



Solution  
Implementer's  
Series™

Deployment Guide

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# Deploying OneConnect™ 10Gb Ethernet Adapters for iSCSI with VMware vSphere

- Create robust, highly available VMware environments with best-of-breed 10GbE iSCSI storage networking

vmware®

EMULEX



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## Emulex Solution Implementer's Series

This document is part of the Emulex Solution Implementer's Series, which provides IT administrators and system architects (Implementers) with solution and deployment information on popular server and software platforms. As a leader in I/O adapters – Fibre Channel, Ethernet, iSCSI and Fibre Channel over Ethernet (FCoE) – the Emulex technology team is taking a lead in providing guidelines for implementing I/O for these solutions.

### Executive summary

The Emulex OneConnect™ Universal Converged Network Adapter (UCNA) family provides high-performance server connectivity for network and storage traffic. This family includes conventional Network Interface Cards (NICs) that can be used for software iSCSI, as well as iSCSI adapters with hardware offload capability that can reduce the server's workload, while also enhancing iSCSI performance.

This document outlines options for using a 10Gb Ethernet (10 GbE) OneConnect iSCSI Adapter to interface with iSCSI storage in a VMware® vSphere environment and provides guidelines for installing drivers, setting the appropriate configuration and attaching target iSCSI LUNs. Advanced topics such as booting from LUN and multipathing are introduced, as is the use of Virtual LAN (VLAN) technology to isolate iSCSI traffic.

**Intended audience:** This document is intended for server administrators, virtualization administrators, network administrators, system and sales engineers and application engineers.



## Introduction

The white paper provides guidelines for attaching a OneConnect iSCSI Adapter to iSCSI storage in an ESX environment using either conventional software iSCSI or hardware iSCSI. The following topics are discussed:

- About Emulex OneConnect iSCSI Adapters and connectivity
- Installing OneConnect ESX drivers and OneCommand Manager (see below)
- Configuring hardware iSCSI
- Configuring software iSCSI
- Advanced topics

## About Emulex OneConnect iSCSI adapters

OneConnect adapters are single-chip, high-performance, multi-function adapters that provide server connectivity for network and storage traffic.



Typical OneConnect UCNA family member

The OneConnect family includes the following devices:

- NIC – Can be used with software iSCSI
- iSCSI Adapter – Provides a NIC and iSCSI hardware offload
- UCNA – Provides a NIC and hardware offload for either iSCSI or FCoE

## OneConnect iSCSI connectivity

You have two options for iSCSI connectivity with the OneConnect family:

- OneConnect NICs can interface to iSCSI storage using a software initiator, referred to as software iSCSI in this document.
- OneConnect iSCSI Adapters interface to iSCSI storage using hardware adapter ports that offload iSCSI protocol processing from the server, referred to as hardware iSCSI in this document. OneConnect iSCSI Adapters also present NIC ports to the operating system or hypervisor for IP network connectivity.



Table 1 compares these devices.

Table 1. Comparing software and hardware iSCSI

Benefit	Hardware iSCSI	Software iSCSI
Resource utilization	iSCSI sessions are managed in hardware on the OneConnect iSCSI Adapter, with buffer DMA transfers to the host	iSCSI sessions use host resources
Single management interface	Emulex OneCommand™ Manager (see below) provides a single, uniform management interface; procedures for attaching to iSCSI targets are the same for all supported host operating systems.	The software iSCSI initiator runs on top of the TCP/IP stack and is managed differently for every operating system.
Device view	OneCommand Manager views OneConnect iSCSI Adapters at the device level, making it easy to discover and attach LUNs.	Software iSCSI views the driver and targets.

OneConnect NICs can be used with the iSCSI software initiator in VMware ESX 4.1 (ESX) and the iSCSI services in the ESX kernel. Using the OneConnect iSCSI Adapter with hardware offload will reduce the I/O load on the host server and also improve iSCSI performance.

### OneCommand Manager overview

OneCommand Manager simplifies configuration and management of Emulex devices. Key functionality includes:

- Single, uniform management interface for Emulex devices
- Firmware updates
- Driver parameter settings
- Digital diagnostics and loop-back tests

For more information on the features and benefits of OneCommand Manager, visit the [Emulex Web site](#).

## Installing OneConnect software drivers for VMware ESX 4.1

The OneConnect iSCSI Adapter supports NIC and hardware iSCSI devices, which require separate ESX drivers.

This section describes how to install the appropriate OneConnect ESX drivers, which are qualified under the VMware I/O Vendor Program (IOVP). In addition to these drivers, Emulex recommends installing OneCommand Manager, which is part of the Emulex Applications Kit.



OneConnect iSCSI and Ethernet drivers and the Applications Kit can be downloaded from the [Emulex Web site](#) and may be applied during or after the installation of ESX. If you need a driver, the Downloads page redirects you to the appropriate VMware site, from which you can download the appropriate ISO file.

The instructions in this section apply to drivers for ESX 4.1. If you are using ESXi, you need to utilize [vSphere Management Assistant](#) (vMA), a pre-packaged Linux virtual machine (VM) that you can use to deploy scripts and select third-party agents to manage your ESXi systems.

## Installing the NIC and iSCSI drivers

After [downloading](#) the desired drivers, you should copy the ISO images on to the host /tmp directory. Then mount the following ISO files:

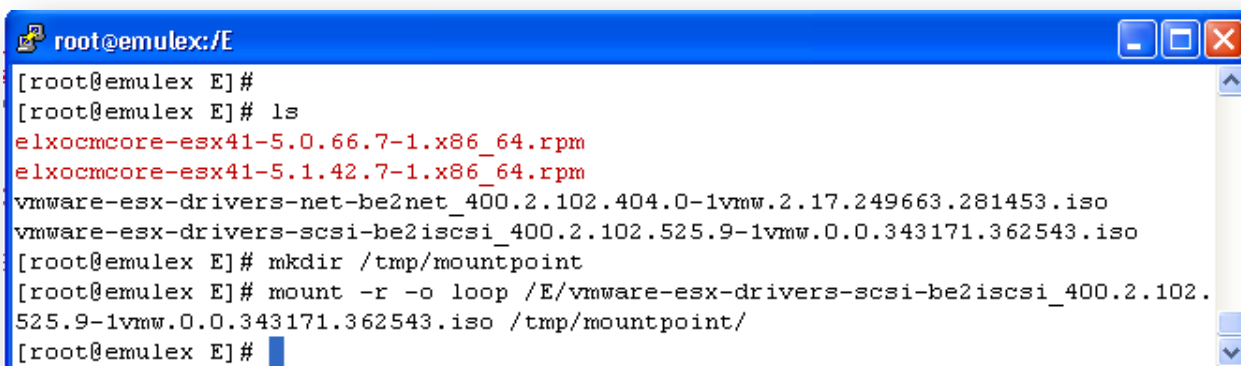
- NIC driver  
vmware-esx-drivers-**net-be2net**-400.2.102.499.0-1vmw.2.17.249663.x86\_64.iso
- iSCSI driver  
vmware-esx-drivers-**scsi-be2iscsi**-400.2.103.308.0-1vmw.0.0.235786.x86\_64.iso

Please check VMware's driver Web site for newer versions of the drivers. At the time of the testing, the NIC and iSCSI drivers shown in the example were used.

Now, use the following commands to mount the drivers, as shown in Figure 1:

```
[root@testmachine ~]# mkdir /tmp/mountpoint
```

```
[root@testmachine ~]# mount -r -o loop /path/to/driver.iso /tmp/mountpoint
```



```
root@emulex:/E
[root@emulex E]#
[root@emulex E]# ls
elxocmcore-esx41-5.0.66.7-1.x86_64.rpm
elxocmcore-esx41-5.1.42.7-1.x86_64.rpm
vmware-esx-drivers-net-be2net_400.2.102.404.0-1vmw.2.17.249663.281453.iso
vmware-esx-drivers-scsi-be2iscsi_400.2.102.525.9-1vmw.0.0.343171.362543.iso
[root@emulex E]# mkdir /tmp/mountpoint
[root@emulex E]# mount -r -o loop /E/vmware-esx-drivers-scsi-be2iscsi_400.2.102.525.9-1vmw.0.0.343171.362543.iso /tmp/mountpoint/
[root@emulex E]#
```

Figure 1. Mounting the NIC and iSCSI drivers



After the ISO image has been mounted, you can access the offline bundle in the **/tmp/mountpoint/offlinebundle/** directory. In this example, the file name for the bundle is **offline-bundle.zip**.

Install the offline bundle on an ESX server using the VMware **esxupdate** command, as in the following example:

```
[root@testmachine ~]# esxupdate --nosig --maintenance update --bundle
offline-bundle.zip
```

---

#### Note

The **--maintenance** parameter is required for Emulex NIC, iSCSI and FCoE installations.

