion of the locale.

For example, the Linux operating system Avaya Media Server directory locations for Canadian English and French are:

```
/opt/avaya/ma/MAS/platdata/Announcements/contactcenter/
default/ca/en/l16
```

```
/opt/avaya/ma/MAS/platdata/Announcements/contactcenter/
default/ca/fr/l16
```

Media file formats

Avaya Media Server provides optimum playback performance with .WAV files encoded as Linear 16-bit PCM, 8KHz Mono with a sampling rate of 128kbits/sec. Create your announcement and music media files with this encoding before copying them onto the Avaya Media Server server.

Licensing requirements

Avaya Media Server requires licenses for Contact Center Services for Avaya Media Server, and optionally for the Agent Greeting feature.

Contact Center supports two licensing mechanisms, depending on your system configuration: PLIC or WebLM. You obtain a PLIC license file from the Avaya Keycode Retrieval System (KRS), or you can obtain a WebLM license file from the Avaya Product Licensing and Delivery System (PLDS).

If Contact Center uses a WebLM license, it automatically pushes license keys to each Avaya MS that the administrator configures as a Media Server in CCMA. Avaya MS does not require a license file or any specific configuration. If Contact Center uses a PLIC license, all network configurations that use standalone Avaya Media Servers require separate license files for Avaya MS.

In a Contact Center using PLIC licensing, an Avaya Media Server that is co-resident with Contact Center Manager Server uses Contact Center License Manager to get license keys. An Avaya Media Server installed on a separate server uses the Avaya Media Server License Server to get license keys. On a separate server you use Element Manager to configure the Avaya MS licensing.

For PLIC licenses, the keycode license sheet that comes with the Contact Center software provides a list of the features you ordered, the Serial Number (Site ID), the Unique Reference Number (URN), the KRS web link, and a label. You use the URN to locate the order on the KRS Web site. You enter the server MAC address to generate and retrieve your Contact Center licenses. KRS supports the generation of two license files for each keycode. In a co-resident deployment, create a single license file using the co-resident server MAC address. In any deployment using one Avaya MS standalone server, create two license files, one using the Contact Center Manager Server server MAC address and the other using the Avaya MS server MAC address. Where you deploy multiple Avaya MS servers or multiple Avaya MS redundant pairs, create a license file using the Contact Center Manager Server server MAC address, and one or more license files using the MAC addresses of both the primary and secondary (or backup) servers.

You can configure the following licenses for Avaya Media Server:

- Contact Center Services for Avaya Media Server.
- Agent Greeting

Important:

Co-resident Avaya Media Server server is not supported when Contact Center uses corporate licensing.

Network configurations

You can configure Avaya Media Server in a number of ways, depending on the requirements of your contact center. The different configurations affect the number of servers required, the operating system required, the licensing configuration, and the media Content Store configuration.

Standalone Avaya Media Server

Standalone Avaya Media Server is supported only on the Linux operating systems. You cannot install other applications on the Avaya Media Server Linux server.

In Contact Center Manager Administration, you configure the Avaya Media Server as a media server and assign it to handle conference, announcement, and dialog media services.

When installed on a separate server, Avaya Media Server uses the Avaya Media Server License Server (which is a function on the Avaya MS) to get licenses. If you are using PLIC licenses, you must install the Contact Center Services for Avaya Media Server and Agent Greeting licenses on the Avaya Media Server License Server using the Avaya Media Server Element Manager.

Avaya Media Server cluster

An Avaya Media Server cluster is a collection of Avaya Media Server nodes that work closely together. Avaya Media Server clusters offer improved redundancy, improved performance and load balancing. An Avaya Media Server cluster shares the following resources:

- Cluster Primary and Secondary Nodes
- Persistent Content Storage
- Redundant License Servers

The cluster performs automatic Content Store replication of system and application configuration data, as well as media content, so you must configure the same media applications on all Avaya Media Server servers in the same cluster.

An Avaya Media Server cluster has:

- One Avaya Media Server designated as the primary Avaya Media Server
- One Avaya Media Server designated as the secondary Avaya Media Server
- Up to six Avaya Media Servers, each designated as standard Avaya Media Servers

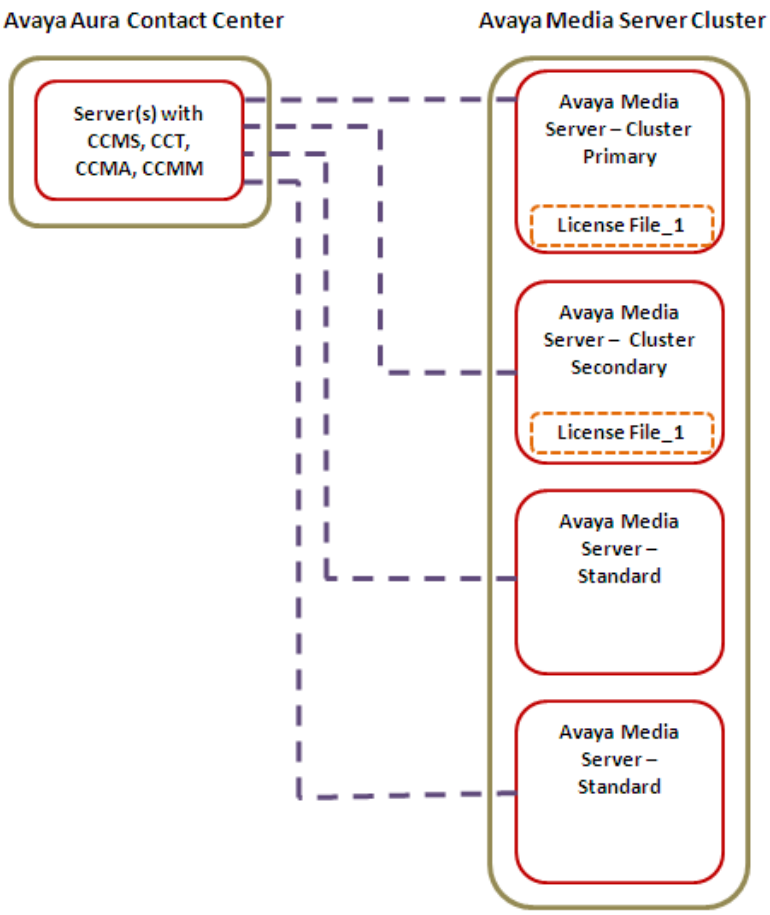


Figure 17: Avaya Media Server cluster, with PLIC licensing

In this deployment, you configure the Avaya Media Server servers in a cluster. This allows you to perform configuration on the Primary server only, and the configuration automatically replicates to the other Avaya Media Servers in the cluster deployment.

If you are using PLIC licenses, you configure licensing on the primary Avaya Media Server. The primary Avaya Media Server automatically copies the license file to the secondary server, and all the servers in the cluster draw their licensing from the active license server.

In Contact Center Manager Administration, you must still configure each Avaya Media Server separately as a media server, and assign it to handle conference, announcement, and dialog media services.

Avaya Media Server Cluster Operating Systems

The servers in an Avaya Media Server cluster must all have the same operating system. All the servers in an Avaya Media Server cluster must use the Windows Server 2008 Release 2 64-bit operating system, or all the servers must use the Red Hat Enterprise Linux 32-bit operating system. Avaya Media Server is supported only when Red Hat Linux is installed with English Language selected. Avaya Media Server does not support clusters with mixed operating systems. You cannot install other applications on the Avaya Media Server.

Avaya Media Server Improved Cluster Redundancy

Each Avaya Media Server supports up to 1000 concurrent agents. When using an Avaya Media Server cluster, in Contact Center Manager Administration, you must configure each Avaya Media Server in the cluster separately as a media server, and assign it to handle media services. Avaya Aura Contact Center then distributes its media processing requirements across all configured Avaya Media Servers.

If your contact center requires 2400 concurrent agents, your solution requires three Avaya Media Servers: one primary Avaya Media Server, one secondary Avaya Media Server, and one standard Avaya Media Server. If one of these three Avaya Media Servers fails, potentially one third of calls may be lost. The remaining two Avaya Media Servers can support only 2000 concurrent agents.

For improved load balancing and redundancy, you may install up to eight Avaya Media Servers, one primary Avaya Media Server, one secondary Avaya Media Server, and up to six standard Avaya Media Servers. If any of the eight Avaya Media Servers in the cluster fail, fewer (one eight) of the calls are lost, and the remaining seven Avaya Media Servers can continue to process the phone calls for all agents.

Avaya Media Server Cluster configuration

Avaya Media Server supports custom (customer generated) media files and default (canned) media files.

In an Avaya Media Server cluster-based solution, you use Element Manager to configure your custom media files in the Content Store of the primary Avaya Media Server. The Content Store contents, including custom media files, are automatically replicated to all other Avaya Media Servers in the cluster.

Avaya Media Server stores default (canned) media files in a country and locale specific folder on every Avaya Media Server. Examples of default media files include digit recordings (one.wav, two.wav, three.wav, and so on). Default media files are not stored in the Avaya Media Server Content Store, and are therefore not replicated automatically to other Avaya Media Servers. If you update the canned or default media files on one Avaya Media Server, you must copy the updated default media files to all Avaya Media Servers in the cluster.

Configure the following Avaya Media Server resources and settings only on the primary Avaya Media Server:

- Licensing
- Locale and Content Namespace
- Trusted Avaya Aura® Contact Center (CCMS) servers
- Custom media files (WAV) for announcements (stored in a Content Namespace in the Content Store)
- Custom music media files and music types (stored in a Content Namespace in the Content Store)
- Streamed music source (Really Simple Syndication or SHOUTCast)
- Media Processing and Security

Configure the following Avaya Media Server resources and settings on every Avaya Media Server in the cluster:

- Cluster Configuration.
- Default “canned” media files. If you update the canned or default media files on one Avaya Media Server, you must copy the updated default media files to all Avaya Media Servers in the cluster.

Avaya Media Server High Availability pair

The Avaya Media Server High Availability feature ensures uninterrupted availability of media processing and reduces loss of processing data when a switchover occurs. In a High Availability deployment, you configure a redundant pair of Avaya Media Server servers. The High Availability feature uses two Avaya Media Server operating in a active-stand-by configuration. Both the servers have identical configuration and provide full media processing capabilities. Administrators configure the High Availability feature by designating one Avaya Media Server as the primary server and the other as the backup server. Both servers communicate with each other using a heart beat mechanism. Interruptions in the heartbeat from the primary server trigger a switchover to the backup server. As both the primary and backup servers are identical in functionality and configuration, the switchover is seamless.

Important:

Avaya Media Server supports High Availability only on a Linux operating system.

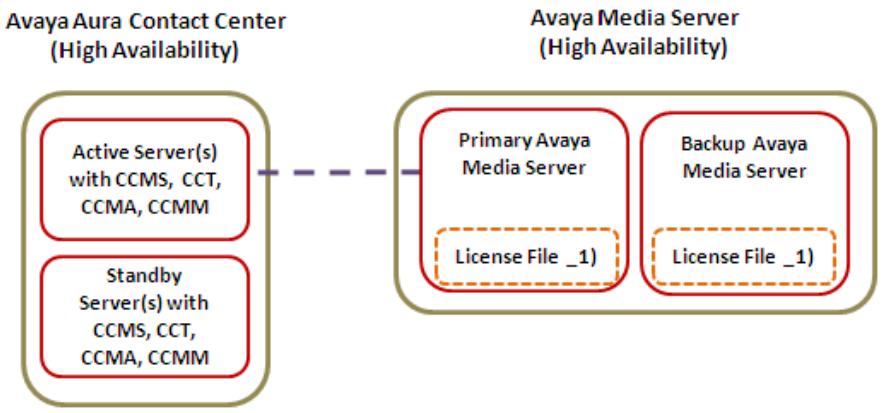


Figure 18: Single Avaya Media Server with High Availability and PLIC licenses

In Contact Center Manager Administration, you configure the Avaya Media Server High Availability pair as the media server, using the managed IP address of the cluster, and assign it to handle conference, announcement, and dialog media services.

Avaya Media Server supports Agent Greeting in a High Availability deployment. However, during a switchover Avaya Media Server supports only greeting playback; it does not support agent—recorded greetings. Existing calls into the Agent Greeting application will be lost in the

event of a switchover, but the recording application will continue to work for new calls after the switchover.

If you are using PLIC licenses, the High Availability pair uses the Avaya Media Server License Server feature. You install the license file on the primary server and the backup Avaya Media Server replicates this license automatically.

Avaya Media Server High Availability configuration

Avaya Media Server supports custom (customer generated) media files and default (canned) media files. You update and configure the custom media files using the Avaya Media Server Element Manager. You update and configure the default media files directly in the locale specific folders on the Avaya Media Server.

In Avaya Media Server High Availability-based solutions, you configure your custom media files only on the primary Avaya Media Server. The custom media files are stored in the Content Store and they are automatically replicated to the backup Avaya Media Server.

If you update the canned or default media files on one Avaya Media Server, you must copy the updated default media files to all Avaya Media Servers.

Configure the following Avaya Media Server resources and settings only on the primary Avaya Media Server:

- Licensing
- Locale and Content Namespace
- Trusted Avaya Aura® Contact Center (CCMS) servers
- Custom media files (WAV) for announcements (stored in a Content Namespace in the Content Store)
- Custom music media files and music types (stored in a Content Namespace in the Content Store)
- Streamed music source (Really Simple Syndication or SHOUTCast)
- Media Processing and Security

Configure the following Avaya Media Server resources and settings on every Avaya Media Server in the cluster:

- High Availability configuration
- Default “canned” media files. If you update the canned or default media files on one Avaya Media Server, you must copy the updated default media files to all Avaya Media Servers

Multiple Avaya Media Server High Availability pairs

For increased agent capacity in a High Availability deployment, you configure multiple redundant pairs of Avaya Media Server servers. The Avaya Media Server High Availability feature ensures uninterrupted availability of media processing and reduces loss of processing data when switchover occurs.

Important:

Avaya Media Server supports High Availability only on a Linux operating system.

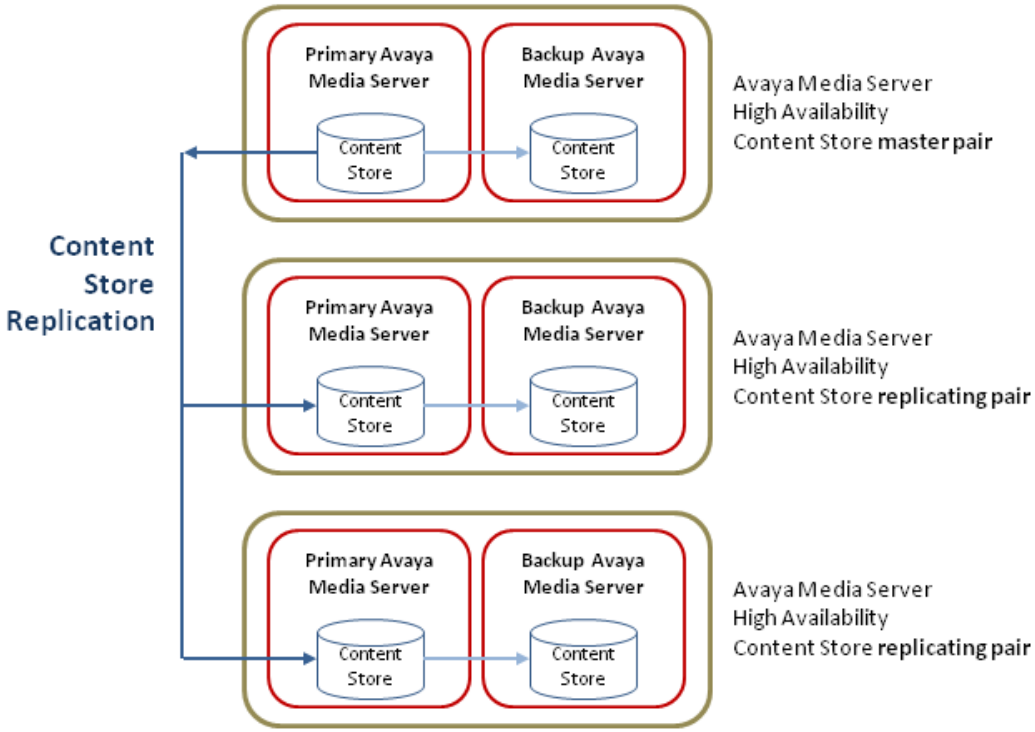


Figure 19: Content Store replication between multiple Avaya Media Servers with High Availability

In this deployment, you configure Content Store replication across the Avaya Media Server Primary servers. This allows you to perform custom media configuration on a single primary server only, and the media configuration automatically replicates to the other Avaya Media Server servers in the network configuration.

