ArubaOS 8.3.0.0 Virtual Appliance



a Hewlett Packard Enterprise company Installation Guide

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Revision History

The following table lists the revisions of this document.

Table 1: Revision History

Revision	Change Description
Revision 01	Initial release.

This guide describes the steps to install, configure, and deploy the Mobility Master Virtual Appliance or Mobility Controller Virtual Appliance on:

- vSphere Hypervisor
- Kernel-Based Virtual Machine (KVM) Hypervisor
- Windows Hyper-V



The steps to deploy a Mobility Master Virtual Appliance and Mobility Controller Virtual Appliance as a standby controller or managed device are the same.

For information related to licensing, refer to the *Aruba Mobility Master Licensing Guide*.

Important

The following sections of the guide have references to configuration changes that need to be made when installing a Mobility Controller Virtual Appliance or Mobility Master Virtual Appliance:

- ArubaOS VM Requirements
- Assigning Network Connections

Conventions

The following conventions are used throughout this document to emphasize important concepts:

Table 2:	Typographical Conventions
----------	---------------------------

Type Style	Description
Italics	This style is used to emphasize important terms and to mark the titles of books.
System items	 This fixed-width font depicts the following: Sample screen output System prompts Filenames, software devices, and specific commands when mentioned in the text
Commands	In the command examples, this bold font depicts text that you must type exactly as shown.
<arguments></arguments>	In the command examples, italicized text within angle brackets represents items that you should replace with information appropriate to your specific situation. For example: # send <text message=""> In this example, you would type "send" at the system prompt exactly as shown, followed by the text of the message you wish to send. Do not type the angle brackets.</text>
[Optional]	Command examples enclosed in brackets are optional. Do not type the brackets.
{Item A Item B}	In the command examples, items within curled braces and separated by a vertical bar represent the available choices. Enter only one choice. Do not type the braces or bars.

The following informational icons are used throughout this guide:



Indicates helpful suggestions, pertinent information, and important things to remember.



Indicates a risk of damage to your hardware or loss of data.



Indicates a risk of personal injury or death.

Contacting Support

Table 3: Contact Information

Main Site	arubanetworks.com
Support Site	support.arubanetworks.com
Airheads Social Forums and Knowledge Base	<u>community.arubanetworks.com</u>
North American Telephone	1-800-943-4526 (Toll Free) 1-408-754-1200
International Telephone	arubanetworks.com/support-services/contact-support/
Software Licensing Site	hpe.com/networking/support
End-of-life Information	arubanetworks.com/support-services/end-of-life/
Security Incident Response Team	Site: <u>arubanetworks.com/support-services/security-bulletins/</u> Email: <u>sirt@arubanetworks.com</u>

What's New

This section lists the new features and enhancements released in this version of the installation guide.

Support on New Platforms

This release of ArubaOS supports installation using the following platforms:

- Windows Hyper-V
- VMware vCenter

ArubaOS VM Requirements

Listed below are the minimum resources required for ArubaOS VM to function:

NOTE

If the prescribed vCPU and Memory values are not configured during the initial setup the following error message is displayed "**Minimum 6GB memory (actual 3GB) or minimum 4 CPU (actual 3 CPU) requirement not met**"



For the Aruba Mobility Master Virtual Appliance and Mobility Controller Virtual Appliance to function as expected on a VMware ESXi server with NIC teaming, LACP should be configured and enabled between the VMware ESXi host and upstream switch.

SKUs	Total vCPU (hyper threaded)	Memory (GB)	Flash/Disk (GB)	Total Supported Interfaces
MM-VA- 50	3	6	6	2 data ports (0/0/0, 0/0/1), 1 mgmt port
MM-VA- 500	6	8	8	2 data ports (0/0/0, 0/0/1), 1 mgmt port
MM-VA- 1K	8	32	32	2 data ports (0/0/0, 0/0/1), 1 mgmt port
MM-VA- 5K	10	64	64	2 data ports (0/0/0, 0/0/1), 1 mgmt port
MM-VA- 10K	16	128	128	2 data ports (0/0/0, 0/0/1), 1 mgmt port

Table 4: Memory and CPU Allocation - Mobility Master Virtual Appliance

NOTE: Aruba recommends using Intel Xeon E5-2650 v4 @ 2.2GHz enterprise grade CPUs for optimum performance.

SKUs	Total vCPU (hyper threaded)	Memory (GB)	Flash/Disk (GB)	Total Supported Interfaces
MC-VA- 10	4	6	6	3 data ports (0/0/0, 0/0/1, 0/0/2), 1 mgmt port
MC-VA- 50	4	6	6	3 data ports (0/0/0, 0/0/1, 0/0/2), 1 mgmt port
MC-VA- 250	5	8	8	3 data ports (0/0/0, 0/0/1, 0/0/2), 1 mgmt port
MC-VA- 1K	6	16	16	3 data ports (0/0/0, 0/0/1, 0/0/2), 1 mgmt port
MC-VA- 4K	12	48	48	3 data ports (0/0/0, 0/0/1, 0/0/2), 1 mgmt port
MC-VA- 6K	14	64	64	3 data ports (0/0/0, 0/0/1, 0/0/2), 1 mgmt port

NOTE: Aruba recommends using Intel Xeon E5-2670 v3 @ 2.3GHz enterprise grade CPUs for optimum performance.



NOT

MC-VA-10 is not an orderable SKU. It is a license for 10 APs to terminate on the Mobility Controller Virtual Appliance and can be installed on MC-VA-50.

MC-VA-4K and MC-VA-6K are not orderable SKUs. However, you can scale up by installing multiple instances of MC-VA-1K. For example to deploy 4K APs on a single Mobility Controller Virtual Appliance, you need to add four MC-VA-1K licenses.

The hypervisor host should not be oversubscribed in terms of number of VMs configured on a host as it adversely impacts the functionality and performance of ArubaOS. In instances where more than one VM is setup in a hypervisor, then:

- The number of logical processors reported on the hypervisor should be higher or equal to the sum of vCPUs allocated to each VM setup in that host.
- The sum of the memory allocated to each VM should not exceed the overall host memory capacity reported.
- The total CPU utilization, memory usage, and network throughput should not exceed 80% of the host capacity.



Ensure the number of sockets and threads is always one and the value of cores is the same as the current allocation.

Prerequisites

Ensure that the following prerequisites are addressed before starting the installation:

- vSphere Hypervisor 5.1, 5.5, 6.0, or 6.5 is installed on the server that hosts the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance as a guest.
- vSphere Client/vCenter is installed on a Windows machine.
- OVF/ISO template is obtained from an Aruba representative and accessible from vSphere Client/vCenter.



Support is not available for vSphere Web Client.

Logging Into ESXi Host Using vSphere Client

Follow the steps to log in to the vSphere ESXi Host:

- 1. Open the vSphere Client.
- 2. Enter the IP address or name of the vSphere Hypervisor in the IP address / Name field.
- 3. Enter the user name in the **User name** field.
- 4. Enter the password in the **Password** field.
- 5. Click Login.

The **vSphere Client** page is displayed.

Creating A VM Network For Management

Follow the steps below to create a VM network for management:

- 1. Log in to the vSphere ESXi Host using vSphere Client. For additional information, see <u>Logging Into ESXi Host</u> Using vSphere Client.
- 2. From the vSphere Client page, click **Inventory**.
- 3. Click **Configuration** tab.
- 4. Click **Networking** from the **Hardware** menu.
- 5. Click Add Networking.

The Add Network Wizard is displayed.

```
Figure 1 Adding A Network
```

loc	localhost.Jocaldomain VMware ESXi, 5.5.0, 2068190						
Ge	etting Started Summary Virtual Ma	achines Resource Allocation Performan	Configuration Local Users & Groups Events Permissions				
н	ardware	View: vSphere Standard Switch					
	Health Status	Networking		Refresh	Add Networking	Properties	
	Processors						
	Memory	Standard Switch: vSwitch0	Remove Properties				
	Storage	VMkernel Port	Physical Adapters				
- L	Networking		👷 🔶 🚛 📟 vmnic0 1000 Full 🖓				
	Storage Adapters	vmk0:10.16.12.27					
	Network Adapters						
	Advanced Settings						
	Power Management						

6. Select the Virtual Machine radio button and click Next.

7. Select the **vSwitch** that has **VMkernel** port mapped for ESXi management network and click **Next**.

Figure 2 Selecting A Network Adapter For Management

Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch using the unclaimed network adapters listed below.								
0	Create a vSphere standard switch Speed Networks							
	Intel Corporation 82599EB 10-Gig	jabit SFP+ Netv	work Connection					
	Vmnic2	Down	None					
	🔲 🔛 vmnic3	Down	None					
	Intel Corporation 1350 Gigabit Ne	twork Connect	ion					
	🔲 🔛 vmnic1	1000 Full	0.0.0.1-255.255.255.254					
\odot	Use vSwitch0	Speed	Networks					
	Intel Corporation 1350 Gigabit Ne	twork Connect	tion					
	Vmnic0	1000 Full	10.16.12.4-10.16.12.4					
Prev	iew:							
	Virtual Machine Port Group	Physical Adapters						
	Wikernel Port Management Network vmk0 : 10.16.12.27							

8. In the **Port Group Properties** section, provide a name for the management network in the **Network Label** field and select **All (4095)** from the **VLAN ID (Optional)** drop-down list. Click **Next**.

Figure 3 Selecting Port Group Properties

Port Group Properties Network Label: VLAN ID (Optional):	VM Network_Management None (0) All (4095)	
Preview:	- Physical Adapters	
VM Network_Management VM Network Management VMkernel Port Management Network vmk0 : 10.16.12.27		

9. Click **Finish**.

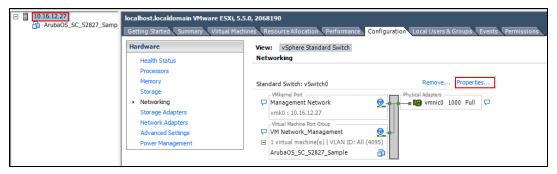


The VM network name is set to VM Network_Management and is used as an example in all configuration procedures.

10.Click the ESXi host IP address.

- 11.Click the **Configuration** tab.
- 12.Click **Networking** from the **Hardware** section.
- 13.Click **Properties** of the **VM Network_Management**.

Figure 4 VM Network Properties_Management



14.Select the VM network that was created for management and click Edit.

Figure 5 Edit Network Properties_Management

🛃 vSw	🕗 vSwitch0 Properties		
Ports	Network Adapters		
Co	nfiguration	Summary	
1	vSwitch	120 Ports	
0	Management Net	vMotion and IP	
9	VM Network_Man	Virtual Machine	
	Add	Edit Ren	nove

15.Click the **Security** tab.

16.Select the **Promiscuous Mode** check box select **Accept** from the drop-down list.

17.Select the Forged Transmits check box and select Accept from the drop-down list.



Forged Transmits should be enabled for $\ensuremath{\mathsf{VRRP}}$ to function.

18.Select the MAC Address Changes check box and select Accept from the drop-down list.19.Click OK.

20.Click Close.

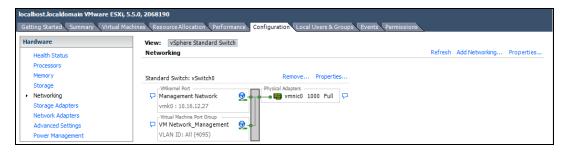
Creating VM Networks For Traffic

Follow the steps below to create a VM network for traffic:

- 1. Repeat steps 1 to 4 of Creating A VM Network For Management.
- 2. Click Add Networking.

The **Add Network Wizard** is displayed.

Figure 6 Adding A Network For Traffic



- 3. Select the Virtual Machine option and click Next.
- 4. Select a **vSwitch** that will handle the network traffic and click **Next**.

Figure 7 Selecting A Network Adapter For Traffic

Add Network Wizard				- 0 X
Virtual Machines - Netwo Virtual machines reach r	ork Access networks through uplink adapters attached to vSphe	ere standard sw	vitches.	
Connection Type Network Access	Select which vSphere standard switch will handle vSphere standard switch using the unclaimed ne			ate a new
Connection Settings Summary	Create a vSphere standard switch Intel Corporation 82599EB 10-Giga	Speed	Networks	
	vmnic2	Down	None	
	🖂 📟 vmnic3	Down	None	
	Intel Corporation I350 Gigabit Netv			=
	vmnic1	1000 Full	0.0.0.1-255.255.255.254	
	O Use vSwitch0	Speed	Networks	
	Intel Corporation I350 Gigabit Netv	1000 Full	10, 16, 12, 4-10, 16, 12, 4	
		1000 Full	10.10.12.4-10.10.12.4	Ŧ
	Preview:			
	Virtual Machine Port Group	-Physical Adapters		
			-	
	J.			
Help			<u><</u> Back Next ≥	Cancel

5. In the **Port Group Properties** section, provide a name for **Network Label** and select **All (4095)** from the **VLAN ID (Optional)** drop-down list. Click **Next**.



🖉 Add Network Wizard				
Virtual Machines - Conne Use network labels to id	ection Settings lentify migration compatible connection	ns common to two or more hosts.		
Connection Type Network Access Connection Settings Summary	Port Group Properties Network Label: VLAN ID (Optional): Preview: Virtual Machine Port Group	VM Network_Traffic None (0) All (4095) Physical Adapters wmnic2	_	
			<u>≤</u> Back	Next > Cancel

6. Click Finish.



Ensure that the Management VM network and the Traffic VM network is isolated to avoid a network loop.

- 7. Click the ESXi host IP address.
- 8. Click the **Configuration** tab.
- 9. Click **Networking** from the **Hardware** section.

10.Click **Properties** of the vSwitch to edit.

Figure 9 VM Network Properties_Traffic

localhost.localdomain VMware ESXi, 5.5.0, 2068190 Getting Started Summary Virtual Machines Resource Allocation Performance Configuration Local Users & Groups Events Permissions		
Hardware Health Status	View: vSphere Standard Switch Networking	
Processors Memory	Standard Switch: vSwitch0	Remove Properties
Storage Networking Storage Adapters	VMkemel Port Management Network vmk0 : 10.16.12.27	Physical Adapters
Network Adapters Advanced Settings	-Virtual Machine Port Group VM Network_Management	
Power Management Software	1 virtual machine(s) VLAN ID: All (4095) ArubaOS_SC_52827_Sample	
Licensed Features Time Configuration	Standard Switch: vSwitch1	Remove Properties
DNS and Routing Authentication Services Virtual Machine Startup/Shutdown Virtual Machine Swapfile Location	Virtual Machine Port Group VM Network_Traffic 1 virtual machine(s) VLAN ID: All (4095) ArubaOS_SC_52827_Sample	Physical Adapters
Security Profile Host Cache Configuration	Standard Switch: vSwitch2	Remove Properties
System Resource Allocation Agent VM Settings Advanced Settings	Virtual Machine Port Group VM Network_Traffic1 I virtual machine(s) VLAN ID: All (4095) ArubaOS_SC_52827_Sample	Physical Adapters

11.Select the VM network that was created for traffic and click Edit

1				
rts Network Adapters		Port Group Properties		
	Summary 120 Ports	Network Label:	VM Network_Traffic	
VM Network_Traff		VLAN ID:	All (4095)	
		Effective Policies		
		Security		
		Promiscuous Mode:	Reject	
		MAC Address Changes:	Accept	
		Forged Transmits:	Accept	
		Traffic Shaping		
		Average Bandwidth:		
		Peak Bandwidth:		
		Burst Size:		
		Failover and Load Balanci	ng	
		Load Balancing:	Port ID	
		Network Failure Detection:	Link status only	
		Notify Switches:	Yes	
		Failback:	Yes	
		Active Adapters:	vmnic2	
		Standby Adapters:	None	
Add	Edit Remove	Unused Adapters:	None	

Figure 10 Edit Network Properties_Traffic

12.Click the **Security** tab.

13.Select the **Promiscuous Mode** check box select **Accept** from the drop-down list.

14.Select the Forged Transmits check box and select Accept from the drop-down list.



Forged Transmits should be enabled for VRRP to function.

15.Select the MAC Address Changes check box and select Accept from the drop-down list.

16.Click **OK**.

17.Click Close.

Create two additional networks for traffic and repeat the steps to enable Promiscuous mode and Forged transmits.



The Mobility Master Virtual Appliance supports three network interfaces and Mobility Controller Virtual Appliance supports four network interfaces. For more information, see What's New on page 9.

If the vSwitch or Distributed vSwitch is configured to use NIC teaming please refer to the <u>Recommendations</u> for NIC Teaming on a vSwitch on page 61 in the Appendix for validated configuration settings.

Deploying the OVF Template

Follow the steps below to deploy the Open Virtual Format (OVF) template:

- 1. Log in to the vSphere ESXi Host using vSphere Client. For additional information, see <u>Logging Into ESXi Host</u> <u>Using vSphere Client</u>.
- 2. Click File > Deploy OVF Template.

The **Deploy OVF Template Wizard** is displayed.



It is recommended to copy the template to the client machine before importing the OVF template.

- 3. Click **Browse** and navigate to the location of the OVA file and click **Next**. The **OVF Template Details** option is highlighted.
- 4. Click **Next**.

The Name and Location option is highlighted..

- In the Name field, enter a name for the OVF template and click Next. The Disk Format option is highlighted.
- Select Thick Provision Lazy Zeroed option and click Next. The Network Mapping option is highlighted.
- 7. Select VM Network_Management from the Destination Networks drop-down list and click Next. The Ready to Complete option is highlighted.

Figure 11 Network Mapping

💋 Deploy OVF Template	🕗 Deploy OVF Template			
Network Mapping What networks should the de	eployed template use?			
Source OVF Template Details Name and Location	Map the networks used in this OVF to	emplate to networks in your inventory		
Disk Format	Source Networks	DestinationNetworks		
Network Mapping	VM Network	VM Network_Management	•	
Ready to Complete		VM Network Management VM Network_Traffic VM Network_Traffic1 VM Network_Traffic2		
	Description:			
	The VM Network network		*	
Help		< Back Next >	Cancel	

Review your preferences before clicking Finish.



