NEXSAN

HYPER–UNIFIED STORAGE

Nexsan Unity

Multipathing Best Practices Guide

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Patents

This product is protected by one or more of the following patents, and other pending patent applications worldwide:

United States patents US8,191,841, US8,120,922;

United Kingdom patents GB2466535B, GB2467622B, GB2467404B, GB2296798B, GB2297636B

About this document

Contents

About this document

This guide describes how to set up multipathing for Linux, Windows, VMware vSphere host systems.

Audience

This guide has been prepared for the following audience:

- IT system administrators
- Engineers
- Technicians
- Any qualified NST/Unity administrator.

Conventions

Here is a list of text conventions used in this document:

Convention	Description
underlined blue	Cross-references, hyperlinks, URLs, and email addresses.
boldface	Text that refers to labels on the physical unit or interactive items in the graphical user interface (GUI).
`monospace`	Text that is displayed in the command-line interface (CLI) or text that refers to file or directory names.
`monospace bold`	Text strings that must be entered by the user in the command-line interface or in text fields in the graphical user interface (GUI).
italics	System messages and non-interactive items in the graphical user interface (GUI) References to Software User Guides

Notes, Tips, Cautions, and Warnings

Note Notes contain important information, present alternative procedures, or call attention to certain items.

Tip Tips contain handy information for end-users, such as other ways to perform an action.

CAUTION: In hardware manuals, cautions alert the user to items or situations which may cause damage to the unit or result in mild injury to the user, or both. In software manuals, cautions alert the user to situations which may cause data corruption or data loss.

WARNING: Warnings alert the user to items or situations which may result in severe injury or death to the user.

Contacting Nexsan

For questions about Nexsan products, please visit the Nexsan support Web page, and the Nexsan Unity Documents & Online Help page. If you are unable to find the answer to your question there, please see our contact information below.

Service and support

Nexsan's Technical Services Group provides worldwide assistance with installation, configuration, software support, warranty, and repair for all Nexsan products. A variety of service and support programs are available to provide you with the level of coverage and availability your operation requires.

Nexsan Unity Documentation & Online Help page:
https://helper.nexsansupport.com/unt_downloads.html

Unity Online Help page:
https://helper.nexsansupport.com/unt_onlinehelp.html

Contact Nexsan Unity support:
https://helper.nexsansupport.com/unt_support

Worldwide Web site:
www.nexsan.com

Related documentation

The following Nexsan product manuals contain related information:

- Nexsan Unity Online Help
- *Nexsan Unity Hardware Reference Guide*
- *Nexsan Unity Hardware Maintenance Guide, Unity Next Generation*
- *Nexsan Unity Software User Guide*
- *Nexsan Unity nxadmin Command-line Interface Reference Guide*
- *Nexsan Unity nxcmd Command-line Interface Reference Guide*
- *Nexsan Unity Snapshots and Replication Guide*
- *Nexsan Unity Storage Expansion Reference Guide*
- *Nexsan Unity VMware Best Practices Guide*
- *Nexsan Unity NFS Interoperability*
- *Nexsan Unity Networking Best Practices Guide*
- *Nexsan Unity Performance Best Practices Guide*
- *Nexsan Unity Microsoft Best Practices Guide*

Chapter 1

Configuring multipathing on Linux

This section describes how to configure multipathing Fibre Channel LUNs on Linux host systems. The procedure applies to all Linux versions running *Multipath 0.49*. If you are using a different version of Multipath, make sure to adapt the code accordingly.

▶ **Before you begin:**

The APAL feature must be enabled and set up properly on Unity.

▶ **To configure multipathing for Fibre Channel:**

1. Set up the Linux multipath service, where its default configuration file would be:

   `/etc/multipath.conf`

2. Add these lines to describe the Unity Storage Systems into `/etc/multipath.conf`.

   Notes:

   - The `polling_interval` and `max_fds` parameters are usually defined in the default section. If so, please remove them from the code below.
   - For Red Hat 7 and above, remove the `getuid_callout` parameter to eliminate a benign error message. The parameter is not required for multipathing.

```
devices {
    device {
        vendor "Nexsan"
        product "NestOS"
        polling_interval 10
        path_grouping_policy group_by_prio
        prio alua
        getuid_callout "/lib/udev/scsi_id --whitelisted --device=/dev/%n"
        path_checker tur
        path_selector "round-robin 0"
        rr_min_io 1 (for kernels older than ver. 2.6.31)
        rr_min_io_rq 1 (for kernels at ver. 2.6.31 and above)
        flush_on_last_del no
        max_fds 8192
        hardware_handler "1 alua"
        failback immediate
        rr_weight priorities
        no_path_retry queue
    }
}
```

3. Reload the multipathing configuration and rediscover multipathing of all storage systems.
4. Verify multipathing to Unity LUNs. Use the `multipath -ll` command to retrieve the discovered multipath. The Unity LUN supports ALUA and provides two types of paths, optimized path and non-optimized path.

   This example shows a Unity LUN with two paths. The first path is "active", meaning it is the planned and optimized normal I/O path. The second path is an "enabled" path, and is not optimized but can be used for I/O if the active path is lost.

```
# multipath -ll
36000402e500000004de5c7e8f67547da dm-4 Nexsan,NestOS
size=110G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|-+- policy='round-robin 0' prio=130 status=active
| `- 7:0:0:5 sdj 8:144 active ready running
`-+- policy='round-robin 0' prio=10 status=enabled
`- 6:0:0:5 sdd 8:48 active ready running
```

► To configure multipathing for iSCSI:

The recommended settings for iSCSI are similar to the ones for Fibre Channel. Make sure the lines of code highlighted below appear in the `/etc/multipath.conf` file.

Note

For Red Hat 7 and above, remove the `getuid_callout` parameter to eliminate a benign error message. The parameter is not required for multipathing.

```
devices {
    device {
        vendor "Nexsan"
        product "NestOS"
        polling_interval 10
        path_grouping_policy group_by_prio
        prio alua
        getuid_callout "/lib/udev/scsi_id --whitelisted --device=/dev/%n"
        path_checker tur
        path_selector "round-robin 0"
        rr_min_io 1 (for kernels older than ver. 2.6.31)
        rr_min_io_rq 1 (for kernels at ver. 2.6.31 and above)
        flush_on_last_del no
        max_fds 8192
        hardware_handler "1 alua"
        failback immediate
        rr_weight priorities
        no_path_retry queue
        dev_loss_tmo 60
    }
}
```

Chapter 2

Configuring multipathing for Windows hosts

Use this section to set up multipathing for Unity LUNs on Windows hosts. You must first configure Unity Storage Systems in the MPIO Device Manager, and then discover your LUNs with the MPIO feature enabled.

The main purpose of multipath connectivity is to provide redundant access to storage systems when one or more hardware components in a path fails. Another advantage of multipathing is increased throughput by way of load balancing. This provides redundancy and maximum performance.

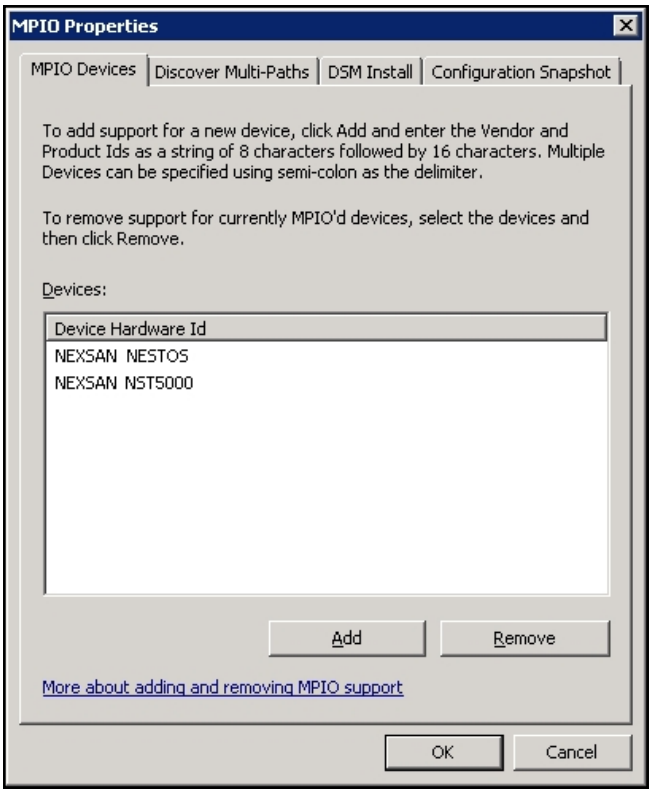
Notes:

- Multipathing on Unity can only be done using MPIO. MSIO is not supported.
- When connecting your LUNs to Windows hosts using the Multipathing I/O (MPIO) feature, you must enter the Unity Vendor and Product names for the LUN to be assigned as a multipath disk exactly as described in the procedure to configure MPIO.

To configure MPIO:

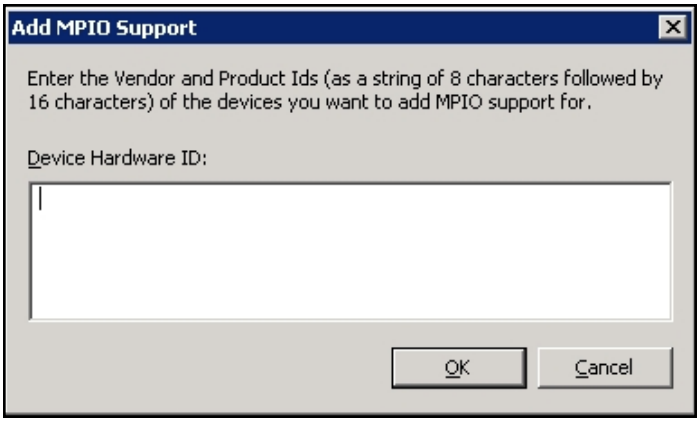
1. From the Windows Server host, select **Start> MPIO Configuration**.

Figure 2-1: Starting the MPIO Device Manager



2. By default, the **MPIO Devices** tab is open. Click **Add**.

Figure 2-2: Adding a device to MPIO support



3. In the **Device Hardware ID** box:
   a. Enter the Unity Vendor and Product names for the LUN to be assigned as a multipath disk in this format:
      - The Vendor format is "`Nexsan  `" followed by 2 spaces, for a total of 8 characters.

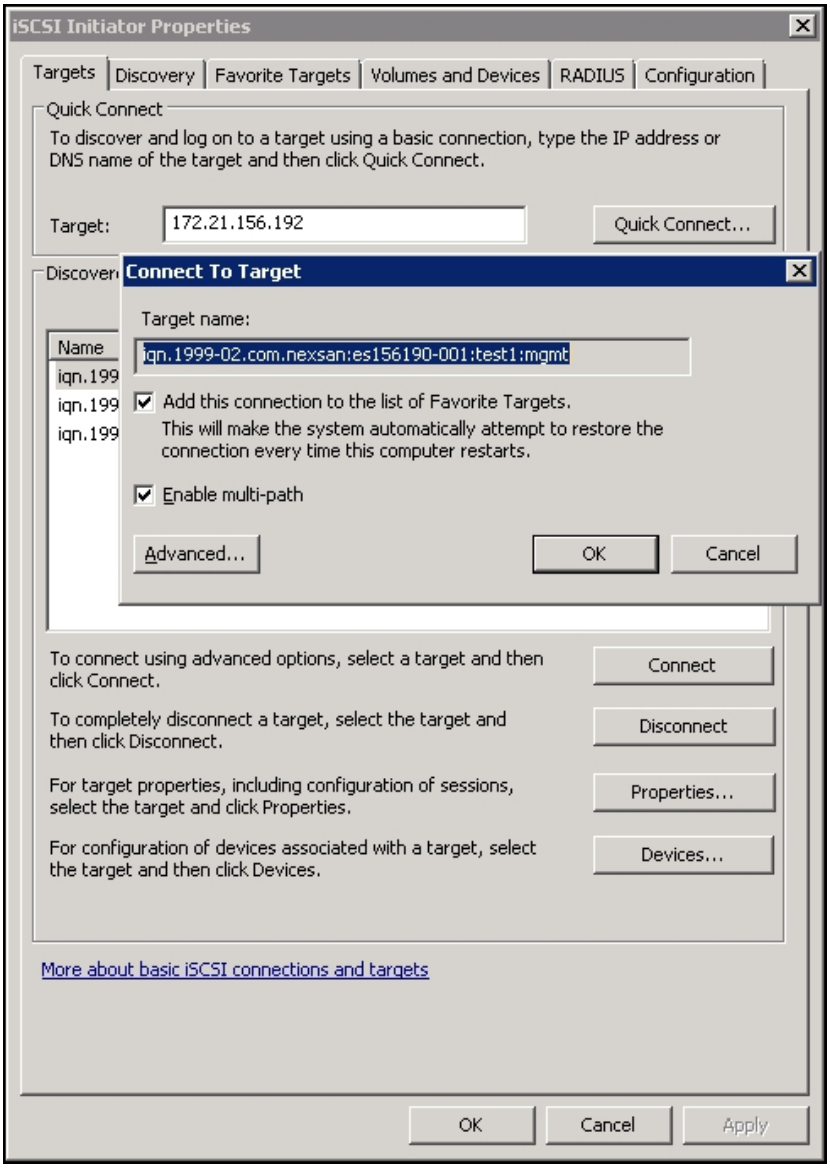
      Note The Vendor and Product names are case-sensitive.
   b. Click **OK**.
4. Reboot the windows machine.

To discover LUNs with MPIO enabled:

1. On the Windows server, select **Start> All Programs> iSCSI Initiator**.
2. In the **Target** field, type the IP address of Unity.
3. Click **Connect**.

4. When the Connect To Target dialog box opens, select the **Enable multi-path** option and click **OK**.

Figure 2-3: Enabling multipathing when discovering LUNs



5. Click **OK** to exit the iSCSI Initiator.
6. Verify that both LUNs appear as disks on the Windows host; to configure the disks in *Disk Management*, see Configuring the LUNs in Disk Management below.

Configuring the LUNs in Disk Management

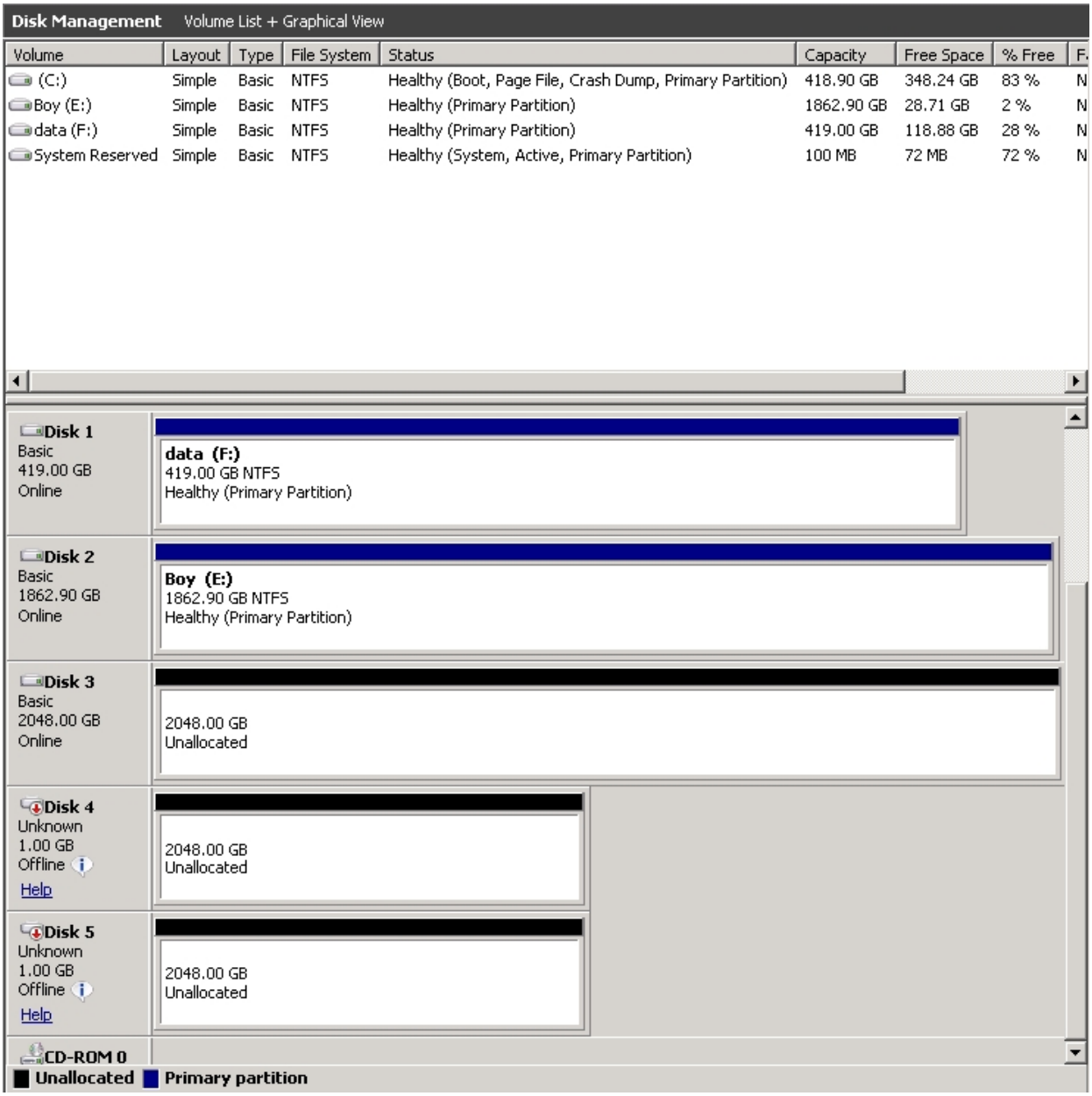
After discovering your LUNs with the Windows iSCSI Initiator, the LUNs appear as new disks, which you need to initialize and configure before you can use them.