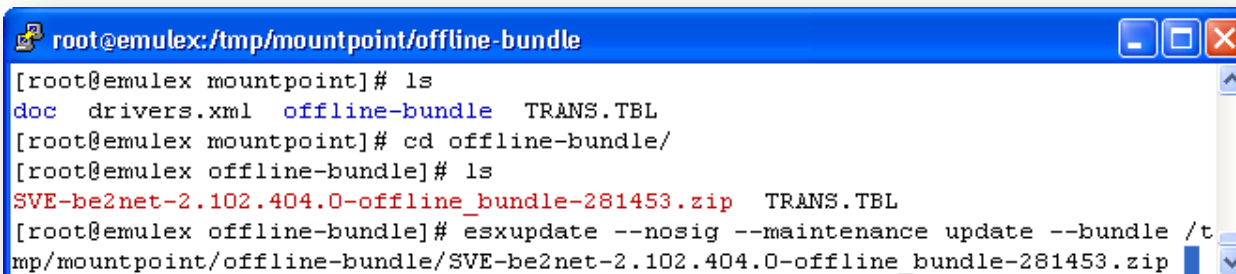
---

After rebooting the ESX host, use the **esxupdate** command to install the drivers as described below.

#### Installing the NIC driver

Use the following command, as shown in Figure 2:

```
#esxupdate --maintenancemode --nosigcheck update --bundle
/tmp/mountpoint/offline-bundle/<BE NIC driver>
```



```
root@emulex:/tmp/mountpoint/offline-bundle
[root@emulex mountpoint]# ls
doc drivers.xml offline-bundle TRANS.TBL
[root@emulex mountpoint]# cd offline-bundle/
[root@emulex offline-bundle]# ls
SVE-be2net-2.102.404.0-offline_bundle-281453.zip TRANS.TBL
[root@emulex offline-bundle]# esxupdate --nosig --maintenance update --bundle /t
mp/mountpoint/offline-bundle/SVE-be2net-2.102.404.0-offline_bundle-281453.zip
```

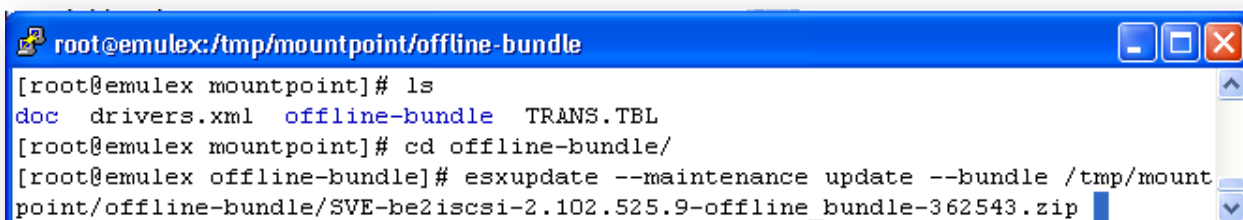
Figure 2. Installing the NIC driver



## Installing the iSCSI driver

Use the following command, as shown in Figure 3:

```
#esxupdate maintenancemode --nosigcheck update --bundle  
/tmp/mountpoint/offline-bundle/ <BE iSCSI driver>
```

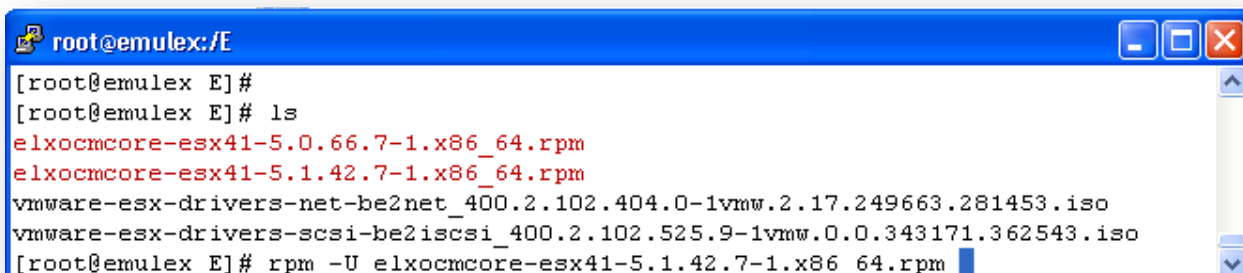


```
root@emulex:/tmp/mountpoint/offline-bundle  
[root@emulex mountpoint]# ls  
doc drivers.xml offline-bundle TRANS.TBL  
[root@emulex mountpoint]# cd offline-bundle/  
[root@emulex offline-bundle]# esxupdate --maintenance update --bundle /tmp/mount  
point/offline-bundle/SVE-be2iscsi-2.102.525.9-offline_bundle-362543.zip
```

Figure 3. Installing the iSCSI driver

## Installing the Applications Kit

[Download](#) and install the Applications Kit (which includes OneCommand Manager and OCM Agent), as shown in Figure 3.



```
root@emulex:/E  
[root@emulex E]#  
[root@emulex E]# ls  
elxocmcore-esx41-5.0.66.7-1.x86_64.rpm  
elxocmcore-esx41-5.1.42.7-1.x86_64.rpm  
vmware-esx-drivers-net-be2net_400.2.102.404.0-1vmw.2.17.249663.281453.iso  
vmware-esx-drivers-scsi-be2iscsi_400.2.102.525.9-1vmw.0.0.343171.362543.iso  
[root@emulex E]# rpm -U elxocmcore-esx41-5.1.42.7-1.x86_64.rpm
```

Figure 4. Installing the Applications Kit

You are now ready to configure the OneConnect iSCSI Adapter and attach the required LUNs. Guidelines are provided for setting up hardware and software iSCSI.

## Configuring hardware iSCSI

The hardware iSCSI capability provided by a OneConnect iSCSI Adapter can be used to enhance iSCSI performance in a virtualized environment. Because iSCSI sessions and connections are directly managed in hardware, it is easy to create and manage iSCSI target attachments; no additional ESX network port configuration is required.



This section describes how to use OneCommand Manager to attach iSCSI LUNs to a OneConnect iSCSI Adapter. For comparison purposes, the use of vSphere Client to attach the same LUNs is also described.

## Using OneCommand Manager to configure hardware iSCSI

OneCommand Manager delivers centralized management for Emulex devices. To identify TCP/IP host servers in a particular environment:

Select Discovery→TCP/IP→Add Host

Select a TCP/IP host (BL460cG7-ELX-41 in this example) and review the Emulex devices installed on this server.

Select the desired device (the hardware iSCSI device associated with Port 1 of a OneConnect OCe11100 iSCSI Adapter in this example) and then the iSCSI Port Info tab. Select Modify.

You can use the resulting Modify TCP/IP Configuration dialog box shown in Figure 6 to enable DHCP, if desired, or specify a fixed IP Address, Subnet Mask and Gateway Address.

