

Coraid® EtherDrive® HBA
for VMware® vSphere™ (ESX/ESXi)

Administration Guide



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Rev B

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Coraid, Incorporated
255 Shoreline Drive, Suite 650
Redwood City, California, 94065
United States of America

Phone: +1-650-517-9300
+1-877-548-7200

Fax: 1-650-226-3788

Web: www.coraid.com
<http://www.coraid.com/support/> support@coraid.com

Introduction

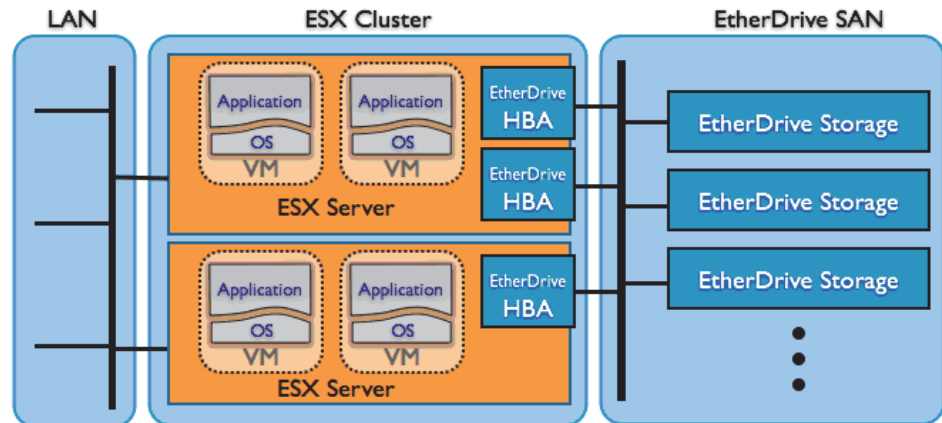
Thank you for purchasing a Coraid® EtherDrive® Host Bus Adapter (HBA).

This guide explains how to install and configure your EtherDrive HBA to work with the VMware vSphere™ operating system on the following server hosts:

- ESX™ Server 4.1
- ESXi™ Server 4.1

The HBA card and HBA Driver software deliver ATA-over-Ethernet (AoE) technology to your host for fast and affordable EtherDrive SAN performance.

The EtherDrive SAN is comprised of one or more LUNs providing shared storage. The EtherDrive HBA is installed in the host and presents LUNs as locally attached SCSI disks. The HBA Driver and HBA card translate disk requests to AoE requests and transmit the requests to the EtherDrive SAN. As responses return from the EtherDrive SAN, the reverse translation occurs in the HBA Driver.



To use Coraid's EtherDrive SAN storage with your host, one or more Coraid EtherDrive HBA cards must be installed. The EtherDrive HBA's two network ports are dedicated specifically for communication with Coraid EtherDrive SAN storage appliances. At least one port from the EtherDrive HBA must be connected to the SAN where the EtherDrive SAN storage is located.

The EtherDrive HBA driver supports up to two 10Gb HBAs (four ports total) or up to two 1Gb HBAs (four ports total).

Overview of Installation

To install your EtherDrive HBA:

- Configure the Coraid EtherDrive SAN storage with at least one LUN. See the *Coraid EtherDrive SR/SRX Administration Guide* for instructions.
- Install the EtherDrive HBA card in your host as described in [Installing an EtherDrive HBA Card](#).
- Remove any previously installed versions of the HBA Driver.
- Install the Coraid EtherDrive HBA Driver on your ESX host as described in [Installing the EtherDrive HBA Driver](#).
- Connect the EtherDrive HBA and EtherDrive SAN with high-quality cables.
- Reboot your ESX host.
- Complete your storage configuration.