To initialize and configure disks in *Disk Management*:

1. Open *Disk Management*. The discovered targets appear as *Offline* and *Unallocated*.

   This example shows two new disks, *Disk 4* and *Disk 5*, that correspond to two LUNs using the same iSCSI target on Unity.

Figure 2-4: Discovered targets in Disk Management

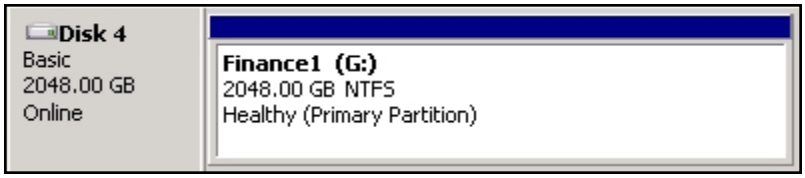


2. Right-click a disk on the left-hand side and select **Online**. The status changes to *Not Initialized* and *Online*.

3. Right-click the same disk on the left-hand side and select **Initialize Disk**.
   - For disks bigger than 2 TB, select **GPT (GUID Partition Table)**.
   - For disks smaller than 2 TB, leave the default option set to **MBR (Master Boot Record)**.

   The status changes to *Basic*.
4. Right-click the initialized disk on the right-hand side. The context menu offers new options; select **New Simple Volume**.
5. Follow these steps in the New Simple Volume wizard:
   a. Assign a volume size.
   b. Assign a drive letter or mount the volume in an empty NTFS folder.
   c. Format the volume as NTFS.
   d. Give it a meaningful name.
   e. Perform a quick format.
6. The volume appears as *Healthy* and displays your configuration settings.

Figure 2-5: Configured volume in Disk Management

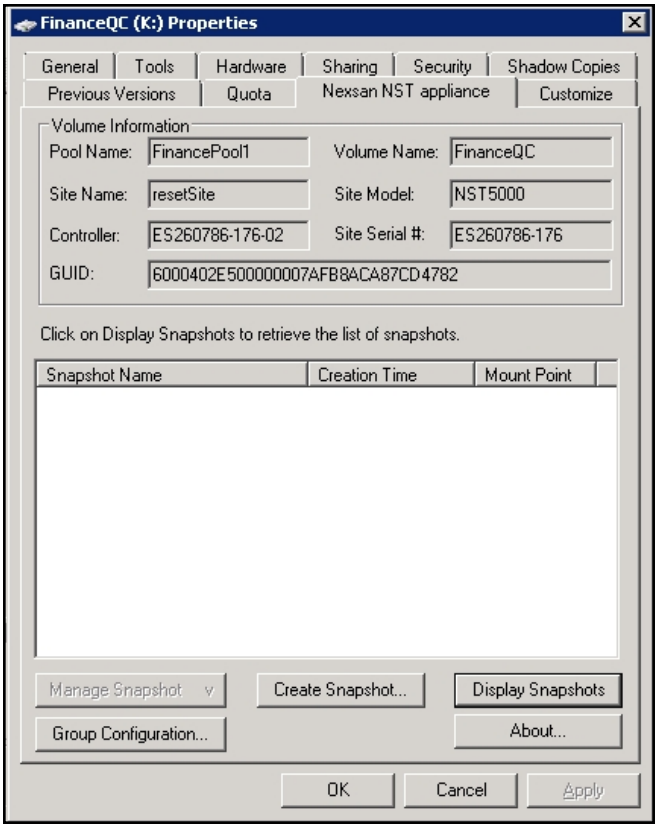


7. Repeat steps 2 to 5 for each discovered target disk.

8. Right-click a volume. The Properties dialog box displays a new tab called **Nexsan Unity** with the disk details, such as the pool name, Controller ID, and GUID.

   Note The Properties panel will also display the **Nexsan Unity** tab when opened from *Explorer*.

Figure 2-6: Disk Properties—Nexsan Unity tab



Configuring Windows iSCSI Initiator settings

In firmware releases prior to 2.2, with multiple iSCSI LUNs connected to a single Microsoft Cluster host, deleting a large VHD (Virtual Hard Disk) from the host system may cause it to lose connection to iSCSI LUNs on the corresponding Unity.

This issue is due to small time-out values for two Windows iSCSI Initiator registry parameters on the Microsoft Cluster host. We strongly recommend that you increase the time-out values for these parameters.

iSCSI LUNs

On the Microsoft Cluster host, modify Windows iSCSI Initiator settings in the system registry as described below.

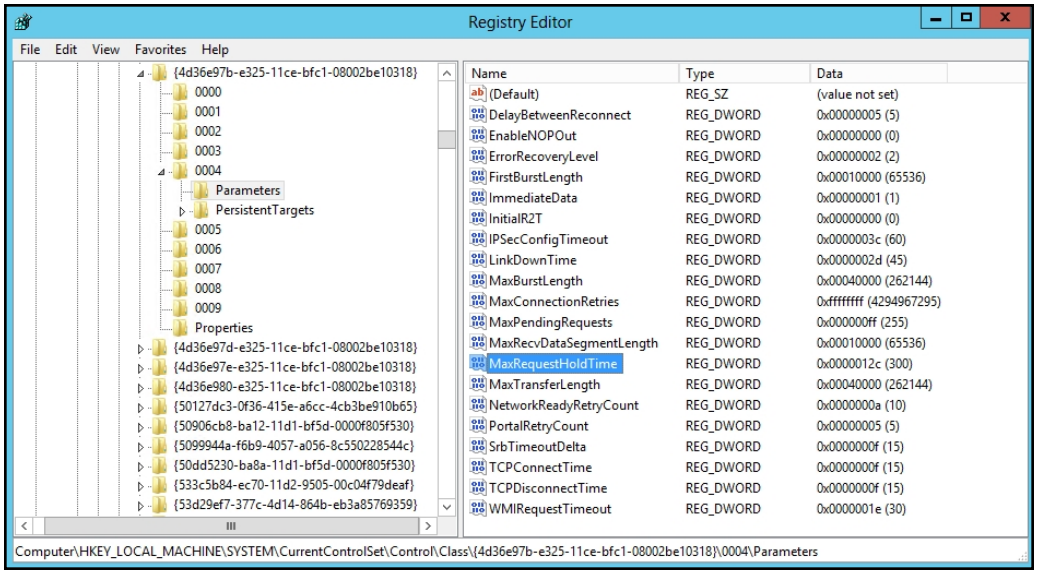
▶ **To configure Windows iSCSI Initiator for iSCSI LUNs:**

1. Click **Start** and select **Run**.
2. In the Run dialog box, type `regedit`, and click **OK**.
3. Navigate to the following registry key:

   `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet`
4. With the `CurrentControlSet` key selected, open the **Edit** menu and select **Find**.

5. Type `MaxRequestHoldTime`, and click **Find**.
6. Set the `MaxRequestHoldTime` parameter to **300** seconds (5 minutes).

   This is the maximum time (in seconds) for which requests will be queued if connection to the target is lost and the connection is being retried. After this hold period, requests fail with an error and device (disk) will be removed from the system.



7. Set the `LinkDownTime` parameter to **35**. This value determines how long requests will be held in the device queue and retried if the connection to the target is lost.

Fibre Channel LUNs

For Windows hosts using MPIO (mostly for Fibre Channel LUNs), it is recommended to set these registry settings to the values mentioned below.

- PDORemovePeriod: This setting controls the amount of time (in seconds) that the multipath LUN will continue to remain in system memory, even after losing all paths to the device. When this timer value is exceeded, pending I/O operations will fail, and the failure is exposed to the application rather than attempting to continue to recover active paths.
- PathRecoveryInterval: This setting specifies how long (in seconds) the MPIO component waits before retrying a lost path.
- UseCustomPathRecoveryInterval: If this key exists and is set to 1, it allows the use of PathRecoveryInterval.

▶ **Recommended MPIO hot fixes for Windows Server:**

- Windows Server 2008 R2 SP1: KB2871163, KB2851144, KB2754704, KB2684681, KB2406705, KB2522766, KB2670762, KB2718576
- Windows Server 2012 R1: KB2867201, KB2889784, KB2869606, KB2779768

▶ **To configure Windows iSCSI Initiator for Fibre Channel LUNs:**

1. Start the registry editor by selecting **Start** > **Run** and typing `regedit`.
2. Navigate to the following registry key:

   `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\mpio\Parameters`

3. Set new values to these entries:
   a. Set the `PDORemovePeriod` parameter to **90**.
   b. Set the `PathRecoveryInterval` parameter to **30**.
   c. Set the `UseCustomPathRecoveryInterval` parameter to **1**.

Chapter 3

Configuring multipathing on VMware vSphere

This section provides procedures to set up vSphere ESXi 5.1 for multipathing on Unity.

Main steps:

1. Configure multipathing on Unity for iSCSI LUNs—see Setting up Unity for multipathing below.
2. Configure vSphere:
   - vNetwork standard switches—see Creating a vNetwork distributed switch on page 35
   - vNetwork distributed switches (recommended)—see Creating a vNetwork distributed switch on page 35
3. Configure Jumbo Frames on vSphere—see Enabling Jumbo Frames in vSphere on page 48.

Setting up Unity for multipathing

This section describes how to configure multipathing on Unity for iSCSI LUNs. You must configure the nx1 network interface on a separate subnet using NestOS Menu commands.

To configure the nx1 interface:

1. At the CLI command prompt, type **menu**.
2. In the NestOS Admin Menu, type **1** (**Network Menu**) and then press Enter. This displays the NestOS Network Menu.
3. Type **6** (**Configure iSCSI targets**) and press Enter.
4. Type **2** (**Recalculate Allocations to Detect IP Address Changes**) and press Enter.
5. Type **3** (**Change the network interface that an iSCSI target is presented on**) and press Enter.
6. Select the target to make modifications to by typing its corresponding number and pressing Enter.

```
List of Targets to make modifications to:

1: iqn.1999-02.com.nexsan:dansystem:fredpool:1 - 172.21.153.194  172.21.14.179
2: iqn.1999-02.com.nexsan:dansystem:fredpool:0 - 172.21.153.194  172.21.14.179
3: iqn.1999-02.com.nexsan:es922001-001:fredpool:mgmt - 172.21.153.194  172.21.14.179
4: iqn.1999-02.com.nexsan:es922001-001:ericpool:mgmt - 172.21.14.173

Please select an option or q to quit: done
4
```

7. Type **1** (**Add interface for the target to listen to**) and press Enter.

8. Select the IP address to be added by typing its corresponding number and pressing Enter.
9. Repeat these steps on the second controller.

What's next:

You can now proceed to configuring vSphere using vNetwork standard switches or distributed switches (recommended).

Creating a vNetwork standard switch below

Creating a vNetwork distributed switch on page 35

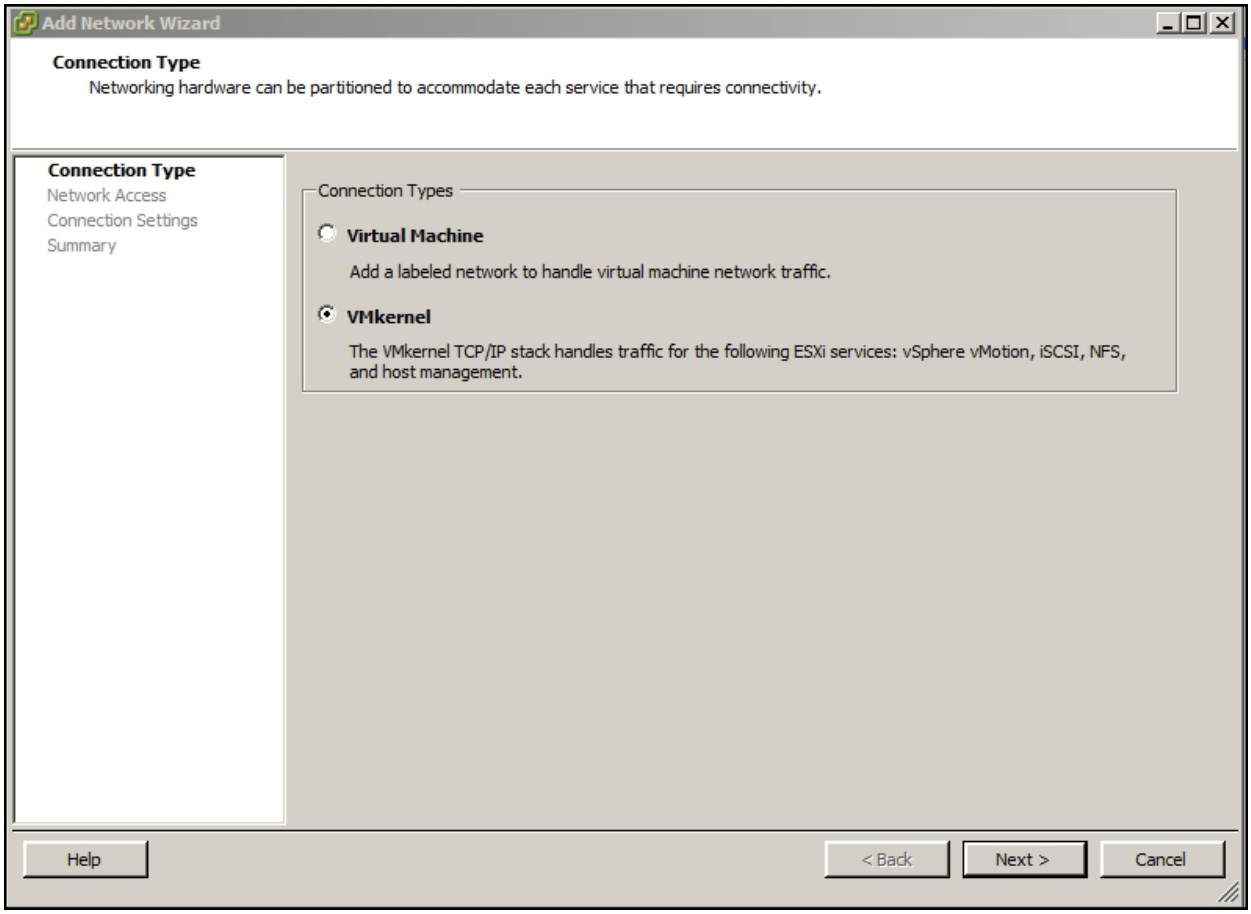
Creating a vNetwork standard switch

This section describes how to create a vSphere standard switch for multipathing of iSCSI LUNs. You create a standard VMkernel vSwitch, and then you configure iSCSI settings for this switch.

