



# Cisco Expressway on Virtual Machine

Installation Guide

**First Published: December 2013**

**Last Updated: July 2019**

X12.5





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## Preface

### Change History

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

Date	Change	Reason
July 2019	Clarify reserved CPU resource for Large VMs.	Clarification
May 2019	Clarify network 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	Software withdrawn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
May 2018	Revised the Recommended Platform section to clarify that the Flash-based 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.	

**Table 1 Cisco Expressway on Virtual Machine Installation Guide Change History (continued)**

Date	Change	Reason
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	<b>For Expressway:</b> Initial release of Expressway variant of this document. <b>For VCS:</b> Updated for X8.1. Provides separate vSphere and vCenter installation paths and includes details of the small, medium and large .ova deployment options. Document renamed as Installation Guide.	X8.1 release
October 2013	<b>For VCS:</b> Republished for new product activation process.	
May 2013	<b>For VCS:</b> Added a link to Cisco docwiki for hardware requirements information. Clarified use of vMotion if a move is required. Added instructions for deploying an .ova file that is already preloaded onto the ESXi Host datastore. Referred to the new Compliance Hold release process. Restructured the "Additional information" section to contain details on upgrading, clustering and migrating from a physical appliance.	
February 2013	<b>For VCS:</b> Information on .ova file usage and VM New Product Hold release process added.	
November 2012	<b>For VCS:</b> Restoring default configuration (factory reset) procedure updated.	
July 2012	<b>For VCS:</b> Troubleshooting section updated.	
March 2012	<b>For VCS:</b> Initial release.	

## Introduction

**IMPORTANT! 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.**

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.

## What's in This Guide

- VM platform requirements for Expressway
- How to load the Expressway .ova installation file
- How to install a VM
- Supported features
- Limitations of support for VMware features (see [Additional Information, page 28](#))
- Troubleshooting

## Getting Release Keys and License Keys

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). See [Ordering and Entering Release and Option Keys, page 23](#) for more information.

When Expressway VM is first installed the web interface banner displays Cisco Expressway / VCS Base. After the **Expressway Series** option key is installed the banner changes to show Cisco Expressway-C (or Cisco Expressway-E if the **Traversal Server** option key is also installed).

## Installing a Virtual Machine

The sections below list the recommended platform and specifications-based system requirements, and describe the VM installation process. The requirements refer to the minimum requirements for Expressway version X12.5. The minimum requirements for future Expressway software releases may differ and you should refer to the release notes or administrator guide to ensure that pre-requisites are met.

### Before you Begin

This section has important information before you start the installation process.

### Recommended Platform

**For Expressway:** See [http://www.cisco.com/c/dam/en/us/td/docs/voice\\_ip\\_comm/uc\\_system/virtualization/virtualization-cisco-expressway.html](http://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.

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

### 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 an Expressway VM, page 28](#), 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, page 24](#)).

**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:



## Installing a Virtual Machine

**Table 2 Required Minimum Specifications by Deployment Size**

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

\***From X8.8:** With X8.8 and later versions, two Large Expressway VMs can co-reside on a UCS server with two eight-core 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.

This was not possible before because the previous higher reservation requirement, added to the CPU requirement for the hypervisor, exceeded the total processing power of the host. 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 below).  
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.
- From X8.10, the requirement to have a 10 Gbps NIC in order to achieve the scalability of a large system is removed. It is now possible to have the capacity of a large system with a 1 Gbps NIC subject to your bandwidth constraints.

## ESXi Requirements

**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.

The minimum virtual hardware required to host virtual Expressway deployments is VMware ESXi 6.0. Cisco does not support Expressway VMs hosted on ESXi 5. or earlier (these versions are no longer supported by VMware).

New installations of Expressway OVAs will not run on any host version before ESXi 6.0.

For new Expressway VM deployments, the Expressway OVAs must be installed on an ESXi 6.0, 6.5, or 6.7 host. If you have existing VM deployments running on an ESXi 5.x version, **upgrade the host to ESXi 6.0, 6.5, or 6.7 before you install the new Expressway software.** For upgrade instructions, please see your VMware documentation (instructions for upgrading the virtual hardware version of a virtual machine are available in this VMware article: <https://kb.vmware.com/s/article/1010675>).

A known issue exists in ESXi 6.0 which was noticed during our testing. This is resolved in ESXi6.0 Update 1a but if you are installing a non-fixed version, we recommend that you read <http://kb.vmware.com/kb/2124669> before you upgrade.

**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 upgrading the VMware virtual hardware are in <http://kb.vmware.com/kb/2124669>
- 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](#)

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- 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-lifecycle-matrix.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.

## Installation Process

This process guides you through installing the Expressway VM using vCenter or vSphere client.

### Configuring the VM Host

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

1. Select the host.
2. Go to the **Configuration** tab.
3. Select **Time configuration**.
4. Select **Properties**.  
If the date and time were red on the previous page, set the date and time manually to the current time.
5. Click **Options**.
6. Select **NTP Settings**.
7. Click **Add**.
8. Enter the IP address of the NTP server.
9. Click **OK**.
10. Select the **Restart NTP service to apply changes** check box.
11. Click **OK**.
12. Click **OK**.

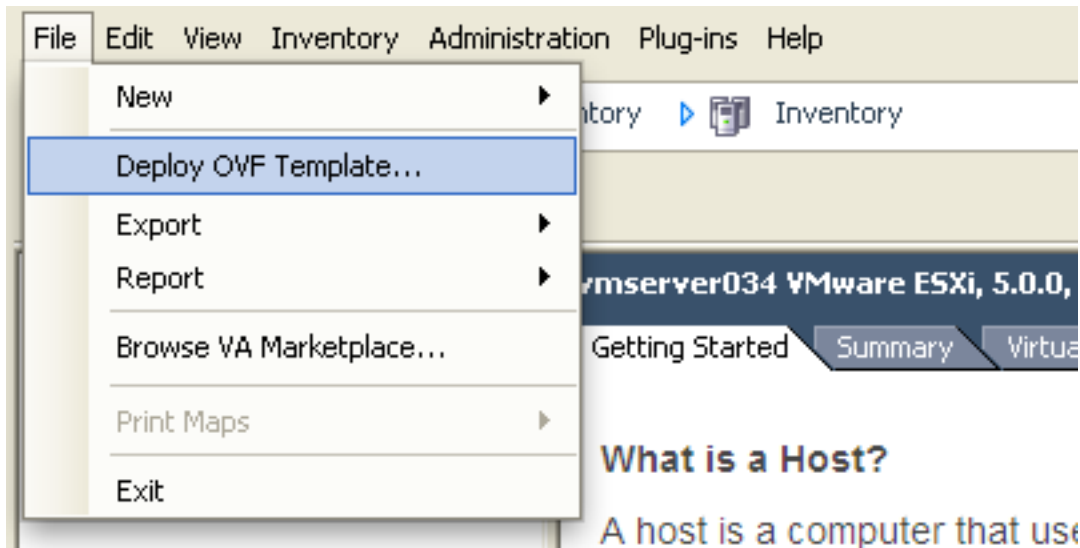
The following section describes how to deploy the ova to host using vCenter. If you are using vSphere, skip this section and go to [Deploying OVA to Standalone ESXi Host, page 19](#).

