



## **Cisco Expressway on Virtual Machine Installation Guide (X14.0)**

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## CONTENTS

---

<b>CHAPTER 1</b>	<b>Introduction</b>	<b>1</b>
	About Cisco Expressway Deployment on VM	1
	Getting License Keys	1

---

<b>CHAPTER 2</b>	<b>About the Documentation</b>	<b>3</b>
	This Guide does not Apply for VCS	3
	Change History	3
	Related Documents	6

---

<b>CHAPTER 3</b>	<b>System Requirements</b>	<b>7</b>
	Recommended Platform	7
	Virtual Machine Requirements	7
	Specifications-Based System – Minimum Specification	8
	How to Modify Expressway VM Capacity	9
	ESXi Requirements	9
	Co-residency Support	10

---

<b>CHAPTER 4</b>	<b>Installing a Virtual Machine</b>	<b>11</b>
	Installation Process	11
	Configuring the VM Host	11
	Deploying OVA to Host Managed by vCenter	12
	Configuring the VM Guest (vCenter)	17
	Set the Root and Admin Password Using the Install Wizard	17
	Set the Root and Admin Password Using SSH	18
	Deploying OVA to Standalone ESXi Host	20
	Configuring the VM Guest (ESXi Host)	23

Automating the Deployment Process 24

---

**CHAPTER 5 Expressway Service Selection, Licenses, and Basic Configuration 25**  
 Next Steps: Service Selection, Licenses, and Basic Configuration 25

---

**CHAPTER 6 Creating a Backup of your System and Deleting Existing Snapshots 27**  
 Creating Backups 27  
 Deleting Existing Snapshots 27

---

**CHAPTER 7 Hardware References 29**  
 Serial Interface 29  
 Ethernet Interfaces (NICs) 29  
 Allocating a Virtual NIC to a Physical NIC Interface 29

---

**CHAPTER 8 Additional Information 33**  
 Upgrading or Downgrading an Expressway VM 33  
 Clustering for Resilience and Capacity 33  
 Migrating from a Physical Appliance to a VM 34  
 Migrating the Host (use VMware VMotion) 34  
 SAN with Fibre Interconnect is Recommended 34  
 Unsupported Features 34  
 Licensing 34  
 Security Hardening 35

---

**APPENDIX A Troubleshooting 37**  
 Checking VMware Compatibility 37  
 VMware Checklist 37  
 Isolating a Possible Root Cause 38  
 Possible Issues 38  
 Analyzing the Cause of VMware Issues 40  
 Restoring the Default Configuration (Factory Reset) 40  
     Before You Begin 40  
     Prerequisites 40  
     Process to Reset to the Default Configuration 41

Resetting Your Administrator Password or Root Password 41

---

**APPENDIX B**

**Deploying Multiple Datastores 43**

Deploying Multiple Datastores 43





# CHAPTER 1

## Introduction

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- [About Cisco Expressway Deployment on VM, on page 1](#)
- [Getting License Keys, on page 1](#)

## About Cisco Expressway Deployment on VM

Cisco Expressway (Expressway) software supports flexible deployment options and is available as a virtualized application for VMware. This lets enterprises run Expressway on the ‘company standard’ Virtual Machine (VM) hardware platform for ease of management and deployment in an existing data center. With a suitably specified VM platform, Expressway running on VMware performs identically to Expressway running on its appliance hardware.

## Getting License Keys

If you use PAK-based licensing, option keys for licenses can be obtained after the Expressway VM is installed, using the Expressway VM serial number (available from the Option key page and in the footer of the Expressway web interface).







## CHAPTER 2

# About the Documentation

- [This Guide does not Apply for VCS, on page 3](#)
- [Change History, on page 3](#)
- [Related Documents, on page 6](#)

## This Guide does not Apply for VCS

New features in software version X12.5 and later are not supported for the Cisco TelePresence Video Communication Server product (VCS). They apply only to the Cisco Expressway Series product (Expressway). This software version is provided for the VCS for maintenance and bug fixing purposes only.

## Change History

*Table 1: Cisco Expressway on Virtual Machine Installation Guide Change History*

Date	Change	Reason
December 2020	Added a section, "Automating the deployment process" in the "Installing a Virtual Machine" chapter. Also, updated the sections, "Deploying OVA to Host Managed by vCenter", and "ESXi Requirements".	X12.7 release
July 2020	Updated for X12.6.1. Added a section, "How to Increase Expressway VM Capacity" in the "System Requirements" chapter. Also, updated the section, "Upgrading or Downgrading an Expressway VM".	X12.6.1

Date	Change	Reason
June 2020	Added a new section "How to Modify Expressway Capacity" in Chapter 3, "System Requirements". Also, modified the section "Upgrading or Downgrading an Expressway VM".	Document correction
June 2020	X12.6 release. Also, modified Chapter 5 by removing obsolete content and rearranging/modifying steps.	X12.6
July 2019	Updated for X12.5.4. Removed references to release key as it is not required to upgrade a system on X8.6.x or later software to 12.5.4 or later  Clarify reserved CPU resource for Large VMs	X12.5.4
May 2019	Clarify virtual machine name, hostname, and domain name must contain only ASCII characters.	Clarification
April 2019	Remove caveat that Small VM is for BE6000 platforms only, as now also supported on VMware ESXi platforms (subject to same minimum hardware specification as BE6000).	Update
January 2019	Updated for X12.5	X12.5
September 2018	Change software version from X8.11 to X8.11.1, as X8.11 is no longer available.	Software withdrawn
August 2018	Add requirement not to change MAC address of VM (serial number of virtual Expressway is based on the address).	Clarification
August 2018	Clarify VM console requirement for factory reset process.	Clarification
July 2018	Republished as single variant to cover both Cisco Expressway and Cisco VCS.	Document change

<b>Date</b>	<b>Change</b>	<b>Reason</b>
May 2018	Revised the Recommended Platform section to clarify that the Flashbased client may be required (version dependent).	Clarification
November 2017	Updated the Recommended Platform section regarding VMware vSphere client availability.	Clarification
August 2017	Added ESXi 6.5 support.	Validation complete
July 2017	Removed requirement for 10 Gb NIC on large systems. Removed support for ESXi 5.0 and ESXi 5.1. Other minor documentation changes	X8.10 updates
January 2017	Updated to include bug fix in relation to unsupported SSH key message in Install Wizard. Wizard now displays serial and release key for reference. Added caution regarding use of backslashes or forward slashes in Name and Location field.	X8.9.1 updates
December 2016	Updated to include new secure install wizard functionality.	X8.9 updates
June 2016	Decreased CPU reservation for Large OVA. Mention lack of support for VMware HA and VMware snapshots.	X8.8 updates
February 2016	Updated for X8.7.1.	Upgrade prerequisite added for Hybrid Services
November 2015	Updated for X8.7. ESXi 6.0 support added. Virtual hardware version change 7 to 8.	
July 2015	Republished for X8.6.	
December 2014	Republished for X8.5	
August 2014	Removed misleading RAID 5 prerequisite for UCS.	
June 2014	Republished for X8.2	
December 2013	Initial release of Expressway variant of this document.	X8.1 release

## Related Documents

The following documents may help with setting up your environment:

- [Expressway Basic Configuration \(Expressway-C with Expressway-E\) Deployment Guide](#)
- [Expressway Cluster Creation and Maintenance Deployment Guide](#)
- [Certificate Creation and Use With Expressway Deployment Guide](#)
- [Cisco Expressway IP Port Usage Configuration Guide](#), on the [Cisco Expressway Series configuration guides page](#).
- [Expressway Administrator Guide](#)
- [Configuration and Administration of IM and Presence Service on Cisco Unified Communications Manager](#), at [Cisco Unified Communications Manager Configuration Guides](#)
- “Directory Integration and Identity Management” chapter in the [Cisco Collaboration System 10.x Solution Reference Network Designs \(SRND\)](#) document
- [SAML SSO Deployment Guide for Cisco Unified Communications Applications](#), at [Cisco Unified Communications Manager Maintain and Operate Guides](#)
- Jabber client configuration details:
  - [Cisco Jabber for Windows](#)
  - [Cisco Jabber for iPad](#)
  - [Cisco Jabber for Android](#)
  - [Cisco Jabber for Mac](#)



## CHAPTER 3

# System Requirements

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- [Recommended Platform](#), on page 7
- [Virtual Machine Requirements](#), on page 7
- [Specifications-Based System – Minimum Specification](#), on page 8
- [How to Modify Expressway VM Capacity](#), on page 9
- [ESXi Requirements](#), on page 9
- [Co-residency Support](#), on page 10

## Recommended Platform

See [https://www.cisco.com/c/dam/en/us/td/docs/voice\\_ip\\_comm/uc\\_system/virtualization/virtualization-cisco-expressway.html](https://www.cisco.com/c/dam/en/us/td/docs/voice_ip_comm/uc_system/virtualization/virtualization-cisco-expressway.html) for the current list of supported UCS Tested Reference Configurations and specs-based supported platforms.

## Virtual Machine Requirements



### Warning

The Expressway ova virtual appliances are designed to meet the minimum deployment requirements. Do not change the ova configuration after installation, as Cisco may no longer be able to support your deployment.

---

Make sure that the following requirements are in place:

- VT is enabled in the BIOS before you install VMware ESXi.
- The VM host “**Virtual Machine Startup/Shutdown**” setting is configured to “**Allow Virtual machines to start and stop automatically with the system**”, and the VM Expressway has been moved to the Automatic startup section.

### Do not change the MAC address of the VM

The serial number of a virtual Expressway is based on the virtual machine's MAC address. The serial number is used to validate Expressway licenses and to identify Expressways that are registered to the Cisco Webex cloud. Do not change the MAC address of the Expressway virtual machine when using VMware tools, or you risk losing service.

**Use the VM .ova file for initial VM installation only**

The VM Expressway is licensed using information that is generated at the time of the .ova file installation. If the .ova was installed a second time, new licensing information would be created, and to use the new VM, new release and licence keys would need to be purchased. To upgrade a VM Expressway, follow the procedure under [Upgrading or Downgrading an Expressway VM, on page 33](#), using the .tar.gz version of the Expressway software.

#### Take a backup after completion

After the VM installation is complete, we recommend that you take a backup of the configuration (described in [Creating a Backup of your System and Deleting Existing Snapshots, on page 27](#)).



**Caution** Do not take VMware snapshots of Cisco Expressway systems. The process interferes with database timing and negatively impacts performance.

## Specifications-Based System – Minimum Specification

If you use a UCS Tested Reference Configuration or specifications-based system, the minimum requirements are:

**Table 2: Specifications-Based System – Minimum Specification**

Deployment size	vCPU	Reserved CPU resource	Reserved RAM	Disk space	NIC
Small	2 core	3600 MHz (2 x 1.8 GHz)	4 GB	132 GB	1 Gb
Medium	2 core	4800 MHz (2 x 2.4 GHz)	6 GB	132 GB	1 Gb
Large (extra performance and scalability capabilities)	8 core	25600 MHz (8 x 3.2 GHz)	8 GB	132 GB	1 Gb

Two Large Expressway VMs can co-reside on a UCS server with two eightcore 3.2 GHz processors all dedicated to Expressway, when hyperthreading is enabled. To allow for hypervisor overhead, the CPU reservation is set to 16000 MHz, but the full allocation of 8x 3.2 GHz CPU cores must be made available to each Large Expressway VM. The reservation does not limit maximum Expressway CPU speed, as the Expressway can use the headroom provided by the higher specification host.