To configure a vNetwork standard switch:

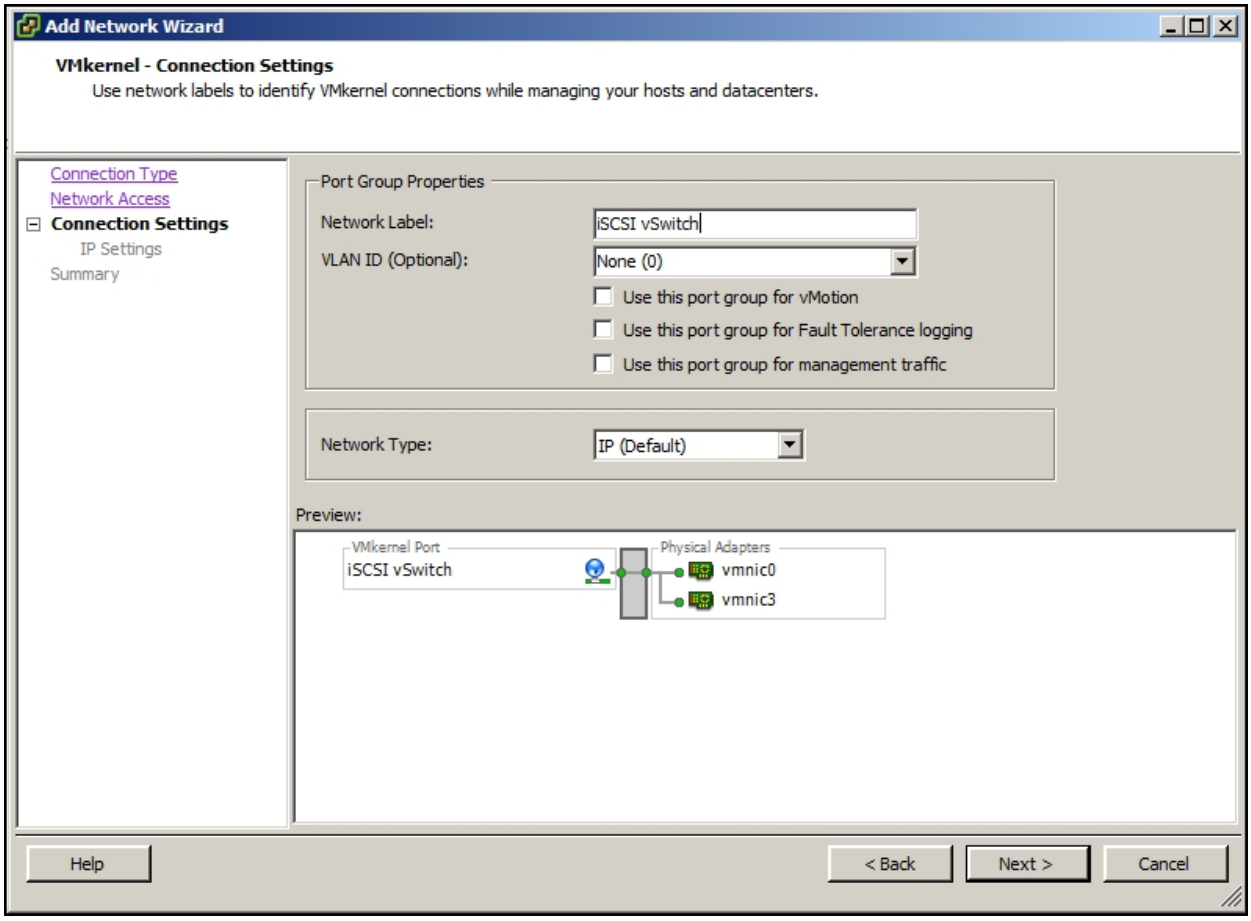
1. In vSphere, launch the Add Network wizard.
2. Select **VMkernel** and click **Next**.

Figure 3-1: Creating vSphere Standard Switch—Choosing the connection type



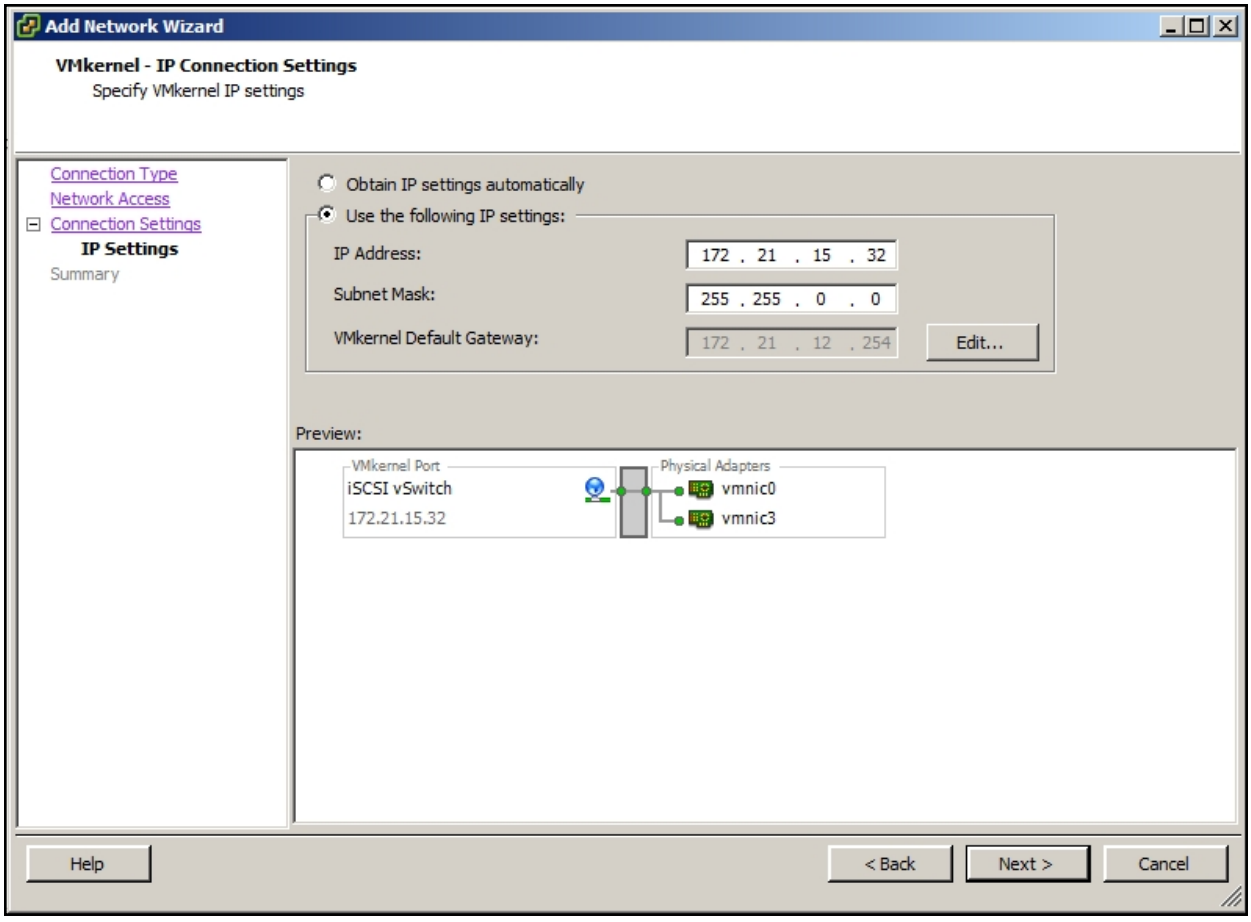
3. Enter a name for the vSwitch in the **Network Label** field. Leave the **Network Type** default to **IP**. Click **Next**. In our example, we are calling it *iSCSI vSwitch*.

Figure 3-2: Creating vSphere Standard Switch—Choosing the connection type



4. For IP connections settings, select a static IP address and click **Next**.

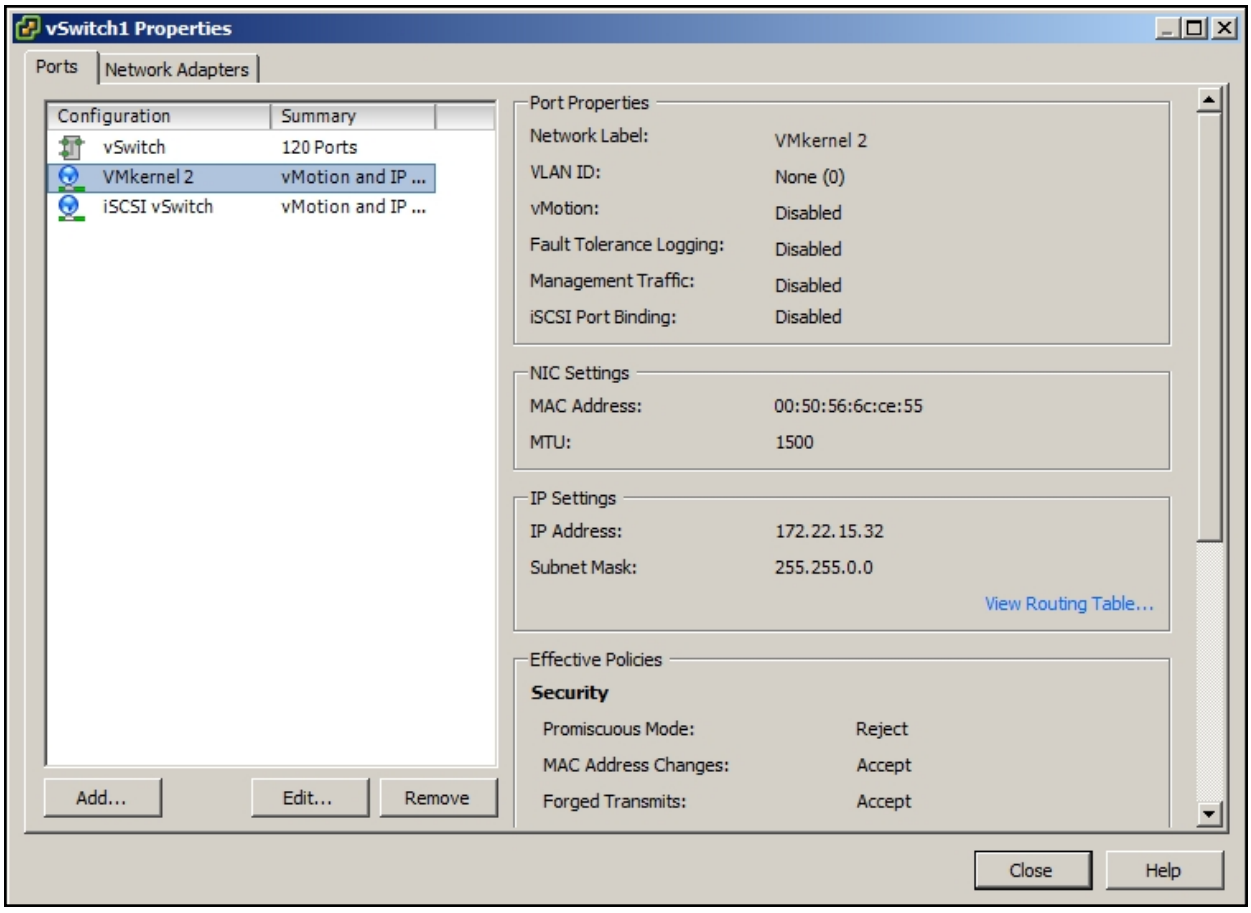
Figure 3-3: Creating vSphere Standard Switch—Setting the IP address



5. Click **Finish**.

6. Go into the properties of the newly created vSwitch:
   a. Add another VMkernel port group, **VMkernel 2** in our example.
   b. Set the other IP address on the secondary subnet.

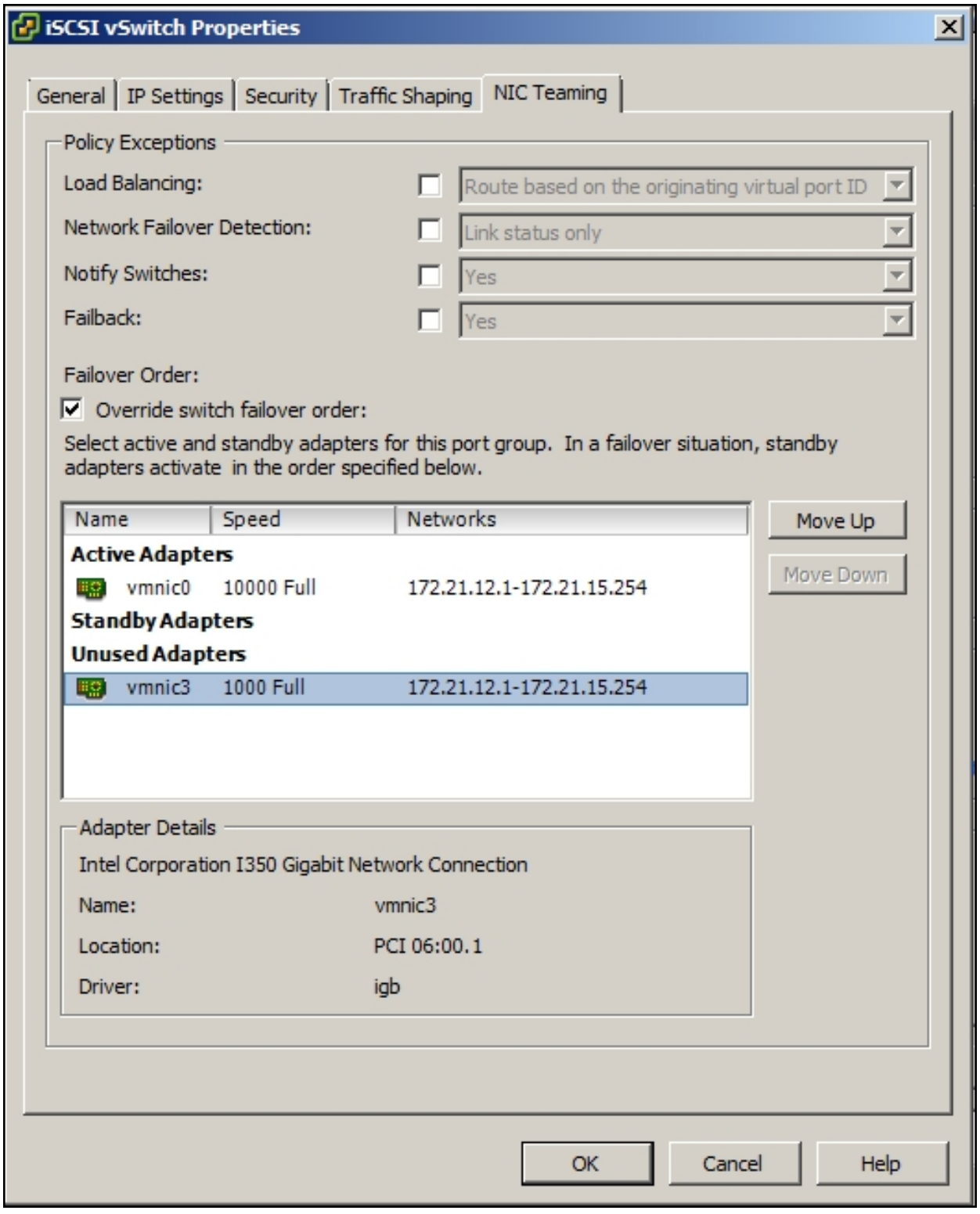
Figure 3-4: Adding a VMkernel to the standard iSCSI vSwitch