In Contact Center Manager Administration, you configure each Avaya Media Server redundant pair as a separate media server, using the managed IP address, and assign it to handle conference, announcement, and dialog media services.

If you are using PLIC licenses, you license each redundant pair separately. For each pair, you install the license file on the primary Avaya Media Server server, and the backup replicates this license automatically.

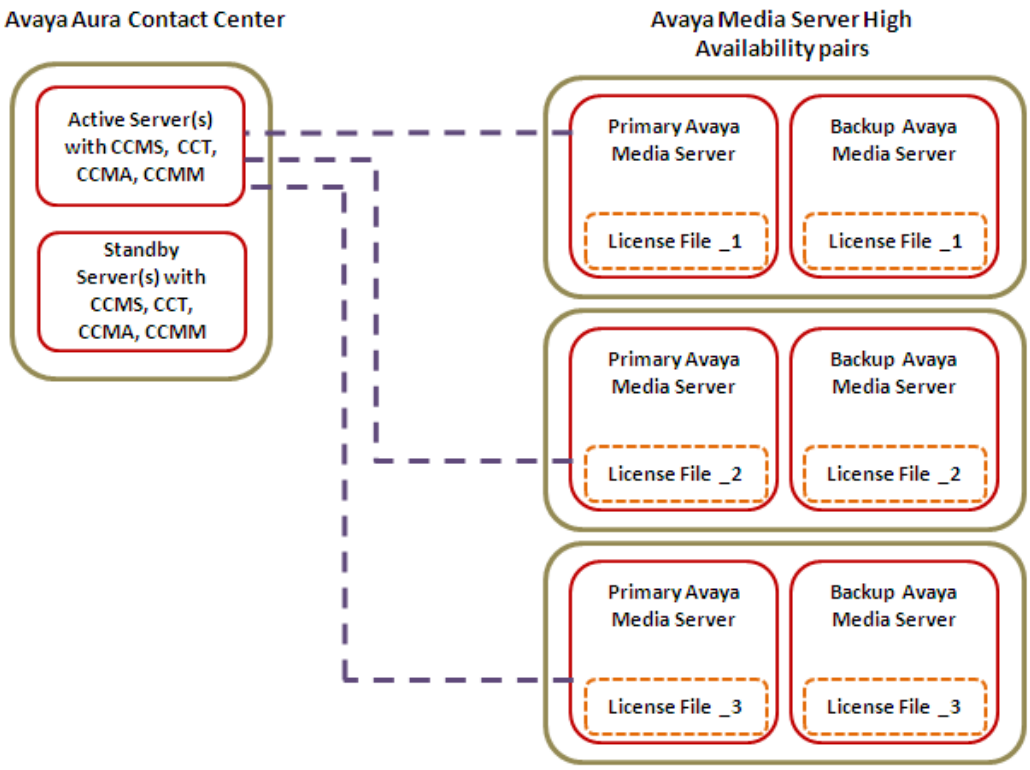


Figure 20: Avaya Media Servers with High Availability and PLIC licenses

Multiple High Availability pair configuration

Avaya Media Server supports custom (customer generated) media files and default (canned) media files. You update and configure the custom media files using the Avaya Media Server Element Manager. You update and configure the default media files directly in the locale specific folders on the Avaya Media Server.

Configure the following Avaya Media Server resources and settings on the primary server of the Avaya Media Server High Availability Content Store master pair:

- Locale and Content Namespace
- Custom media files (WAV) for announcements (stored in a Content Namespace in the Content Store)
- Custom music media files and music types (stored in a Content Namespace in the Content Store)

Configure the following Avaya Media Server resources and settings on each primary Avaya Media Server:

- Licensing
- Locale

- Streamed music source (Really Simple Syndication or SHOUTCast)
- Trusted Contact Center Manager Server (CCMS) servers
- Media Processing and Security

Configure the following Avaya Media Server resources and settings on every Avaya Media Server in the cluster:

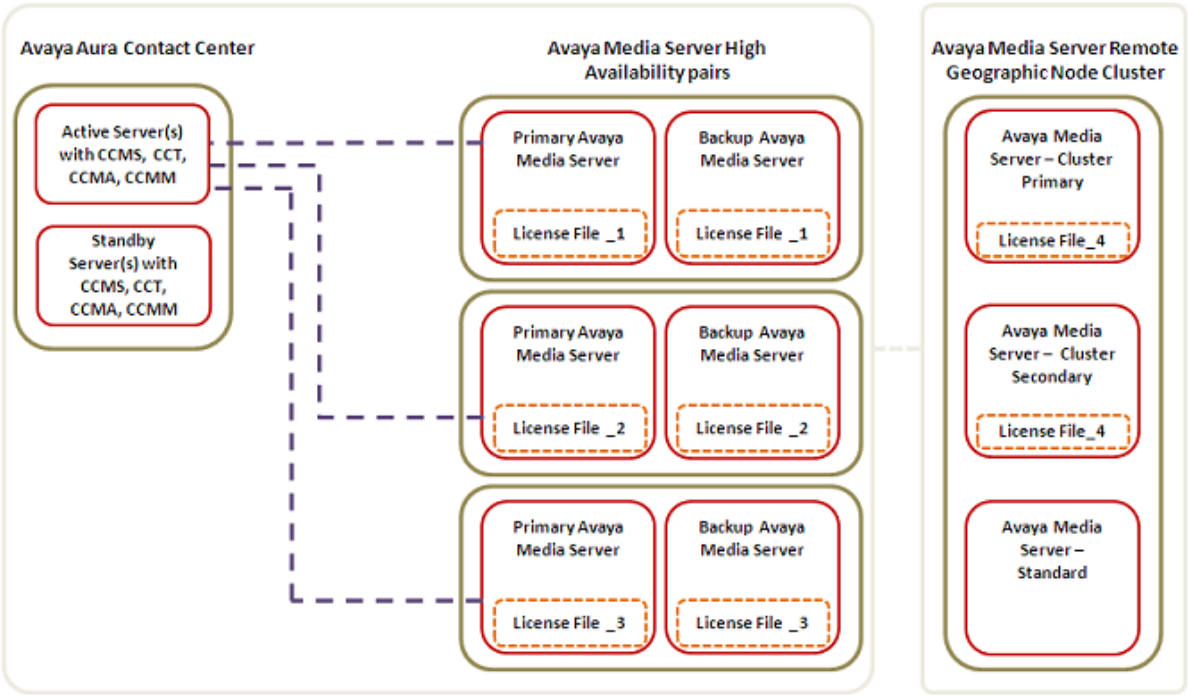
- High Availability configuration.
- Default “canned” media files. If you update the canned or default media files on one Avaya Media Server, you must copy the updated default media files to all Avaya Media Servers.

Avaya Media Server Remote Geographic Node deployment

Where the contact center deploys High Availability with a Remote Geographic Node, implement one or more Avaya Media Servers at the remote site. Configure one remote Avaya Media Server primary server to replicate from the primary Avaya Media Server at the campus site. Then configure all other Avaya Media Servers at the remote site to replicate from the primary Avaya Media Server at the remote site.

If you are using PLIC licenses, configure licensing on the remote cluster in the same way as you would for a standard cluster.

Figure 21: Avaya Media Server in a Remote Geographic Node deployment with PLIC licenses



In this deployment, you configure Content Store replication between the primary server of the remote cluster and the primary server on the campus. This allows Content Store configuration on only a single primary server on the campus, and the Content Store configuration automatically replicates to the primary server at the remote side, and from that server to the other Avaya Media Server servers in the remote site cluster.

Important:

After a switchover to the remote site, the administrator must manually configure each of the remote Avaya Media Server servers separately as a media server on CCMA, and assign it to handle conference, announcement, and dialog media services.

Hardware requirements

The Avaya Media Server hardware specification depends on your solution type, agent count, and call flow rate. Avaya Aura® Contact Center defines three server specification levels based on agent count and call flow rates: Entry-level, Mid-range, and High-end.

You can install Avaya Media Server software standalone on the following server specifications.

Table 73: Avaya Media Server supported server specifications

Platform	Physical server			Virtual guest		
	Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Aura SIP	No	Yes	Yes	No	Yes	Yes

For more information about Avaya Media Server standalone server specifications, and to select a server specification suitable for your agent count and call flow rate, see Server Specifications on page 331.

For information about Avaya Media Server and Avaya Aura® Contact Center virtualized on one VMware host server, see Avaya Media Server and Contact Center on one VMware host on page 347.

Third-party software requirements

Due to the mission-critical, real-time processing that Avaya Aura® Contact Center applications perform, you must not install any other application class software on the server. You can install certain utility class software on the server, providing it conforms to the following guidelines, see Third-party software requirements on page 161.

Antivirus software

For Avaya Media Server, you must exclude the following files and folders from scans (both real-time and scheduled):

Avaya Media Server on Linux, default locations to exclude:

- `/opt/avaya/ma/MAS/platdata`
- `/opt/avaya/ma/MAS/common/log`

If you do not install Avaya Media Server in the default location, adjust these file and folder paths to match your actual installation.

For additional antivirus software requirements, see Additional guidelines for the use of antivirus software on page 162.

Port requirements

The following table shows the port numbers required for Avaya Media Server on Linux.

Table 74: Avaya Media Server port usage–Linux

Port	Type	Permit in TCP Filter	Description
80	TCP	Yes	SoapServer
443	TCP	Yes	SoapServer TLS
636	TCP	Yes	UCM TLS port for LDAP **Note:** This port can not be reconfigured.
1812	UDP	No	UCM RADIUS service
3306	TCP	Yes	MySQL
3389	TCP	Yes	Remote Desktop
3867	SCTP	No	Diameter over SCTP
3868	TCP	No	Diameter over TCP
3869	TCP	No	Diameter over TLS
3998	TCP	Yes	License Server
4001	TCP	No	IvrMP MSLink
4004	TCP	No	Sip UA MSLink
4005	TCP	No	Resource Manager ExtSess
4014	TCP	No	SIP UA cmd i/f
4015	TCP	No	Resource Manager and i/f
5060	TCP	Yes	SIP over TCP
5060	UDP	No	SIP over UDP
5061	TCP	Yes	SIP over TLS
6080	TCP	Yes	Agent Greeting
7080	TCP	No	ConfMP MSLink
8080	TCP	Yes	EM/UCM HTTP
8093	TCP	Yes	UCM bind port for JMS
8193	TCP	Yes	UCM TLS port for JMS

Port	Type	Permit in TCP Filter	Description
8443	TCP	Yes	EM/UCM HTTP(s)
11004	TCP	No	DiamC MSLink
11014	TCP	No	DiamC and i/f
19899	TCP	Yes	Resource Manager CPLink
19999	TCP	Yes	IvrMP ssdata
51000	TCP	No	Resource Manager IPC
51001	TCP	No	Legacy MPS Alarm deamon
51002	TCP	No	Voice XML Interpreter IPC
51003	TCP	No	CCXML Interpreter IPC
52005	TCP	Yes	CStore MSLink
52007	TCP	Yes	CStore RTFT
52009	TCP	Yes	IvrMP RTFT

Avaya MS requires a UDP port range for media processing. The administrator can configure all starting UDP ports.

Table 75: Required UDP Port Range

Media Type	UDP Port Range
IvrMP (audio)	21,000 to (21,000 + 2 * maxsessions)
IvrMP (video)	41,000 to (41,000 + 2 * maxsessions)
ConfMP (audio & video)	53,500 to (53,500 + 8 * maxsessions)

Chapter 22: Administration client configuration requirements

This section provides the configuration requirements for the browser-based administration client computers. The number of these client computers is usually proportional to the number of agents in the contact center.

The following Avaya Aura® Contact Center servers use Contact Center Manager Administration and require one or more browser-based client computer:

- Voice and Multimedia Contact Server
- Voice Contact Server
- Multimedia Contact Server
- Multimedia Complement for Elite
- No Switch Configured Multimedia only
- Network Control Center Server

The following Avaya Aura® Contact Center servers require one or more browser-based administration client computer:

- Knowledge Worker Server
- Security Framework Server
- Avaya Media Server

Install this client computer to configure and administer Avaya Aura® Contact Center resources, to monitor performance, to generate (real-time and historical) reports. You can also use this client computer upload and download data using the Configuration Tool spreadsheets.

Client hardware requirements

The following table lists the hardware requirements for administration client.

This specification applies to the Supervisor Client PC but can also apply to computers that run Agent Desktop Displays.

Table 76: Administration client hardware requirements

Hardware item	Minimum requirements	Additional information
CPU	Intel-based CPU - Pentium IV 1.8GHz	Dual- and quad-CPU systems are supported with or without Hyperthreading enabled. AMD processors of the same or higher specification are also supported. Unsupported processors include Intel Celeron, and Intel Itanium (IA64) processors.
RAM	1 GB	—
Hard disk space	60 GB	60 GB is recommended only to store large reports.
Hard disk partitioning	No specific partitioning requirements	—
Hard disk type	IDE/SCSI Bus for hard drives	—
Hard disk speed	2.5 inch disk minimum speed: 10000 RPM 3.5 inch disk minimum speed: 7200 RPM	—
DVD ROM	One dual-layer DVD ROM drive	—
Network interface	One network interface card	—
Video card	One video card and monitor	1024*768 pixels minimum resolution
Keyboard	One keyboard	—
Mouse	One mouse	—
Serial ports	One serial port (if connection of the CS 1000 Data Extraction Tool to the Communication Server 1000 switch must use a serial port)	—

Client operating system requirements

The following table lists the operating system requirements for administration client computers.

Table 77: Administration client operating system requirements

Operating system	International versions supported (See Note)	Minimum service pack
Windows XP Professional	English French German Italian LA Spanish Brazilian Portuguese Russian Simplified Chinese Traditional Chinese Japanese Korean	Service Pack 2 or later
Windows Vista Business 32-bit Windows Vista Enterprise 32-bit	English	SP1 or later
Windows 7 (32-bit and 64-bit)	English	
Windows Server 2008 Release 2 Standard Edition and Enterprise Editions 64-bit	English French (FR) German (DE) Italian (IT) LA Spanish (ES) Brazilian Portuguese (PT-BR) Russian (RU) Simplified Chinese (Zh-CN) Traditional Chinese (Zh-TW) Japanese (JA) Korean (KO)	

Note:

The client operating system must be of the same language family as the associated server.