For all deployment sizes, you need the following:

- VM host operational and running a supported ESXi version (see [ESXi Requirements, on page 9](#)).  
From X12.5, **the Expressway no longer supports ESXi 5.5 or earlier versions.**
- VMware vCenter or vSphere client operational. Depending on the client software version, you may need to use the Flash-based version (not HTML5) due to customized template requirements.  
The **desktop vSphere Client is not available from vSphere 6.5 and later.**

- Reserved RAM, CPU, and NIC as per table above.
- Subject to bandwidth constraints, Large VMs can run with a 1 Gbps NIC.

## How to Modify Expressway VM Capacity

Increasing the capacity of a VM-based Expressway from a smaller deployment size to a larger deployment (Small -> Medium -> Large) or decreasing the capacity from a larger deployment to a smaller one (Large -> Medium -> Small) **cannot be done by simply increasing or decreasing the underlying vCPUs and memory hardware resources of the VM.** The correct method to upgrade or downgrade is to deploy a new VM of the required deployment size, and then restore the existing configuration (smaller VM for upgrade and larger VM for downgrade) onto the new one. The process to do this is outlined later in this guide in [Upgrading or Downgrading an Expressway VM, on page 33](#).

## ESXi Requirements



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**Note** The minimum versions specified here are subject to VMware support. The versions are correct when this documentation is published, but if VMware subsequently withdraws support for any stated version, you may need to use newer ESXi versions.

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The minimum virtual hardware required to host virtual Expressway deployments is VMware ESXi 6.5. Cisco does not support Expressway VMs hosted on ESXi 6.0 or earlier (these versions are no longer supported by VMware).

New installations of Expressway OVAs will not run on any host version before ESXi 6.5.

The following are the ESXi supported versions for X12.7. For new Expressway VM deployments, the Expressway OVAs must be installed on any of the following versions. If you have existing VM deployments running on an ESXi 6.0 or earlier versions, **upgrade the host to any of the following versions before you install the new Expressway software.**

- ESXi 6.5 Update 2
- ESXi 6.7 Update 1 from X12.5.2, and Update 2 - for Large VMs only - from X12.5.4
- ESXi 6.7 Update 3 from X12.6.1 for Large and Medium VMs
- ESXi 6.7 Update 3 from X12.6.3 for Small VMs
- ESXi 7.0

For upgrade instructions, see your VMware documentation.



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**Note** If you migrate an existing VM to a different host, you must shut down the VM before you move it.

---

**More information**

- Instructions about installing new Cisco Expressway VMs are in the Cisco Expressway on Virtual Machine Installation Guide on the [Expressway Install and Upgrade Guides](#) page
- Instructions about how to upgrade a single (non-clustered) Expressway VM are also in the Cisco Expressway on Virtual Machine Installation Guide
- Instructions about upgrading a clustered Expressway VM system are in the Cisco Expressway Cluster Creation and Maintenance Deployment Guide on the [Cisco Expressway Series configuration guides](#) page
- For information about VMware supported versions, see <https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/support/product-lifecyclematrix.pdf>

If using the vSphere client, configure the network properties through the console.

## Co-residency Support

The Expressway can co-reside with applications (any other VMs occupying same host) subject to the following conditions:

- No oversubscription of CPU. You need one-to-one allocation of vCPU to physical cores.
- No oversubscription of RAM. You need one-to-one allocation of vRAM to physical memory
- No oversubscription of NIC. The Expressway handles large volumes of data, much of which is for real-time communications, and it needs dedicated access to all the bandwidth specified for its interfaces.

For example, you should not assume that four co-resident small Expressway VMs can handle the expected load if there is only a 1 Gbps physical interface on the host. In this case none of the VMs meet the required minimum specification.

- Sharing disk storage subsystem is supported, subject to correct performance (latency, bandwidth) characteristics.





## CHAPTER 4

# Installing a Virtual Machine

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- [Installation Process](#), on page 11
- [Configuring the VM Host](#), on page 11
- [Deploying OVA to Host Managed by vCenter](#), on page 12
- [Configuring the VM Guest \(vCenter\)](#), on page 17
- [Deploying OVA to Standalone ESXi Host](#), on page 20
- [Configuring the VM Guest \(ESXi Host\)](#), on page 23
- [Automating the Deployment Process](#), on page 24

## Installation Process

This process guides you through installing the Expressway VM using vCenter or vSphere client. Before you start the installation, make sure all the system requirements are in place, as detailed in [System Requirements](#), on page 7.

## Configuring the VM Host

### Before you begin

Ensure that the VM host is configured with a valid NTP server – the same NTP server that will be specified in Expressway.

- 
- Step 1** Select the host.
  - Step 2** Go to the **Configuration** tab.
  - Step 3** Select **Time configuration**.
  - Step 4** Select **Properties**.  
If the date and time were red on the previous page, set the date and time manually to the current time.
  - Step 5** Click **Options**.
  - Step 6** Select **NTP Settings**.
  - Step 7** Click **Add**.
  - Step 8** Enter the IP address of the NTP server.

- Step 9** Click **OK**.
- Step 10** Select the **Restart NTP service to apply changes** check box.
- Step 11** Click **OK**.
- Step 12** Click **OK**.

### What to do next

The following section describes how to deploy the ova to host using vCenter. If you are using vSphere, skip this section and go to [Deploying OVA to Standalone ESXi Host, on page 20](#).

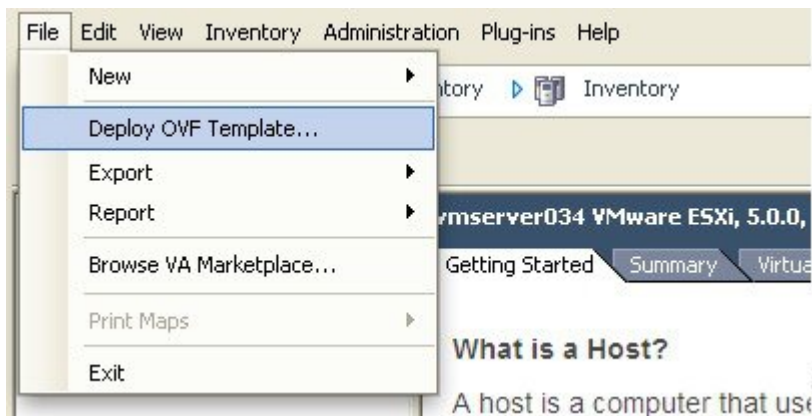
## Deploying OVA to Host Managed by vCenter

These instructions represent a typical installation. The Deploy OVF Template wizard dynamically changes to reflect host configuration.

- Step 1** If the .ova file is already preloaded onto the ESXi Host datastore (for example, in Cisco Business Edition 6000 deployments):
- Using a web browser, go to `https://folder` supplying any required credentials (typically the same username and password as used to log into vCenter).
  - Navigate through the index of datacenters to find the .ova file you want to deploy from the datastore.
  - Right click on the .ova file and select **Copy Link Location**.
- (If the .ova file is not preloaded on the datastore, you can select and upload it in the following steps.)

- Step 2** Log in to vCenter to access the ESXi Host.
- Step 3** Select **File > Deploy OVF Template**.

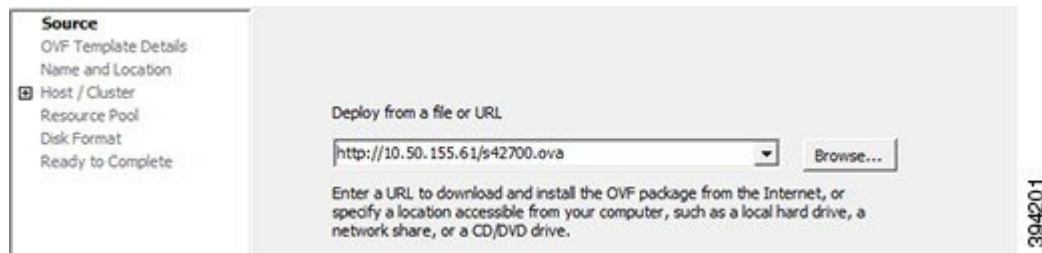
*Figure 1: Deploy OVF Template*



- Step 4** On the **Source** page, identify where the .ova file is located, and then click **Next**.
- If the .ova file is already preloaded onto the ESXi Host datastore, paste the URL you copied from step 1 above. You may have to re-enter username and password credentials so that vCenter can access the web server.

- If the .ova file is not preloaded on the datastore, **Browse** to the location of the .ova file.

**Figure 2: Browse .ova file**



**Step 5** On the **OVF Template Details** page, check that the Publisher certificate is valid and click **Next**.

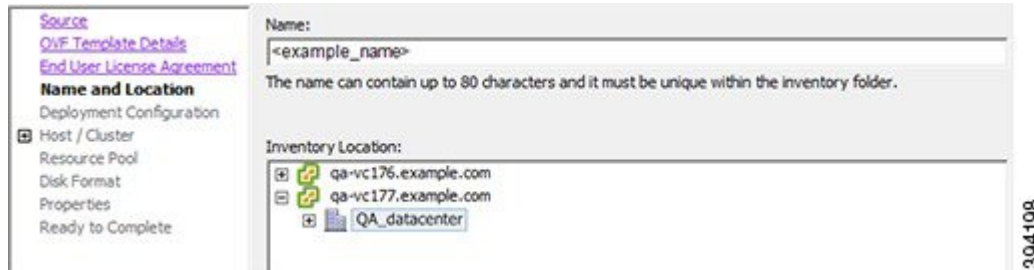
**Step 6** On the **End User License Agreement** page:

- Read the EULA.
- If you accept the EULA, click **Accept** then **Next**.

**Step 7** On the **Name and Location** page enter a **Name** for this Expressway VM guest, for example "**virtual\_Expressway**" and click **Next**.

**Important** When deploying a VM to ESXi version 6.0 or later, you must not use a backslash or forward slash in the VM name as the characters are unsupported and it can cause errors during the deployment. You must remove the slash from the default name of Cisco Expressway/VCS Base.

**Figure 3: Name and Location**



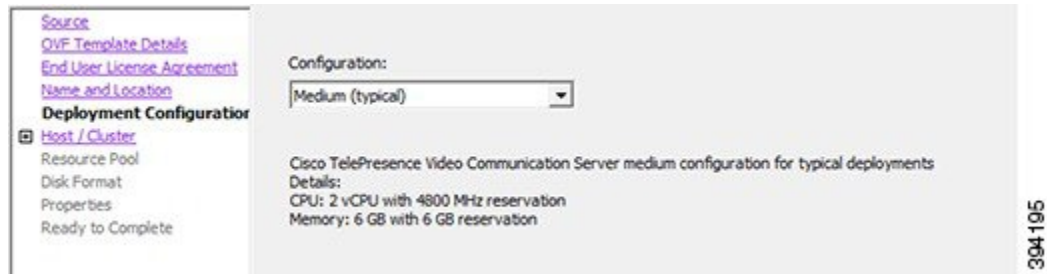
**Step 8** On the **Deployment Configuration** page, select the appropriately sized deployment:

- Select **Small**, **Medium** or **Large** depending on the capabilities of the VMware host.

The default is Medium. See [System Requirements, on page 7](#) for details about resource requirements. If the VMware host has insufficient resources, the virtual Expressway will fail to power on / boot.

- Click **Next**.