Do not select **Power on after deployment** check box in the **Ready to Complete** window.

8. Click Finish.

The OVF template is deployed.



Since the deployment of the OVF template is time consuming, it is highly recommended that the client is on the same VLAN as the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance.

9. Click **OK**.

10.Click Close.

Pre-Allocating Memory

Follow the steps below to pre-allocate memory in the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance:

- 1. Right-click the VM and select **Edit Settings** or click **Edit virtual machine settings** from the **Getting Started** tab.
- 2. From the **Resources** tab select **Memory.**
- 3. Select the Reserve all guest memory (All locked) check box.
- 4. Click **OK**.

Figure 12 Editing Memory Settings

ArubaOS_SC_Test - Virtual Machine Properties			
Hardware Options Resources		Virtual I	Machine Version: 8
Settings	Summary	Resource Allocation	
CPU	0 MHz		
Memory	0 MB	Reserve all guest memory (All locked)	
Disk Advanced CPU	Normal HT Sharing: Any	Shares: Normal 💌	81920 +
Advanced Memory	NUMA No des: 2	Reservation:	0 🕂 MB
		Limit:	60123 <u></u> MB
		Limit based on parent resource pool or current	host
Help		OK	Cancel



Repeat the steps to pre-allocate memory for other ArubaOS VMs.

For more information on memory and CPU allocation refer to sizing tables in What's New on page 9.

Assigning Network Connections

By default the management network is assigned to all network adapters.

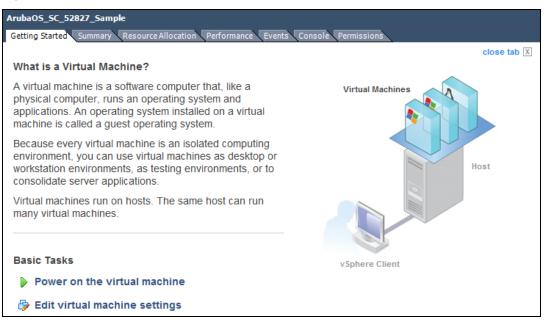


If different networks are not assigned to different adapters it will result in a network loop.

Follow the steps below to assign different networks to different adapters:

1. Click Edit virtual machine settings.

Figure 13 Virtual Machine Settings



2. Select Network adapter2 and select VM Network_Traffic from the Network label drop-down list.

Figure 14 Assigning A Network

🛃 ArubaOS_SC_52827_Sample - Virtual Machine Properties 📃 💷 📧			
Hardware Options Resources		Virtual Machine Version: 8	
Show All Devices	Add Remove	Device Status Connected Connect at power on	
Hardware Memory CPUs Video card VMCI device SCSI controller 0 CD/DVD drive 1 Hard disk 1 Floppy drive 1 Network adapter 1 Network adapter 2 Network adapter 3 Network adapter 4 Serial port 1	Summary 8192 MB 3 Video card Restricted LSI Logic Parallel Client Device Virtual Disk Client Device VM Network_Managem VM Network_Traffic VM Network_Traffic1 VM Network_Traffic2 telnet://:6001	Adapter Type Current adapter: VMXNET 3 MAC Address 00:0c:29:55:26:1d Automatic Manual DirectPath I/O Status: Inactive Network Connection Network Annagement VM Network_Traffic VM Network_Traffic VM Network_Traffic1 VM Network_Traffic1 VM Network_Traffic1	
Help		OK Cancel	

- 3. Repeat the steps and assign:
 - a. Network adapter3 to VM Network_Traffic1
 - b. Network adapter4 to VM Network_Traffic2
- 4. Click **OK**.

Table 6: Network Adapter Mapping

Adpater	Mapping
Network Adapter 1	Out-of-band management
Network Adapter 2	Gigabit ethernet 0/0/0
Network Adapter 3	Gigabit ethernet 0/0/1
Network Adapter 4	Gigabit ethernet 0/0/2



The Mobility Master Virtual Appliance does not support more than three network interfaces, but Mobility Controller Virtual Appliance supports four interfaces.

Enabling Security Profile Configuration

This is an optional step and should be used only if serial console redirection is required. To enable security profile configuration you need to Telnet over the network.

- 1. Click the ESXi host IP address.
- 2. Click the **Configuration** tab.
- 3. In the **Software** section, click **Security Profile**.
- 4. In the **Firewall** section, click **Properties**.
- 5. Select the VM serial port connected over network check box.

Figure 15 Enabling VM Serial Port Connected Over Network

	Label	Incoming Ports	Outgoing Ports	Protocols	Da 🔺
\square	HBR		31031,44046	TCP	N/.
$\mathbf{\nabla}$	rdt	2233	2233	TCP	N/.
$\mathbf{\nabla}$	Fault Tolerance	8100,8200,8300	80,8100,8200,8300	TCP,UDP	N/.
	syslog		514,1514	UDP,TCP	N/.
$\mathbf{\nabla}$	VMware vCenterAgent		902	UDP	St(
	IKED	500	500	UDP	N/ =
\square	VM serial port connected over network	23,1024-65535	0-65535	TCP	N/
	httpClient		80,443	TCP	N/.
$\mathbf{\nabla}$	ipfam	6999	6999	UDP	N/.
\checkmark	DNS Client	53	53	UDP,TCP	N/. +
•		111			•

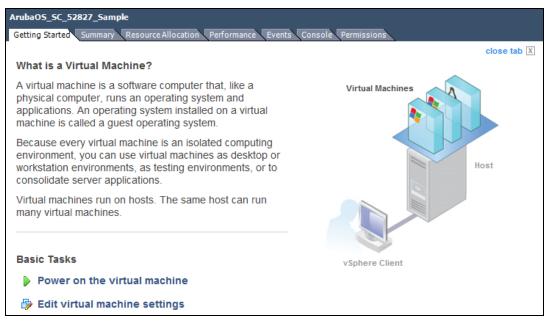
6. Click **OK**.

Configuring Serial Console for the VM

Follow the steps below to configure serial console for the VM:

- 1. Select the VM machine that was created.
- 2. Click Edit virtual machine settings.

Figure 16 Edit Virtual Machine Settings



- 3. On the Hardware tab, click Add.
- 4. Select Serial Port and click Next.
- 5. Select Connect via Network and click Next.

Figure 17 Configuring Serial Console

🕢 Add Hardware		×
Device Type What sort of device do	o you wish to add to your virtual machine?	
Device Type Select Port Type Select Output File Ready to Complete	Choose the type of device you wish to add.	is Virtual Machine.
Help	<u>≤</u> Back N	lext ≥ Cancel

6. Select Server (VM Listens for connection) and enter telnet://:6001 in the Port URI field.

Figure 18 Connecting The Serial Via Network

🕜 Add Hardware	×
Network Serial Port Setting How should this serial port of	
Device Type Select Port Type Select Network Backing Ready to Complete	Network Backing Server (VM listens for connection) Client (VM initiates connection) Port URI: telnet://:6001 Use Virtual Serial Port Concentrator vSPC URI: Device Status Connect at power on I/O Mode Vield CPU on poll Allow the guest operating system to use this serial port in polled mode rather than in interrupt mode.
Help	≤Back Next ≥ Cancel

7. Click **Next > Finish > OK**.

To enable serial console redirect refer to <u>Configuring the Initial Setup on page 56</u>.



If there are multiple VMs on the same ESXi host ensure they are connected to different serial ports.

To access the VM console you must telnet to the IP address of the ESXi host.

Chapter 4 Installing ArubaOS ISO Using vSphere Hypervisor

Logging Into ESXi Host Using vSphere Client

NOTE

This section describes the configuration of the VM using the vSphere Windows client, if vCenter infrastructure is available the same can be achieved through the web interface provided by vCenter.

Follow the steps to log in to the vSphere ESXi Host:

- 1. Open the vSphere Client.
- 2. Enter the IP address or name of the vSphere Hypervisor in the IP address / Name field.
- 3. Enter the user name and password in the **User name** and **Password** fields.
- 4. Click **Login**. The **vSphere Client** page is displayed.

Creating a New VM

- 1. Right click the host IP address and select **New Virtual Machine**.
- 2. Select **Custom > Next**.

Figure 19 Create a New VM

figuration Select the configura	ion for the virtual machine		
iguration and Location ge Machine Version Operating System ork Controler a Disk to Complete	Configuration Typical Create a new virtual machine with the most common devices and o Create a virtual machine with additional devices or specific configura Create a virtual machine with additional devices or specific configura		
ory ork Controller a Disk		tion options.	C

- 3. Enter a name for the new VM in **Name** field.
- 4. Select **Storage** and click **datastore1** as the destination storage. Click **Next**.
- 5. Select the Virtual Machine Version 8.
- 6. Select the Linux radio button for Guest Operating System.
- 7. Select Red Hat Enterprise Linux 6 (64-bit) from the Version drop-down menu. Click Next.

Figure 20 Selecting the Guest Operating System

🕜 Create New Virtual Mac	hine	_ _ X
Guest Operating Syst Specify the guest o	em perating system to use with this virtual machine	/irtual Machine Version: 8
Configuration Name and Location Storage Virtual Machine Version Guest Operating Syst CPUs Memory Network SCSI Controller Select a Disk Ready to Complete	Guest Operating System: C Windows C Linux C Other Version: Red Hat Enterprise Linux 6 (64-bit) Identifying the guest operating system here allows the wizard to provide the appropriate defaults for the operating s	ystem installation.
< Ⅲ → Help	< Back Next >	Cancel

8. Select the required virtual CPUs from the **Number of cores per virtual socket drop-down list**. In this example, six virtual CPUs are used for 500 devices. For more information see, What's New on page 9

Figure 21 Selecting Virtual CPUs

🕜 Create New Virtual Mac	hine				X
CPUs Select the number	of virtual CPUs for the virtual ma	chine.		Virtu	ual Machine Version: 8
Configuration Name and Location Storage Virtual Machine Version Guest Operating System CPUS Memory Network SCSI Controller Select a Disk Ready to Complete	Number of virtual sockets: Number of cores per virtual Total number of cores: The number of virtual CPUs to add to a VM depends on the CPUs on the host and the nu CPUs supported by the gues The virtual CPU configuration this page might violate the lic guest OS. Click Help for information on of processors supported for guest operating systems.	number of imber of it OS. a specified on isense of the the number			
Help			< Back	Next >	Cancel

- 9. Select the required memory. In this example 8 GB RAM is used. Click **Next**.
- 10.Select the required NICs for the network connections. In this example, 3 NICs are used as the installation is on the Mobility Master Virtual Appliance, in case of a Mobility Controller Virtual Appliance 4 NICs should be used.
- 11.Ensure that the **Connect at Power On** check-box is not selected for NIC 2 and NIC 3. This ensures that only the management interface comes up on when the OS boots up.

Network Which network cor	nections will be used by the virtual mach	ine?			Virtu	al Machine Version:
Configuration Name and Location Storage Virtual Machine Version Guest Operating System CPUs Memory Network SCSI Controler Select a Disk Ready to Complete	Create Network Connections How many NICs do you want to Network NIC VM Network NIC VM Network 2 NIC VM Network 3 If supported by this virtual maching Adapter choice can affect both network compatibility. Consult the VMware Kr choosing among the network adapter operating systems and hosts.	e is created, via its Edit Set orking performance and mig nowledgeBase for more info	tings gration prmation on			
Help			_	≤ Back	Next ≥	Cancel

Figure 22 Creating Network Connections

12.Select LSI Logic Parallel as the SCSI controller. Click Next.

13.Select the **Create a new virtual disk** radio button an click **Next**.

14.Create a 4 GB disk space using the **Disk** field. Click **Next**.

Figure 23 Create New Disk

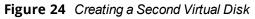
🕜 Create New Virtual Mac	hine	
Create a Disk Specify the virtual	disk size and provisioning policy	Virtual Machine Version: 8
Confouration Name and Location Storage Virtual Machine Version Guest Operating System CPUs Memory Network SCSI Controller Select a Disk Advanced Options Ready to Complete	Capacity Disk GB Disk Provisioning Thick Provision Lazy Zeroed Thick Provision Eager Zeroed Thin Provision Location Store with the virtual machine Specify a datastore or datastore cluster: Browse.	
Help		< Back Next > Cancel

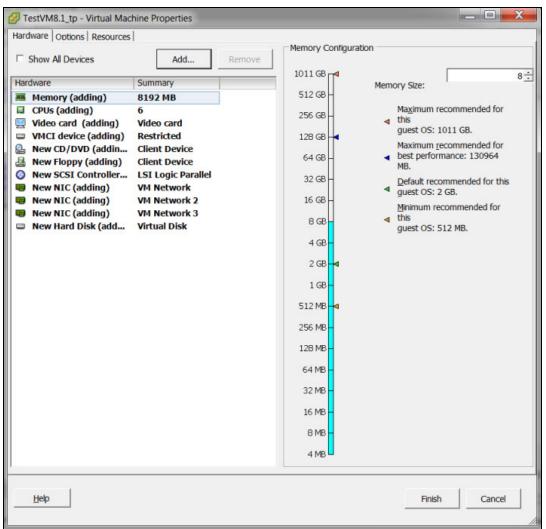
15.Select SCSI (0:0) from the Virtual Device Node drop-down list. Click Next.

Adding a Second Disk Virtual Disk and Serial Port

Follow the steps below to create a second virtual disk and a serial port before the installation.

- 1. Select **Edit the virtual machine settings before** check box. Click **Continue**.
- 2. Click Add in the Virtual Machine Properties page.





- 3. Select **Hard Disk** as the device type. Click **Next**.
- 4. Create a 16 GB disk space using the **Disk** field. Click **Next**. For more information on memory and CPU allocation refer to sizing tables in <u>What's New on page 9</u>
- 5. Select SCSI (0:1) from the Virtual Device Node drop-down list. Click Next.
- 6. Click Finish.
- 7. Select the VM that was created and click **Edit virtual machine settings**.
- 8. Click the **Options** tab and click **Boot Options**.
- 9. Select the Force BOOT Setup and Failed Boot Recovery check boxes. Click OK.

Figure 25 First Boot Options

TestVM8.1_tp - Virtual Machine Properties	
Hardware Options Resources	Virtual Machine Version: 8
Hardware Options Resources Settings Summary General Options TestVM8.1_tp VMware Tools System Default Power Management Suspend Advanced General Normal CPUID Mask Expose Nx flag Boot Options Boot to BIOS Fibre Channel NPIV None CPU/MMU Virtualization Automatic Swapfile Location Use default sett	Firmware Specify the boot firmware: • BIOS E FI A Changing firmware may cause installed guest operating system to Power On Boot Delay Whenever the virtual machine is powered on or reset, delay the system to Force BIOS Setup v The next time the virtual machine boots, force entry into the BIOS setup screen. Failed Boot Recovery v Menet the virtual machine fails to find boot device, automaticaly retry boot after 10 i seconds
Help	OK Cancel
Help	OK Cancel

Deploying the ISO File

- 1. Power on the VM. The BIOS setup screen is displayed.
- 2. In the BIOS setup screen select the **Boot** tab and select **CD-ROM Drive** as the first bootable option. Press **F10** to save and exit.

Figure 26 BIOS Setup Screen

AOS_ISO on localhost.localdoma	iin — 🗆 🗙
<u>F</u> ile Vie <u>w</u> ⊻M ■ ■ ● ⑤ ◎ ◎ ⋒ இ ⊳ ⊘ ⊮	
PhoenixBIOS Setup Utility Main Advanced Security Boot Exit	
CD-ROM Drive	Item Specific Help
+Hard Drive +Removable Devices Network boot from VMware VMXNET3 Network boot from VMware VMXNET3 #2 Network boot from VMware VMXNET3 #3	Keys used to view or configure devices: <enter> expands or collapses devices with a + or - <ctrl+enter> expands all <+> and <-> moves the device up or down. <n> May move removable device between Hard Disk or Removable Disk <d> Remove a device that is not installed.</d></n></ctrl+enter></enter>
F1 Help ↑↓ Select Item -/+ Change Values Esc Exit ↔ Select Menu Enter Select ► Sub-	F9 Setup Defaults Tenu F10 Save and Exit

- 3. Add the ISO file to the local CD drive to enable the VM to select the ISO file from the local CD drive and start the installation.
- 4. Power off and power on the VM to continue with the configurations. For more information, see <u>Configuring</u> the Initial Setup on page 56.

Follow the steps below to deploy the Open Virtual Format (OVF) template using vCenter:

- 1. Login to vCenter.
- 2. Right-click the ESXi host where the ovf will be deployed and click **Deploy OVF Template**. This action can also be done through the **Actions > Deploy OVF Template**.

Figure 27 Deploying the OVF Template

Mare vSphere Web Client	New vApp New Resource Pool Deploy OVF Template Connection Maintenance Mode
 Vcsa.qavm.com Amol SSP SSP-DC Platform-DC 10.16.13.239 ArubaOS_MM_60512-sha1-ne MM-8.2-stdby srini-sample-del (orphaned) 10.16.9.20 	Power Certificates Storage Add Networking Add Diagnostic Partition
ArubaOS_MM_60512-MM1 ArubaOS_MM_8.1.0.0_59206 ArubaOS_MM_8.1.0.2_60417 ArubaOS_MM_8.1.0.2_60858 ArubaOS_VMC_8.1.0.0_5920 ArubaOS_VMC_8.1.0.2_6041 Mui	Reconfigure for vSphere HA Assign License Settings
 Primary Primary Secondary vmcui IO.16.9.25 ArubaOS_MM_8.0.1.0_57204 ArubaOS_MM_8.1.0.2_60858 ArubaOS_VMC_8.1.0.2 ArubaOS_VMC_8.1.0.2_60858 Windows 2012_10.16.9.26 Windows 8 	All vCenter Orchestrator plugin Actions Update Manager

3. Select Local file and click Browse.

- 4. Navigate to the location of the ova template, select the file, click **Open**.
- 5. Click **Next**.
- 6. Provide a name for the VM deployment and select the data center that contains the ESXi host. Click **Next**.