The following table lists the compatibility between the Contact Center Manager Administration language patches and the operating system language family. Only languages compatible with the operating system language family can be enabled on the Contact Center Manager Administration server.

OS language	FR	DE	ES	PT-BR	IT	Zh-CN	Zh-TW	JA	RU	KO
English	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Any 1 Latin language	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Simplified Chinese	No	No	No	No	No	Yes	No	No	No	No
Traditional Chinese	No	No	No	No	No	No	Yes	No	No	No
Japanese	No	No	No	No	No	No	No	Yes	No	No
Russian	No	No	No	No	No	No	No	No	Yes	No
Korean	No	No	No	No	No	No	No	No	No	Yes

For Contact Center Manager Administration (CCMA), only languages that are compatible with the local operating system of the CCMA server can be enabled. For example, you can enable the simplified Chinese language on a simplified Chinese OS, however you cannot enable German on a simplified Chinese OS.

The CCMA client operating system must be of the same language family as the associated server. For example, if CCMA is installed on a English language OS, if Spanish and English are enabled in the CCMA Language Settings utility, and if Spanish is the preferred language in Internet Explorer on the CCMA client computer, then CCMA appears in Spanish in the CCMA client browser.

Client Citrix support

Both Contact Center Manager Administration (CCMA) and Agent Desktop Displays (ADD) are supported in Citrix deployments. A Citrix server solution uses software to deliver on-demand Windows applications to physical desktops. This allows client users to access and use programs which are available on the Windows Server 2008 operating system of the Citrix server.

Users access Contact Center Manager Administration through a Citrix client on their client computer, connecting through an Internet Explorer browser that runs on the Citrix server. The browser is available to users through a Citrix client on their client computer. In a client Citrix deployment of CCMA, you must install ActiveX controls on the Citrix server. For more

information about manually installing ActiveX controls, see *Avaya Aura® Contact Center Commissioning* (NN44400-312).

On the CCMA server the Agent Desktop Displays folder is typically located in:

`D:\Avaya\Contact Center\Manager Administration\Apps\ADD` folder.

You must copy this folder onto the Citrix server and install the Agent Desktop Displays application on the Citrix server. You must then configure your Citrix server to publish ADD as a published application. On the Citrix server, select the users allowed to access the ADD published application.

For more information about Citrix application publishing, see your Citrix documentation. For more information on how to configure your Citrix server to publish ADD as a published application, or how to configure your Citrix server to allow users to access CCMA, see *Avaya Aura® Contact Center Installation* (NN44400-311).

Contact Center Manager Administration and Agent Desktop Displays are supported only with the following versions of Citrix server:

- Citrix Presentation Server 4.5
- Citrix XenApp 6.0
- Citrix XenApp 6.5

Avaya Aura® Contact Center supports only the Multicast option for Real-Time Displays (RTDs) in a Citrix environment. Avaya Aura® Contact Center does not support the Unicast option for Real-Time Displays (RTDs) in a Citrix environment.

Important:

No Avaya Aura® Contact Center client components, other than Avaya Aura® Agent Desktop, Contact Center Manager Administration, and Agent Desktop Displays, are supported in a Citrix deployment. This includes Orchestration Designer (OD), Outbound Campaign Management Tool (OCMT), and the CCMM Administration utility.

Third-party software requirements

This section describes the third-party software requirements for the administration client computer.

The following components are required on the administration client PC:

- Microsoft Internet Explorer 7.0 (32-bit version only), 8.0 (32-bit version only), and 9.0 (32-bit version only).
- Microsoft Excel 2000 Service Release 1a or later (for Configuration Tool only)

Contact Center Manager Administration supports only the 32-bit version of Microsoft Internet Explorer.

Chapter 23: Agent Desktop client configuration requirements

This section provides the configuration requirements for the Avaya Aura® Agent Desktop client computers. Avaya Aura® Agent Desktop is a single-interface client application used by contact center agents to interact with customers.

Agents download and install Avaya Aura® Agent Desktop client software from an Avaya Aura® Contact Center server:

- In a small to medium solution using a Voice and Multimedia Contact Server, agents download and install Avaya Aura® Agent Desktop software from the Voice and Multimedia Contact Server.
- In a large solution using a Multimedia Contact Server, agents download and install Avaya Aura® Agent Desktop software from the Multimedia Contact Server.
- In an Elite Complement solution, agents download and install Avaya Aura® Agent Desktop software from the Multimedia Complement for Elite server.
- In a No Switch Configured multimedia only solution, agents download and install Avaya Aura® Agent Desktop software from the No Switch Configured Voice and Multimedia Contact Server.

Avaya Aura Agent Desktop localized languages

Avaya Aura® Agent Desktop (AAAD) is supported in the following localized languages:

- English
- French
- German
- Italian
- LA Spanish
- Brazilian Portuguese
- Russian
- Simplified Chinese
- Traditional Chinese

- Japanese
- Korean

A single Avaya Aura® Contact Center solution, with the localization language patches installed, supports all of the AAAD localized languages. For example, a single English language Voice and Multimedia Contact Server supports the English, Chinese, French, Korean, and Russian language versions of AAAD client software.

To support the localized Avaya Aura® Agent Desktop client software:

1. On each AAAD client computer, configure the language locale setting.
2. Download the AAAD software from the Avaya Aura® Contact Center server to each client computer. The downloaded AAAD package includes all of the supported languages.
3. When the agent starts AAAD on the client computer, the client computer's language locale setting determines which language AAAD uses. For example, client computers with a Korean language locale setting, use the Korean language version of AAAD, regardless of the Avaya Aura® Contact Center server language.

Install the localization language patches to enable the supported AAAD localized languages. The Avaya Aura® Contact Center language patches contain all supported languages.

Avaya Aura® Contact Center supports AAAD client operating systems that use a different language family to the Contact Center server.

Client hardware requirements

Agent Desktop requires TCP/IP network access back to the Contact Center Multimedia, Contact Center Manager Administration, and Communication Control Toolkit servers— Avaya recommends 100 Mb/s connectivity.

The following table lists the hardware requirements for Agent Desktop.

Table 78: Avaya Aura® Agent Desktop client hardware requirements

Hardware item	Minimum requirements	Additional information
CPU	Intel-based CPU - Pentium III 733 MHz	Pentium IV, Intel Xeon (32- and 64-bit), Dual core Xeon and Intel Xeon DP are supported. Dual- and quad-CPU systems are supported with or without Hyperthreading enabled. AMD processors of the same or higher specification are also supported.

Hardware item	Minimum requirements	Additional information
		Unsupported processors include Intel Celeron, and Intel Itanium (IA 64) processors.
RAM	1 GB	2 GB minimum is required, if you run other memory intensive applications at the same time as Avaya Aura® Agent Desktop (AAAD).
Hard disk space	> 4 GB	—
Hard disk partitioning	No specific partitioning requirements	—
Hard disk type	IDE/SCSI Bus for hard drives	—
Hard disk speed	> 7200 RPM	—
Floppy drive	Not required	If a floppy drive is installed, it must be A.
DVD ROM	Not required	
Network interface	One network interface card	100 Mb/s Ethernet or higher is recommended.
Video card	Video card and monitor	1024 x 768 pixels minimum resolution
Keyboard	One keyboard	—
Mouse	One mouse	—
Serial ports	Not required	—

Client operating system requirements

The following table lists the operating system requirements for the Avaya Aura® Agent Desktop client computers.

Table 79: Avaya Aura® Agent Desktop client computer operating system requirements

Operating system	International versions supported	Minimum service pack
Windows XP Professional	English French German Italian LA Spanish	Service Pack 2 or later

Operating system	International versions supported	Minimum service pack
	Brazilian Portuguese Russian Simplified Chinese Traditional Chinese Japanese Korean	
Windows Vista Business	English	Service Pack 1 or later
Windows Vista Enterprise	English	Service Pack 1or later
Windows 7 (32-bit and 64-bit)	English	—

Agent Desktop client network infrastructure requirements

Avaya Aura® Agent Desktop (AAAD) is a client application which communicates with several Avaya Aura® Contact Center (AACC) servers. For optimal Agent Desktop operation, the underlying contact center network infrastructure must provide adequate latency and bandwidth between the agent computer and the Contact Center servers (including, if applicable, Instant Messaging/Presence provider servers).

This section provides a high-level overview of the data that is passed between Agent Desktop and the Contact Center servers. It also sets out the recommended network values and likely impacts on agents if these values are not met. This section also describes the performance of Agent Desktop in varying Round Trip Time (RTT) and bandwidth environments.

Important:

Avaya Aura® Agent Desktop performance degrades as network Round Trip Time increases and network bandwidth decreases.

Network Latency

Network latency is a measure of the time delay experienced in a system, measured in Round Trip Time (RTT). RTT is the average Round Trip (packet) Time as measured using the ping command for a 1024-byte (1KB) data size.

For optimal performance, Avaya recommends a RTT of less than 80ms from the Agent Desktop client computer to the following Contact Center servers:

- Communications Control Toolkit (CCT) server
- Contact Center Multimedia (CCMM) server
- Contact Center Management Server (CCMS)

The RTT from the Avaya Aura® Agent Desktop client PC to the CCT and CCMM servers must be less than 120ms. For network environments with an RTT greater than 120ms, refer to the

Citrix deployments of Agent Desktop in the next section. In Citrix deployments of Avaya Aura® Agent Desktop, the My Computer embedded softphone mode is not supported. In Citrix deployments, Avaya Aura® Agent Desktop must use a desk phone.

RTT impacts on Voice traffic

This section describes how the underlying RTT and latency of the network affects the experience of handling voice traffic in Avaya Aura® Agent Desktop.

Agent Desktop used with a physical desk phone

In Avaya Aura® Contact Center, the CCT server sends Computer Telephony Integration (CTI) signals to Agent Desktop, for example to prompt Agent Desktop to alert an incoming contact. These CTI signals are passed across the network as data. However, if the agent is using a physical desk phone connected to an Avaya CS 1000 or Avaya Aura® Unified Communications platform, voice packets are transported across a network using H.323 or SIP. Avaya CS 1000 deskphones that require custom data ports are isolated from the Ethernet network and these deskphones do not consume data bandwidth.

The following table details the time taken for the contact to alert on the AAAD, compared to the time taken for the same contact to ring on the agent's phone, where the phone is subject to a constant RTT of 1ms.

RTT (ms)	Delay between desk phone ring and call alert on Agent Desktop	Delay between clicking Accept button on Agent Desktop and active voice path
1ms LAN	<0.5 Seconds	<0.5 Seconds
50ms	0.5 Seconds	1.0 Seconds
120ms	1.0 Seconds	2.5 Seconds

Agent Desktop used in VoIP or Softphone configuration

Where Agent Desktop is deployed with an Avaya Aura® Unified Communications platform, it can be used as a soft phone to handle the voice media stream using Voice over IP (VoIP). To use Agent Desktop as an embedded softphone, select "My Computer" mode on Agent Desktop at logon time. In softphone mode, Agent Desktop telephony is controlled by Avaya Aura® Communication Manager (Avaya Aura® CM), so the network topology between Agent Desktop and CM must be provisioned as per standard Avaya Aura® voice provisioning.

Packet Loss impacts on VoIP quality

When using Agent Desktop with an embedded softphone in Local Area Network (LAN) or Wide Area Network (WAN) conditions, to maintain acceptable VoIP audio quality, Avaya recommends that packet loss (or jitter) is 0.5% or less.

The following tables show how Packet Loss impacts on VoIP quality and RTT between the Agent Desktop and the Communication Manager (CM) server.

Agent Desktop audio quality results at 5% jitter (E = Excellent; G = Good; F = Fair):

Packet Loss (%)	Network Latency (RTT)			
	0 ms	50 ms	100 ms	150 ms
0.0	E	E	E	E
0.5	E	E	E	E
1.0	E	E	E	E
1.5	G	G	G	G
2.0	G	G	G	G

Agent Desktop audio quality results at 10% jitter (E = Excellent; F = Fair; P = Poor):

Packet Loss (%)	Network Latency (RTT)			
	0 ms	50 ms	100 ms	150 ms
0.0	E	E	F	P
0.5	E	E	F	P
1.0	E	E	F	P
1.5	E	E	F	P
2.0	E	E	F	P

RTT impact on Multimedia Contacts

Contact Center Multimedia contacts are also affected by network latency. Agent Desktop downloads Customer contacts from the CCMM server and displays their contents as soon as they are fully retrieved.

The table below shows how varying RTTs affect multimedia contact display times – in this case, email contacts – on Agent Desktop. The “Customer Details/Customer History Display” column indicates how much time passes between the email being opened on the Agent Desktop and the additional context information being loaded and displayed. These sample times are for ideal laboratory conditions.

RTT (ms)	Email Display	Customer Details/Customer History Display
1ms LAN	2 Seconds	0 Seconds
50ms	3 Seconds	Additional 3 Seconds
100ms	4 Seconds	Additional 4 Seconds
120ms	4 Seconds	Additional 5 Seconds

This data was generated using a 20KB email message, a customer history containing 30 contacts of 20KB each, in a network where bandwidth is not limiting the data transfer. Email messages of different sizes generate different results.

Bandwidth

The network bandwidth available to Agent Desktop client computers for communication with Avaya Aura® Contact Center servers is critical to Agent Desktop performance. If voice traffic is carried on the same network, this traffic is often prioritized above other network traffic – this bandwidth is therefore not available to Agent Desktop. In many cases agents use other third party applications over the same network. The bandwidth requirements of these third party applications must be considered as part of the overall bandwidth calculations (in addition to bandwidth allocated for voice soft phones and for Agent Desktop).

Several factors affect the recommended bandwidth for Avaya Aura® Agent Desktop (AAAD). Depending on which Contact Center Multimedia (CCMM) features are in use on a given Customer deployment, not all factors apply. Indicative calculations to estimate the actual bandwidth usage are presented below for the various contact types and features. To calculate the required bandwidth, the relevant figures for the deployed features and supported contact types can be combined to derive an overall figure.

The network usage can be one of two types:

Constant traffic	These require dedicated, permanently available network use for the lifetime of the consumption. Examples of this type of traffic include; statistics display in AAAD, update of live Web chat contacts. Many factors influence constant traffic levels, for example the number of agents with a large number of assigned skillsets, the number of active supervisors running RTDs in unicast mode, and large numbers of skillsets in use (large data packet) even for multicast.
Bursty traffic	The display of multimedia contacts and multimedia contact history is bursty traffic. A significant amount of data is downloaded to the Agent Desktop over a number of seconds. The frequency of these download is driven by agent activity. These require high usage of the available network for short times to download bursts of data. The time window that this data takes to download depends on the available network bandwidth at that time. Since this is not constant network consumption, a Kilo bits per second value is not reflective of the bandwidth required and a Kilo bit value has been provided instead.

Bandwidth impacts on Voice

If the agents are using a physical desk phone for voice or any other application which utilizes network bandwidth, this needs to be factored into the engineering of the network to meet the expected performance levels on AAAD.

Where Agent Desktop is deployed with an Avaya Aura® Communication Manager, the Agent Desktop can be used as an embedded soft phone, handling the voice media stream as well. In softphone mode Agent Desktop communicates directly with Avaya Aura® Communication Manager, so the network topology between Agent Desktop and CM must be provisioned as per standard Aura voice provisioning.