7. Select **iSCSI vSwitch** and click **Edit**.

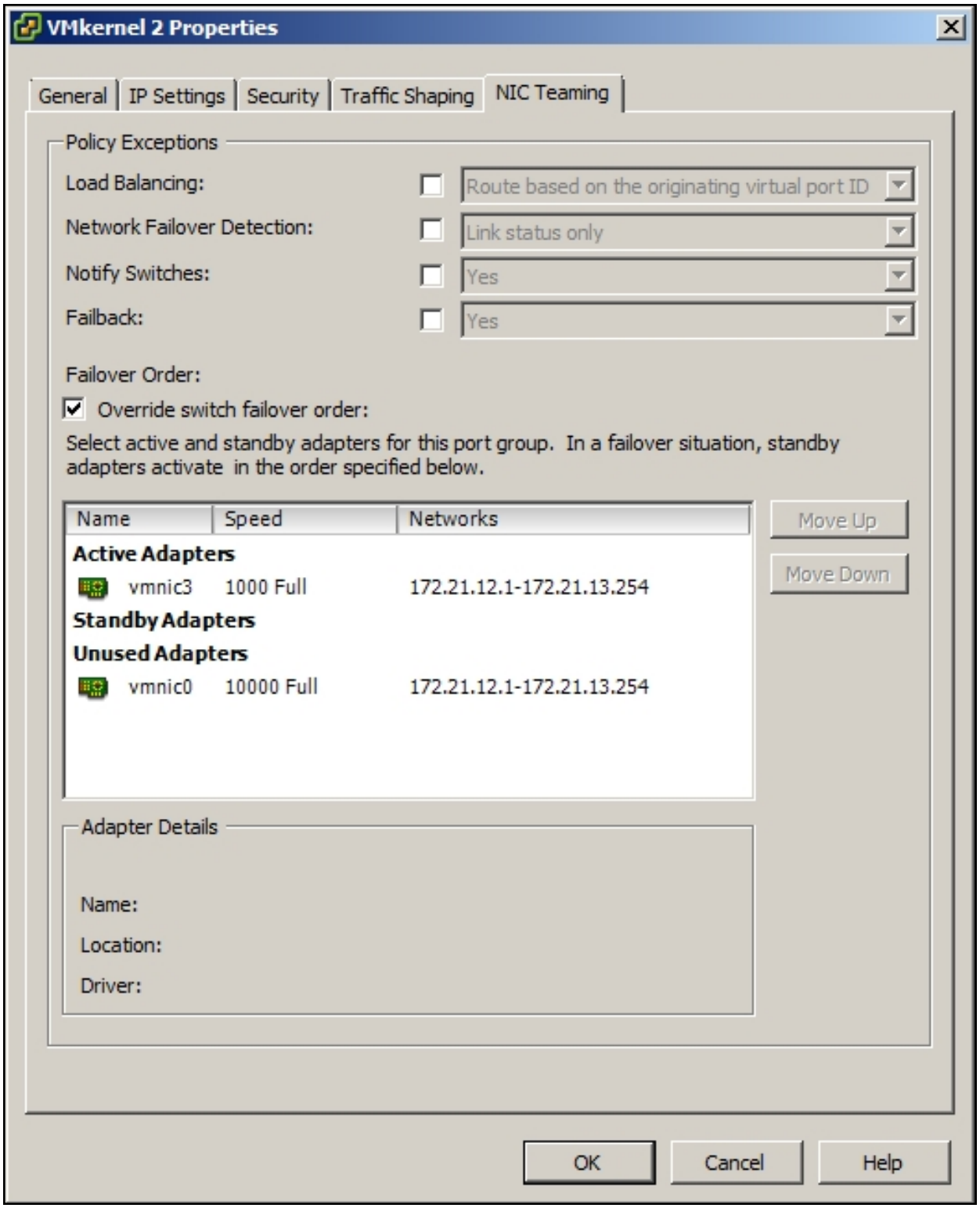
8. In the iSCSI vSwitch Properties dialog box:
   a. Select the **Override switch failover order** option so that only one of the NIC is Active and the other (s) are set to *Unused*.
   b. Click **OK**.

Figure 3-5: Setting the failover order for the standard iSCSI vSwitch



9. Back in the vSwitch Properties dialog box, select **VMkernel 2** and click **Edit**. In the VMkernel 2 Properties dialog box:
   a. Select the **Override switch failover order** option so that only one of the NIC is Active and the other (s) are set to *Unused*.
   b. Click **OK**.

Figure 3-6: Setting the failover order for the VMkernel



► **What's next:**

Proceed to Configuring iSCSI settings of the standard vSwitch on the next page.

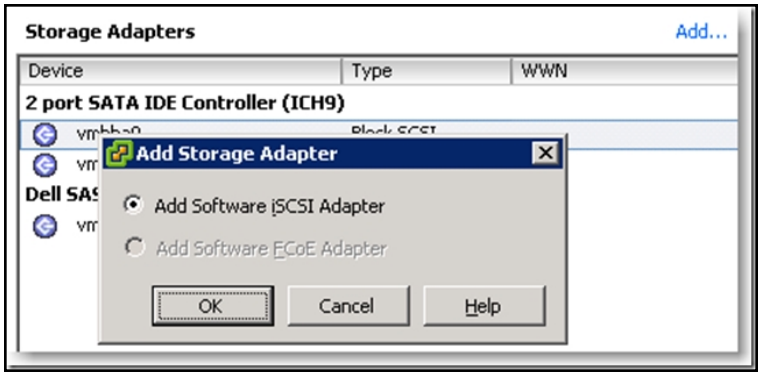
Configuring iSCSI settings of the standard vSwitch

After creating the standard vSwitch, you must add and configure the iSCSI Storage Adapter.

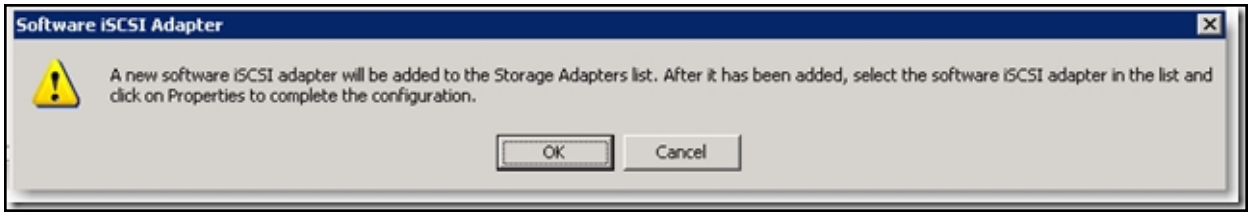
► **To configure the iSCSI settings of the standard vSwitch:**

1. Select **Host** > **Configuration** > **Storage Adapters**. Click **Add**.

Figure 3-7: Adding an iSCSI storage adapter

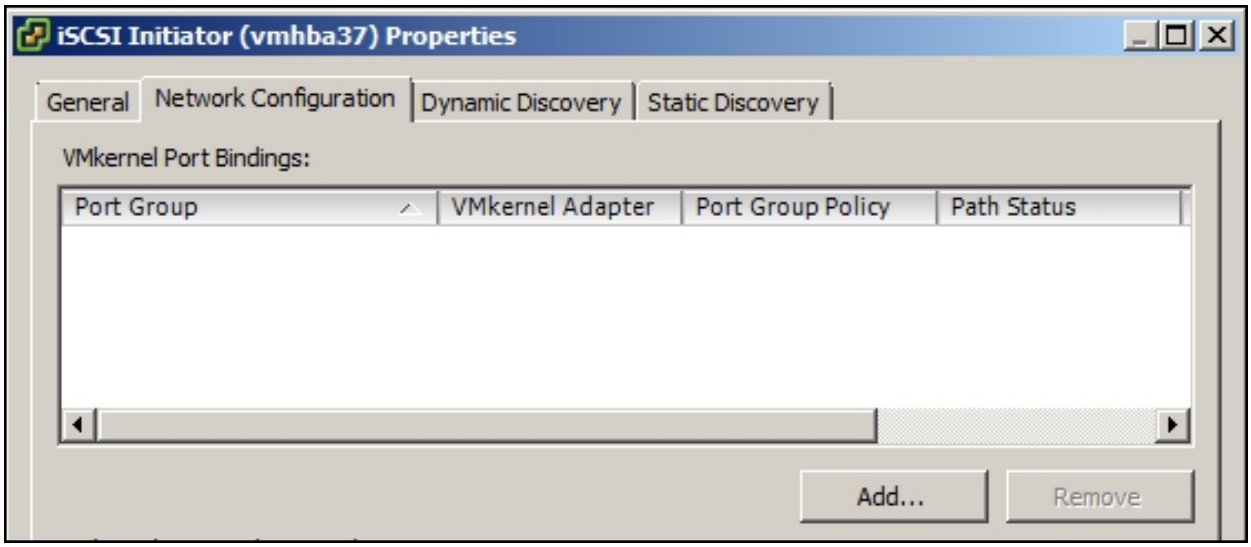


2. Click **OK** to add the iSCSI adapter.
3. At the following message, click **OK**.



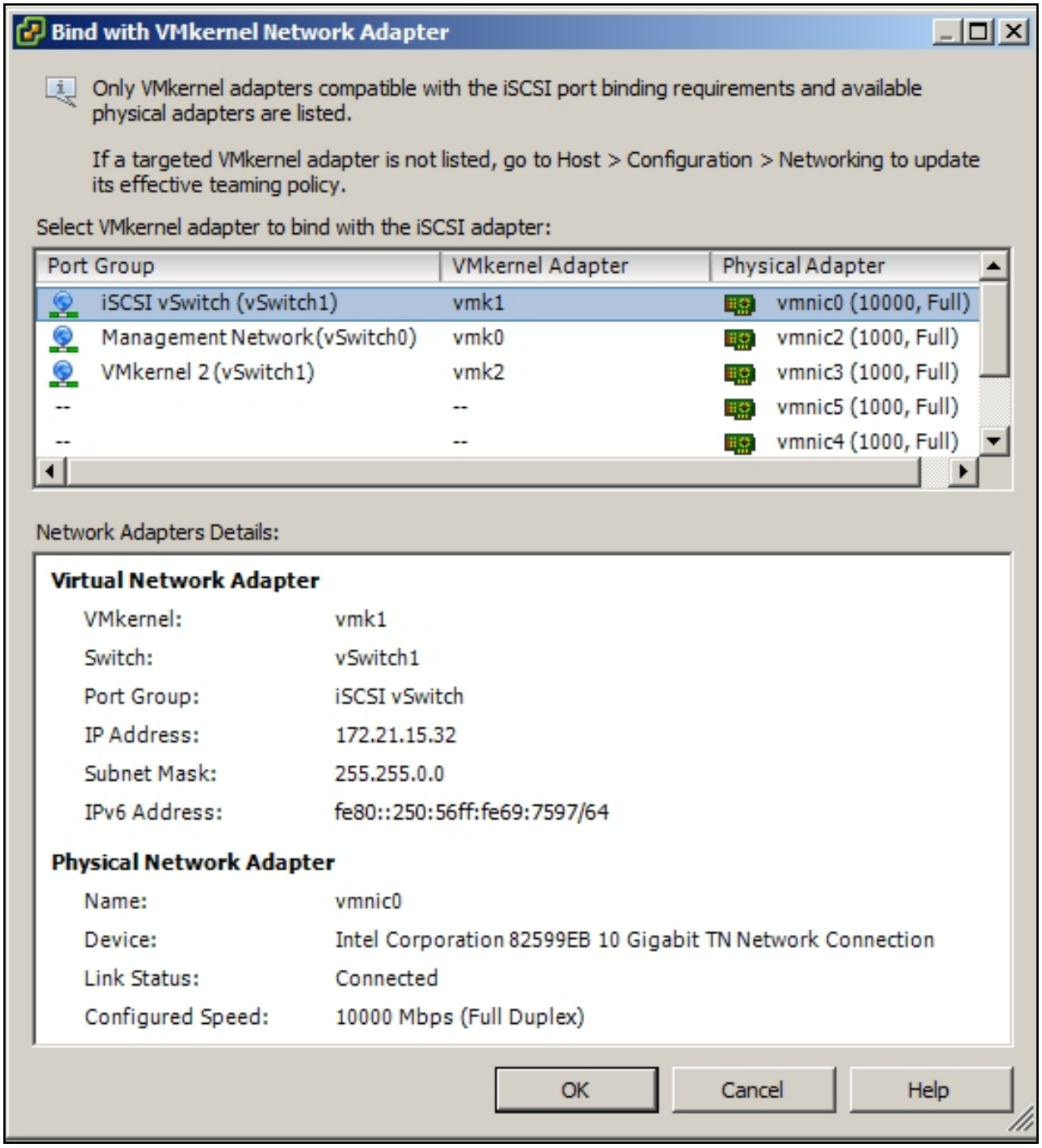
4. To configure the iSCSI adapter, click **Properties**.
5. In the iSCSI Initiator Properties dialog box, select the **Network Configuration** tab.

Figure 3-8: iSCSI initiator properties



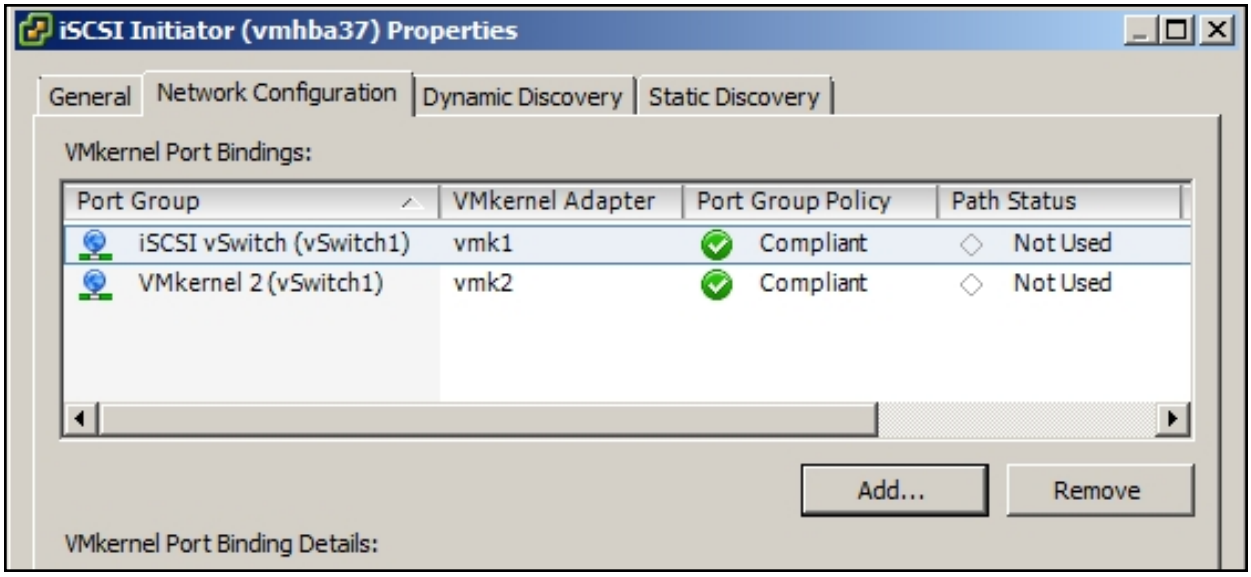
6. Click **Add**. The two ports that we created earlier are now added; *iSCSI vSwitch* and *VMkernel 2* in our example.

Figure 3-9: Binding the standard switch with VMkernel network adapter



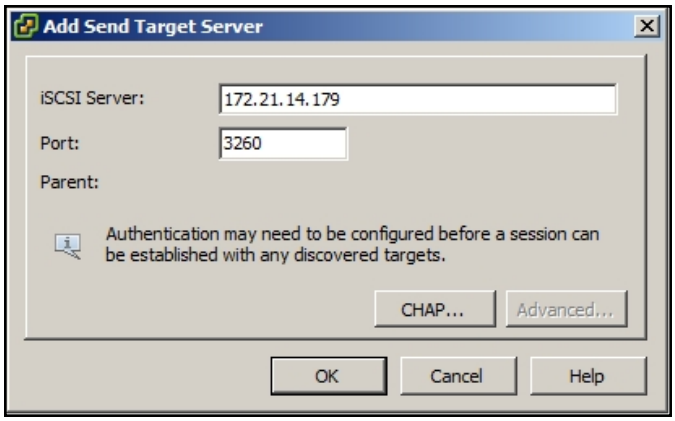
7. Click **OK** to close the dialog box. When you go back to the iSCSI Initiator Properties dialog box, both port groups are listed.

Figure 3-10: iSCSI initiator properties with port groups



8. Select the **Dynamic Discovery** tab.
9. Click **Add**.
10. Enter the IP address of the NST5000 resource group you have iSCSI target set on, and click **OK**.

