Deploying Avaya Call Management System in an Avaya Customer Experience Virtualized Environment

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Chapter 1: Introduction

Purpose

This document provides procedures for deploying Avaya Call Management System (CMS) in the Avaya Customer Experience Virtualized Environment.

Task instructions in this document are based on the 6.5 vSphere Client (vSphere Client (HTML5)). You can also perform the tasks in this document by using the old installable vSphere Client (pre-6.5) or the vSphere Web Client (6.0, 6.5). The interface steps can vary with Client interfaces. Refer to the VMware documentation if the slight interface differences are an issue.

This document includes a description of virtualization architecture, how to plan for the deployment, a checklist of configuration data you must get, how to deploy the OVA, how to verify the installation, references to procedures for configuring the CMS software, and maintenance procedures related to the deployment on a virtual machine.

Important:

This document does *not* contain detailed procedures for configuring or maintaining the CMS software. This document refers to standard CMS documents for those procedures.

Functional differences when installing CMS in a virtualized environment

When deploying CMS in a virtualized environment, it operates almost identically as a CMS deployed on a traditional hardware server provided by Avaya using the Solaris or Linux operating system. This section describes a few of the functional areas that are different when deploying CMS in a virtualized environment.

Software media

You must download an OVA file to deploy CMS in a virtualized environment. You do not receive a software disc with the OVA file, operating system software, or CMS software. The OVA file contains the operating system and a specific CMS load. Because you do not receive a software disc, you must make a backup copy of the OVA file in the event you must restore the system. Store the backup copy of the OVA file in a safe location so you can get it quickly if you must restore your system.

Base Load upgrade media

CMS in a virtualized environment uses an ISO image when doing a CMS Base Load upgrade. You do not receive a CMS software disc, so you must make a backup copy of the ISO image. Store the backup copy of the ISO image in a safe location so you can get it quickly if you must do a Base Load upgrade.

Backup options

Avaya supports backups to a network mount point for CMS in a virtualized environment.

Under permissive use, you can back up CMS in a virtualized environment to USB-connected devices. Avaya does not officially support nor has tested USB-connected devices for CMS backup in a virtualized environment. USB backup is not recommended for any system with large data storage because of the slower speed of USB devices and the interface.

Avaya does not support LAN Backup for CMS in a virtualized environment. Do not use the LAN Backup procedures when backing up CMS on a virtual machine.

For more information about backup options, see *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.

Restore procedures

When first deploying CMS in a virtualized environment, the virtual machine takes and remembers a snapshot of the virtualized CMS hardware. If you must ever restore CMS, deploying the OVA a second time changes the virtualized CMS hardware. The restore process compares the original virtualized CMS hardware configuration against the new virtualized CMS hardware configuration and detects a difference between the two configurations. This difference causes the CMS setup process to fail during the restore procedure. You must contact Avaya personnel to run the **auth_set** command for the new virtualized CMS hardware configuration to overwrite the old virtualized CMS hardware configuration. The **auth_set** command requires a password known only by authorized Avaya personnel. If you must restore the system, arrange for Avaya personnel to be available to run the **auth_set** command.

Intended audience

The primary audience for this document is anyone who installs and configures CMS in a virtualized environment at a customer site. The audience includes implementation engineers, field technicians, business partners, solution providers, and customers.

This document does not include optional or customized aspects of a configuration.

Document changes since last issue

The following changes have been made to this document since the last issue:

July 2016

- Changed the minimum storage reservation to 600GB for small configuration.
- Changed the note for small configuration to “The CMS OVA for the small configuration is based on the medium configuration. Provide a minimum of 600 GB of physical disk space even though the small configuration storage reservation is only 200 GB.”

March 2018

- Added support for VMware vSphere/vCenter Server 6.5
- Removed support for VMware vSphere/vCenter Server 5.0 and 5.1
- Removed Deployment guidelines based installable vSphere Client.
- Added Deployment guidelines for the based vSphere Client (HTML5). Note this vSphere client interface is available in 6.5 and will be the future vSphere client interface.

Related resources

Documentation

The following table lists the documents that relate to this product. Download the documents from the Avaya Support website at http://support.avaya.com.

Document number	Title	Description	Audience
Design			
	Avaya Customer Experience Virtualized Environment Solution Description	Describes the AvayaCustomer Experience Virtualized Environment market solution from a holistic perspective that focuses on the functional view of the solution architecture.	Sales engineers
	Avaya CMS Overview and Specification	Describes tested product characteristics and product capabilities including feature descriptions, interoperability, performance specifications, security, and licensing requirements.	Sales engineers

Table continues…

Document number	Title	Description	Audience
Implementation			
	Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®	Describes how to install, configure, and maintain Avaya CMS when installed on a Linux OS.	Avaya support personnel Avaya factory personnel Contact center administrators
	Avaya CMS Switch Connections, Administration, and Troubleshooting	Describes how to connect and administer Avayacommunication servers (switches) that CMS uses Avaya.	Avaya support personnel
	Avaya CMS Base Load Upgrade	Describes how to install a new version of the Avaya CMS software.	Contact center administrators
	Avaya CMS High Availability User Guide	Describes how to install and maintain an Avaya CMS High Availability (HA) system.	Avaya support personnel Avaya factory personnel Contact center administrators
Administration			
	Avaya CMS Administration	Provides instructions on administering a contact center through Avaya CMS Supervisor.	Avaya support personnel Contact center administrators

VMware documentation

VMware component or operation	Document description	Document description (link)
vSphere Virtual Machine Administration	Provides information on managing virtual machines in the VMware vSphere Web Client for vSphere 5.5, 6.0, and 6.5. This document also provides information of the following: • Deploying OVF templates • Configuring virtual machine hardware and options • Managing Virtual Machines	https://docs.vmware.com/en/VMware-vSphere/6.5/com.vmware.vsphere.vm_admin.doc/GUID-55238059-912E-411F-A0E9-A7A536972A91.html

Table continues…

VMware component or operation	Document description	Document description (link)
vSphere Web Client	Provides information on how through a browser vSphere Web Client connects to a vCenter server or directly to an ESXi host if a vCenter Server is not used.	https://docs.vmware.com/en/VMware-vSphere/6.5/com.vmware.vsphere.vcenterhost.doc/GUID-A618EF76-638A-49DA-991D-B93C5AC0E2B1.html

Note:

If the document description (link) are no longer active, consult VMware for documents associated with the component or operation.