Figure 28 Selecting the Name and Location

🍘 Deploy OVF Template		? >>
 1 Select template 2 Select name and location 	Select name and location Enter a name for the OVF and select a deployment location.	
 3 Select a resource 4 Review details 5 Select storage 6 Ready to complete 	ArubaOS_VMC_8.2.0.0_60872 Filter Browse Select a datacenter or folder.	
	Back Next Finish C	ancel

- 7. Select the ESXi host to run the deployment. Click **Next**.
- 8. Review the details of the deployment and click **Next**.
- 9. In the Select storage window ensure Select Thick Provision Lazy Zeroed option and click Next.
- 10.In the **Select network** window you can either add a standard vSwitch or distributed vSwitch to the source network. Click **Next** and **Finish**.

Figure 29 Selecting a Network

🎁 Deploy OVF Template		? >>
 1 Select template 2 Select name and location 	Select networks Select a destination network for each sour	ce network.
 3 Select a resource 	Source Network	Destination Network
✓ 4 Review details	VM Network	Platform_DPortGroup
 5 Select storage 		Platform_DPortGroup
6 Select networks		Dummy
7 Ready to complete		200_network
		VM Network 3
		VM Network
		Browse
	Description - VM Network	
	The VM Network network	
	IP Allocation Settings	
	IP protocol: IPv4	IP allocation: Static - Manual 🚯
		Back Next Finish Cancel

Adding a Serial Port

Follow the steps below to add a serial port to be configured for serial access.

- 1. Right-click the ESXi where the OVA is displayed and click **Edit Settings**.
- 2. In the Virtual Hardware tab select Serial Port from the New device drop down and click Add,
- 3. Make the following changes:
 - a. For New Serial Port select Use Network.
 - b. For Direction select Server.
 - c. For **Port URL** enter telnet://:<esxi ip address>:<port number>.
- 4. Click **OK** and power on the OVA.

The following steps summarize the flow of steps to be followed to complete the installation:

- 1. Download the ISO file.
- 2. Create a VM running Red Hat Enterprise Linux 6 (64-bit).
- 3. Edit memory, HDD, network settings, and SCSI controller logic.
- 4. Edit the VM to force BIOS and use this to change the OS boot from CD.
- 5. Connect the ISO as CD/DVD from Datastore or local machine.
- 6. Boot the VM. The VM detects ArubaOS from the CD and installs ArubaOS.

Create a New VM

- 1. Download the ISO file from Aruba website and upload the file to the VMware vSphere ESXi hypervisor datastore.
- 2. Right-click the ESXi host where the VM will be created and click **New Virtual Machine > New Virtual Machine**.
- 3. In the **Select a create type** window select **Create a new virtual machine**.
- 4. In the **Select a name folder** window enter a name for the new VM and select a location. Click **Next**.

Figure 30 Name and Location of New VM

🖆 New Virtual Machine		** (*)
 1 Select creation type 1a Select a creation type 	Select a name and folder Specify a unique name and target location	
2 Edit settings	Enter a name for the virtual machine.	
2a Select a name and folder	New Virtual Machine_Tpubs	
2b Select a compute resource	Virtual machine names can contain up to 80 characters and they	rmust be unique within each vCenter Server VM folder.
2c Select storage	Select a location for the virtual machine.	
2d Select compatibility	Q Search	
2e Select a guest OS		
2f Customize hardware	▶ 🛅 Amol	
3 Ready to complete	▶ SSP ↓ ▶ Platform-DC	Select a datacenter or VM folder to create the new virtual machine in.
		Back Next Finish Cancel

- 5. In the **Select a compute resource** window select the location of the host for installation. Click **Next**.
- 6. In the **Select storage** window select the datastore to store the configuration and disk files. Click **Next**.

🔁 New Virtual Machine						(?))
 Select creation type 1a Select a creation type 	Select storage Select the datastore in	which to store the configuration	on and disk files			
 2 Edit settings 2a Select a name and folder 2b Select a compute resource 	The following datasto	atastore Default res are accessible from the de uration files and all of the virtu		at you selected. Select	the destination da	atastore for the
✓ 2c Select storage	Name	Capacity	Provisioned	Free	Туре	Cluster
2d Select compatibility	datastore1 (1)	924.00 GB	76.35 GB	874.77 GB	VMFS 5	
2e Select a guest OS						
2f Customize hardware						
3 Ready to complete						
	•					4
	Compatibility					
	Compatibility che	ecks succeeded.				
				Back	Vext Finis	h Cancel

Figure 31 Select Datastore

- 7. In the **Select compatibility** window, from the drop-down box select the ESXi version running on the vSphere. Click **Next**.
- 8. In the **Select a guest OS** screen, select **Guest OS Family** as Linux and **Guest OS version** as Red Hat Enterprise Linux 6 (64-bit). Click **Next**.

Figure 32 Select Guest Operating System

🔁 New Virtual Machine		? ₩							
Select creation type 1a Select a creation type	elect a guest OS Choose the guest OS that will be installed on the virtual machine dentifying the guest operating system here allows the wizard to provide the appropriate defaults for the operating system								
 1a Select a creation type 2 Edit settings 									
 2a Select a name and folder 	installation.								
 2b Select a compute resource 	Guest OS Family.								
 2c Select storage 	Guest OS Version: Red Hat Enterprise Linux 6 (64-bit)								
 2d Select compatibility 									
✓ 2e Select a guest OS									
2f Customize hardware									
3 Ready to complete	Compatibility: ESXi 6.0 and later (VM versio	n 11)							
		,							
	Back Next Finish Car	ncel							

- 9. In the **Customize hardware** screen make the following changes:
 - a. Change the CPU value to 6.



Aruba recommends increasing the Cores for CPU and keeping the Socket value always at 1.

- b. Click the CPU drop-down and change **Cores per Socket** to 6.
- c. Change the **Memory** from 2048 MB to 8192 MB.

1 New Virtual Machine			?₩
 1 Select creation type 1 a Select a creation type 	Customize hardware Configure the virtual machine hard	dware	
2 Edit settings	Virtual Hardware VM Options	SDRS Rules	
 2a Select a name and folder 	✓ □ *CPU	6	
2b Select a compute resource	Cores per Socket (*)	6 Sockets: 1	
2c Select storage 2d Select compatibility	CPU Hot Plug	Enable CPU Hot Add	
 2e Select a guest OS 	Reservation	0 MHz V	
2f Customize hardware	Limit	Unlimited WHz V	
3 Ready to complete	Shares	Normal + 6000 +	
	CPUID Mask	Expose the NX/XD flag to guest Advanced	
	Hardware virtualization	Expose hardware assisted virtualization to the guest	
	Performance Counters	Enable virtualized CPU performance counters	
	Scheduling Affinity	0	
	CPU/MMU	Automatic V	Ŧ
	New device:	Select Add	
		Compatibility: ESXi 6.0 and later (VM versio	n 11)
		Back Next Finish Ca	ncel

Figure 33 Customize CPU, Cores Per Socket, and Memory

- d. Change the **New SCSI controller** type to **LSI Logic Parallel**.
- e. From the **New device** drop down select **New Hard Disk**. Click **Add**.
- f. From the **New device** drop down select **Network** and click **Add**. Add another network for the installation.

The following steps for configuring a serial port is optional:

- a. From the **New device** drop down select **Serial Port**. Click **Add**.
- b. From the **New Serial Port** drop down select **Use Network** and for **Connection** change **Direction** to **Server**.
- c. Configure the **Port URI** to telnet://:<esxi ip address>:<port number>

Figure 34 Other Modifications

Customize hardware Configure the virtual machine hardware							
Virtual Hardware VM Options	SDRS Rules						
▶ 🔜 New Hard disk	16 🙀 GB 🖵						
✓ Ⅰ New SCSI controller	LSI Logic Parallel						
SCSI Bus Sharing	None 🔹 🕤						
Change Type	LSI Logic Parallel 🗸 🗸						
▶ 飅 New Network	VM Network 🗸 🗸 Connect						
▶ 🝥 New CD/DVD Drive	Client Device						
🕨 🗖 New Floppy drive	Client Device						
Video card	Specify custom settings						
VMCI device							
Mew SATA Controller							
▶ Other Devices							
▶ 🔜 New Hard disk	16 GB						
▼ ID *New Serial port	Use Network						
Status	Connect At Power On						
Connection	Direction Server						
\rightarrow	Port URI: telnet://10.16.13.239:3333						
	Use Virtual Serial Port Concentrator						
	vSPC URI:						
I/O Mode	✓ Yield CPU on poll						
New device: Serial Port - Add							

Installing the ISO on the VM

- 1. Navigate to the ESXi host where the VM was installed.
- 2. Right click and select **Edit Settings**.
- 3. Click the VM Options tab and select Boot Options.
- 4. Select Force Boot Options and Failed Boot Recovery. Click OK.

Figure 35 Boot Options

New VM_TPubs_iso - Edit Settings							
Virtual Hardware	VM Options	SDRS Rules	vApp Options				
 General Options 		VM Name:	New VM_TPubs_is	0		-	
VMware Remote Console Options			Lock the guest operating system when the last remote use disconnects				
▹ VMware Tools		Ex	pand for VMware T	ools settings			
Power manager	nent	Ex	pand for power ma	nagement se	ttings		
Firmware		Choose wh machine:	Choose which firmware should be used to boot the virtual machine:				
		BIOS (reco	mmended)			•	
		-	A Changing firmware might cause the installed guest operating system to become unbootable.				
Boot Delay		Whenever t boot order f	he virtual machine or:	is powered o	n or reset, d	elay the	
		0	milliseconds	5			
Force BIOS setu	ıp (*) 🗲		time the virtual ma tup screen	chine boots,	force entry ir	nto the	
Failed Boot Recovery (*) 🗲			e virtual machine fa ically retry boot afte		oot device,		
		10	second:	6			
 Encryption 		Ex	pand for encryption	n settings			
		_					
Compatibility: ESXi	6.0 and later (\	/M version 11)			ОК	Cancel	

- 5. Click **Power on the virtual machine**. The BIOS prompt is displayed.
- 6. In the **Boot** option change **CD-ROM Drive** to first boot option and **Hard Drive** as the second boot option. Press **F10** to save changes and exit.

Figure 36 Changes to the First Boot Option

Main	Adva	unced	Phoe Secur		Setup Boot	Utility Exit	
	D DOM D						Item Specific Help
CD-ROM Drive -Hard Drive Bootable Add-in Cards UMware Virtual SCSI Hard Drive (0:0) UMware Virtual SCSI Hard Drive (0:1) -Removable Devices Legacy Floppy Drives Network boot from UMware UMXNET3 Network boot from UMware UMXNET3 #2 Network boot from UMware UMXNET3 #3					Keys used to view or configure devices: <enter> expands or collapses devices with a + or - <ctrl+enter> expands all <+> and <-> moves the device up or down. <n> May move removable device between Hard Disk or Removable Disk <d> Remove a device that is not installed.</d></n></ctrl+enter></enter>		
	elp î↓ xit ↔	Select Select		-/+ Enter		Values ► Sub-M	F9 Setup Defaults enu F10 Save and Exit

7. Navigate to the ESxi host where the VM was installed. Click the **Summary** tab.

8. In the VM Hardware section, select CD/DVD drive 1 > Connect to CD/DVD image on a datastore.

Figure 37 Connect the CD/DVD Image on Datastore

🚯 New VM_TPubs_iso 🛛 🛃 👂 📇 🛛 🍪 Actions 🗸									
Getting Started Summ	nary Monitor Config	gure Permissio	ns Snapshots	Datastores	Networks	Update Manager			
Series Time (Balleton)	New VM_TPubs_iso Guest OS: Red Hat Enterprise Linux 6 (64-bit) Compatibility: ESXI 6.0 and later (VM version 11) VM ware Tools: Not running, not installed More info Now King More info DNS Name: DNS Name:								
🔥 VMware Tools is n	ot installed on this virtu:	al machine.							
▼ VM Hardware			▼ VM Storage	Policies					
▶ CPU	6 CPU(s), 143 MHz us	ed	VM Storage Poli	cies	-				
▶ Memory	8192 MB, 2539 MB	memory active	VM Storage Poli	cy Compliance	-				
▶ Hard disk 1	 16.00 GB		Last Checked Date -						
▶ Hard disk 2	32.00 GB	32.00 GB Check Compliance							
Network adapter 1	VM Network 3 (conne	ected)	▼ Tags						
Network adapter 2	VM Network (connect	VM Network (connected)		Category	Des	ription			
▶ Network adapter 3	VM Network (connect	VM Network (connected)		This list is e	mpty.				
OD/DVD drive 1	Disconnected	ه ^{ور} - الا							
Floppy drive 1	Disconnected		host CD device						
Video card	8.00 MB		o CD/DVD image on a datastore						
▶ Other	Additional Hardware	Connect to	ISO image from a	a Content Librar	у				

9. Browse to the location of the ISO file in the datastore, select the ISO file and click **OK**. Verify if the CD/DVD drive is connected in the **Summary** tab.

The installation will be initiated and once the installation is complete the system will be halted.

Figure 38 System Halt

New VM_TPubs_iso	Enforce US Keyboard Layout	View Fullscreen	Send Ctrl+Alt+Delete
Unmounting partitions			
Boot		C OK 1	
Image0 Image1		[0K] [0K]	
License		[0K]	
Димму1		[OK]	
Dummy2 Flash		[ОК] [ОК]	
1 Augu		2 011 1	
Installing Bootloader		[0K]	
ArubaOS installation completed s	uccessfully		
Please remove the installation m	edium		
System will be halted in 5 secon	ds		
The system is going down NOW! Sent SIGTERM to all processes Sent SIGKILL to all processes Requesting system halt [150.205797] reboot: System ha	lted		

10.Power off the VM and ensure the ISO is removed from the CD/DVD drive in the **Summary** tab.

11.Power on the system.

Prerequisites

Ensure that the following prerequisites are addressed before starting the installation:

- Enabling Intel VT virtualization hardware extensions in BIOS.
- Installing CentOS 7.2 on the x86 hardware.

Supported Versions

QEMU 2.0



The host kernel should be running version 4.6 or above and QEMU verision 2.7.0 for optimum crypto throughput performance with ArubaOS in the KVM infrastructre. Libvrt should support passing of poll-us configuration option from VM xmlspecification to QEMU.

Enabling Intel VT Virtualization Hardware Extensions in the BIOS

Follow the steps below to enable Intel IT virtualization hardware extensions in the BIOS:

- 1. Power on the machine and access the **BIOS Settings**.
- 2. Navigate to the **Processor** submenu. Processor settings menu may be hidden in **Chipset**, **Advanced CPU Configuration**, or **Northbridge**.
- 3. Enable Intel Virtualization Technology.

Installing CentOS 7.2

Follow the steps below to install CentOS 7.2 on your system:

- 1. Connect a DVD or bootable USB stick to install CentOS 7.2.
- 2. Select Virtualization Host in Software Selection and select all Add-Ons for the installation.
- 3. Click Done.
- 4. Navigate to the location of the CentOS 7.2 file and select the destination folder.
- 5. Click Begin Installation.
- 6. Create a new user and a root password for the CentOS 7.2 installation during the installation process.
- 7. Reboot the server after the installation is complete.
- 8. Login to the newly installed CentOS 7.2 and configure the network and connect the server to the Internet.

A connection to the Internet is required to validate the installation and to install other packages.

a) Check for cpu virtualization support by executing the following command:

[root@localhost ~]# cat /proc/cpuinfo | grep -i vmx flags :vmx

b) Check for KVM mode support in the Kernel. If kvm_intel is not listed, manually load kvm_intel using the modprobe kvm_intel command.

```
[root@localhost ~]# lsmod | grep -i kvm
kvm_intel 162153 0
kvm_525259 1 kvm_intel
[root@localhost ~]#
```



If the **Operation not supported** error message is displayed, ensure that Intel Virtualization technology is enabled in the BIOS.

- 9. Install the following packages:
- yum install qemu-kvm-tools.x86_64 qemu-kvm.x86_64 qemu-kvm-common.x86_64
- yum install virt-manager.noarch virt-manager-common.noarch
- yum install virt-install.noarch
- yum groupinstall "GNOME Desktop"
- yum install tigervnc-server xorg-x11-fonts-Type1

Follow the steps below to install the ArubaOS Mobility Master Virtual Appliance or a Mobility Controller Virtual Appliance on a KVM hypervisor:

- 1. Configuring the Virtual Network Computing (VNC) Server.
- 2. Creating a new VM and installing ArubaOS.
- 3. Deploying the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance.

Configuring the Virtual Network Computing Server

Follow the steps below to configure the Virtual Network Computing (VNC) server and open up the firewall port to access the server remotely:

1. Start the VNC Server and configure a password for your CentOS server by executing the following command:

```
[root@localhost ~]# vncserver.You will require a password to access your desktop.
Password:
Verify:
xauth: file /root/.Xauthority does not exist
New 'localhost.localdomain:1 (root)' desktop is localhost.localdomain:1
Creating default startup script /root/.vnc/xstartup
Starting applications specified in /root/.vnc/xstartup
Log file is /root/.vnc/localhost.localdomain:1.log
```

2. Open the firewall port on the CentOS server to ensure the CentOS server can be accessed using vncviewer.

```
[root@localhost ~]# netstat -ntap | grep vnc
tcp 0 0 0.0.0.0:5901 0.0.0.0:* LISTEN 14318/Xvnc
tcp 0 0 0.0.0.0:5902 0.0.0.0:* LISTEN 5242/Xvnc
tcp 0 0 10.16.9.130:5902 10.20.102.206:51576 ESTABLISHED 5242/Xvnc
tcp6 0 0 :::5901 :::* LISTEN 14318/Xvnc
tcp6 0 0 :::5902 :::* LISTEN 5242/Xvnc
[root@localhost ~]#
[root@localhost ~]# firewall-cmd --permanent --zone=public --add-port=5901/tcp
success
[root@localhost ~]# firewall-cmd --reload
success
[root@localhost ~]#
```

- 3. Download the ArubaOS ISO image file from **support.arubanetworks.com** to your CentOS server. The following are examples of ISO image files:
- ArubaOS_MM_8.2.0.0_57113.iso.
- ArubaOS_VMC_8.2.0.0_57113.iso.

