

Dell™ PowerEdge™ Systems With
Microsoft® Windows Server® 2003
Operating Systems

**Instructions to Perform Boot From
iSCSI With Dell PowerVault™
MD3000i Storage Array**

Notes and Notices



NOTE: A NOTE indicates important information that helps you make better use of your computer.



NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

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Overview

This document provides instructions about configuring a Dell™ PowerEdge™ system for booting from a virtual disk in an Internet Small Computer System Interface (iSCSI) storage solution.

The following sections describe the process to configure a PowerEdge system, create an operating system base image, and clone the operating system image to an iSCSI disk in order to boot from it.

The following topics are discussed in detail:

- Configuring boot from iSCSI using Intel® PRO network adapter on a system that is configured with a local disk
- Configuring boot from iSCSI using Intel PRO network adapter on a system that is not configured with a local disk using the F6 option
- Configuring boot from iSCSI using Broadcom® NetXtreme® network adapter on a system that is configured with a local disk
- Replacing the Intel network adapter and configuring the boot menu to boot From iSCSI
- Replacing the Broadcom network adapter and configuring the boot menu to boot from iSCSI



NOTE: Throughout this document the terms *host* refers to the PowerEdge system that on which you configure Boot From iSCSI (BFI). The terms *iSCSI LUN* and *iSCSI Target* refer to the refer to the logical unit number (LUN) PowerVault MD3000i storage array from which you perform the boot.

Configuring Boot From iSCSI (BFI) Using Intel PRO Network Adapter on a System That is Configured With a Local Disk


This section provides information about configuring a Dell™ PowerEdge™ system that is configured with a local disk to boot from an Internet Small Computer System Interface (iSCSI) using the Intel® PRO network adapter.

To create the operating system base image, you must initially configure the PowerEdge system with a local hard drive. After you create the operating system image and clone the image to an iSCSI Logical Unit Number (LUN) on the storage array, the PowerEdge system does not require a local hard drive for booting.

Before implementing a Boot From iSCSI (BFI) LUN:


- See "Additional Information" on page 23 and the *Intel iSCSI Boot User Guide*
- Configure IP addresses for the iSCSI ports on the Dell PowerVault™ MD3000i storage array


Pre-Installation Requirements

 **NOTE:** It is strongly recommended that you configure redundant paths to the target from all hosts that are configured with boot from iSCSI. The following instructions incorporate Multi-path I/O (MPIO) configuration. Misconfigured networks or networks under heavy load may interfere with critical communication between the host and the associated boot LUN on the target, causing the system to hang or display a bluescreen. To work-around this issue, configure multiple paths between the host and target. For best practices, configure a redundant iSCSI network on a separate subnets and monitor the network performance. For more information , see the whitepaper *Creating Multipath Connections to Dell iSCSI Storage Arrays* available on the Dell Techcenter website at www.dell.com/TechCenter.

Before configuring your system for BFi, read this document, complete the configuration worksheets in "Configuration Worksheet" on page 77, and ensure that you have the following:

- A system with a local hard drive to create the initial image
- Intel® PRO/1000 Peripheral Component Interconnect Express (PCIe) Network Interface Card (NIC)
- Download the Intel PRO PCIe Gigabit drivers and firmware from the Dell Support website at support.dell.com. For latest supported Intel PRO PCIe Gigabit drivers and firmware versions, see the *Dell PowerVault MD3000i Support Matrix* located on the Dell Support website at support.dell.com.
- *Intel iSCSI Boot User Guide* located on the Intel NIC media or on the Dell Support website at support.dell.com
- Microsoft® iSCSI Software Initiator with boot support version as stated in the *Dell PowerVault MD3000i Support Matrix* located on the Dell Support website at support.dell.com
- Media of the supported Microsoft operating system or a copy of the Sysprep utility
- Any disk imaging software such as Symantec™ Ghost
- Dell PowerVault Resource media

 **NOTE:** All systems that use the cloned operating system base image must have the same hardware configuration as the host.

 **NOTE:** For the latest drive and firmware versions, refer to the *Dell PowerVault MD3000i Systems Support Matrix* located on the Dell Support website at support.dell.com.

Creating the Operating System Boot Image

The following sections describe the process to create the operating system boot image on the virtual disk.