Viewing Avaya Mentor videos

Avaya Mentor videos provide technical content on how to install, configure, and troubleshoot Avaya products.

About this task

Videos are available on the Avaya Support website, listed under the video document type, and on the Avaya-run channel on YouTube.

Procedure

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  - In **Search**, type `Avaya Mentor Videos` to see a list of the available videos.
  - In **Search**, type the product name. On the Search Results page, select **Video** in the **Content Type** column on the left.
- To find the Avaya Mentor videos on YouTube, go to 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 website.

Note:

Videos are not available for all products.

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Go to the Avaya Support website at http://support.avaya.com for the most up-to-date documentation, product notices, and knowledge articles. You can also search for release notes, downloads, and resolutions to issues. Use the online service request system to create a service request. Chat with live agents to get answers to questions, or request an agent to connect you to a support team if an issue requires additional expertise.

Chapter 2: Architecture overview

Avaya Customer Experience Virtualized Environment overview

Avaya Customer Experience Virtualized Environment integrates Avaya Aura® Contact Center applications with VMware® virtualized server architecture. Avaya Customer Experience Virtualized Environment provides the following benefits:

- simplifies IT management by providing common software administration and maintenance.
- requires fewer servers and racks which reduces the footprint.
- lowers power consumption and cooling requirements.
- enables capital equipment cost savings.
- lowers operational expenses.
- uses standard operating procedures for both Avaya and non-Avaya products.
- customers can deploy Avaya products in a virtualized environment on customer-specified servers and hardware.
- businesses can scale rapidly to accommodate growth and to respond to changing business requirements.

For existing customers who have a VMware IT infrastructure, Avaya Customer Experience Virtualized Environment provides an opportunity to upgrade to the next release level of collaboration using their own VMware infrastructure.

The Avaya Customer Experience Virtualized Environment project is only for VMware and is not intended to include any other industry hypervisor.

Note:

This document uses the following terms, and at times, uses the terms interchangeably.

- server and host
- reservations and configuration values

Customer deployment

Deployment into the blade, cluster, and server is managed by vCenter Server and vSphere Client.

The customer provides the servers and the VMware infrastructure including the VMware licenses.

Software delivery

The software is delivered as one or more pre-packaged Open Virtualization Appliance (OVA) files that are posted on the Avaya Product Licensing and Download System (PLDS). Each OVA contains the following components:

- the application software and operating system.
- pre-installed VMware tools.
- preset configuration details for
  - RAM and CPU reservations and storage requirements
  - Network Interface Card (NIC)

Patches and upgrades

A minimum patch level can be required for each supported application. See the compatibility matrix tool at http://support.avaya.com/CompatibilityMatrix/Index.aspx for more information regarding the application patch requirements.

Important:

Do not upgrade the VMware tools software that is packaged with each OVA unless instructed to do so by Avaya. The supplied version is the supported release and has been thoroughly tested.

Performance and capacities

The OVA template is built with configuration values which optimize performance and follow recommended Best Practices.

Caution:

Modifying these values can have a direct impact on the performance, capacity, and stability of the virtual machine. It is the responsibility of the customer to understand the aforementioned impacts when changing configuration values. Avaya Global Support Services (GSS) may not be able to assist in fully resolving a problem if the resource allocation has been changed for a virtual application. Avaya GSS could require the customer to reset the values to the optimized values before starting to investigate the issue.

Virtualized components

Software component	Description
ESXi Host	The physical machine running the ESXi Hypervisor software.
ESXi Hypervisor	A platform that runs multiple operating systems on a host computer at the same time.
vSphere Client	vSphere Client is an application that installs and manages virtual machines. vSphere Client connects to a vCenter server or directly to an ESXi host if a vCenter Server is not used. The application is installed

Table continues…

Software component	Description
	on a personal computer or accessible through a web interface. The installable vSphere Client is not available in vSphere 6.5 and later releases.
vSphere Web Client	Using a Web browser, vSphere Web Client connects to a vCenter server or directly to an ESXi host if a vCenter Server is not used.
vSphere Client (HTML5)	vSphere Client (HTML5) is available in vSphere 6.5. Using a Web browser, it connects to a vCenter server or directly to an ESXi host if a vCenter Server is not used. This is the only vSphere client administration tool after the next vSphere release.
vCenter Server	vCenter Server provides centralized control and visibility at every level of the virtual infrastructure. vCenter Server provides VMware features such as High Availability and vMotion.
Appliance Virtualization Platform	Avaya-provided virtualization turnkey solution that includes the hardware and all the software including the VMware hypervisor.
Solution Deployment Manager	Centralized software management solution of Avaya that provides deployment, upgrade, migration, and update capabilities for the Avaya Aura® virtual applications.
Open Virtualization Appliance (OVA)	The virtualized OS and application packaged in a single file that is used to deploy a virtual machine.

Deployment guidelines

- Deploy as many virtual appliances on the same host as possible.
- Deploy the virtual appliances on the same cluster if the cluster goes beyond the host boundary.
- Segment redundant elements on a different cluster, or ensure that the redundant elements are not on the same host.
- Create a tiered or segmented cluster infrastructure that isolates critical applications, such as CMS, from other virtual machines.
- Plan for rainy day scenarios or conditions. Do not configure resources only for traffic or performance on an average day.
- Do not oversubscribe resources. Oversubscribing affects performance.
- Monitor the server, host, and virtual appliance performance.

Important:

The values for performance, occupancy, and usage can vary greatly. The blade server might run at 5% occupancy, but a virtual machine might run at 50% occupancy. Note that a virtual machine behaves differently when the CPU usage is higher.