Figure 4: Select Deployment Size



394195

**Step 9** On the **Host / Cluster** page, select where you want to run the virtual Expressway and click **Next**.

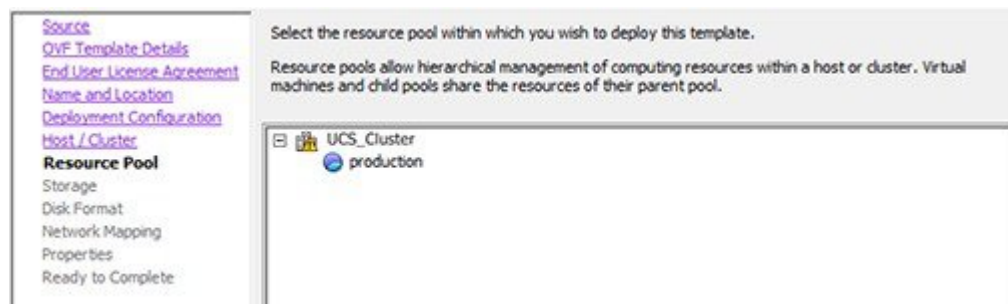
Figure 5: Select Host or Cluster



394197

**Step 10** On the **Resource Pool** page, select where you want to run the virtual Expressway and click **Next**.

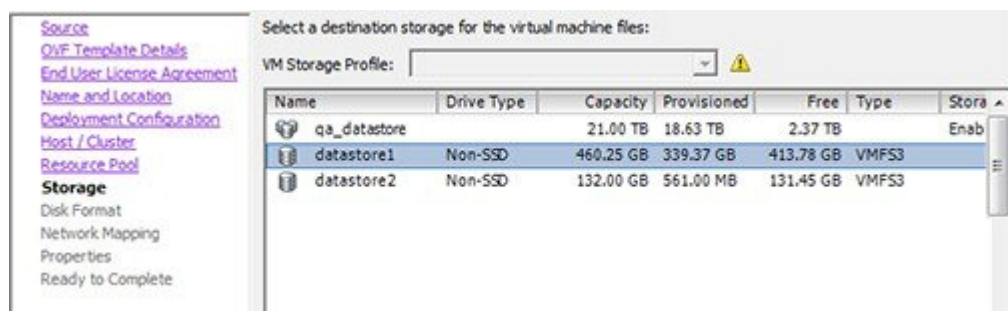
Figure 6: Select Resource Pool



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**Step 11** On the **Storage** page, select the location onto which the virtual Expressway will be deployed and click **Next**.

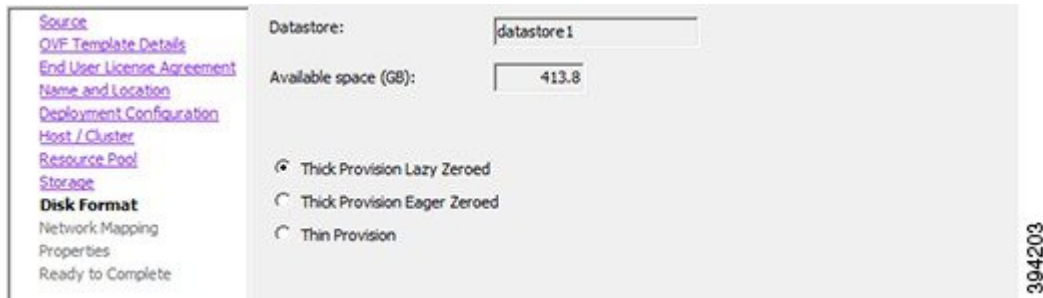
Figure 7: Select Destination Storage



394202

**Step 12** On the **Disk Format** page, ensure that the default disk format of **Thick Provision Lazy Zeroed** is selected and then click **Next**.

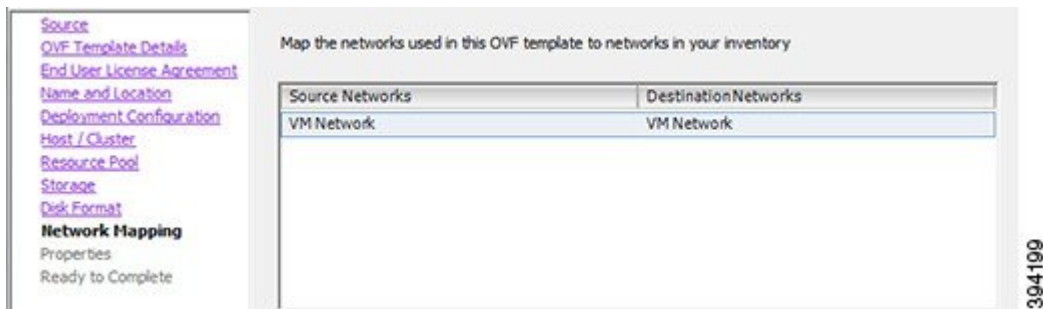
*Figure 8: Select Disk Format*



**Step 13** On the **Network Mapping** page, select the network mapping that applies to your infrastructure (the default is **VM Network**) and then click **Next**.

**Important** In Expressway versions 12.5.3 and earlier, the network name must contain only ASCII characters. From 12.5.4 release, network name can also contain non-ASCII characters.

*Figure 9: Select Network Mapping*



**Step 14** On the **Properties** page, configure the network properties of the virtual Expressway and click **Next**.

The properties you can set include the Expressway's IPv4 and IPv6 settings, option to enable DMI, and configure DMI Address and DMI Netmask, System, hostname and domain, up to five NTP servers, and up to five DNS servers. For automated deployments you can also enter an RSA SSH public key to securely set the root and admin passwords via SSH. If you do not enter a public key, you must set the passwords during the Install Wizard process.

**Important** The hostname and domain name must contain only ASCII characters

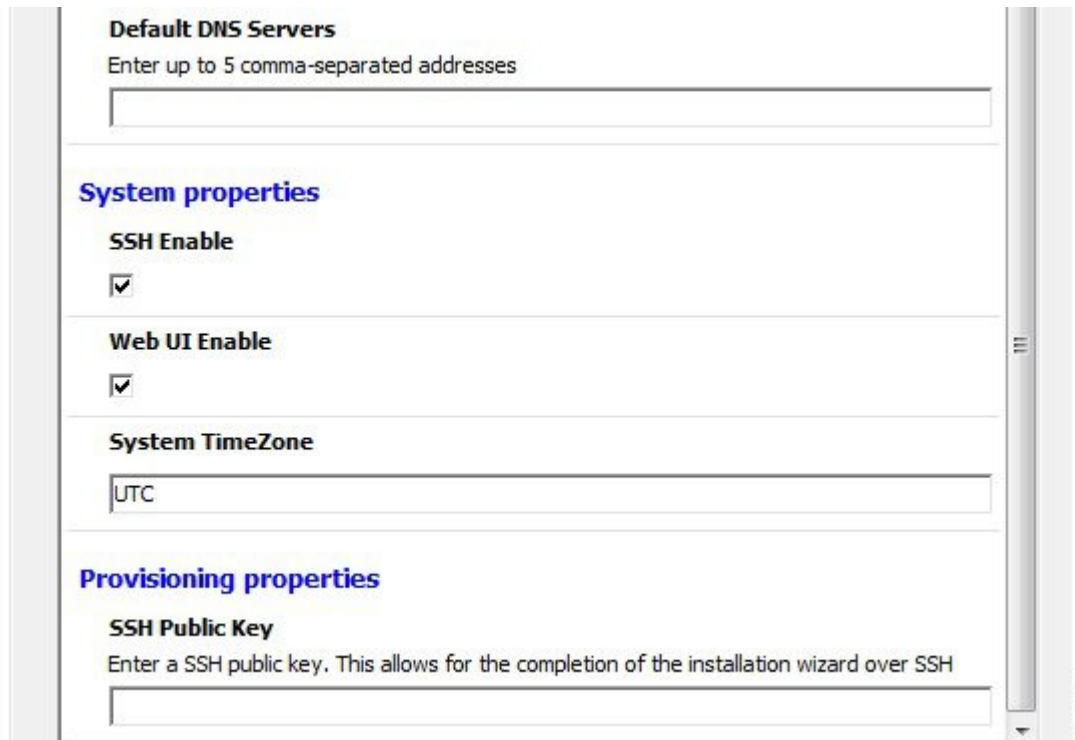
Figure 10: Configure Network Properties

## Deploy OVF Template

1 Select an OVF template  
 2 Select a name and folder  
 3 Select a compute resource  
 4 Review details  
 5 License agreements  
 6 Configuration  
 7 Select storage  
 8 Select networks  
 **9 Customize template**  
 10 Ready to complete

Network properties	15 settings
IPv4 Enable	<input checked="" type="checkbox"/>
IPv4 Address	192.168.0.100
IPv4 Netmask	255.255.255.0
IPv4 Gateway	192.168.0.1
IPv6 Enable	<input type="checkbox"/>
IPv6 Address	
IPv6 Gateway	
Dedicated Management Interface (DMI) Enable	<input type="checkbox"/>
DMI IPv4 Address	192.168.0.100
DMI IPv4 Netmask	255.255.255.0
DMI IPv6 Address	
System Hostname	

454335



**Default DNS Servers**  
Enter up to 5 comma-separated addresses

**System properties**

**SSH Enable**

**Web UI Enable**

**System TimeZone**  
UTC

**Provisioning properties**

**SSH Public Key**  
Enter a SSH public key. This allows for the completion of the installation wizard over SSH

394181

**Step 15**

On the **Ready to Complete** page:

- Confirm the deployment settings.
- Select the **Power on after deployment** check box.
- Click **Finish**.

The installation process will begin and a progress bar will be displayed.

---

The Expressway ova is now deployed as a Guest on the VM Host.

## Configuring the VM Guest (vCenter)

These instructions describe how to set the root and admin password over SSH if you entered an RSA SSH public key in the **VM Properties** page – used primarily for automated deployments - or using the Install Wizard.




---

**Note** You can ignore any floppy read errors that appear, as they are not relevant to this deployment mode.

---

## Set the Root and Admin Password Using the Install Wizard

**Step 1** Select the VM guest and then select the **Console** tab.

You are taken to the Install Wizard.

**Step 2** Enter and confirm your root and admin passwords. You will also be prompted to set any properties you did not set in VMware.

**Note** These passwords should be unique; do not use the same password for admin and root accounts.

*Figure 11: Enter Root and Admin Password*

```

Root password:
Please confirm the password:
Admin password:
Please confirm the password:

Installation wizard complete
Press Enter to continue the boot and apply the configuration _

```

394175

**Step 3** Press Enter to apply the configuration.

**Step 4** The Expressway will apply the configuration and reboot.

*Figure 12: Configuration Applied*

```

cisco login: Starting xmapiadapter
Starting tandberg
Upgrade in process. Not starting crl_updater
Starting vmtoolsd
Fri Oct 7 11:54:57 UTC 2016 S98vmtoolsd startup Failed rc 1!
Starting migrate
<131>Oct 7 11:54:58 ttupgrade: UTCTime="2016-10-07-11:54:58" Event="upgrade" De
tail="Running 10-migrate"
<131>Oct 7 11:55:01 ttupgrade: UTCTime="2016-10-07-11:55:01" Event="upgrade" De
tail="Running 20-cdbtransforms-precuil.py"
<131>Oct 7 11:55:01 ttupgrade: UTCTime="2016-10-07-11:55:01" Event="upgrade" De
tail="Running 50-cdbtransforms.py"
<131>Oct 7 11:55:02 ttupgrade: UTCTime="2016-10-07-11:55:02" Event="upgrade" De
tail="Running 50-tandberg-update.php"
<131>Oct 7 11:55:22 ttupgrade: UTCTime="2016-10-07-11:55:22" Event="upgrade" De
tail="Running 80-cdbtransforms-postcuil.py"
<131>Oct 7 11:55:22 ttupgrade: UTCTime="2016-10-07-11:55:22" Event="upgrade" De
tail="Running 90-delete-upgrade-config"
<131>Oct 7 11:55:22 ttupgrade: UTCTime="2016-10-07-11:55:22" Event="upgrade" De
tail="Running 99-tidy-persistent-directory"
Starting restmanager
Starting vmtoolsd
_

```

394177

You should now be able to access the Expressway using a web browser.