### Deploying OVA to Host Managed by vCenter

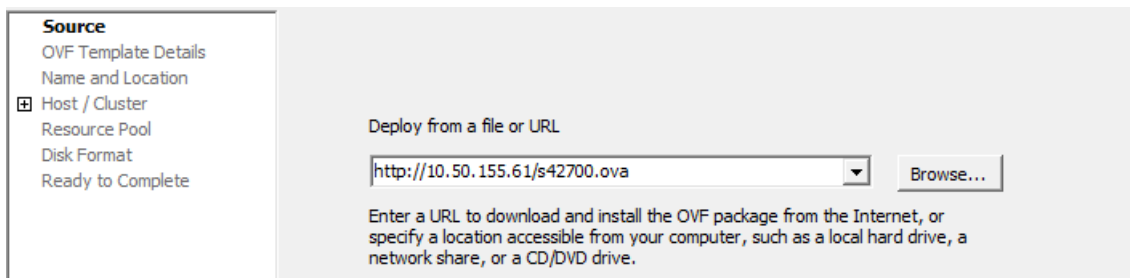
These instructions represent a typical installation. The Deploy OVF Template wizard dynamically changes to reflect host configuration.

1. If the .ova file is already preloaded onto the ESXi Host datastore (for example, in Cisco Business Edition 6000 deployments):
  - a. Using a web browser, go to <https://<VMwareHost>/folder> supplying any required credentials (typically the same username and password as used to log into vCenter ).
  - b. Navigate through the index of datacenters to find the .ova file you want to deploy from the datastore.
  - c. 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.)
2. Log in to vCenter to access the ESXi Host.

## Installing a Virtual Machine

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

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.



5. On the **OVF Template Details** page, check that the Publisher certificate is valid and click **Next**.
6. On the **End User License Agreement** page:
- a. Read the EULA
  - b. If you accept the EULA, click **Accept** then **Next**.

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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.

The screenshot shows the 'Name and Location' configuration page. On the left, a navigation pane lists options: Source, OVF Template Details, End User License Agreement, Name and Location (selected), Deployment Configuration, Host / Cluster, Resource Pool, Disk Format, Properties, and Ready to Complete. The main area has a 'Name:' field containing 'Virtual\_Expressway' with a note: 'The name can contain up to 80 characters and it must be unique within the inventory folder.' Below it, the 'Inventory Location:' is set to 'QA\_datacenter'.

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 [Before you Begin, page 8](#) for details about resource requirements. If the VMware host has insufficient resources, the virtual Expressway will fail to power on / boot.
  - Click **Next**.

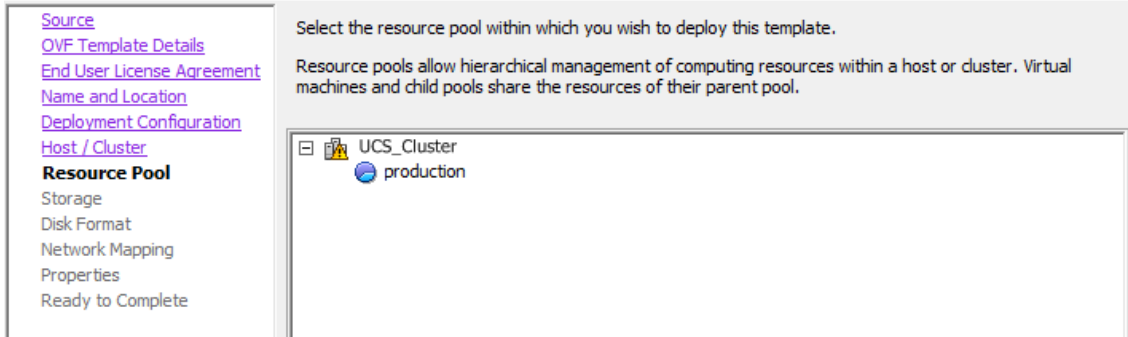
The screenshot shows the 'Deployment Configuration' page. The left navigation pane is similar to the previous step, with 'Deployment Configuration' selected. The main area shows a 'Configuration:' dropdown menu set to 'Medium (typical)'. Below it, the details are: 'Cisco TelePresence Video Communication Server medium configuration for typical deployments', 'Details: CPU: 2 vCPU with 4800 MHz reservation, Memory: 6 GB with 6 GB reservation'.

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

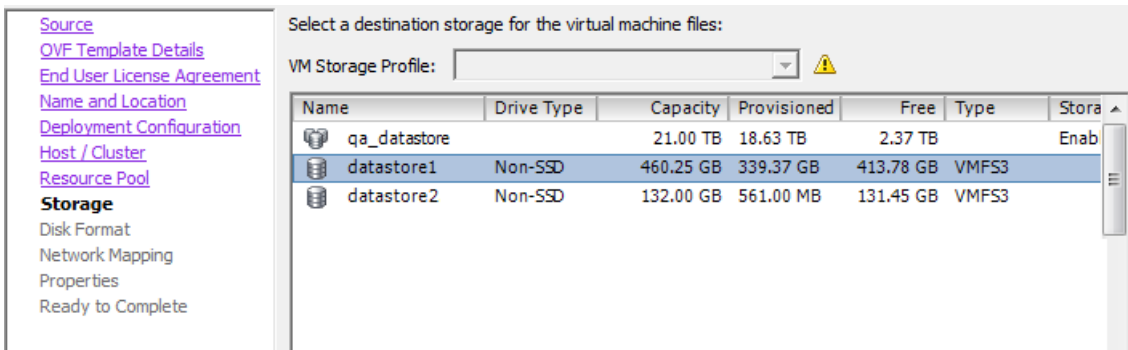
The screenshot shows the 'Host / Cluster' configuration page. The left navigation pane has 'Host / Cluster' selected. The main area shows a tree view of the inventory. Under 'QA\_datacenter', the 'UCS\_Cluster' is selected, which contains two hosts: 'server1.example.com' and 'server2.example.com'.

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

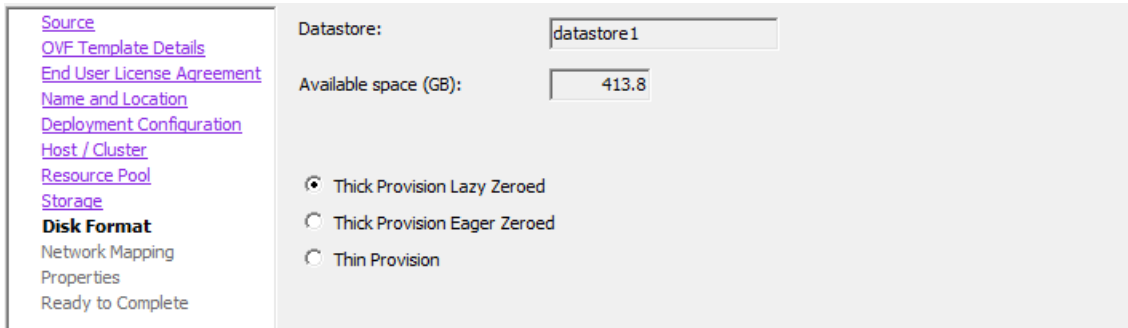


11. On the **Storage** page, select the location onto which the virtual Expressway will be deployed and click **Next**.



12. 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.



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- 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! The network name must contain only ASCII characters.**

Map the networks used in this OVF template to networks in your inventory

Source Networks	Destination Networks
VM Network	VM Network

## Installing a Virtual Machine

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, the timezone, 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.