Chapter 3: Planning and configuration

Planning

Ensure that the following activities are complete before deploying the virtual appliance:

#	Action	Notes	✔
1	Assess the vSphere Infrastructure resource requirements. Key factors are: • CPU usage • Memory usage • Storage requirements • Network usage • Supported capacity		
2	Coordinate deployment activities with service providers.		
3	Buy all required VMware licenses and make all OVA files accessible.	You must separately license each CMS instance, that is, each installation of an OVA. To install multiple instances of CMS, customers or business partners must order a separate CMS license for each instance.	
4	Buy and install all required hardware.		
5	Plan and resource all staging and verification activities.		

Note:

You can deploy a configuration that consists of a mixture of CMS hosted on VMware platforms and CMS hosted on non-VMware platforms.

Server hardware and resources

VMware offers compatibility guides that list servers, system, I/O, storage, and backup compatibility with VMware infrastructure. For more information about VMware-certified compatibility guides and product interoperability matrices, see http://www.vmware.com/resources/guides.html.

CMS virtualized environment configurations

When deploying CMS in a virtualized environment, you can configure your deployment as a small, medium, or large configuration.

- A small configuration is intended for customers with very small CMS deployments.
- A medium configuration (the default configuration) is similar to a deployment that uses the Dell R630 with Linux.
- A large configuration is intended for Large CMS deployment customers.

Keep these comparisons in mind when deciding which configuration to deploy.

High Availability

High Availability (HA) CMS and Survivable CMS are Avaya product offers that are different from VMware vSphere High Availability. Contact your account team to discuss deployment options for HA CMS and Survivable CMS.

VMware vSphere HA is a specific approach to VMware deployment. Customers implement HA in a specific VMware environment.

You can deploy all these features to provide a higher level of reliability.

HA CMS and Survivable CMS

Avaya offers a High Availability (HA) CMS package and a Survivable CMS package. With HA CMS, you deploy two CMS systems and provision the systems to both receive the same call data from the same Communication Manager system. The deployment of two CMS systems provides reliability and duplication of ACD call data across both CMS systems for better reliability if the network fails or a server fails.

The Survivable CMS option expands reliability by providing data collection from the Communication Manager Survivable Core and Survivable Remote technology. Survivable CMS has a Dual Role CMS option where the HA CMS supports a connection from the Communication Manager system and the Survivable Core or Survivable Remote, and a separate Survivable CMS where only the Survivable Core or Survivable Remote connects to a Survivable CMS. The deployment of a Survivable CMS allows users to continue working if the main site is not operational because of network failures or server failures.

To have multiple CMS systems in an HA CMS, Survivable CMS, or an HA CMS and Survivable CMS combination deployment when using VMware, you must deploy separate CMS OVA files for each CMS. The reason you need separate OVA files is because all CMS virtual machines must be provisioned as active, licensed systems.

In addition to redundancy of ACD data provided by HA CMS or the resiliency of data provided by Survivable CMS, Avaya requires a feature that synchronizes the administrative data from a primary CMS to the HA CMS or Survivable CMS deployment. This feature allows all systems to remain synchronized with up-to-date administrative data.

Contact your account team for more information about HA CMS and Survivable CMS.

VMware vSphere HA

VMware vSphere HA provides automatic detection of hardware failures, server failures, and operating system failures. If a physical server fails, affected virtual machines restart automatically on another production server that has spare capacity. If an operating system fails, vSphere HA restarts the affected virtual machine on the same server. The restart takes several minutes, but the system does recover.

VMware HA ensures that capacity is always available to restart all virtual machines affected by a server failure. HA continuously and intelligently monitors capacity use and reserves spare capacity to restart virtual machines. VMware HA helps VMware vSphere users identify abnormal configuration settings detected within HA clusters. The VMware vSphere client interface reports relevant operating status and potential error conditions with suggested steps for correction.

CMS software requirements

The following CMSor later releases support deployments on VMware:

- R18.0 (cms-R18.0.0.0-xx.y.x86_64)

Avaya packages the CMS VMware environment as a virtual appliance ready for deployment on VMware-certified hardware.

Virtual Machine resource requirements and average utilization

Before deploying the CMS Virtual Machine, ensure that the ESXi host can support the configuration you want. After deployment and during normal operation, monitor your resource use to ensure that the proper level of resources remains available.

Note:

In the following tables, note the following:

- vCPU equals the number of virtual machine CPUs
  - With Intel hyper-threading, there are two vCPUs per physical core or CPU.
  - With AMD, there is one vCPU per physical core CPU.
- The minimum CPU speed is based on Xeon E5620 or equivalent.

Minimum required resources for configurations

VMware resource	Small configuration	Medium configuration	Large configuration	Notes
vCPU Cores	2	8	16	
vCPU reservation	1,200 MHz	4,800 MHz	9,600 MHz	
Minimum CPU speed	2.4 GHz Xeon E5620 or equivalent	2.4 GHz Xeon E5620 or equivalent	2.4 GHz Xeon E5620 or equivalent	
Memory	8,192 MB	16,384 MB	65,536 MB	The medium and large configuration memory sizes match real hardware machines. The real hardware memory configuration considers future memory growth.
Memory reservation	4,096 MB	8,192 MB	16,384 MB	
Storage	600 GB	600 GB	600 GB	1. Small configuration: The CMS OVA for the small configuration is based on the medium configuration. Provide a minimum of 600 GB of physical disk space even though the small configuration storage reservation is only 200 GB. 2. Large configuration: See *Requirements for expanding large configurations.*
IOPS	200	300	600	IOPS data is based on the real CMS hardware machines

Table continues…

VMware resource	Small configuration	Medium configuration	Large configuration	Notes
				with 50% read and 50% write.
Shared NICs	Four @ 1000 Mbps	Four @ 1000 Mbps	Four @ 1000 Mbps	

The OVA contains many of the virtual machine resource requirements, such as vCPU reservation and memory reservation. The target virtual machine confirms that the required resources in the OVA are available before deploying the OVA.

Caution:

Avaya recommends that you do not change the resource settings. Changing these allocated resources can have a direct impact on the performance, capacity, and stability of the CMS virtual machine. To run at full capacity, you must meet these resource size requirements; removing or greatly downsizing reservations can put this requirement at risk. Any deviation is at the customer's own risk.