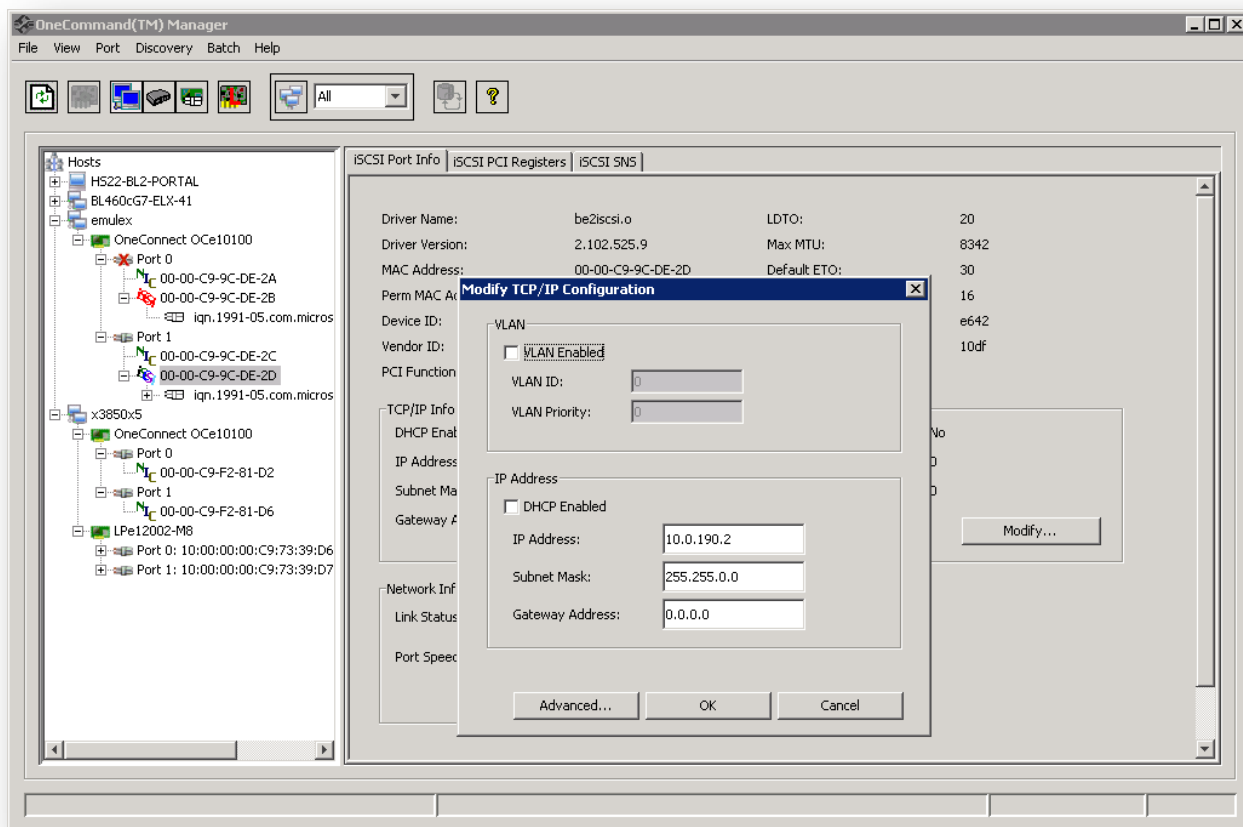




Figure 6. Modifying the TCP/IP configuration

First, select the iSCSI port that appears under the adapter's iSCSI icon, then select the **iSCSI Initiator Login Options** tab to view the **Initiator iSCSI Name**, as shown in Figure 7.

---

#### Note

Consider forwarding the iSCSI name to the storage administrator so that the name can be bound to the target being provisioned.

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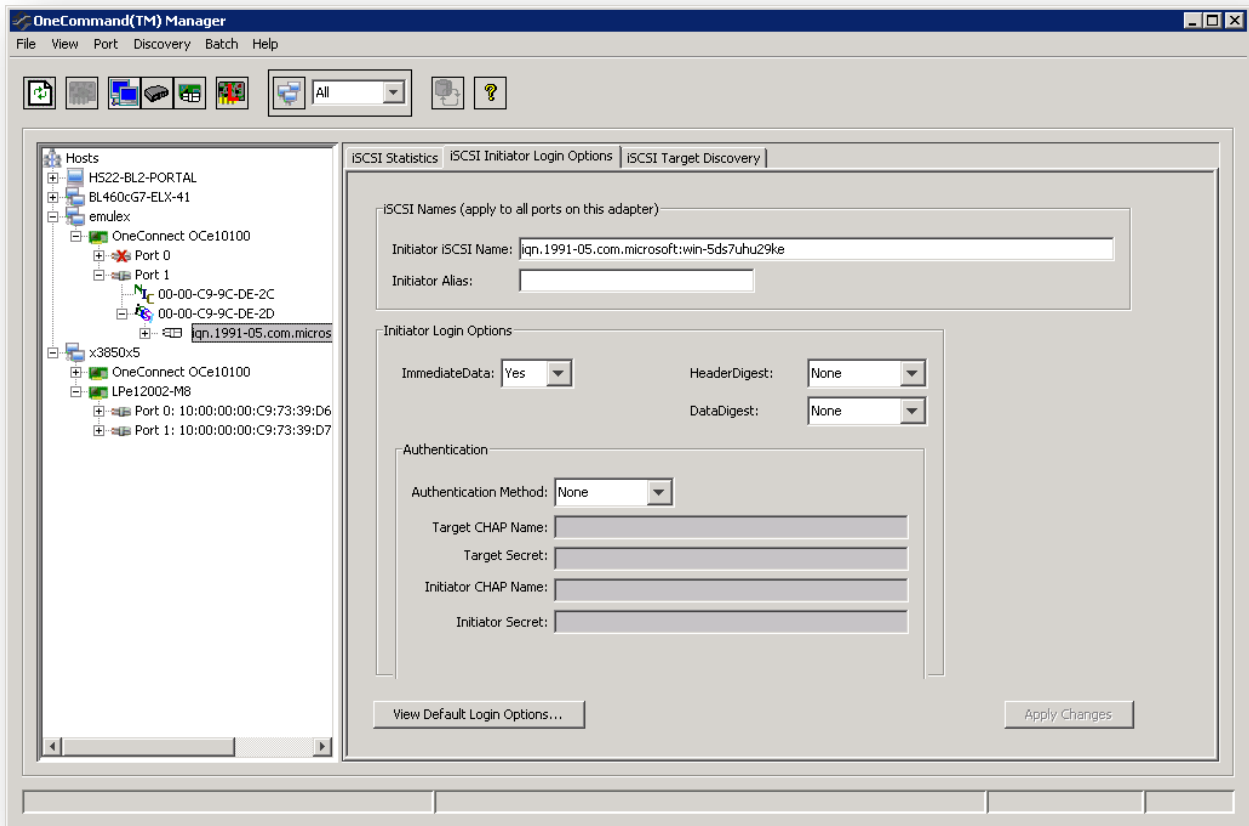


Figure 7. Viewing the Initiator iSCSI name

Select the **iSCSI Target Discovery** tab, then select the "Add Portal" button, allowing you to specify the IP address of the iSCSI target portal, as shown in Figure 8. Verify that port address 3260 is being used.



---

**Note**

LUNs may not be shown on the initiator until the storage administrator has bound the iSCSI name to the target.

---

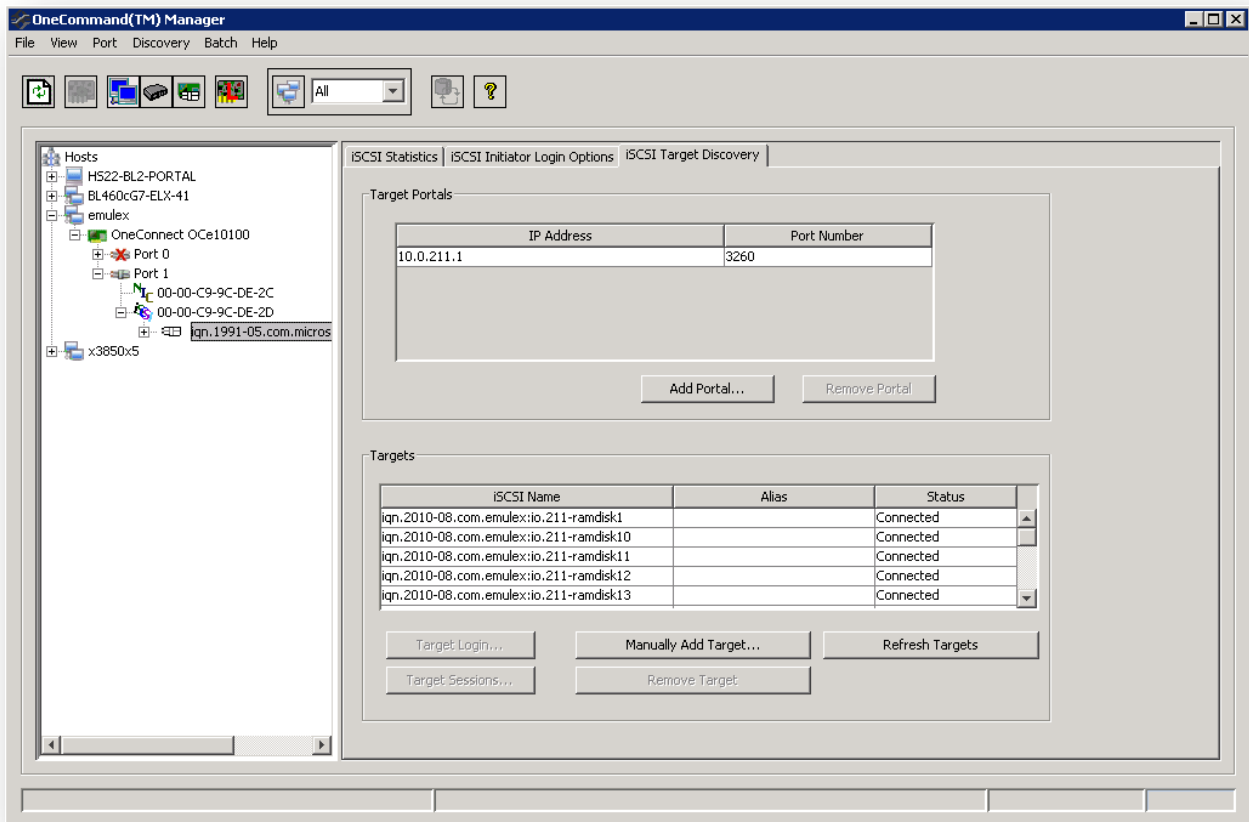


Figure 8. Attaching to the target

---

**Note**

At this point, the OneCommand Manager screen is similar to that used for other forms of storage, such as Fibre Channel.

