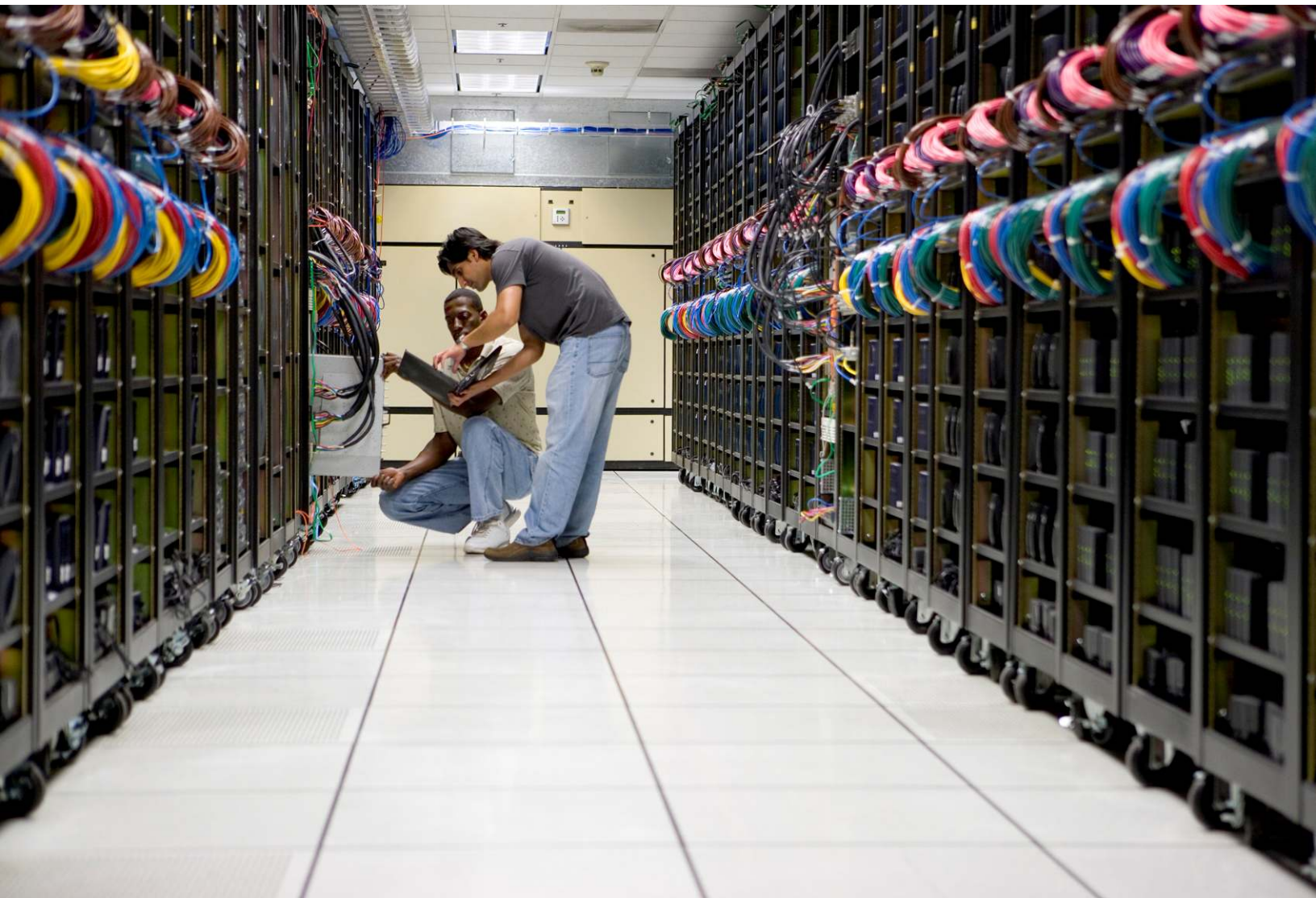
Best Practices for Unified Communications Management Suite on Virtualization

White Paper



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Usage and Audience

Best Practices for Cisco Unified Communications Management Suite on Virtualization provides requirements, recommendations, policies, and performance metrics to aid in deploying the Cisco® Unified Communications Management Suite (UCMS) components on VMware vSphere.

This document is intended for anyone responsible for the design or configuration of any Cisco Unified Communications Management Suite components on VMware vSphere. Successful deployments require configuration of Cisco Unified Communications Management Suite application servers, VMware vSphere software, server hardware, data networking, and storage.