Retrieve Customer History on voice contacts

The Agent Desktop Customer History feature enables agents to retrieve voice callers' multimedia Customer history, from the CCMM server, when a voice contact is accepted. Agent

Desktop Customer History is an optional feature which is enabled in the CCMM Administration tool. These historical contacts can be of any multimedia contact type. Agent Desktop Customer History requires adequate bandwidth to function and it must be included in your network bandwidth planning calculations.

To calculate the impact of a voice callers' multimedia Customer history on bandwidth, consider voice contacts as an additional Multimedia contact type and add the number of voice contacts to your multimedia calculation for bandwidth calculations.

Multimedia Contact bandwidth requirements

This section details the bandwidth requirement of Agent Desktop Customer History for the following multimedia contact types:

- Email messages
- Fax messages
- Scanned Documents (SD)
- SMS text messages
- Outbound contacts
- Web Communications (WCs)
- Instant Messages (IMs)

This section also details the bandwidth requirement for voice contact types if multimedia history display is enabled.

Some multimedia contact supports attachments and these attachments must also be included in network calculations:

- Email contacts are of variable size. The average email size is a reasonable estimate, and is used for Agent Desktop calculations.
- Fax messages are delivered as email attachments. Fax messages must be included in the attachment size and rate estimates.
- Outbound contacts from Avaya Aura® Contact Center solution do not have attachments.
- SMS test messages from customers. SMS test messages do not have attachments.
- Web chat messages do not have attachments.
- Instant Messages (IMs) from customers do not have attachments.

The Agent Desktop Customer History feature enables agents to retrieve multimedia Customer history (containing up to 30 previous contacts), from the CCMM server, when a multimedia contact is accepted. Agent Desktop Customer History requires adequate bandwidth to function and it must be included in your network bandwidth planning calculations. Retrieving Agent Desktop Customer history from the Contact Center Multimedia (CCMM) server uses the bursty type of network data, and where the Customer history feature is enabled, it must be included in all network bandwidth calculations.

Example of calculating the bandwidth requirements of Agent Desktop Customer history downloads (based on ideal laboratory conditions):

N = Number of agents working on multimedia (MM) contacts. If the feature to display multimedia history with voice calls is activated, then N must include voice agents.

C = Maximum number of multimedia contacts per hour for the entire contact center solution. If the feature to display multimedia history with voice calls is activated, then C must include voice traffic per hour to all those agents.

avg_contact_size = average size of a contact in Kbits (not Kbytes). (Kbits = KBytes * 8). In many cases this is the average size of the incoming or outgoing email.

att_rate_in = percentage of incoming contact attachments. Contact attachments apply to email messages and fax messages.

att_rate_out = percentage of incoming email messages that are responded to with agent attached attachments in the reply.

avg_att_size = average size of an attachment in Kbits . Contact attachments apply to email messages and fax messages.

Note:

In-line attachments must also be included in the bandwidth calculations as regular attachments.

A key factor in calculating the minimum bandwidth for processing multimedia contacts is an assessment of the number of active agents that accept contacts in any one second period. The available bandwidth is shared across all of these agents in this time period.

The long term average number of agents active in any one second is calculated as follows:

$n_{average}$ = Roundup(C / 3600)

This equates to the average number of agents clicking the Accept button on the Agent Desktop at any one time. However, since the length of time it takes an agent to handle a contact is random, the number of agents clicking the Accept button is random. It is incorrect to engineer a bandwidth solution based solely on this average, as nearly 50% of the time more than $n_{average}$ agents are clicking the Accept button.

Therefore the number of active agent per second is calculated with a factor F as follows:

n_{active} = Roundup(F* C / 3600)

where F is an engineering factor between 3 and 10. A higher value for F must be used when N, the total number of agents processing multimedia contacts and multimedia history with voice contact, is lower than 50. The choice of value F is your decision. F reflects the amount of extra bandwidth to build into your network to handle both the inherently random distribution of agent activity which results in natural peaks of use and any data spike events attributable to your particular Contact Center business models, such as initial shift start times, promotions and emergencies. A higher value reduces the level of bandwidth limitation caused by the overlapping of multiple agent download of multimedia contacts.

Once F is defined, the minimum bandwidth (in Kbits per second) can be estimated as follows:

$BWMM_{min}$ =

n_{active} * ((avg_contact_size * 64) + 2000) + avg_att_size * (att_rate_in% + att_rate_out%) / 100) Kbps

Important:

The minimum recommended bandwidth available for processing multimedia contacts $BWMM_{min}$ must be greater than 10 Mbits per second.

The time to download and display contacts on Agent Desktop is directly impacted by the bandwidth available between the CCMM server and Agent Desktop at the time when the contact is accepted in Agent Desktop. The impact of bandwidth limitation is observed as a delayed display of contact and contact history in the Agent Desktop.

The following table demonstrates the impact of limiting bandwidth on multimedia contact display times on Agent Desktop. The data was generated using a 20KB email message, a Customer history of 30 contacts of 20KB size each, with a fixed RTT of 80ms.

Available bandwidth	Email display	Customer Details/Customer History Display
1Mbps	3 Seconds	Additional 6 Seconds
3Mbp	3 Seconds	Additional 3 Seconds
5Mbps	3 Seconds	Additional 2 Seconds

Retrieve Customer History on Voice contacts

This optional feature enables Agent Desktop to retrieve voice callers' multimedia Customer history (containing up to 30 previous contacts), from the CCMM server, at the time a voice contact is accepted. These historical contacts can be of any multimedia contact type. If this feature is activated, the size of this history can be added to your network planning by considering voice as an additional multimedia contact type and adding the number of voice contacts to your multimedia calculation.

Instant Messaging (IM) and Web Communication (WC) network bandwidth calculation

Processing instant messages and web communications, after they have been received by the agent requires a constant level of bandwidth.

Network usage type: Constant

c = Number of IM/WC contacts per hour

avg_session_length = Average length in seconds of IM/WC session

Data size: 50 Kbps per active IM/WC contact

IM/WC network bandwidth requirement (Kbps):

IM/WC_{BW} = (c * 50Kbps * avg_session_length)/ 3600

Presence network bandwidth calculation

Presence updates require a constant level of bandwidth.

Network usage Type: Constant

N = Number of agents working on MM contacts

avg_pres = Average number of presence updates per user per hour

Data size: 7 Kb per Presence update

Presence network bandwidth requirement (in Kbps) = (N* 7Kb * avg_pres)/ 3600

CCMM Search network bandwidth calculation

Bandwidth must be provided for an agent carrying out multimedia searches.

Network usage Type: Bursty

N = Number of agents running searches

average_search = Average number of searches per hour

Data transmitted: 1280Kb per search

CCMM Search bandwidth requirement (in Kbps) = (1280Kb * average_search * N)/3600

CCMM Pull Mode network bandwidth calculation

Pull Mode allows agents to work outside the normal Avaya Aura® Contact Center routing mode. They personally select individual contacts from the Avaya Aura® Contact Center queues. Their view of the Avaya Aura® Contact Center queue is automatically updated using the same web services as the Avaya Aura® Contact Center CCMM search feature, and so uses the same bandwidth.

N = Number of agents working in Pull Mode

c = Number of contacts per hour per agent

Data transmitted: 1280Kb per search

CCMM Pull Mode search bandwidth requirement (in Kbps) = (1280Kb * c * N)/3600

Web Statistics network bandwidth calculation

Network usage Type: Bursty

N = Number of agents

avg_skills = Average number of skillsets per agent

Data transmitted: 3.2 Kb per skillset once a minute

Web Statistics bandwidth requirement: (3.2 Kb * avg_skills * N)/60

Agent Desktop downloads by agent

Agent Desktop is a smart client which is downloaded from the CCMM server over the network onto each agent computer on initial install. On each software update (service pack or patch) the updated Agent Desktop is re-downloaded onto each agent computer. The download size is approximately 90Mbytes. The download requirements of Agent Desktop must be considered when planning the bandwidth requirements to remote agents.

Summary of total bandwidth requirements

You must sum up all the applicable bandwidth demands listed above to arrive at a minimum bandwidth for the site. Calculate the cumulative bandwidth for all multimedia features.

Example One:

In this example contact center the Customer has 40 agents processing both voice and multimedia contacts.
The maximum multimedia traffic rate in any one hour is 380 multimedia contacts.
The maximum voice rate in any one hour is 200 voice contacts.
The customer has enabled the Customer history feature to display multimedia history when voice calls are received.

This customer is using IM, Presence and Web statistics. Agent are not using Pull Mode.

Example contact center data:

N_{max} = 40
c = 380 multimedia contacts + 200 voice contacts = 580 per hour.
c = 580.
avg_contact_size = 10KBytes = 80Kb

avg_att_size = 0KBytes

Calculation:

As N_{max} is less than 50, set F =10

The guidance on minimum bandwidth is therefore

n_{active} = 10 * 580 / 3600 = 1.61

$BWMM_{min}$ = n_{active} * ((avg_contact_size * 64) + 2000) + (avg_att_size * (att_rate_in%+ att_rate_out%)/100)

$BWMM_{min}$ = 1.61 * ((80 * 64) + 2000) + (0)

$BWMM_{min}$ = 11463.2Kbps

11463.2Kbps / 1024 = 11.192Mbps

This is greater than 10Mbps, so 11.192Mbps is the bandwidth for this feature.
If $BWMM_{min}$ was less than 10Mbps then set the feature bandwidth to 10Mbps.

Calculating Instant Messaging (IM) network bandwidth requirements:

c (Number of IM contacts per hour) = 200
avg_session_length (Average length in seconds of IM session) = 240
Data size: 50 Kbps per active IM contact

Network bandwidth requirement:
Bandwidth = (c * 50Kbps * avg_session_length)/ 3600

```
    Bandwidth = (200 * 50Kbps * 240)/ 3600
    Bandwidth = 666 Kbs = .67 Mbps
    Bandwidth = 0.67 Mbps


Calculating Presence network bandwidth requirements:

    N (Number of agents working on MM contacts) = 40
    avg_pres (Average number of presence updates per user per hour) = 4000
    Data size: 7 Kb per Presence update

    Network bandwidth requirement:
    Bandwidth = (N* 7Kb * avg_pres)/3600
    Bandwidth = (40* 7Kb * 4000)/ 3600
    Bandwidth = 311Kbps = .311 Mbps
    Bandwidth = 0.311 Mbps


CCMM Search network bandwidth requirements:

    N (Number of agents running searches) = 40
    avg_search (Average number of searches per hour) = 12
    Data transmitted: 1280Kb per search

    Network bandwidth requirement:
    Bandwidth = (1280 * avg_search * N)/ 3600
    Bandwidth = (1280 * 12 * 40)/ 3600
    Bandwidth = 170 kbps
    Bandwidth = 0.17 Mbps


Web Statistics network bandwidth requirement:

    N (Number of agents) = 40
    avg_skills (Average number of skillsets per agent) = 25
    Data transmitted: 3.2 Kb per skillset once a minute

    Network bandwidth requirement:
    Bandwidth = (3.2 Kb * avg_skills * N)/60
    Bandwidth = 53Kbps = .053Mbps
    Bandwidth = 0.053Mbps


Total multimedia minimum network bandwidth calculation:

To calculate the total minimum network bandwidth requirement for the example
customer site, add the bandwidth (BW) requirements for each multimedia feature used.

    Feature                      Bandwidth required
    Voice                  =     As per standard Avaya provisioning
    Multimedia             =     11.19
    IM                     =     00.67
    Presence               =     00.311
    CCMM Search            =     00.170
    Web Statistics         =     00.053

    Total                        12.4 Mbps + Voice BW + Third-party BW
```

The total minimum network bandwidth requirement for all the multimedia features on the example customer site is 12.4 Mbps.

Important:

If agents are using other applications that require network bandwidth, subtract the bandwidth these applications use from the overall bandwidth to give the available bandwidth for the Avaya Aura® Agent Desktop application.

Example Two:

In this example contact center the Customer has 100 agents processing multimedia contacts. The maximum multimedia traffic rate in any one hour is 2000 multimedia contacts.

This customer is using IM, Presence and Web statistics. Agents are not using Pull Mode.

Example contact center data:

N_{max} = 100
c = 2000 multimedia (MM) Contacts per hour.
avg_contact_size = 20KBytes = 160Kb
avg_att_size = 100KBytes = 800Kb
att_rate_in = 10%
att_rate_out = 10%

Calculation:

As N_{max} is greater than 50, set F =3

The guidance on minimum bandwidth is therefore:

n_{active} = Roundup(F* C / 3600)

n_{active} = 3 * 2000 / 3600 = 1.666

$BWMM_{min}$ = n_{active} * ((avg_contact_size * 64) + 2000) + (avg_att_size * (att_rate_in %+ att_rate_out%)/100)

$BWMM_{min}$ = 1.666 * ((160* 64) + 2000) + (800 * 0.2))

$BWMM_{min}$ = 20658.4Kbps

20658.4Kbps / 1024 = 20.17Mbps

This is greater than 10Mbps, so 20.17Mbps is the bandwidth for this feature.
If $BWMM_{min}$ was less than 10Mbps then set the feature bandwidth to 10Mbps at this stage.

Calculating Instant Messaging (IM) network bandwidth requirements:

c (Number of IM contacts per hour) = 500
avg_session_length (Average length in seconds of IM session) = 240
Data size: 50 Kbps per active IM contact

Network bandwidth requirement:
Bandwidth = (c * 50Kbps * avg_session_length)/ 3600
Bandwidth = (500 * 50Kbps * 240)/ 3600
Bandwidth = 1666.6 Kbs = 1.67 Mbps
Bandwidth = 1.67 Mbps

Calculating Presence network bandwidth requirements:

```
    N (Number of agents working on MM contacts) = 100
    avg_pres (Average number of presence updates per user per hour) = 6000
    Data size: 7 Kb per Presence update

    Network bandwidth requirement:
    Bandwidth = (N* 7Kb * avg_pres)/3600
    Bandwidth = (100* 7Kb * 6000)/ 3600
    Bandwidth = 1166.6Kbps = 1.17 Mbps
    Bandwidth = 1.17 Mbps
```

CCMM Search network bandwidth requirements:

```
    N (Number of agents running searches) = 100
    avg_search (Average number of searches per hour) = 12
    Data transmitted: 1280Kb per search

    Network bandwidth requirement:
    Bandwidth = (1280 * avg_search * N)/ 3600
    Bandwidth = (1280 * 12 * 100)/ 3600
    Bandwidth = 426.6 Kbps
    Bandwidth = 0.427 Mbps
```

Web Statistics network bandwidth requirement:

```
    N (Number of agents) = 100
    avg_skills (Average number of skillsets per agent) = 50
    Data transmitted: 3.2 Kb per skillset once a minute

    Network bandwidth requirement:
    Bandwidth = (3.2 Kb * 50 * 100)/60
    Bandwidth = 266Kbps = .266Mbps
    Bandwidth = 0.266Mbps
```

Total multimedia minimum network bandwidth calculation:

To calculate the total minimum network bandwidth requirement for the example customer site, add the bandwidth (BW) requirements for each multimedia feature used.

Feature		Bandwidth required
Voice	=	As per standard Avaya provisioning
Multimedia	=	20.17
IM	=	01.67
Presence	=	01.17
CCMM Search	=	00.427
Web Statistics	=	00.266
Total	=	23.703 Mbps + Voice BW + Third-party BW

Reference material:

Kb = kilobit

KB = kilobyte

Kbps = kilobit per second

Mb = megabit

Mbps = megabit per second

1Mb = 1024 Kb (and 1MB = 1024 KB)

Client Citrix support

Avaya Aura® Agent Desktop (AAAD) is supported as a Citrix-published application. A Citrix server solution uses software to deliver on-demand Windows applications to physical desktops. This allows client users (agents in this case) to access and use programs which are available on the Windows Server 2008 operating system of the Citrix server.