Average resource and network utilization for standard configurations

Average resource usage	Small configuration	Medium configuration	Large configuration	Notes
CPU consumed	600 MHz	2 GHz	8 GHz	
Memory consumed	500 MB	2 GB	4 GB	
Network consumed	0.252 Mbps	0.512 Mbps	1.696 Mbps	
IOPS	12	18	28	IOPS is higher during nightly summarization.

Requirements for expanding large configurations

To accommodate CMS deployments that require larger databases, you can increase the amount of disk space on the virtual machine. Use the following table to determine the amount of disk space required by the database to support a larger number of agent skill pairs at interval lengths of 15 or 30 minutes.

Note:

The values in this table assume 31 days of interval storage, five years of daily storage (1825 days), and three agent shifts every 24 hours when you have one time zone. Perform the following procedure to get space estimates:

1. Log on to the CMS server as `cms`.
2. Run the **`cms`** command.
3. Navigate to **System Setup** > **Data Storage Allocation** and **System Setup** > **Free Space Allocation** to get space estimates.

Agent skill pairs	200,000		400,000		600,000		800,000	
Interval length (minutes)	15	30	15	30	15	30	15	30

Table continues…

Agent skill pairs	200,000		400,000		600,000		800,000	
Minimum virtual machine disk size (TB)	1.8	1.2	2.2	1.9	2.9	2.6	3.8	3.3

To expand the disk size on a large configuration that has already been deployed, see Increasing the disk size on a large configuration on page 34.

Hyper-threading

Some confusion can arise in relation to the processor core count on systems that have hyper-threading enabled CPUs where the logical core count increases above the physical core count, usually by a factor of two.

For Avaya contact center deployments, only the physical cores count towards the total number of processor cores on an ESXi host that can be assigned as vCPUs.

Hyper-threading is supported enabled or disabled on CPU types that offer the feature. If hyper-threading is enabled, the additional logical cores do not increase the host's number of vCPUs available for provisioning.

Testing conducted on hosts with hyper-threading enabled concluded that scheduling problems can occur when provisioning vCPUs counts greater than the number of physical cores on the host resulting in a degradation of performance of the contact center applications, for example, slower call setup times and degraded media quality.

VMware software requirements

CMSsupports the following VMware software versions:

- VMware vSphere ESXi 5.5
- VMware vSphere ESXi 6.0
- VMware vSphere ESXi 6.5
- VMware vCenter Server 5.5
- VMware vCenter Server 6.0
- VMware vCenter Server 6.5

To view compatibility with other solution releases, see *VMware Product Interoperability Matrices* at http://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php.

Capacities

Parameter	Small VMware configuration — intended for customers with very small CMS deployments	Medium VMware configuration — equivalent to midsized Dell R620 with Linux	Large VMware configuration — intended for Large CMS deployment customers
Peak busy-hour call volume	30,000	200,000	400,000
Concurrent Supervisor sessions[1]	50	200	1,600[2]
Concurrent agents	500	5,000	10,000
Third-party software	3	3	7
Agent skill pairs	100,000	200,000	800,000[3]
Reports per Supervisor session	3	5	10
Report elements	5	5	12
Percentage of supervisors that can run reports with a 3 second refresh rate	0%	50%	100%
Active agent traces	250	1,000	5,000
Internal Call History (ICH) records	4,000 per 20 minutes	4,000 per 20 minutes	4,000 per 20 minutes
External Call History (ECH) records	10,000 per 20 minutes	60,000 per 20 minutes	300,000 per 20 minutes

Customer configuration data

The following table identifies the key customer configuration information that you must enter when deploying the OVA file. Determine your configuration data before you begin the deployment.

Parameter	Your value
Location of OVA template file on your computer	
Virtual machine template name	

Table continues…

[1] This value is the total number of active CMS Supervisor PC client and CMS Supervisor Web client sessions.
[2] Of the 1600 sessions supported, only 800 can be CMS Supervisor Web client sessions
[3] Supporting 800,000 agent skill pairs requires greatly increased disk space for interval data. Customers should create up to 8 additional disk volumes. For full details on disk space usage recommendations, see Virtual Machine resource requirements and average utilization on page 18.

Parameter	Your value
Virtual machine location	
Destination storage location for virtual machine files	
Disk format to store the virtual disks	Thin Provision

The following table identifies the key customer networking information that you must enter when you run the CMS `/cms/toolsbin/netconfig` command.

Parameter	Example	Your value
Network interface name	eth0	
Host name; use the short host name	VM_CMS1	
Domain name	CompanyName.com	
IP address	123.45.67.89	
Netmask	255.255.255.0	
Default gateway IP address	123.45.67.254	
DNS IP addresses, up to 3, separated with a space	123.1.0.1 123.1.0.2 123.1.0.3	
DNS search domains separated with a space	AltCompanyName.com OtherCompanyName.com	

SAL Gateway

A Secure Access Link (SAL) Gateway is required for remote access and alarming.

Through SAL, support personnel or tools can gain remote access to managed devices to troubleshoot and debug problems.

A SAL Gateway:

1. Receives alarms from Avaya products in the customer network.
2. Reformats the alarms.
3. Forwards the alarms to the Avaya support center or a customer-managed Network Management System.

You can deploy the SAL Gateway OVA using vCenter through a vSphere client. You can also deploy the SAL Gateway OVA directly to the ESXi server through a vSphere client.

For more information about the SAL Gateway, see the Secure Access Link documentation on the Avaya Support website at http://support.avaya.com .

Chapter 4: Deploying the CMS OVA

Deployment of cloned and copied OVAs

To redeploy a virtual machine, do *not* create a copy of the virtual machine or clone the virtual machine. These processes have subtle technical details that require a thorough understanding of the effects of these approaches. To avoid any complexities and unexpected behavior, deploy a new OVA on the virtual machine. At this time, Avaya only supports the deployment of new OVAs.

