



Avaya Customer Experience Virtualized Environment Solution Description

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Chapter 1: Introduction

Purpose

This document provides information about the Avaya Customer Experience Virtualized Environment market solution. This document also describes the functional view of the solution architecture, provides a high-level description of the solution, and explains the topology diagrams, customer requirements, and design considerations.

The primary audience for this document is the sales engineer. This document is intended to help sales engineers understand how the solution and its verified configurations meet customer needs at a high level.

This document can be used by solution architects, implementation engineers, and support personnel.

Chapter 2: Planning for virtualization

Supported hardware for VMware

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>.

Avaya Customer Experience Virtualized Environment overview

Avaya Customer Experience Virtualized Environment integrates several Avaya Contact Center products with the 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 reduce the footprint.
- Lowers the power consumption and cooling requirements.
- Enables capital equipment cost savings.
- Lowers operational expenses.
- Uses standard operating procedures for both Avaya and non-Avaya products.
- Satisfies customer demand for Avaya products in a virtualized environment on the customer-specified servers.
- Enables businesses to scale rapidly to accommodate growth and respond to the 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 contact center applications using own VMware infrastructure.

The Avaya Customer Experience Virtualized Environment project is only for VMware and does not 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

Virtualized Environment applications

- Avaya Call Management System (CMS)
- Avaya Aura® Experience Portal

Customer deployment

vCenter manages the deployment into the blade, cluster, and server.

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

Software delivery

The customer receives the software delivery as one or more prepackaged Open Virtualization Appliance (OVA) files. These files are posted on the Avaya Product Licensing and Download System (Avaya PLDS). Each OVA file contains the following components:

- The application software and operating system.
- Preset configuration details for:
 - RAM and CPU reservations and storage requirements
 - Network Interface Card (NIC)

Patches and upgrades

Each supported application requires a minimum patch level. For more information about application patch requirements, see the compatibility matrix tool at <http://support.avaya.com/CompatibilityMatrix/Index.aspx>.

Performance and capacities

The OVA template is built with configuration values which optimize the performance and follow the recommended best practices.

 **Caution:**

Modifying the configuration values can have a direct impact on the performance, capacity, and stability of the computer. Avaya Global Support Services (GSS) cannot assist to fully resolve a problem if the resource allocation changed for a virtual application. Avaya GSS might require the customer to reset the values to the optimized values before starting to investigate the problem.

Customer requirements

| Problem/ Symptoms What the customer experiences | Cause of problem Why it happens to customers | Negative Business Impact Consequences of inaction | How we solve the problem What we do to address the cause | Positive Business Outcomes as a Result Key operational/ financial metrics |
|---|---|---|--|--|
| Large number of individual servers and storage devices | Company Expansion | More cost for Rack and Stack space. | Multiple applications on one cluster. | Fewer racks required. |
| Electrical costs for cooling and power. | Electricity to run servers including air conditioning and fans. | Monthly reoccurring costs for AC and fans. | Reduce the number of servers, therefore reducing the costs for AC and additional fans. | Less power consumption for cooling. |
| Cost of servers and power as new functionality is added. | Adopting new technologies. | Additional servers and electrical costs. | Fewer servers and less cost. | Cost savings, both reoccurring and additional investment. |
| Avaya Applications do not integrate with a VMware Data Center from an OA&M perspective. | Some Avaya applications were not available on VMware. | Craftsperson needs to be familiar with several different ways of performing serviceability functions. | Allow seamless integration for Serviceability and Maintenance with VMware. | Standard operating procedures. |
| Customers want to control their own hardware and data centers. | Some applications in the Avaya Contact Center portfolio ship as appliance-only solutions. | Customers may choose to deploy a solution from a competitor. | Provide a phased-in approach of Avaya Contact Center virtual appliances. | Provide customers with what they are asking for. |

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. |

Table continues...

| Software component | Description |
|-------------------------------------|---|
| 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 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. |

General engineering guidelines

Each application is packaged as one or more virtual appliances which include the following:

- Guest operating system
- Operation application
- Optional: VMware tools package (5.5 or later)
- Defined footprint resource parameters for successful application use
- Use and configuration of VMXNET3 and NTP for VMware best practices

Virtualized Environment supports local or SAN storage. A customer can choose to use SAN or not.

All products can be deployed using any of the following methods:

- vSphere Client direct
- vCenter

⚠ Caution:

Snapshot operations can adversely affect service. Therefore, before performing a snapshot operation, the application running on the virtual machine must be stopped or set to out-of-service.

After the snapshot operation is complete, you can restart the application or bring the application back into service.

Material codes

The following are the new Material codes that are associated with the OVAs/virtual appliances in Avaya System Design Tool (ASD).

| Product | SAP Material Code | Description |
|-------------------------------|-------------------|---------------------------|
| Call Management System | 274002 | CMS R17 VE VAPP FOR LINUX |
| Avaya Aura® Experience Portal | 302257 | AAEP R7 EPM VE VAPP |

Resource requirements

Each Avaya Customer Experience Virtualized Environment application has individual resource requirements that must be met to run successfully on VMware. The following sections contain high-level resource requirement information for each application.

*** Note:**

In the following tables, note the following:

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

Supported hardware for VMware

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>.

Application requirements

Avaya Aura® Experience Portal resource requirements

The following tables provide VMware resource requirements for Avaya Aura® Experience Portal (EPM/MPP/Auxiliary) configuration.

| VMware Resource | Value |
|---------------------|---|
| vCPU Cores | 4 |
| vCPU reservation | 2400 MHz |
| Minimum CPU speed | 2.9 GHz Intel Xeon E5-26900 or equivalent |
| Memory | 4096 MB |
| Memory reservation | 4096 MB |
| Storage reservation | 120 GB |
| Shared NICs | One @ 1000 Mbps |

Call Management System (CMS) resource requirements

The following table provides VMware resource requirements for CMS.

| VMware Resource | Medium configuration | Large configuration |
|---------------------|----------------------------------|----------------------------------|
| vCPU Cores | 8 | 16 |
| vCPU reservation | 4800 MHz | 9600 MHz |
| Minimum CPU speed | 2.4 GHz Xeon E5620 or equivalent | 2.4 GHz Xeon E5620 or equivalent |
| Memory | 8192 MB | 32768 MB |
| Memory reservation | 4096 MB | 10240 MB |
| Storage reservation | 600 GB | 600 GB |
| IOPS | 400 | 400 |
| Shared NICs | One @ 1000 Mbps | One @ 1000 Mbps |

WebLM resource requirements

The current software licensing structure remains the same for the Virtualized Environment. Any application that uses WebLM for licensing continues to do so with the same functionality and services.