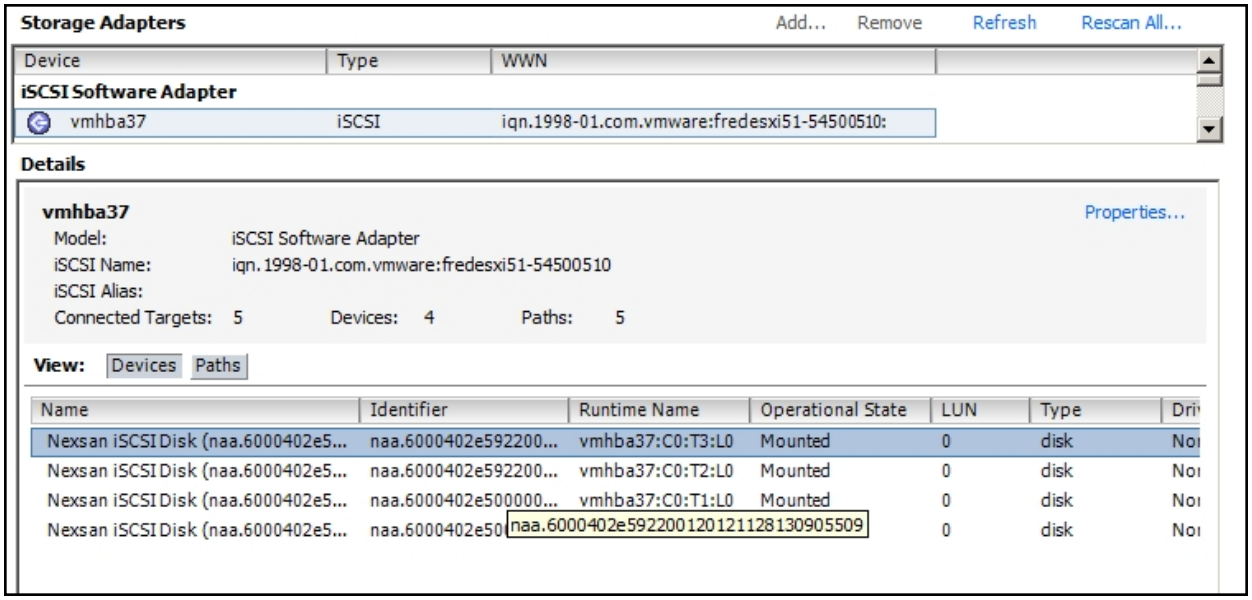
Figure 3-11: Adding a Send target server to the iSCSI initiator



11. Click **Close**.

12. When prompted to rescan for devices, click **Yes**. In our example, the iSCSI Storage Adapter displays four iSCSI disks.

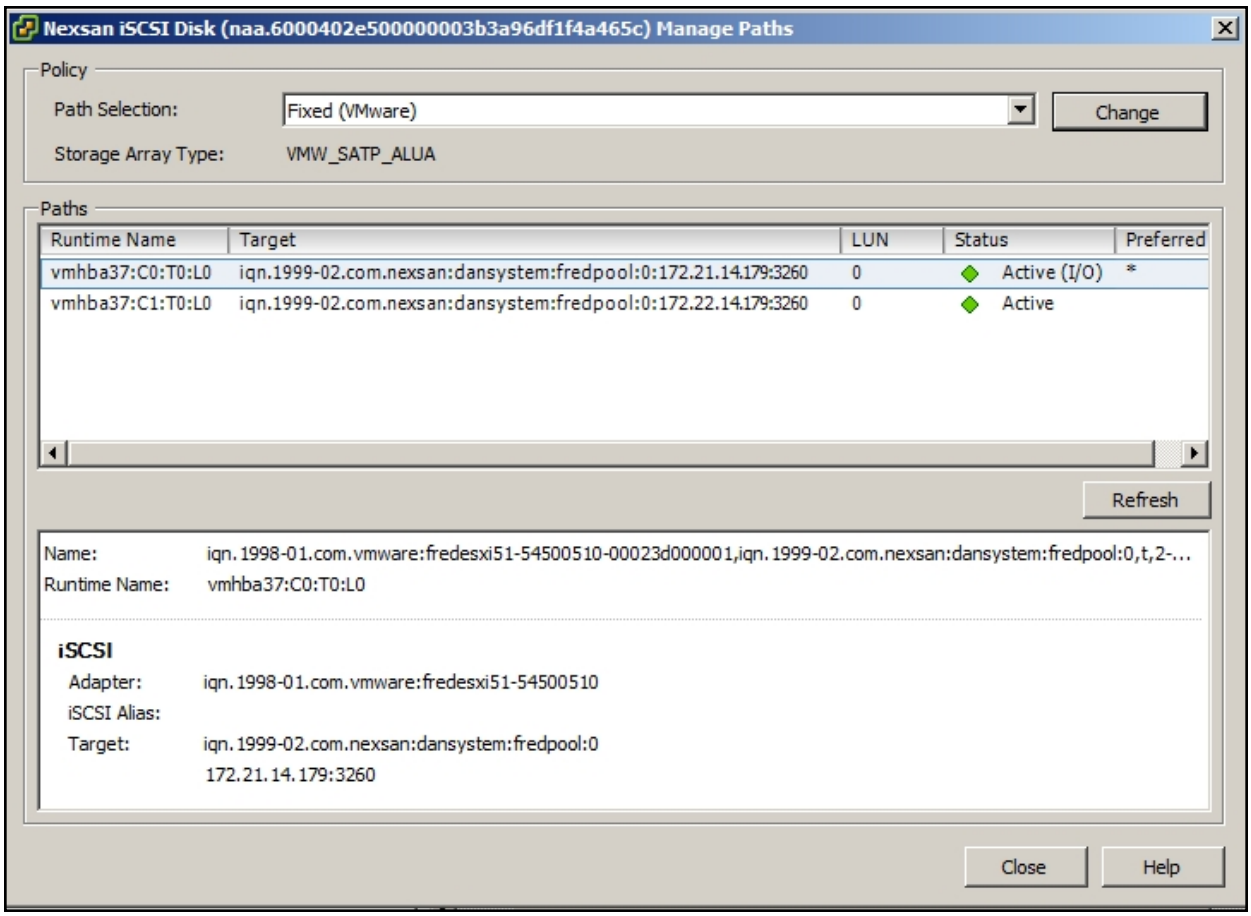
Figure 3-12: Viewing the iSCSI storage adapter



13. To configure your path to fail back after a link recovers from a failure, perform these steps:
    a. Right-click the iSCSI disk and select **Manage Paths**.
    b. Set the Path Selection to **Fixed (VMware)**.
    c. Click on **Change** to apply the setting.
    d. Click **Close**.

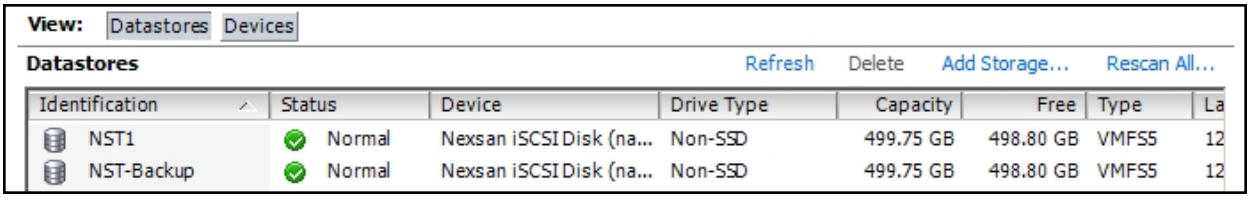
    Note For performance, you would use all the NICs in round robin fashion by setting the Path Selection to **Round Robin (VMware)**.

Figure 3-13: Managing paths for the iSCSI disk



14. Verify your new datastores. You may have to refresh the screen to get a clean view.

Figure 3-14: Reviewing your new datastores



Creating a vNetwork distributed switch

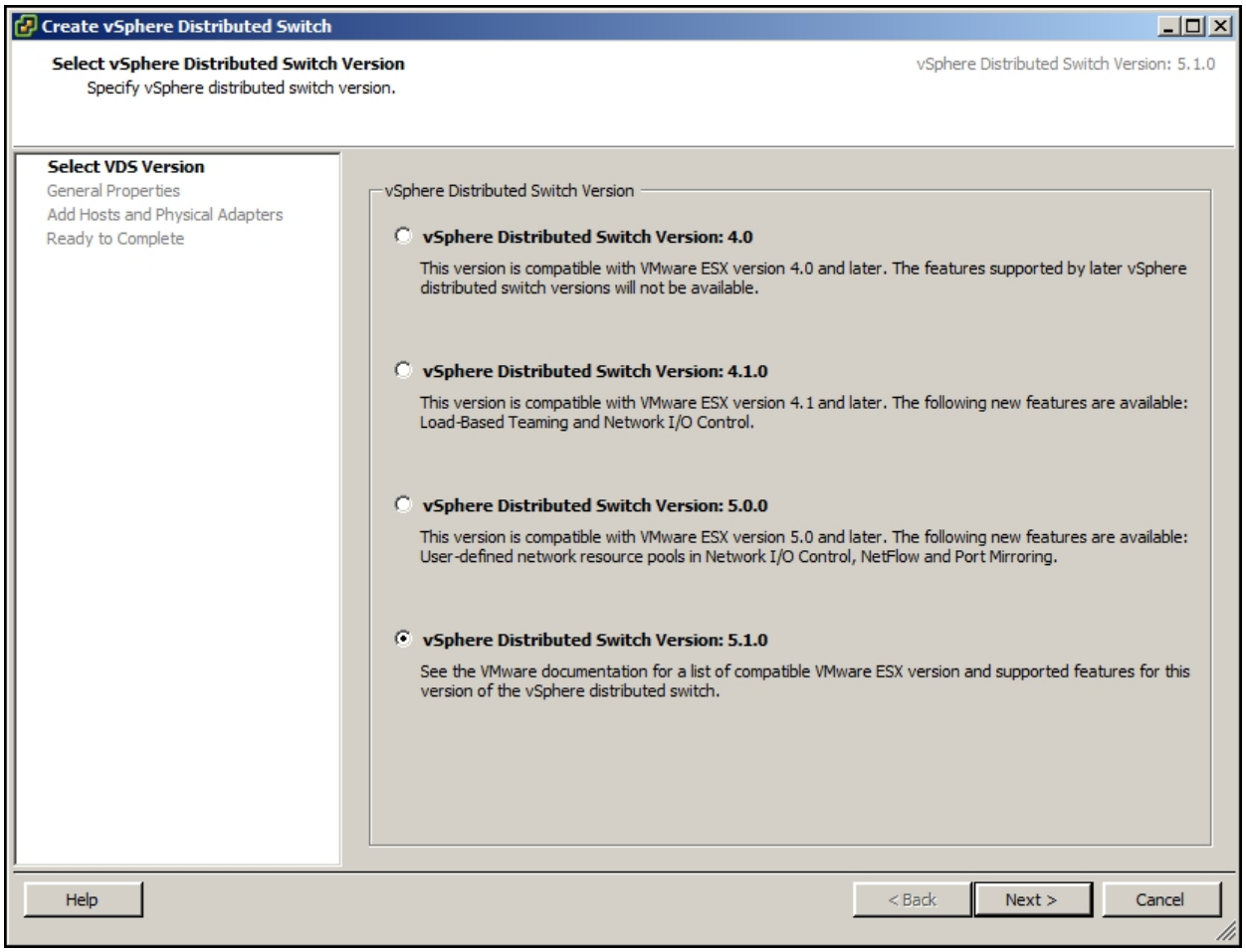
After configuring multipathing on Unity, you must create a new vSphere Distributed Switch and then configure iSCSI for that switch.

This procedure pertains to vSphere 5.1.

To create a VMkernel vSwitch:

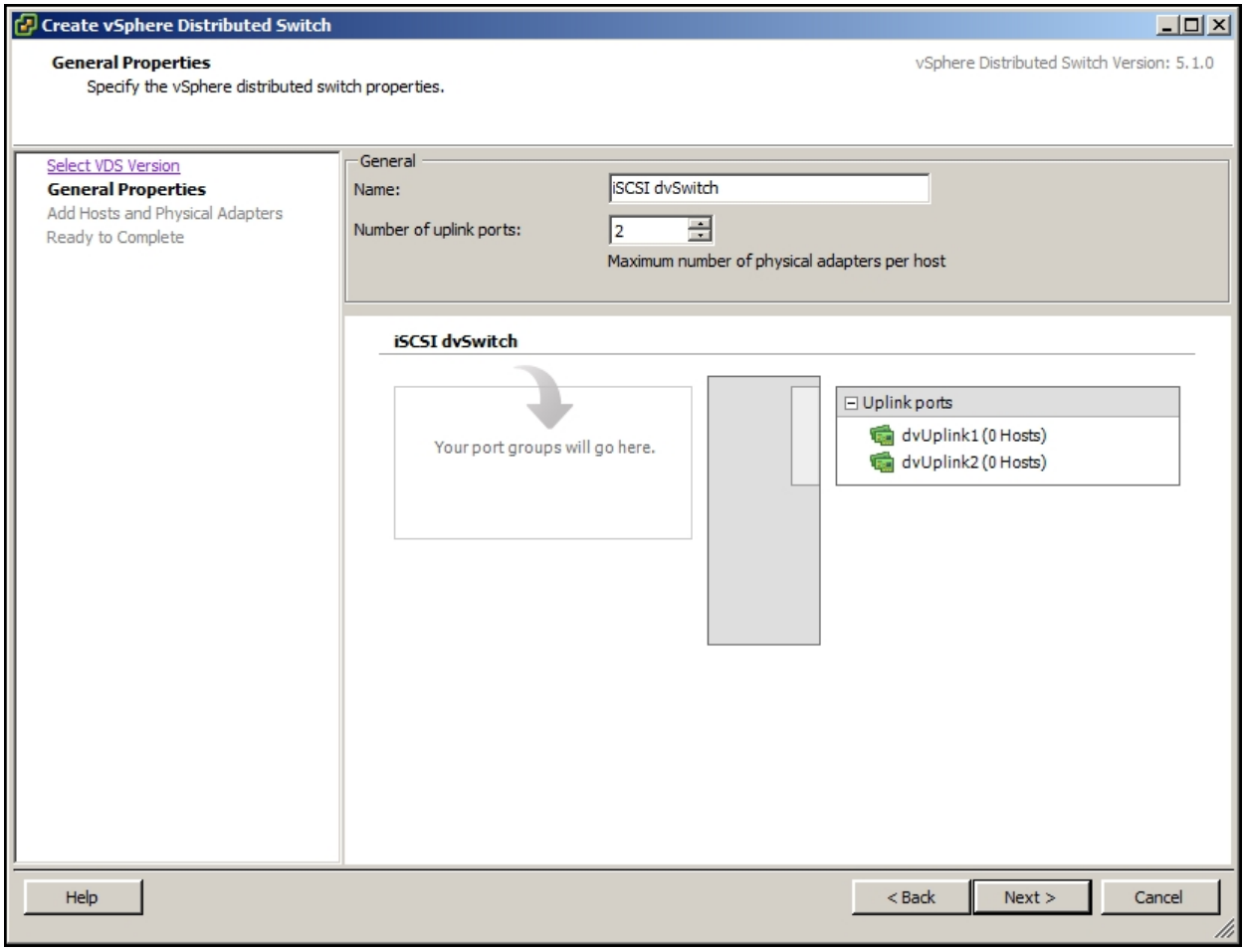
1. In vSphere, launch the Add Network wizard.
2. For the VDS version , select **vSphere Distributed Switch Version 5.1.0** and click **Next**.