[Source](#)  
[OVF Template Details](#)  
[End User License Agreement](#)  
[Name and Location](#)  
[Deployment Configuration](#)  
[Host / Cluster](#)  
[Resource Pool](#)  
[Storage](#)  
[Disk Format](#)  
[Network Mapping](#)  
**Properties**  
Ready to Complete

### Network properties

**IPv4 Enable**

**IPv4 Address**  
192 . 168 . 0 . 100

**IPv4 Netmask**  
255 . 255 . 255 . 0

**IPv4 Gateway**  
192 . 168 . 0 . 1

**IPv6 Enable**

**IPv6 Address**

**IPv6 Gateway**

**System Hostname**

**System Domain Name**  
Hostname.Domain must match the DNS record for this system's FQDN

**NTP Servers**  
Enter up to 5 comma-separated addresses



## Installing a Virtual Machine

The screenshot shows a configuration window with the following sections:

- Default DNS Servers:** A text input field with the instruction "Enter up to 5 comma-separated addresses".
- System properties:**
  - SSH Enable:** A checked checkbox.
  - Web UI Enable:** A checked checkbox.
  - System TimeZone:** A text input field containing "UTC".
- Provisioning properties:**
  - SSH Public Key:** A text input field with the instruction "Enter a SSH public key. This allows for the completion of the installation wizard over SSH".

15. 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 (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

1. Select the VM guest and then select the **Console** tab.
2. You are taken to the Install Wizard.
3. Enter and confirm your root and admin password. You will also be prompted to set any properties you did not set in VMware.

```

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 _
  
```

4. Press **Enter** to apply the configuration.

## Installing a Virtual Machine

- The Expressway will apply the configuration and reboot.

```
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
-
```

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

You can now order your release or option keys; see [Ordering and Entering Release and Option Keys, page 23](#).

### Set the Root and Admin Password Using SSH

- The Install Wizard starts an SSH daemon, listening on port 5022, so you can set the root and admin password.
- Connect as user "wizard" using an SSH client on port 5022 (for example: `ssh wizard@10.0.0.1 -p 5022`).

```
*****
Installation Wizard for Cisco Expressway/UCS 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
vnxnet3 0000:0b:00.0 eth0: intr type 3, mode 0, 3 vectors allocated
vnxnet3 0000:0b:00.0 eth0: NIC Link is Up 10000 Mbps
8021q: 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
-
```

## Installing a Virtual Machine

3. Follow the prompt to set `admin.password` 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": "w6djqiAgmmAMbrH0", "root.password": "FkSZ95KL865Q15/T"}
Example response: {"status": "success", "detail": "Configuration complete"}

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

$ █
```

4. The Expressway will apply the configuration and reboot.