---

The iSCSI LUNs are now visible to ESX.



## Viewing LUNs from vSphere Client

A hardware iSCSI device appears to ESX as a storage adapter. Thus, your newly-configured device and attached storage may be viewed in vSphere Client under **Storage Adapters** in the **Configuration** tab, as shown in Figure 9.

The screenshot shows the vSphere Client interface for a VMware ESX host. The 'Configuration' tab is active, and the 'Storage Adapters' section is expanded. The 'Storage Adapters' table lists several iSCSI adapters, with 'vmhba2' selected. The details for 'vmhba2' are shown below, including its model, iSCSI name, IP address, and connected targets. A table below the details shows the LUNs attached to 'vmhba2'.

Device	Type	WWN
vmhba32	iSCSI	iqn.1998-01.com.vmware:emulex:255288870:34...
vmhba33	iSCSI	iqn.1998-01.com.vmware:emulex:255288870:35...
vmhba34	iSCSI	iqn.1998-01.com.vmware:emulex:255288870:36...
vmhba35	iSCSI	iqn.1998-01.com.vmware:emulex:1031002631:37...
vmhba2	iSCSI	iqn.1991-05.com.microsoft:win-5ds7uhu29ke...
vmhba3	iSCSI	iqn.1991-05.com.microsoft:win-5ds7uhu29ke...

**vmhba2** Details:

- Model: Emulex OneConnect
- iSCSI Name: iqn.1991-05.com.microsoft:win-5ds7uhu29ke
- iSCSI Alias:
- IP Address: 10.0.190.1
- Connected Targets: 10 Devices: 10 Paths: 10

Name	Identifier	Runtime Name	LUN	Type	Transport	Capacity	Owner
EQLOGIC iSCSI Disk (naa.6090a07...)	naa.6090...	vmhba2:C0:T3:L0	0	disk	iSCSI	30.00 GB	NMP
EQLOGIC iSCSI Disk (naa.6090a07...)	naa.6090...	vmhba2:C0:T8:L0	0	disk	iSCSI	30.00 GB	NMP
EQLOGIC iSCSI Disk (naa.6090a07...)	naa.6090...	vmhba2:C0:T2:L0	0	disk	iSCSI	30.00 GB	NMP
EQLOGIC iSCSI Disk (naa.6090a07...)	naa.6090...	vmhba2:C0:T7:L0	0	disk	iSCSI	30.00 GB	NMP
EQLOGIC iSCSI Disk (naa.6090a07...)	naa.6090...	vmhba2:C0:T1:L0	0	disk	iSCSI	30.00 GB	NMP
EQLOGIC iSCSI Disk (naa.6090a07...)	naa.6090...	vmhba2:C0:T6:L0	0	disk	iSCSI	30.00 GB	NMP
EQLOGIC iSCSI Disk (naa.6090a07...)	naa.6090...	vmhba2:C0:T0:L0	0	disk	iSCSI	30.00 GB	NMP

Figure 9. Using vSphere Client to view LUNs attached to storage adapter **vmhba2**



## Using vSphere Client to configure hardware iSCSI

As an alternative to OneCommand Manager, you could use vSphere Client to configure hardware iSCSI. For example, Figure 10 shows using General Properties on the **Configuration** tab under Storage Adapters to configure IP settings.

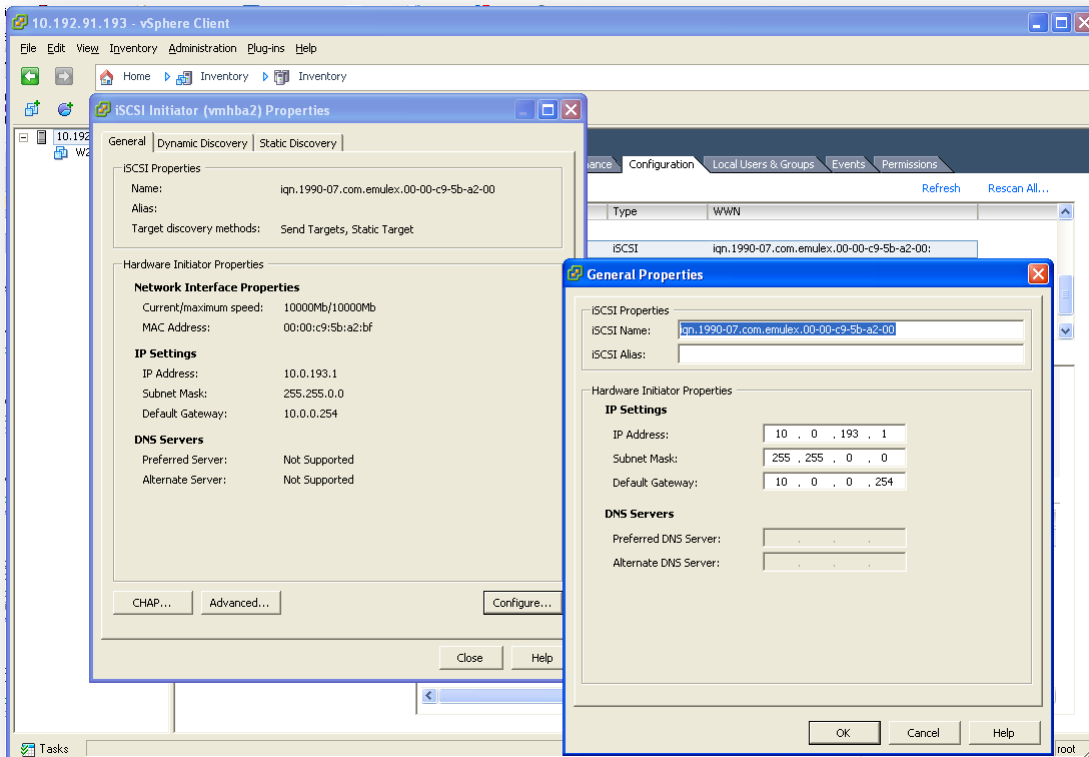


Figure 10. Using the **Configuration** tab of VMware vSphere Client to OneConnect iSCSI adapter properties



After you have configured the properties for hardware iSCSI, the next step is to discover the target portal, as shown in Figure 11.

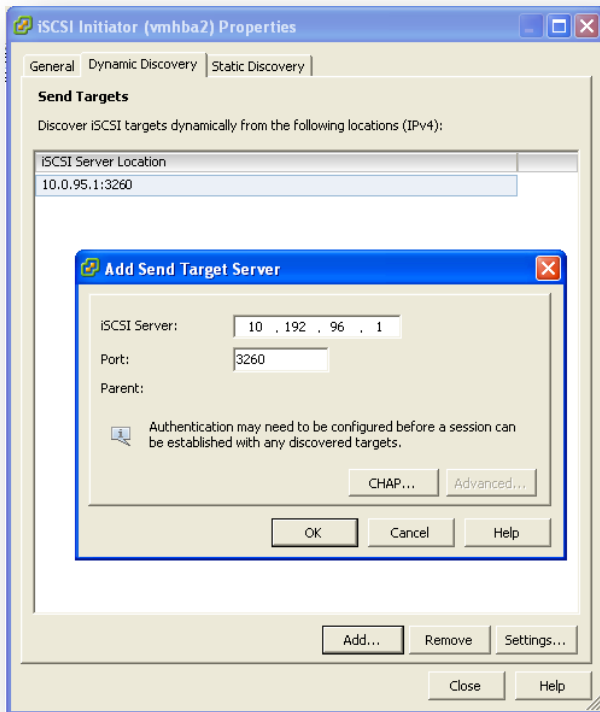


Figure 11. Using vSphere Client to add the target portal using dynamic discovery

## Configuring software iSCSI

If desired, you can use software iSCSI as a lower-performing alternative to hardware iSCSI. This section will describe the process of using VMware's built-in software iSCSI adapter.

To create a software iSCSI path in a virtualized environment, you must first configure the iSCSI target on the array. Please refer to the storage array vendor's documentation or contact their technical support for assistance.

Next, configure the VMkernel port for an iSCSI connection. This connection supplements the basic connections used for VM network traffic or the service console. Then, enable the ESX iSCSI software initiator. Once the software initiator is enabled, configure dynamic discovery so the iSCSI initiator knows with which iSCSI target it should communicate. Next, connect the iSCSI LUN to the ESX iSCSI initiator.



## Creating the VMkernel connection

You can view existing virtual switches from vSphere Client by selecting **Networking** in the **Configuration** tab as shown in Figure 12. In this example, the only switch shown is **vSwitch0**, which is carrying basic VM and service console traffic.

To add a new switch, click **Add Networking** and specify the desired VMkernel connection.