Deployment checklist

#	Action	Link/Notes	✔
1	Complete all the planning and configuration requirements.	Planning on page 16	
2	Deploy the OVA.	Deploying the OVA on page 24	
3	Configure the virtual machine settings if you are deploying a small or large configuration. The default configuration is a medium configuration and requires no modifications.	Configuring the virtual machine for a small configuration on page 27. Configuring the virtual machine for a large configuration on page 29.	
4	Optional. Expand the disk size on a large configuration after you deploy a standard large configuration. If you are deploying a small or medium configuration, skip this procedure.	Increasing the disk size on a large configuration on page 34	

Deploying the OVA

Before you begin

Download the file to the computer where you will execute the vSphere client. Note the folder and the file name for the download.

Decide on the browser to use for access to the vSphere client. VMware recommends using a Google Chrome or Mozilla Firefox browser. Avoid using Internet Explorer. Problems have been identified with OVA deployment using Internet Explorer.

Important:

You must separately license each CMS instance, that is, each installation of an OVA. To install multiple instances of CMS, customers or business partners must order a separate CMS license for each instance.

Get a copy of the *AVAYA CMS RedHat Enterprise Linux 6.6 Kickstart DVD* ISO image from PLDS. Download the ISO image to your work PC. If you need to troubleshoot boot-up problems on the VMware machine, you must create a DVD disc to allow you to boot from disc on the VMware machine.

About this task

Note:

Slight interface differences might exist depending in vSphere version.

Procedure

1. Start the vSphere client software on your PC via a browser.
   a. Open a Web browser and enter the URL for the client on the vSphere vCenter, / https://server.hostname/ui
   b. Alternatively, open a Web browser and enter the URL for the vSphere ESXi , /https://server.hostname and click on vSphere Client (HTML5).
2. In the **Username** field, enter the user name that is on the vCenter Single Sign On and has permissions on vCenter Server.
3. In the **Password** field, enter the password.
4. Click **Login**.
5. If a warning message about an untrusted SSL certificate appears, select the appropriate action based on your security policy.

Option	Action
Ignore the security warning for this login session only.	Click **Ignore**.
Ignore the security warning for this login session, and install the default certificate so that the warning does not appear again.	Select **Install this certificate and do not display any security warnings for this server** and click **Ignore**. Select this option only if using the default certificate does not present a security problem in your environment.
Cancel and install a signed certificate before proceeding	Click **Cancel** and ensure that a signed certificate is installed on the vCenter Server system before you attempt to connect again.

6. Click on the Hosts and Clusters icon.

   The Host and Cluster tree will display in the left pane.

7. Click **Actions**.
8. In the drop-down list, select **Deploy OVF Template**.

   The Select an OVF template window is displayed.
9. Select **Local File**, click **Choose Files**.

   The system displays the Open dialog box.
10. Browse to the folder where you saved the CMS OVA file and select the OVA file.
11. Select **Open**.

    The Source window displays the path to the OVA file.
12. Select **Next**.

    The system displays the Select a name and folder window.
13. Enter the virtual machine name.
14. Select the location for the virtual machine.
15. Select **Next**.
16. Select the destination compute resource.
17. Select **Next**.

    The Review details window is displayed.
18. Verify that the details shown for the OVA file are correct, specifically the CMS version number. The Size of disk attributes will be configured later.
19. Select **Next**.

    The system displays the End User License Agreement window.
20. Review the license agreement and, if you agree to the terms, select **Accept**.
21. Select **Next**.
22. In the Select virtual disk format drop-down list, select **Thin Provision**.
23. In the VM Storage Policy drop-down list, select **Datastore Default**.
24. From the Datastore table, select **Datastore**.

    Important:

    The data store type you select must use the VMFS5 format.
25. Select **Next**.

    The system displays the Select networks window.
26. Click the **Destination Network** field.
27. From the drop-down list, select the proper subnetwork.
28. Select **Next**.

The system displays the Ready to Complete window.

29. Verify the deployment settings. If you must change any of the settings, click **Back** and fix the incorrect settings.
30. Select **Finish**.

    The Deploy OVF window closes and installation begins.

    The **Recent Tasks** pane displays information for tasks **Deploy OVF template and Import OVF package**.

    The Status column shows the percentage complete.

    Expected execution time is 10-20 minutes, but it could take longer. The execution time depends on the resources available on the vSphere server.

Next steps

Do one of the following:

- If the virtual machine is a small configuration, continue with Configuring the virtual machine for a small configuration on page 27.
- If the virtual machine is a medium configuration, continue with Configuring the virtual machine for a medium configuration on page 28.
- If the virtual machine is a large configuration, continue with Configuring the virtual machine for a large configuration on page 29.

Configuring the virtual machine for a small configuration

Before you begin

Turn off the virtual machine. Note that interfaces on different vSphere versions might differ.

Procedure

1. On your web browser, type the vSphere vCenter URL.
2. In the **User name** field, type your user name.
3. In the **Password** field, type your password.
4. Click **Login**.
5. On the vSphere Web Client home page, click one of the following icons:
   - **Hosts and Clusters**
   - **VMs and Templates**
6. In the navigation pane, click the CMS virtual machine.
7. Click **Actions** > **Edit Settings**.

8. In the Edit Settings dialog box, do the following:
    a. In the navigation pane, click **CPU**.
    b. In the **CPU** drop-down list, click `2`.
    c. In the content pane, click **Cores per Socket**.
    d. In the drop-down list, click `2`.
    e. In the navigation pane, click **Reservation**.
    f. In the drop-down list, click `1200 MHz`.
    g. In the content pane, click **Memory**.
    h. Click **Reservation**.
    i. In the drop-down list, click `4096 MB`.
    j. Click **OK**.
9. Click **Actions** > **Power** > **Power On**.

Configuring the virtual machine for a medium configuration

Before you begin

Turn off the virtual machine. Note that interfaces on different vSphere versions might differ.