Requirements

- The EtherDrive HBA should only be used in conjunction with Coraid EtherDrive SAN storage appliances (SR/SRX).
- All Coraid EtherDrive SAN storage appliances must be upgraded to the latest CorOS version in order to operate correctly with the EtherDrive HBA.
- The EtherDrive HBA requires an HBA Driver.
- Because the AoE protocol is not routable, the EtherDrive HBA and the EtherDrive SAN storage must be connected to the same network broadcast domain.
- The EtherDrive HBA requires a PCI Express (PCIe®) slot in the host and does not support PCI-x slots.
- SAN Ethernet ports—HBA cards are available in the following SAN port configurations. Use high-quality cables when connecting to these ports.
 - EtherDrive EHBA-2-E-RJ45—2 x 1GbE UTP
 - EtherDrive EHBA-20-E-RJ45—2 x 10GbE UTP
 - EtherDrive EHBA-20-E-CX4—2 x 10GbE CX4
 - EtherDrive EHBA-20-E-SFP—2 x 10GbE SFP+
- The EtherDrive HBA must be connected to a network switch that supports flow control (IEEE 802.3) and jumbo frames with an MTU (Maximum Transmission Unit) size of 9000 or greater.

Note: To dedicate your SAN exclusively for storage, isolate the SAN from other network traffic.

Terminology

The information in this guide assumes familiarity with common data storage and networking concepts and familiarity with data center operations. Users unfamiliar with standard networking and storage terminology are encouraged to find definitions for unfamiliar terms using Web resources and reference documents.

This guide uses the following terms that might be unfamiliar to you or are specific to Coraid products.

Term	Definition
AoE	ATA-over-Ethernet protocol.
AoE Target	The shelf and LUN combination used to identify a block storage device on the EtherDrive SAN.
CorOS	Operating system software that is embedded into—and distributed as an integral part of—the Coraid hardware storage solution.
ESX and ESXi	EtherDrive HBA is compatible with both ESX and ESXi servers. Except where noted, this document uses the term ESX to refer to both servers.
HBA (Host Bus Adapter)	An HBA is used to connect a host system to network storage. Coraid offers a range of HBAs with support for a variety of operating systems. For more information see www.coraid.com .
LUN (Logical Unit Number)	A LUN is a grouping of uniquely numbered blocks of storage attached to a storage appliance by Ethernet SAN, in which each block contains 512 bytes of data. LUNs can be disk drives, disk partitions, or a RAID. The terms “LUN,” “device,” and “disk” are used interchangeably in this document.
VM (Virtual Machine)	A collection of virtual hardware that collectively presents a physical machine for a guest operating system.

EtherDrive SAN Configuration

Before you can communicate with the EtherDrive SAN through your EtherDrive HBA, you must create and place online one or more SR/SRX LUNs. As part of the LUN configuration, you can optionally set up a mask ID for each configured LUN. For details, see the *Coraid EtherDrive SR/SRX Administration Guide* and the *Coraid EtherDrive SAN Manager Administration Guide*.

Note: RAID performance is suboptimal while the RAID on the LUN is initializing. For optimal performance, wait until the RAID has finished initializing before using it.

Configuring Multipath communication

Every EtherDrive HBA has two ports. It is recommended that each port be connected to the SAN network. Having two connections to the SAN offers two advantages: network redundancy and higher bandwidth capacity. A higher level of redundancy is achieved when the two ports of the EtherDrive HBA are connected to separate switches. Furthermore, more than one EtherDrive HBA may be installed in your host; multiple HBAs offer further redundancy and throughput.

Multipath communication is built into the EtherDrive HBA driver and requires no configuration. The EtherDrive HBA automatically detects all network paths to EtherDrive SAN storage and uses each path to load balance all data packets bound for EtherDrive SAN storage.

Installing an EtherDrive HBA Card

To use Coraid's EtherDrive SAN, install one or more EtherDrive HBA cards in the host.

After the EtherDrive HBA is installed, install the EtherDrive HBA Driver as described in [Installing the EtherDrive HBA Driver](#).

To install the HBA card

- 1. Follow ESD (electrostatic discharge) and other safety precautions when handling the EtherDrive HBA.**



Static discharge can destroy the circuits etched in silicon microchips or dramatically shorten their life span. To protect the EtherDrive HBA from damage, observe standard ESD precautions.