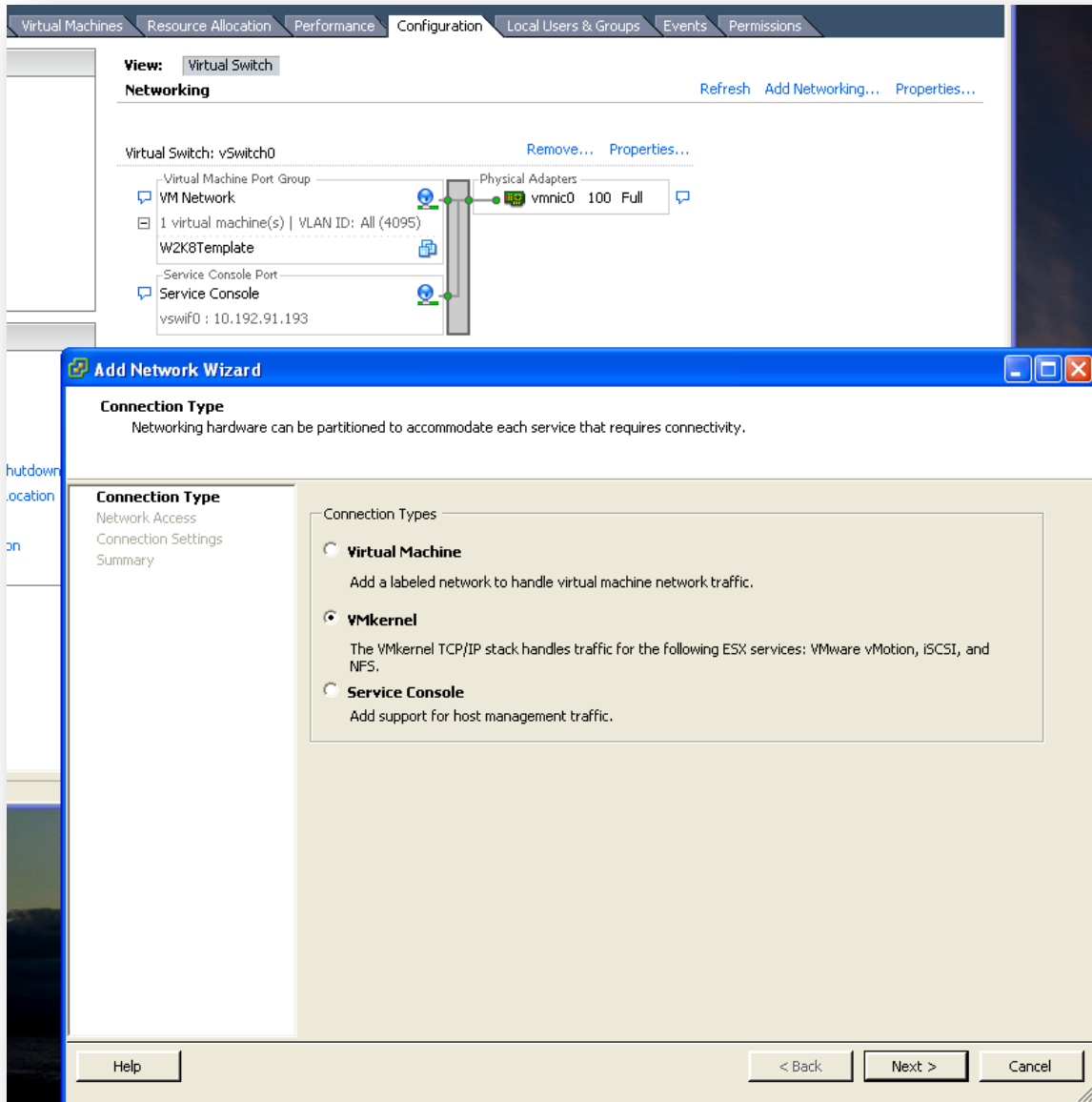


Figure 12. Using the **Add Network Wizard** to create a VMkernel connection



You must now select the vmnic and create the virtual switch that will handle the network traffic, as shown in Figure 13.

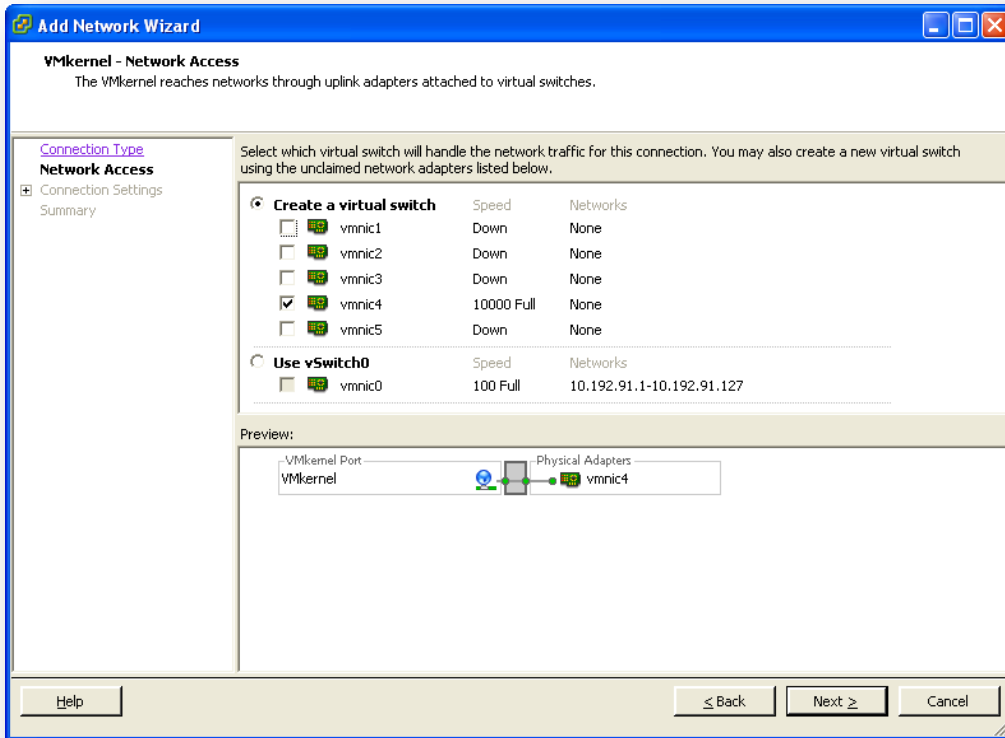


Figure 13. Selecting the virtual switch that will handle the network traffic. In this example, a single connection to **vmnic4** is created. Ideally you will want at least two physical adapters for failover and load balancing.



In the Port Group Properties, give the switch a name to facilitate management; in this example, it has been renamed **VMkernel\_iSCSI**.

After creating the new VMkernel switch, you can configure its IP settings, as shown in Figure 14.

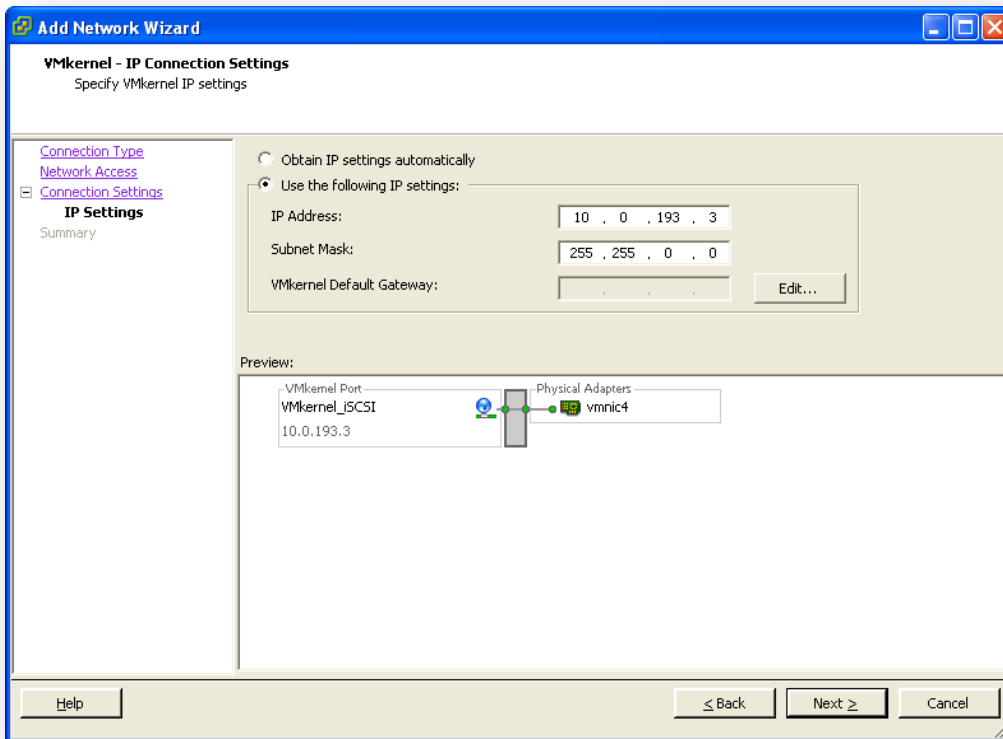


Figure 14. Configuring IP settings for the new VMkernel switch



Figure 15 shows the VMkernel switch you have just created, complete with its new name and IP address.