Procedure

1. On your web browser, type the vSphere vCenter URL.
2. In the **User name** field, enter your user name.
3. In the **Password** field, enter your password.
4. Click **Login**.
5. On the vSphere Web Client home page, click one of the following icons:
    - **Hosts and Clusters**
    - **VMs and Templates**
6. In the navigation pane, click the CMS virtual machine.
7. Click **Actions** and select **Edit Settings**.
8. In the Edit Settings dialog box, do the following:
    a. In the navigation pane, click **CPU**.
    b. In the **CPU** drop-down list, click `8`.

c. In the content pane, select **Cores per Socket** .
d. In the drop-down list, click `8`.
e. In the navigation pane, click **Reservation**.
f. In the drop-down list, click `4800 MHz`.
g. In the content pane, select **Memory** .
h. In the drop-down list, click `16 GB`.
i. Select **Reservation**.
j. In the drop-down list, click `8192 MB`.
k. Click **OK**.

9. Click **Actions** and select **Power** > **Power On**.

Configuring the virtual machine for a large configuration

Before you begin

Turn off the virtual machine. Note that interfaces on different vSphere versions might differ.

Procedure

1. On your web browser, type the vSphere vCenter URL.
2. In the **User name** field, type your user name.
3. In the **Password** field, type your password.
4. Click **Login**.
5. On the vSphere Web Client home page, click one of the following icons:
   - **Hosts and Clusters**
   - **VMs and Templates**
6. In the navigation pane, click the CMS virtual machine.
7. Click **Actions** and select **Edit Settings**.
8. In the Edit Settings dialog box, do the following:
   a. In the navigation pane, click **CPU**.
   b. In the **CPU** drop-down list, click `16`.
   c. In the content pane, select **Cores per Socket**.
   d. In the drop-down list, click `16`.
   e. In the navigation pane, click **Reservation**.

f. In the drop-down list, click `9600 MHz`.
g. In the content pane, select **Memory**
h. In the drop-down list, click `64 GB`.
i. Select **Reservation**.
j. In the drop-down list, click `16384 MB`.
k. Click **OK**.

9. Click **Actions** and select **Power** > **Power On**.

Chapter 5: Configuring the system

Configuration checklist

#	Action	Link/Notes	✔
1	Log on to the operating system, open a terminal window, and test the CMS software.	Verifying a successful deployment on page 31.	
2	Configure the CMS software.	Configuring the CMS software on page 32.	
3	Configure the virtual machine startup settings.	Configuring the virtual machine automatic startup settings on VMware on page 33.	

Verifying a successful deployment

Before you begin

Confirm that the OVA completed successfully as described in Deploying the OVA on page 24.

Note:

Slight interface differences may exist depending in vSphere version.

Procedure

1. If not already active, open a browser to the vSphere vcenter host url.
2. In the **username** field, enter username.
3. In the **password** field, enter password.
4. Click **Login**.
5. Click **Hosts and Clusters** or **VMs and Templates** icon. In the left pane, select the CMS virtual machine.
6. Click **Launch Web Console** or **Launch Remote Console**.

   The system displays the RedHat Linux login window to the CMS virtual machine in the browser Console or Remote Console.

7. Log on as root. Initially, no password exists. To log on, click your cursor in the console window and press **Enter**.

   The system displays a console terminal window.

8. Enter:

   ```
   cmssvc
   ```

   The system displays the CMS Services Menu, which verifies that the Red Hat Linux and CMS software was successfully deployed. You do not have to run any other CMS Services commands.

9. Enter `q` to exit the CMS Services Menu.

Configuring the CMS software

Before you begin

Use the procedures in Verifying a successful deployment on page 31 to confirm successful deployment of Red Hat Linux and CMS.

Procedure

1. Install any CMS patches that apply to this release of CMS as shown in the *Maintaining the CMS Software* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.
2. Set up networking as shown in the *Configuring the RHEL operating system* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.
3. Install and set up the CMS software and supporting software as shown in the *Installing CMS and supporting software* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*. *Installing CMS and supporting software* contains the procedure to authorize the number of agents, ACDs, or CMS Supervisor logins. The authorization procedure is the equivalent of installing a license on the CMS.
4. Change the CMS Supervisor Web client certificate as shown in the *Installing CMS and supporting software* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*
5. Set the correct time and date on the system as shown in the *Maintaining the CMS Software* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.

Next steps

Continue with Configuring the virtual machine automatic startup settings on page 33.

Optional. To expand the disk size on a large configuration that has already been deployed, see Increasing the disk size on a large configuration on page 34.

Configuring the virtual machine automatic startup settings on VMware

About this task

When a vSphere ESXi host restarts after a power failure, the virtual machines that are deployed on the host do not start automatically. You must configure the virtual machines to start automatically.

In high availability (HA) clusters, the VMware HA software ignores the startup selections.

Before you begin

Verify with the system administrator that you have the proper level of permissions to configure the automatic startup settings.

Procedure

1. In the Web browser, type the vSphere vCenter host URL.
2. Click **Hosts and Clusters** or **VMs and Templates** icon.
3. In the left pane, select the host where the virtual machine is located.
4. Click **Configure**.
5. Under Virtual Machines, select **VM Startup/Shutdown**, and click **Edit**.

   The system displays the Edit VM Startup and Shutdown window.
6. Select **Automatically start and stop the virtual machines with the system**.
7. Click **OK**.

Chapter 6: Maintenance operations

General maintenance

In general, CMS maintenance varies little when deploying CMS on a virtual machine as opposed to a Solaris or Linux machine. Except for the procedures specified in this chapter, use the maintenance procedures shown in *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux*® when performing maintenance on CMS.

Increasing the disk size on a large configuration

About this task

Do this procedure only for large configurations. You do not need to change any parameters for small or medium configurations.

Adding disks is not service affecting.

Before you begin

Confirm that you have deployed a large configuration as shown in the following sections:

- Deploying the OVA on page 24
- Configuring the virtual machine for a large configuration on page 29

Verify IDS is on the CMS server and determine disk space size.

Procedure

1. If not already active, open a browser to the vSphere vcenter host url.
2. In the **username** field, enter username.
3. In the **password** field, enter password.
4. Click **Login**.
5. Click **Hosts and Clusters** or **VMs and Templates** icon. In the left pane, select the CMS virtual machine.
6. If the CMS virtual machine is not powered on, click **Actions** and select **Power** > **Power On**.

7. To verify that IDS is turned on the CMSmachine and determine disk space size, do:
   a. Click **Launch Web Console** or **Launch Remote Control**.