Configuring the Host:

To create an operating system boot image:

- 1 Configure a PowerEdge system with a local hard drive. To configure:
 - a Install Microsoft Windows Server® 2003 SP1, Windows Server 2003 SP2, or Windows Server 2003 R2 operating system on the PowerEdge system that is temporarily configured with a local hard drive.
 - b Install the Intel PRO/1000 NIC(s) to be used for BFi in an available PCIe slot of the PowerEdge system. For information about supported NICs, see the Intel documentation.
 - c Install the latest supported drivers for Intel PRO PCIe Gigabit family of adapters.



NOTE: Do not configure the IP addresses of the Intel NICs being used for iSCSI boot manually. You must configure the NICs with Dynamic Host Configuration Protocol (DHCP). The IP address is assigned automatically when the iSCSI LUN is detected by the boot firmware of the Intel NIC.

- 2 Install the supported version of Microsoft iSCSI Software Initiator with integrated software boot support on the PowerEdge system. To download the iSCSI Software Initiator boot version, go to the Microsoft Support website at www.microsoft.com and search for **iSCSI Initiator**.




NOTE: Download the iSCSI Initiator. The download link may be in the text and not hyperlinked.

- 3 To ensure that BFi is configured correctly, select the following installation options when prompted during installation:
 - a Select **Initiator Service, Software Initiator, and Microsoft Multipath I/O (MPIO) Support** for iSCSI.



NOTE: Do not select Microsoft Multipath I/O (MPIO) Support for iSCSI.

- b Select **Configure iSCSI Network Boot Support** and highlight at least one Intel NIC with an *express service name*.

 **NOTICE:** It is strongly recommended that you *do not* login to the iSCSI target manually. The iSCSI Software Initiator automatically retrieves the iSCSI boot configuration from the Intel PRO/1000 adapter iSCSI boot firmware. Adding additional connections manually inside the iSCSI Software Initiator with the same paths as configured in the iSCSI boot firmware may cause the system to hang, display a blue screen, or reboot during failover.

- 4 Install the **Dell PowerVault Modular Disk Storage Manager** host software available on the Dell PowerVault Resource media.
- 5 Select the installation type as either **Typical** or **Host**. The **Typical** installation installs both host software and management software; the **Host** installation installs only the necessary host software.
- 6 Disable the page file if the PowerEdge system does not have a local hard drive configured on the host. To disable the page file:
 - a Right-click **My Computer** and select **Properties**.
 - b In the **System Properties** screen, click the **Advanced** tab.
 - c In the **Performance** section, click **Settings**.
 - d In the **Performance Options** screen, click the **Advanced** tab.
 - e In the **Virtual Memory** section, click **Change**.
 - f In the **Virtual Memory** screen, select the **No paging file** option, and then click **Set** and **OK**.

 **NOTICE:** You must perform the following step. Skipping the following step may cause the operating system to display a blue screen and fail to boot. For more information, see the Microsoft Knowledge Base article **934235** on the Microsoft Support website at support.microsoft.com.

- 7 If you add or update any hardware or software components such as network drivers or operating system service pack updates that may impact the Networking stack, you must re-run the `iscsibcg.exe` utility with the `/verify /fix` command line option. Failing to do this may cause the operating system to blue screen and fail to boot.

To configure the `iscsibcg.exe` utility to run every time the system is turned off, perform the following steps:



- a Click **Start**→ **Run**.
- b Type `gpedit.msc` and click **OK**.
- c In the **Group Policy** window, expand **Computer Configuration**→ **Windows Settings**→ **Scripts (Startup/Shutdown)**.
- d In the **Scripts (Startup/Shutdown)** screen, double-click **Shutdown**.
- e In the **Shutdown Properties** screen, click **Add**.
- f Locate the `iscsibcg.exe` utility (default location is `c:\Windows\System32\`) in the **Script Name** field and type `/verify /fix` in the **Script Parameters** field.
- g Click **OK**.

Configuring the PowerVault MD3000i Storage Array


- 1 Perform the following procedure to manually register a host:
 - a Open the **PowerVault Modular Disk Storage Manager**, and connect to the PowerVault MD3000i storage array to be used by the host for booting.
 - b Select the **Configure** tab, and then click **Configure Host Access (Manual)**.
 - c In the **host** field, enter the host name, select the **host type** from the drop down list, and then click **Next**.
 - d In the **Selected iSCSI initiators** field, click the **New** button.
 - e In the **iSCSI initiator name** field, enter the **iSCSI Qualified Name (IQN)** of the host initiator and leave the iSCSI Initiator label to the default.