 **Note:**

Install WebLM on a stand-alone server. However, using the Centralized Licensing feature, you can install WebLM on the System Manager server that ensures all licensing requirements. In a failover scenario, the System Manager geo-redundant server administers all licenses.

Eth0 is used for License Management.

| VMware Resource | Value |
|--------------------|---------|
| vCPU (virtual CPU) | 1 |
| Minimum CPU speed | 2.4 GHz |
| Virtual memory | 1 GB |
| Virtual storage | 30 GB |
| Shared NIC(s) | 1 |

SAL Gateway resource requirements

| Virtualized Environment Resource requirements for SAL Gateway | |
|---|--------------|
| SAL Gateway software | Release 2.2 |
| Capacity | 500 Elements |
| Virtual CPU | 2 |
| Virtual memory | 2 GB |
| Virtual storage | 40 GB |
| Minimum CPU speed based on Xeon E5620 or equivalent processor | 2 GHz |
| Shared NIC | 1 @ 1000Mbps |

| Documentation | | |
|----------------|---|--|
| Procedure | Document | Chapter/Section title |
| Backup/restore | <i>Avaya Secure Access Link Gateway using VMware® in the Virtualized Environment Deployment Guide</i> | Backing up and restoring the virtual machine |
| Upgrade | <i>Avaya Secure Access Link Gateway using VMware® in the Virtualized Environment Deployment Guide</i> | Upgrading the SAL Gateway OVA |

Pre-deployment checklist

| # | Task | Link/Notes | ✓ |
|---|----------------------------------|---|---|
| 1 | Register for PLDS. | See Registering for PLDS on page 14 | |
| 2 | Download the software from PLDS. | See Downloading software from PLDS on page 14 | |
| 3 | Verify the downloaded OVA. | See Verifying the downloaded OVA on page 15 | |

Registering for PLDS

Procedure

1. Go to the Avaya Product Licensing and Delivery System (PLDS) website at <https://plds.avaya.com>.

The PLDS website redirects you to the Avaya single sign-on (SSO) webpage.

2. Log in to SSO with your SSO ID and password.
3. On the PLDS registration page, register as:
 - An Avaya Partner: Enter the Partner Link ID. To know your Partner Link ID, send an email to prmadin@avaya.com.
 - A customer: Enter one of the following:
 - Company Sold-To
 - Ship-To number
 - License authorization code (LAC)

4. Click **Submit**.

Avaya sends the PLDS access confirmation within one business day.

Downloading software from PLDS

Procedure

1. In your web browser, type <http://plds.avaya.com> to go to the Avaya PLDS website.
2. On the PLDS website, enter your Login ID and password.
3. On the Home page, select **Assets**.
4. Select **View Downloads**.
5. Click the search icon () for Company Name.
6. In the Search Companies dialog box, do the following:
 - a. In the **%Name** field, type `AVAYA` or the Partner company name.
 - b. Click **Search Companies**.
 - c. Locate the correct entry and click the **Select** link.
7. Search for the available downloads by using one of the following:
 - In **Download Pub ID**, type the download pub ID.
 - In the **Application** field, click the application name.
8. Click **Search Downloads**.

9. Scroll down to the entry for the download file, and click the **Download** link.
10. Select a location where you want to save the file, and click **Save**.
11. **(Optional)** If you receive an error message, click the message, install Active X, and continue with the download.
12. **(Optional)** When the system displays the security warning, click **Install**.

When the installation is complete, PLDS displays the downloads again with a check mark next to the downloads that have completed successfully.

Verifying the downloaded OVA

Verifying the OVA on a Linux-based computer

About this task

Use this procedure to verify that the md5 checksum of the downloaded OVA matches the md5 checksum that is displayed for the OVA on the PLDS website.

Use this procedure if you downloaded OVA to a Linux-based computer.

Procedure

1. Enter `md5sum filename`, where *filename* is the name of the OVA. Include the `.ova` file extension in the filename.
2. Compare the md5 checksum of the OVA to be used for installation with the md5 checksum that is displayed for the OVA on the PLDS website.
3. Ensure that both checksums are the same.
4. If the numbers are different, download the OVA again and reverify the md5 checksum.

Verifying the OVA on a Windows-based computer

About this task

Use this procedure to verify that the md5 checksum of the downloaded OVA matches the md5 checksum that is displayed for the OVA on the PLDS website.

Use this procedure if you downloaded OVA files to a Windows-based computer.

Procedure

1. Download a tool to compute md5 checksums from one of the following websites:
 - <https://sourceforge.net/projects/filechecksumutility/>

- <http://www.richherrick.com/software/hash/index.html>

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2. Run the tool on the downloaded OVA and note the md5 checksum.
3. Compare the md5 checksum of the OVA to be used for installation with the md5 checksum that is displayed for the OVA on the PLDS website.
4. Ensure that both numbers are the same.
5. If the numbers are different, download the OVA again and reverify the md5 checksum.

Verifying the OVA for SHA256 on a Linux-based computer

About this task

Use this procedure to verify that the SHA256 checksum of the downloaded OVA matches the SHA256 checksum that is displayed for the OVA on the PLDS Web site.

Use this procedure if you downloaded OVA to a Linux-based computer.

Procedure

1. Enter `Sha256sum filename`, where filename is the name of the OVA. Include the .ova file extension in the filename.
2. Compare the SHA256 checksum of the OVA to be used for installation with the SHA256 checksum that is displayed for the OVA on the PLDS Web site.
3. Ensure that both checksums are the same.
4. If the numbers are different, download the OVA again and re-verify the SHA256 checksum.

Verifying the OVA for SHA256 on a Windows-based computer

About this task

Use this procedure to verify that the SHA256 checksum of the downloaded OVA matches the SHA256 checksum that is displayed for the OVA on the PLDS Web site.

Use this procedure if you downloaded OVA files to a Windows-based computer.

Procedure

1. Download a tool to compute SHA256 checksums from one of the following Web sites:
 - <https://sourceforge.net/projects/filechecksumutility/>
 - <http://www.richherrick.com/software/hash/index.html>

 **Note:**

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2. Run the tool on the downloaded OVA and note the SHA256 checksum.
3. Compare the SHA256 checksum of the OVA to be used for installation with the SHA256 checksum that is displayed for the OVA on the PLDS Web site.
4. Ensure that both numbers are the same.
5. If the numbers are different, download the OVA again and re-verify the SHA256 checksum.