- 2. Power off the host and disconnect the power cable.**
- 3. Open the host chassis and locate an available PCIe slot.**
- 4. Remove the slot cover (if any) by removing the screw or releasing the lever.**
- 5. Seat the EtherDrive HBA firmly into the PCIe slot.**

You might need to remove and replace existing PCIe cards or other hardware to access an available slot.

6. Attach the EtherDrive HBA retaining bracket using the existing screw or lever.

Note: Depending on whether you are using a full-height or half-height slot, you might need to change the retaining bracket on your EtherDrive HBA. Your EtherDrive HBA includes both a half-height and a full-height retaining bracket.

- (SFP+ EtherDrive HBA only) You must remove both transceivers before you can remove the retaining bracket.
- (CX4 HBA EtherDrive HBA only) If you change the retaining bracket on your EtherDrive HBA, make sure you remove and replace the locking pin on each port carefully. Push the pin on one side at a time, alternating sides, until it comes loose or clicks back into place. The locking pin looks like this:



7. Close the host chassis, and then connect the power cable(s).

8. Connect cables from the HBA SAN ports on the host to an Ethernet switch connected to the SAN. The switch must support jumbo frames with an MTU size of 9000 (see **Requirements**).

Each EtherDrive HBA provides two ports for communication with Coraid EtherDrive storage appliances. At least one port must be connected to the SAN network where the EtherDrive SAN is located. You can also connect directly to the ports on the SR/SRX appliance.

9. Power on the host.

Installing the EtherDrive HBA Driver

After you install the EtherDrive HBA card in the host, install the HBA Driver. The host will not recognize the EtherDrive HBA until the HBA Driver software has been installed.

In these instructions, the version and release numbers in the file names are replaced by **xxx**. Substitute the name of the rpm package you download when installing your driver. If you are not familiar with the scp utility used in the example, you can use a different download utility, browser, or copy tool.

To install the EtherDrive HBA Driver on your host

1. Make sure that Secure shell (ssh) is enabled on the ESX host.

For instructions, see [Appendix: Enabling Secure Shell \(ssh\)](#).

2. Download the appropriate EtherDrive HBA Driver from:

<http://www.coraid.com/support/downloads>

Note: Make sure that you download the correct driver for your version of ESX server.

3. If applicable, uninstall any previously installed Coraid EtherDrive HBA Drivers.

4. Copy the EtherDrive HBA driver to your ESX server.

For example:

```
scp /path/to/etherdrive-hba-esx41-XXX.zip root@esx_ip_address:/tmp/
```

5. Log in as root, and then use ssh to access your ESX server and change directory.

For example:

```
ssh root@esx_ip_address
```

```
cd /tmp
```

Note: You must have access permissions as a superuser (root) to perform this installation.

6. Install your EtherDrive HBA Driver.

For example:

```
esxupdate --bundle etherdrive-hba-esx41-XXX.zip --maintenancemode update
```

7. Reboot your ESX server by typing `reboot` at the Console OS command prompt.

Important information about using virtual machines

Note the following:

- Virtual machines have limitations on LUN size.

VMware uses the SCSI-2 standard. The SCSI-2 standard defines an addressing scheme that supports a maximum 2TB of storage. The ESX server can not use a LUN greater than 2TB. EtherDrive HBA automatically presents a LUN greater than 2TB to the ESX server as multiple LUNs segmented at 2TB boundaries.

For example: a 5TB LUN is presented to the ESX server as two 2TB LUNs and one 1TB LUN.

The segmented LUNs can be put back together by vSphere Client with the Extend Datastore feature. For instructions, see [Extending a volume on the EtherDrive SAN](#).

- Storage is not “hot pluggable” with virtual machines.

Virtual machines do not recover well when their boot storage is removed. The ESX server expects its LUNs to be available unless the LUN has failed. If a LUN is taken offline while the ESX server is attached to the LUN, performance of the ESX host could be impacted.