```
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
-
```

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

You can now order your release or option keys; see [Ordering and Entering Release and Option Keys, page 23](#).

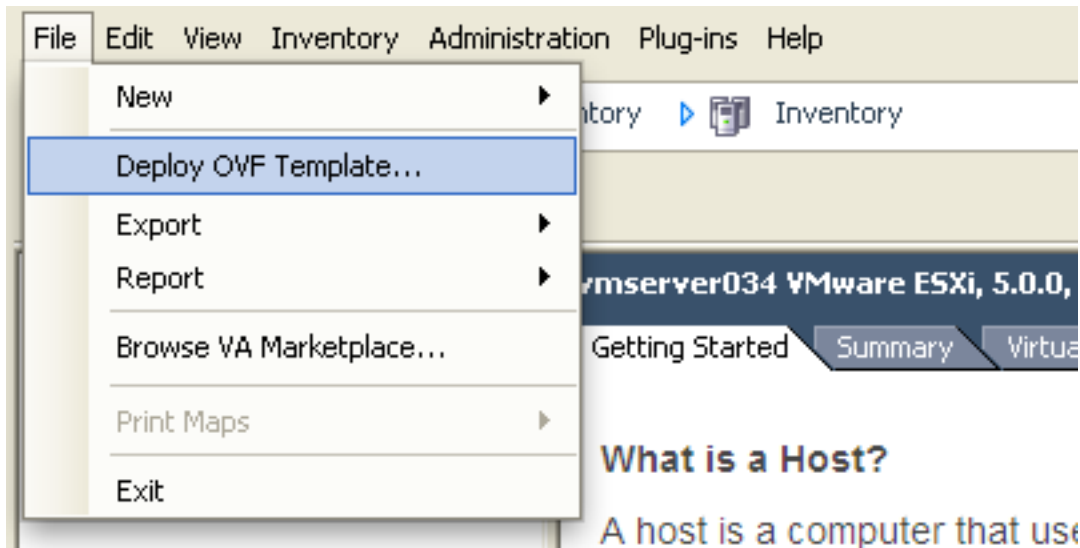
## Deploying OVA to Standalone ESXi Host

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

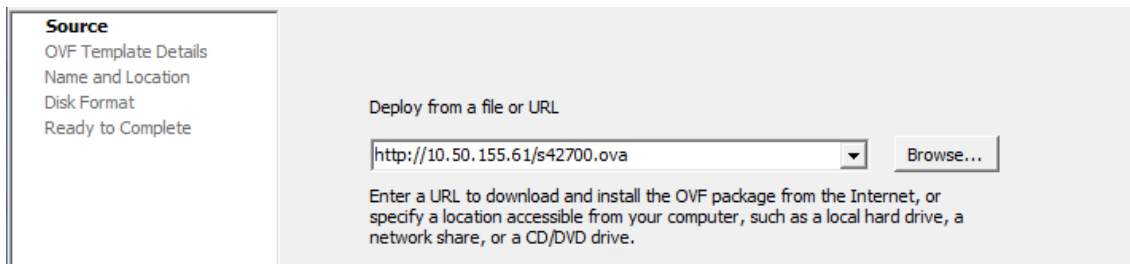
**Note:** The desktop vSphere Client is not available from vSphere 6.5 and later.

1. If the `.ova` file is already preloaded onto the ESXi Host datastore (for example, in Cisco Business Edition 6000 deployments):
  - a. 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).
  - b. Navigate through the index of datacenters to find the `.ova` file you want to deploy from the datastore.
  - c. 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.)
2. Log in to the vSphere client to access the ESXi Host.

## Installing a Virtual Machine

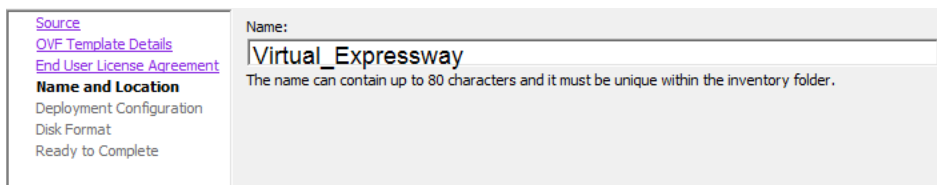
3. Select **File > Deploy OVF Template**.

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.



5. On the **OVF Template Details** page, check that the Publisher certificate is valid and click **Next**.
6. On the **End User License Agreement** page:
  - a. Read the EULA
  - b. If you accept the EULA, click **Accept** then **Next**.
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.



## Installing a Virtual Machine

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 [Before you Begin, page 8](#) for details about resource requirements. If the VMware host has insufficient resources, the virtual Expressway will fail to power on / boot.
  - b. Click **Next**.

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.

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 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.
- The Install Wizard displays the serial number and release key, if available, for reference.

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

## Installing a Virtual Machine

Wizard.

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.
  - The admin password.
  - Whether you want to enable the web UI.
  - Whether you want to use SSH to administer the Expressway.
  - The timezone.
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.**
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.

You can now order your release or option keys; see [Ordering and Entering Release and Option Keys, page 23](#).

## Ordering and Entering Release and Option Keys

After the Expressway ova has been deployed as a Guest on the VM Host, and you have set the *root* and *admin* passwords, you can access the Expressway through a web browser and order your release key.

### Task 1: Order the Keys

1. Log in to the Expressway via a web browser as *admin*.
2. Follow the service setup wizard to define the purpose of the system, apply the release and options keys, then restart the system.  

The wizard helps you through the configuration described in the rest of this topic, so you can ignore the rest of the topic if you are using the wizard.