You can now order your option keys; see [Expressway Service Selection, Licenses, and Basic Configuration](#), on page 25.

## Set the Root and Admin Password Using SSH

**Step 1** The Install Wizard starts an SSH daemon, listening on port 5022, so you can set the root and admin password.

**Step 2** Connect as user "wizard" using an SSH client on port 5022 (for example: `ssh wizard@10.0.0.1 -p 5022`).



Figure 13: Connect as User "wizard"

```

*****
Installation Wizard for Cisco Expressway/VCS Base

If you encounter issues or enter incorrect
information during the wizard you can press
Ctrl+D to restart

Some questions may also support Tab completion
*****
ip_tables: (C) 2000-2006 Netfilter Core Team
vrxnet3 0000:0b:00.0 eth0: intr type 3, mode 0, 3 vectors allocated
vrxnet3 0000:0b:00.0 eth0: NIC Link is Up 10000 Mbps
0021q: adding VLAN 0 to HW filter on device eth0

Starting SSH daemon on 10.50.156.150:5022 for automated deployment
Please connect as user 'wizard' to continue
e.g. ssh wizard@10.50.156.150 -p 5022

```

394193

**Step 3** Follow the prompt to set `admin.password` and `root.password`.

Figure 14: Set Admin and Root Password

```

>>> Installation Wizard for Cisco Expressway/VCS Base

This shell is intended for completing automated deployments and expects a
JSON encoded structure containing the remaining configuration that needs
to be set.

Example input: {"admin.password": "w6djq1AgmmAMbrH0", "root.password": "FkSZ95KL865Q15/T"}
Example response: {"status": "success", "detail": "Configuration complete"}

Required configuration keys: ['admin.password', 'root.password']
$ 

```

394192

**Step 4** The Expressway will apply the configuration and reboot.

Figure 15: Configuration Applied

```

cisco login: Starting xmlapiadapter
Starting tandberg
Upgrade in process. Not starting crl_updater
Starting vmttoolsd
Fri Oct 7 11:54:57 UTC 2016 S98vmttoolsd startup Failed rc 1!
Starting migrate
<131>Oct 7 11:54:58 ttupgrade: UTCTime="2016-10-07-11:54:58" Event="upgrade" De
tail="Running 10-migrate"
<131>Oct 7 11:55:01 ttupgrade: UTCTime="2016-10-07-11:55:01" Event="upgrade" De
tail="Running 20-cdbtransforms-precuil.py"
<131>Oct 7 11:55:01 ttupgrade: UTCTime="2016-10-07-11:55:01" Event="upgrade" De
tail="Running 50-cdbtransforms.py"
<131>Oct 7 11:55:02 ttupgrade: UTCTime="2016-10-07-11:55:02" Event="upgrade" De
tail="Running 50-tandberg-update.php"
<131>Oct 7 11:55:22 ttupgrade: UTCTime="2016-10-07-11:55:22" Event="upgrade" De
tail="Running 80-cdbtransforms-postcuil.py"
<131>Oct 7 11:55:22 ttupgrade: UTCTime="2016-10-07-11:55:22" Event="upgrade" De
tail="Running 90-delete-upgrade-config"
<131>Oct 7 11:55:22 ttupgrade: UTCTime="2016-10-07-11:55:22" Event="upgrade" De
tail="Running 99-tidy-persistent-directory"
Starting restmanager
Starting svmttoolsd
-

```

394177

You should now be able to access the Expressway using a web browser.

You can now order your option keys; see [Expressway Service Selection, Licenses, and Basic Configuration](#), on page 25.

## Deploying OVA to Standalone ESXi Host

These instructions represent a typical installation. The Deploy OVF Template wizard dynamically changes to reflect host configuration.



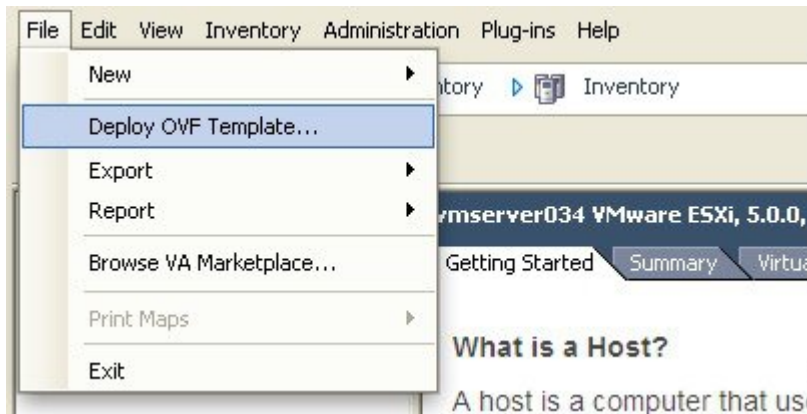
**Note** The desktop vSphere Client is not available from vSphere 6.5 and later.

- Step 1** If the .ova file is already preloaded onto the ESXi Host datastore (for example, in Cisco Business Edition 6000 deployments):
- Using a web browser, go to `https://<VMwareHost>/folder` supplying any required credentials (typically the same username and password as used to log into the vSphere client).
  - Navigate through the index of datacenters to find the .ova file you want to deploy from the datastore.
  - Right click on the .ova file and select **Copy Link Location**.
- (If the .ova file is not preloaded on the datastore, you can select and upload it in the following steps.)

**Step 2** Log in to the vSphere client to access the ESXi Host.

**Step 3** Select **File > Deploy OVF Template**.

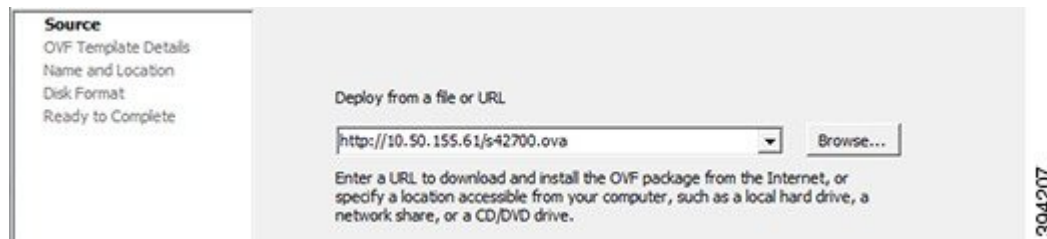
Figure 16: Deploy OVF Template



**Step 4** On the **Source** page, identify where the .ova file is located, and then click **Next**.

- If the .ova file is already preloaded onto the ESXi Host datastore, paste the URL you copied from step 1 above. You may have to re-enter username and password credentials so that the vSphere client can access the web server.
- If the .ova file is not preloaded on the datastore, **Browse** to the location of the .ova file.

Figure 17: Browse .ova File



**Step 5** On the **OVF Template Details** page, check that the Publisher certificate is valid and click **Next**.

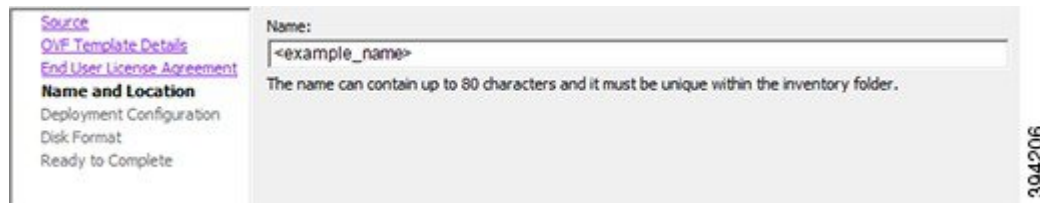
**Step 6** On the **End User License Agreement** page:

- Read the EULA
- If you accept the EULA, click **Accept** then **Next**.

**Step 7** On the **Name and Location** page enter a **Name** for this Expressway VM guest, for example "Virtual\_Expressway" and click **Next**.

**Important** When deploying a VM to ESXi version 6.0 or later, you must not use a backslash or forward slash in the VM name as the characters are unsupported and it can cause errors during the deployment. You must remove the slash from the default name of Cisco Expressway/VCS Base

Figure 18: Name and Location

**Step 8**

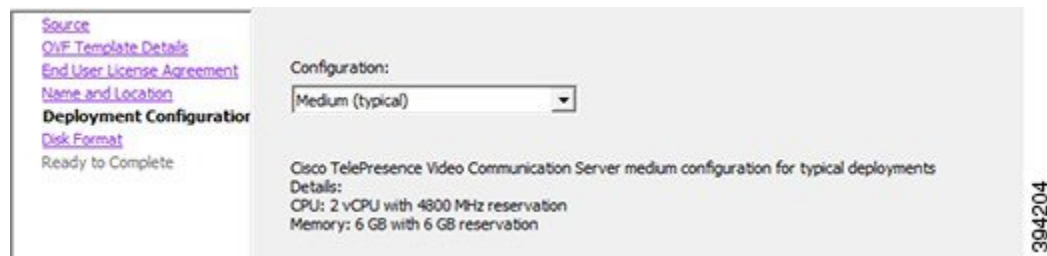
On the **Deployment Configuration** page, select the appropriately sized deployment:

- a) Select **Small**, **Medium** or **Large** depending on the capabilities of the VMware host.

The default is **Medium**. See [System Requirements, on page 7](#) for details about resource requirements. If the VMware host has insufficient resources, the virtual Expressway will fail to power on / boot.

- b) Click **Next**.

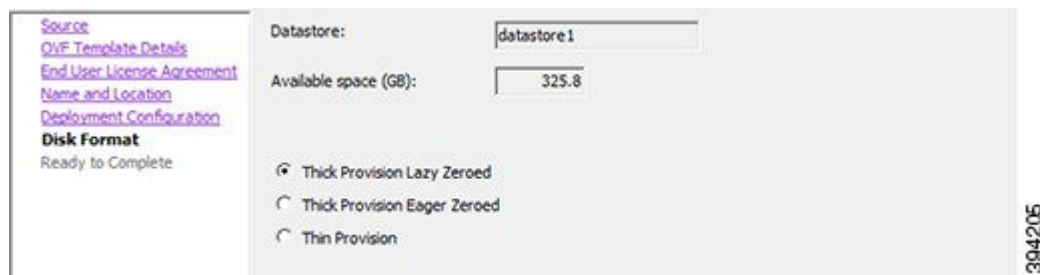
Figure 19: Deployment Configuration

**Step 9**

On the **Disk Format** page, ensure that the default disk format of **Thick Provision Lazy Zeroed** is selected and then click **Next**.

**Thin Provision** is not supported as VM performance may degrade during resizing of a partition.

Figure 20: Disk Format

**Step 10**

On the **Ready to Complete** page:

- a) Confirm the deployment settings.
- b) Select the **Power on after deployment** check box.
- c) Click **Finish**.

The installation process will begin and a progress bar will be displayed.

The Expressway ova is now deployed as a guest on the VM Host.

## Configuring the VM Guest (ESXi Host)

These instructions describe how to configure the VM Guest as a standalone host using the Install Wizard.