Using vSphere Client to manage your EtherDrive HBA

After you install the EtherDrive HBA and HBA Driver, you can use vSphere Client to manage your storage as you would any other standard SCSI storage.

For information about using VMware features, see the VMware documentation.

You can use vSphere Client:

- To recognize the EtherDrive HBA as a storage adapter using vSphere Client.
- To rename an EtherDrive LUN.
- To set up a volume.
- To extend a volume.
- To rename a datastore.

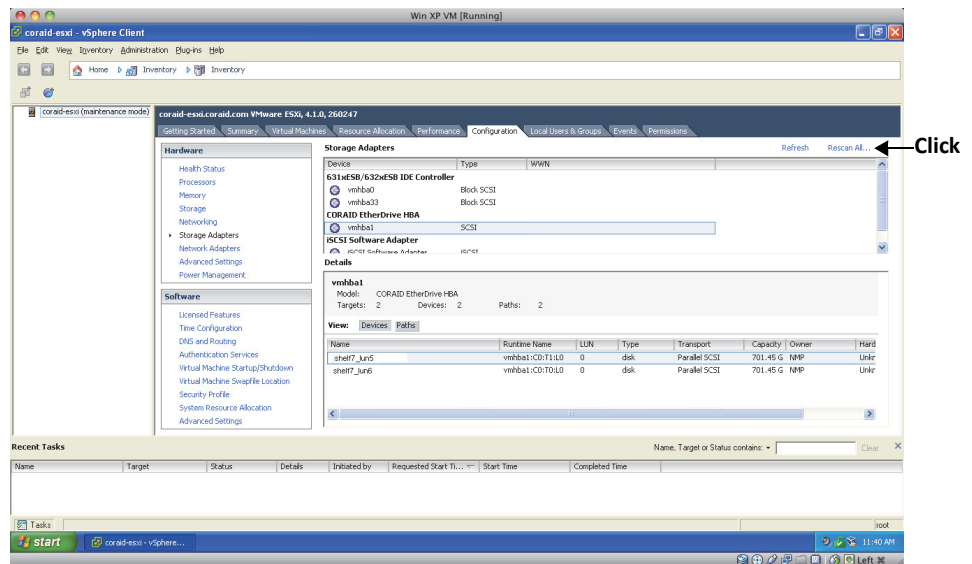
Recognizing the EtherDrive HBA as a storage adapter

Use the vSphere Client Rescan feature to recognize an EtherDrive HBA.

To recognize the EtherDrive HBA as a storage adapter using vSphere Client

- 1. Launch vSphere Client.**
- 2. Click the Configuration tab.**
- 3. Under Hardware, click Storage Adapters.**

4. Click Rescan All.



The EtherDrive HBA appears in the list of available storage adapters. The available EtherDrive LUNs are listed in the Details section.

Renaming an EtherDrive LUN

vSphere assigns a name to each LUN available to the ESX server. You can change the vSphere-assigned LUN names to reflect EtherDrive **shelf.slot** names. Renaming the LUNs helps you determine the best placement of virtual machines and virtual disks, as well as helps you to troubleshoot any problems. To see how vSphere-assigned LUN names correspond to EtherDrive LUNs, perform the following procedure, and then rename the LUNs as described in the procedure **To rename an EtherDrive LUN**.

To determine the name that vSphere assigned to an EtherDrive LUN

1. **Make sure that ssh is enabled on the ESX host.**
For instructions, see [Appendix: Enabling Secure Shell \(ssh\)](#).
2. **Use ssh to log in to the ESX server.**
3. **Issue the following command to remove targets that are no longer present on the ESX host's storage network:**

```
echo flush > /proc/ethdrv/ctl
```

Note: You can use this command any time a target is missing on the ESX host's storage network. After one minute of absence, the target will be considered "dead" and the **flush** command will remove it from the network.