If you do not want the wizard to guide you, click **Skip Service Setup Wizard**, then follow the rest of these instructions.
3. Get release and option keys:
  - a. Go to the **Option keys** page (**Maintenance > Option keys**).
  - b. Copy the **Serial number**.
  - c. Use this serial number to order release and option keys for this VM Expressway.  

For full details on obtaining your release and option keys, see [Appendix 2: VM Expressway Activation Process, page 36](#).

### Task 2: Apply the Keys to the System

When you have the release and option keys:

1. Log in to the Expressway via a web browser as *admin*.
2. Enter the release and option keys:
  - a. Go to the **Option keys** page (**Maintenance > Option keys**).
  - b. Enter the release key provided in the **Release key** field.
  - c. Click **Set release key**.
  - d. For each option key provided, enter the key value in the **Add option key** field and click **Add option**.
3. Reboot the Expressway to activate the licenses:
  - a. Go to the **Restart options** page (**Maintenance > Restart options**).
  - b. Click **Reboot**.
4. After the reboot, log in to the web interface and configure the Expressway, including DNS, NTP, zones, search rules and so on as required.  

Follow the [Basic Configuration Deployment Guide](#) to guide you through configuring this VM Expressway ready for operation.
5. After the Expressway has been configured it is good practice to backup the Expressway configuration using the Expressway backup facility (see next section).

## Creating a Backup of your System and Deleting Existing Snapshots

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

### Creating Backups

After installation we instead recommend that you regularly create backups of your configuration, as follows.

1. Go to **Maintenance > Maintenance Mode** and switch **Maintenance Mode On**.
2. Go to **Maintenance > Backup and Restore**.
3. You can optionally add a password for your backup file.
4. Click *Create system backup file*.
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

1. Make a backup of your configuration.
2. Shutdown the Expressway:
  - a. Go to **Maintenance > Restart Options** and click *Shutdown*.
  - b. Click *OK* to shut down the system.
3. Power off the VM.
4. Right-click on the VM and select *Manage Snapshots*.
5. In the **Snapshot Manager**, select *Delete All Snapshots*.
6. Click *Yes* in the confirmation dialog box.
7. Click *Close* to exit the Snapshot Manager.



## Hardware References

### 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 vSphere Client 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

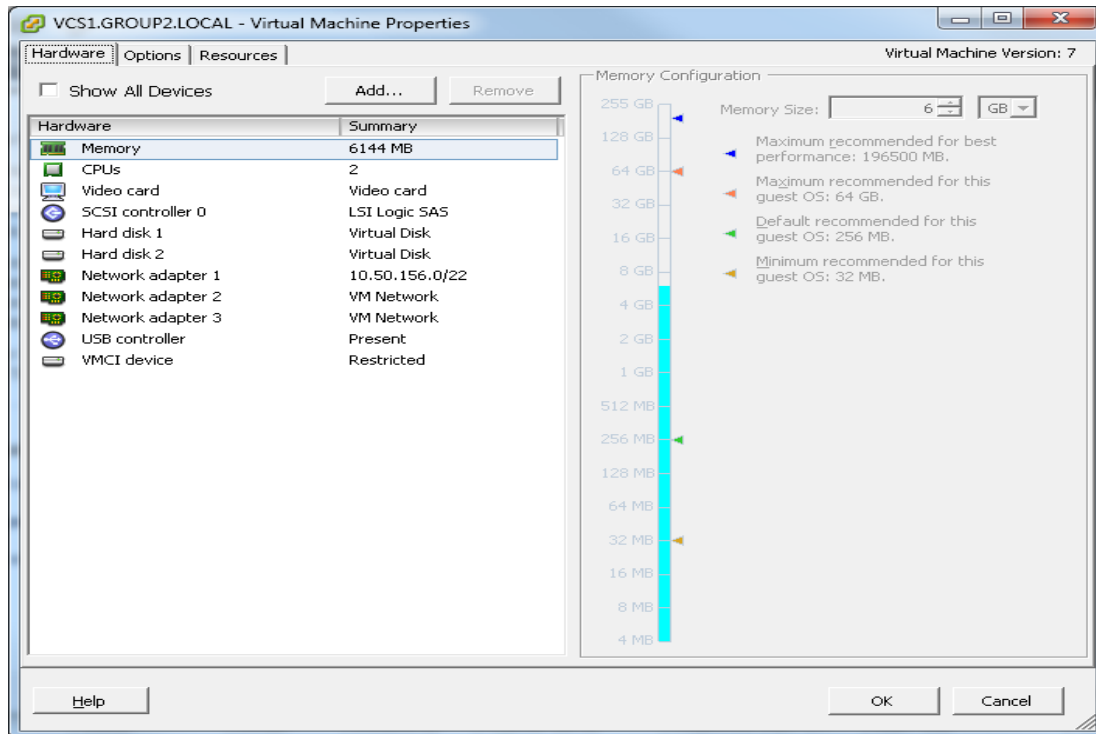
Virtual NICs can be assigned to physical interfaces as follows:

1. Ensure that the physical NIC on the VM host is connected and operational.
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**.)
3. Ensure that there is at least one Virtual Machine Port Group (with associated VLAN IDs) set up for each physical NIC.

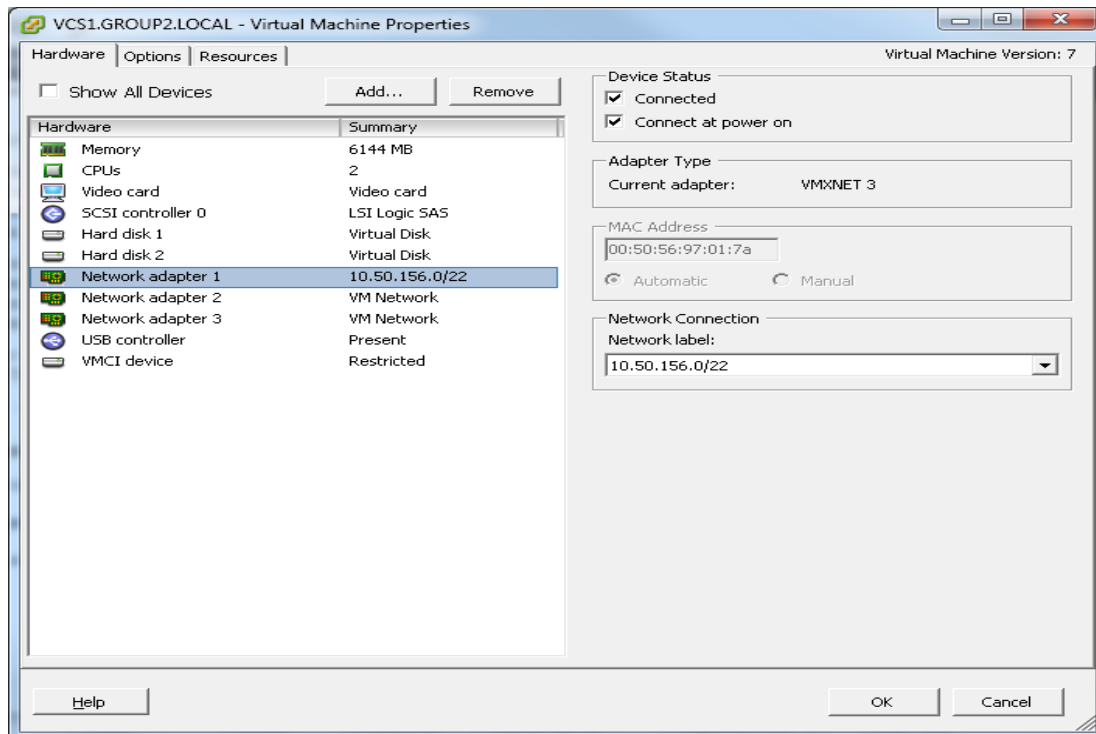
To add a new Virtual Machine Port Group:

- a. Click **Properties** on the appropriate Virtual Switch or vNetwork Distributed Switch.
  - b. Follow the network wizard.
4. Note the name of a Virtual Machine Port Group connecting to the required NIC.

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



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



7. Select the appropriate Network label (Virtual Machine Port Group) to associate the Expressway LAN interface with the required physical NIC.

## Hardware References

8. After a few seconds the Expressway will be able to communicate over the physical interface.

## Additional Information

### Upgrading an Expressway VM

#### Read this before you begin

- To avoid any performance degradation we recommend that you upgrade the Expressway while the system is inactive.
- If your Expressway is registered for Hybrid Services: **Important! Your Management Connector must be up to date before you upgrade your Expressway. You must authorize and accept any Management Connector upgrades advertised by the Cisco Collaboration Cloud before attempting to upgrade your Expressway. Failure to do so may cause issues with the connector once you have upgraded your Expressway.**
- If the Expressway is part of a cluster or is using provisioning or FindMe, follow the relevant *Expressway Cluster Deployment Guide* instead of this procedure.

#### Upgrade procedure

When upgrading a VM Expressway you must use a .tar.gz file (available from the software download site), not an .ova file:

1. Log in to the Expressway VM web interface as an administrator.
2. Backup the Expressway from the **Backup** page (**Maintenance > Backup and restore**).
3. Upgrade the Expressway from the **Upgrade** page (**Maintenance > Upgrade**).

### 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 (or VCS) requires licensing in the same way that an Expressway (or VCS) appliance requires licensing.

If you copy the VM, the Expressway serial number will change and the existing license keys will be invalidated. If you need to move Expressway to a new host, you must 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 1: Troubleshooting

This section has information to help in troubleshooting system issues.

### 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

1. Check accessibility to the VM host server (by ping, physical console access, SSH remote access, KVM-over-IP console, and so on).
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).
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.
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.
5. Check the ESXi server file log (hostd.logs) under the folder `/var/log/vmware`. This log contains common error logs such as iSCSI naming error, authentication error, and host convertibility error.
6. Verify that adequate disk space is available on the physical volume that stores the database files. Free up disk space if necessary.
7. Validate authentication to the vCenter Server database. The vCenter Server service may not be able to authenticate with the database if:
  - a. There are permission issues with the database when importing from one instance to another.