Figure 3-15: Creating vSphere Distributed Switch—Selecting the distributed switch version



3. Set the number of uplink ports to **2**; this will use two physical adapters per host. Click **Next**.

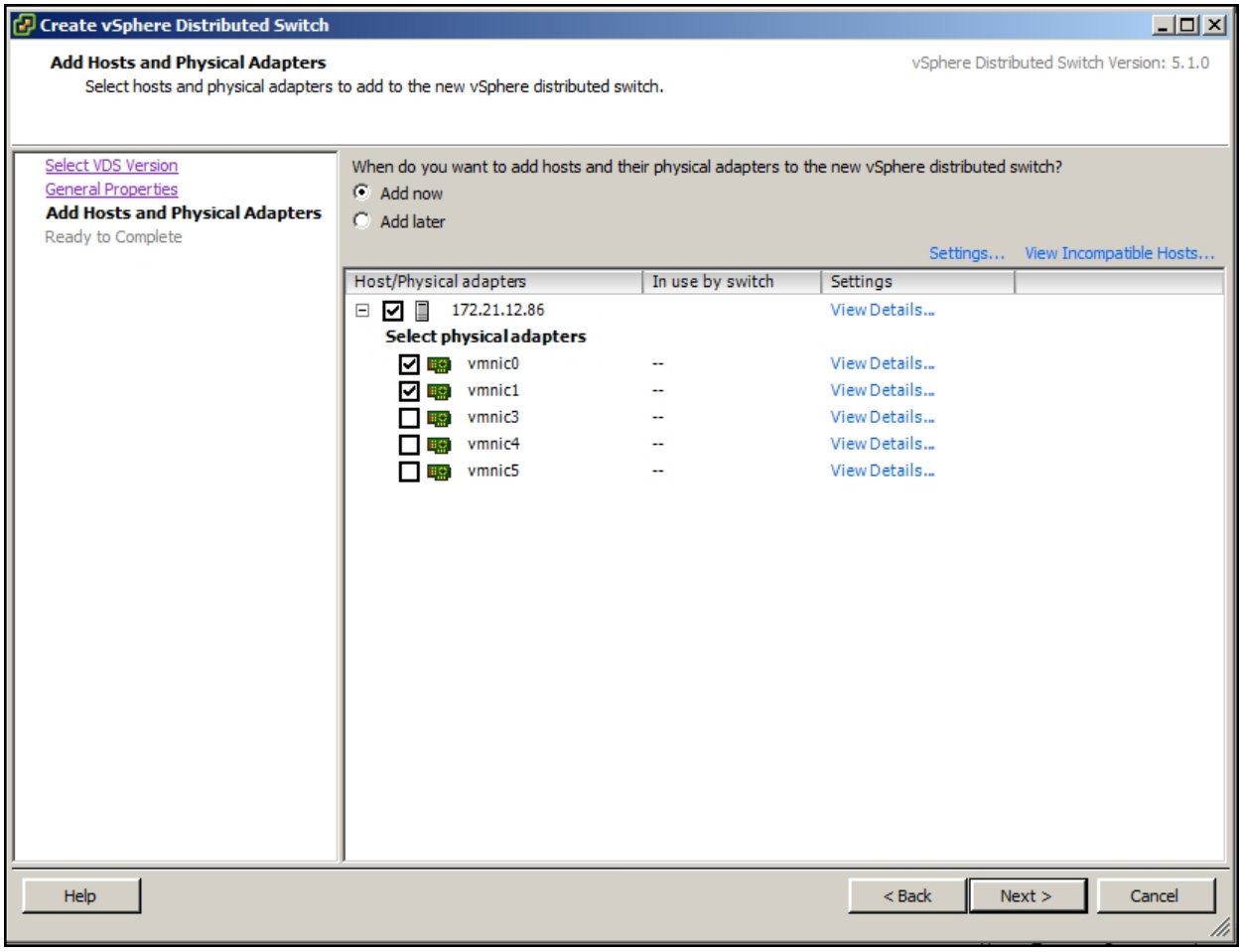
Figure 3-16: Creating vSphere Distributed Switch—Setting general properties



4. Select the physical adapters and click **Next**. In our example, we are using *vmnic0* and *vmnic1* on each of our servers.

   In summary, *dvUplink1* will use *Host1/vmnic0* and *Host2/vmnic0*, and *dvUplink2* will use *Host1/vmnic0* and *Host2/vmnic0*.

Figure 3-17: Creating vSphere Distributed Switch—Adding hosts and physical adapters



5. In this step, we create two default port groups. For iSCSI multipathing, your VMkernel interface must be configured to have one active adapter and no standby adapters. For further details, see the VMware vSphere Storage documentation.
   a. Adjust the **Teaming and Failover** settings as displayed in the image below.
   b. Set up your iSCSI adapter to use a compliant portgroup policy as follows:

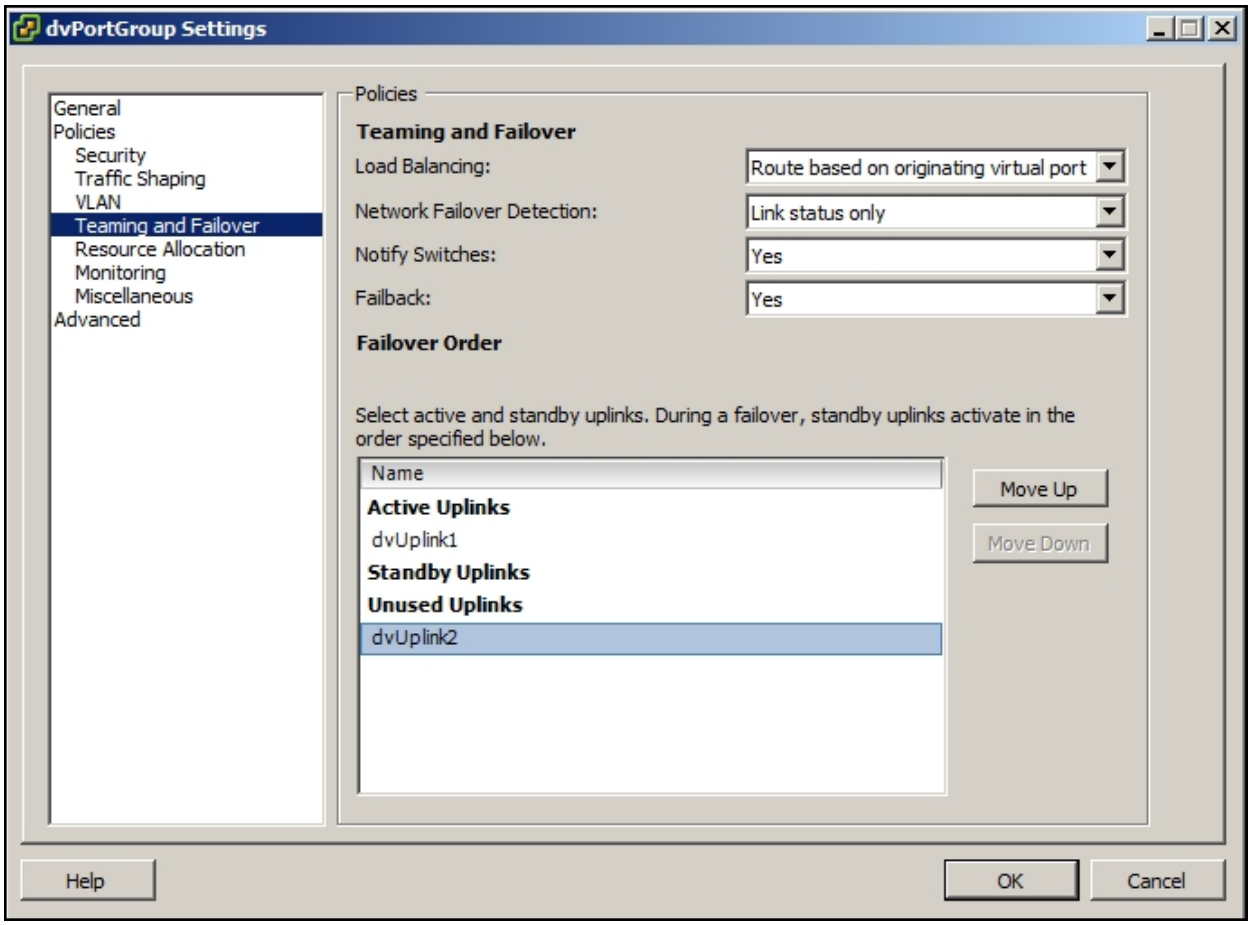
      Portgroup1:

      - Active Uplink = *dvUplink1*
      - Unused Uplink = *dvUplink2*

      Portgroup2:

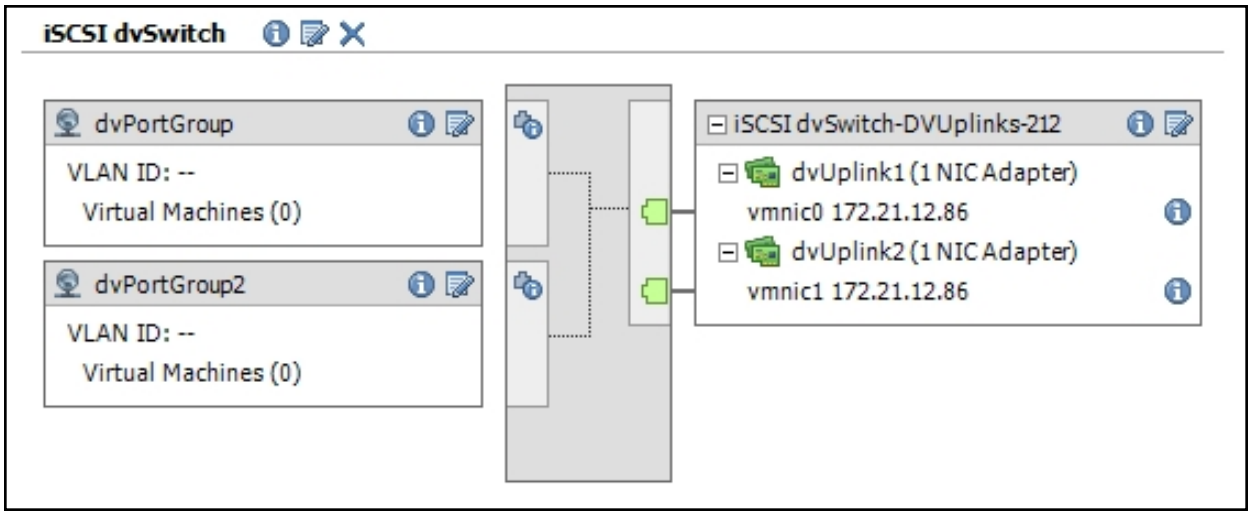
      - Active Uplink = *dvUplink2*
      - Unused Uplink = *dvUplink1*

Figure 3-18: Creating vSphere Distributed Switch—Setting the Teaming and Failover options



When you are done, the distributed vSwitch should display as follows:

Figure 3-19: Viewing the new vSphere Distributed Switch



What's next:

Proceed to Creating VMkernel virtual adapters below.

Creating VMkernel virtual adapters

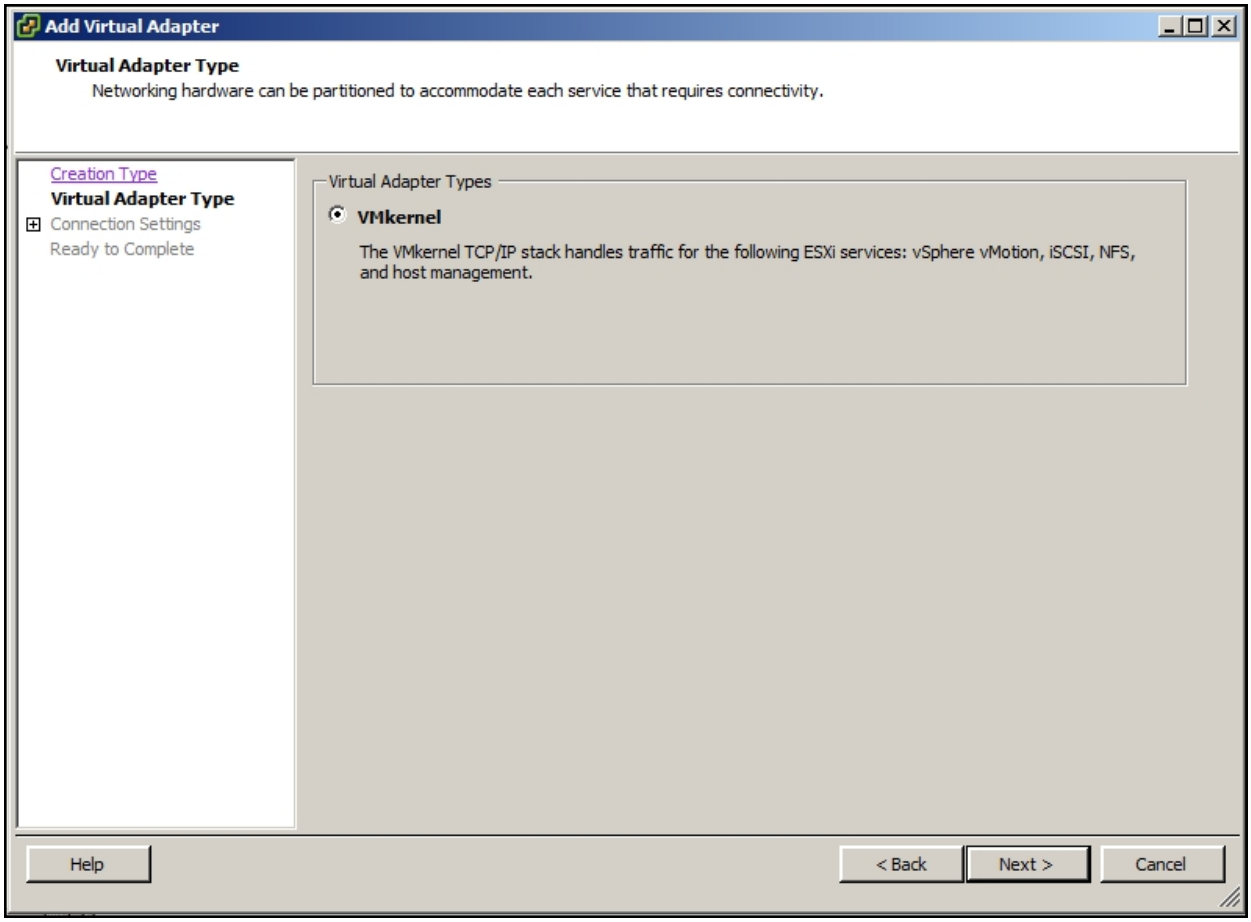
In order to talk to the iSCSI host, we need to bind a VMkernel to each port group.

To create a virtual adapter:

1. On each host, navigate to **Configuration**> **Networking**> **vSphere Distributed Switch**> **iSCSI-dvSwitch**.
2. Select **Manage Virtual Adapters**.

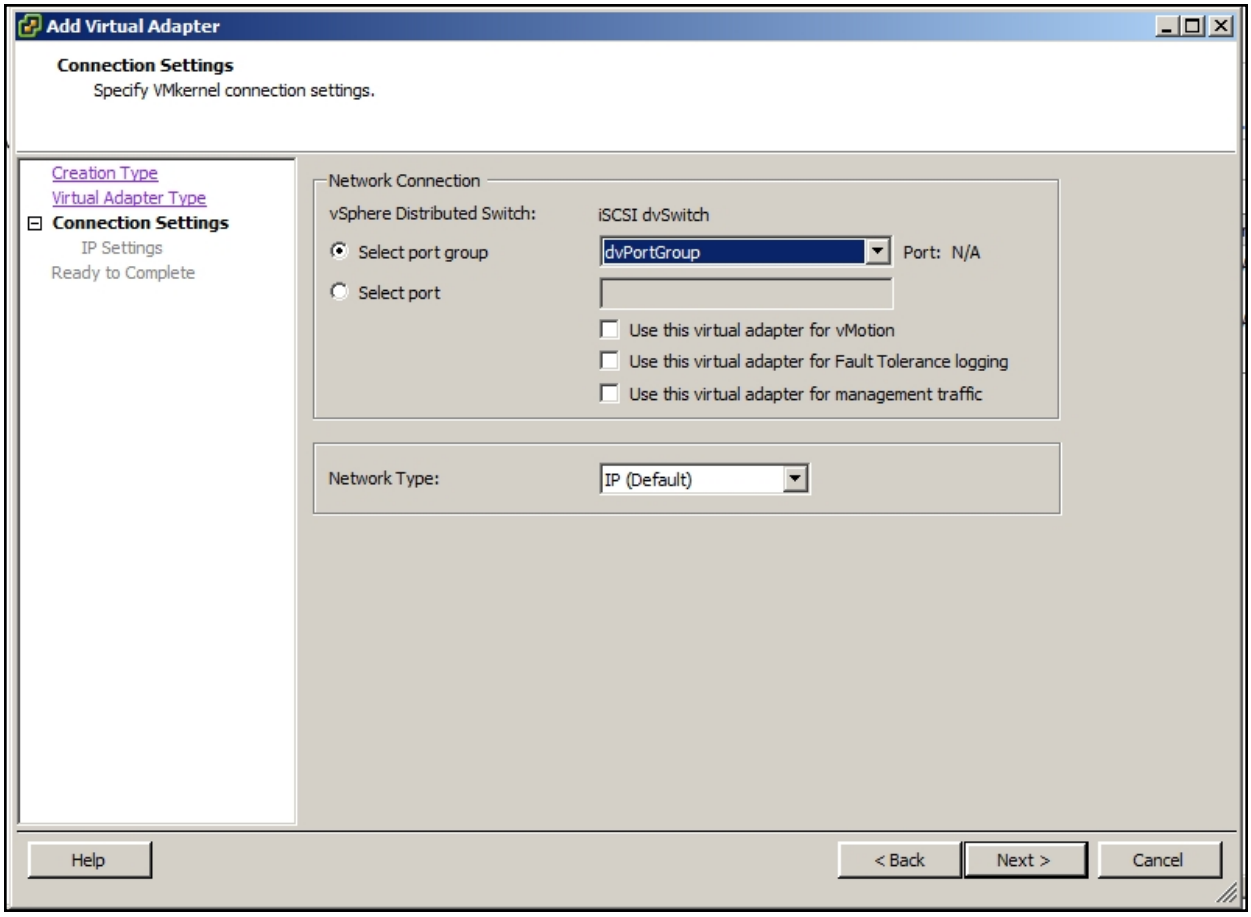
3. Select **VMkernel** from the virtual adapter types and click **Next**.