Creating a VM and Installing ArubaOS

Follow the steps below to access the CentOS server through the VNC and start the virt manager to create the VM to be used by ArubaOS:

- 1. Access the terminal and type **virt-manager** to start the **Virtual Machine Manager**.
- 2. Access the Virtual Machine Manager tab.
- 3. Click on **File > New Virtual Machine**. The **New VM** dialog box is displayed.

Figure	39	New	Virtual	Machine
inguic	55	14000	viituui	iviaci ili ic

	Virtual Machine Manager	- • ×
File Edit View Help		
Add Connection		
<u>N</u> ew Virtual Machine	CPU usage	Host CPU usage
<u>C</u> lose	Ctrl+W	
<u>Q</u> uit	Ctrl+Q	
Running		
Suchin-MM Running		
Suchin-VMC Running		
VS-MM1 Running		
VS-VMC-250AP Running		

- 4. Select Choose Local Install Media and click Forward.
- 5. Select Use ISO image and click Browse.
- 6. Navigate to the location of the iso image and click **Choose Volume**.



Ensure that Automatically detect operating system based in install media is not selected.

- 7. Select **OS type** as **Linux** and **Version** as **Redhat Enterprise Linux 7.2** from the drop-down lists and click **Forward**.
- 8. Change the Memory (RAM) to 8192 and CPUs to 6 and click Forward.

For Mobility Controller Virtual Appliance the RAM can be setup as 4096 (4 GB) and 3 CPUs. For more information on memory and CPU allocation refer to sizing tables in the <u>What's New on page 9</u> section.

9. Select **Enable Storage for this VM** and change the value in **Create a disk image on the computer's** hard drive to 4 GB. Click **Forward**.

Figure 40 Enabling Storage on the VM

New VM					
Create a new virtual machine Step 4 of 5					
 Enable storage for this virtual machine Oreate a disk image on the computer's hard drive 					
4.0 – + GiB					
845.0 GiB available in the default location Allocate entire disk now Select managed or other existing storage 					
Browse					
Cancel Back Forward					

The size of this disk needs to be at least 4 GB for Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance.

10.Provide a name for the VM and select **Customize configuration before install**. Click **Finish**.

Figure 41 Beginning the Installation

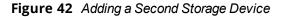
New VM						
Create a new virtual machine Step 5 of 5						
Ready to be	gin the installation					
Name:	ArubaMM_KVM					
OS: F	Red Hat Enterprise Linux 7.2					
Install: l	ocal CDROM/ISO					
Memory: 8	3942 MiB					
CPUs: (5					
Storage: 4	4.0 GiB					
(Customize configuration before install					
▼ Network	selection					
Virtual network 'default' : NAT 🔻						
	Cancel Back Finish					

11.Select VirtIO Disk 1 and click on Advanced Options and make sure the Disk bus option is VirtIO.

12.Click **Add Hardware** and add another 8 GB storage device. (should be greater than half the size of RAM

configured for the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance).

13.Select VirtIO from the Bus type drop-down list. Click Finish.



	Add New Virtual Hardware	
🖋 Begin Installation 🛛 🐰 Ca	Storage	
 Overview Processor Memory Boot Options VirtIO Disk 1 IDE CDROM 1 IDE CDROM 1 NIC :26:24:45 Tablet Display Spice Sound: ich6 Console Channel qemu-ga Channel spice Video QXL Controller USB USB Redirector 1 USB Redirector 2 	Stor age Controller Network Input Graphics Graphics Sound Sound Sound Serial Parallel Console Channel USB Host Device PCI Host Device Video Video Watchdog Filesystem Smartcard USB Redirection TPM RNG Panic Notifier	t location
Add Hardware	Can	cel Finish

Creating Bridge Entries

Create bridge entries to map all three network adapters that you will create in the steps below:



Ensure that you create a fourth bridge entry when configuring Mobility Controller Virtual Appliance.

1. Login to CentOS and create three bridges and map three physical interfaces to these bridges.

```
[root@localhost ~]# brctl addbr br1
[root@localhost ~]# brctl addif br1 enol
[root@localhost ~]# ifconfig br1 up
[root@localhost ~]# brctl addbr br2
[root@localhost ~]# brctl addif br2 eno2
[root@localhost ~]# brctl addbr br3
[root@localhost ~]# brctl addbr br3
[root@localhost ~]# brctl addif br3 eno3
[root@localhost ~]# ifconfig br3 up
```

2. To make these bridge entries persistent across reboots, create a file in **/etc/sysconfig/network-scripts/** for all bridges.

[root@localhost ~]#vi /etc/sysconfig/network-scripts/ifcfg-br1 DEVICE=br1 STP=no TYPE=Bridge IPV6INIT=yes IPV6 AUTOCONF=no IPV6 DEFROUTE=yes IPV6 FAILURE FATAL=no NAME=br1 UUID=a65be46d-a32a-4dca-bd00-f8acf9a356e5 ONBOOT=yes IPV6 PRIVACY=no [root@localhost ~]# [root@localhost ~]# cat /etc/sysconfig/network-scripts/ifcfq-br2 DEVICE=br2 STP=no TYPE=Bridge IPV6INIT=yes IPV6 AUTOCONF=no IPV6 DEFROUTE=yes IPV6 FAILURE FATAL=no NAME=br2 UUID=19cf4539-9633-40aa-a4c5-606849b6e3db ONBOOT=yes IPV6 PRIVACY=no [root@localhost ~]# [root@localhost ~]# cat /etc/sysconfig/network-scripts/ifcfg-br3 DEVICE=br3 STP=no TYPE=Bridge IPV6INIT=yes IPV6 AUTOCONF=no IPV6 DEFROUTE=yes IPV6 FAILURE FATAL=no NAME=br3 UUID=cb9a8df9-aa37-4346-8993-9e3739a9b0ce ONBOOT=yes IPV6 PRIVACY=no

- 3. Click **Network Interface** and enter the following values:
- Network Source: Specify shared device name.
- Bridge name: br1
- Device model: virtio

Figure 43 Creating Bridge Entries

	too	t tashauba Virtual Mashi	bing (
	test_techpubs Virtual Machine					
Begin Installation 🛛 🐰	Cancel Installation					
	Virtual Network In	· · · · · · · · · · · · · · · · · · ·				
Overview		terrace				
Processor	Network source:	Specify shared device n	name 🔻			
Memory		Bridge name: br1				
🐉 Boot Options						
VirtIO Disk 1	Device model:	virtio	•			
IDE CDROM 1	MAC address:	F3.F4.00.61.20.02				
Pic: :f1:38:93	MAC address:	52:54:00:f1:38:93				
🖉 Tablet						
💻 Display Spice						
📑 Sound: ich6						
🚵 Console						
🚵 Channel qemu-ga						
🚵 Channel spice						
🖳 Video QXL						
📑 Controller USB						
USB Redirector 1						
USB Redirector 2						
Add Hardware]		Remove Cancel Apply			

- 4. Click Add Hardware to add two more network interfaces.
- 5. Map bridge interfaces (**br2** and **br3**) to these network interfaces.
- 6. Click **Add Hardware** to add serial console.

Enabling Serial Console Over Telnet

Follow the steps below to enable serial console over telnet. This procedure is optional.

- 1. Remove the existing Serial 1 device and click **Add Hardware**.
- 2. Select **Serial** on the left pane.
- 3. Select **TCP net Console** from the **Device Type** drop-down list.
- 4. Add the CentOS Server IP in the **Host** field and change the port number.
- 5. Select the **Use Telnet** check box and click **Finish**.



171		Add New	Virtual Hardware				- • ×
	Storage Controller	Serial Devi	ce				
	Network Input	Device Type:	TCP net console (tcp)		•		
	Graphics	Host:	10.16.34.34	Port:	 4560		+
	Sound Serial	Mode:	Server mode (bind)	•			
1	Parallel	Use Telnet:					
	Console Channel						
ŝ	USB Host Device						
***	PCI Host Device Video						
	Watchdog						
1	Filesystem Smartcard						
۲	USB Redirection						
	TPM RNG						
ŝ	Panic Notifier						
				😮 Car	ncel	🔿 Fini	sh

6. Execute the following command to ensure the host firewall permits access to port number for serial console.

```
[root@localhost ~]# firewall-cmd --permanent --zone=public --add-port=4560/tcp
success
[root@localhost ~]# firewall-cmd --reload
success
```



Enable serial console redirection from the ArubaOS CLI after ArubaOS boots up by executing the following command serial console redirection enable.

- 7. Select **VNC server** as the Spice Server from the **Type** drop-down list.
- 8. Select **Copy local keymap** from the **Kepymap** drop-down list and click **Apply**.
- 9. Select **CPUs** and make select the **Copy host CPU configuration** option.
- 10.Select the **Manually set CPU topology** option from the **Topology** drop down list.
- 11.Ensure the number of **Sockets** and **Threads** is always 1 and the value of **Cores** is the same as the value of **Current allocation**.

20.			rhe	17.0 on Q	EMU/KV	/M			- ° ×
File	Virtual Machine Vie	w Send Key .							
		_ × @	8						5.0
	Overview OS information Performance	CPUs Logical hos Current allo		24	-	+	1		
	CPUs	Maximum a	llocation	3	-	+	1		
	Memory Boot Options VirtIO Disk 1 VirtIO Disk 2	Configuration	st CPU co	-					
0	IDE CDROM 1 NIC :51:db:08	Sockets:	1	+]				
	NIC :e4:64:54	Cores:	3	- +]				
	NIC :24:49:70 NIC :07:d0:73 Tablet	Threads:	1	+]				
9	Mouse Keyboard								
	Display VNC Sound: ich6								
	Add Hardware							Cancel	O Apply

Figure 45 Configuring CPU Values

12.Click Begin Installation and select Install ArubaOS.

Once the installation is complete the system will be halted after configuring the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance.

Figure 46 System Halt

8 > 00 • 5		 •
Unmounting partitions Boot	сок з	
Image0 Image1 License Dummy1	СОК Ј СОК Ј СОК Ј СОК Ј	
Dummy2 Flash		
Installing Bootloader	сок з	
ArubaOS installation completed successfully		
Please remove the installation medium		
System will be halted in 5 seconds		
The system is going down NOW! Sent SIGTERM to all processes Sent SIGKILL to all processes Requesting system halt [26.572173] reboot: System halted		

13. Force reset the VM to boot ArubaOS and access to first boot dialogue.

Important

Ensure you open the firewall port from CentOS terminal and restart the firewall. [root@localhost ~]# firewall-cmd --permanent --zone=public --add-port=7001/tcp

```
success
[root@localhost ~]# firewall-cmd --reload
success
[root@localhost ~]#
```

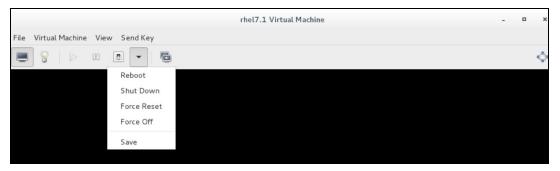
Configure Multiple Datapath CPUs

To configure multiple datapath CPU's additional configuration is required both in host and guest. The guest changes cannot be made using virt-manager and hence you need to use the **virsh edit** command.



Ensure that the VM is gracefully shut down by using either the **Reboot** or **Shut Down** option before editing the VM xml specification.

Figure 47 Graceful Shutdown



Changes in Host

On the KVM server, load the **vhost_net module**

[root@localhost	~]#	lsmod g:	rep vhost
[root@localhost	~]#	modprobe ·	vhost_net
[root@localhost	~]#	lsmod g:	rep vhost
vhost_net		18152	0
vhost		33338	1 vhost_net
macvtap		22363	1 vhost_net
tun		27141	3 vhost_net

XML Changes in Guest

Use the **virsh edit <name of the VM>** command in the KVM server and add the **<driver name='vhost' queues='y'/>"** tag, where y = total number of CPU's allocated to the VM.

For example, for a VM with six VCPU's and three NIC's of type Virtio, edit the xml and add **<driver** name='vhost' queues='6'> " tag for each NIC interface.

```
aruba@ubuntu-server-16x:~$ virsh list --all

Id Name State

5 centos6.5 running

- vmm-500dev shut off

[root@localhost ~]# virsh edit vmm-500dev
```

Domain vmm-500dev XML configuration edited.

Add **<driver name='vhost' queues='6'/>** after **"model type='virtio"** in the bridge config to ensure the values for the number of queues for the vhost and CPUs for the VM are the same.

The following snippet is an example of multi-queue XML specification for a single NIC interface. The same tag needs to be added for all Mobility Master Virtual Appliance NIC interfaces.

```
</controller>
<interface type='bridge'>
<mac address='52:54:00:d3:4a:3c'/>
```

```
<source bridge='br1'/>
<target dev='vnet10'/>
<model type='virtio'/>
<driver name='vhost' queues='6'/>
<alias name='net0'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x03' function='0x0'/>
</interface>
<interface type='bridge'>
<mac address='52:54:00:49:7a:c6'/>
<source bridge='br2'/>
<target dev='vnet11'/>
<model type='virtio'/>
<driver name='vhost' queues='6'/>
<alias name='net1'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x04' function='0x0'/>
</interface>
<interface type='bridge'>
<mac address='52:54:00:d3:55:7d'/>
<source bridge='br3'/>
<target dev='vnet12'/>
<model type='virtio'/>
<driver name='vhost' queues='6'/>
<alias name='net2'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x05' function='0x0'/>
</interface>
[root@localhost ~] # virsh edit vmm-500dev
```

Domain vmm-500dev XML configuration edited.

```
[root@localhost ~]# virsh dumpxml vmm-500dev | grep queues
<driver name='vhost' queues='6'/>
<driver name='vhost' queues='6'/>
<driver name='vhost' queues='6'/>
[root@localhost ~]#
```

Reboot the VM and once the VM boots up you should see three CPUs as indicated in the example

```
(ArubaMM) [mynode] #show datapath utilization
Datapath Network Processor Utilization
+----+
| Cpu | Cpu utilization during past |
| Type | Id | 1 Sec 4 Secs 64 Secs |
+----+
SP | 1 |
           08 |
                   08 |
                           0% |
          0% |
                  0% |
FP | 2 |
                           08 |
    3 |
          0% |
                  0% |
FP |
                            08 |
Datapath CPU Allocation Summary
Slow Path (SP) : 1, Slow Path Gateway (SPGW) : 0
Fast Path (FP) : 2, Fast Path Gateway (FPGW) : 0
DPI : 0, Crypto (CRYP) : 0
(ArubaMM) [mynode] #
```

VM memory locking xml tag

```
<name>VMC_50</name>
<uuid>4f5aaac7-7c3c-4565-8bf3-1b1492945cdc</uuid>
<memory unit='KiB'>6291456</memory>
<currentMemory unit='KiB'>6291456</currentMemory>
<memtune>
<hard_limit unit='G'>8</hard_limit>
</memtune>
<memoryBacking>
<locked/>
</memoryBacking>
```

Prerequisites

Ensure that the following prerequisites are addressed before starting the installation:

- Hyper-V Version Windows Server 2012 R2
- Hyper-V Version Windows Server 2016

The following procedure can be used to deploy a Mobility Controller Virtual Appliance or a Mobility Master Virtual Appliance on Windows Hpyer-V.

Installing ArubaOS on Windows Server Hyper-V

- 1. Log into the Windows server.
- 2. Open the Hyper-V manager.
- 3. Select the Hyper-V host machine from the navigation pane.
- 4. Right-click on the host machine and click **New > Virtual Machine**. Click **Next**.

Figure 48 Creating a New WM

1			
File Action View Help			
🗢 🏟 🞽 📰			
Hyper-V Manager	Virtual Machines		
	New	•	Virtual Machine
	Import Virtual Machine		Hard Disk
	Hyper-V Settings		Floppy Disk
	Virtual Switch Manager		Off
	Virtual SAN Manager		Off
	Edit Disk		
	Inspect Disk		
	Stop Service		
	Remove Server		
	Refresh		
	View	•	
	Help	_	

- 5. Enter a name for the VM in **Specify Name and Location** screen. If you want to store the machine in a location different from the default one, select the **Store the virtual machine in a different location** checkbox.
- 6. Select **Generation 1** as generation for this VM. Click **Next**.
- 7. Allocate 4096 MB as the startup memory. Click **Next**.

- 8. Click **Next** on the **Configure Network** screen. Network will be configured in later steps.
- 9. Enter a name for the first virtual disk. A second virtual disk will be added in later steps. Click **Next**.
- 10.Select Install an operating system from a bootable CD/DVD-ROM.
- 11.Select **Image file (.iso)** and click **Browse** to navigate to the location of the iso file. Select the iso file and click **Next**.
- 12.Click Finish.

Figure 49 Completing the Installation

ð.	New Virtual Machine Wizard
Completing t	the New Virtual Machine Wizard
Before You Begin Specify Name and Location Specify Generation Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	You have successfully completed the New Virtual Machine Wizard. You are about to create the following virtual machine. Description: Name: New Virtual Machine_Test Generation: Generation 1 Memory: 4096 MB Network: Not Connected Hard Disk: C:\Users\Public\Documents\Hyper-V\Virtual Hard Disks\VMC Disk1_Test.vhdx (VH Operating System: Will be installed from C:\Users\Administrator\Desktop\ArubaOS_MM_8.2.0.0-mm-
	< III To create the virtual machine and close the wizard, click Finish.

Configuring the New VM

- 1. Right-click on the new VM and click **Settings**.
- 2. Select **Processor** from the **Hardware** pane and set the **Number of virtual processors** based on your requirement. For more information see, <u>What's New on page 9</u>.