Chapter 3: Design considerations

Caveats and limitations

- The Virtualized Environment solution is available to service providers, system integrators, authorized partners, certified partners, and service delivery specialized partners. The solution can be ordered directly from Avaya or through a distributor.
- The virtualized portfolio provides equivalent features and functionality as the appliance-based versions with the exception of management functions. Management functions were modified to support the VMware environment.
- Virtualized Environment Release 1.0 only supports the specific product releases as listed in PLDS Download files.
- Avaya and Business Partners access the virtualized products through the Secure Access Link (SAL).
- Avaya continues to support the installation and services of applications, but the customer or certified Business Partner supports the VMware interfaces.
- The end customer location must have a VMware infrastructure, an accessible VMware Certified Professional (VCP) and VMware vSphere 5.5, or 6.0 licenses.
- DVDs are not shipped.

These items are required for a successful installation. For additional details on product specific requirements, refer to the individual product offer definition and the Avaya Customer Experience Virtualized Environment offer definition.

Licensing

Licenses are available from Avaya RFA. The licenses are managed using Avaya WebLM. Currently, Business Partners use the Avaya System Design Tool (ASD) to quote the various Avaya product configurations. Virtualized Environment also uses the ASD. New Material Codes indicate that the Business Partner is quoting a virtual appliance. For the list of the material codes, see [Material Codes](#) on page 11.

Customers can move licenses from an appliance-based model to a virtual appliance of the same product. There is no charge for the software application. Licensing charges apply for the appliance installations (licenses for new users, new features, and expanded systems.)

The virtual applications can use the WebLM infrastructure that is in place today.

All applicable licensing remains the same as it is today. No third-party licensing is required.

Business Partners purchase virtual appliance licenses they install from Avaya using the same processes that are used for Avaya applications distributed in non-VMware environments.

Avaya does not provide VMware ESXi Hypervisor, vCenter Server, or vSphere Client licenses.

The WebLM provides licensing for the Avaya Customer Experience Virtualized Environment products.

Authentication files and ASG access

To provide full security, the authentication file must be changed on each application that is capable of accepting a unique file. You can obtain the authentication file at <http://rfa.avaya.com> and gain access to the Authentication File System (AFS) application.

Applications requiring an authentication file from the AFS are:

- Experience Portal
- WebLM

The authentication file installation is based on the installation model of the particular virtual application. See the deployment guide for a specific product for the AFS installation procedures.

Potential issues

Potential issues which could cause problems in the Virtualized Environment include:

- Server setup, server administration, and the VMware infrastructure are not under control of Avaya.
 - A virtual machine could be starved and not be able to provide Service Level Agreement (SLA).
 - Resources could be over-subscribed.
 - Server BIOS could not be optimized.
- The VMware infrastructure can be modified by customer data center staff. A changed value could cause the system to not work properly.
- Servicing is more complex:
 - Is the problem related to the infrastructure (hardware or VMware)?
 - Is the problem related to the operating system?

- Is the problem related to the application or software?

Capacity information

The following table provides the virtualized product name and the capacity of the product in a virtualized environment.

| Product | Capacity (Agent) |
|--|---|
| Call Center Elite Release 6.2.4 (on Communication Manager Release 6.2) | <ul style="list-style-type: none"> • 10000 (H.323) • 2500 (SIP) |
| CMS (Linux) Release 17 | <ul style="list-style-type: none"> • 200 Supervisors (medium configuration) • 1600 Supervisors (large configuration)¹ |
| Experience Portal Release 7.2 | 450 concurrent sessions The Experience Portal capacity limits and port sizing details are documented in <i>Application Notes for Avaya Aura® Experience Portal 7.2 on VMware vSphere</i> . You can download the document from the Avaya Support website at http://support.avaya.com . |
| Avaya WebLM Release 6.2 | 5000 simultaneous requests |
| SAL Release 2.2 | 500 Elements |

Average resource utilization

Certain virtual applications were tested at a high capacity. An average was determined for CPU, memory, network, and disk use for each application. The following table contains the name of the virtual application that was tested at a high capacity, the average CPU consumed, the average memory consumed, the average number of kilobits per second for network use, and the average number of disk input/output operations per second.

The average numbers for your system might differ.

Avaya Aura® Experience Portal 7.2

| Resource Usage | Primary EPM | MPP | Auxiliary EPM |
|-----------------|---------------------------|-------------------------|-----------------------------|
| CPU Consumed | 2.4 (Avg) – 9 Ghz (peaks) | 2.4 (Avg) – 8 Ghz (Avg) | 1.3 Ghz (Avg) - 3 Ghz (Avg) |
| Memory Consumed | 4 GB | 4 GB | 1.7 GB - 4 GB |

Table continues...

¹ Supervisor Web Clients limited to a maximum of 800 concurrent logins on the large configuration.

| Resource Usage | Primary EPM | MPP | Auxiliary EPM |
|------------------|-------------------|----------------------|---------------|
| Network Consumed | 250 - 32,000 kbps | 64,000 - 96,000 kbps | 250-1200 kbps |
| IOPS | 28 | 30 | 8 |

Call Management System (CMS)

| Resource Usage | Medium configuration | Large configuration |
|-------------------|----------------------|---------------------|
| CPU Consumed | 2 GHz | 8 GHz |
| Memory Consumed | 2 GB | 4 GB |
| Network Consumed | 64 KBps | 212 KBps |
| IOPS ² | 18 | 28 |