Although installation of the Cisco Unified Communications Management Suite components on VMware vSphere is identical to installation on a physical server, this guide highlights the considerations for deploying Cisco Unified Communications Management Suite in a virtualized environment.

The following components are part of Cisco Unified Communications Management Suite:

- Cisco Prime™ Unified Operations Manager (UOM)
- Cisco Prime Unified Service Monitor (USM)
- Cisco Unified Service Statistics Manager (USSM)
- Cisco Prime Unified Provisioning Manager (UPM)

Introduction

Virtualization has emerged as a leading trend in enterprises. Organizations are embracing virtualization in enterprises for a variety of reasons, including total cost of ownership (TCO), consolidation, operational efficiency and flexibility, disaster recovery and business continuity, security, and reduced carbon footprint.

Cisco is committed to leading the transition toward virtualization through innovative products and solutions. In that effort, Cisco Unified Communications Management Suite can now be run on the VMware vSphere platform, part of the VMware Infrastructure suite.

Deploying Cisco Unified Communications Management Suite on VMware vSphere delivers the following advantages:

- Extends the benefits of virtualization and storage data center investments to Cisco Unified Communications Management Suite
- Maintains the same predictable scalability provided by running the Cisco Unified Communications Management Suite application on a dedicated non-VMware (physical) server

You can virtualize the Cisco Unified Communications Management Suite in various configurations based on the number of phones being managed.

To virtualize Cisco Unified Communications Management Suite applications, users must provide the hardware, VMware vSphere software, and Microsoft Windows Server OS software following the requirements of the Cisco Unified Communications Management Suite products. Users are also responsible for obtaining support for the above components including provisioning and performance troubleshooting.

As mentioned above, you will need to arrange the OS yourself. The correct steps for installation will be to run the Open Virtualization Archive (OVA) file first for sizing, then install the OS needed, and then install the required UCMS application on top of it.

VMware vSphere Requirements

For best results when deploying the Cisco Unified Communications Management Suite in a virtualized environment, the following requirements should be met at the VMware ESX level for the entire Cisco Unified Communications Management Suite:

- VMware ESX 4.x and VMware ESXi 5.0.
- VMware ESX and ESXi should be deployed in a configuration supported by VMware.
- All the hardware components such as servers, CPU, storage, and Storage Area Network (SAN) models should be compatible with the VMware comprehensive compatibility guides posted at http://www.vmware.com.
- The VMware ESX and ESXi host/IP must be reachable.
- VMware Infrastructure client must be able to access the VMware ESX and ESXi host.
- The virtual network interface card (vNIC) on a Cisco Unified Communications Management Suite application virtual machine (VM) should be configured with a static MAC address.

Each component of the Cisco Unified Communications Management Suite has a minimum requirement to run successfully on VMware 3.5. The following sections outline the individual product requirements.

VMware Infrastructure Feature Support

Users should follow the recommended templates for Cisco Unified Communications Management Suite component virtual machine resource configuration.

Virtualizing Cisco Prime Unified Operations Manager on VMware vSphere

Requirements

- VMware ESX and ESXi requirements should be met.
- Cisco Prime Unified Operations Manager should be installed.
- Cisco Prime Unified Operations Manager virtual machine configuration properties must match or exceed a virtual machine template. (See the "Cisco Prime Unified Operations Manager Virtual Machine Templates" section.)
- Disk size and I/O performance should meet or exceed the required level.
- The Cisco Prime Unified Operations Manager virtual machine clock (time) must be reliably kept in sync with true time. (See "Timekeeping Basics" from Timekeeping in VMware Virtual Machines.)
- The Cisco Prime Unified Operations Manager virtual machine must have VMware Tools installed. (See "Installing VMware Tools" on the VMware website.)

Cisco Prime Unified Operations Manager Virtual Machine Templates

Scalability for Cisco Prime Unified Operations Manager on VMware ESX and ESXi can be predicted by adhering to the hardware requirements and virtual configuration parameters in the following virtual machine templates.

A virtual machine template defines the virtual machine configuration, which includes CPU, memory, disk, and network resources. The configuration of a Cisco Prime Unified Operations Manager virtual machine must match a supported virtual machine template defined in Table 1. The supported UOM OVA templates are listed in Table 2.