Figure 50 Virtual Processor Settings

New Virtual Machine_Test	✓ 4 ▶ Q.
 ★ Hardware Add Hardware BIOS Boot from CD Wemory 4096 MB Processor IDE Controller 0 Hard Drive VMC Disk1_Test.vhdx IDE Controller 1 DVD Drive Aruba0S_MM_8.2.0.0-mm SCSI Controller None COM 1 None COM 1 None COM 2 None Diskette Drive None Integration Services Some services offered Checkpoint File Location C: Program Data Microsoft Win Smart Paging File Location C: 'Program Data Microsoft Win Automatic Start Action Restart if previously running 	Processor You can modify the number of virtual processors based on the number of processors on the physical computer. You can also modify other resource control settings. Number of virtual processors: 1 🔆 Resource control 1 🔆 You can use resource controls to balance resources among virtual machines. Virtual machine reserve (percentage): 0 Percent of total system resources: 0 Virtual machine limit (percentage): 100 Percent of total system resources: 5 Relative weight: 100

3. Click **IDE Controller 0**. Select **Hard Drive** and click **Add** to add a second hard drive.



For increased performance it is recommended to use a SCSI controller/Disk instead of IDE controller.

4. Click **New**.

Figure 51 Adding a Second Virtual Disk

New Virtual Machine_Test	✓ 4 ▶ Q	
 Hardware Add Hardware BIOS Boot from CD Memory 4096 MB Processor 3 Virtual processors IDE Controller 0 Hard Drive VMC Disk1_Test.vhdx Hard Drive cfile> IDE Controller 1 DVD Drive ArubaOS_MM_8.2.0.0-mm SCSI Controller Network Adapter Not connected COM 1 None COM 2 None Diskette Drive None Management Name New Virtual Machine_Test 	IDE Controller 0 Media You can compact, convert, expand, merge, by editing the associated file. Specify the for Image: Specify the form of the system of the sy	ging the attachment might prevent the Location: 1 (in use) reconnect or shrink a virtual hard disk all path to the file. t Inspect Browse to use is not listed, make sure that the nt on the physical computer to manage
 Integration Services Some services offered Checkpoint File Location 	-	

- 5. Click Next in the New Virtual Hard Disk Wizard window.
- 6. Select **VHDX** as the disk format and click **Next**.
- 7. Select **Dynamically expanding** as the disk type. Click **Next**.
- 8. Specify a name and location for the new VM and click **Next**.
- 9. The size of the new VM should be at least the size of the RAM. For more information on the size of the hard disk, see <u>What's New on page 9</u>. Click **Next > Finish**.



In the **Hardware > Processor** section of the VM ensure the **Maximum number of processors** and the **Maximum amount of memory** on a single virtual NUMA node in the NUMA topplogy should always be more than the values configured for the Mobility Master. If the number of processors or memory allocated to the Mobility Master is more than what is configured under the NUMA configuration, the number of NUMA nodes and sockets will automatically increase and Mobility Master will not boot up.

Creating a Network Adapter

- 1. Select Add Hardware from the Hardware pane.
- 2. Select Network Adapter and click Add.
- 3. Select a virtual switch from the drop-down list.
- 4. Select Hardware Acceleration and ensure that Enable virtual machine queue and Enable IPsec task offloading check-boxes are cleared.

Figure 52 Creating a Network Adapter

New Virtual Machine_Test Image: Construction of the construc	🖻 Settings	for New Virtual Machine_Test on WIN-6VM9II90K1P
Mardinal e Acceleration Mardinal e Acceleration Mardinal e Acceleration Specify networking tasks that can be offloaded to a physical network adapter. Virtual machine queue Wirtual processors IDE Controller 0 Memory Monory Monory Add Hardware Add Hardware Specify networking tasks that can be offloaded to a physical network adapter that supports this feature. Virtual machine queue Wirtual machine queue Bitos Signer toroller 1 Plot Drive ArubaotS-JMM_8.2.0.0-mm Signer toroller Plot Drive ArubaotS-JMM_8.2.0.0-mm Signer toroller Plot Drive ArubaotS-JMM_8.2.0.0-mm Select the maximum number of offloaded security associations from a range of 1 to 4096. Maximum number: 512 Offloaded SA Single-root 1	New Virtual Machine_Test	✓ ▲ ▶ Q.
New Virtual Machine_Test Integration Services Some services offered Chedopoint File Location C: ProgramData Wicrosoft Win Smart Paging File Location	 ★ Hardware ▲ Add Hardware ▲ BIOS Boot from CD ➡ Memory ↔ 4096 MB ➡ Processor ③ Virtual processors ➡ IDE Controller 0 ➡ Hard Drive VMC Disk1_Test.vhdx ➡ IDE Controller 1 ♠ DVD Drive ArubaOS_MM_8.2.0.0-mm ♥ SCSI Controller ➡ Network Adapter temp Hardware Acceleration Advanced Features ♥ COM 1 None ♥ COM 2 None ➡ Diskette Drive None 	 Ardware Acceleration
Some services offered Checkpoint File Location C: \ProgramData \Wicrosoft\Win Smart Paging File Location	Name New Virtual Machine_Test	
	Some services offered Checkpoint File Location C: \ProgramData \Microsoft \Win	
OK Cancel Apply		v

- 5. Select **Advanced Features** and complete the following steps:
 - a. Check the Enable MAC address spoofing checkbox.
 - b. Disable **Protected Network**.

Figure 53 Advanced Features

Settings	s for New Virtual Machine_Test on WIN-6VM9II90K1P	X
New Virtual Machine_Test	✓ 4 ▶ Q.	
 ★ Hardware ★ Hardware ★ BIOS Boot from CD ➡ Memory 4096 MB ➡ Processor 3 Virtual processors ➡ IDE Controller 0 ➡ Hard Drive VMC Disk1_Test.vhdx ➡ IDE Controller 1 ➡ DVD Drive 	Advanced Features Advanced Features MAC address Dynamic Static 0 -00 -00 -00 -00 MAC address spoofing allows virtual machines to change the source MAC address in outgoing packets to one that is not assigned to them. Enable MAC address spoofing	*
DVD Drive ArubaOS_MM_8.2.0.0-mm SCSI Controller Network Adapter temp Hardware Acceleration Advanced Features COM 1 None COM 2 None	DHCP guard DHCP guard drops DHCP server messages from unauthorized virtual machines pretending to be DHCP servers. Enable DHCP guard Router guard Router guard drops router advertisement and redirection messages from unauthorized virtual machines pretending to be routers. Enable router advertisement guard	=
	Protected network Move this virtual machine to another cluster node if a network disconnection is detected. Protected network	
Some services offered Checkpoint File Location C:\ProgramData\Microsoft\Win Smart Paging File Location C:\ProgramData\Microsoft\Win	virtual machine configured for monitoring.	~
	OK Cancel Apply	

6. Click **Apply > OK**.

Repeat the steps to create a second network adapter.

- 7. Right-click the new VM and click **Start**.
- 8. Turn off the VM after the installation is complete and remove the installation ISO from DVD Drive. Restart the VM.

```
Virtual Machines
                           State
                                          CPU Usage Assigned Memory Uptime
                                                                                              Status
Name
mm-8.2
                           Off
u1
ubuntu-16.04-2
                      Connect...
                      Settings...
VMC
                      Turn Off...
                      Shut Down.
                      Save
                      Pause
                      Reset
                      Checkpoint
                                                                                                                                                                        •
Checkpoints
                      Move...
                                                                  The selected virtual machine has no checkpoints
                      Export...
                      Rename...
                      Enable Replication...
                      Help
```



To configure remote serial console for the VM, use a third party TCP proxy tool.

Configuring Trunk Ports

Figure 54 Restart the VM

Run the following **PowerShell** commands to configure trunk ports:

Remove all network adapters from the VM:

Remove-VMNetworkAdapter -vmname VMC

Add mgmt interface:

```
Add-VMNetworkAdapter -VMName VMC -Name mgmt
Set-VMNetworkAdapter -VMName VMC -Name mgmt -IPsecOffloadMaximumSecurityAssociation 0 -
VmqWeight 0 -NotMonitoredInCluster $true
```

Add data interfaces:

```
Add-VMNetworkAdapter -VMName VMC -Name p1
Set-VMNetworkAdapter -VMName VMC -Name p1 -IPsecOffloadMaximumSecurityAssociation 0 -
VmqWeight 0 -NotMonitoredInCluster $true -MacAddressSpoofing on
Set-VMNetworkAdapterVlan -VMName VMC -VMNetworkAdapterName p1 -Trunk -AllowedVlanIdList
"1-4094" -NativeVlanId 0
```

These interfaces can then be added to virtual switches added through UI.

Once the installation is complete, follow these post-installation procedures to complete the deployment.

Configuring the Initial Setup

Follow the steps below to configure initial setup:

- 1. Click **Power on the virtual machine**.
- 2. Enter values for the following first boot parameters in the console:
 - System name
 - Switch role
 - IP type to terminate IPsec tunnel
 - Master switch IP address or FQDN
 - Is this a VPN concentrator for managed device to reach Master switch
 - This device connects to Master switch via VPN concentrator
 - Master switch Authentication method
 - IPsec Pre-shared Key
 - Uplink Vlan ID
 - Uplink port
 - Uplink port mode
 - Native VLAN ID [1]
 - Uplink Vlan IP assignment method
 - Uplink Vlan Static IP address
 - Uplink Vlan Static IP netmask
 - IP default gateway
 - DNS IP address
 - IPV6 address on vlan
 - Port-channel
 - Port-channel id
 - Uplink Vlan Static IPv6 address
 - Uplink Vlan interface IPV6 prefix length
 - IPv6 default gateway
 - Country code
 - Time Zone
 - Time in UTC
 - Date
 - Password for admin login
 - Re-type password for admin login

The choices you entered in the first boot dialog are displayed.



Enter a static IP as the management IP in VLAN as part of the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance setup. This should be a routable IP in an accessible subnet that the user can use to access the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance via CLI (SSH) or Web GUI (HTTP) after VM setup is complete.

Enter **<Ctrl P>** to make changes to the first boot parameters.

- 3. Enter **Yes** to accept the changes. The Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance reboots and displays the log in prompt.
- 4. Log in with user name as admin and the password set in Step 2.
- 5. Execute the **enable** command.
- 6. Power on the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance and execute the following command to enable the serial console.

Serial console redirect requires the vSphere Enterprise Plus license. When you enable serial console redirect, the vSphere console host window will be blank.

(host) #serial console redirect enable

Execute the following command to see the status of the serial console.

```
(host) #show serial console redirect
   Serial Console Redirect : Enabled
```

Execute the following commands to disable and view the status of the serial console.

```
(host) #serial console redirect disable
(host) #show serial console redirect
        Serial Console Redirect : Disabled
```

Reboot the Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance to access the serial console after enabling the serial console redirect.

To access the serial console telnet the IP address of the serial console followed by the serial port configured. For example: telnet 10.16.12.27 6001.

Management Interface

The Mobility Master Virtual Appliance/Mobility Controller Virtual Appliance is a VM instance and access to the console is dependent on the deployment environment. If access through the serial port is denied you can alternatively access the console through the Management Interface. After an IP is assigned, the management interface can be accessed from anywhere in the network. To implement this change a separate routing table is assigned with its own default gateway for managing the IP that is introduced. This ensures the management traffic is routed to the right interface.

The initial implementation of this feature covers IPv4, IPv6, and manual configuration of a static IP for management interface from the console.



NOTI

This feature cannot be configured using the WebUI.

Execute the following commands to configure an IP on the management interface:

IPv4:

```
(host) [mynode] #configure terminal
Enter Configuration commands, one per line. End with CNTL/Z
(host) [mynode] (config) #interface mgmt
```



(host) [mynode] (config-submode)#no shutdown
(host) [mynode] (config-submode)#ip address 10.16.9.203 255.255.255.0
IPv6:

(host) [mynode] (config) #interface mgmt
(host) [mynode] (config-submode)#ipv6 address 2014::184/64

Execute the following commands to configure a default gateway for the management interface traffic and to segregate the management traffic from the normal data traffic on datapath ports:

IPv4:

(host) [mynode] (config) #ip default-gateway mgmt 10.16.9.2

IPv6:

(host) [mynode] (config) #ipv6 default-gateway mgmt 2014::1

Connectivity Issues

Users experience wireless client connectivity issues when Mobility Master Virtual Appliance and Mobility Controller Virtual Appliance is used with NIC teaming and without configuring LACP. To resolve this issue refer to in the Appendix.

DHCP Address

Clients connected to the Aruba Mobility Controller Virtual Appliance are unable to get a DHCP address. This issue is resolved by implementing NIC teaming on vSwitch or Distributed vSwitch. For more information refer to the Appendix.

ARP Issues

Scenario

ARP issue occurs when Promiscuous Mode is not enabled and all VLANs are disallowed on vSwitch.

Instructions

Enable Promiscuous Mode and allow all VLANs on vSwitch.

To enable Promiscuous Mode, perform the following steps:

- 1. Log in to vSphere ESXi Host.
- 2. Switch to **Configuration** tab.
- 3. Select Networking under Hardware section.
- 4. Click **Properties** for a configured vSwitch.
- 5. Click Edit under Ports tab of vSwitch Properties window.
- 6. Switch to Security tab in vSwitch Properties window.
- 7. Select Accept from the Promiscuous Mode drop-down list.



Enable Promiscuous Mode on all ports attached to the VM. If a single port is used in ArubaOS, Promiscuous Mode need not be enabled.

8. Click **OK**.

To allow all VLANs on vSwitch, perform the following steps:

- 1. Log in to the vSphere ESXi Host.
- 2. Click the **Configuration** tab.
- 3. Select Networking under Hardware section.
- 4. Click **Properties** for a configured vSwitch.
- 5. Select a configured VM network under Ports tab of vSwitch Properties window.
- 6. Click Edit under Ports tab of vSwitch Properties window.
- 7. Select All (4095) from the drop-down list against VLAN ID (Optional).

MAC Address Collision in a Network

A user notices MAC address collision in a network due to duplicate MAC entries. When the duplicate MAC entry is detected by ArubaOS, connectivity to the Mobility Controller Virtual Appliance is lost. To resolve this issue, refer to the following KB article. Once the issue is resolved reboot all VMs.

https://kb.vmware.com/selfservice/microsites/search.do?language=en_ US&cmd=displayKC&externalId=1024025

Characters Repeating In Remote Console

The user notices unintended keystrokes when typing into a remote console. To resolve this issue, refer to the following KB article:

http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=196

Networks Cards Not Detected

When a new network card is added to the ESXi/ESX host the following symptoms might be displayed:

- The new network card is not recognized by the system.
- The new network card is not listed when you run the command **esxcfg-nics -I**.

To resolve this issue, refer to the following KB article:

http://kb.vmware.com/selfservice/microsites/search.do?language=en_ US&cmd=displayKC&externalId=1034782

HP Proliant DL580 Running ESXi 5.5 Is Not Powered On Due To Memory Leaks

HP Proliant DL580 running ESXi 5.5 will not be powered on due to memory leaks. To resolve this issue, refer to the following KB article:

http://kb.vmware.com/selfservice/microsites/search.do?language=en_%20US&cmd=displayKC&externalId=2 085618

Network Interfaces Are Not In The Correct Order

Adding a fifth network adapter that uses **vmxnet3** devices changes the PCI bus IDs and also the order of network interfaces. To resolve this issue, refer to the following KB article:

https://communities.vmware.com/thread/443600

Connectivity Issues Observed When Using Multiple vSwitches

Connectivity issues observed when multiple vSwitches in a VM network. To resolve this issue, refer to the following KB article:

https://communities.vmware.com/thread/460582

This chapter details additional information required in the current version of the Mobility Master. Click the following links for more information:

- Recommendations for NIC Teaming on a vSwitch on page 61
- Increasing the Flash Size on a vSphere Hypervisor on page 75
- Increasing the Flash Size on a KVM Hypervisor on page 78
- Backing up and Restoring Critical Data on page 81
- Datapath Debug Commands on page 83
- Implementing Management Interface on page 83
- Upgrading a Controller on page 86

Recommendations for NIC Teaming on a vSwitch

When creating a vSwitch on the ESXi host, two or more NICs (network adapters) can be configured in the same vSwitch. To balance the traffic from the VM host to the uplink device since there is more than one NIC configured, ESXi provides the following configuration options:

- Route based on originating port ID.
- Route based on IP hash.
- Route based on source MAC hash.
- Explicit failover order.

Configuring NIC Teaming

Login to the vSphere ESXi host using WebUI or a vSphere client. This following example is configured through the WebUI.

- 1. Login to the ESXi host.
- 2. Navigate to **Networking > Virtual Switches > Add standard virtual switch** or right click **Networking** and select **Add standard vSwitch**.



vmware ESXi	-				
°E Navigator		🧕 localhost.localdom	nain - Networking		
👻 📳 Host		Port groups Vi	/irtual switches Physical NICs VMkernel NIC	Cs TCP/IP stacks Firewall rules	
Manage Monitor		Add standard vir	irtual switch 📃 Add uplink 🥒 Edit settings 🧲 F	Refresh 🔅 Actions	
Dirtual Machines	5	Name	~	Port groups ~	Uplinks
> 📑 Storage	1	switch0		2	1
🛛 💇 Networking	3	wSwitch1	1	1	0
	Q Networkin			1	2
	Add port	group			
	🔚 Add stan	dard vSwitch			
	触 Add VMk	ernel NIC			

3. In the Add standard virtual switch - New switch window enter the following details:

a. vSwitch Name

- b. Add the required number of uplinks from the **Uplink 1** drop-down menu.
- c. Under Security, click the Accept radio button for Promiscuous mode and Mac address changes.
- 4. Click **Add**. A new vSwitch is created.