### Note

- If you encounter issues or enter incorrect information during the wizard you can press Ctrl+D to restart.
- The pre-X8.9 default passwords of the admin and root accounts are well known. You must use strong passwords for these accounts. If your new system is on X8.9 or later, you must supply non-default passwords.
- The pre-X8.9 default passwords of the admin and root accounts are well known. You must use strong passwords for these accounts. If your new system is on X8.9 or later, you must supply non-default passwords.
- The default timezone is UTC but you can search for your desired timezone. You can also change it later in the web interface by going to **System** > **Time**.
- The default values support tab completion.

**Step 1** Select the VM guest and then select the **Console** tab.

The VM guest will take some time to boot, create its second hard disk partition and then reboot to the Install Wizard.

**Step 2** Follow the prompts given by the Install Wizard to specify the following:

- Whether you want to use IPv4, IPv6 or Both.
- The LAN 1 IPv4 subnet mask of the Expressway (if you have selected IPv4).
- The IP address of the default gateway of the Expressway.
- The root password. Should be unique, do not use the same password as for admin account.
- The admin password. Should be unique, do not use the same password as for root account.
- Whether you want to enable the web UI.
- Whether you want to use SSH to administer the Expressway.
- The timezone.

**Step 3** After the wizard is finished the following message will appear:

```
Installation wizard complete
```

```
Press Enter to continue the boot and apply the configuration.
```

Press **Enter**.

- Step 4** After it has applied the configuration and rebooted, the Expressway is ready to use. You should now be able to access the Expressway using a web browser.

---

### What to do next

You can now manage the Expressway licensing and basic configuration; see [Expressway Service Selection, Licenses, and Basic Configuration, on page 25](#).

## Automating the Deployment Process

We recommend deploying an Expressway VMWare OVA in an automated manner. To do this:

- Step 1** Deploy the VM using VMWare's OVFTool:

```
Ovftool -acceptAllEulas -ds=<vsphere datastore> --powerOn -noSSLVerify
--name=<name of VM> --prop:ip4.address=<ip address> --prop:ip4.gateway=<gateway>
--prop:ip4.netmask=<subnet mask> --prop.dmi.enable=<enable>
--prop.dmi.ip4.address=<dmi ipv4 address> --prop.dmi.ip4.netmask=<dmi ipv4 netmask>
--prop.dmi.ip6.address=<dmi ipv6 address> --prop:default.dns=1.1.1.1 -nw=<vsphere network>
--X:waitForIp --prop:ssh.public.key='<public ssh key>' <OVA file>
```

For more details of the command syntax, including examples, see the [OVFTool User's Guide](#).

- Step 2** Configure the *root* and *admin* passwords using ssh on port 5022. Refer the section [Set the Root and Admin Password Using SSH](#).

- Step 3** There are multiple ways to automate the deployment, for example, you can use Python [Paramiko](#) SSH library command:

```
{{command = '{"admin.password": "x", "root.password": "x"}\n'}}
```



## CHAPTER 5

# Expressway Service Selection, Licenses, and Basic Configuration

---

- [Next Steps: Service Selection, Licenses, and Basic Configuration, on page 25](#)

## Next Steps: Service Selection, Licenses, and Basic Configuration

When you have the option keys:

- 
- Step 1** Log in to the Expressway via a web browser as admin.
  - Step 2** Please refer to the *Basic Configuration Deployment Guide* on the [Cisco Expressway Series configuration guides](#) page to guide you through how to select services, apply licenses, and configure this VM Expressway ready for operation (including DNS, NTP, zones, and search rules).
  - Step 3** After the Expressway has been configured it is good practice to backup the Expressway configuration using the Expressway backup facility (see next section).
-







## CHAPTER 6

# Creating a Backup of your System and Deleting Existing Snapshots

---

- [Creating Backups, on page 27](#)
- [Deleting Existing Snapshots, on page 27](#)

## Creating Backups

We recommend that you regularly create backups of your configuration, as follows.



---

**Caution** Do not take VMware snapshots of Cisco Expressway systems. The process interferes with database timing and negatively impacts performance.

---

**Step 1** Go to **Maintenance > Maintenance Mode** and switch **Maintenance Mode On**.

**Step 2** Go to **Maintenance > Backup and Restore**.

**Step 3** You can optionally add a password for your backup file.

**Step 4** Click **Create system backup file**.

**Step 5** Save the backup file.

**Note** When you restore your system from a backup, it does not include Active Directory credentials. You will need to add them in order to access the Active Directory domain.

---

## Deleting Existing Snapshots

---

**Step 1** Make a backup of your configuration.

**Step 2** Shutdown the Expressway:

- a) Go to **Maintenance > Restart Options** and click **Shutdown**.

b) Click **OK** to shut down the system.

- Step 3** Power off the VM.
- Step 4** Right-click on the VM and select **Manage Snapshots**.
- Step 5** In the **Snapshot Manager**, select **Delete All Snapshots**.
- Step 6** Click **Yes** in the confirmation dialog box.
- Step 7** Click **Close** to exit the Snapshot Manager.
-



## CHAPTER 7

# Hardware References

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- [Serial Interface, on page 29](#)
- [Ethernet Interfaces \(NICs\), on page 29](#)
- [Allocating a Virtual NIC to a Physical NIC Interface, on page 29](#)

## Serial Interface

A VM Expressway has no physical serial interface; the serial interface is accessible through the console tab of the VM guest.

You can use CTRL+ALT to exit from the Console window (this is identified in the bottom right corner of the vSphereClient window).

## Ethernet Interfaces (NICs)

In VM Expressway the LAN interfaces are Virtual NICs. Appropriate drivers are set up as VM Expressway is installed; configuration of IP addresses is carried out through the standard Expressway interface.

VM Expressway allocates 3 virtual NICs:

- the first is used for the standard LAN 1 interface
- the second is used if Dual Network interfaces is enabled (LAN 2)
- the third is reserved for future use

## Allocating a Virtual NIC to a Physical NIC Interface

Virtual NICs can be assigned to physical interfaces as follows:

---

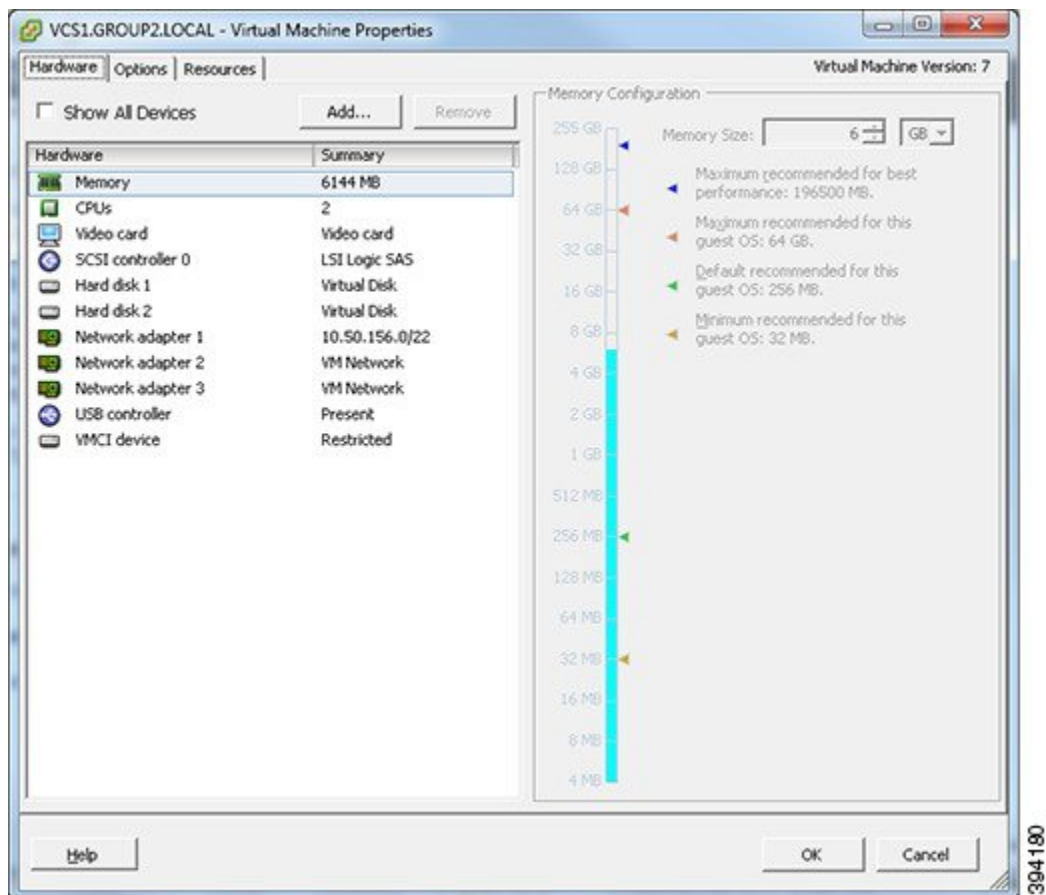
- Step 1** Ensure that the physical NIC on the VM host is connected and operational.
- Step 2** Set up or check that there are Virtual Switches (vNetwork Distributed Switches) for each physical NIC. (Select the host on which the VM Expressway will run, select the **Configuration** tab and select **Networking**.)
- Step 3** Ensure that there is at least one Virtual Machine Port Group (with associated VLAN IDs) set up for each physical NIC.

- a) To add a new Virtual Machine Port Group, click **Properties** on the appropriate Virtual Switch or vNetwork Distributed Switch.
- b) Follow the network wizard.

**Step 4** Note the name of a Virtual Machine Port Group connecting to the required NIC.

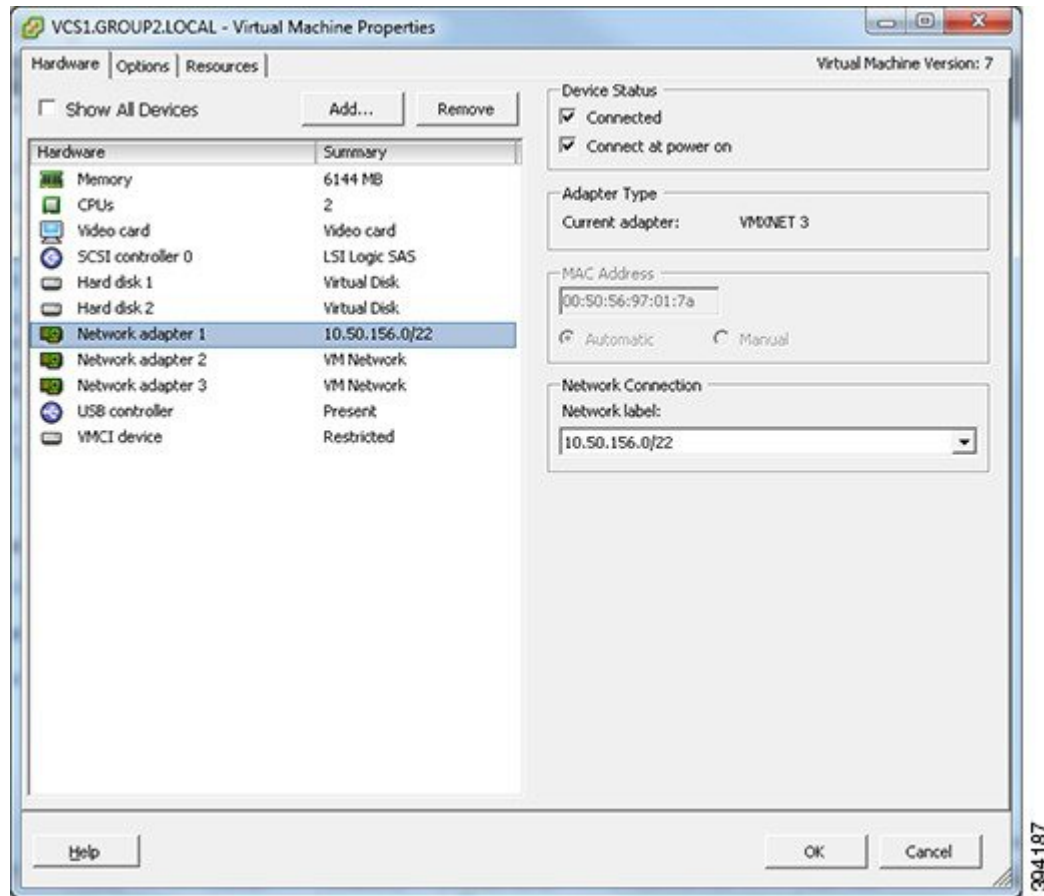
**Step 5** Select the VM guest; right click it and select **Edit settings...**