² Higher IOPS during nightly summarization

Chapter 4: Topology

Avaya Customer Experience Virtualized Environment

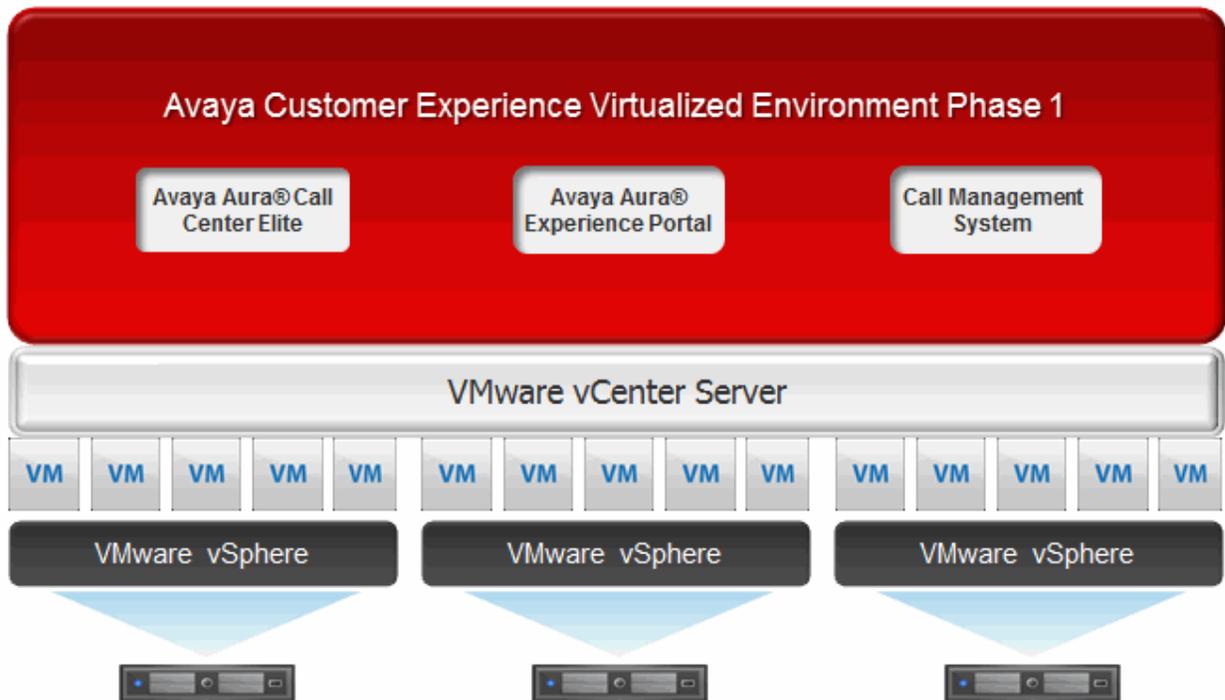


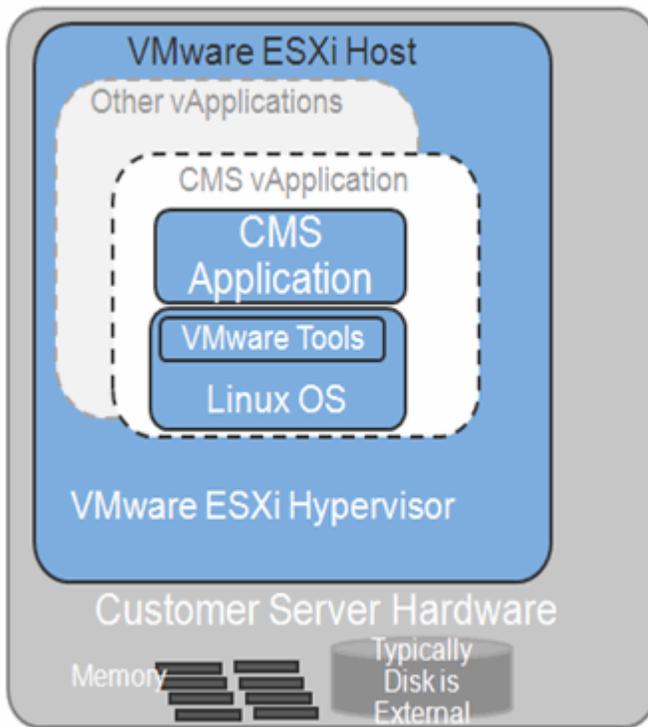
Diagram showing the virtualized Avaya applications, the vCenter Server, and the virtual machines. The applications are installed as separate virtual machines supported by the VMware virtualization platform, VMware vSphere version 5.5 or 6.0. The VMware vCenter management system manages the applications as virtual machines, and provides management and implementation features in addition to the standard features.

Example of ESXi configuration

This section provides ESXi configuration diagram for illustration purposes only. Customer implementation might vary.

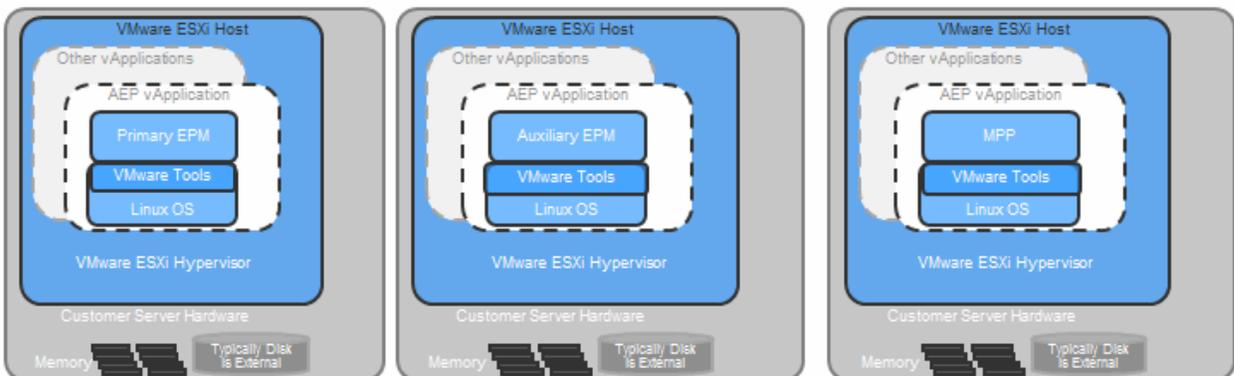
CMS deployed on ESXi host

This diagram shows CMS deployed on ESXi host



Experience Portal deployed on ESXi host

This diagram shows Experience Portal deployed on ESXi host.



Chapter 5: Resources

Documentation

The following table lists the documents related to Virtualized Environment. Download the documents from the Avaya Support website at <http://support.avaya.com>. The documents are listed under the product names and specific software release.

| Title | Description | Audience |
|---|---|---|
| Deploying Avaya Call Management System in an Avaya Customer Experience Virtualized Environment | Describes the procedures for deploying and configuring the Call Management System virtual application in the Virtualized Environment. | Implementation engineers, Field technicians, Business partners, Solution providers, Customers |
| Deploying Avaya Aura® Experience Portal in an Avaya Customer Experience Virtualized Environment | Describes the procedures for deploying and configuring the Experience Portal virtual application in the Virtualized Environment. | Implementation engineers, Field technicians, Business partners, Solution providers, Customers |

Related links

[Finding documents on the Avaya Support website](#) on page 24

Finding documents on the Avaya Support website

Procedure

1. Go to <https://support.avaya.com>.
2. At the top of the screen, type your username and password and click **Login**.
3. Click **Documents**.
4. In **Enter your Product Here**, type the product name and then select the product from the list.
5. In **Choose Release**, select an appropriate release number.
6. In the **Content Type** filter, click a document type, or click **Select All** to see a list of all available documents.