Figure 56 New vSwitch

Iocalhost.localdomain - Networking Port groups Virtual switches Physical N	Cs VMkernel NICs TCP/IP stacks Firewall ru	les		
🏝 Add standard virtual switch 🛛 💻 Add uplink 🥖	Edit settings 🤁 Refresh 🍈 Actions			Q. Search
Name	 Port groups 	~ Uplinks	~ Type	
www.ch0	2	1	Standard vSwitch	
wSwitch1	1	0	Standard vSwitch	
wSwitch2	1	2	Standard vSwitch	
m test vSwitch	0	1	Standard vSwitch	
				4 item:

Creating a Port Group

1. Navigate to **Networking > Port groups > Add port group** or right click **Networking** and select **Add port group**.

Figure 57 Adding Port Group

🖀 Navigator 🛛 🔹	🧕 localhost.localdomain - Networking			
 Host Manage Monitor 	Port groups Virtual switches Physical NICs <u>29</u> Add port group <i>/</i> Edit settings <i> </i> C Refresh <i> </i>	VMkernel NICs TCP/IP	tacks Firewall rules	
Dirtual Machines 5	Name	~ Active ports	✓ VLAN ID ✓ Type	~ vSwitch
Storage	Q VM Network	1	0 Standard p	port group av vSwitcht
🔮 Networking 🙆 Networking	ptwork	1	0 Standard p	port group Switch
		0	51 Standard p	port group and vSwitch1
😏 Add port g				

- 2. Provide a name for the new port group.
- 3. Add the virtual switch that was configured with NIC teaming to this port group.
- 4. Ensure the **Accept** radio button is selected for **Promiscuous mode**, **MAC address changes**, and **Forged transmits** under **Security**.
- 5. Click **Add**. A new port group is created.

Figure 58 New Port Group

😫 Add port group - test port group	
Name	test port group
VLAN ID	0
Virtual switch	test vSwitch
✓ Security	
Promiscuous mode	● Accept ○ Reject ○ Inherit from vSwitch
MAC address changes	Accept Reject Inherit from vSwitch
Forged transmits	● Accept ○ Reject ○ Inherit from vSwitch
	Add Cancel

Adding the Port Group to a VM Host

To add the port group to an host, edit the host setting of the Mobility Master Virtual Appliance or Mobility Controller Virtual Appliance.

- 1. From the **Navigator** window select **Virtual Machines**. The list of VMs are displayed.
- 2. Right-click the VM and select **Edit settings** or select the VM and click **Actions** > **Edit settings**.

Virtual machine 🔺	~	Status 🗸 🤇	-	vmc_8x Power		Guest OS	
Fed		Normal		Guest OS	P	Other Linux (64-bit)	
✓ ∰ vmc_8x		🕑 Normal	_	Snapshots	- P	Red Hat Enterprise Linux 6 (64-bit)	
Quick filters				Console	- P - F		
	.		5	Autostart	Þ	-	
Vmc_ Guest C		Enterprise Linux 6 (64-	6				
Compatibility of the second se		and later (VM version	4				
VMware VMware CPUs	Tools Yes 4		5	Edit settings			
Memory	6 GB	-	2	Permissions			
				Edit notes			
C C			₿₿Ĵ)	Rename			
			12				
			4				
			?	Help			
		-	5	Open in a new window			

Figure 59 Edit VM Settings

3. Add the new port group that was created to the VM host.

Virtual Hardware VM Options			
🔜 Add hard disk 🛛 🛤 Add network	adapter 🛛 🚍 Add other device		
🕨 🔲 CPU	4 🔻 🚺		
Memory	6144 MB v		
Hard disk 1	4 GB •		C
Hard disk 2	6 GB v		6
SCSI Controller 0	LSI Logic Parallel	Ŧ	C
Network Adapter 1	VM Network	▼	G
Mill Network Adapter 2	test port group	Connect	6
Mill Network Adapter 3	VM Network	Connect	6
Network Adapter 4	VM Network	 Connect 	0
Floppy drive 1	Use existing floppy image	•	
▶ i CD/DVD Drive 1	Host device	•	C
▶ 📃 Video Card	Specify custom settings	¥	
		Save	e Canc

4. Click Save.

Preventing Dropping or Looping Broadcast/Multicast Packets

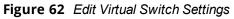
To achieve this you need to make some changes to the NIC teaming policy.

- 1. From the **Navigator** window select **Networking** > **Port Groups**.
- 2. Select the new port group that was created and click **Edit settings**.

Figure 61 Edit Port Group Settings

vmware ESXi		
E Navigator	Q localhost.localdomain - Networking	
✓ ☐ Host Manage	Port groups Virtual switches Physical NICs V Add port group	/Mkernel NICs TCP/IP stacks
Monitor Monitor Storage Networking More networks	Name Image: WM Network Image: WM_8.x Image: Clu_8x Imag	 Active ports 2 1 0 0 1 1
	vmnic4PG test port group Accessible: Virtual machines: Virtual switch: VLAN ID: Active ports:	Yes 1 test vSwitch 0 1

- 3. Click **Security** and select the **Accept** radio option to enable **Promiscuous mode**, **MAC address changes**, and **Forged transmits**.
- 4. Click **NIC teaming** and make the following changes:
 - a. Load balancing option to Use explicit failover order.
 - b. Network failover detection option to Link status only.
 - c. Select the Yes radio button for Notify switches and Failback.
 - d. Select **No** for **Override failover order**.



Edit standard virtual switch - tes Add uplink						
MTU	1500					
Uplink 1	vmnic5 🔻	vmnic5 🔻 🛞				
Uplink 2	vmnic3 🔻]	8			
Link discovery	Click to expand					
- Security						
Promiscuous mode	Accept					
MAC address changes	Accept OReject					
Forged transmits	Accept OReject					
 NIC teaming 						
Load balancing	Use explicit failover	order	•			
Network failover detection	Link status only		•			
Notify switches	• Yes O No					
Failback	🔾 Yes 💿 No					
Failover order	Mark standby	👔 Move up 🛛 📃 Move down				
	Name	Speed	Status			
	wmic5	Link down	Active			
	vmnic3	1000 Mbps, full duplex	Active			
 Traffic shaping 	Click to expand					
			Save Cance			

5. Click Save.

Configuring ReversePathFwdCheckPromisc

In the WebUI

- 1. From the Navigator window select **Manage** > **System** > **Advanced settings**.
- 2. Scroll down or use the search bar to go to the **Net.ReversePathFwdCheckPromisc** option.
- 3. Select Net.ReversePathFwdCheckPromisc and click Edit option.
- 4. In the **Edit option Net.ReversePathFwdCheckPromisc** window update the **New value** field to 1 and click **Save**.



The **Net.ReversePathFwdCheckPromisc** option is not enabled by default and making changes to this option will be globally applicable on the ESXi.

In the CLI

[host:] esxcfg-advcfg /Net/ReversePathFwdCheckPromisc

Value of ReversePathFwdCheckPromisc is 0

```
[host:] esxcfg-advcfg -s 1 /Net/ReversePathFwdCheckPromisc
Value of ReversePathFwdCheckPromisc is 1
[host:]
```



If the value of the ReversePathFwdCheckPromisc configuration option is changed when the ESXi instance is running, you need to enable or re-enable the promiscuous mode for the change in the configuration to take effect.

Creating a Distributed vSwitch Using vCenter with LACP Configuration

Follow the steps below to create a distributed vSwitch:

- 1. Log in to the vSphere web client.
- 2. From the **Home** screen, select **Networking**.

Figure 63 Navigating to the Networking Icon

•Navigator	🔂 Home						
Back	Home						
🔥 Home	Inventories						•
Hosts and Clusters VMs and Templates		57		 Q 			
Storage Networking Content Libraries	Hosts and Clusters Operations and P	VMs and Templates	Storage	Networking	Content Libraries	Global Inventory Lists	
🔂 Global Inventory Lists	Operations and P	Olicies					
Tellicies and Profiles	S			de la	۵	5	
Regional Administration	Task Console	Event Console	VM Storage Policies	Customization Specification Manager	Update Manager	Host Profiles	
😨 Tasks 🙀 Events	Administration						
Tags & Custom Attributes	2		2		<u>_</u>		
Q New Search B Saved Searches	Roles	System Configuration	Licensing	Customer Experience Improvement	vRealize Operations Manager		
	Plug-ins for Instal						•

3. Right-click the data center and click **Distributed Switch > New Distributed Switch**.

Navigator I	Platform	-DC 1 👣	智 🦾 😚	a 🤯 Acti	ons 👻					
4 Back	Getting Sta	rted Summary	Monitor C	Configure	Permissions	Hosts & Clusters	VMs	Datastores	Networks	Update Manager
✓ ② vcsa.qavm.com	What is	a Datacenter?								
Amol		nter is the primary				-				
▶ SSP		objects such as h s. From the datace				States -				
Platform-DC 200 network Actions - Platform-DC		nize inventory obje s. folders, and clu		, you		Vi	rtual Mac	chines		
200_network Actions - Platform-DC 200_network Add Host	tacent		sters to a		Cluster		1			
🧕 test 🕲 New Cluster	ontor	Server can contain	multiple					÷		
WI Network New Folder	tacent	ers. Large compar	nies might us	e						
Q VM Network 2 Distributed Switch		lew Distributed Sv		_			н	lost		
Q VM Network 2-19: New Virtual Machine	• 🖳 I	mport Distributed	Switch							
🔮 VM Network 3 🛛 😤 New vApp from Library			_		N.		/			
🔮 VM Network 4 🎲 Deploy OVF Template	_	Datacenter								
Platform-DSWITC Platform-DSW Storage	•					nter Server				
Platform_DPo Edit Default VM Compatibility				V	Sphere Client					
🙊 Migrate VMs to Another Network										
Move To Rename	sic Ta	sks			Explore Fu	rther		-		
Tags & Custom Attributes							_			
Recent Objects Add Permission										
Viewed Cre: Alarms	•									
Platform-DC X Delete		Target	Statu	15		Initiator		Queued For	Sta	rt Time 1 🔻
Platform_DPortGroup All vCenter Orchestrator plugin Act	ions 🕨 👔	🗿 vcsa.qavm.con	n 🖌	Completed	t	VMware vSph	ere Up	2	263 ms 8/1	3/2017 10:29:01
10.16.9.25 Update Manager	•									
A vmcui										

4. Enter a name for the new switch in the **Name and location** window. Click **Next**.

Figure 65 Name of the New Distributed Switch

Level 2 Mew Distributed Switch		? ₩
Name and location Select version Get version Get version Ready to complete	Name and location Specify distributed switch name and location. Name: New Distributed Switch Location: Platform-DC	
	Back Next Finish Ca	ancel

5. Select **Distributed switch:6.0.0**. Click **Next**.

Select the exact version that is running on the ESXi host for the distributed switch. In this example we are selecting Distributed switch: 6.0.0, as the setup uses vCenter 6.5 managing ESXi hosts running 6.0.

6. Select the required number of uplink ports Edit Settings page.

Figure 66 Edit Settings

NOTE

La New Distributed Switch		?**
 1 Name and location 2 Select version 3 Edit settings 4 Ready to complete 	Edit settings Specify number of uplinks: Number of uplinks: Network I/O Control: Default port group: Port group name:	k ports, resource allocation and default port group.
		Back Next Finish Cancel

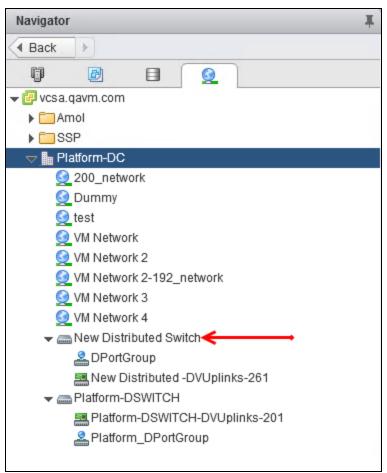
7. Click **Next** and review your selections.

Figure 67 Review and Completing the Wizard

New Distributed Switch				? ₩
 1 Name and location 2 Select version 	Ready to complete Review your settings selections be	fore finishing the wizard.		
✓ 3 Edit settings	Name:	New Distributed Switch		
4 Ready to complete	Version: Number of uplinks: Network I/O Control: Default port group:	6.5.0 3 Enabled DPortGroup		
	Suggested next actions Support of the second secon	p lable in the Actions menu of the new o	iistributed switch.	
			Back Next Finish Car	ncel

8. Click Finish.

Figure 68 New Distributed Switch



Adding ESXi Hosts to the Distributed Switch

Follow the steps below to add ESXi hosts to the newly created distributed switch. These steps will enable vCenter to add physical ports to the distributed switch.

- 1. Right-click the newly created distributed switch and select **Add and Manage Hosts.** Click **Next**.
- 2. In the **Select task** window select **Add hosts**. Click **Next**.

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Figure 69 Add Hosts

- Navigato I Platform-DC 👕 🎁 🎥 浩 👘 🔯 Actions 🗸 Getting Started Summary Monitor Con Actions - Platform-DC 4 Back Data 📔 Add Host... p Ð Q 🝿 New Cluster. 🗕 🖅 vcsa.qavm.com What is a Datacenter? New Folder Amol A datacenter is the primary container of Distributed Switch inventory objects such as hosts and virtual machines. From the datacenter, you can ad-▶ TSSP ▽ 📠 Platform-DC New Virtual Machine and organize inventory objects. Typically, you 🔠 New vApp from Library.. 200_network add hosts, folders, and clusters to a datacenter Deploy OVF Template.. 🧕 Dummy 🧕 test vCenter Server can contain multiple Storage datacenters. Large companies might use multiple datacenters to represent 🕺 VM Network Edit Default VM Compatibility.. VM Network 2 organizational units in their enterprise 🙊 Migrate VMs to Another Network.. Q VM Network 2-192_network 🔮 VM Network 3 Move To. 🧕 VM Network 4 Rename. Tags & Custom Attributes 2 DPortGroup Add Permission.. Rew Distributed -DVUplinks-261 - Platform-DSWITCH Alarms Real Platform-DSWITCH-DVUplinks-201 🗙 Delete Platform_DPortGroup Basic Tasks All vCenter Orchestrator plugin Actions 🐒 Add a host Update Manager ters Learn how to create datacenters 🗊 Create a cluster 狩 Create a new virtual machine Learn about hosts Add a datastore Learn about clusters 🏪 Create a distributed switch Learn about folders
- 3. Click **New Hosts** to add new ESXi hosts for the distributed switch configuration.
- 4. Select the host from the **Select new hosts** window and click **OK**.

Select **Configure identical network settings on multiple hosts (template mode)** to enable similar network configurations on multiple hosts.

Select new hosts			X
Incompatible Hosts		C	Filter -
✓ Host	Host State	Cluster	
10.16.13.239	Connected	N/A	
🕌 🔍 Find 🔹			1 items 🕒 Copy 🗸
			OK Cancel

Figure 70 Select New Hosts

5. Click **Next**. In the **Select template host** window select a template host to apply its configuration to other hosts on the switch.

This step will enable you to add physical ports on the ESXi hosts to the distributed switch. Click **Next**.

6. In the Manage physical network adapters window select a physical network adapter.



7. Click Assign uplink. The Select an Uplink for vmnic1 window is displayed.

8. Select Uplink 1 for vmnic1 and click OK. Click Next.



In this example we have selected three uplinks when creating the distributed switch. Repeat these steps for the other vmnic2 and vmnic3.

9. Click **Apply to all** to apply the physical network adapter assignments to all hosts on the switch.

Figure 71 Selecting an Uplink for the Physical Adapter

Add and Manage Hosts		?
Add and Manage Hosts Select task Select network adapter tasks Manage physical network adapters Manage VMkernel network adapters Analyze impact Ready to complete	Select network adapter tasks Select the network adapter tasks to perform. ✓ Manage physical adapters Add physical network adapters to the distributed switch, assign them to uplinks, or remove existing ones. ✓ Manage VMkernel adapters Add or migrate VMkernel network adapters to this distributed switch, assign them to distributed port groups, configure VMkernel adapter settings, or remove existing ones. ☐ Migrate virtual machine networking Migrate VM network adapters by assigning them to distributed port groups on the distributed switch. Sample distributed switch Manage VMkernel adapters by assigning them to distributed port groups on the distributed switch. Sample distributed switch Manage VMkernel ports ✓ Wikernel ports ✓ Wikernel ports ✓ Witual Machines ✓ Windent group ✓ Windentions	•
	Back Next Finish Ca	ncel

10.Click Next in the Manage VMkernel network adapters page.

11.Click **Next** in the **Analyze impact** page and **Ready to complete** page. Click **Finish**.

Editing Security Properties on the Distributed Port Group

Follow the steps below to modify the security settings on the distributed port group:

- 1. Select the distributed port group that is created under the distributed switch.
- 2. Select the **Configure** tab and click **Edit**.
- 3. Select Accept from the Promiscuous mode, MAC address changes, and Forged transmits drop down lists. Click OK.