      The system displays a RedHat Linux login window to the CMS virtual machine in the browser Console or Remote Console.
   b. Enter `cmssvc` on the console.
   c. Enter the number associated with the **run_ids** option.
   d. Enter the number associated with the **Turn on IDS** option.
   e. Enter `su-cms`.
   f. Enter `cms`.
   g. To determine Agent/skill pairs, click **System Setup** > **Data Storage Allocation** and **System Setup** > **Free Space Allocation**.
   h. To determine allocated space and free space, click **System Setup** > **Free Space Allocation**.
   i. To determine the size of the new disk based on Agent/skill pairs, allocated space, and free space, use the following table:

      Note:

      The values in this table assume 31 days of interval storage, five years of daily storage (1825 days), and three agent shifts every 24 hours when you have one time zone. Perform the following procedure to get space estimates:

      a. Log on to the CMS server as `cms`.
      b. Run the **`cms`** command.
      c. Navigate to **System Setup** > **Data Storage Allocation** and **System Setup** > **Free Space Allocation** to get space estimates.

Agent skill pairs	200,000		400,000		600,000		800,000	
Interval length (minutes)	15	30	15	30	15	30	15	30
Minimum virtual machine disk size (TB)	1.8	1.2	2.2	1.9	2.9	2.6	3.8	3.3

Important:

The 5.1 and 5.2 vSphere software only allows you to add disks 2 TB at a time. Because of this, you must not enter the entire disk size shown in the table. You must repeat this procedure until the space on the disks add up to the required size. For example, if you require 5.9 TB, you must add two 2-TB disks and a 1.9-TB disk.

8. On the vSphere Client browser, click **Actions** and select **Edit Settings**.

   The system displays the Edit Settings window.

9. Click **ADD NEW DEVICE**.

   The system displays a drop-down list.
10. Select **Hard Disk**.
11. Select **New Hard disk** and click to expand.
12. Enter the determined disk space size in the **Maximum Size** value.
13. Click **Disk Provisioning**, and select **Thin Provision**.
14. Select **OK**.
15. Select the **Console** tab.

    The system displays a console terminal window.
16. Log on as root.
17. Enter the following command to initialize the new disks:

    ```
    /opt/informix/bin/dbinit.sh add_disks
    ```

    Verify that the disks were added successfully. If the procedure fails, contact Avaya support.

Backing up CMS on a virtual machine

Procedure

Do a CMSADM backup as shown in “Backing up CMS” in the *Maintaining the CMS software* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.

Important:

Do not use the LAN Backup procedures when backing up CMS on a virtual machine.

Restoring CMS on a virtual machine

If a failure occurs on your virtual machine or the CMS software becomes corrupted, use the procedures in this section to restore your system.

Important:

When first deploying CMS in a virtualized environment, the virtual machine takes and remembers a snapshot of the virtualized CMS hardware. If you must ever restore CMS, deploying the OVA a second time changes the virtualized CMS hardware. The restore process compares the original virtualized CMS hardware configuration against the new virtualized CMS hardware configuration and detects a difference between the two configurations. This difference causes the CMS setup process to fail during the restore procedure. You must

contact Avaya personnel to run the **auth_set** command for the new virtualized CMS hardware configuration to overwrite the old virtualized CMS hardware configuration. The **auth_set** command requires a password known only by authorized Avaya personnel. If you must restore the system, arrange for Avaya personnel to be available to run the **auth_set** command.

Procedure

1. Deploy the OVA as shown in Deploying the OVA on page 24.
2. Set up networking as shown in “Configuring the system network” in the *Configuring the RHEL operating system* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.
3. Do a CMSADM restore as shown in “Performing a CMSADM restore of a system” in the *Maintaining the CMS software* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.
4. To access the CMSADM backup from a NFS mount point, enter:

   ```
   mkdir NFSMountPoint
   mount NFSServer:NFSDirectory NFSMountPoint
   ```

5. Verify that the backup files are on the NFS mounted folder. Enter:

   ```
   ls –al NFSMountPoint
   ```

6. Change to the `/tmp` folder. Enter:

   ```
   cd /tmp
   ```

7. Enter the following command on a single line:

   ```
   cpio -icumdv -C 10240 -I NFSMountPoint/CMSADMFilename "cms/
   install/bin/restore"
   ```

   where *CMSADMFilename* is the CMSADM system backup file of interest. Enter the CMSADM file name to match the path on the media device, for example:

   ```
   cpio -icmudv -C 10240 -I /a/CMSADM-rNNxx.y-121116151708-trex "cms/
   install/bin/restore"
   ```

   The name of the CMSADM backup file identifies the following:

   - Type of backup: CMSADM
   - CMS version at the time of the backup: rNNxx.y
   - Date of the backup: 121116 (yymmdd)
   - Unique identifier of the backup: 151708
   - CMS hostname: trex

8. Press **Ctrl+C**.

   The system stops searching the CMSADM backup media device.

Note:

If you do not press **Ctrl+C**, the system continues to search the entire backup media device. This search might take several hours to complete.

9. Verify that the restore script has the correct permissions. Enter:

   ```
   chmod +x cms/install/bin/restore
   ```

   The system sets the correct permissions to run the script. If the permissions for the script are not correct, the restore fails.

10. Restore the system from the media device. Enter:

    ```
    cms/install/bin/restore NFSMountPoint/CMSADMFilename
    ```

    The system restores the files on the backup media. The system automatically reboots after transferring the files on the media device.

    Note:

    If a problem occurs during the restore process, the system displays prompts indicating a problem. Follow the instructions displayed by the system.

11. Log on to the system as root.

12. The restore process continues. The process might fail when the system detects that the CMS hardware configuration has changed. The system displays the following messages:

    ```
    <timestamp> ERR:CMS Setup has failed 3 times.
    <timestamp> ERR:View the admin.log file for details on status.
    <timestamp> ERR:You will need to manually resolve the problem.
    <timestamp> ERR:The most likely cause is an error in or problem
    <timestamp> ERR:with the CMS Setup flat file.
    <timestamp> ERR:CMS Restore failed to complete.
    ```

13. Review the `/cms/install/logdir/admin.log` file to verify the failure is from no running the **auth_set** command. Enter:

    ```
    tail /cms/install/logdir/admin.log
    ```

    Do one of the following:

    - If the failure is because you must run the **auth_set** command, the file contains the following message. Continue with Step 14.