Table 1. UOM Virtual Machine Templates

Requirement Type	Small Template For up to 1000 IP Phones and 300 Devices	Medium Template For up to 10,000 IP Phones and 1000 Devices	Medium Template For up to 30,000 IP Phones and 2000 Devices	Large Template For up to 60,000 IP Phones (including 45k) and 2500 Devices
vCPU	2000 MHz, 1 vCPU	4000 MHz, 2 vCPU	8000 MHz, 4 vCPU	8000 MHz, 4 vCPU
Memory	3 GB	8 GB	8 GB	12 GB
vNIC	1 with static MAC	1 with static MAC	1 with static MAC	1 with static MAC
vDisk	vDisk1: 84 GB	vDisk1: 84 GB	vDisk1: 84 GB	vDisk1: 100 GB
Input/Output Operations per Second (IOPS)*	To be announced	To be announced	To be announced	To be announced

* This measurement is a work in progress.

Table 2. Supported UOM OVA Templates (Note: the UOM standalone ova's in CCO have the OS sizing also built in. But for the UOM/USM OVA's the OS requirement is not built in. Also the OVA only does the sizing of the VM. It does not contain the application or OS software. You can deploy the OVA and then install the OS and the applications).

Application and OVA Capacity	vCPU Cores	vRAM/Memory	vDisk	IOPS (Avg)	IOPS (Max)	vNIC
UOM 1000 Server OVA	2	3 GB	84 GB			1
UOM 10,000 Server OVA	2	8 GB	84 GB			1
UOM 30,000 Server OVA	4	8 GB	84 GB			1
UOM 60,000 Server OVA	4	12 GB	100 GB			1
UOM/USM 1000 Server OVA	2	3 GB	84 GB			1
UOM/USM 10,000 Server OVA	4	8 GB	84 GB			1
UOM/USM 30,000 Server OVA	4	8 GB	84 GB			1
UOM/USM 60,000 Server OVA	8	20 GB	100 GB			

VMware Backup

All the VMware products can be backed up using VMware Data Recovery (VDR) and then restored. For more information on VDR, go to http://www.vmware.com/products/data-recovery/.

Software Installation and System Setup

Installation of Cisco Prime Unified Operations Manager and the system setup follow the same processes described in the Cisco Prime Unified Operations Manager installation guide, available at http://www.cisco.com/en/US/products/ps6535/prod_installation_guides_list.html.

- Create a virtual disk on a data store with sufficient I/O as outlined in the "Cisco Prime Unified Operations Manager Virtual Machine Templates" section of this guide.
- Install Cisco Unified Operations Manager on vDisk1 defined in the "Cisco Prime Unified Operations Manager Virtual Machine Templates" section of this guide.
- Follow the Cisco Prime Unified Operations Manager Installation Guide instructions for installing, uninstalling, and upgrading Cisco Prime Unified Operations Manager. (The other options in the installation guide do not apply in the virtualization context.)

Licensing

A static MAC address needs to be configured on the virtual machine to use the Cisco Prime Unified Operations Manager.

Note: The MAC must be within the allowed VMware MAC address range: 00:50:56:00:00:00 to 00:50:56:3F:FF:FF. The Cisco license is issued only to the static MAC address on the virtual machine.

Virtualizing Cisco Prime Unified Service Monitor on VMware vSphere

Requirements

- VMware ESX and ESXi requirements should be met.
- Cisco Prime Unified Service Monitor should be installed.
- Cisco Prime Unified Service Monitor virtual machine configuration properties must match or exceed a virtual machine template. (See the "Cisco Prime Unified Service Monitor Virtual Machine Templates" section.)
- Disk size and I/O performance should meet or exceed the required level.
- The Cisco Prime Unified Service Monitor virtual machine must have VMware Tools installed. (See "Installing VMware Tools" on the VMware website.)
- The Cisco Prime Unified Service Monitor virtual machine clock (time) must be reliably kept in sync with true time. (See "Timekeeping Basics" from Timekeeping in VMware Virtual Machines.)

Cisco Prime Unified Service Monitor Virtual Machine Templates

Scalability for Cisco Prime Unified Service Monitor on VMware ESX can be predicted by adhering to the hardware requirements and virtual configuration parameters in the following virtual machine templates.

A virtual machine template defines the virtual machine configuration, which includes CPU, memory, disk, and network resources. The configuration of a Cisco Prime Unified Service Monitor virtual machine must match a supported virtual machine template defined in this section. The size of the template is defined based on the number of IP phones, call detail records (CDRs), and Cisco 1040 Sensor or Network Analysis Module (NAM) RTP streams per minute monitored by each Cisco Prime Unified Service Monitor instance. The configuration of a Cisco Prime Unified Service Monitor virtual machine must match a supported virtual machine template defined in Table 3. The supported USM OVA templates are listed in Table 4.