Figure 72 Modify Security Settings

A DPortGroup_TestTP - Edit Settings	S				?
General Advanced Security Traffic shaping VLAN Teaming and failover Monitoring Traffic filtering and marking Miscellaneous	Promiscuous mode: MAC address changes: Forged transmits:	Accept Accept Accept	▼ ▼ ▼		
				ОК	Cancel

4. Navigate to Hosts and clusters.

5. Right-click the ArubaOS VM that is running on the ESXi hosts to which the distributed switch is configured and select **Edit Settings.**

Figure 73 Mapping Uplink Ports

🔫 🚰 vcsa.qavm.com				
▶ 🛄 Amol				
▼ SSP				
SSP-DC				
✓ Im Platform-DC	Powered On as			
🔻 🐻 10.16.13.239	×			
🖶 ArubaOS_MM_60512-sha1-newovatool6	6_5			
MM-8.2-stdby				
🖆 srini-sample-del (orphaned)				
	 VM Hardware 			
ArubaOS_MM_60512-MM1	Actions - ArubaOS_MM_60512-MM1			
🗗 ArubaOS_MM_8.1.0.0_59206	Power •			
ArubaOS_MM_8.1.0.2_60417-july14	Guest OS			
ArubaOS_MM_8.1.0.2_60858-11	Snapshots •			
ArubaOS_VMC_8.1.0.0_59206	Popen Console			
ArubaOS_VMC_8.1.0.2_60417-july14				
🔂 MMui	🚔 Migrate			
🗗 primary	Clone			
둼 secondary	Template			
🗗 vmcui	Fault Tolerance			
▼ 10.16.9.25 ☐ ArubaOS_MM_8.0.1.0_57204	VM Policies			
ArubaOS_MM_8.1.0.2_60858-1	Compatibility			
ArubaOS_VMC_8.1.0.2	Export System Logs			
ArubaOS_VMC_8.1.0.2_60858-2				
Windows 2012_10.16.9.26	Edit Resource Settings			
Windows 8	🚱 Edit Settings <			
	Move To			
	Rename			
	Edit Notes			
	Tags & Custom Attributes			
	Add Permission			
	Alarms			
	Remove from Inventory Delete from Disk			
	All vCenter Orchestrator plugin Actions			
	Update Manager			

6. Select the distributed port group that was created in the earlier steps as Network Adapter 2.

Figure 74 Selecting Network Adapter

ArubaOS_MM_60512-M	1M1 - Edit Settings	?₩		
Virtual Hardware VM Opt	tions SDRS Rules vApp Options			
F 🔲 CPU	6 🖉 🖉			
▶ 🌉 Memory	8192 • MB •			
🕨 🛄 Hard disk 1	4 📥 GB 🖵			
▶ 🛄 Hard disk 2	6 🐥 GB 🖵			
▶ G SCSI controller 0	LSI Logic Parallel			
Metwork adapter 1	VM Network 🛛 🗸 Connect	ed		
▶ m *Network adapter 2	DPortGroup_TestTP (DSwitch_Test' 🚽 🗹 Connect	ed		
▶ 🗾 Network adapter 3	Dummy 🖵 Connect	ed		
▶ i CD/DVD drive 1	Client Device	ed		
Floppy drive 1	Client Device	ed		
Video card	Specify custom settings			
VMCI device				
 Other Devices 				
▶ Upgrade	Schedule VM Compatibility Upgrade			
New device:	Select Add			
Compatibility: ESXi 5.0 and	later (VM version 8)	OK Cancel		

Connectivity will be restored with correct uplink switch configuration.

Configuring LACP Between the Distributed Switch and Uplink Switch

Follow the steps below to configure LACP between the distributed and uplink switch:

- 1. From vCenter dashboard, click **Networking** and select the new distributed switch.
- 2. Click the **Configure** tab, and select **LACP**.

Getting Started Summary Mo	onitor Configure P	ermission	s Ports Ho	sts VMs Networks			
44	LACP						
▼ Settings	The enhanced	The enhanced LACP support on a vSphere distributed switch lets you connect ESXi hosts to physical switches by using dynamic link aggregation					
Properties	Migrating netv	Migrating network traffic to LAGs					
Topology							
LACP							
Private VLAN	LAG Name	Ports	Mode	VLAN This list is empty.			
NetFlow				The lette enpy.			
Port mirroring							
Health check							

Figure 75 Configure LACP

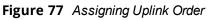
- 3. Click + to add a LAG.
- 4. In the **New Link Aggregation Group** window update the following and click **OK**.
 - a. Name Name for the new LAG
 - b. Number of Ports 3
 - c. Mode Active
- 5. Select the new distributed port group configuration.



6. In the distributed port group page, click the **Configure** tab and select **Edit**.

🚨 DPortGroup_TestTP 🛛 🍰 🖓 🖓	tions 👻	≡▼
Getting Started Summary Monitor	Configure Permissions Ports	Hosts VMs
Getting Started Summary Monitor 44 - - • Settings - - Policies - - • More - -	Configure Permissions Ports Properties General Name: Name: Port binding: Port binding: Port allocation: Number of ports: Network resource pool: Advanced Configure reset at disconnect: Override port policies Block ports: Block ports: Block ports:	Hosts VMs Edit DPortGroup_TestTP Static binding Elastic 8 (default) Enabled Allowed
	Traffic shaping: Vendor configuration: VLAN: Uplink teaming: Security policy: NetFlow: Traffic filtering and marking:	Disabled Disabled Disabled Disabled Disabled Disabled

- 7. Select Teaming and failover.
- 8. Using the up and down arrow button move **Uplink 1**, **Uplink 2**, and **Uplink 3** to **Unused uplinks** and **lag1_MM1_test** to **Active uplinks**. Click **OK**.



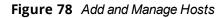
A DPortGroup_TestTP - Edit Setting	S		()
General Advanced Security Traffic shaping VLAN Teaming and failover	Load balancing: Network failure detection: Notify switches: Failback: Failborer order	Link status only	• 0 • • •
Monitoring Traffic filtering and marking	Active uplinks		
Miscellaneous	Iag1_MM1_test		
	Unused uplinks		
	🗾 Uplink 1		
	🗾 Uplink 2		
	🗾 Uplink 3		
	Select active and standby u	plinks. During a failover, standby uplinks activa	te in the order specified above.
			OK Cancel

Mapping LACP Port with Physical NICs

Follow the steps below to map LACP with physical NICs.

- 1. Right-click the newly created distributed switch and select **Add and Manage Hosts.** Click **Next**.
- 2. In the Select task window select Manage host networking. Click Next.
- 3. Click Attached hosts and add ESXi hosts to the LACP configuration. Click Next.

Select **Configure identical network settings on multiple hosts (template mode)** to enable similar network configurations on multiple hosts.



D	Add and Manage Hosts		(?
>	1 Select task 2 Select hosts	Select hosts Select hosts to manage their networking on this distributed switch.		
	3 Select template host	► 🕂 Attached hosts 💥 Remove		
	4 Select network adapter tasks	Host	Host Status	
	5 Manage physical network adapters (template mode) 6 Manage VMkernel network adapters (template mode)	10.16.9.20 10.16.9.25	Connected Connected	
	7 Analyze impact			
	8 Ready to complete	✓ Configure identical network settings on multiple hosts (template	mode). 🚯	
			Back Next Finish Cancel	

4. In the **Select template host** window select a template host to apply its configuration to other hosts on the switch. Click **Next**.

This step will enable you to add physical ports on the ESXi hosts for LACP. Click **Next**.

- 5. In the Select network adapter tasks window select Manage physical network adapters. Click Next.
- 6. In the **Manage physical network adapters** window select a physical network adapter.
- 7. Click Assign uplink. The Select an Uplink for vmnic1 window is displayed.
- 8. Select **lag_MM1_test0** for vmnic1 and click **OK**.



9. Click **Apply to all** to apply the physical network adapter assignments to all hosts on the switch. Click **Next**.

Figure 79 Adding Ports for LACP

 3 Select template host 4 select network adapter tasks Configure or review physical network adapter assignments for the template host in this switch. Assign uplink Unassign adapter Reset changes View settings Analyze impact A Ready to complete On this switch In Use by Switch Uplink Uplink In Use by Switch In Use by Switch	est-1 DSwitch_TestTP-DVUplinks
6 Analyze impact ID 16.9.20 (template) On this switch On this switch Impact (Reassigned) DSwitch_TestTP Iag1_MM1_te Iag1_MM1_te Impact vmnic2 (Reassigned) DSwitch_TestTP Iag1_MM1_te Vmnic2 (Reassigned) VSwitch_TestTP Iag1_MM1_te Vmnic0 VSwitch0 Impact VSwitch0 	est-0 DSwitch_TestTP-DVUplinks est-1 DSwitch_TestTP-DVUplinks est-2 DSwitch_TestTP-DVUplinks
Contribution Complete Contribution Completee Contribution C	est-1 DSwitch_TestTP-DVUplinks est-2 DSwitch_TestTP-DVUplinks
7 Ready to complete Image: monic1 (Reassigned) DSwitch_TestTP lag1_MM1_te Image: monic2 (Reassigned) VSwitch0 -	est-1 DSwitch_TestTP-DVUplinks est-2 DSwitch_TestTP-DVUplinks
wmnic2 (Reassigned) DSwitch_TestTP lag1_MM1_te wmnic3 (Reassigned) DSwitch_TestTP lag1_MM1_te on other switches/unclaimed wwnic0 -	est-1 DSwitch_TestTP-DVUplinks est-2 DSwitch_TestTP-DVUplinks
wmnic3 (Reassigned) DSwitch_TestTP lag1_MM1_te ✓ On other switches/unclaimed wmnic0 vSwitch0 -	est-2 DSwitch_TestTP-DVUplinks
On other switches/unclaimed witches/unclaimed viswitch0	
vmic0 vSwitch0	-
Apply the physical network adapter assignments on this switch for the template host to all hosts.	
I Apply to all 🕐 Reset all 👔 View settings	
Host/Physical Network Adapters 1 I In Use by Switch Uplink	Uplink Port Group
- 10.16.9.25	
✓ On this switch	
mmic1 (Reassigned) DSwitch_TestTP lag1_MM1_te	est-0 DSwitch_TestTP-DVUplinks-
m vmnic2 (Reassigned) DSwitch_TestTP lag1_MM1_te	est-1 DSwitch_TestTP-DVUplinks-
m vmnic3 (Reassigned) DSwitch_TestTP lag1_MM1_te	est-2 DSwitch_TestTP-DVUplinks-
 On other switches/unclaimed 	
📷 vmnic0 vSwitch0	-

10.Click **Next** in the **Analyze impact** screen. There should be no impact in this window.

Increasing the Flash Size on a vSphere Hypervisor

ArubaOS enables you to increase the size of your flash to ensure that the flash is hosted on a separate disk. By doing this you can move to a hard disk with higher storage capacity for flash with minimal impact. Follow the steps below to increase the size of the flash on the Mobility Master Virtual Appliance.

- 1. Power down the VM.
- 2. Right click the VM in the vSphere client and click **Edit Settings**.
- 3. Click Add in the Virtual Machine Properties window.

Figure 80 Virtual Machine Properties

10.16.9.238 - vSphere Cl	ient			
File Edit View Inventor	File Edit View Inventory Administration Plug-ins Help			
🖸 🖬 🏠 Home	🗈 🔂 Home 🕨 🛃 Inventory 🕨 🗊 Inventory			
	a 13 c 🖻 🖗 🚸			
□ □ 10.16.9.238 AOS_SC-1 ArubaOS_MM ArubaOS_SC_ ControllerSim ControllerSim Fedora 20 5.1 Mahesh_SC_N Migration Too	ArubaOS_MM_8.0.055647 Cotting Charter Power Guest Snapshot Open Console			
SC_Abhinesh	Edit Settings Add Permission Ctrl+P Report Performance			
	Rename			
	Open in New Window Ctrl+Alt+N Remove from Inventory Delete from Disk			

4. Click Hard Disk in the Add Hardware window and click Next.

Figure 81 Selecting the Device Type

and the second se			X
u wish to add to your virtual machine?			
Choose the type of device you wish to add.			
© Parallel Port (unavailable) 월 Floppy Drive (unavailable) 일 CD/DVD Drive (unavailable)			
 USB Device (unavailable) PCI Device (unavailable) Ethernet Adapter 			
SCSI Device (unavailable)	≤ Back	Next >	Cancel
	Serial Port (unavailable) Parallel Port (unavailable) CD/DVD Drive (unavailable) USB Controller USB Device (unavailable) PCI Device (unavailable) Hernet Adapter Hard Disk	Choose the type of device you wish to add. Serial Port (unavailable) Parallel Port (unavailable) Coupy Drive (unavailable) COUDVD Drive (unavailable) USB Device (unavailable) PCI Device (unavailable) Ethernet Adapter Hard Disk SCSI Device (unavailable)	Choose the type of device you wish to add. Serial Port (unavailable) Parallel Port (unavailable) CD/DVD Drive (unavailable) USB Device (unavailable) USB Device (unavailable) PCI Device (unavailable) Hernet Adapter Hard Disk SCSI Device (unavailable)

- 5. Select **Create a new virtual disk** and click **Next**.
- 6. Enter a value of the desired disk size and select **Thick Provision Lazy Zeroed**. Click **Next**.

Figure 82 Create Disk

🕗 Add Hardware	100 M	Manager Same	X
Create a Disk Specify the virtu	al disk size and provisioning policy		
Device Type Select a Disk Create a Disk Advanced Options Ready to Complete	Capacity Disk 16 - GB - Disk Provisioning Thick Provision Lazy Zeroed Thick Provision Eager Zeroed Thin Provision Location Store with the <u>v</u> irtual machine Specify a <u>d</u> atastore or datastore cluster: Browse		
Help		≤ Back Next ≥ Ca	ancel

7. Click **Next** in the **Advanced Options** window and click **Finish**.

Figure 83	New Hard Disk	

ardware Options Resour	rces			Virtual Machine Version	1:8
Show All Devices	Add	Remove	Memory Configural	tion	
Aardware Memory CPUs Video card VMCI device SCSI controller 0 CD/DVD drive 1 Hard disk 1 Hard disk 2 Hard disk 3 Floppy drive 1	Summary 8192 MB 3 Video card Restricted LSI Logic Parallel Client Device Virtual Disk Virtual Disk Virtual Disk Client Device		1011 68 512 68 128 68 64 68 32 68 16 68	Memory Size: Maximum recommended for this guest OS: 1011 GB. Maximum recommended for best performance: 130964 MB. Default recommended for this guest OS: 2 GB. Minimum recommended for	8
Network adapter 1 Network adapter 2 Network adapter 2 Network adapter 3 Serial port 1	VM Network VM Network 2 VM Network 3 telnet://:6004		B 665 - 4 68 - 2 68 - 1 68 - 512 MB - 256 MB - 128 MB -	this guest OS: 512 MB.	
			64 MB 32 MB 16 MB 8 MB 4 MB		

8. Power on the VM and ArubaOS will migrate data from the old hard disk to the new one.

Figure 84 Migrating Data

Aruba Networks ArubaOS Version 8.0.0.0-sucs-ctrl (build 0000 / 1 Built by srini@localhost.localdomain on 2016-05-0 Copyright (c) 2002-2016, Aruba, a Hewlett Packard	
Formatting new flash Forcing filesystem check on new flash	СОК] СОК]
Mounting new flash	
Copying files to new flash <<<<< Welcome to Aruba Networks -	[OK] - Aruba MM >>>>>
[10:53:53]:Probing for EEPROM devices [10:53:53]:Probing for real-time clock [10:53:53]:Uncompressing core image files	E NOT FOUND] E ok j

- Confirm if the newly added Hard disk 3 is used by ArubaOS. The Hard disk 3 will be listed as /dev/sdc1 and if old hard disk is in use, it will be listed as /dev/sdb1. If the OVF file only contains a single hard disk it be listed as /dev/sda3.
- 10.If the new **Hard disk 3** is working as expected, the older hard disk can be removed from the VM and deleted from disk of the vSphere server.

lardware Options Resour	ces	Virtual Machine Version: 8
Show All Devices	Add Restore	This device has been marked for removal from
Hardware	Summary	To cancel the removal, click the Restore button.
Memory	8192 MB	Removal Options
CPUs	3	Remove from virtual machine
📃 Video card	Video card	 Remove from virtual machine and delete
VMCI device	Restricted	· · · · · · · · · · · · · · · · · · ·
SCSI controller 0	LSI Logic Parallel	
CD/DVD drive 1	Client Device	
Hard disk 1	Virtual Disk	
Hard disk 2 (removing)	Removed	
Hard disk 3	Virtual Disk	
Floppy drive 1	Client Device	
Network adapter 1	VM Network	
Network adapter 2	VM Network 2	
Network adapter 3	VM Network 3	
Serial port 1	telnet://:6004	
Help		OK Cancel

Figure 85 Removing a Hard Disk



ArubaOS supports only 3 disks and the size of the new disk that is added should be more than the current disk size.

Increasing the Flash Size on a KVM Hypervisor

ArubaOS enables you to increase the size of your flash to ensure that the flash is hosted on a separate disk. By doing this you can move to a hard disk with higher storage capacity for flash with minimal impact. Follow the steps below to increase the size of the flash on the Mobility Master Virtual Appliance.

1. To protect the data on the controller, take a flashback up of ArubaOS using **scp/ftp/tftp**.

(ArubaMM) [m	nynode]	#show	storage					
Filesystem			Size	Usec	l Available	Use%	Mounted	on
none			3.0G	5.61	1 3.0G	0%	/tmp	

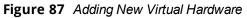
/dev/vdb1 7.7G 452.7M 6.9G 6% /flash /dev/vda5 1.4G 380.3M 1022.7M 27% /mnt/disk1 /dev/vda6 1.4G 380.3M 1022.7M 27% /mnt/disk2 (ArubaMM) [mynode] #backup flash Please wait while we take the flash backup...... File flashbackup.tar.gz created successfully on flash. Please copy it out of the controller and delete it when done. (ArubaMM) [mynode] # copy flash: flashbackup.tar.gz scp: 10.16.9.107 tester flashbackup.tar.gz

- 2. Access the virt-manager and right click on the VM. Select **Shut Down**.
- 3. Click **Shut Down** for a graceful shutdown of the VM.

Figure 86 Graceful Shutdown

		Virtual Machine Manager		- • ×
File Edit Viev	w Help			
📔 📃 Ор	en (> 10 🔲	•		
Name		-	CPU usage	Host CPU usage
GEMU/KVM				
Running	M-MM-1		-lal-	
rhel7.1 Running Suchin- Shutoff	Run			· · · · · ·
VS-MM Running	<u>P</u> ause <u>S</u> hut Down	Reboot	MMM	
VS-VM Running	Clone Migrate <u>D</u> elete	Shut Down Force Reset Force Off	MMM	
	<u>O</u> pen	Save		

- 4. Add a new VirtIO Disk according to your requirement. For more information refer to the sizing table in <u>What's New on page 9</u>.
- 5. Double click the VM and click **Show virtual hardware details**. Click on **Add Hardware**.
- 6. In the Add New Virtual Hardware window click Storage. Enter a desired value for the Create a disk image on the computer hard drive option and click Finish. A new disk is added.