4. Issue the following command:

```
cat /proc/ethdrv/devices
```

For example:

```
[root@remo ~]# cat /proc/ethdrv/devices
```

5. Review the results.

For example:

```
vmhba1:C0:T0:L0 7.5 701.45GB
vmhba1:C0:T1:L0 7.6 701.45GB
```

In this example, the ESX server's hardware assignments `vmhba1:C0:T0:L0` and `vmhba1:C0:T1:L0` correspond to EtherDrive SAN shelf.luns `7.5` and `7.6`, respectively.

To rename an EtherDrive LUN

1. Launch vSphere Client.
2. Click the Configuration tab.
3. Note the default vSphere-assigned LUN name in the Runtime Name column and compare it with the EtherDrive shelf.lun number you discovered in **step 5** of the previous procedure.
4. Note the extent value in the LUN column (which is 0, in this example).
5. Right-click the LUN name and select Rename.
6. Name the LUN with the shelf:LUN:Extent number used by the EtherDrive SAN.

In this example, `7:5:0`.

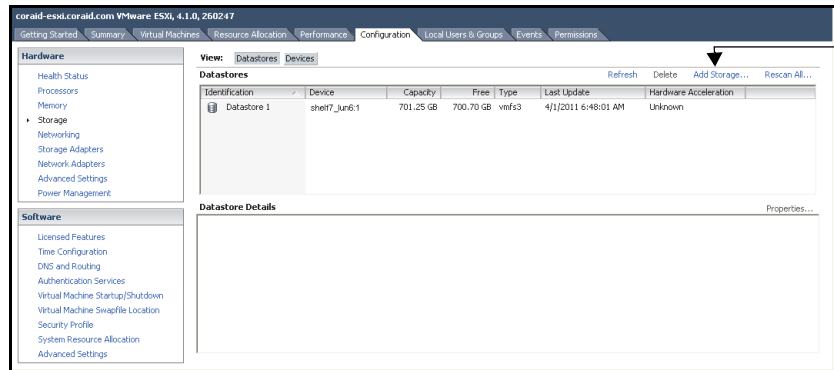
The LUN name can also include additional information as appropriate for your implementation. For example: `Accounting Dept DB: Shelf:7 LUN:5 Extent: 0`.

Setting up a volume on the EtherDrive SAN

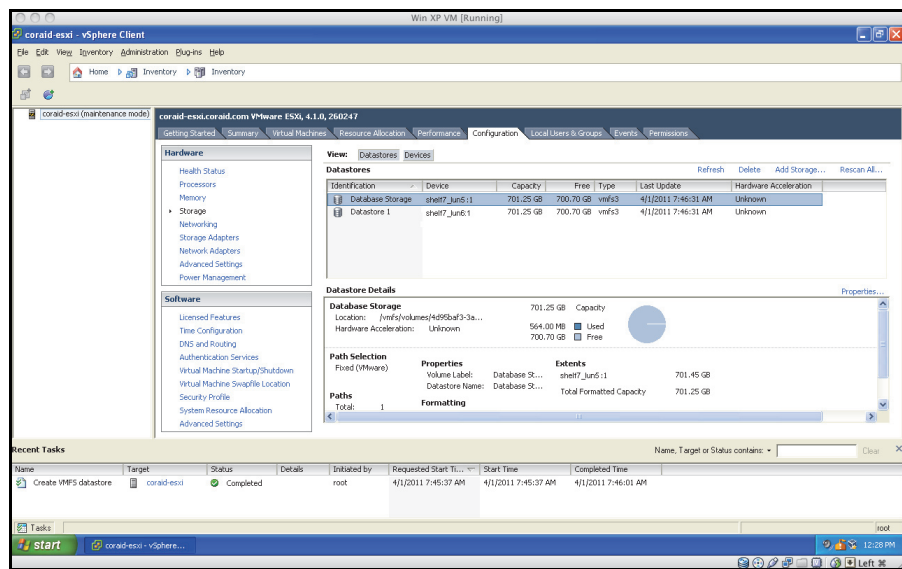
Set up a volume on the EtherDrive SAN as you would on any SCSI storage.