  - b. The password on the account you are using to authenticate to the database has changed but the password in the registry has not.
  - c. The vCenter Server database user is not granted correct permissions.

### Isolating a Possible Root Cause

Potential issue area	What to look for
Storage	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: <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	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.

## Appendix 1: Troubleshooting

Potential issue area	What to look for
DNS	DNS server failures or communication failures between DNS and the VM server may cause the VMware application or the VM Expressway application to fail.
vCenter Server	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.
Host application	Check any critical alarms on the VM application for events on the host or application level (check the event information from vSphere Client).

## 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 blank

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.
3. Shut down guest on the original node.
4. Start up a new VM using the X12.5 .ova file and give it the same IP address as the original node.
5. Power on the new VM and assign it a new release key.
6. Restore the backup configuration from the original node onto the new VM.
7. Rebuild the cluster and add the cluster configuration on the other nodes.

## Appendix 1: Troubleshooting

8. 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:

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

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. The following two files stored in the `/mnt/harddisk/factory-reset/` system folder, are used for the reinstallation. In some cases these files are not present on the system (most commonly with a fresh VM installation that has not been upgraded). If so, you must first put the files in place using SCP as root.
  - A text file containing just the 16-character Release Key, named **rk**
  - A file containing the software image in tar.gz format, named **tandberg-image.tar.gz**

### 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.

1. Log in to the system as **root**.
2. Type `factory-reset`

## Appendix 1: Troubleshooting

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

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 <i>not</i> 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

4. Confirm that you want to proceed.
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 Administration Guide:

- [Expressway Administrator Guide](#)
- [VCS 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:

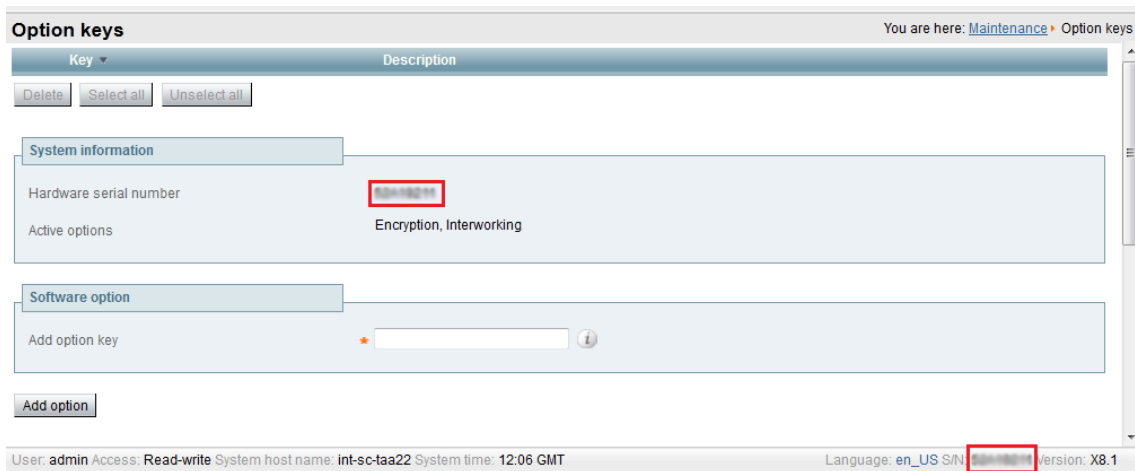
1. Open the vSphere client.
2. Click on the link **Launch Console**.
3. Reboot the Expressway.
4. In the vSphere console log in with the username **pwrec**. No password is required.
5. When prompted, select the account (*root* or the username of the administrator account) whose password you want to change.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

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 2: VM Expressway Activation Process