File	Virtual Machine View		Add New Virtual Hardware
	Overview Performance Processor Memory Boot Options VirtIO Disk 1 VirtIO Disk 2 IDE CDROM 1	 Storage Controller Network Input Graphics Sound Serial Parallel Console Channel 	Add New Virtual Hardware Storage Create a disk image on the computer's hard drive 16.0 - + GiB 840.0 GiB available in the default location Allocate entire disk now Select managed or other existing storage Browse Device type: Disk device
	IC :f5:4b:cf & IUSB Host IC :14:13:6b & PCI Host IC :6d:de:75 & Video ablet & Video eyboard & Smartcan splay Spice & USB Redi pund: ich6 & TPM erial 2 & RNG hannel qemu-ga	 PCI Host Device Video Watchdog Filesystem Smartcard USB Redirection TPM RNG 	Bus type: VirtIO ▼
	Channel spice		Cancel Finish

7. Power on the VM. The following message is displayed when ArubaOS boots up.

ArubaNetworks

ArubaOS Version 8.1.0.0 (build 57204 / label #57204)

Built by p4build@lemnos on 2017-04-06 at 20:26:23 PST (gcc version 4.7.2)

(c) Copyright 2017 Hewlett Packard Enterprise Development LP.

[10:18:22]:Starting device manager [OK]

Formatting new flash [OK]

Forcing filesystem check on new flash [OK]

Mounting new flash [OK]

Copying files to new flash [OK]

8. Once the system boots up, the new disk will show up as vdc and not vdb. The flash will contain the old data.

(ArubaMM) [mynode]	#show	storage				
Filesystem		Size	Used	Available	Use%	Mounted on
none		3.0G	7.5M	3.0G	0%	/tmp
/dev/vdc1		15.6G	477.7M	14.4G	3%	/flash
/dev/vda5		1.4G	380.3M	1022.7M	27%	/mnt/disk1
/dev/vda6		1.4G	380.3M	1022.7M	27%	/mnt/disk2
(ArubaMM) [mynode]	#					

9. Power off the VM and select VirtIO Disk2. Click Remove and reboot the controller.

10.Click Yes in the Are you sure you want to remove this device window.

11. The following information is displayed after rebbot and you will be able to use the new disk.

(ArubaMM) [mynode]	#show	storage					
Filesystem		Size	Used	Available	Use%	Mounted	on
none		3.0G	7.6M	3.0G	0%	/tmp	
/dev/vdb1		15.6G	477.8M	14.4G	3%	/flash	



ArubaOS supports only 3 disks and the size of the new disk that is added should be more than the current disk size.

Backing up and Restoring Critical Data

It is important to frequently back up all critical configuration data and files on the compact flash file system to an external server or mass storage device. Ensure the following files are backed up regularly:

- Configuration data
- WMS database
- Local user database
- Licensing database
- Floor plan JPEGs
- Custom captive portal pages
- x.509 certificates
- Controller Logs

Back Up and Restore Compact Flash in the WebUI

The WebUI provides the easiest way to back up and restore the entire compact flash file system. The following steps describe how to back up and restore the compact flash file system using the WebUI on the Mobility Master:

- 1. Click on the **Configuration** tab.
- 2. Click **Pending Configuration** and then **Deploy Changes**. **Pending Changes** is visible only when there changes to be saved, if this option is not visible skip this step.
- 3. Navigate to the **Diagnostics > Technical Support > Backup Flash** page.
- 4. Click **Create Backup** to back up the contents of the compact flash file system to the flashbackup.tar.gz file.
- 5. Click **Copy Backup** to copy the file to an external server.

You can later copy the backup file from the external server to the compact flash file system using the file utility in the **Diagnostics > Technical Support > Copy Files** page.

 To restore the backup file to the compact flash file system, navigate to the Diagnostics > Technical Support > Restore Flash page. Click Restore.

Back Up and Restore Compact Flash in the CLI

The following steps describe the backup and restore procedure for the entire compact flash file system using the controller's command line:

1. Enter **config** mode in the CLI on the controller, and enter the following command:

(host) [mynode] (config) #write memory

2. Use the backup command to back up the contents of the compact flash file system to the **flashbackup.tar.gz file**.

```
(host) [mynode] (config)# backup flash
Please wait while we tar relevant files from flash...
Please wait while we compress the tar file...
Checking for free space on flash...
Copying file to flash...
File flashbackup.tar.gz created successfully on flash.
```

3. Use the copy command to transfer the backup flash file to an external server or storage device:

(host) [mynode] (config) copy flash: flashbackup.tar.gz ftp: <ftphost> <ftpusername>
<ftpuserpassword> <remote directory>

(host) [mynode] (config) copy flash: flashbackup.tar.gz usb: partition copy flash: flashbackup.tar.gz

You can later transfer the backup flash file from the external server or storage device to the compact flash file system with the copy command:

(host) [mynode] (config) # copy tftp: <tftphost> <filename> flash: flashbackup.tar.gz
(host) [mynode] (config) # copy usb: partition <partition-number> <filename> flash:
flashbackup.tar.gz

4. Use the restore command to untar and extract the flashbackup.tar.gz file to the compact flash file system: (host) [mynode] (config) # restore flash

Back Up and Restore Configuration in the CLI

The following steps describe the backup and restore procedure for the configuration file system using the controller's command line:

1. Enter **config** mode in the CLI on the controller, and execute the following command:

(host) [mynode] (config) #write memory

2. Use the backup command to back up the contents of the configuration file system to the **configbackup.tar.gz** file.

(host) [mynode] (config) # backup config
Please wait while we take the config backup.....
File configbackup.tar.gz created successfully on flash.
Please copy it out of the controller and delete it when done.

3. Use the copy command to transfer the backup configuration file system to an external server or storage device:

(host) [mynode] (config) copy flash: configbackup.tar.gz ftp: <ftphost> <ftpusername>
<ftpuserpassword> <remote directory>

(host) [mynode] (config) copy flash: configbackup.tar.gz usb: partition <partition-number>

You can later transfer the backup configuration file from the external server or storage device to the compact flash file system with the copy command:

(host) # copy tftp: <tftphost> <filename> flash: configbackup.tar.gz
(host) # copy usb: partition <partition-number> <filename> flash: configbackup.tar.gz

4. Use the restore command to untar and extract the **configbackup.tar.gz** file to restore the configuration:

(host) [mynode] (config) # restore config Please wait while we restore the config backup..... Config restored successfully. Please reload (reboot) the controller for the new config to take effect.

Snapshot

A VMware snapshot is a copy of the virtual machine's disk file (VMDK) at a given point in time. Snapshots provide a change log for the virtual disk and are used to restore a VM to a particular point in time when a failure or system error occurs.

A snapshot preserves the state and data of a VM at a specific point in time. A VM provides several operations for creating and managing snapshots and snapshot chains. These operations let you create snapshots, revert to any snapshot in the chain, and remove snapshots. For additional information about snapshots refer to the VMware kb article https://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1015180.

Implementing Management Interface

This sections discusses implementation of the management interface on the Mobility Master. It includes the following:

- Assigning the IP address to the management interface from the CLI
- Ensuring management bound traffic uses the correct interfaces and a default gateway specific to the management interface
- Protecting the management interface against unwanted traffic and DOS attacks

Once the IP is assigned (manual or dynamic) we should be able to reach the management interface from anywhere in the network. This requires that we have a default gateway for the management interface. But this default gateway should not be used for the data routing table of the controller. So the inherent problem is that we need to have two default gateways; one for the management interface and the other for the data traffic and the management traffic should be via the management interface only. This is solved by the use of the iproute2 utility and having a separate routing table with its own default gateway for the management IP. With this we can ensure that the management traffic does not leak onto unwanted interfaces.

The management interface is mapped to eth0 and is a Linux interface. It is not a part of SOS and does not have access to the SOS firewall to protect itself. Since the management interface is susceptible to attacks it is imperative that we should firewall this interface. For this we use the iptables firewall present in Linux. We allow only ssh (22), telnet(2323) ,tftp(69) and HTTPS(443,4343) traffic on the management interface and also rate limit traffic to protect controller from unwanted traffic flood over the network. Initially phase of this feature is implemented for manually configuring a static IP for management interface from the console. It covers both IPv4 and IPv6 implementation. Most of the functional behavior and implementation are same for IPv4 and IPv6. This feature can be extended for obtaining IP dynamically from DHCP server in the network in future.

Datapath Debug Commands

Listed below are the commands to view the system statistics of your controller:

Execute the show datapath frame [counters] command to view statistics of the data traffic processed. This command displays the frame statistics that are received and transmitted from the datapath of the controller. Allocated frames indicate buffers allocated at any given point of time. A constant increment in the buffer indicates a buffer leak.

The following example displays statistics of data traffic processed.

• Execute the **show port stats** command to view the traffic received/transmitted through gigabit ports using the datapath.

The following example displays the port statistics.

(host) #show port stats

Execute the show datapath heartbeat stats command to monitor the health of the systems. Heartbeats are sent from the control plane to the datapath every second. The packets pass through the datapath CPUs and return to the control plane in one second. If the load on the system increases or there is a CPU lock there is a possibility of the heartbeat being missed. If this recurs 30 times consecutively the controller reboots. The heartbeat probe introduced in this release, sends out a probe when two consecutive heartbeats are missed and also measures the actual time taken for the packets to pass through the datapath CPUs and return to the control plane.

The following example displays the heartbeat statistics.

```
(host) #show datapath heartbeat stats
Sibyte HeartBeat Stats:
   Total HB sent: 42686
   Total HB send errors: 0
   Current HB send errors: 0 (max:30)
   HB send errors high water-mark: 0
Sibyte Probe Stats:
   Total probes sent: 0
   Total probes sent: 0
```

```
Last probe sent @ 0:00:00.000
Last probe rcvd @ 0:00:00.000
```

Execute the show datapath dpdk [mempool-stats | ring-stats] command to view the DPDK mempool and ring statistics. Since the size of the mempool and ring may vary based on the system template this command identifies the size of the structures used.

The following example displays DPDK mempool and ring statistics.

```
(host) #show datapath dpdk mempool-stats
DPDK Memory Pool Statistics Table
                    ___ _____ ____
mPoolName mPoolAddr Flags phyAddr Size hdrSize eltSize tSize priDataSize success bulk
success objs fail bulk fail objs cPoolCount
_____ _____
log history 0x2aaaaa802080 0 0x0xa9002080 512 64 2048 0 0 0 0 0 479
mbuf pool 0x2aaa36200000 0 0x0xa9400000 65536 64 4032 0 0 0 0 0 0 62935
msg 0x7fecd6700080 0 0x0x24700080 1024 64 40 24 0 0 0 0 1024
(host) #show datapath dpdk ring-stats
DPDK Ring Statistics Table
---- ---- ------ -----
Flags: Flag - set for single producer or consumer
Used - number of entries in a ring
Freed - number of free entries in a ring
```

QThreshold - Enqueque Threshold nQSuccessBulk - Successful enqueues number nQSuccessObjs - Objects successfully enqueued nQFailBulk - Failed enqueues number nQFailObjs - Objects that failed to be enqueued dQSuccessBulk - Sucessful dequeues number dQSuccessObjs - Objects successfully dequeued dQFailBulk - Failed dequeues number dQFailObjs - Objects that failed to be dequeued RinqName RinqAddr Flaq Used Freed QThreshold nQSuccessBulk nQSuccessObjs nQFailBulk nQFailObjs dQSuccessBulk dQSuccessObjs dQFailBulk dQFailObjs ___ _____ ____ ____ ____ MP log history 0x2aaaaa800000 0 479 544 0 0 0 0 0 0 0 0 0 MP mbuf pool 0x7fecd6600000 0 62908 68163 0 0 0 0 0 0 0 0 0 core-0-low 0x2aaaaa98a5c0 2 0 1023 0 0 0 0 0 0 0 0 0 core-0-high 0x2aaaaa98c640 2 0 1023 0 0 0 0 0 0 0 0 0 core-1-low 0x2aaaaa98e6c0 2 0 1023 0 0 0 0 0 0 0 0 0 core-1-high 0x2aaaaa990740 2 0 1023 0 0 0 0 0 0 0 0 0 core-2-low 0x2aaaaa9927c0 2 0 1023 0 0 0 0 0 0 0 0 0 core-2-high 0x2aaaaa994840 2 0 1023 0 0 0 0 0 0 0 0 0 MP msg 0x2aaaaa9968c0 0 1024 1023 0 0 0 0 0 0 0 0 0

Execute the **show datapath utilization** command to view the CPU utilization of all the datapath CPUs (SP/FP).

The following example displays datapath CPU utilization statistics.



If the CPU speed is more than 2.1 GHz, data displayed under the **64 Secs** option is invalid, but valid only for **1 Sec** and **4 Sec** options. Counter inconsistency is only for CPUs with speed more than 2.1 GHz.

```
(host) #show datapath utilization
Datapath Network Processor Utilization
-----+
| Cpu utilization during past |
Cpu | 1 Sec 4 Secs 64 Secs |
-----+
1 | 0% | 0% | 0% |
2 | 0% | 0% | 0% |
```

Execute the **show cpuload [current]** command to view the controller's CPU load for application and system processes. Use the current option to check the output of the top two UNIX commands.

The following example shows that the majority of the controller's CPU resources are not being used by either the application (user) or system processes.

(host) #show cpuload user 6.9%, system 7.7%, idle 85.4%

The following example displays the summary of system (CPU) load. When the current option is used, it displays detailed information of the CPU load for each process.

```
(host) #show cpuload [current]
top2 - 05:09:29 up 2 days, 9 min, 0 users, load average: 0.00, 0.01, 0.05
Tasks: 132 total, 2 running, 130 sleeping, 0 stopped, 0 zombie
```

Cpu(s): 2.5%us, 1.5%sy, 0.0%ni, 96.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st Mem: 7915932k total, 2817304k used, 5098628k free, 2744k buffers Swap: Ok total, Ok used, Ok free, 193244k cached PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND 3462 root 20 0 2134m 16m 7772 S 26 0.2 744:48.18 sos.shumway.elf 3654 root 20 0 56112 5856 4732 S 4 0.1 40:48.87 gsmmgr 3503 root 20 0 0 0 0 R 2 0.0 63:24.05 kni single 1 root 20 0 8340 676 572 S 0 0.0 0:00.92 init 2 root 20 0 0 0 0 S 0 0.0 0:00.00 kthreadd 3 root 20 0 0 0 0 S 0 0.0 0:00.22 ksoftirgd/0 5 root 20 0 0 0 0 S 0 0.0 0:02.02 kworker/u:0 6 root RT 0 0 0 0 S 0 0.0 0:00.00 migration/0 7 root RT 0 0 0 0 S 0 0.0 0:00.00 migration/1 8 root 20 0 0 0 0 S 0 0.0 0:01.94 kworker/1:0 9 root 20 0 0 0 0 S 0 0.0 0:07.79 ksoftirgd/1 10 root 20 0 0 0 0 S 0 0.0 0:01.26 kworker/0:1 11 root RT 0 0 0 0 S 0 0.0 0:00.00 migration/2 12 root 20 0 0 0 0 S 0 0.0 0:01.08 kworker/2:0 13 root 20 0 0 0 0 S 0 0.0 0:05.80 ksoftirgd/2 14 root 0 -20 0 0 0 S 0 0.0 0:00.00 cpuset 15 root 0 -20 0 0 0 S 0 0.0 0:00.00 khelper 16 root 0 -20 0 0 0 S 0 0.0 0:00.00 netns ...

Upgrading a Controller

Follow the steps below to upgrade the controller. You can upgrade the OS on the controller either through WebUI or through the CLI. The following methods can be used to upgrade the OS on the controller:

- TFTP
- FTP
- SCP
- Local File (This option is available while upgrading through WebUI)

Be sure to back up the controllers as described in **Backing up and Restoring Critical Data**.

In the WebUI:

- 1. In the Mobility Master node hierarchy, navigate to **Configuration > Upgrade > Software Management.**
- 2. Choose the upgrade method.
- 3. If you are using TFTP, FTP, or SCP for upgrade enter the server IP address.
- 4. Enter the image file name.
- 5. Choose the partition to upgrade.
- 6. Select Yes to Reboot Controller After Upgrade.
- 7. Select Yes to Save Current Configuration Before Reboot.
- 8. Click **Upgrade**.

In the CLI:

Execute the following commands on the CLI to upgrade the OS:

For TFTP: (host) [mynode] (config)# copy tftp: <TFTP server IP address> <image file name>
system: partition <0 or 1>

For FTP: (host) [mynode] (config) # copy ftp: <FTP server IP address> <username> <image file
name> system: partition <0 or 1>

For SCP: (host) [mynode] (config) # copy scp: <SCP host IP address> <username> <image file name>
system: partition <0 or 1>

Once the image is uploaded in the flash, save the configuration and reload the controller.

If the following error message is displayed, follow the steps above to reload the OS on both partitions.

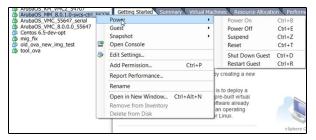
Gracefully Shutting Down ArubaOS VMs

It is important to gracefully shutdown the guest ArubaOS VM's to avoid database corruptions and other related issues. The following steps describe the process to perform a graceful shutdown in the VMware ESXi and KVM hypervisor.

In the VMware ESXi Hypervisor

- 1. Right click the VM in the vSphere client.
- 2. Click Power > Shut Down Guest or Power > Restart Guest.

Figure 88 Graceful Shutdown in VMware ESXi Hypervisor



In the KVM Hypervisor

In the KVM hypervisor peform a graceful shutdown by either clicking click **Shut Down** or **Reboot**.

Figure 89 Graceful Shutdown in KVM Hypervisor

	rhel7.1 Virtual Machine	- • ×
File Virtual Machine View Send Key		
9 > 0 0 - 15		۹ <u></u>
Reboot		
Shut Down		
Force Reset		
Force Off		
Save		