On the Contact Center Multimedia (CCMM) server the Avaya Aura® Agent Desktop folder is typically located in:

`D:\Avaya\Contact Center\Multimedia Server\Agent Desktop\client` folder.

This folder contains the entire AAAD application. You can copy this folder onto any client computer and run AAAD by clicking AAAD.exe. Copy this folder on the CCMM server to the Citrix server. Then configure your Citrix server to publish AAAD as a published application, accessed from this AAAD folder on the Citrix server. On the Citrix server select the users (agents) allowed to execute the AAAD published application. For more information about Citrix application publishing, see your Citrix documentation. For more information on how to configure your Citrix server to publish AAAD as a published application, see *Avaya Aura® Contact Center Installation* (NN44400-311).

The Citrix server publishing Avaya Aura® Agent Desktop must be located in the same Local Area Network (LAN) as the Contact Center Multimedia server.

Avaya Aura® Agent Desktop is supported only with the following versions of Citrix server:

- Citrix Presentation Server 4.5
- Citrix XenApp 6.0
- Citrix XenApp 6.5

In Citrix deployments of Avaya Aura® Agent Desktop, you must use a desk phone. The My Computer embedded softphone mode is not supported.

Avaya Aura® Contact Center supports only the Multicast option for Real-Time Displays (RTDs) in a Citrix environment. Avaya Aura® Contact Center does not support the Unicast option for Real-Time Displays (RTDs) in a Citrix environment.

Agent Desktop thick client deployment

If you do not want to use the click-once features of Avaya Aura® Agent Desktop, it is possible to deploy it as a thick client. This differs from the click-once deployment method of installing and starting AAAD by entering a URL address in a Web browser. The AAAD thick client deployment requires you to manually copy the contents of the `Avaya\Contact Center \Multimedia Server\Agent Desktop\client` folder from your Avaya Aura® Contact Center server to each client computer. Launch AAAD using the CCAD.exe file located in the `Avaya\Contact Center\Multimedia Server\Agent Desktop\client` folder.

The required folder is located on the Contact Center server that Contact Center Multimedia is installed on.

If you deploy AAAD as a thick client, you must consider the administrative tasks required due to the limitations of this type of deployment.

- You must manually install all required prerequisites on each client computer. Install the AAAD prerequisites using the setup.exe file located in the `Avaya\Contact Center \Multimedia Server\Agent Desktop\` folder.
- All Contact Center client computers must contain the `Avaya\Contact Center \Multimedia Server\Agent Desktop\client` folder. Use, for example, a Systems Management Server (SMS) to allow client computers to access this folder.
- All agents must launch AAAD using the CCAD.exe file located in the local copy of the `Avaya\Contact Center\Multimedia Server\Agent Desktop\client` folder. Agents must not launch AAAD from within a Web browser or from a shortcut on the client computer, as this initiates a click-once install from the Contact Center server.
- If you make configuration changes to the CCADAppSettings.xml file, client computers must use the latest version of this file. For example, in High Availability solutions, you must launch AAAD using the Managed name or IP address of Contact Center Multimedia. This requires editing the CCADAppSettings.xml file. All client computers must have the latest version of the CCADAppSettings.xml file after configuration changes are made.
- After an Avaya Aura® Contact Center service pack upgrade or patch application., all agents must have access to the updated version of the `Avaya\Contact Center \Multimedia Server\Agent Desktop\client` folder. For example, following the application of a service pack, you must once again manually copy the folder from your Contact Center server to each client computer.

Third-party software requirements

This section describes the third-party software requirements for the Avaya Aura® Agent Desktop client computers.

If you are using the Avaya Device Media Call Control (DMCC) Call Recorder in beep tone mode, a simple call is displayed as a conference call on the agent phone, whereas Agent Desktop and Contact Center Real Time Reporting report the call as a simple two party call.

Important:

Avaya Aura® Agent Desktop (AAAD) is not supported when installed co-resident with Microsoft Office Communicator client software.

Important:

If your contact center uses an Avaya Aura® Communication Manager, Avaya Aura® Agent Desktop client computers do not support the following applications running concurrently with Avaya Aura® Agent Desktop:

- Avaya one-X® Communicator
- IP Agent
- IP Softphone
- Any other non-Avaya softphone applications
- Avaya one-X® Agent. In a Multimedia-only Contact Center deployment, where the Contact Center agents are configured for Multimedia contact types only, running Avaya Aura® Agent Desktop concurrently with Avaya one-X® Agent on a client computer is supported.

Agent Desktop uses the .NET Framework v3.5, the Windows Installer 3.1 Redistributable, the Microsoft Visual C++ 2005 SP1 Runtime Libraries (x86), and the Microsoft Visual C++ 2008 Runtime Libraries (x86). After you install these components, further client deployments are through Microsoft Internet Explorer URL or SMS deployment.

Avaya Aura® Agent Desktop headset support

Where Agent Desktop is deployed with an Avaya Aura® Communication Manager, you can use Agent Desktop in embedded soft phone mode. While using Agent Desktop in embedded soft phone mode, you can perform telephony operations (for example, call answer or hold) using buttons on certain third-party headsets. If you want to use third-party headsets to perform telephony operations, you must install the required third-party software on the client computer and you must register the headset interface dll. Avaya Aura® Contact Center Release 6.3 includes an .msi file that performs this automatic registration. This .msi file, AAADHeadsetSupport.msi, is available at http://support.avaya.com.

For more information on registering third-party headsets, see *Avaya Aura® Contact Center Installation*.

Agent Desktop network port requirements

Avaya Aura® Agent Desktop uses the following network ports to communicate with the other Contact Center applications and servers.

Feature	Server	Port number
HTTP (Web services)	CCMM	80
CCT	CCT	29373
Web Reporting P2P IMs	CCMS	7080
Voice History	CCMS	57772
Aura Presence	Aura Presence Server	5222 (fixed, jabber protocol)
Web Statistics	CCMS	9086
CC Offsite Agent	CC Offsite Agent	8080 (fixed, web service)
CC Offsite Agent	CC Offsite Agent	20000 (fixed, service call)
Spark – embedded phone	Communication Manager	6225 – 65535 range
Spark – embedded phone	Communication Manager	1719 (for RAS registration)
Spark – embedded phone	Communication Manager	1720 (for signaling)
MS Office Communicator	MS Office Communicator server	5060 and 5061 (fixed, TCP and TLS)
SER	Predictive server	40000

Chapter 24: Contact center email server configuration requirements

You can use Contact Center Manager Administration to configure mailboxes, general settings, and rules that are required and optional for routing email messages.

This section provides an overview of the email server requirements, including the use of aliases. Contact Center Multimedia pulls email from any POP3/SMTP compatible email server. It polls the mailboxes at a specified interval.

Warning:

You must install and actively manage a spam filter to remove spam messages from all contact center mailboxes. Unsolicited bulk spam messages to your Contact Center, if not filtered out, may impact performance or may cause damage to your contact center solution.

Receiving email messages originating from a Web page

If your Web site generates email messages destined for a Contact Center Multimedia monitored mailbox, you must ensure that the FROM address of the generated email messages is set to the email address of the Web user. Do not generate email messages with a generic From address such as webmaster@company.com as this may lead to database instability due to the high volume of email messages from a single email address.

Hosted email Providers

Contact Center Multimedia supports hosted email providers that permit a POP3 & SMTP connection. Contact Center Multimedia supports hosted email providers that require SSL access. Contact Center Multimedia does not support email providers that require TLS access.

Spam Handling

Short Pointless Annoying Messages (SPAM) are unsolicited, indiscriminate , or junk email messages. You must install and actively manage a spam filter to remove spam messages from all contact center mailboxes. Unsolicited spam messages to your Contact Center, if not filtered out, may impact performance or may cause damage to your contact center solution. Do not use Contact Center Multimedia as a spam filtering tool.

Email server requirements

Contact Center Multimedia uses the POP3/SMTP protocols to retrieve and send email. You must enable these protocols on your mail server. Contact Center Multimedia can support

SMTP Authentication, POP3/SMTP over SSL, and the use of nonstandard ports for these protocols. For more information, see *Avaya Aura® Contact Center Installation* (NN44400-311).

Email settings

Use the E-mail General Settings window to configure the following settings:

- The Mailbox Scan Interval is the interval between the scans made to the email server to check for new email messages. The default value is 60 seconds.
  - Configure the specific intervals in the Contact Center Multimedia Administrator application.
- The Attachment Files are the locations on the Contact Center Multimedia server where the attachments to email messages are stored. A URL is provided for agents to access the folder on the Web server. These values are provided by default.

  To change these folder names, you must ensure that the new folder exists on the file system with the correct path to the folders, the folder is shared, a parallel IIS virtual folder is created, and that all of the permissions are correct. No verification is performed in the Contact Center Multimedia Administrator application to ensure that the new values are correct, so the values need to checked carefully. The default values for the folder, where <Server name> is the name of the Contact Center Multimedia server, are:
  - Inbound URL: `http://<Server name>/inboundattachment`
  - Inbound Share: `<Database Installation Drive>:\AVAYA\CONTACT CENTER\EMAIL ATTACHMENTS\INBOUND`
  - Outbound URL: `http://<Server name>/outboundattachment`
  - Outbound Share: `<Database Installation Drive>:\AVAYA\CONTACT CENTER\EMAIL ATTACHMENTS\INBOUND`

Caution:

Risk of backup failure

Use the default attachment locations defined during installation. If required, you can choose a different location for the inbound and outbound shared email folders. If you choose a different location, you must ensure that you perform the following activities:

1) Create the inbound email attachment folder with the path `Email Attachments/Inbound`.

2) Create the Outbound folder with the path `Email Attachments/Outbound`.

3) Share the inbound and outbound folders with IUSR_<Servername>.

4) Configure the folders in the email attachment locations in the Contact Center Multimedia Administrator application.

- The AutoNumber Outgoing E-mail is the customer identification number and can optionally be included in the message subject of all email messages.
- The Include E-mail Body in Keyword Search specifies that the keyword search for rules is applied to both the subject and the body of the email message. You can also select the number of characters in the email message to search.

Aliases

An alias is an alternative name for a mailbox. Sending an email to either an alias or the mailbox itself has the same result; that is, the email is stored in the same place.

For example, if you have a mailbox named `sales@avaya.com`. This mailbox has two aliases —`contactcentersales@avaya.com` and `mcssales@avaya.com`. If you send an email to either one of these addresses (`sales@avaya.com`, `contactcentersales@avaya.com`, `mcssales@avaya.com`), the email is sent to the same destination, which is `sales@avaya.com`.

Using an alias

Aliases are useful for email filtering. For example, if an alias address is defined for only a short promotion period, you can discard any email messages that arrive at that alias after the promotional time has passed.

Impact of an alias addresses on Contact Center Multimedia

Alias addresses are a useful pre-routing tool for email. Given the example in the previous section, you can configure three email routing rules. Email messages arriving with an address `contactcentersales@avaya.com` can be routed to the skillset EM_ContactCenterSales. Email messages arriving with the address `mcssales@avaya.com` can be routed to the skillset EM_MCSSales. If an email message arrives at the address `sales@avaya.com`, you may not be sure of its content (at least without further keyword searching); therefore, route it to a general skillset such as EM_DefaultSales.

Contact Center Multimedia and alias configuration

As an alias is only an alternative name for a mailbox, it is not polled. Therefore, Contact Center Multimedia must be aware of all possible aliases to ensure powerful routing. Define an alias in the same way as a physical mailbox. The only difference is you select Alias rather than Mail Store when configuring the mailbox. This informs Contact Center Multimedia that this is an alias address and there is no physical mailbox to poll. The email itself is retrieved from the physical mailbox with which the alias is associated. When you define all the possible aliases (as well as the physical mailboxes) in this list, the aliases become available to the Rules Wizard to selectively apply keyword searching, including address matching and other criteria to make routing decisions.

For more information about defining an alias, see *Avaya Aura® Contact Center Server Administration* (NN44400-610).

Outgoing email

Configure outgoing email mailbox settings to identify who responds to the customer's email message.

The response can contain the email address to which the customer sent the original email message, or a general corporate email address that is configured for each skillset.

Agent-initiated messages are always sent from an email address associated with a skillset.

After you define the rules for email routing, all email are routed to a skillset. To determine the mailbox that is set as the originator, map the skillset to a mailbox. For detailed information, see *Avaya Aura® Contact Center Commissioning* (NN44400-312).

Mailbox requirements

Contact Center Multimedia logs onto nominated mailboxes on your mail server and retrieves email at defined intervals. Email is then routed to agents. To route an email, Contact Center Multimedia requires the mailbox name and password. In addition, Contact Center Multimedia requires the possible alias names used for a mailbox to ensure correct routing of email.

Chapter 25: Avaya Aura® Presence Services requirements

This section describes the requirements for integrating Avaya Aura® Presence Services to provide instant messaging services to support the Instant Message contact type.

Avaya Aura® Presence Services overview

Avaya Aura® Contact Center Release 6.3 allows customers to use Avaya Aura® Presence Services to provide instant messaging services to support the Instant Message contact type. Customers also have the option of using Microsoft OCS 2007 for the same purpose.

Customers integrating their multimedia Contact Center with Avaya Aura® Presence Services get the additional benefit of providing rich presence information to their agents using Agent Desktop.

Integration with Avaya Aura® Presence Services enables Agent Desktop to display presence information for agents and supervisors. This increases an agent's success in finding an available expert or supervisor when they need to consult a colleague about an IM contact.

Integration with Avaya Aura® Presence Services is available only in a SIP-enabled contact center based on the Avaya Aura® Release 6.1 or 6.2 platforms.

Important:

The Avaya Aura® Presence Services IM Proxy Server - XMPP Domain name must be different from the Avaya Aura® Contact Center Local SIP Subscriber - Domain Name entry.