Figure 3-20: Adding a virtual adapter—Selecting the virtual adapter type



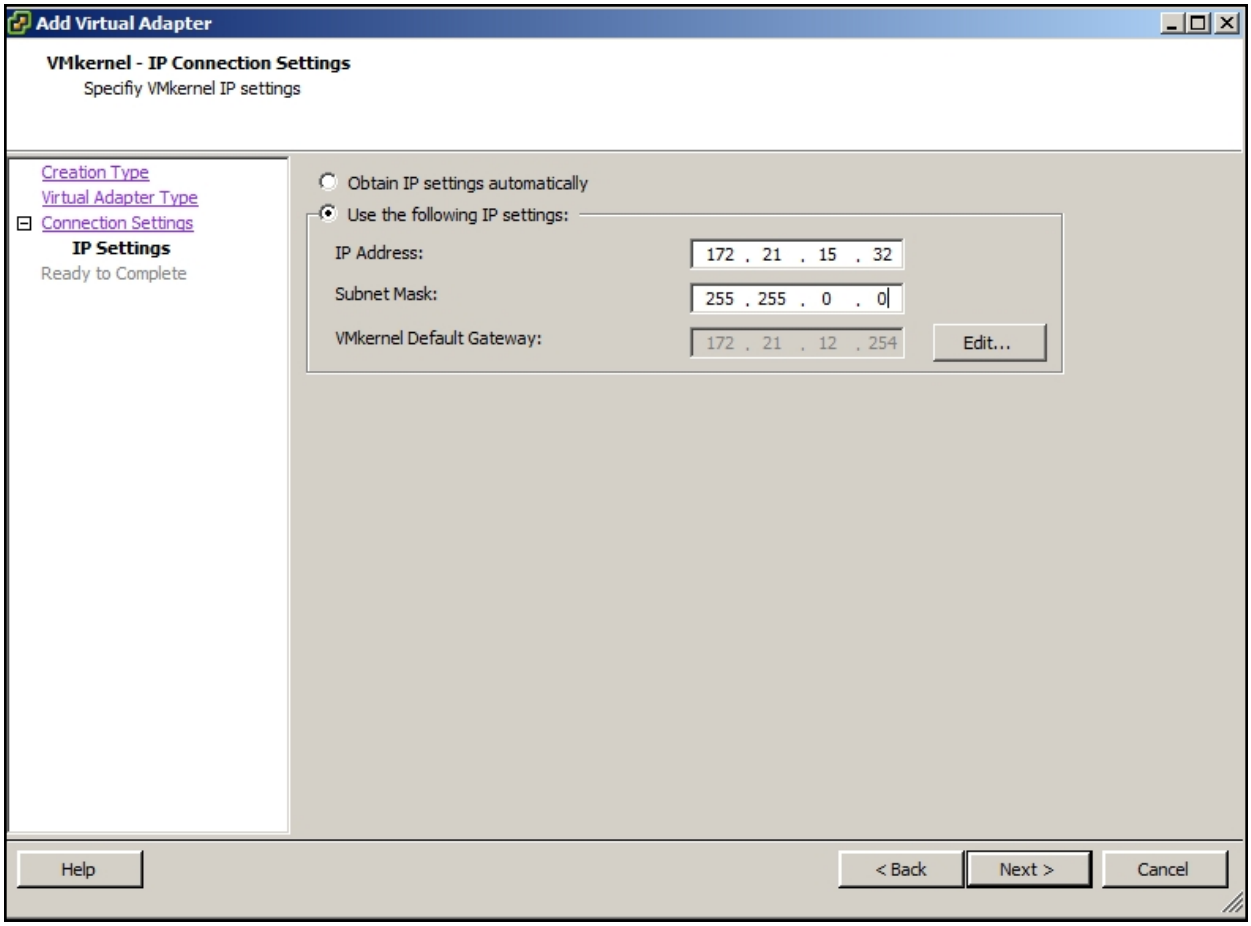
4. Select **dvPortGroup** for the network connection and click **Next**.

Figure 3-21: Adding a virtual adapter—Selecting the port group



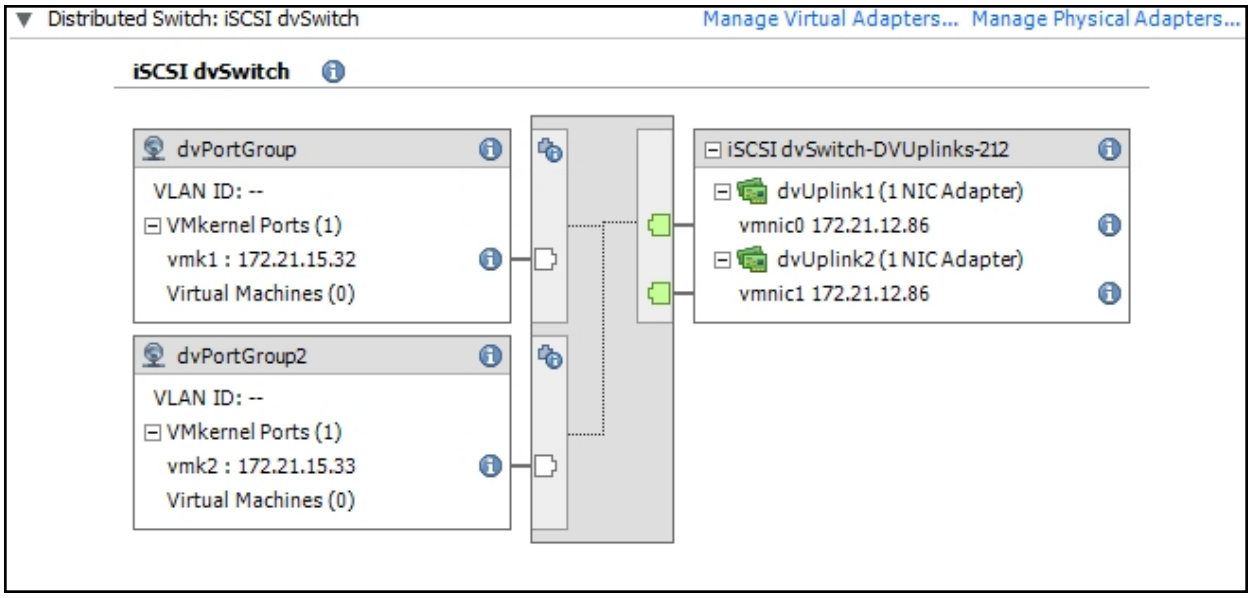
5. Select **Use the following IP settings** and enter a static IP address. Click **Next**.

Figure 3-22: Adding a virtual adapter—Setting the IP address



6. Click **Finish**.
7. Repeat these steps for each port group and each host.

When you are done, your iSCSI distributed vSwitch should look similar to this:



What's next:

Proceed to Configuring iSCSI settings for distributed vSwitch below.

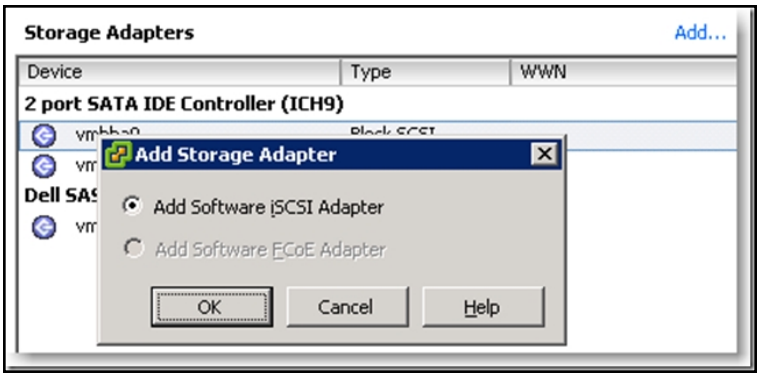
Configuring iSCSI settings for distributed vSwitch

After adding the virtual adapters to the distributed vSwitch, you need to add and configure an iSCSI storage adapter.

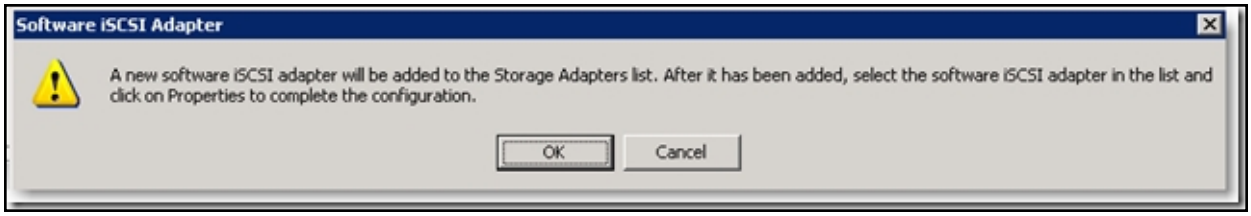
To configure the iSCSI settings of the distributed vSwitch:

1. Select **Host** > **Configuration** > **Storage Adapters**. Click **Add**.

Figure 3-23: Adding an iSCSI storage adapter

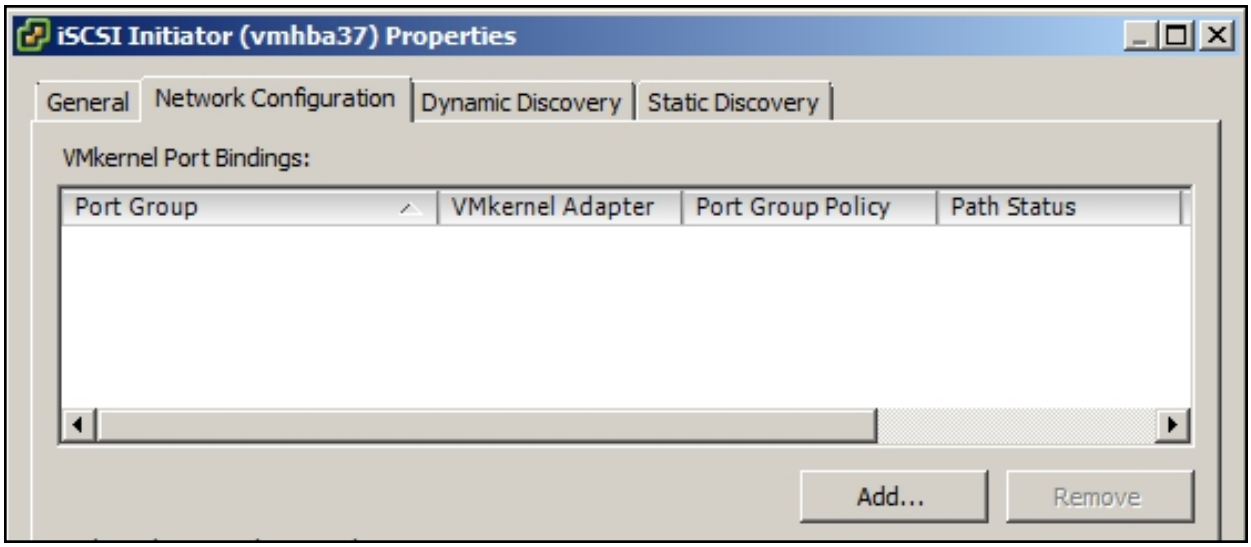


2. Click **OK** to add the iSCSI adapter.
3. At the following message, click **OK**.



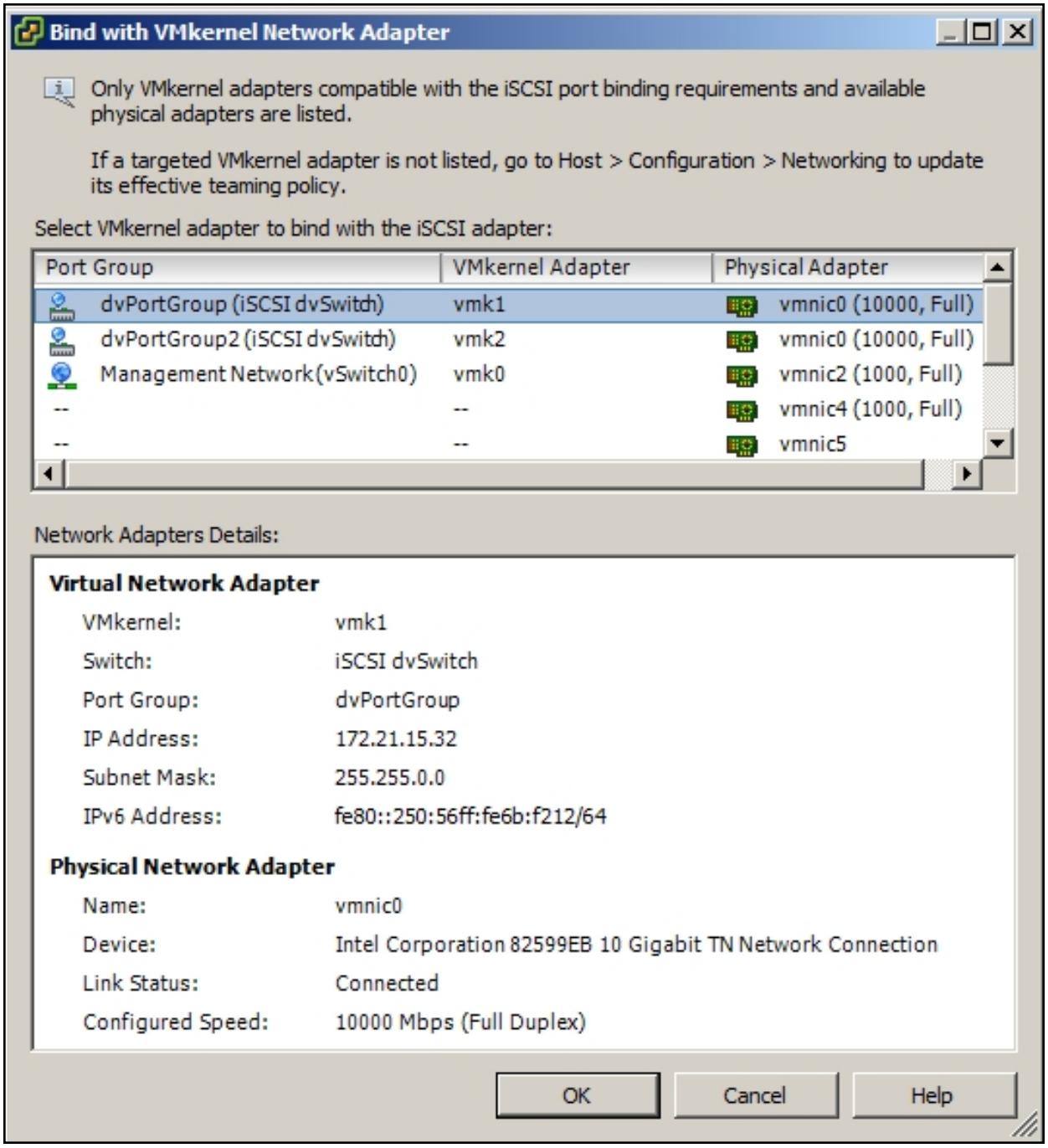
4. To configure the iSCSI adapter, click **Properties**.
5. In the iSCSI Initiator Properties dialog box, select the **Network Configuration** tab.