Note: These templates for CUSM have to be created by customer and the resources required for each deployment is given below.

Table 3. USM Virtual Machine Templates (**Note: the vDisk is excluding OS requirements so will be more than listed here. The vDisk listed here is for the USM software only not for the Operating System)**

Requirement Type	Small Template For up to 1000 IP Phones, 50 CDRs per Minute, and 100 Cisco 1040/NAM Streams per Minute or 50cdrs/100 streams if having both	Medium Template For up to 10,000 IP Phones, 150 CDRs per Minute, and 1000 Cisco 1040/NAM Streams per Minute or 150 cdrs/800 streams if both	Medium Template For up to 30,000 IP Phones, 500 CDRs per Minute, and 5000 Cisco 1040/NAM Streams per Minute or 500 cdrs/1500 streams if having both	Large Template For up to 60,000 IP Phones, 600 CDRs per Minute, or 5000 Cisco 1040/NAM Streams per Minute (500 cdr/1500 streams if having both CDR's and 1040/NAM)
vCPU	4000 MHz, 2 vCPU	4000 MHz, 2 vCPU	8000 MHz, 4 vCPU	8000 MHz, 4 vCPU
Memory	4 GB	4 GB	4 GB	8 GB
vNIC	1 with static MAC	1 with static MAC	1 with static MAC	1 with static MAC
vDisk	84 GB	84 GB	84 GB	100 GB
IOPS*	To be announced	To be announced	To be announced	To be announced

* This measurement is a work in progress.

VMware Backup

All the VMware products can be backed up using VDR and then restored. For more information on VDR, go to http://www.vmware.com/products/data-recovery/.

Software Installation and System Setup

Installation of Cisco Prime Unified Service Monitor and the system setup follow the same processes described in the Cisco Prime Unified Service Monitor installation guide, available at http://www.cisco.com/en/US/products/ps6536/prod_installation_guides_list.html.

- Create a virtual disk on a data store with sufficient I/O as outlined in the "Cisco Prime Unified Service Monitor Virtual Machine Templates" section of this guide.
- Install Cisco Prime Unified Service Monitor on vDisk1 defined in the "Cisco Prime Unified Service Monitor Virtual Machine Templates" section of this guide.
- For Cisco Prime Unified Service Monitor, follow the installation guide instructions for installing, uninstalling, and upgrading Cisco Prime Unified Service Monitor. (The other options in the installation guide do not apply in the virtualization context.)

Licensing

A static MAC address needs to be configured on the virtual machine to use the Cisco Prime Unified Service Monitor.

Note: The MAC must be within the allowed VMware MAC address range: 00:50:56:00:00:00 to 00:50:56:3F:FF:FF. A Cisco license is issued only to the static MAC address on the virtual machine.

Virtualizing Cisco Unified Service Statistics Manager on VMware vSphere

Requirements

- VMware ESX and ESXi requirements should be met.
- Cisco Unified Service Statistics Manager should be installed.
- Cisco Unified Service Statistics Manager virtual machine configuration properties must match or exceed a virtual machine template. (See the "Cisco Unified Service Statistics Manager Virtual Machine Template" section.)
- Disk size and I/O performance should meet or exceed the required level.
- The Cisco Unified Service Statistics Manager virtual machine must have VMware Tools installed. (See "Installing VMware Tools" on the VMware website.)
- The Cisco Unified Service Statistics Manager virtual machine clock (time) must be reliably kept in sync with true time. (See "Timekeeping Basics" from Timekeeping in VMware Virtual Machines.)

Cisco Unified Service Statistics Manager Virtual Machine Templates

Scalability for Cisco Unified Service Statistics Manager on VMware ESX and ESXi can be predicted by adhering to the hardware requirements and virtual configuration parameters in the following virtual machine templates.

A virtual machine template defines the virtual machine configuration, which includes CPU, memory, disk, and network resources. The configuration of a Cisco Unified Service Statistics Manager virtual machine must match a supported virtual machine template defined in Table 4. The supported USSM OVA templates are listed in Table 5.