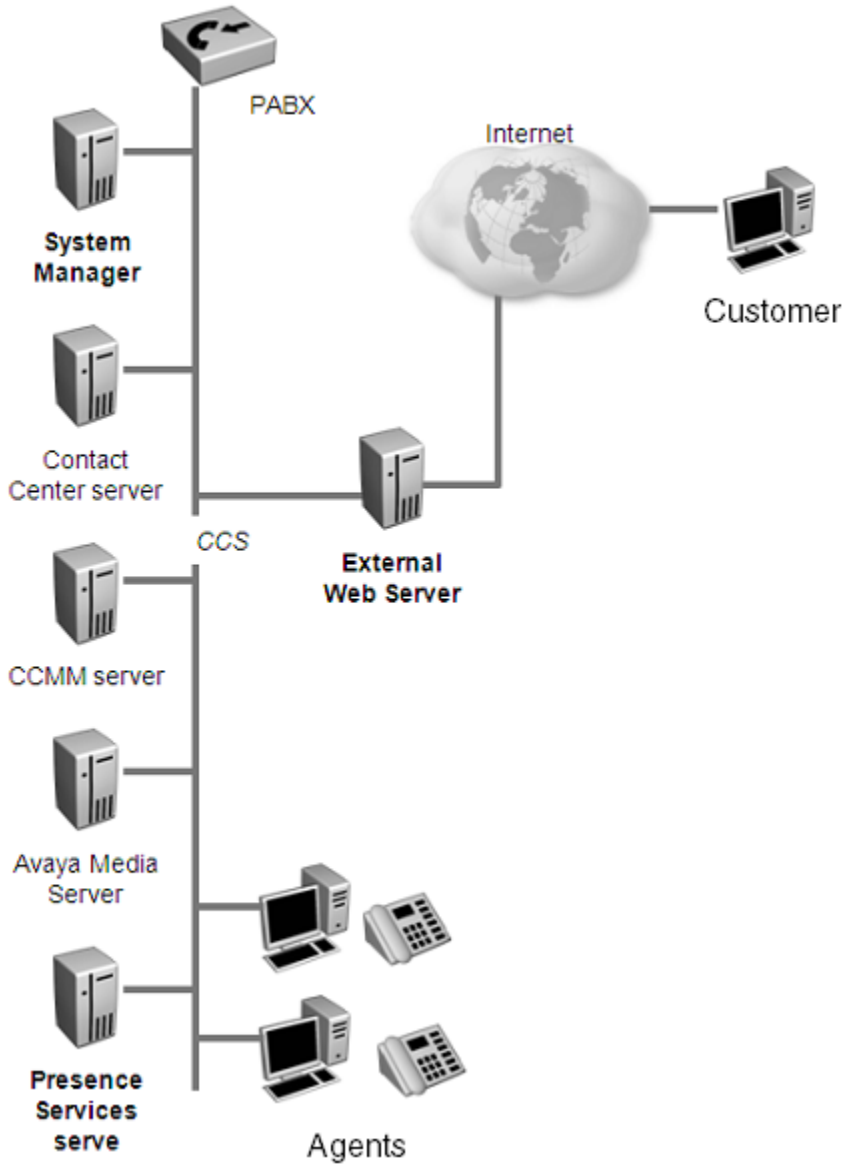


Figure 22: Avaya Aura® Presence Services server deployment

Avaya Aura® Presence Services requires a dedicated server and cannot co-reside with Avaya Aura® Contact Center or Avaya Media Server. Avaya provides extensions to the Extensible Messaging and Presence Protocol (XMPP) to allow customers to develop applications to establish IM chat sessions with Contact Center, and disconnect them.

To integrate Avaya Aura® Presence Services server with Contact Center, you must develop an application that allows customers to send Instant Messages to the contact center.

To assist with understanding this development, Avaya supplies a sample Instant Messaging chat server component that you can install on your external Web server. The Instant Messaging

chat server allows customers to start Instant Messaging chat sessions with the contact center.

For full details of the interface specifications, browse www.avaya.com/devconnect.

To integrate with Contact Center, Avaya Aura® Presence Services requires the following:

- A Contact Center Multimedia server installed and commissioned, with the IM contact type licensed.
- An Avaya Aura® Presence Services server.

  For information on installing the Avaya Aura® Presence Services server, see documentation on implementing Avaya Aura® releases 6.1 or 6.2.
- Avaya Aura® System Manager, which provides centralized management of all Avaya Aura® components including Avaya Aura® Presence Services.

  You create routepoints and agent user accounts in System Manager for each routepoint and agent that is configured for Instant Messaging in CCMA, see documentation on installing and upgrading Avaya Aura® System Manager.

Hardware requirements

Apart from the server requirements for both Avaya Aura® Presence Services and Avaya Aura® System Manager, Contact Center has no additional hardware requirements outside those normally needed for a multimedia contact center with the IM contact type enabled.

For 3000 Multimedia agents (the contact center maximum), the contact center requires a single Avaya Aura® Presence Services server.

Operating system requirements

Avaya Aura® Presence Services requires the Linux operating system. See documentation on implementing Avaya Aura® releases 6.1 or 6.2.

For integrating Avaya Aura® Presence Services, Contact Center has no additional operating system requirements outside those normally needed for a multimedia contact center with the IM contact type enabled.

Avaya Aura® Presence Services port requirements

The following table shows the port numbers required for Avaya Aura® Presence Services.

Table 80: Presence Services server port usage

Port	Type	Permit in TCP Filter	Description
5222	XMPP	Yes	Presence Services uses this port to communicate with all XMPP endpoints, including the Contact Center servers, customer-facing servers, and agent desktops.

Licensing requirements

For integrating Avaya Aura® Presence Services, Contact Center has no additional licensing requirements outside those normally needed for a multimedia contact center with the IM contact type enabled.

High Availability

The Avaya Aura® Presence Services Release 6.1 product does not have a High Availability feature.

The Avaya Aura® Presence Services integration does not support Contact Center High Availability. During a Contact Center switchover, in-progress IM contacts are interrupted.

Chapter 26: Performance optimization

This section provides information about performance optimization.

Contact Center Manager Server services performance impact

Contact Center Manager Server services Meridian Link Services (MLS) and Host Data Exchange impact performance. This section describes the performance of these two services, for which many contact centers require detailed information.

Host Data Exchange

The host data exchange (HDX) server enables the values of script variables to be sent to or received from a third-party provider application.

The following conditions apply:

- Third-party provider applications reside on a third-party host computer, and, therefore, are often referred to as host applications.
- Avaya provides a provider application that can co-reside with Contact Center Manager Server. The Database Integration Wizard (DIW) provides an easy-to-use tool for configuring and customizing the Avaya provider application. (Using the Database Integration Wizard can result in additional contact center subnet traffic.) For more information, see the *Avaya Aura® Contact Center Server Administration* (NN44400-610).

For example, a script can

- obtain a credit card number from a caller using IVR
- query the provider application using the HDX API to determine the account balance of the caller
- use the account balance as a variable in the script

An API known as the service provider API enables a Contact Center Manager user to write custom applications (provider applications) that register with the HDX server to handle back-end processing for the script elements.

Two service elements can be invoked in the script:

- Send Info
- Send Request/Get Response

The Send Info command sends data to the provider application or the HDX server. The Send Request/Get Response command sends information to and receives information from the provider application. The Send Request/Get Response operation uses approximately twice as much CPU resources as the Send Info operation.

On the Call Complexity input page, enter the average number of Send Info and Send Request/Get Response commands issued for each call.

This is the average value taken over all incoming calls.

Example

Suppose that the call rate is 20 000 CPH during the peak hour. If 40 percent of incoming calls are treated with the HDX service, and of these calls

- 20 percent use one Send Info command
- 20 percent use two Send Info commands
- 30 percent use one Send Info and one Send Request/Get Response command
- 30 percent use one Send Request/Get Response command

The average number of Send Info commands issued per incoming call is

0.4 x (0.2 + 0.2 x 2 + 0.3) = 0.36

The average number of Send Request/Get Response commands issued per incoming call is

0.4 x 0.3 x 2 = 0.24

Enter these values into the appropriate boxes on the Call Complexity property sheet.

Cautions

If the provider application runs on a slow platform, or if it runs on the same platform as other CPU-intensive applications, the provider application may not be able to handle the Send Request commands quickly enough. As a result, a high volume of messages may become queued in the HDX server. If the queue reaches its size limit, the HDX server terminates the provider session. When this situation occurs, the provider application receives a DXM_SERVER_SHUTDOWN message from the API.

A DXM_SERVER_SHUTDOWN message means either of the following:

- The session is terminated because the provider application is too slow to respond.
- Communication is down because the HDX server is terminated.

If the provider application is too slow, either reduce the incoming Contact Center Manager Server call rate or run the provider application alone on a faster computer.

Guidelines to minimize capacity requirements

The engineering models used to calculate the capacity requirements of your contact center assume that you follow certain guidelines to minimize the load on your server. These guidelines apply to both stand-alone and co-resident servers.

Steady state operation

Steady state refers to an operational state in which average values of the capacity parameters do not change with time. For example, CPU usage can vary widely; however, if you examine the average values of CPU usage measured at consecutive intervals of 20 minutes, during a period of steady state operation, these average values are approximately the same.

Guidelines for steady state operation

To ensure trouble-free operation of the server, adhere to the following guidelines for steady state operation:

- Processor CPU—Average CPU usage for any interval of 20 minutes during the peak hour under steady state operation must not exceed 50 percent.
- Server RAM memory—Average pages per second (found in the Memory Object of the Performance Monitor) for any interval of 20 minutes during the peak hour under steady state operation must not exceed five.
- Server virtual memory—Committed Bytes (found in the Memory Object of the Performance Monitor) must not exceed 90 percent of the Commit Limit (also found in the Memory Object of the Performance Monitor).
- Physical and virtual memory—The Microsoft recommendations for physical RAM and virtual memory sizing must be adhered to for optimal performance.

Guidelines for non-steady state operation

A number of non-steady state processes can impact the steady state call processing activity of the server. To minimize their impact, Avaya recommends a number of restrictions:

- All non-steady state processes
    - Run only one non-steady state process at any given time.

- Do not run other applications between 12:00 midnight and 12:30 a.m. During this time, the Historical Data Manager (HDM) service performs data consolidation for monthly, weekly, and daily data. CPU usage for this activity is high.

• Activation of the Master script

- Do not activate the Master script during a busy period.
- If you must activate the Master script during a busy period, activate all primary and secondary scripts first.

Important:

If the server is not processing calls, you can activate the Master script without first activating the primary and secondary scripts.

• Validation of large scripts

- Do not validate the Master script or any large script during a busy period.

• Agent-to-supervisor assignments

- Do not run multiple agent-to-supervisor assignments concurrently.

• Agent-to-skillset assignments

- Do not run multiple agent-to-skillset assignments concurrently.

• Generation of large reports

- Generate large reports one after the other rather than concurrently.

• Extraction of large amounts of data from the database

- Generate large data extractions one after the other rather than concurrently.

• Mass logon and logoff of agents

- Spread agent logon/logoff activity over a period of 5 to 15 minutes, and do not perform this activity during the peak busy hour.

• Database backup

- Perform online (for example, database) backups during off-peak hours.

• Checking files for viruses

- Perform this activity during off-peak hours.

Contact Center Manager Administration performance

This section describes performance impacts to Contact Center Manager Administration server.

Contact Center Manager Administration contact center server network impact

The network impact from Contact Center Manager Administration on the contact center LAN or WAN can be divided into two parts:

- RSM multicast data sent from Contact Center Manager Server to Contact Center Manager Administration.

  Important:

  RSM compression is a new option that can now be configured on the Contact Center Manager Server. However, Contact Center Manager Administration does not support RSM compression. If the compression is configured, Contact Center Manager Administration real-time displays do not work.

- Consolidated Real-Time Display (CRTD) data

  Contact Center Manager Administration consolidates multicast traffic into a single stream, and sends it to the client PCs in either multicast or unicast format.

  Important:

  Because the unicast option has a significant impact on network bandwidth requirements and CPU usage, Avaya recommends that you use multicast mode of network communication where possible.

In a network Contact Center Manager Server environment, Contact Center Manager Administration can consolidate traffic from multiple contact center servers. The RSM multicast data streams can originate at local and remote sites, and may be directed to both local clients and remote clients. In this environment, the consolidated display data is known as Network Consolidated Real-Time Display (NCRTD) data.

NCRTD multicast characterization

The inputs required to characterize the NCRTD multicast traffic are:

- send rates (time intervals in seconds) for each of the following statistics:
  - Agent
  - Application
  - Skillset
  - Nodal
  - IVR
  - Route
- the number configured for the following parameters:
  - Active agents

- Applications
- Skillsets
- IVR queues
- Routes

Important:

Number of nodes is always equal to 1.

- the number of data streams sent for each of the listed statistics. This value is 0, 1, or 2 for each type of statistic. The two types of data streams are Moving Window and Interval-to-date.

NCRTD unicast characterization

The inputs required to characterize unicast traffic are the same as those for multicast traffic, with the following additional input: number of unicast connections for each type of statistic (Agent, Application, Skillset, Nodal, IVR, and Route). A separate unicast data stream is required for each unique unicast display on each client. The number of possible unique displays for each client is 12— six for Moving Window statistics and six for Interval-to-date statistics. If more than one identical display for a particular statistic type is required on a given client, then only one unicast stream is sent for both.

For example, if two Agent/Moving Window displays are opened by the same client, only one Agent/Moving Window data stream is sent. However, if another client PC opens an Agent/Moving Window data stream, a new unicast stream is sent from the server. Two identical streams are open at this point.

Contact Center Manager Administration client performance

The following section describes performance impacts to Contact Center Manager Administration client.

Contact Center Manager Client CPU impact

The real-time displays have the largest impact on CPU performance on Contact Center Manager Client. The input parameters used to calculate Contact Center Manager Client CPU requirements are:

- the refresh rate (assumed identical for each display)
- the number of lines displayed (overall displays, including fixed header rows)

Contact Center Manager Administration CPU load reduction

There are several ways to reduce CPU load on the Contact Center Manager Administration server and client.

Contact Center Manager Administration server

To minimize CPU load, make the following adjustments in Contact Center Manager Administration:

- Reduce real-time display refresh rates.
- Stagger scheduled historical reports so that they are not scheduled to run at the same time.
- Schedule large reports to run at off-peak hours.
- Schedule antivirus scanning to occur at off-peak hours.
- Perform backup and restore procedures at off-peak hours.
- Schedule skillset assignments to run at different times, and not all at the same time. For example, for skillset assignments needed by 09:00, schedule the assignments to run between 08:50 and 09:00 at 2-minute intervals.

Contact Center Manager Administration client

To minimize CPU load, make the following adjustments in Contact Center Manager Administration client:

- Reduce real-time display refresh rates.
- Configure the client to display less data by using data partitioning and filtering.

If the parameters are exceeded, you can use more than one Contact Center Manager Administration, and you can split Contact Center Manager Administration users across the multiple Contact Center Manager Administration servers.

Contact Center Multimedia customer contact ratio

The customer to contact ratio in Contact Center Multimedia (CCMM) must not exceed a ratio of 1:100 (or 1 customer record per 100 contacts). To avoid exceeding the ratio, whenever

possible, each contact must generate a new customer record. Email manager creates a new customer record automatically when a unique from address is found. The ratio allows sufficient scope for multiple threads of conversation with a single customer (where agent and customer exchange a number of email messages).

Contacts in CCMM are generated from a variety of sources:

- standard email messages
- Web chat
- external Web sites using the Customer Interfaces Web services
- document imaging servers
- SMS/Fax gateways that generate email traffic

When a contact is generated in CCMM, a customer record is created to capture details of the sender and capture the details of the service request. You must ensure that each new sender is unique where possible to ensure correct threading of contacts and efficient system operation.

It is critical that you do not define a single sender (e.g. fax mailbox) for all contacts. This leads to an unsustainable ratio of customers to contacts in the CCMM database. The SMS/Fax gateway or other sending application must use the From address of each email message placed in the mailbox so that it identifies the originator of the email message, rather than an address that represents the gateway machine.

Example: An SMS or Fax from +353875555555@sms.company.com instead of gateway@sms.company.com must be recorded under +353875555555@sms.company.com to reduce the customer to contact ratio. Reducing the customer to contact ratio ensures logical threading of customer messages at the agent desktop as well as efficient system operation.

This consideration applies to all types of contacts: Web chat / callback requests must also create unique customer records rather than converging all requests on a single customer record.

Contact Center Multimedia bandwidth recommendations

Avaya recommends that the average contact center subnet usage not exceed 30 percent of the total bandwidth. This includes all the traffic (even customer traffic).

The email servers can be remote, but, if they are, the latency and bandwidth of the connection to these servers result in slower throughput of the overall system.