To set up a volume

1. Launch vSphere Client.
2. Under Hardware, click Storage.
3. Click Add Storage.



4. In the Add Storage Wizard, select Disk/LUN for Storage Type, then click Next.
5. Click to select the EtherDrive LUN on which to create a volume, then click Next.
6. Verify the LUN, then click Next.
7. Enter a name for the volume (datastore), then click Next.
8. Select the block size of the volume (datastore), then click Next.
9. Verify that the configuration information is correct, then click Finish.
10. Review the information about the volume (datastore) on the Configuration tab.



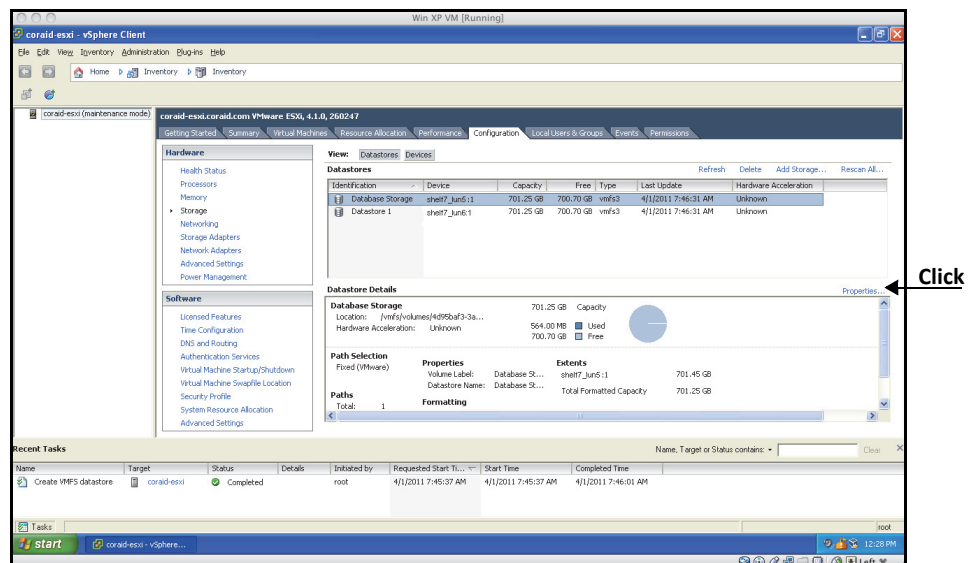
Extending a volume on the EtherDrive SAN

Virtual machines have limitations on LUN size. For details, see [Important information about using virtual machines](#).

Use the Extend Datastore feature of vSphere Client to put the segmented LUNs back together.