*Figure 21: Edit Settings*



**Step 6** Select the required network adaptor (Network adaptor 1 = LAN 1, Network adaptor 2 = LAN 2).

Figure 22: Select Network Adaptor



394187

- Step 7** Select the appropriate Network label (Virtual Machine Port Group) to associate the Expressway LAN interface with the required physical NIC.
- Step 8** After a few seconds the Expressway will be able to communicate over the physical interface.
-





## CHAPTER 8

# Additional Information

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- [Upgrading or Downgrading an Expressway VM, on page 33](#)
- [Clustering for Resilience and Capacity, on page 33](#)
- [Migrating from a Physical Appliance to a VM, on page 34](#)
- [Migrating the Host \(use VMware VMotion\), on page 34](#)
- [SAN with Fibre Interconnect is Recommended, on page 34](#)
- [Unsupported Features, on page 34](#)
- [Licensing, on page 34](#)
- [Security Hardening, on page 35](#)

## Upgrading or Downgrading an Expressway VM

### Before you begin

#### *Profile Information is Removed from Backups*

From X12.6, Expressway backup files do not include system profile information (ProfileID value). This is to prevent a known issue with unexpected changes to sizing if a backup is restored across a different sized deployment. Therefore, device profiles are unaffected by backup and restore operations. Refer to Bug ID [CSCvs59766](#).

- 
- Step 1** Take a backup of the smaller (or the larger for downgrade) VM configuration. Use the Expressway's backup function, not the VMware snapshot.
  - Step 2** Install and deploy the new, larger (or smaller for downgrade) VM as described in this guide.
  - Step 3** Restore the configuration of the (old) smaller (or the larger for downgrade) VM onto the newly deployed VM. Note that profile information will not be included in the backup/restore.
- 

## Clustering for Resilience and Capacity

If you cluster Expressway VMs, we strongly advise you to use at least two physical hardware hosts. Hardware resilience requires Expressway peers to run on at least two different hardware platforms.

For the current maximum supported round trip delay (RTT) and hop distances between peers, see the *Cisco Expressway Cluster Creation and Maintenance Deployment Guide* for your version, on the [Cisco Expressway Series configuration guides](#) page.

## Migrating from a Physical Appliance to a VM

If you are migrating from a physical appliance to a VM, the backup/restore process (**Maintenance > Backup and restore**) can be used to transfer configuration between the two installations. You will receive a warning message, but you will be allowed to continue.

## Migrating the Host (use VMware VMotion)

If you need to move Expressway to a new host, you must use VMware VMotion to perform the host migration.

Before you start, there may be glitches (packet loss/jitter) in media for calls that are interworked by Expressway as the VM is moved. We recommend that a VMotion move is carried out when there is minimal activity on the VM Expressway. To ensure this, before you carry out the move put the Expressway VM into maintenance mode (**Maintenance > Maintenance mode**) and wait for active calls to clear.

## SAN with Fibre Interconnect is Recommended

Use of a SAN with Fibre interconnect, rather than a NAS, is recommended in order to maximize the transfer speed.

## Unsupported Features

### VMware Fault Tolerant Mode

VMware fault tolerant mode is not supported (because the Expressway uses multiple cores).

### VMware HA

We do not support VMware High Availability. We recommend clustering for resilience. If you need to move a virtual Expressway, you can use VMotion.

### VMware Snapshots

We do not support VMware snapshots. We recommend you take regular backups of the Expressway instead.

## Licensing

A virtual Expressway requires licensing in the same way that an Expressway appliance requires licensing.



Do not copy the VM, as the Expressway serial number will change and the existing license keys and option keys will be invalidated. If you need to move Expressway to a new host, use VMware VMotion to perform the host migration.

## Security Hardening

Information on how to deploy and operate VMware products in a secure manner is available from the [VMware Security Hardening Guides](#).





## APPENDIX **A**

# Troubleshooting

---

- [Checking VMware Compatibility, on page 37](#)
- [VMware Checklist, on page 37](#)
- [Isolating a Possible Root Cause, on page 38](#)
- [Possible Issues, on page 38](#)
- [Analyzing the Cause of VMware Issues, on page 40](#)
- [Restoring the Default Configuration \(Factory Reset\), on page 40](#)
- [Resetting Your Administrator Password or Root Password, on page 41](#)

## Checking VMware Compatibility

If you use third-party hardware to host the VM Expressway application, check the hardware compatibility. You can do this with the VMware compatibility guide tool from <http://www.vmware.com/resources/compatibility/search.php>.

## VMware Checklist

---

- Step 1** Check accessibility to the VM host server (by ping, physical console access, SSH remote access, KVM-over-IP console, and so on).
- Step 2** Check network connectivity of the VMkernel (by executing the **vmkping** command using Tech Support Mode to verify network connectivity from the VMkernel NIC level).
- Step 3** If you have problems connecting to the vSphere Client management console, execute the **command/sbin/services.sh** from an SSH session to restart the ESXi management agent.
- Step 4** Check the VM host server utilization. CPU utilization, memory utilization, disk access speed, storage access speed, network access status, power utilization, and so on.
- If any specific application causes high utilization, stop or restart this application to isolate the overall VM host performance level. Or execute the command **esxtop** from Tech Support Mode to list all system processes running on the ESXi host application.
- Step 5** Check the ESXi server file log (`hostd.log`s) under the folder `/var/log/vmware`. This log contains common error logs such as iSCSI naming error, authentication error, and host convertibility error.

- Step 6** Verify that adequate disk space is available on the physical volume that stores the database files. Free up disk space if necessary.
- Step 7** Validate authentication to the vCenter Server database. The vCenter Server service may not be able to authenticate with the database if:
- There are permission issues with the database when importing from one instance to another.
  - The password on the account you are using to authenticate to the database has changed but the password in the registry has not.
  - The vCenter Server database user is not granted correct permissions.

## Isolating a Possible Root Cause

Potential issue area	What to look for
Storage	<p>Look for the VM store application image stored either on the local drive, SAN, or NFS. VMs often freeze or hang up if the application failed to access the storage. Possible error messages are:</p> <ul style="list-style-type: none"> <li>vCenter Server does not start</li> <li>vCenter Server is slow to respond</li> <li>vCenter Server fails after an indefinite amount of time</li> </ul>
Network	<p>Any network failure or locking causes a connection failure between the VM and the virtual network. Also, if using NFS or iSCSI, storage may cause application failures because the application cannot access the file system.</p>
DNS	<p>DNS server failures or communication failures between DNS and the VM server may cause the VMware application or the VM Expressway application to fail.</p>
vCenter Server	<p>If vCenter is not operating properly, although the VM Expressway application is still up and running, you may lose connection to the VM Expressway application from the network.</p>
Host application	<p>Check any critical alarms on the VM application for events on the host or application level (check the event information from vSphere Client).</p>

## Possible Issues

### VM image fails to boot

If the VM image fails to boot, check the VT (Virtualization Technology) setting in BIOS. This needs to be enabled for hosting VMs. If it is not set, set it and reinstall ESXi then load the .ova file.

### Expressway application fails to start

Look at the `/tmp/hwfail` file – its content indicates any violations in the installation.

For example, Expressway reserves 3 virtual NICs – these are required in the Expressway, do not try deleting one or more of them otherwise `hwfail` is created and the VM Expressway will not run.

### Configured NTP does not work

For NTP to work on Expressway, the same NTP must also be configured on the VM host.

### Guest console in vSphere 5 fails to run on some Microsoft platforms

When attempting to open a console screen from vSphere for the VM:

- Error message: “The VMRC console has disconnected...attempting to reconnect.”
- Screen remains black

The following operating systems are at risk:

- Windows 7 64 bit – reported on VMware forum (<http://communities.vmware.com/thread/333026>)
- Windows Server 2008 R2 (64-bit) – found by use

### Web page/IP address unreachable after OVA deployment

This issue can be caused by a cache issue in the gateway switch.

To resolve, access vCenter, go to the console and ping the gateway: `ping <gateway_ip_address>`.

### Clustering status incorrect after recreating a VM within a cluster

When recreating a VM within a cluster, the cluster must be broken and recreated for it to function correctly.

To resolve, take the following steps:

1. Back up the existing configuration from the original node you want to recreate.
2. Upgrade all nodes to X12.5.4.
3. Shut down guest on the original node.
4. Start up a new VM using the X12.5.4 .ova file and give it the same IP address as the original node.
5. Restore the backup configuration from the original node onto the new VM.
6. Rebuild the cluster and add the cluster configuration on the other nodes.
7. After approximately 10 minutes, clustering status on the **Status > Clustering** page should accurately indicate a normal status for the cluster.

### Raid controller synchronization

If the VMware system is synchronizing its RAID disks, disk performance is seriously degraded. We strongly recommend that Expressway is not installed or run on VM platforms where RAID disks are in a degraded or synchronizing state.

## Analyzing the Cause of VMware Issues

If issues exist with VMware on the Expressway host, we recommend that you collect logs from the host for analysis, using the following procedure:

- 
- Step 1** Using the vSphere client (or the vCenter Server managing this ESXi host) connect to the ESXi host on which the Expressway is running.
- Step 2** Go to **File > Export > Export System logs**, choose the appropriate ESXi host and go with the default settings.
- 

### What to do next

After you have downloaded the logs analyze them, or have them analyzed to determine the issue.

More information on exporting logs can be found at: [http://kb.vmware.com/selfservice/microsites/search.do?language=en\\_US&cmd=displayKC&externalId=653](http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=653).

## Restoring the Default Configuration (Factory Reset)

Rarely, it may be necessary to run the “factory-reset” script on your system. This reinstalls the software image and resets the configuration to the default, functional minimum.

### Before You Begin

If you've upgraded since the system was first set up, be aware that the reset reinstalls your latest software version.

The system uses the default configuration values that currently apply in the software version installed by the reset. These may differ from your previously configured values, especially if the system has been upgraded from an older version. In particular this may affect port settings, such as multiplexed media ports. After restoring the default configuration you may want to reset those port settings to match the expected behavior of your firewall. (As described below, optionally it's possible to retain a few configuration values like option keys, SSH keys, and FIPS140 mode, but we recommend that you reset all these values.)

### Prerequisites

- As the virtual machine console is required to complete this process, **you need appropriate VMware access in order to open the VM console.**
- The factory reset procedure described below rebuilds the system based on the most recent successfully installed software image. A file containing the software image in tar.gz format, named `tandberg-image.tar.gz`, stored in the `/mnt/harddisk/factory-reset/` system folder is used for the reinstallation. In some cases this file is not present on the system (most commonly with a fresh VM installation that has not been upgraded). If so, you must first put this file in place using SCP as root.