Communication Control Toolkit guidelines to minimize capacity requirements

The engineering models used to calculate the capacity requirements of your contact center assume that you follow certain guidelines to minimize the load on your server.

Steady state operation

Steady state refers to an operational state in which average values of the capacity parameters do not change with time. For example, CPU usage may vary widely at different consecutive time intervals; however, if you examine the average values of CPU usage taken over consecutive 20-minute intervals, during a period of steady state operation, these average values are approximately the same.

Guidelines for steady state operation

To ensure trouble-free operation of the server, adhere to the following guidelines for steady state operation:

- Processor CPU—Average CPU usage over an interval of 20 minutes during the peak hour under steady state operation must not exceed 70 percent.
- Server RAM memory—Average pages per second (found in the Memory Object of the Performance Monitor) over an interval of 20 minutes during the peak hour under steady state operation must not exceed 5.
- Server virtual memory—Committed Bytes (found in the Memory Object of the Performance Monitor) must not exceed 90 percent of the Commit Limit (also found in the Memory Object of the Performance Monitor).
- Physical and virtual memory—For optimal performance, you must adhere to the Microsoft recommendations for physical RAM and virtual memory sizing.

Guidelines for non-steady state operations

Non-steady state processes can impact the steady state call processing activity of the server. To minimize their impact, Avaya recommends a number of restrictions:

- Database backup

Perform database backups during off-peak hours.

- Checking files for viruses

  Perform this activity during off-peak hours.

Network Traffic

Communication Control Toolkit uses remote method calls between the client PC and the Communication Control Toolkit server. Avaya recommends that you design and develop the applications to minimize the number of remote calls and, therefore, reduce the demands on the underlying network and increase the application responsiveness.

The following network traffic measurements were taken using the Full API Reference Client and logging on to the Communication Control Toolkit server as a user with a single AgentTerminal assigned (representing the normal deployment of a Communication Control Toolkit application).

The following table provides a measurement of the network traffic generated by various call scenarios using the Full API Reference Client. These network traffic statistics provide a representation of what load the Communication Control Toolkit imposes on the network.

Table 81: Network traffic statistics

Scenario	Rx by server (bytes)	Tx by server (bytes)	Total (bytes)
Connect to the CCT server (does not include traffic required to perform user authentication)	8227	7090	15 317
Disconnect from the CCT server	1629	1243	2872
Answer and drop an incoming call	4171	7324	11 495
Make and drop an outgoing call	4332	6726	11 058

Appendix A: Server Specifications

This section describes sample Avaya Aura® Contact Center solutions and the server specifications for each sample solution. The sample solutions are based on agent count and call flow rates.

The Entry-level, Mid-range, and High-end servers may be physical servers or, where supported, virtualized guest machines.

The sample Avaya Aura® Contact Center solutions, with a minimum server specification for each level, are as follows:

- Entry-level solution and server specification on page 333
- Mid-range solution and server specification on page 336
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Avaya Aura® Contact Center supports Platform Vendor Independence (PVI). This provides the flexibility to purchase a hardware specification that conforms with your corporate standard. A further benefit is that you need not seek approval for hardware that does not comply with your corporate specification.

Avaya recommends using the High-end server specification for all new installations.

Server types and server specifications overview

The following table summarizes the supported Avaya Aura® Contact Center server specifications for each server type. The table shows which server specification each server type requires when installed on a physical server or on a virtual guest.

Table 82: Supported server specifications for each server type

Server type	Voice Platform	Supported Server Specifications - Physical server			Supported Server Specifications - Virtual guest		
		Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Voice and Multimedia Contact Server with Avaya Media Server	Aura SIP	No	Yes	Yes	No	No	No

Server type	Voice Platform	Supported Server Specifications - Physical server			Supported Server Specifications - Virtual guest		
		Entry-level	Mid-range	High-end	Entry-level	Mid-range	High-end
Voice and Multimedia Contact Server without Avaya Media Server	Aura SIP	No	Yes	Yes	No	No	Yes
	CS 1000 AML	No	Yes	Yes	No	No	Yes
Voice Contact Server Only	Aura SIP	Yes	Yes	Yes	Yes	Yes	Yes
	CS 1000 AML	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia Contact Server Only	Aura SIP	Yes	Yes	Yes	Yes	Yes	Yes
	CS 1000 AML	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia Complement for Elite	Avaya Aura® Call Center Elite	No	Yes	Yes	No	Yes	Yes
Voice and Multimedia Contact Server with Avaya Media Server	No Switch Configured	No	Yes	Yes	No	No	No
Network Control Center Server	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Knowledge Worker Server Only	CS 1000 AML	Yes	Yes	Yes	Yes	Yes	Yes
Security Framework Server	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Avaya Media Server standalone on Linux	Aura SIP	No	Yes	Yes	No	Yes	Yes

For more information about the server specifications, see the following server specifications sections.

Entry-level solution and server specification

Entry-level solution

The following table lists the installation options, maximum number of agents, and maximum call rates of an entry-level Avaya Aura® Contact Center solution.

If your contact center requires more agents or a higher call rate than shown here, refer to the mid-range or high-end server specifications.

Server type	Voice Platform type	Logged-in Agents maximum	CCMA Supervisors maximum	Call rate (cph)	MM rate (WCph/ Eph) [1]
Voice and Multimedia Contact Server without Avaya Media Server	Aura SIP	Not Supported	Not Supported	N/A	N/A
	CS 1000 AML	Not Supported	Not Supported	N/A	N/A
	CS 1000 SIP	Not Supported	Not Supported	N/A	N/A
Voice and Multimedia Contact Server with Avaya Media Server	Aura SIP	Not Supported	Not Supported	N/A	N/A
	CS 1000 AML	Not Supported	Not Supported	N/A	N/A
	CS 1000 SIP	Not Supported	Not Supported	N/A	N/A
Voice Contact Server Only	Aura SIP	300	100	6K	500 / 800
	CS 1000 AML	300	100	6K	500 / 800
	CS 1000 SIP	300	100	6K	500 / 800
Multimedia Contact Server Only	Aura SIP	1000	N/A	N/A	2.0K / 4.0K
	CS 1000 AML	1000	N/A	N/A	2.0K / 4.0K
	CS 1000 SIP	800	N/A	N/A	2.0K / 4.0K
Knowledge Worker Server	CS 1000 AML	1000	N/A	50K	N/A
Multimedia Complement for Elite	Elite	Not Supported	Not Supported	N/A	N/A
Voice and Multimedia Contact Server	No Switch Configured	Not Supported	Not Supported	N/A	N/A

Server type	Voice Platform type	Logged-in Agents maximum	CCMA Supervisors maximum	Call rate (cph)	MM rate (WCph/ Eph) [1]
with Avaya Media Server					
Network Control Center Server	All switch types	Supported	400	N/A	N/A
Security Framework Server	All switch types	Supported	N/A	N/A	N/A
CCMS standalone (Not for new installs)	Aura SIP	800	N/A	10K	2.0K / 4.0K
	CS 1000 AML	1000	N/A	20K	2.0K / 4.0K
	CS 1000 SIP	800	N/A	8K	2.0K / 4.0K
CCMA standalone (Not for new installs)	Aura SIP	800	400	10K	2.0K / 4.0K
	CS 1000 AML	1000	400	20K	2.0K / 4.0K
	CS 1000 SIP	800	400	8K	2.0K / 4.0K
CCT standalone (Not for new installs)	Aura SIP	800	N/A	10K	2.0K / 4.0K
	CS 1000 AML	1000	N/A	50K	2.0K / 4.0K
	CS 1000 SIP	800	N/A	8K	2.0K / 4.0K
Avaya Media Server standalone	Linux	Not Supported	Not Supported	N/A	N/A
	MS Windows	Not Supported	Not Supported	N/A	N/A

Note 1: Multimedia contact rates are relevant only if CCMM is part of the solution.

Note: The Aura SIP agent count and call rate limits apply to Avaya Aura® Communication Manager Release 6.0.1 or later configurations.

Note: Avaya Media Server is not supported on an entry-level server.

Note: Avaya Aura® Contact Center High Availability is not supported on an entry-level server.

Note: Avaya Call Recording (ACR) is not supported on an entry-level server.

Note: Avaya Aura® Contact Center Release 6.3 does not support standalone CCMS, standalone CCT, or standalone CCMA for new installations. Existing Avaya Aura® Contact Center solutions using standalone servers may be expanded or upgraded.

Note: Avaya Aura® Contact Center Release 6.3 does not support standalone Avaya Media Server on Windows. Existing Avaya Aura® Contact Center solutions using standalone Avaya Media Server on Windows may be expanded or upgraded.

Note: You can use the instance of CCMA on this server to manage the agents and supervisors associated with this server or with remote CCMS servers up to the maximum supervisor capacity for this server.

Entry-level server specification

The following table lists the minimum specifications for an Avaya Aura® Contact Center server in an entry-level solution.

Specification	Configuration	Comment
CPU	Quad Core Xeon E5640 2.67GHz	You must select a CPU that exceeds the benchmark rating for the Quad Core E5640 2.67 GHz CPU. You can make CPU comparisons by viewing the benchmarked CPU passmark rankings here: http://www.cpubenchmark.net • For virtualized servers, you must increase the CPU benchmark rating by 15% for Avaya Aura® Contact Center. Alternately you must ensure that the agent count and call rate are appropriately lower. • AMD processors of a higher specification are also supported. The AMD CPU benchmark score must be at least 10 percent greater than the Intel E5640 benchmark score. • Non supported processors include: Intel Celeron and Intel Itanium (IA 64). **Note:** Octal core CPUs (or above) are not supported.
RAM	12 GB	
Disk Type and Speed	SCSI, SATA, SAS, Minimum 7200 RPM	• For 3.5 inch disks the minimum disk speed is 7200 RPM. • For 2.5 inch disks the minimum disk speed is 10000 RPM. • For more than 300 agents, the minimum disk speed is 10000 RPM. • IDE drives are not supported.
C: (partition)	80 GB NTFS	Minimum OS partition size
D: (partition)	80 GB NTFS	Application partition
DVD Drive	One dual-layer DVD drive	Minimum speed is 4X.
CCMS Database partition	200 GB NTFS	Required for the following server types: • Voice and Multimedia Contact Server • Voice Contact Server

Specification	Configuration	Comment
		• Multimedia Complement for Elite • No Switch Configured Multimedia only • Network Control Center Server
CCMM Database partition	300 GB NTFS	Required for the following server types: • Voice and Multimedia Contact Server • Multimedia Contact Server
CCT Database partition	10 GB NTFS	Required for the following server types: • Voice and Multimedia Contact Server • Voice Contact Server • CCT Knowledge Worker Server
Total Disk size	670 GB	1340 GB of physical disk space with RAID-1
Network Interface	Dual NIC 100 Mbit/s or faster	Only Ethernet supported.

Note:

For servers operating at 40% or above the rated capacity figures for the server type, Avaya recommends that you use a physical database disk drive, separate from the Contact Center application and Operating System disk drives.

Mid-range solution and server specification

Mid-range solution

The following table lists the installation options, maximum number of agents, and maximum call rates of a mid-range Avaya Aura® Contact Center solution.

If your contact center requires more agents or a higher call rate than shown here, refer to the high-end server specifications.

Server type	Voice Platform type	Logged-in Agents maximum	CCMA Supervisors maximum	Call rate (cph)	MM rate (WCph/Eph) [1]
Voice and Multimedia Contact Server without Avaya Media Server	Aura SIP	300	60	6K	0.8K / 1.2K
	CS 1000 AML	500	100	10K	0.8K / 1.2K
	CS 1000 SIP	300	60	6K	0.8K / 1.2K

Server type	Voice Platform type	Logged-in Agents maximum	CCMA Supervisors maximum	Call rate (cph)	MM rate (WCph/Eph) [1]
Voice and Multimedia Contact Server with Avaya Media Server	Aura SIP	150	30	3K	300 / 600
	Aura SIP	200	40	2K	300 / 600
	CS 1000 SIP	200	40	2K	300 / 600
Voice Contact Server Only	Aura SIP	1500	300	30K	4.0K / 8.0K
	CS 1000 AML	3000	400	60K	4.0K / 8.0K
	CS 1000 SIP	750	200	15K	4.0K / 8.0K
Multimedia Contact Server Only	Aura SIP	2000	N/A	N/A	4.0K / 8.0K
	CS 1000 AML	2000	N/A	N/A	4.0K / 8.0K
	CS 1000 SIP	1000	N/A	N/A	4.0K / 8.0K
Knowledge Worker Server	CS 1000 AML	5000	N/A	100K	N/A
Multimedia Complement for Elite	Elite	2000	300	N/A	4.0K / 8.0K
Voice and Multimedia Contact Server with Avaya Media Server	No Switch Configured	1000	300	N/A	0.8K / 1.2K
Network Control Center Server	All switch types	Supported	600	N/A	N/A
Security Framework Server	All switch types	Supported	N/A	N/A	N/A
CCMS standalone (Not for new installs)	Aura SIP	1500	N/A	20K	4.0K / 8.0K
	CS 1000 AML	5000	N/A	100K	6.0K / 12K
	CS 1000 SIP	1000	N/A	15K	4.0K / 8.0K
CCMA standalone (Not for new installs)	Aura SIP	1500	600	20K	4.0K / 8.0K
	CS 1000 AML	5000	600	100K	6.0K / 12K

Server type	Voice Platform type	Logged-in Agents maximum	CCMA Supervisors maximum	Call rate (cph)	MM rate (WCph/Eph) [1]
	CS 1000 SIP	1000	600	15K	4.0K / 8.0K
CCT standalone (Not for new installs)	Aura SIP	1500	N/A	20K	4.0K / 8.0K
	CS 1000 AML	5000	N/A	100K	6.0K / 12K
	CS 1000 SIP	1000	N/A	15K	4.0K / 8.0K
Avaya Media Server standalone	Linux	700	N/A	—	N/A
	MS Windows	490	N/A	—	N/A

Note 1: Multimedia contact rates are relevant only if CCMM is part of the solution.
Note: The Aura SIP agent count and call rate limits apply to Avaya Aura® Communication Manager Release 6.0.1 or later configurations.
Note: Reduce capacity by 35 percent if you are recording all calls. Reduce by (the percentage of calls being recorded) X (35 percent) if you are using sampled recording.
Note: Avaya Aura® Contact Center High Availability is supported on mid-range servers.
Note: Avaya Aura® Contact Center Release 6.3 does not support standalone CCMS, standalone CCT, or standalone CCMA for new installations. Existing Avaya Aura® Contact Center solutions using standalone servers may be expanded or upgraded.
Note: Avaya Aura® Contact Center Release 6.3 does not support standalone Avaya Media Server on Windows. Existing Avaya Aura® Contact Center solutions using standalone Avaya Media Server on Windows may be expanded or upgraded.
Note: You can use the instance of CCMA on this server to manage the agents and supervisors associated with this server or with remote CCMS servers up to the maximum supervisor capacity for this server.

Avaya Call Recording

The following tables lists the maximum number of Avaya Media Server agent sessions supported by the mid-range server.