For example, for user guides, click **User Guides** in the **Content Type** filter. The list displays the documents only from the selected category.

7. Click **Enter**.

Related links

[Documentation](#) on page 24

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

- To find videos on the Avaya Support website, go to <https://support.avaya.com/> and do one of the following:
 - 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 do one of the following:
 - 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.

Support

Go to the Avaya Support website at <https://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.

Appendix A: Resource requirements

Each Avaya Customer Experience Virtualized Environment application has individual resource requirements that must be met to run successfully on VMware. The following sections contain high-level resource requirement information for each application.

*** Note:**

In the following tables, note the following:

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

Supported hardware for VMware

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>.

Application requirements

Avaya Aura[®] Experience Portal resource requirements

The following tables provide VMware resource requirements for Avaya Aura[®] Experience Portal (EPM/MPP/Auxiliary) configuration.

| VMware Resource | Value |
|-----------------|-------|
| vCPU Cores | 4 |

Table continues...

| VMware Resource | Value |
|---------------------|---|
| vCPU reservation | 2400 MHz |
| Minimum CPU speed | 2.9 GHz Intel Xeon E5-26900 or equivalent |
| Memory | 4096 MB |
| Memory reservation | 4096 MB |
| Storage reservation | 120 GB |
| Shared NICs | One @ 1000 Mbps |

Call Management System (CMS) resource requirements

The following table provides VMware resource requirements for CMS.

| VMware Resource | Medium configuration | Large configuration |
|---------------------|----------------------------------|----------------------------------|
| vCPU Cores | 8 | 16 |
| vCPU reservation | 4800 MHz | 9600 MHz |
| Minimum CPU speed | 2.4 GHz Xeon E5620 or equivalent | 2.4 GHz Xeon E5620 or equivalent |
| Memory | 8192 MB | 32768 MB |
| Memory reservation | 4096 MB | 10240 MB |
| Storage reservation | 600 GB | 600 GB |
| IOPS | 400 | 400 |
| Shared NICs | One @ 1000 Mbps | One @ 1000 Mbps |

WebLM resource requirements

The current software licensing structure remains the same for the Virtualized Environment. Any application that uses WebLM for licensing continues to do so with the same functionality and services.

*** Note:**

Install WebLM on a stand-alone server. However, using the Centralized Licensing feature, you can install WebLM on the System Manager server that ensures all licensing requirements. In a failover scenario, the System Manager geo-redundant server administers all licenses.

Eth0 is used for License Management.

| VMware Resource | Value |
|--------------------|---------|
| vCPU (virtual CPU) | 1 |
| Minimum CPU speed | 2.4 GHz |

Table continues...

Resource requirements

| VMware Resource | Value |
|-----------------|-------|
| Virtual memory | 1 GB |
| Virtual storage | 30 GB |
| Shared NIC(s) | 1 |

SAL Gateway resource requirements

| Virtualized Environment Resource requirements for SAL Gateway | |
|---|--------------|
| SAL Gateway software | Release 2.2 |
| Capacity | 500 Elements |
| Virtual CPU | 2 |
| Virtual memory | 2 GB |
| Virtual storage | 40 GB |
| Minimum CPU speed based on Xeon E5620 or equivalent processor | 2 GHz |
| Shared NIC | 1 @ 1000Mbps |

| Documentation | | |
|----------------|---|--|
| Procedure | Document | Chapter/Section title |
| Backup/restore | <i>Avaya Secure Access Link Gateway using VMware® in the Virtualized Environment Deployment Guide</i> | Backing up and restoring the virtual machine |
| Upgrade | <i>Avaya Secure Access Link Gateway using VMware® in the Virtualized Environment Deployment Guide</i> | Upgrading the SAL Gateway OVA |

Appendix B: VMware Best Practices

BIOS

For optimal performance, turn off power saving server options. See the technical data provided by the manufacturer for your particular server regarding power saving options.

For information about how to use BIOS settings to improve the environment for latency-sensitive workloads for an application, see the technical white paper at <http://www.vmware.com/files/pdf/techpaper/VMW-Tuning-Latency-Sensitive-Workloads.pdf>.

The following sections describe the recommended BIOS settings for:

- Intel Virtualization Technology
- Dell PowerEdge Servers
- HP ProLiant Servers

Intel Virtualization Technology

Intel CPUs require EM64T and Virtualization Technology (VT) support in the chip and in the BIOS to run 64-bit virtual machines.

All Intel Xeon processors include:

- Intel Virtualization Technology
- Intel Extended Memory 64 Technology
- Execute Disable Bit

Ensure that VT is enabled in the host system BIOS. The feature is also known as VT, Vanderpool Technology, Virtualization Technology, VMX, or Virtual Machine Extensions.

Note:

The VT setting is locked as either **On** or **Off** when the server starts. After enabling VT in the system BIOS, save your changes to the BIOS settings and exit. The BIOS changes take effect after the host server reboots.

Other suggested BIOS settings

Servers with Intel Nehalem class and newer Intel Xeon CPUs offer two more power management options: C-states and Intel Turbo Boost. These settings depend on the OEM make and model of

the server. The BIOS parameter terminology for current Dell and HP servers are described in the following sections. Other server models might use other terminology for the same BIOS controls.

- Disabling C-states lowers latencies to activate the CPUs from halt or idle states to a fully active state.
- Intel Turbo Boost steps up the internal frequency of the processor if the workload requires more power. The default for this option is **enabled**. Do not change the default.

Dell PowerEdge Server

When the Dell server starts, press F2 to display the system setup options.

- Set the Power Management Mode to **Maximum Performance**.
- Set the CPU Power and Performance Management Mode to **Maximum Performance**.
- In Processor Settings, set:
 - **Turbo Mode** to **enable**.
 - **C States** to **disabled**.