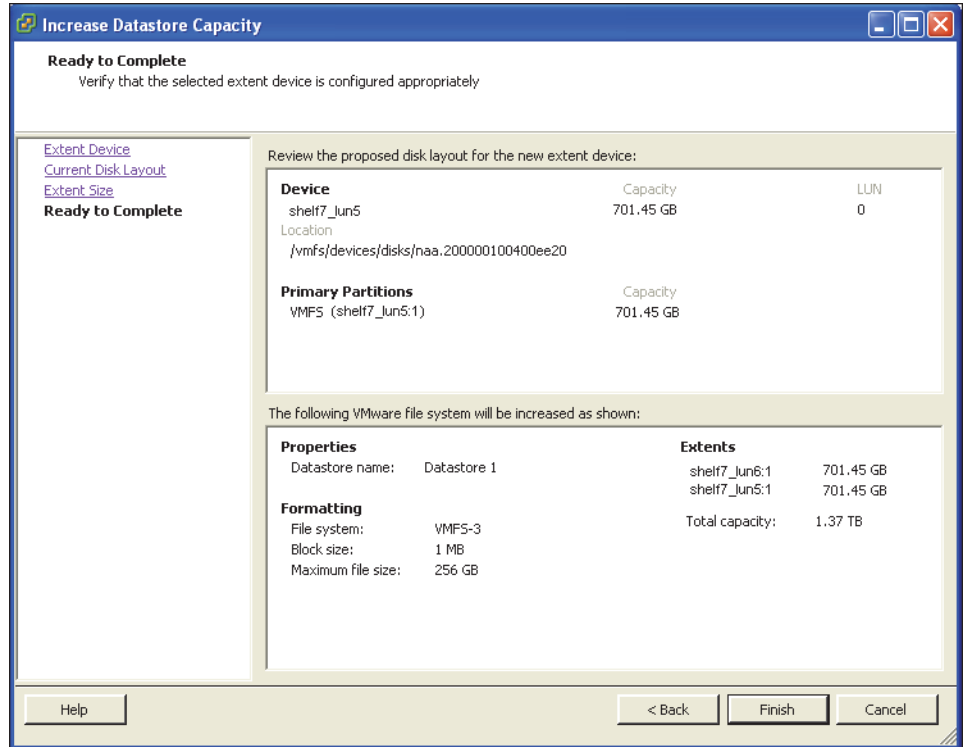
To extend a volume

1. Launch vSphere Client.
2. Click the Configuration tab.
3. Under Hardware, click Storage.
4. Select the EtherDrive volume you want to extend, then click Properties.



5. Click Increase in the Database Storage Properties screen.
6. Select the extent device you want to add to the current volume, then click Next.
7. Verify the volume and extent device information, then click Next.
8. Specify how much of the capacity of the LUN to add to the volume, then click Next.

9. Verify the information about the extension, then click Finish.



10. Review the information about the volume, then click Close.

Renaming a volume (datastore)

You can rename a datastore to indicate that LUN locations have been extended onto it.

To rename a datastore

1. Launch vSphere Client.
2. Click the Configuration tab.
3. Under Hardware, click Storage.
4. Select the volume (datastore) you want to rename, then click Properties.
5. Click Rename.
6. Enter a new name, then click OK.
For example: **Shelf:7 LUN: 5 + Shelf:7 LUN:6**
7. Click Close in the Properties window.

Using Raw Device Mappings

With vSphere, the Raw Device Mapping (RDM) option is only available for non-local storage. Only iSCSI, Fibre Channel, and SAS storage types are considered non-local; EtherDrive storage LUNs are considered local storage by ESX. For this reason, the RDM storage type option is not available when configuring a Virtual Machine or Virtual Disk.

While it is possible to enable RDM for local storage types, VMware warns that:

- RDM is a mechanism that VMware provides in order to support MSCS, as described in VMware's public manuals. Other uses of RDM are not tested by VMware.
- Using RDM to map any other volume that contains sensitive customer data (for example: outside ESX Server's root file-system, and not MSCS, but still important to the customer) is undertaken strictly at the customer's own risk.
- If you lose data in a non-MSCS configuration (something that VMware has not tested and does not support), VMware will reject any service or support request.

It may be possible to configure RDM on a volume that holds the ESX Server's root file-system. This is absolutely NOT supported or recommended by VMware. If you attempt this and are unsuccessful, and then file a Field Service request or Support Request with VMware, VMware will reject the request.

Given these constraints, if you still want to enable RDM for EtherDrive storage, contact Coraid Support for more information. For more information about RDM, please see the VMware document *ESX Configuration Guide*.

Frequently Asked Questions

Question: The EtherDrive HBA looks like a standard Network Interface Card (NIC). Can I use the EtherDrive HBA for IP traffic?

Answer: No. The EtherDrive HBA is a dedicated storage device. This allows it to process storage commands at an exceptionally fast rate.

Question: What do I have to configure to use Multipath?

Answer: Nothing! The EtherDrive HBA Driver automatically handles Multipath communications for all of the available EtherDrive HBA ports. Even if a single host has two EtherDrive HBA cards, the EtherDrive HBA Driver automatically uses the ports on both devices. For information, see [Configuring Multipath communication](#).