Table 4. USSM Virtual Machine Templates

Requirement Type	Small Template For up to 1000 IP Phones	Medium Template For up to 10,000 IP Phones	Medium Template For up to 30,000 IP Phones	Large Template For up to 45,000 IP Phones
vCPU	2000 MHz, 1 vCPU	2000 MHz, 1 vCPU	4000 MHz, 2 vCPU	4000 MHz, 2 vCPU
Memory	4 GB	4 GB	4 GB	4 GB
vNIC	1 with static MAC	1 with static MAC	1 with static MAC	1 with static MAC
vDisk	vDisk1: 60 GB	vDisk1: 60 GB	vDisk1: 60 GB	vDisk1: 60 GB
IOPS*	To be announced	To be announced	To be announced	To be announced

* This measurement is a work in progress.

Table 5. Supported USSM OVA Templates

Application and OVA Capacity	vCPU Cores	vRAM/Memory	vDisk	IOPS (Avg)	IOPS (Max)	vNIC
USSM 1000 Server OVA	1	4 GB	60 GB			1
USSM 10,000 Server OVA	1	4 GB	60 GB			1
USSM 30,000 Server OVA	2	4 GB	60 GB			1
USSM 45,000 Server OVA	2	4 GB	60 GB			1

VMware Backup

All the VMware products can be backed up using VDR and then restored. For more information on VDR, go to http://www.vmware.com/products/data-recovery/.

Software Installation and System Setup

Installation of Cisco Unified Service Statistics Manager and the system setup follow the same processes described in the Cisco Unified Service Statistics Manager 8.5 installation guide, available at http://www.cisco.com/en/US/products/ps7285/prod_installation_guides_list.html.

- Create a virtual disk on a data store with sufficient I/O as outlined in the "Cisco Unified Service Statistics Manager Virtual Machine Template" section of this guide.
- Install Cisco Unified Service Statistics Manager on the vDisk1 defined in the "Cisco Unified Service Statistics Manager Virtual Machine Template" section of this guide.
- For Cisco Unified Service Statistics Manager, follow the installation guide instructions for installing, uninstalling, and upgrading Cisco Prime Unified Service Monitor. (The other options in the installation guide do not apply in the virtualization context.)

Licensing

A static MAC address needs to be configured on the virtual machine to use the Cisco Unified Service Statistics Manager.

Note: The MAC must be within the allowed VMware MAC address range: 00:50:56:00:00:00 to 00:50:56:3F:FF:FF. A Cisco license is issued only to the static MAC address on the virtual machine.

Virtualizing Cisco Prime Unified Provisioning Manager on VMware vSphere

Requirements

- VMware ESX requirements should be met.
- Cisco Prime Unified Provisioning Manager should be installed.
- Cisco Prime Unified Provisioning Manager virtual machine configuration properties must match or exceed a virtual machine template. (See the "Cisco Prime Unified Provisioning Manager Virtual Machine Templates" section.)
- Disk size and I/O performance should meet or exceed the required level.
- The Cisco Prime Unified Provisioning Manager virtual machine must have VMware Tools installed. (See "Installing VMware Tools" on the VMware website.)
- The Cisco Prime Unified Provisioning Manager virtual machine clock (time) must be reliably kept in sync with true time. (See "Timekeeping Basics" from Timekeeping in VMware Virtual Machines.)

Cisco Prime Unified Provisioning Manager Virtual Machine Templates

Scalability for Cisco Prime Unified Provisioning Manager on VMware ESX can be predicted by adhering to the hardware requirements and virtual configuration parameters in the following virtual machine templates.

A virtual machine template defines the virtual machine configuration, which includes CPU, memory, disk, and network resources. The configuration of a Cisco Prime Unified Provisioning Manager virtual machine must match a supported virtual machine template defined in Table 6. The supported UPM OVA templates are listed in Table 7.

Table 6. Virtual Machine Templates

Requirement Type	Small Template For up to 1000 IP Phones	Medium Template For up to 10,000 IP Phones	Large Template 1 For up to 30,000 IP Phones*	Large Template 2 For up to 60,000 IP Phones*
vCPU	2000 MHz, 1 vCPU	8000 MHz, 4 vCPU	8000 MHz, 4 vCPU on each of the application and database servers	8000 MHz, 4 vCPU on each of the application and database servers
Memory	2 GB	4 GB	4 GB on each of the application and database servers	4 GB on the application server and 8 GB on the database servers
vNIC	1 with static MAC	1 with static MAC	1 with static MAC	1 with static MAC
vDisk	vDisk1: 30 GB	vDisk1: 60 GB	vDisk1: 30/80 GB**	vDisk1: 30/120 GB**
IOPS (Avg/Max)***	100/500	100/500	100/500	100/500