HP ProLiant G8 and G9 Servers

The following are the recommended BIOS settings for the HP ProLiant G8 and G9 servers:

- Set the Power Regulator Mode to **Static High Mode**.
- Disable **Processor C-State Support**.
- Disable **Processor C1E Support**.
- Disable **QPI Power Management**.
- Enable **Intel Turbo Boost**.

VMware Tools

The VMware Tools utility suite is built into the application OVA. The tools enhance the performance of the guest operating system on the virtual machine and improve the management of the virtual machine.

VMware tools provide:

- VMware Network acceleration
- Host to Guest time synchronization
- Disk sizing

For more information about VMware tools, see *Overview of VMware Tools* at <http://kb.vmware.com/kb/340>.

! **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.

VMware networking best practices

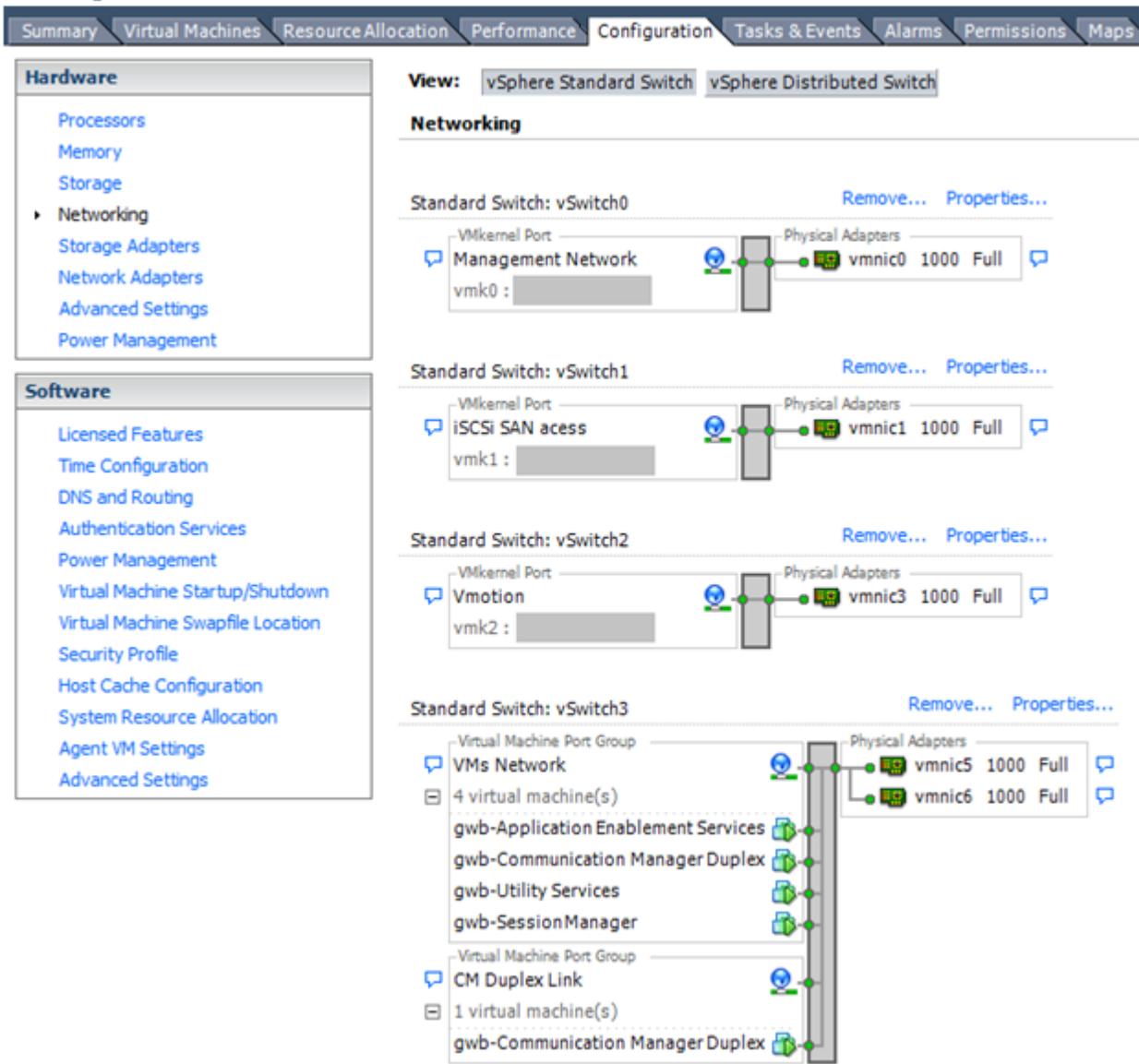
You can administer networking in a VMware environment for many different configurations. The examples in this section describe some of the VMware networking possibilities.

This section is not a substitute for the VMware documentation. Review the VMware networking best practices before deploying any applications on an ESXi host.

The following are the suggested best practices for configuring a network that supports deployed applications on VMware Hosts:

- Separate the network services to achieve greater security and performance by creating a vSphere standard or distributed switch with dedicated NICs for each service. If you cannot use separate switches, use port groups with different VLAN IDs.
- Configure the vMotion connection on a separate network devoted to vMotion.
- For protection, deploy firewalls in the virtual machines that route between virtual networks that have uplinks to physical networks and pure virtual networks without uplinks.
- Specify virtual machine NIC hardware type **vmxnet3** for best performance.
- Connect all physical NICs that are connected to the same vSphere standard switch to the same physical network.
- Connect all physical NICs that are connected to the same distributed switch to the same physical network.
- Configure all VMkernel vNICs to be the same IP Maximum Transmission Unit (MTU).