Question: I understand that I need a EtherDrive HBA for my host in order to use my EtherDrive SAN storage appliances. Do I also need an EtherDrive HBA for each of my EtherDrive SAN storage appliances?

Answer: No. Only one EtherDrive HBA is required for each host. One EtherDrive HBA can communicate with any EtherDrive SAN storage appliance running a compatible version of the CorOS. You can add additional EtherDrive HBAs to your host if you have unusual security or bandwidth requirements or if your storage exceeds the limitations of your operating system.

Question: I added a new LUN to my EtherDrive SAN storage appliance. How do I view it in vSphere Client?

Answer: Perform a storage rescan from vSphere Client. For instructions, see [Recognizing the EtherDrive HBA as a storage adapter](#).

Question: Why can vSphere see my EtherDrive storage but is not able to add a VMFS file system to it?

Answer: The Ethernet switch used to connect the EtherDrive HBA to the EtherDrive storage does not support jumbo frames or jumbo frames are not enabled on the switch. The HBA requires the use of jumbo frames with an MTU of 9000. See [Requirements](#).

Question: Why is the EtherDrive HBA's description listed as Unknown on the Storage Adapters page in vSphere?

Answer: This is a known issue with ESXi. Although the EtherDrive HBA is described as Unknown, there are no functional issues with ESXi or the EtherDrive HBA. This issue will be addressed by VMware in a future release of ESXi.

Appendix: Enabling Secure Shell (ssh)

The following procedures describe how to enable ssh on your ESX server.

To enable ssh from vSphere Client

1. **Launch vSphere Client.**
2. **Click the Configuration tab.**
3. **Under Software, click Security Profile, then click Properties.**
4. **In the Services Properties window, select Remote Tech Support (SSH), then click the Options button.**
5. **Select your desired startup option for SSH.**
6. **Click Start, then click OK.**

Note: To disable SSH access after you install the EtherDrive HBA driver, repeat this procedure and choose Stop in [step 5](#).

Coraid Policy Statements, Warranty and EULA

Technical support

Do you have more questions? See the Coraid Support web site:

<http://www.coraid.com/support/>

Contact the Coraid Technical Assistance Center at:

support@coraid.com

To help the Technical Assistance Center diagnose your problem, send diagnostic output along with a description of your problem. To obtain diagnostic output, issue the **sos** command.

Warranty and return policy



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Coraid’s sole obligation shall be to repair or replace the defective Hardware during the Warranty Period at no charge to the original owner or to refund at Coraid’s sole discretion. Such repair or replacement will be rendered by Coraid at Coraid’s Service Center. The replacement Hardware need not be new nor have an identical make, model or part. Coraid may in its sole discretion replace the defective Hardware (or any part thereof) with any reconditioned product that Coraid reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. Repaired or replacement Hardware will be warranted for the remainder of the original Warranty Period from the date of original Product purchase from Coraid or its authorized reseller.

Submitting a claim

The customer shall obtain a Return Material Authorization (“RMA”) number from Coraid service center and return the Product to Coraid. The customer must submit with the Product as part of the claim a written description of the hardware defect or Software nonconformance in sufficient detail to allow Coraid to confirm the same.

After an RMA number has been issued by Coraid, the defective Product must be packaged securely in suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. The customer is responsible for all return shipping charges to Coraid, and Coraid will not be held responsible for any packages that are lost in transit to Coraid.

Return Product ship to address is: Coraid Inc. 2393 Pendley Rd, Suite 200, Cumming, Georgia 30041

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“**CorOS**” means the firmware operating system software that is embedded into, and distributed as an integral part of the Coraid hardware storage solution.

“**Host Bus Adaptor (HBA) Driver**” means the specific software adaptors allowing the CorOS firmware operating system to interoperate with the HBA network interface card (NIC) in the Coraid hardware storage solution.

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