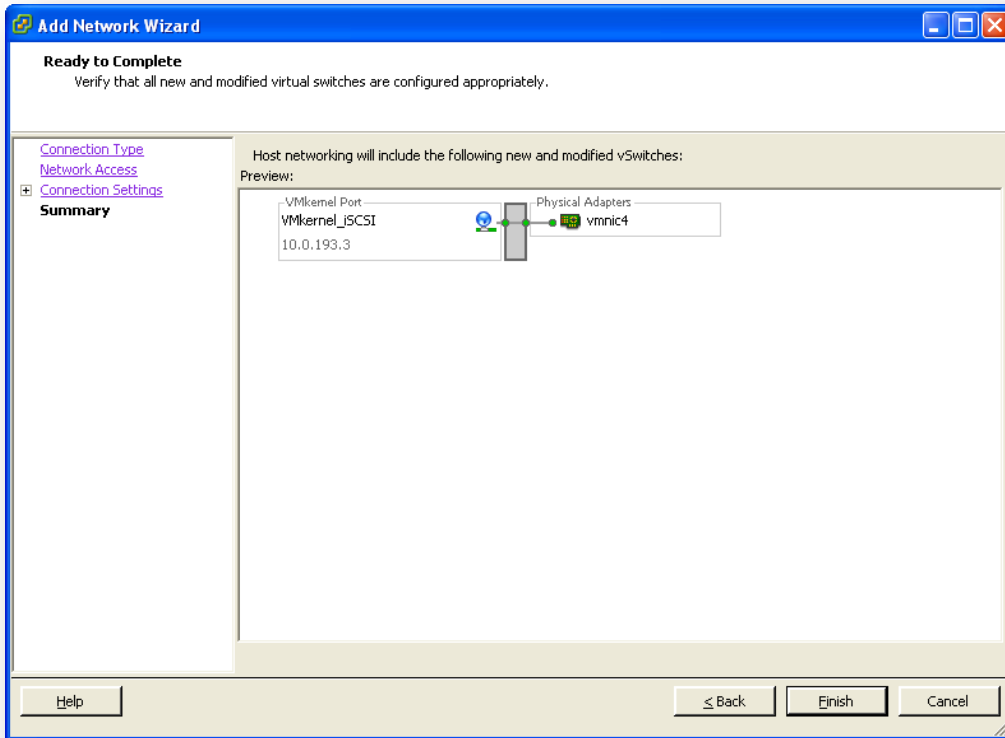


Figure 15. The newly created VMkernel switch



As shown in Figure 16, **vSwitch1 (VMkernel\_iSCSI)** has been added to the VMware vSphere Client **Networking** view.

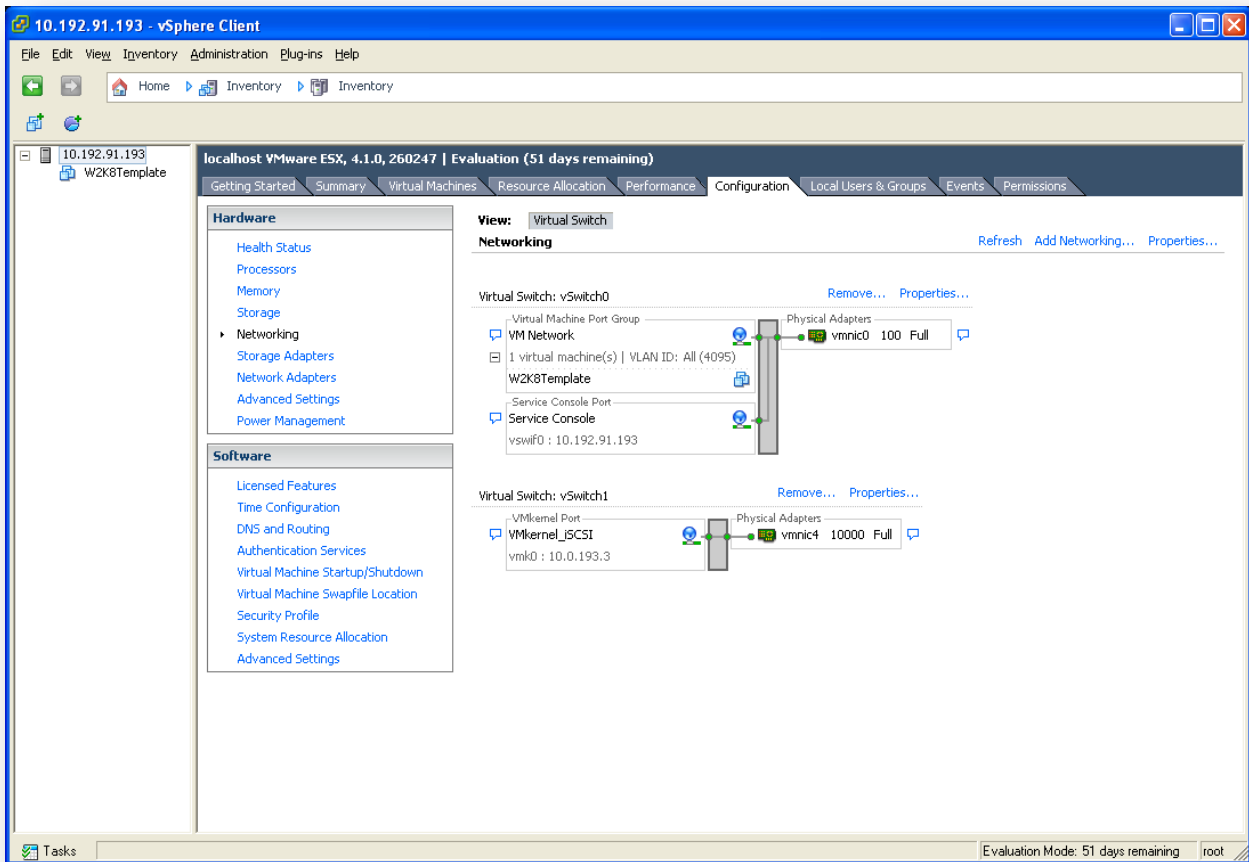


Figure 16. Viewing the newly created VMkernel switch (**VMkernel\_iSCSI**) in VMware vSphere Client

The example shown only goes through the process for a single vSwitch creation. In many cases, you will need to create two VMkernel ports on either the same or new vSwitch, and also add a second vmnic to support failover and load balancing.

## Configuring the VMkernel switch as an iSCSI software initiator

After completing initial configuration, the VMkernel switch needs to be configured. Select the **Storage Adapter** view of VMware vSphere Client to view the iSCSI software adapter, **vmhba37**, as shown in Figure 17. To configure the switch, select **vmhba37** and click **Properties**. If the iSCSI software adapter has not been enabled, select Properties, then Configure... select the box in the Status to enable the software iSCSI adapter.