After you install the Cisco Expressway VM, you can use this procedure to activate your Cisco Expressway software. If you're using the service setup wizard, you can ignore this topic. The wizard guides you through completing this configuration.

1. You will have received your Product Authorization Keys (PAKs) via email. The Expressway software can be downloaded from <https://software.cisco.com/download/navigator.html>.
2. After the VM software is installed, retrieve the 8 character serial number from the **Option keys** page (**Maintenance > Option keys**) or from the bottom right-hand corner of the web interface.



3. Register your software and feature PAKs at the customer licensing portal to retrieve your **Release** key and any relevant **Option** keys:
  - a. Go to [www.cisco.com/go/license](http://www.cisco.com/go/license) and sign in.
  - b. If necessary, click **Continue to Product License Registration**.
  - c. Follow the onscreen instructions to register your software PAK (with a part number prefix of LIC-SW-EXP or LIC-SW-VMVCS) using the product serial number obtained in the previous step.
  - d. Continue to register any applicable feature PAK.

You will shortly receive 2 emails containing your release key and option keys.

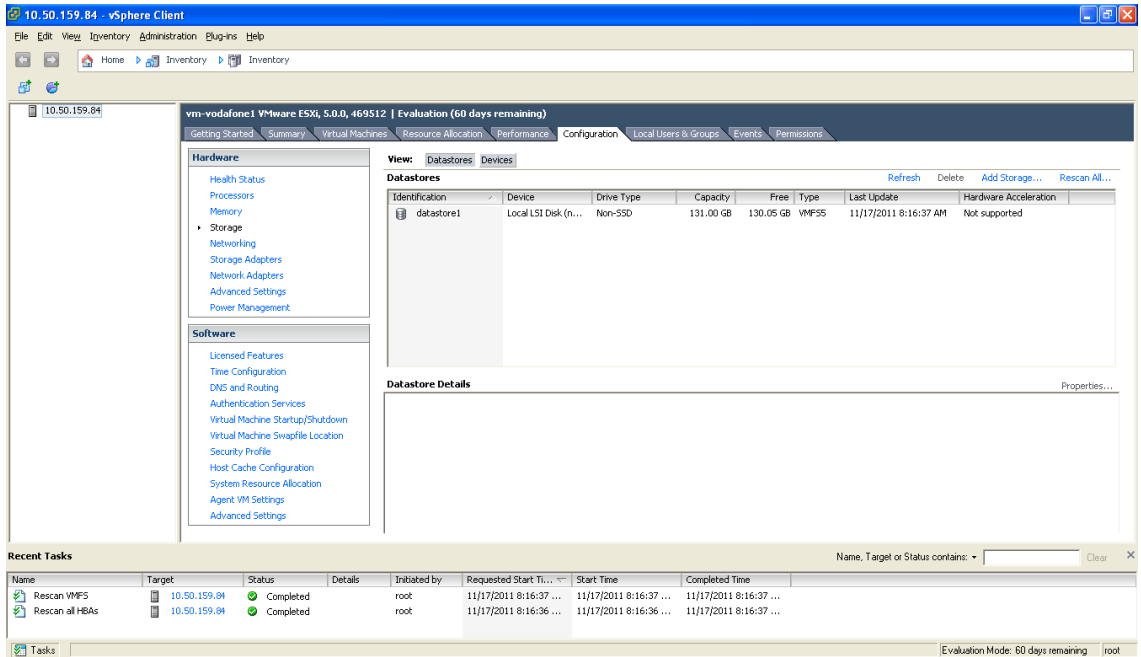
4. Enter your **Release key** and any **Option keys** on the **Option keys** page (**Maintenance > Option keys**) on the Expressway web interface.
5. Restart the Expressway (**Maintenance > Restart options**).

Only one restart is required after the release key and option keys have been entered.

## Appendix 3: Deploying Multiple Datastores

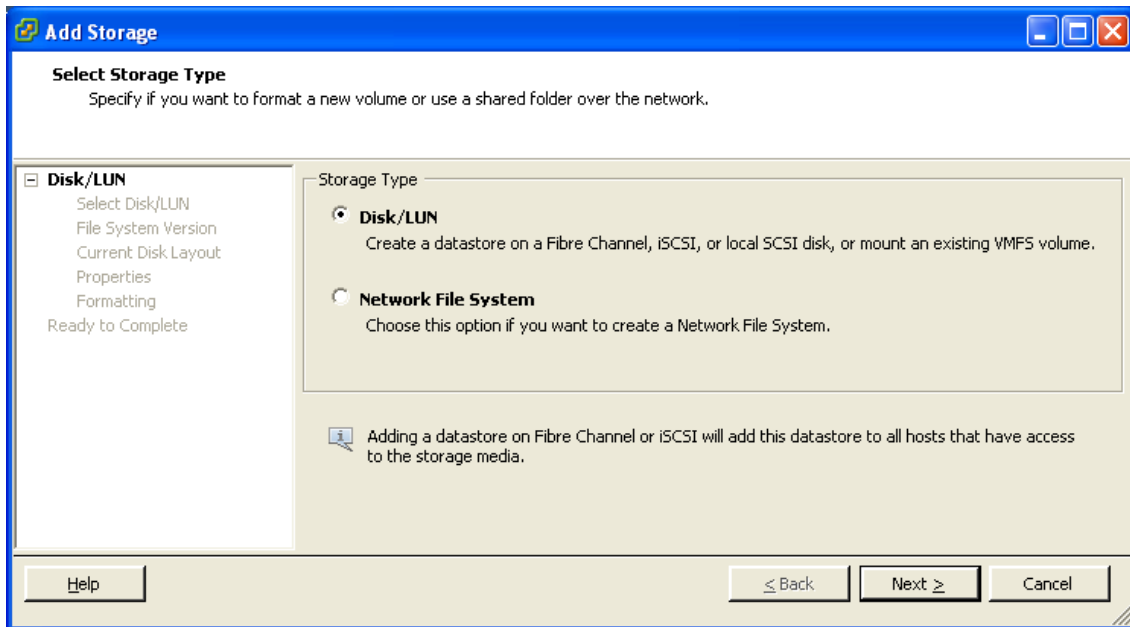
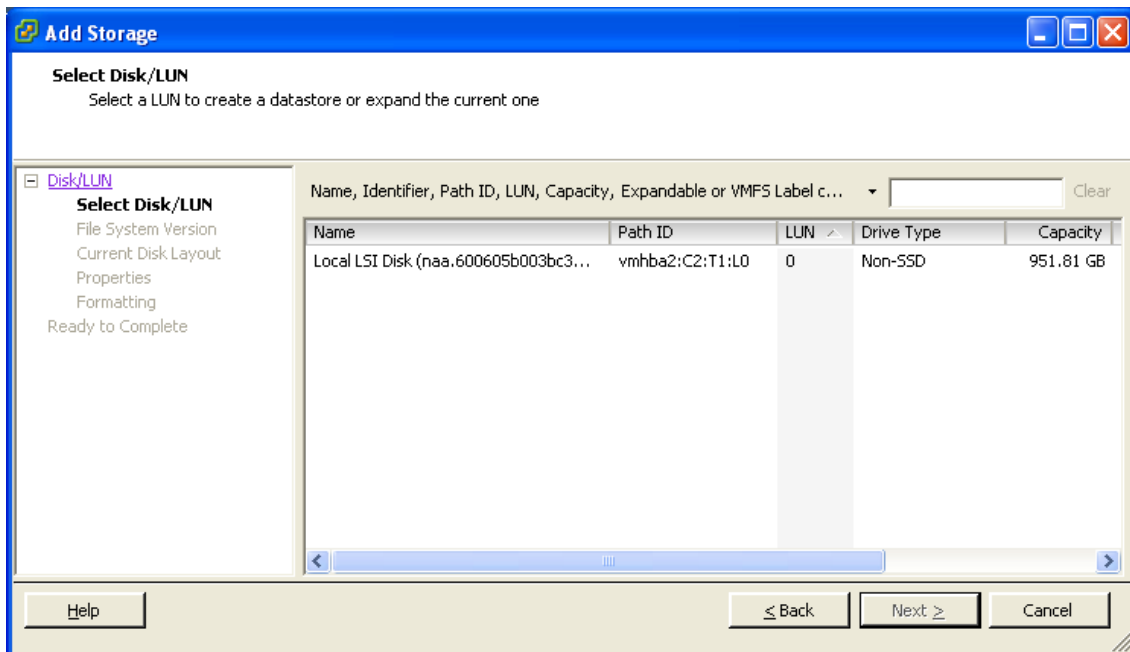
This process should be carried out during the initial build of the VM host, if the VM host has two or more RAID arrays of disk storage. This configuration enables vSphere / vCenter to know about all the datastores.

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



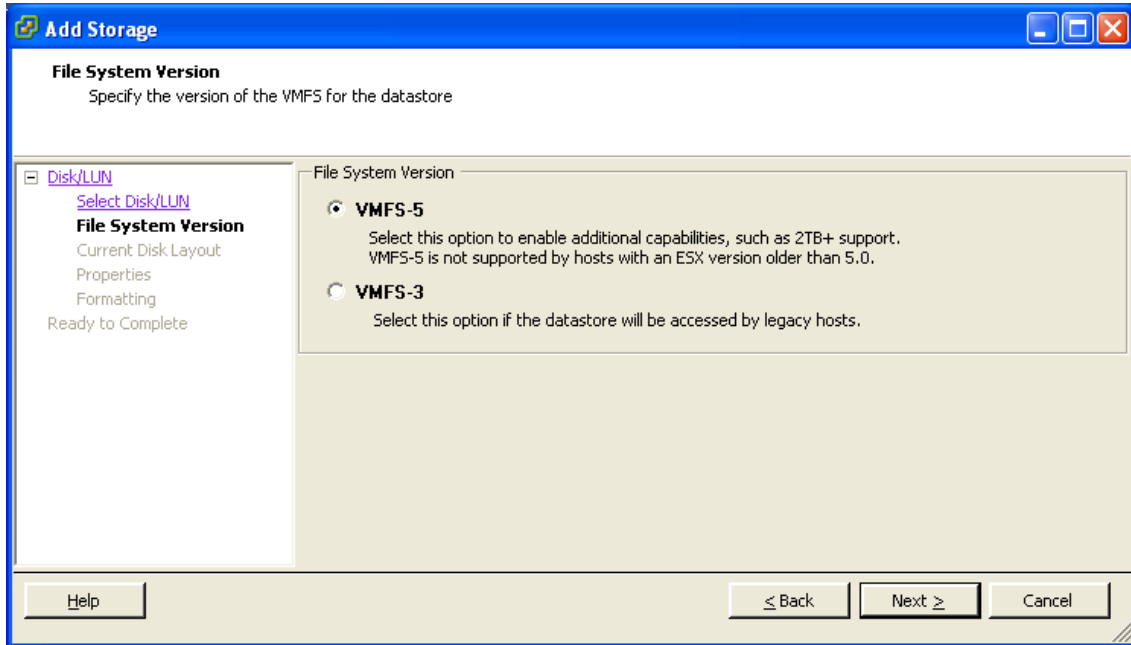
4. Select **Add Storage ...** (on the right hand side window).

## Appendix 3: Deploying Multiple Datastores

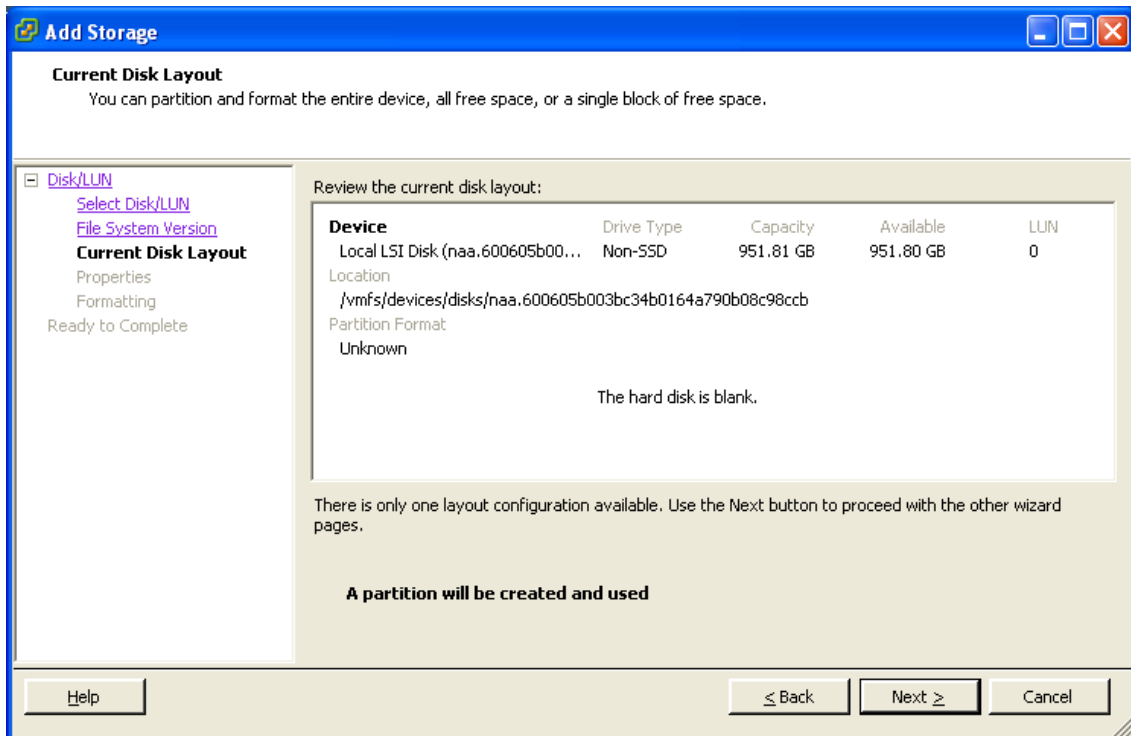
5. Select **Disk/LUN** and click **Next**.6. Under **Disk/LUN** select the required Disc/LUN from the list presented and click **Next**.

## Appendix 3: Deploying Multiple Datastores

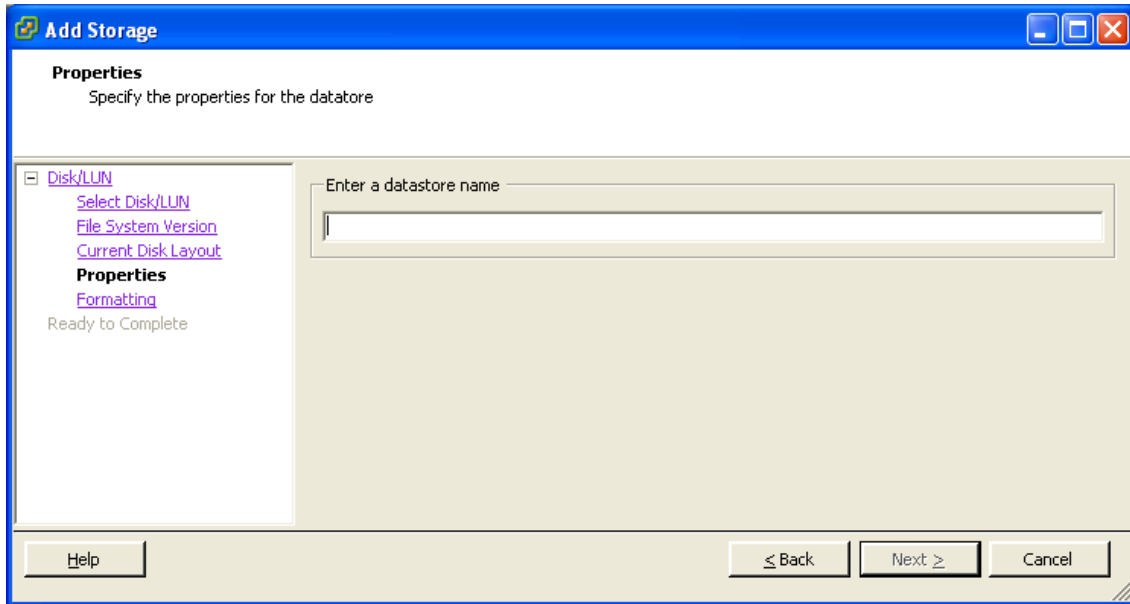
7. On the **File System Version** page select **VMFS-5** and then click **Next**.



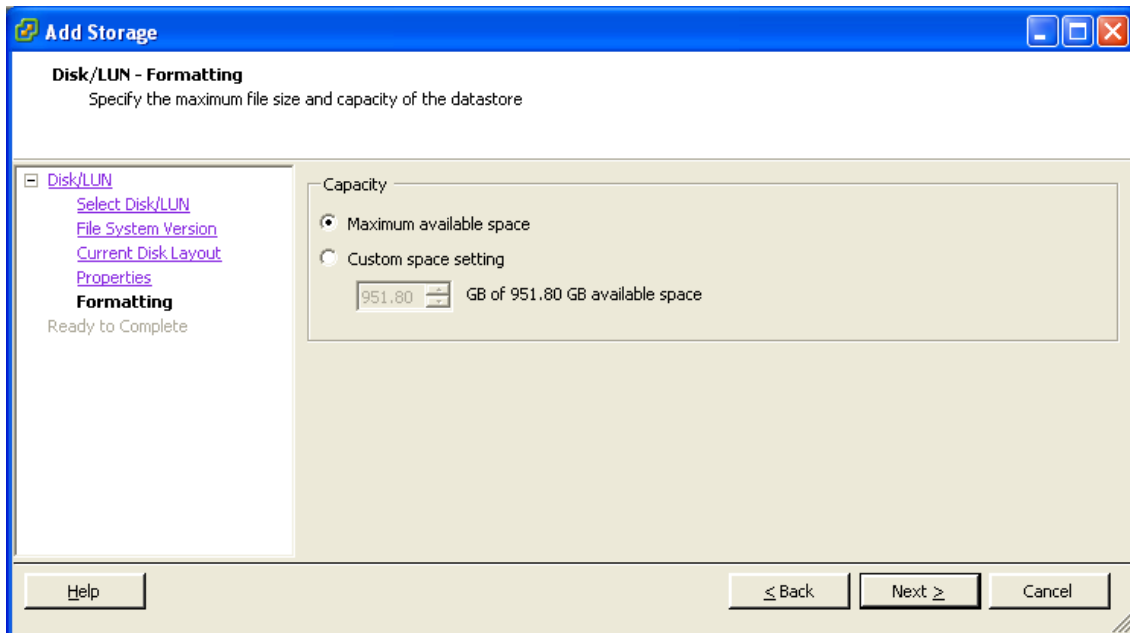
8. On the **Current Disk Layout** page verify the details and then click **Next**.



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

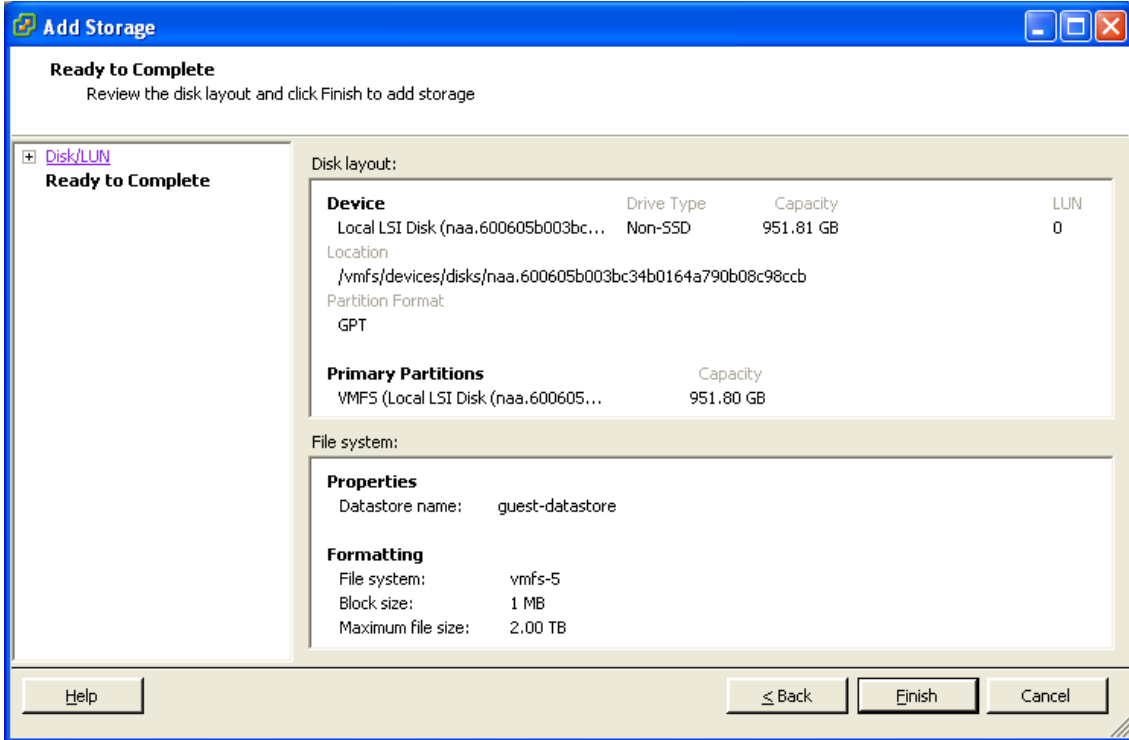


10. On the **Formatting** page select **Maximum available space** and then click **Next**.

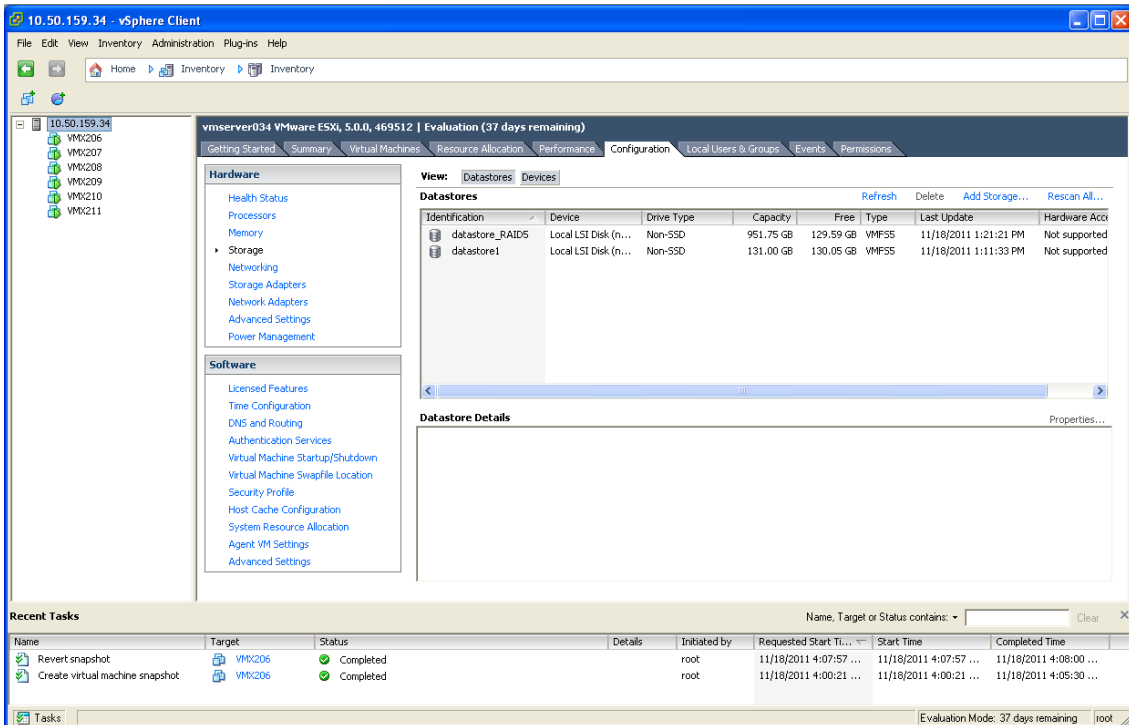




- On the **Ready to Complete** page verify the details and then click **Finish**.



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



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