## Process to Reset to the Default Configuration

You must do this procedure from the console. Because the network settings are rewritten, all calls and any SSH session used to initiate the reset will be dropped and you won't be able to see the procedure output.

The process takes approximately 20 minutes.

**Step 1** Log in to the system as **root**.

**Step 2** Type **factory-reset**

**Step 3** Answer the questions as required. The recommended responses will reset the system completely to a factory default state:

*Table 3:*

Prompt	Recommended response
Keep option keys [YES/NO]?	NO
Keep FIPS140 configuration [YES/NO]?	NO
Keep IP configuration [YES/NO]?	NO
Keep ssh keys [YES/NO]?	NO
Keep server certificate, associated key and CA trust store [YES/NO]?	NO
This option does not preserve SNI / domain certificates, which are always deleted regardless of what you respond. Only the server certificate and associated key and CA trust store are saved (if you respond YES).	
Keep root and admin passwords [YES/NO]?	NO
Save log files [YES/NO]?	NO

**Step 4** Confirm that you want to proceed.

**Step 5** After the VM boots, you are taken to the Install Wizard. You must complete the wizard through the VM console. Some of the questions in the wizard may be skipped depending on your responses in step 3, but even if you preserved the IP configuration and password, you still need to complete the Install Wizard through the VM console.

**Note** If you were using FIPS140 and you want to enable it again, see the relevant section in the [Expressway Administrator Guide](#).

## Resetting Your Administrator Password or Root Password

If you have forgotten the password for either an administrator account or the **root** account and you are using a VM (Virtual Machine) Expressway, you can reset it using the following procedure:

- 
- Step 1** Open the vSphere client.
  - Step 2** Click on the link **Launch Console**.
  - Step 3** Reboot the Expressway.
  - Step 4** In the vSphere console log in with the username **pwrec**. No password is required.
  - Step 5** When prompted, select the account (root or the username of the administrator account) whose password you want to change.
  - Step 6** You will be prompted for a new password.
- 

### What to do next

The **pwrec** account is only active for one minute following a reboot. After that time you will have to reboot the system again to reset the password.





# APPENDIX B

## Deploying Multiple Datastores

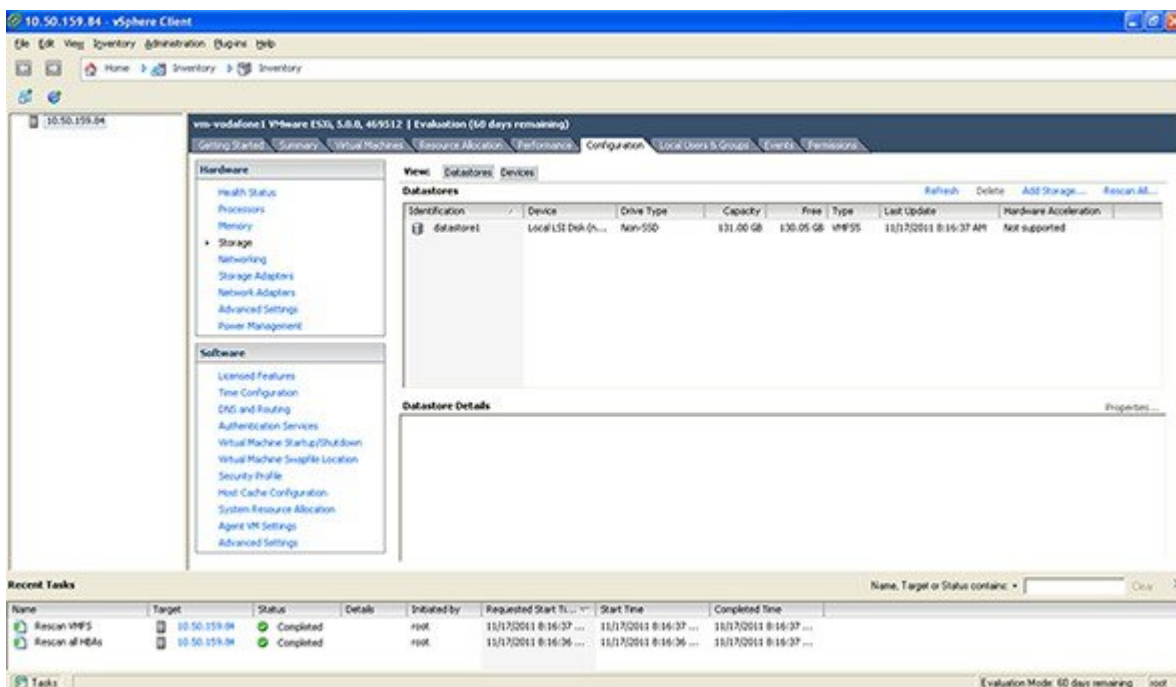
- [Deploying Multiple Datastores, on page 43](#)

### Deploying Multiple Datastores

This process should be carried out during the initial build of the VM host, if the VM host has two or more RAID arrays of disk storage. This configuration enables vSphere / vCenter to know about all the datastores.

- Step 1** From vSphere or vCenter Inventory list select the relevant Host.
- Step 2** Select the **Configuration** tab.
- Step 3** Select **Storage**.

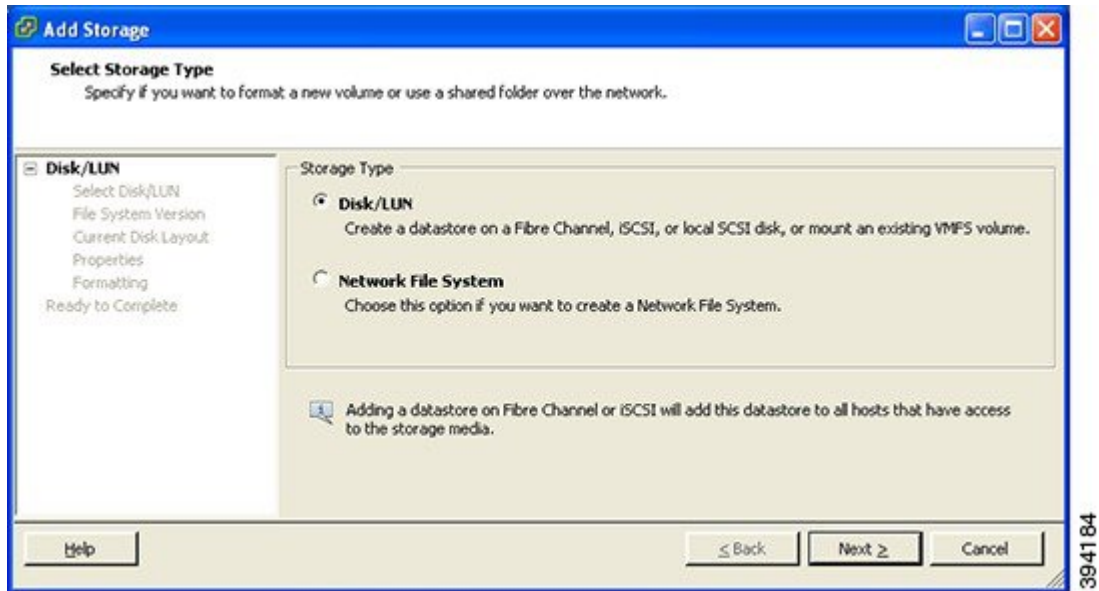
Figure 23: Select Storage



- Step 4** Select **Add Storage ...** (on the right hand side window).