Networking Avaya applications on VMware ESXi – Example 1

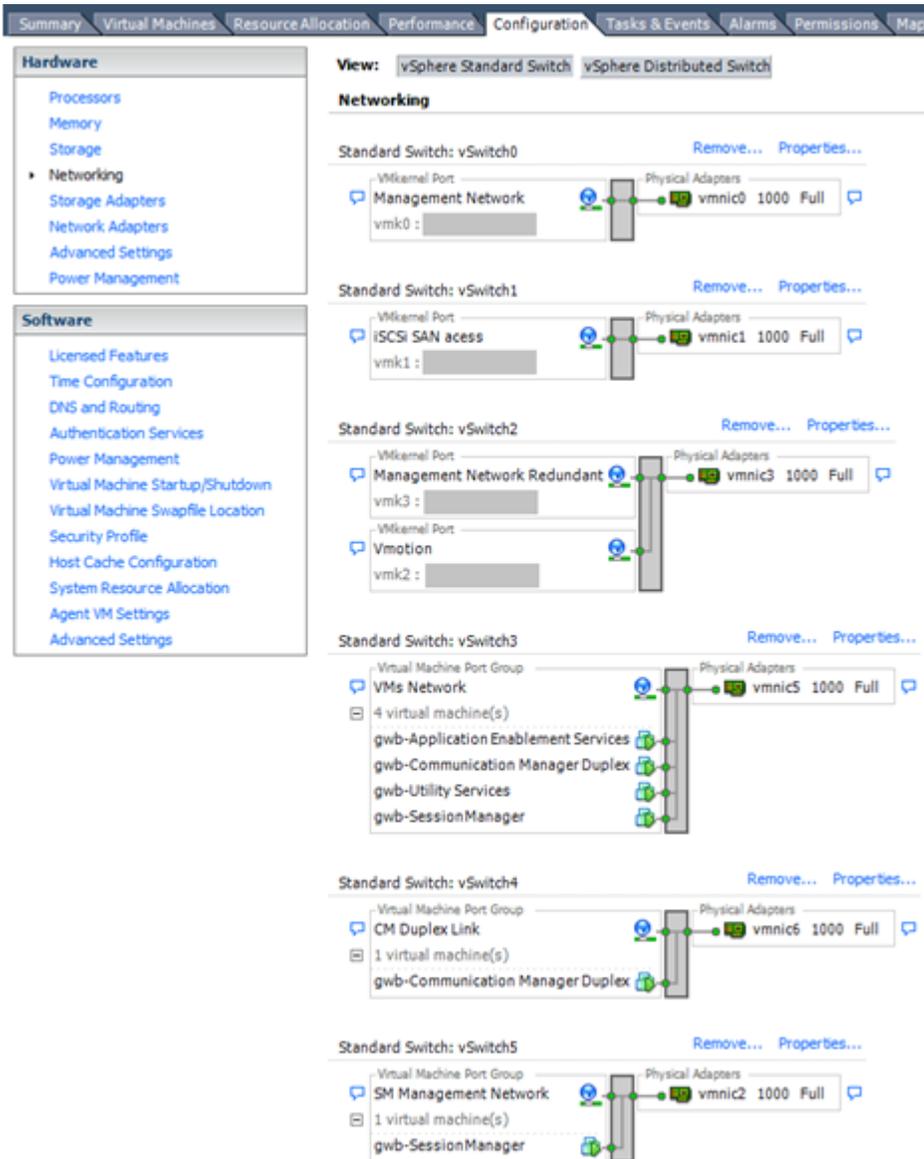


This configuration describes a simple version of networking Avaya applications within the same ESXi host. Highlights to note:

- Separation of networks: VMware Management, VMware vMotion, iSCSI (SAN traffic), and virtual machine networks are segregated to separate physical NICs.
- Teamed network interfaces: vSwitch 3 in Example 1 displays use of a load-balanced NIC team for the Virtual Machines Network. Load balancing provides additional bandwidth for the Virtual Machines Network, while also providing network connectivity for the virtual machines in the case of a single NIC failure.
- Virtual networking: The network connectivity between virtual machines that connect to the same vSwitch is entirely virtual. In example 2, the virtual machine network of vSwitch3 can

communicate without entering the physical network. Virtual networks benefit from faster communication speeds and lower management overhead.

Networking Avaya applications on VMware ESXi – Example 2



This configuration shows a complex situation using multiple physical network interface cards. The key differences between example 1 and example 2 are:

- VMware Management Network redundancy: Example 2 includes a second VMkernel Port at vSwitch2 to handle VMware Management Network traffic. In the event of a failure of vmnic0, VMware Management Network operations can continue on this redundant management network.
- Removal of Teaming for Virtual Machines Network: Example 2 removes the teamed physical NICs on vSwitch3. vSwitch3 was providing more bandwidth and tolerance of a single NIC failure instead of reallocating this NIC to other workloads.

- Communication Manager Duplex Link: vSwitch4 is dedicated to Communication Manager Software Duplication. The physical NIC given to vSwitch4 is on a separate physical network that follows the requirements described in PSN003556u at [PSN003556u](#).
- Session Manager Management Network: Example 2 shows the Session Manager Management network separated onto its own vSwitch. The vSwitch has a dedicated physical NIC that physically segregates the Session Manager Management network from other network traffic.

References

| Title | Link |
|--|---|
| Product Support Notice PSN003556u | https://downloads.avaya.com/css/P8/documents/100154621 |
| Performance Best Practices for VMware vSphere® 6.0 | http://www.vmware.com/files/pdf/techpaper/VMware-PerfBest-Practices-vSphere6-0.pdf |
| VMware vSphere 6.5 Documentation | http://pubs.vmware.com/vsphere-65/index.jsp |
| VMware vSphere 6.0 Documentation | https://www.vmware.com/support/pubs/vsphere-esxi-vcenter-server-6-pubs.html |
| VMware Documentation Sets | https://www.vmware.com/support/pubs/ |

Thin vs. thick deployments

When creating a virtual disk file, VMware ESXi uses a thick type of virtual disk by default. The thick disk pre-allocates the space specified during the creation of the disk. For example, if you create a 10 megabyte disk, all 10 megabytes are pre-allocated for that virtual disk.

In contrast, a thin virtual disk does not pre-allocate disk space. Blocks in the VMDK file are not allocated and backed by physical storage until they are written during the normal course of operation. A read to an unallocated block returns zeroes, but the block is not backed with physical storage until it is written. Consider the following when implementing thin provisioning in your VMware environment:

- Thin provisioned disks can grow to the full size specified at the time of virtual disk creation, but do not shrink. Once the blocks have been allocated, they cannot be un-allocated.
- By implementing thin provisioned disks, you are able to over-allocate storage. If storage is over-allocated, thin virtual disks can grow to fill an entire datastore if left unchecked.
- If a guest operating system needs to make use of a virtual disk, the guest operating system must first partition and format the disk to a file system it can recognize. Depending on the type of format selected within the guest operating system, the format may cause the thin provisioned disk to grow to full size. For example, if you present a thin provisioned disk to a Microsoft Windows operating system and format the disk, unless you explicitly select the Quick Format option, the Microsoft Windows format tool writes information to all sectors on the disk, which in turn inflates the thin provisioned disk to full size.