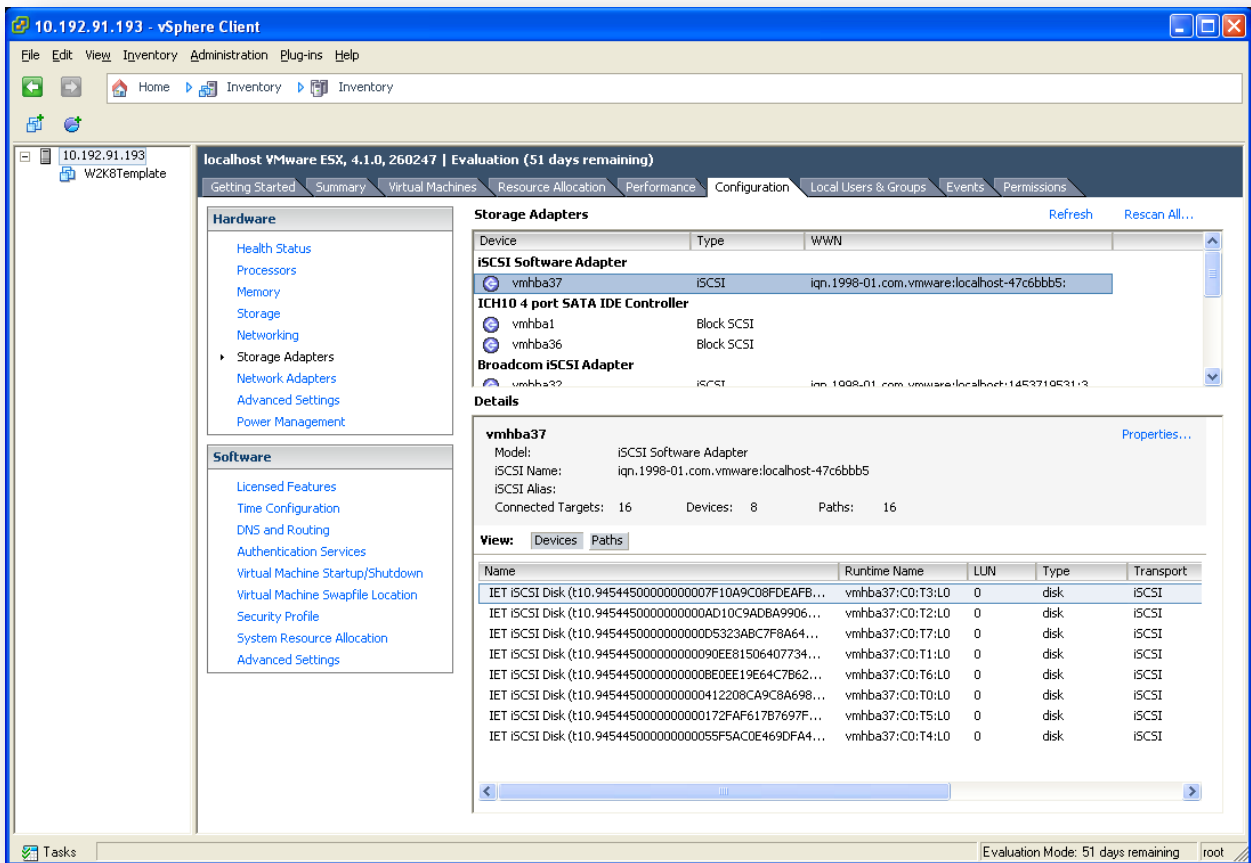


Figure 17. The newly created VMkernel switch is visible in vSphere Client as a software adapter named **vmhba37**

Figures 18 and 19 show **vmhba37** as a software iSCSI initiator (disabled by default). Once the software has been enabled, there will be an IQN name assigned.

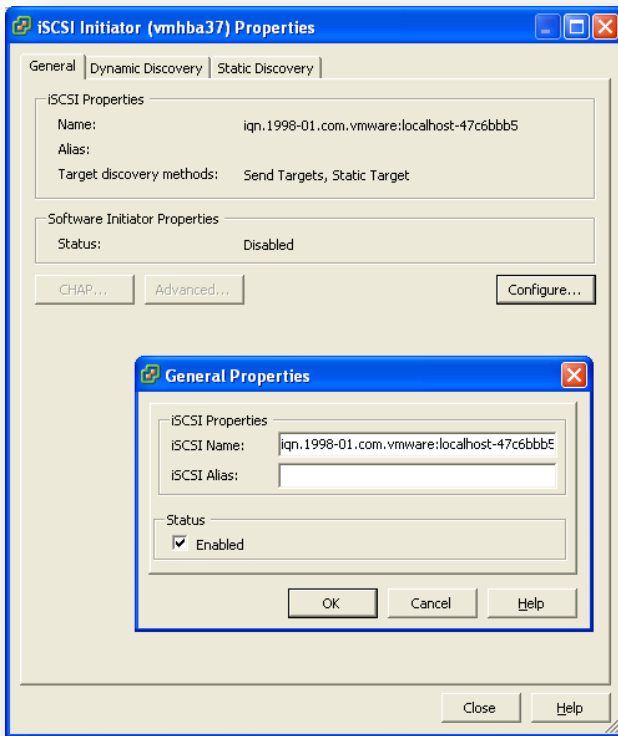


Figure 18. Updating the properties of software adapter **vmhba37** and enabling it as a software iSCSI initiator

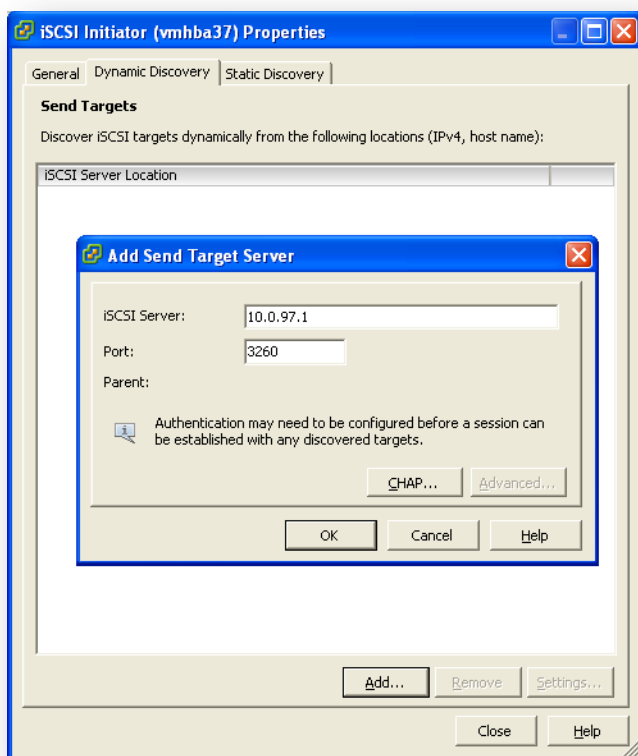


Figure 19. Attaching the software iSCSI initiator to target LUNs

### Binding iSCSI ports to iSCSI Adapters

Bind the iSCSI port you created for a NIC to an iSCSI adapter. This step is necessary when you set up two or more NICs with software iSCSI adapters for iSCSI Multipathing. In the example, a single iSCSI port bind process is demonstrated. You need to repeat the steps for the second iSCSI port.

1. Use the vSphere CLI command

```
esxcli swiscsi nic add -n port_name -d vmhba
```

Connect vmk1 to vmhba37: `esxcli swiscsi nic add vmk1 -d vmhba37`

2. Repeat the command for each of the iSCSI ports connecting to all ports with the software iSCSI adapter
3. Verify the port was added to the iSCSI adapter

```
esxcli swiscsi nic list -d vmhba
```

Verify vmhba37 configuration: `esxcli swiscsi nic list -d vmhba37`



4. Use the vSphere client to rescan the iSCSI adapter

## Advanced topics

This section provides information on the following advanced topics:

- Configuring a OneConnect iSCSI Adapter to boot from an iSCSI target
- Using OneConnect iSCSI Adapters in a multipathing implementation
- Using virtual LAN (VLAN) technology to isolate and better route iSCSI data

### Configuring OneConnect iSCSI Adapters to boot an ESX server from an iSCSI target

A OneConnect iSCSI Adapter can attach to an iSCSI target at boot time, allowing the server to boot remotely. Thus, the server's operating system – or, in the context of this white paper, ESX 4.1 – can be booted from a drive that is not local to the server.

To enable remote boot, use Emulex ServerEngines iSCSISelect Utility to specify and configure a boot device on a LUN. Invoke this utility at boot-time by pressing **Ctrl S** when the iSCSI boot banner is displayed, as shown in Figure 20.

```
ServerEngines iSCSI Initiator BIOS v2.103.397.10
(c) 2005-2009 ServerEngines Corporation. All Rights Reserved.
(c) 1998-2005 Adaptec, Inc. All Rights Reserved.

<<< Press <Ctrl><S> for iSCSISelect(TM)Utility >>>
```

Figure 20. Invoking the iSCSISelect Utility



ServerEngines iSCSISelect Utility provides a number of menu screens (such as that shown in Figure 21) that allow you to enable and configure remote boot.

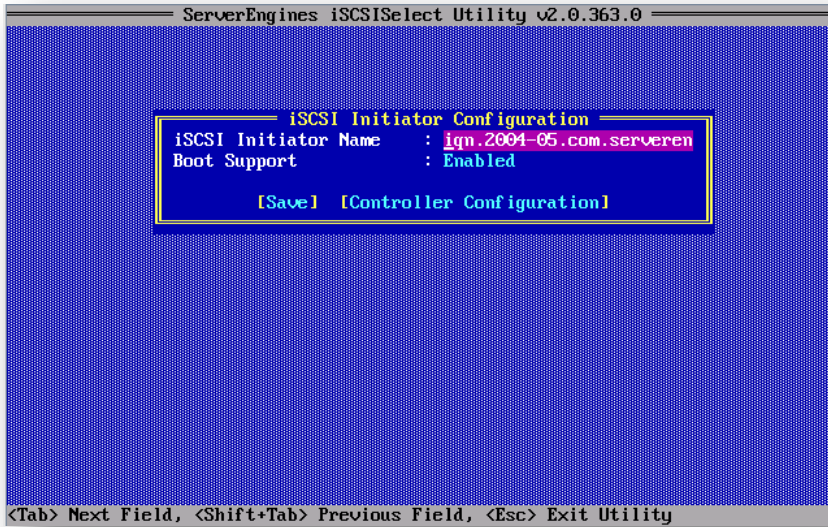


Figure 21. Enabling and configuring remote boot



After the LUN is attached, it can be configured as a boot device, as shown in Figure 22.

```
Controller #0:0 - ServerEngines iSCSISelect Utility v2.0.363.0

Edit/Ping iSCSI Target #001
iSCSI Target Name      : iqn.1992-08.com.ne
IP Version             : IPv4
iSCSI Target IP Address : 172.40 .11 .104
TCP Port Number        : 3260
BladeEngine Port       : 0
Boot Target            : Yes
ISID Qualifier         : 1
Header Digest          : No
Data Digest            : No
Authentication Method   : Mutual CHAP

[Ping] [Save/Login] [Advanced]

<Tab> Next Field, <Shift+Tab> Previous Field, <Esc> Cancel Dialog Box
```

Figure 22. Using iSCSISelect Utility to configure the iSCSI target as a boot device

This connection persists after a system power-cycle. At this point, the OS can be installed on the LUN.