Operating System	No Avaya Call Recording (ACR) and Avaya Media Server installed on physical mid-range server	No Avaya Call Recording (ACR) and Avaya Media Server installed on mid-range virtualized guest	Avaya Call Recording (ACR) enabled and Avaya Media Server installed on physical mid-range server	Avaya Call Recording (ACR) enabled and Avaya Media Server installed on mid-range virtualized guest
Linux	700 maximum agent sessions	350 maximum agent sessions	455 maximum agent sessions	Not supported

Operating System	No Avaya Call Recording (ACR) and Avaya Media Server installed on physical mid-range server	No Avaya Call Recording (ACR) and Avaya Media Server installed on mid-range virtualized guest	Avaya Call Recording (ACR) enabled and Avaya Media Server installed on physical mid-range server	Avaya Call Recording (ACR) enabled and Avaya Media Server installed on mid-range virtualized guest
Windows	490 maximum agent sessions	Not supported	319 maximum agent sessions	Not supported

To support more agent sessions, add additional Avaya Media Server servers to your solution, or refer to the high-end server specifications.

Mid-range server specification

The following table lists the minimum specifications for an Avaya Aura® Contact Center server for a mid-range solution.

Specification	Configuration	Comment
CPU	Dual Quad Core Xeon X5667 3.07GHz	You must select a CPU that exceeds the benchmark rating for the Dual Quad Core Xeon X5667 3.07GHz CPU. You can make CPU comparisons by viewing the benchmarked CPU passmark rankings here: http://www.cpubenchmark.net • For virtualized servers, you must increase the CPU benchmark rating by 15% for Avaya Aura® Contact Center. For virtualized servers, you must increase the CPU benchmark rating by 50% for Avaya Media Server. Alternately you must ensure that the agent count and call rate are appropriately lower. • Avaya Media Server is supported only on Intel Xeon Dual Quad or Dual 6-Core CPUs. • Avaya Aura® Contact Center supports AMD processors of a higher specification. The AMD CPU benchmark score must be at least 10 percent greater than the Intel X5667 benchmark score. Avaya

Specification	Configuration	Comment
		Media Server does not support AMD processors. • Non supported processors include: Intel Celeron and Intel Itanium (IA 64). **Note:** Octal core CPUs (or above) are not supported.
RAM	12 GB	16 GB RAM required for High Availability and /or virtualized environments.
Disk Type and Speed	SCSI, SATA, SAS, Minimum 7200 RPM	• For 3.5 inch disks the minimum disk speed is 7200 RPM. • For 2.5 inch disks the minimum disk speed is 10000 RPM. • For more than 500 agents, the minimum disk speed is 10000 RPM. • For Avaya Media Server co-residency, the minimum disk speed is 15000 RPM. • IDE drives are not supported.
C: (partition)	80 GB NTFS	Minimum OS partition size
D: (partition)	80 GB NTFS	Application partition
DVD Drive	One dual-layer DVD drive	Minimum speed is 4X.
CCMS Database partition	200 GB NTFS	Required for the following server types: • Voice and Multimedia Contact Server • Voice Contact Server • Multimedia Complement for Elite • No Switch Configured Multimedia only • Network Control Center Server
CCMM Database partition	300 GB NTFS	Required for the following server types:

Specification	Configuration	Comment
		• Voice and Multimedia Contact Server • Multimedia Contact Server • Multimedia Complement for Elite • No Switch Configured Multimedia only
CCT Database partition	10 GB NTFS	Required for the following server types: • Voice and Multimedia Contact Server • Voice Contact Server • Multimedia Complement for Elite • No Switch Configured Multimedia only • CCT Knowledge Worker Server
Total Disk size	670 GB	1340 GB of physical disk space with RAID-1
Network Interface	Dual NIC 1 Gbit/s	Only Ethernet supported.

Note:

For servers operating at 40% or above the rated capacity figures for the server type, Avaya recommends that you use a physical database disk drive, separate from the Contact Center application and Operating System disk drives.

Note:

When installing Avaya Media Server software on a Linux server, Avaya Media Server requires one flat hard disk partition with a minimum of 80GB.

High-end solution and server specification

High-end solution

The following table lists the installation options, maximum number of agents, and maximum call rates of a high-end Avaya Aura® Contact Center solution.

Server type	Voice Platform type	Logged-in Agents maximum	CCMA Supervisors maximum	Call rate (cph)	MM rate (WCph/Eph) [1]
Voice and Multimedia Contact Server without Avaya Media Server	Aura SIP	600	100	12K	1.2K / 2.4K
	CS 1000 AML	1000	200	20K	1.2K / 2.4K
	CS 1000 SIP	600	100	12K	1.2K / 2.4K
Voice and Multimedia Contact Server with Avaya Media Server	Aura SIP	300	50	6K	600 / 1200
	Aura SIP	400	80	4K	600 / 1200
	CS 1000 SIP	400	80	4K	600 / 1200
Voice Contact Server Only	Aura SIP	3000	600	45K	6.0K / 12K
	CS 1000 AML	5000	600	100K	6.0K / 12K
	CS 1000 SIP	1500	300	30K	6.0K / 12K
Multimedia Contact Server Only	Aura SIP	3000	N/A	N/A	6.0K / 12K
	CS 1000 AML	3000	N/A	N/A	6.0K / 12K
	CS 1000 SIP	1500	N/A	N/A	6.0K / 12K
Knowledge Worker Server	CS 1000 AML	5000	N/A	100K	N/A
Multimedia Complement for Elite	Elite	3000	600	N/A	6.0K / 12K
Voice and Multimedia Contact Server with Avaya Media Server	No Switch Configured	3000	600	N/A	6.0K / 12K
Network Control Center Server	All switch types	Supported	600	N/A	N/A
Security Framework Server	All switch types	Supported	N/A	N/A	N/A
CCMS standalone	Aura SIP	3000	N/A	45K	6.0K / 12K

Server type	Voice Platform type	Logged-in Agents maximum	CCMA Supervisors maximum	Call rate (cph)	MM rate (WCph/Eph) [1]
(Not for new installs)	CS 1000 AML	5000	N/A	100K	6.0K / 12K
	CS 1000 SIP	1500	N/A	30K	6.0K / 12K
CCMA standalone (Not for new installs)	Aura SIP	3000	600	45K	6.0K / 12K
	CS 1000 AML	5000	600	100K	6.0K / 12K
	CS 1000 SIP	1500	600	30K	6.0K / 12K
CCT standalone (Not for new installs)	Aura SIP	3000	N/A	45K	6.0K / 12K
	CS 1000 AML	5000	N/A	100K	6.0K / 12K
	CS 1000 SIP	1500	N/A	30K	6.0K / 12K
Avaya Media Server standalone	Linux	1000	N/A	—	N/A
	MS Windows	700	N/A	—	N/A

Note 1: Multimedia contact rates are relevant only if CCMM is part of the solution.

Note: The Aura SIP agent count and call rate limits apply to Avaya Aura® Communication Manager Release 6.0.1 or later configurations

Note: Reduce capacity by 35 percent if you are recording all calls. Reduce by (the percentage of calls being recorded) X (35 percent) if you are using sampled recording.

Note: Avaya Aura® Contact Center High Availability is supported on high-end servers.

Note: Avaya Aura® Contact Center Release 6.3 does not support standalone CCMS, standalone CCT, or standalone CCMA for new installations. Existing Avaya Aura® Contact Center solutions using standalone servers may be expanded or upgraded.

Note: Avaya Aura® Contact Center Release 6.3 does not support standalone Avaya Media Server on Windows. Existing Avaya Aura® Contact Center solutions using standalone Avaya Media Server on Windows may be expanded or upgraded.

Note: You can use the instance of CCMA on this server to manage the agents and supervisors associated with this server or with remote CCMS servers up to the maximum supervisor capacity for this server.

Avaya Call Recording

The following tables lists the maximum number of Avaya Media Server agent sessions supported by the high-end server.

Operating System	No Avaya Call Recording (ACR) and Avaya Media Server installed on physical mid-range server	No Avaya Call Recording (ACR) and Avaya Media Server installed on mid-range virtualized guest	Avaya Call Recording (ACR) enabled and Avaya Media Server installed on physical mid-range server	Avaya Call Recording (ACR) enabled and Avaya Media Server installed on mid-range virtualized guest
Linux	1000 maximum agent sessions	500 maximum agent sessions	650 maximum agent sessions	325
Windows	700 maximum agent sessions	Not supported	445 maximum agent sessions	Not supported

To support more agent sessions, add additional Avaya Media Server servers to your solution.

High-end server specification

The following table lists the minimum specifications for an Avaya Aura® Contact Center server in a High-end solution.

Specification	Configuration	Comment
CPU	Dual 6-Core Xeon X5680 3.33GHz	You must select a CPU that exceeds the benchmark rating for the Dual 6-Core Xeon X5680 3.33GHz CPU. You can make CPU comparisons by viewing the benchmarked CPU passmark rankings here: http://www.cpubenchmark.net • For virtualized servers, you must increase the CPU benchmark rating by 15% for Avaya Aura® Contact Center. For virtualized servers, you must increase the CPU benchmark rating by 50% for Avaya Media Server. Alternately you must ensure that the agent count and call rate are appropriately lower. • Avaya Media Server is supported only on Intel Xeon Dual Quad or Dual 6-Core CPUs. • Avaya Aura® Contact Center supports AMD processors of a higher specification. The AMD CPU benchmark score must be at least 10 percent greater than the

Specification	Configuration	Comment
		Intel X5680 benchmark score. Avaya Media Server does not support AMD processors. • Non supported processors include: Intel Celeron and Intel Itanium (IA 64). **Note:** Octal core CPUs (or above) are not supported.
RAM	16 GB	32 GB required for virtualized configurations.
Disk Type and Speed	SCSI, SATA, SAS, Minimum 10000 RPM	• For 3.5 inch disks the minimum disk speed is 10000 RPM. • For 2.5 inch disks the minimum disk speed is 15000 RPM. • For more than 1000 agents, the minimum disk speed is 10000 RPM. • For Avaya Media Server co-residency, the minimum disk speed is 15000 RPM. • IDE drives are not supported.
C: (partition)	80 GB NTFS	OS partition
D: (partition)	80 GB NTFS	Application partition.
DVD Drive	One dual-layer DVD drive	Minimum speed is 4X.
CCMS Database partition	200 GB NTFS	Required for the following server types: • Voice and Multimedia Contact Server • Voice Contact Server • Multimedia Complement for Elite • No Switch Configured Multimedia only • Network Control Center Server
CCMM Database partition	300 GB NTFS	Required for the following server types:

Specification	Configuration	Comment
		• Voice and Multimedia Contact Server • Multimedia Contact Server • Multimedia Complement for Elite • No Switch Configured Multimedia only
CCT Database partition	10 GB NTFS	Required for the following server types: • Voice and Multimedia Contact Server • Voice Contact Server • Multimedia Complement for Elite • No Switch Configured Multimedia only • CCT Knowledge Worker Server
Total Disk size	670 GB	1340 GB of physical disk space with RAID-1
Network Interface	Dual 1 Gbit/s	Only Ethernet supported. Quad 1 Gbit/s required for virtualized configurations that include both Avaya Media Server and Avaya Aura® Contact Center guests on the same physical host.

Note:

For servers operating at 40% or above the rated capacity figures for the server type, Avaya recommends that you use a physical database disk drive, separate from the Contact Center application and Operating System disk drives.

Note:

When installing Avaya Media Server software on a Linux server, Avaya Media Server requires one flat hard disk partition with a minimum of 80 GB.

Avaya Media Server and Contact Center on one VMware host

Virtualized solution

This section specifies the VMware host server requirements for a solution where Avaya Media Server and Avaya Aura® Contact Center are virtualized on one VMware host.

When Avaya Aura® Contact Center and Avaya Media Server are virtualized on the same VMware host server, the host server supports only:

- One Avaya Aura® Contact Center Voice and Multimedia Contact Server without Avaya Media Server running on a guest operating system (Windows Server 2008 Release 2, 64-bit, Service Pack 1).
- One standalone Avaya Media Server server running on a guest operating system (Red Hat Enterprise Linux 6.x 32-bit only).

This configuration supports only two guests on the host; one guest for the Voice and Multimedia Contact Server (Windows), and another guest for Avaya Media Server (Linux). No other guests are supported on this VMware host. This section also specifies these supported VMware guest specifications.

Important:

This Avaya Aura® Contact Center virtualized solution does not support Avaya Aura® Contact Center High Availability. Virtualized Avaya Media Server does not support High Availability.

The following table lists the installation options, maximum number of agents, and maximum call rates of a virtualized Avaya Aura® Contact Center solution.

Virtualized server applications	Type	Agents maximum	Call rate (Calls per hour)
Voice and Multimedia Contact Server without Avaya Media Server and a standalone Avaya MS server on Linux	Aura — SIP	400*	4K

Note:

This is limited to a maximum of 300 agents active on customer calls, 100 agents on post-call activity with an additional 100 customer calls receiving treatment.

Virtualized server specification

The following table lists the minimum specifications for the servers in a virtualized Avaya Aura® Contact Center solution. All guest server configuration must be completed before the Operating System is installed.

Server type	Specification	Configuration	Comment
VMware host server	CPU	Dual 6-Core Xeon X5690 3.47GHz	This dual processor has a benchmark score of 19,638. You can compare CPU performance using CPU benchmarking Web sites, for example www.cpubenchmark.net.
	RAM	32 GB	
	Disk Type and Speed	SCSI, SATA, SAS, Minimum 15000 RPM	For 2.5 inch disks the minimum disk speed is 15000 RPM. For 3.5 inch disks the minimum disk speed is 10000 RPM.
	Total Disk Size	1 TB minimum	
	DVD drive	One dual-layer DVD drive	
	Network Interface Card (NIC)	4 NICs	Provision 4 dedicated NICs for the Vmware Management Network, the AACC server and the Avaya MS server. The NICs must be 1 Gbit/s or faster. You must configure the Avaya MS NIC for DirectPath I/O (passthrough mode). This is configured in the VMware ESXi console. On the Configuration tab of the host server, edit the advanced settings and mark your chosen NIC device for passthrough mode. **Note:** If the NIC device is paired, you must mark both devices for passthrough mode.

Server type	Specification	Configuration	Comment
Guest Voice and Multimedia Contact Server without Avaya Media Server	CPU cores	12 logical CPU cores	
	RAM	12 GB allocated	
	Total Hard Disk size	670 GB	Thick Provision Eager Zeroed.
	Network Interface Card (NIC)	Up to 2 NIC configuration	The NICs must be 1 Gbit/s or faster. Configure the guest network adapters to use the manual MAC address.
	DVD drive	One DVD drive	
	Operating System	Windows Server 2008 Release 2 64-bit server	Standard or Enterprise edition.
	C: (partition)	80 GB	OS partition only.
	D: (partition)	80 GB	Application partition.
	CCMS and CCT Databases partition	210 GB	F drive.
	CCMM Database partition	300 GB	G drive.
Guest Avaya Media Server server	CPU cores	12 logical CPU cores	
	RAM	12 GB allocated	
	Total Hard Disk size	80 GB	The Avaya Media Server applications require 3GB of disk space. The additional space provides for prompts, tones, scripted music, and announcement files, and agent greeting recordings. Avaya recommends installing Avaya Media Server on a different partition to the operating system partition. Configure the partitions for Thick Provision Eager Zeroed.
	Network Interface Card (NIC)	Up to 2 NIC configuration	There must be 1 dedicated NIC for Avaya MS. Avaya Aura® Contact Center supports Linux NIC bonding in this virtualized solution. The NICs must be 1 Gbit/s or faster.

Server type	Specification	Configuration	Comment
			On the guest Avaya MS server, you must add the NIC device as a PCI device. Add the NIC device which you configured on the host server for DirectPath I/O (passthrough mode).
	DVD Drive	One DVD drive	
	Operating System	Linux Red Hat 6.x 32-bit version	

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