* For large template use, the distributed deployment, Cisco Prime Unified Provisioning Manager application, and database server are deployed on different virtual machines. It is preferable to deploy the Cisco Prime Unified Provisioning Manager application and database server on the same physical server (ESX).
** vDisk1 is 30 GB for the Cisco Prime Unified Provisioning Manager application, and it is 80/120 GB for the database server.
*** IOPS are for each Communications Manager publisher synchronized in parallel. If there is only one Communications Manager publisher, then IOPS are 100/500. The maximum figures would be expected during nightly Infrastructure or subscriber syncs. Cisco Unified Communications Manager throttles traffic between itself and Unified Provisioning Manager to preserve Communications Manager call processing performance.

Table 7. Supported OVA Templates

Application, OVA Capacity, and Notes Plus Download Link	vCPU Cores	vRAM/Memory	vDisk	IOPS (Avg)*	IOPS (Max)*	vNIC	Notes
UPM up to 1000 Phones (VM-CUCMS_1S)	1	2 GB	30 GB	100	500	1	
UPM 1000 to 10,000 Phones	4	4 GB	40 GB**	100	500	1	
UPM 10,000 to 60,000 Phones Application Server	4	4 GB	30 GB***	100	500	1	Requires database VM
UPM 10,000 to 60,000 Phones Database Server	4	8 GB	120 GB***	100	500	1	Requires application VM

Notes:
* IOPS are for each Communications Manager publisher synced in parallel. If there is only one Communications Manager publisher, IOPS are 100/500. The maximum figures would be expected during nightly infrastructure or subscriber syncs, but may occur during large searches.
** UPM requires SAS or SCSI drives for deployments over 1000 phones up to 10,000 phones. (Disks must be aligned.)
*** UPM requires FC SAS for deployments over 10,000 phones. (Disks must be aligned.)

VMware Backup

All the VMware products can be backed up using VDR and then restored. For more information on VDR, go to http://www.vmware.com/products/data-recovery/.

Software Installation and System Setup

Installation of Cisco Prime Unified Provisioning Manager and the system setup follow the same processes described in the Cisco Prime Unified Provisioning Manager installation guide, available at http://www.cisco.com/en/US/products/ps7125/prod_installation_guides_list.html.

- Create a virtual disk on a data store with sufficient I/O as outlined in the "Cisco Prime Unified Provisioning Manager Virtual Machine Templates" section of this guide.
- Install Cisco Prime Unified Provisioning Manager on vDisk1 defined in the "Cisco Prime Unified Provisioning Manager Virtual Machine Templates" section of this guide.
- For Cisco Prime Unified Provisioning Manager, follow the installation guide instructions for installing, uninstalling, and upgrading Cisco Prime Unified Provisioning Manager. (The other options in the installation guide do not apply in the virtualization context.)

Licensing

A static MAC address needs to be configured on the virtual machine to use the Cisco Prime Unified Provisioning Manager.

Note: The MAC must be within the allowed VMware MAC address range: 00:50:56:00:00:00 to 00:50:56:3F:FF:FF. A Cisco license is issued only to the static MAC address on the virtual machine.

Coresident Virtual Machine Template

Operations Manager, Service Monitor, Service Statistics Manager, and Provisioning Manager can be coresident with up to 10,000 phones. Table 8 provides the virtual machine template for this type of coresident installation. The supported OVA templates for coresident installation are listed in Table 9.

Table 8. Virtual Machine Templates for Coresident Installation

Requirement Type	Coresident Template For up to 10,000 Phones
vCPU	16,000 MHz, 8 vCPU
Memory	16 GB
vNIC	1 with static MA
vDisk	vDisk1: 320 GB Unified Service Statistics Manager
IOPS*	To be announced

* This measurement is a work in progress.

Table 9. Supported OVA Templates for Coresident Installation

Application and OVA Capacity	vCPU Cores	vRAM/Memory	vDisk	IOPS (Avg)	IOS (Max)	vNIC
UCMS 2000 Server OVA	4	8 GB	100 GB			1
UCMS 10,000 Server OVA	8	16 GB	100 GB			1

VMware Backup

All the VMware products can be backed up using VDR and then restored. For more information on VDR, go to http://www.vmware.com/products/data-recovery/.

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