Thin provisioned disks can over-allocate storage. If the storage is over-allocated, thin virtual disks can grow to fill an entire datastore if left unchecked. You can use thin provisioned disks, but you

must use strict control and monitoring to maintain adequate performance and ensure that storage is not completely consumed. If operational procedures are in place to mitigate the risk of performance and storage depletion, then thin disks are a viable option.

Best Practices for VMware features

VMware Snapshots

A snapshot preserves the state and data of a virtual machine at a specific point in time. You can create a snapshot before upgrading or installing a patch.

The best time to take a snapshot is when no applications in the virtual machine are communicating with other computers. The potential for problems is greatest if the virtual machine is communicating with another computer. For example, if you take a snapshot while the virtual machine is downloading a file from a server on the network, the virtual machine continues downloading the file and communicating its progress to the server. If you revert to the snapshot, communications between the virtual machine and the server are confused and the file transfer fails.

 **Caution:**

Snapshot operations can adversely affect service. Before performing a snapshot operation, you must stop the application that is running on the virtual machine or place the application out-of-service. When the snapshot operation is complete, start or bring the application back into service.

Snapshots can:

- Consume large amounts of data resources.
- Increase CPU loads on the host.
- Affect performance.
- Affect service.

To prevent adverse behaviors, consider the following recommendations when using the Snapshot feature:

- Do not rely on VMware snapshots as a robust backup and recovery method. Snapshots are not backups. The snapshot file is only a change log of the original virtual disk.
- Do not run a virtual machine from a snapshot. Do not use a single snapshot for more than 24 to 72 hours.
- Take the snapshot, make the changes to the virtual machine, and delete or commit the snapshot after you verify the virtual machine is working properly. These actions prevent snapshots from growing so large as to cause issues when deleting or committing the snapshots to the original virtual machine disks.

- When taking a snapshot, do not save the memory of the virtual machine. The time that the host takes to write the memory to the disk is relative to the amount of memory that the virtual machine is configured to use. Saving the memory can add several minutes to the time taken to complete the operation. If the snapshot is active, saving memory can make calls appear to be active or in progress and can cause confusion to the user. To create a clean snapshot image from which to boot, do the following when you create a snapshot:
 - In the **Take Virtual Machine Snapshot** window, clear the **Snapshot the virtual machine's memory** check box.
 - Select the **Quiesce guest file system (Needs VMware Tools installed)** check box to ensure that all write instructions to the disks are complete. You have a better chance of creating a clean snapshot image from which to boot.
- If you are going to use snapshots for a long time, you must consolidate the snapshot files regularly to improve performance and reduce disk usage. Before merging the snapshot delta disks back into the base disk of the virtual machine, you must first delete stored snapshots.

*** Note:**

If a consolidation failure occurs, end-users can use the actual Consolidate option without opening a service request with VMware. If a commit or delete operation does not merge the snapshot deltas into the base disk of the virtual machine, the system displays a warning on the user interface.

Related resources

| Title | Link |
|---|--|
| Best practices for virtual machine snapshots in the VMware environment | Best Practices for virtual machine snapshots in the VMware environment |
| Understanding virtual machine snapshots in VMware ESXi and ESX | Understanding virtual machine snapshots in VMware ESXi and ESX |
| Working with snapshots | Working with snapshots |
| Configuring VMware vCenter Server to send alarms when virtual machines are running from snapshots | Send alarms when virtual machines are running from snapshots |

VMware vMotion

VMware uses the vMotion technology to migrate a running virtual machine from one physical server to another physical server without incurring downtime. The migration process, also known as a **hot-migration**, enables the live migration of running virtual machines with zero downtime, continuous service availability, and complete transaction integrity. vMotion is a key enabling technology for enabling a VMware datacenter.

With vMotion, you can

- schedule migration to occur at predetermined times without the presence of an administrator.
- perform hardware maintenance without scheduled downtime.

- migrate virtual machines away from failing or under-performing servers.

Before using vMotion, note the following:

- Ensure that each host that migrates virtual machines to or from the host uses a licensed vMotion application and that vMotion is enabled.
- Ensure that you have identical vSwitches. You must enable vMotion on these vSwitches.
- Ensure identical Port Groups for vMotion.
- Use a dedicated NIC to ensure the best performance.

As vMotion has a nonzero stun time in which the VM moves from one host to another, users might experience variations in performance.

VMware Storage vMotion

VMware Storage vMotion migrates virtual machine disk files within and across storage arrays while maintaining continuous service availability.

Features of Storage vMotion include:

- simplification of storage array migrations and storage upgrades.
- dynamic optimization of storage I/O performance.
- efficient utilization of storage and capacity management.

VMware High Availability

VMware vSphere High Availability (HA) provides automatic detection of hardware/server failures and operating system failures. In the event of a physical server failure, affected virtual machines are automatically restarted on other production servers with spare capacity. In the case of an operating system failure, vSphere HA restarts the affected virtual machine on the same server.

VMware HA ensures that capacity is always available to restart all virtual machines affected by a server failure. HA continuously and intelligently monitors capacity utilization 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 remediation steps.

VMware vSphere High Availability (HA) provides easy-to-use, cost effective high availability for applications running in virtual machines. In the event of physical server failure, affected virtual machines are automatically restarted (rebooted) on other production servers with spare capacity. In the case of operating system failure, vSphere HA can be configured to restart the affected virtual machine on the same physical server.

You must understand the native reliability offer or the HA capabilities of a product that VMware HA can overlay to replace a failed server. Where earlier a technician manually replaced the hardware

of the server, you can now deploy VMware HA, which is the additional layer similar to a replacement hardware server, automatically within minutes.

 **Note:**

In addition to VMware HA, each of the applications have their own HA capabilities that can be leveraged for full redundancy. For more information related to High Availability of a specific product, see *Deploying <product name> in an Avaya Customer Experience Virtualized Environment guide*.

For more information about VMware HA, see the VMware website: <http://www.vmware.com/files/pdf/VMware-High-Availability-DS-EN.pdf>.

Glossary

| | |
|--------------------|---|
| Application | A software solution development by Avaya that includes a guest operating system. |
| 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. |
| EASG | Enhanced Access Security Gateway. The Avaya Services Logins to access your system remotely. The product must be registered using the Avaya Global Registration Tool for enabling the system for Avaya Remote Connectivity. |
| ESXi | A virtualization layer that runs directly on the server hardware. Also known as a <i>bare-metal hypervisor</i> . 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. |
| 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 Web client version is VMware 6.5 and later.

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