**Step 5** Select **Disk/LUN** and click **Next**.

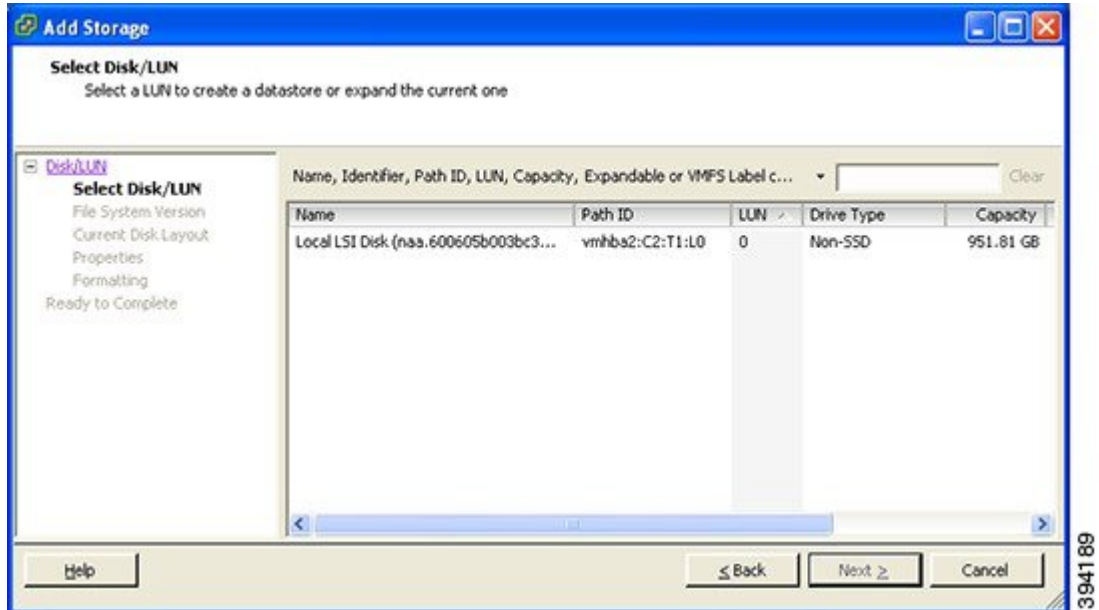
*Figure 24: Select Disk/LUN*



394184

**Step 6** Under **Disk/LUN** select the required Disc/LUN from the list presented and click **Next**.

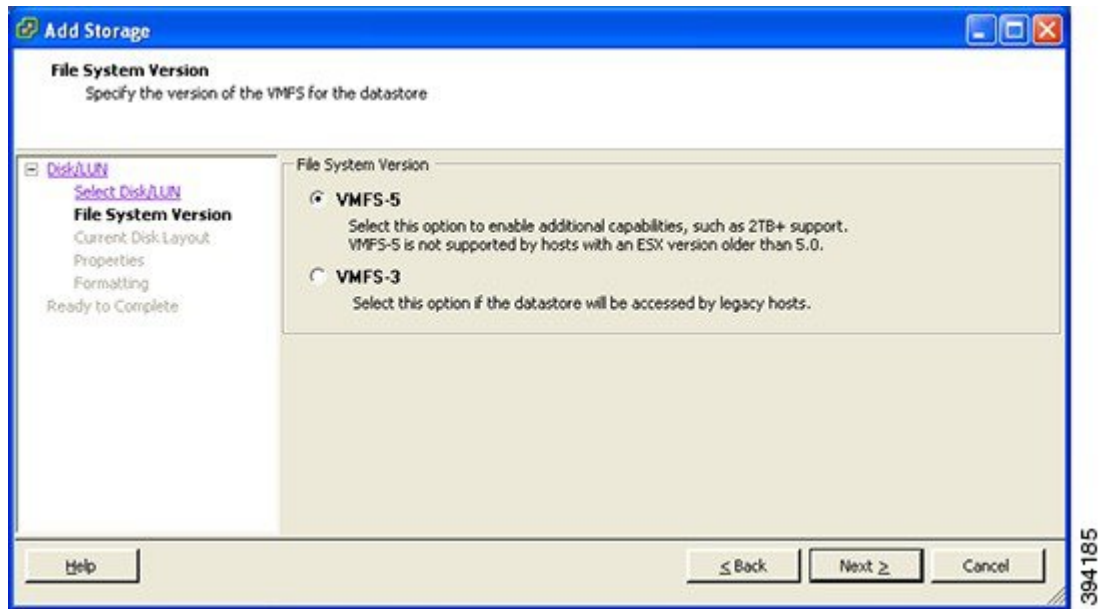
*Figure 25: Required Disc/LUN*



394189

**Step 7** On the **File System Version** page select **VMFS-5** and then click **Next**.

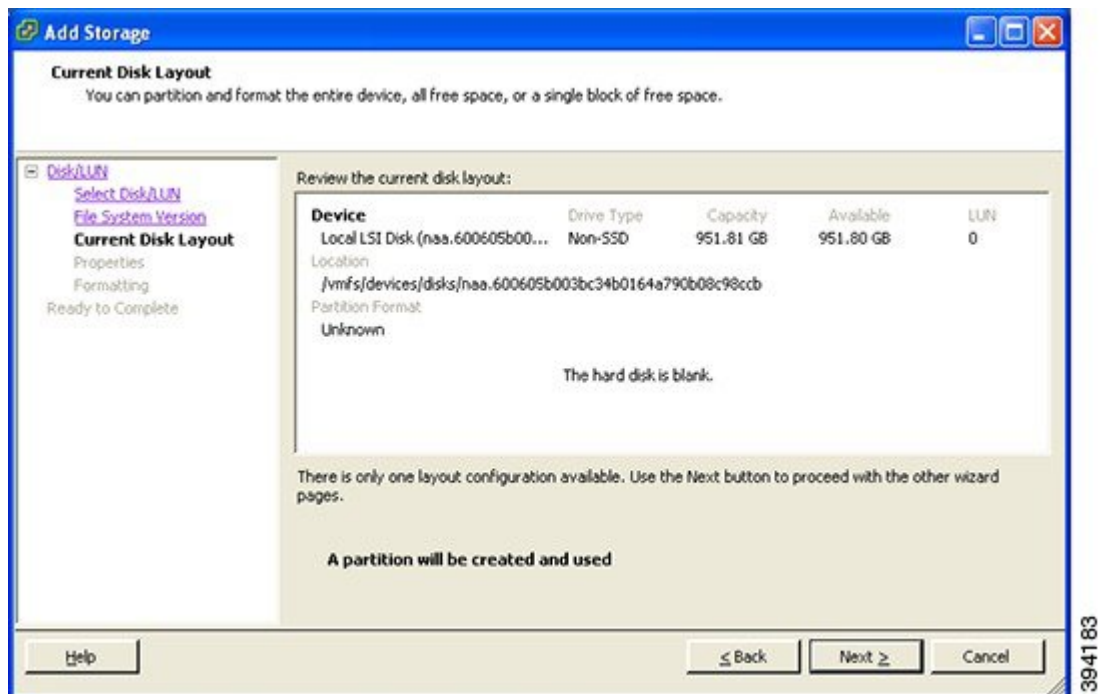
Figure 26: Select VMFS-5



394185

**Step 8** On the **Current Disk Layout** page verify the details and then click **Next**.

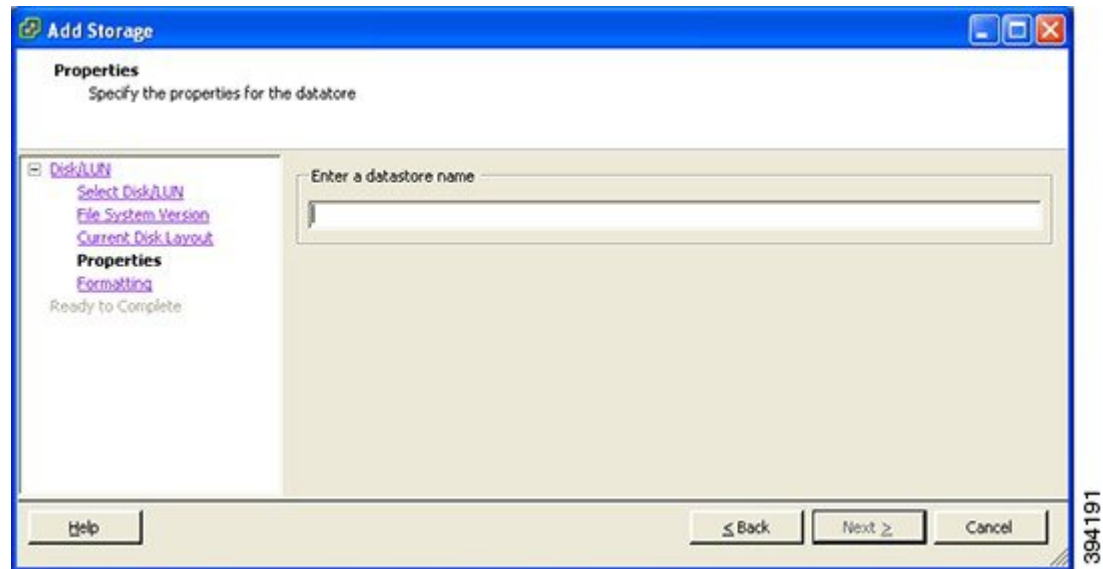
Figure 27: Verify Details



394185

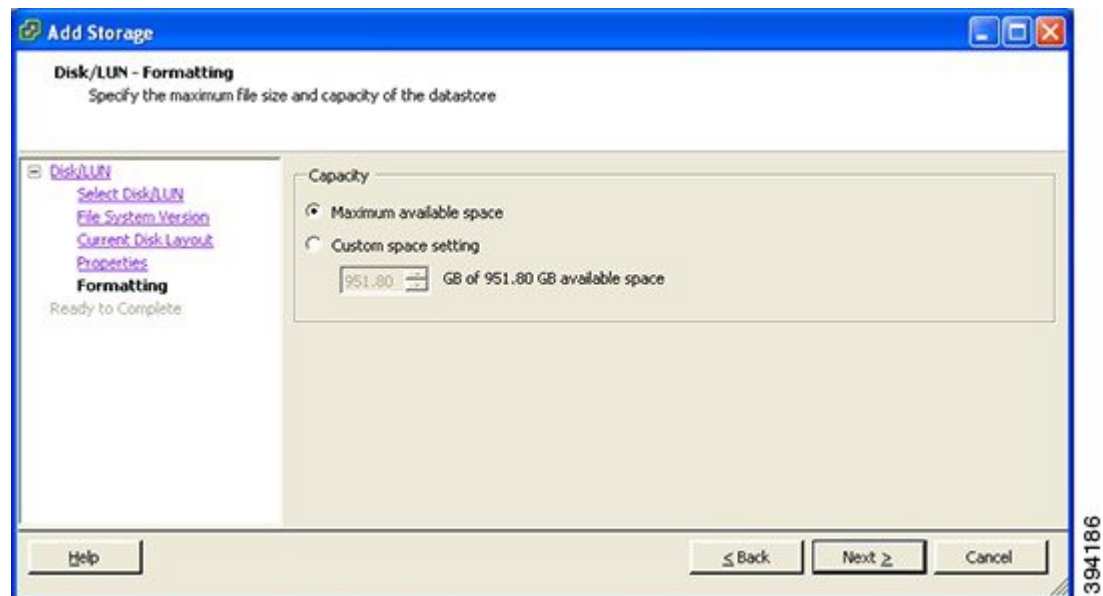
**Step 9** On the **Properties** page enter a name for the new datastore and then click **Next**.

Figure 28: Name for New Datastore



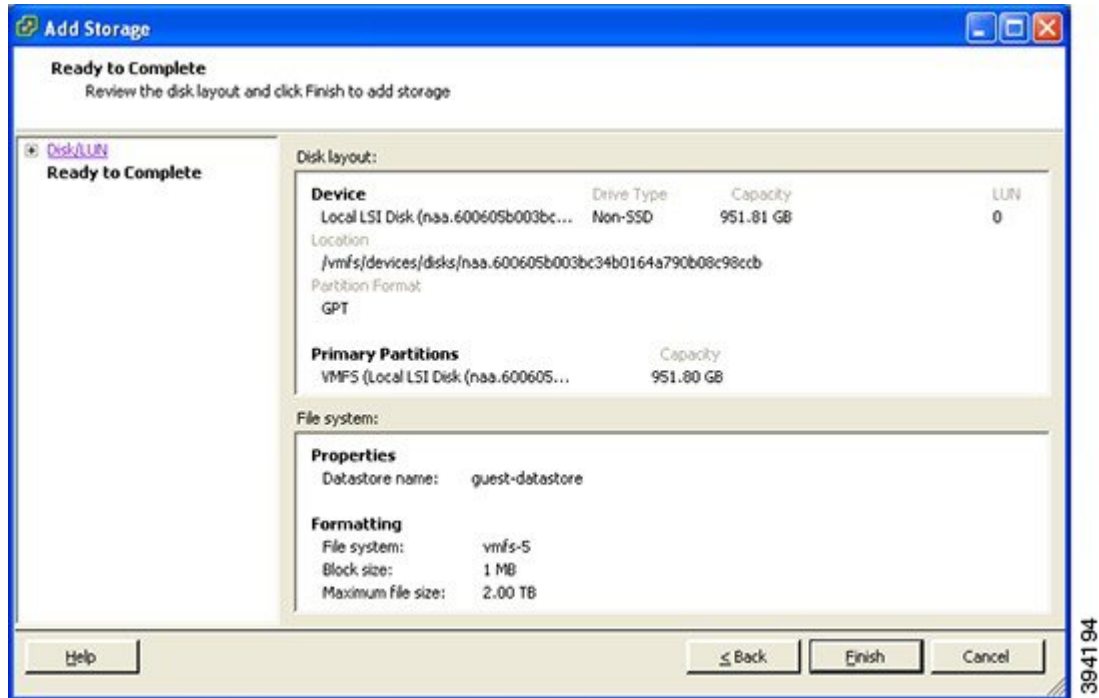
**Step 10** On the **Formatting** page select **Maximum available space** and then click **Next**.

Figure 29: Select Maximum Available Space



**Step 11** On the **Ready to Complete** page verify the details and then click **Finish**.

Figure 30: Verify the Details



- Step 12** Wait for the Create VMFS Datastore task to complete.
- Step 13** On completion, the new datastore will be listed under the **Storage** section.

Figure 31: New Datastore

The screenshot displays the vSphere Client interface for a VM named 'vmserver034'. The 'Configuration' tab is active, showing the 'Datastores' section. The 'Datastores' table is as follows:

Identification	Device	Drive Type	Capacity	Free	Type	Last Update	Hardware Acc...
datastore_RAID5	Local LSI Disk (h...	Non-SSD	951.75 GB	129.59 GB	VMFS5	11/18/2011 1:21:21 PM	Not supported
datastore1	Local LSI Disk (h...	Non-SSD	131.00 GB	130.05 GB	VMFS5	11/18/2011 1:11:33 PM	Not supported

Below the table, the 'Datastore Details' section is visible. At the bottom of the window, the 'Recent Tasks' table shows the following entries:

Name	Target	Status	Details	Initiated by	Requested Start T...	Start Time	Completed Time
Revert snapshot	VM0206	Completed		root	11/18/2011 4:07:57 ...	11/18/2011 4:07:57 ...	11/18/2011 4:08:00 ...
Create virtual machine snapshot	VM0206	Completed		root	11/18/2011 4:00:21 ...	11/18/2011 4:00:21 ...	11/18/2011 4:05:30 ...

394178