      ```
      Auth_set must be run (under cmssvc menu) before invoking this command.
      ```

    - If the failure is not because you must run the **auth_set** command, escalate through normal channels.

14. Contact Avaya personnel to run the **auth_set** command.

15. After Avaya personnel have run the **auth_set** command, verify that the Avaya personnel authorized the CMS hardware feature. Enter:

    ```
    cmssvc
    ```

16. Enter the number for the **auth_display** option.

    The system displays the current authorizations.

17. Review the list of authorizations and verify authorization of the CMS hardware feature.
18. Turn off IDS. Enter:

    ```
    cmssvc
    ```

19. Enter the number of the **run_ids** option.
20. Enter the number of the **Turn off IDS** option.
21. Set up CMS. Enter:

    ```
    /cms/install/bin/restore database
    ```

22. To verify that the installation completed successfully, enter:

    ```
    tail /cms/install/logdir/admin.log
    ```

    The system logs all failure messages in this file. The CMS software setup is a success when the system displays a message similar to the following:

    ```
    Setup completed successfully <date/time>
    ```

    Note:

    If CMS Setup fails, verify that the flat file is correct and rerun Step 21. If CMS Setup fails again, escalate through normal channels.

23. Do a maintenance restore as shown in “Performing a CMS maintenance restore” in the *Maintaining the CMS software* chapter of *Avaya CMS Software Installation, Maintenance, and Troubleshooting for Linux®*.

Powering off CMS on a virtual machine

About this task

Use this procedure to shut down CMS and the virtual machine. Shut down the system when you do maintenance on the virtual machine hardware.

Procedure

1. Log on as root at the console.
2. Enter:

   ```
   shutdown –h 0
   ```

   The system displays a message similar to the following:

   ```
   Broadcast message from root@testova
           (/dev/pts/0) at 20:13 ...

   The system is going down for halt NOW!
   ```

Starting up CMS on a virtual machine

About this task

Use this procedure to start the virtual machine and CMS. Do this after you have done maintenance on the virtual system hardware or if the virtual machine had a power failure.

Procedure

1. If not already active, open a browser to the vSphere vcenter host url.
2. In the **username** field, enter username.
3. In the **password** field, enter password.
4. Click **Login**.
5. Click **Hosts and Clusters** or **VMs and Templates** icon. In the left pane, select the CMS virtual machine.
6. Click **Actions** and select **Power** > **Power On**.

Doing a base load upgrade

Procedure

Do a base load upgrade as shown in *Avaya CMS Base Load Upgrade*. Follow the procedures for base load upgrades on a CMS VMware deployment.

Glossary

AFS	Authentication File System. AFS is an Avaya Web system that allows you to create Authentication Files for secure Avaya Global Services logins for supported non-Communication Manager Systems.
Application	A software solution development by Avaya that includes a guest operating system.
Avaya Appliance	A physical server sold by Avaya running a VMware hypervisor that has several virtual machines, each with its virtualized applications. The servers can be staged with the operating system and application software already installed. Some of the servers are sold as just the server with DVD or software downloads.
Blade	A blade server is a stripped-down server computer with a modular design optimized to minimize the use of physical space and energy. Although many components are removed from blade servers to save space, minimize power consumption and other considerations, the blade still has all of the functional components to be considered a computer.
ESXi	A virtualization layer that runs directly on the server hardware. Also known as a *bare-metal hypervisor.* Provides processor, memory, storage, and networking resources on multiple virtual machines.
Hypervisor	A hypervisor is also known as a Virtual Machine Manager (VMM). A hypervisor is a hardware virtualization technique which runs multiple operating systems on the same shared physical server.
MAC	Media Access Control address. A unique identifier assigned to network interfaces for communication on the physical network segment.
OVA	Open Virtualization Appliance. An OVA contains the virtual machine description, disk images, and a manifest zipped into a single file. The OVA follows the Distributed Management Task Force (DMTF) specification.
PLDS	Product Licensing and Download System. The Avaya PLDS provides product licensing and electronic software download distribution.

Reservation	A reservation specifies the guaranteed minimum required amounts of CPU or memory for a virtual machine.
RFA	Remote Feature Activation. RFA is an Avaya Web system that you use to create Avaya License Files. These files are used to activate software including features, capacities, releases, and offer categories. RFA also creates Authentication Files for secure Avaya Global Services logins for Communication Manager Systems.
SAN	Storage Area Network. A SAN is a dedicated network that provides access to consolidated data storage. SANs are primarily used to make storage devices, such as disk arrays, accessible to servers so that the devices appear as locally attached devices to the operating system.
Snapshot	The state of a virtual appliance configuration at a particular point in time. Creating a snapshot can affect service. Some Avaya virtual appliances have limitations and others have specific instructions for creating snapshots.
Storage vMotion	A VMware feature that migrates virtual machine disk files from one data storage location to another with limited impact to end users.
vCenter Server	An administrative interface from VMware for the entire virtual infrastructure or data center, including VMs, ESXi hosts, deployment profiles, distributed virtual networking, and hardware monitoring.
virtual appliance	A virtual appliance is a single software application bundled with an operating system.
VM	Virtual Machine. Replica of a physical server from an operational perspective. A VM is a software implementation of a machine (for example, a computer) that executes programs similar to a physical machine.
vMotion	A VMware feature that migrates a running virtual machine from one physical server to another with minimal downtime or impact to end users. vMotion cannot be used to move virtual machines from one data center to another.
VMware HA	VMware High Availability. A VMware feature for supporting virtual application failover by migrating the application from one ESXi host to another. Since the entire host fails over, several applications or virtual machines can be involved. The failover is a reboot recovery level which can take several minutes.
vSphere Client	The vSphere Client is an interface for administering vCenter Server and ESXi. Downloadable versions are VMware 5.5 and 6.0. A browser-based client version is VMware 6.5 and later.

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