Figure 3-24: iSCSI initiator properties



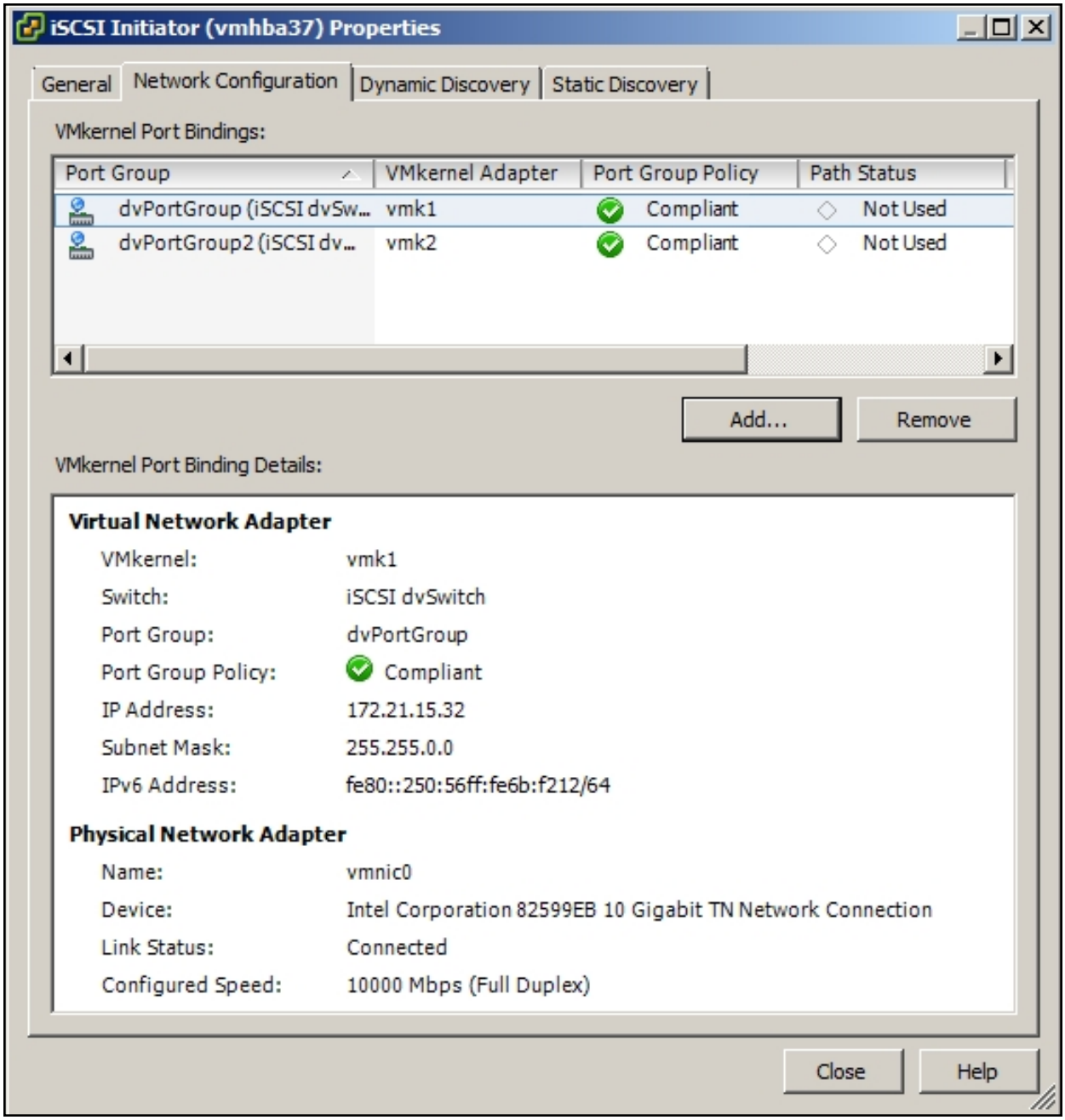
6. Click **Add**. The two ports that we created earlier are now added; *iSCSI vSwitch* and *VMkernel 2* in our example.

Figure 3-25: Binding the standard switch with VMkernel network adapter



7. Click **OK** to close the dialog box. When you go back to the iSCSI Initiator Properties dialog box, both port groups are listed.

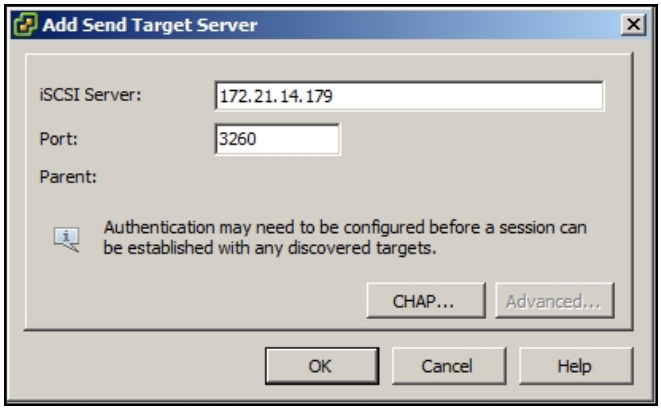
Figure 3-26: iSCSI initiator properties with port groups



8. Select the **Dynamic Discovery** tab.
9. Click **Add**.

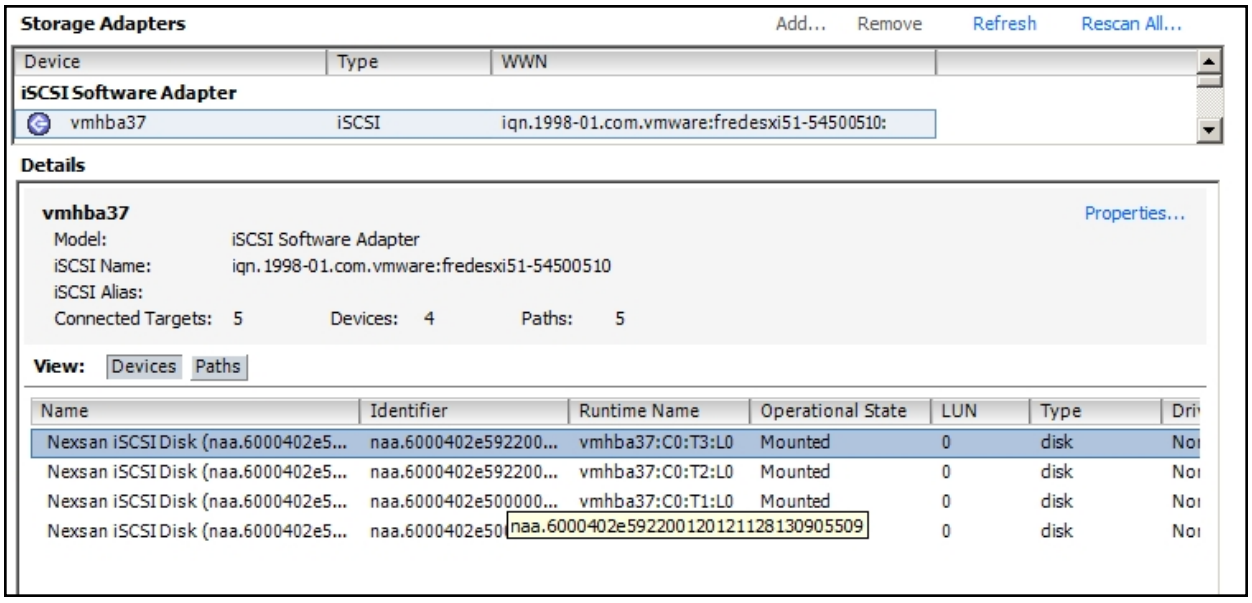
10. Enter the IP address of the NST5000 resource group you have iSCSI target set on, and click **OK**.

Figure 3-27: Adding a Send target server to the iSCSI initiator



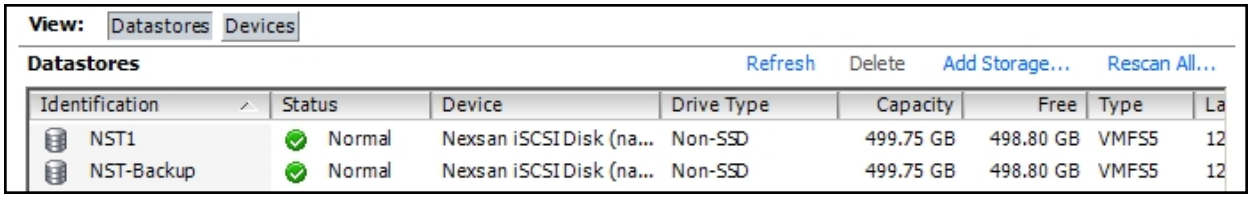
11. Click **Close**.
12. When prompted to rescan for devices, click **Yes**. In our example, the iSCSI Storage Adapter displays four iSCSI disks.

Figure 3-28: Viewing the iSCSI storage adapter



13. Verify your new datastores. You may have to refresh the screen to get a clean view.

Figure 3-29: Reviewing your new datastores



Enabling Jumbo Frames in vSphere

Enabling jumbo frames on Unity can significantly increase network throughput while consuming fewer CPU cycles on the system. A jumbo frame is essentially an Ethernet frame that is larger than 1,518 bytes. When the frame is 1,518 bytes, the MTU (or payload—not frames) on Unity is actually 1500 bytes. For Unity, gigabit Ethernet supports a maximum MTU (payload) of 9,000 bytes. You will notice the greatest benefit from enabling jumbo frames when you transfer large files across your network: since fewer frames are needed to carry the same amount of data, transfer speeds go up and CPU utilization goes down.

Before you begin:

- Make sure to enable jumbo frames on Unity (as described in the *Nexsan Unity Software User Guide*)
- Make sure that all switch(es) that Unity is connected to, as well as all client systems and disk arrays, are configured for and support jumbo frames.

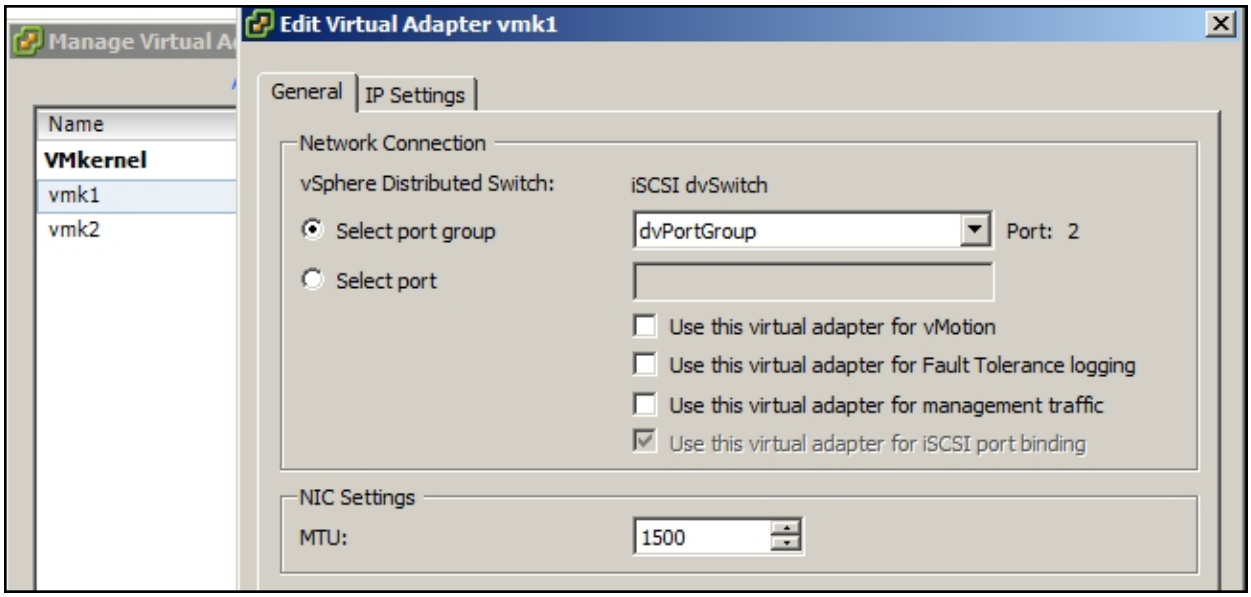
You need to enable Jumbo Frames in two places in vSphere:

- the VMkernel, more specifically, the NIC attached to the VMkernel being used for iSCSI traffic;
- the vSwitch itself.

To configure the VMkernel MTU settings:

1. In vSphere, go to **Inventory**> **Host and Clusters**.
2. Click on the host and select the **Configuration** tab.
3. Select **Networking**.
4. Select **Virtual Distributed Switch**.
5. Click on **Manage Virtual Adapters**.
6. Select the VMkernel and click **Edit**.

Figure 3-30: Configuring the VMkernel MTU settings

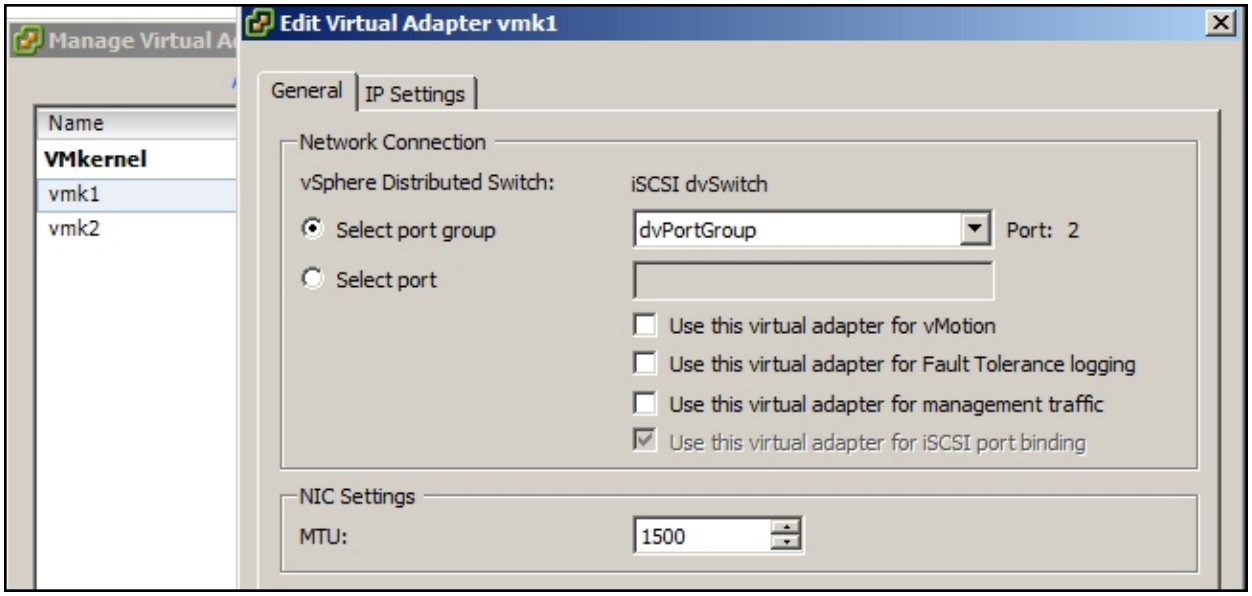


7. Under the **General** tab, set the **MTU** value to ***9000***.
8. Repeat these steps for each port group.

To configure the distributed vSwitch MTU settings:

1. Go to **Inventory**> **Host and Clusters**.
2. Click on the host and select the **Configuration** tab.
3. Select **Networking**.
4. Select the distributed vSwitch and click **Edit**.

Figure 3-31: Configuring the vSwitch MTU settings



5. Under the **Properties** tab, set the **Maximum MTU** value to ***9000***.

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