## Host-based Path Failover

Setting up ESX hosts for multipathing and failover, you can use multiple OneCommand HW iSCSI Host Bus Adapters (HBAs) or multiple ports or NICs, depending on the type of iSCSI initiators on the host. Here are a few ways you can configure the OneCommand iSCSI adapter.

### Failover with OneCommand HW iSCSI

With OneCommand HW iSCSI, the host setup might consist of one adapter and two storage processors so that the adapter uses different paths to the storage system. Another configuration can consist of the host having two or more OneCommand hardware iSCSI adapters from which the storage system can reach using one or more network switches.

### Failover with software iSCSI

Software iSCSI with multiple ports from a OneCommand adapter or multiple OneCommand adapters can provide failover and load balancing for iSCSI connections between the host and storage system. The setup will consist of having to connect each physical NIC to a separate VMkernel port. Follow by using a port binding technique, so you can have each VMkernel port connected to a separate NIC, which then becomes a different path that the iSCSI storage stack and the array multipathing plug into.

## Multipathing with OneConnect iSCSI Adapters

If there was only a single path between an iSCSI initiator and its target, the loss of any single point of failure in that path would render data in the LUN unavailable. To mitigate this risk, VMware provides a VMkernel multipathing plug-in that ESX uses by default, and it is the VMware Native Multipathing plug-in (NMP), which provides redundancy and I/O load balancing between paths. The VMware NMP supports storage arrays listed on the VMware HCL and provides default path selection algorithm based on the array type.



### Implementing VMkernel NMP using hardware iSCSI

You can easily implement multipathing by connecting to the same iSCSI target from two separate hardware iSCSI devices, as shown in Figure 24. ESX Server has two OneCommand iSCSI adapters, iSCSI CNA 1 and iSCSI CNA 2, which provide two physical paths to the storage system. The VMware multipathing plug-in, such as the default VMkernel NMP, has access to the paths by default and can monitor the health of each physical path. If the iSCSI CNA 1 fails, then the multipath plug-in can switch the path over to iSCSI CNA 2.

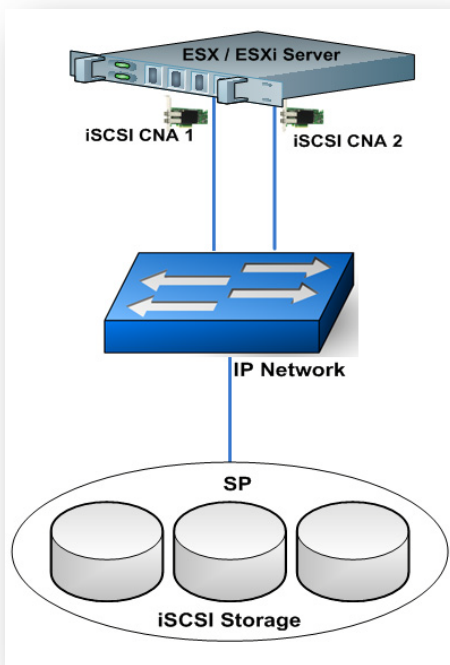


Figure 24. Implementing MPIO by connecting from two separate OneConnect UCNAs to a single storage portal (SP)

### Implementing VMkernel NMP using software iSCSI

There are two methods to use for software iSCSI adapter. First, you can create a single switch and create two VMkernel ports. The second is to create two separate virtual switches and connect a vmnic on each vSwitch.

In the example shown with figures 25 and 26, we added all NICs and VMkernel port pairs to a single switch. You will then need to override the default setup and configure each port to map to only one corresponding active NIC.



Figures 25 (**Network Adapters**) and 26 (**Networking**) provide vSphere client views of a vSwitch1 with two VMkernel ports and two NICs.

ServerEngines Corp. Emulex OneConnect				
	vmnic5	10000 F...	10000 Full	vSwitch1 00:00:c9:5b:a2:c0
	vmnic4	10000 F...	10000 Full	vSwitch1 00:00:c9:5b:a2:be

Figure 25. **Network Adapters** view, showing two physical NICs (**vmnic5** and **vmnic4**), each connected to a separate VMkernel port of **vSwitch1**

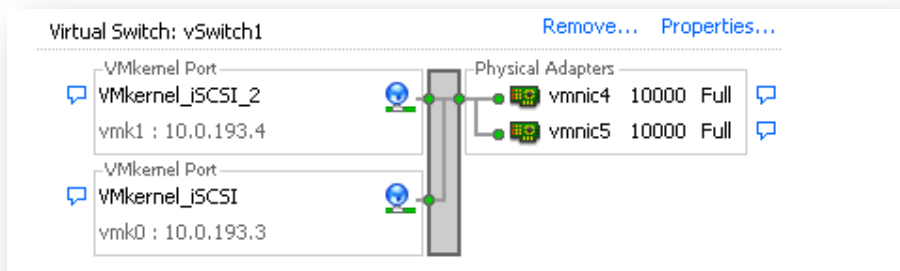


Figure 26. **Networking** view, showing physical NICs (**vmnic5** and **vmnic4**) connected to VMkernel ports **VMkernel\_iSCSI\_2** and **VMkernel\_iSCSI** on vSwitch1

When all of the iSCSI ports have been mapped to network adapters, you will need to use the `esxcli` command to bind the ports to the iSCSI adapter.

## Using VLAN technology to isolate and better route iSCSI traffic

Best practices for iSCSI deployments include the separation of network and storage traffic – for example, by using different physical networks for each traffic type. Alternatively, VLAN technology allows you to create independent logical networks within a single physical network to isolate iSCSI traffic, which delivers the following benefits:

- **Bandwidth** – Since traffic only goes to the intended devices, traffic to remaining devices is decreased
- **Latency** – By effectively eliminating routers and their associated latency, VLAN connections are faster
- **Security** – In a single broadcast domain, only valid initiators can connect to the target storage array
- **Cost-effective** – There are fewer physical switches
- **Manageability** – Fewer physical switches translates to less management time



For a VLAN implementation involving iSCSI, all the related components (initiator, switch and target) must support this capability; moreover, in addition to configuring the iSCSI initiator for the VLAN, the VLAN configuration must also be applied to switch and target ports in the data path.

## Summary

This document, which is part of the Emulex Solution Implementer's Series, outlines options for configuring iSCSI connectivity with members of the OneConnect UCNA family, using either software iSCSI with a OneConnect NIC or hardware iSCSI offload with a OneConnect iSCSI Adapter. Using hardware iSCSI reduces the I/O load on the host server and also improves iSCSI performance.

Emulex recommends using the powerful OneCommand Manager application to simplify the configuration and management of OneConnect UCNA products.



## More information

Emulex UCNAs	<a href="http://www.emulex.com/products/oneconnect-ucnas.html">http://www.emulex.com/products/oneconnect-ucnas.html</a>
Emulex OneCommand Manager	<a href="http://www.emulex.com/products/management-software/device-management/onecommand-manager/overview.html">http://www.emulex.com/products/management-software/device-management/onecommand-manager/overview.html</a>
VMware vSphere	<a href="http://www.vmware.com/products/vsphere/">http://www.vmware.com/products/vsphere/</a>
VMware vSphere documentation	<a href="http://www.vmware.com/support/pubs/vs_pubs.html">http://www.vmware.com/support/pubs/vs_pubs.html</a>
VMware iSCSI SAN Configuration Guide ESX 4.1	<a href="http://www.vmware.com/pdf/vsphere4/r41/vsp_41_iscsi_san_cfg.pdf">http://www.vmware.com/pdf/vsphere4/r41/vsp_41_iscsi_san_cfg.pdf</a>

To help us improve our documents, please provide feedback at [ImplementersLab@emulex.com](mailto:ImplementersLab@emulex.com).

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