Fully qualified IQN format is `<iqn><yyyy-mm>.com<company name>:<server name>`.

Example: `iqn.1984-04.com.dell:server-name`. Record the IQN of the host initiator in the "Configuration Worksheet" on page 77. The IQN of the host initiator is required to configure Intel iSCSI boot BIOS.
 - f Click **Add** and then click **Next**.

- g Ensure that the option **No, This host will NOT share access to the same virtual disks with other hosts** is selected and then click **Next**.
 - h In the **Confirm Host Definition** page, click **Finish**.
- 2** Create a virtual disk and assign it to the host:
- a Select the **Configure** tab and click **Create Virtual Disks**.
 - b Create a virtual disk which is of the same size as the boot partition and assign it to the host. Enter the virtual disk capacity.
-  **NOTE:** It is recommended that the capacity you allocate to the virtual disk be equal to or more than the boot partition capacity. A minimum boot partition size of 16 GB is recommended.
- c Enter a Name for the virtual disk.
-  **NOTE:** It is recommended that you use the service tag of the PowerEdge system and the term boot-LUN in the description field.
- d In the **Virtual Disk I/O characteristics** field, select **File system**, and click **Next**.
 - e Select **Map now** and the host you are preparing to boot, and then click **Finish**.
- 3** After creating the virtual disk, assign the preferred path for the virtual disk to the appropriate Redundant Array of Independent Disks (RAID) controller. For systems with only one boot NIC, ensure that you assign the virtual disk to the RAID controller the NIC is connecting to. For systems with two boot NICs, configure the primary path to the RAID controller that the Primary NIC is configured to boot from. To configure the preferred path:
- a Click the **Modify** tab and select the **Change Virtual Disk Ownership/Preferred Path** option.
 - b Select the **virtual disk** and the **preferred path**, and then click **Change** if required.

- 4 Record the IQN of the PowerVault MD3000i storage array in the "Configuration Worksheet" on page 77:
 - a Select the iSCSI tab, and then click **Change Target Identification**.
 - b Record the iSCSI target name.

 **NOTE:** The iSCSI Target Alias cannot be used by a host for booting.
- 5 Record the iSCSI host port IP addresses of the RAID controllers in the "Configuration Worksheet" on page 77:
 - a Select the iSCSI tab and click **Configure iSCSI Host Ports**.
 - b Select each iSCSI host port from the drop down list. Record the IP address of the port to which the host system is configured to boot from. If the host system has redundant paths, select a port on a controller that is on a separate subnet.


Configuring the Intel iSCSI Boot Menu

- 1 Use the iSCSI DOS utility located in the `iSCSI\DOS` directory on the media that shipped with the Intel NIC to flash the Intel NIC with the iSCSI Boot Programmable Read-Only Memory (PROM). For more instructions, see the *Intel iSCSI Boot User Guide*.
Boot to a bootable MS-DOS[®] diskette drive or a bootable USB key and run the iSCSI DOS utility using the following commands:

```
ISCSIUTL -ALL -FLASHENABLE
ISCSIUTL -ALL -UP
```


 For additional help, type `ISCSIUTL -?` at a command prompt.
- 2 Boot into the **Intel iSCSI Boot Setup** menu. For more information, see the *Firmware Setup* section in the *Intel iSCSI Boot User Guide*.
 - a Configure one NIC as **Primary**.
 - b Enter the initiator name, IP address, subnet, and gateway of the host that you recorded in step 1 of "Configuring the PowerVault MD3000i Storage Array" on page 15.
 - c Enter the IQN and IP address of the target.
 - d Retain the default values of the port number as 3260 and LUN number as 0, unless you need to change them.

- e Select **OK** and save the changes.
- f Repeat step a to step e to configure a secondary NIC if required.

 **NOTE:** Ensure that the primary NIC and the secondary NIC are configured on separate subnets.

- g Observe the Power-On Self-Test (POST) output to ensure that the iSCSI LUN is detected. If the iSCSI LUN is not detected during POST, halt the process and verify the configuration on the PowerVault MD3000i storage array and the Intel iSCSI Boot Setup menu.

 **NOTE:** *Do not* continue if the iSCSI LUN is not detected during POST.

 **NOTE:** It is strongly recommended that you save the iSCSI boot configuration to a file to enable faster recovery when you replace the NIC.


- 3 To save the iSCSI boot configuration to a file, perform the following steps:

- a Boot to a bootable device.

- b Save the configuration to a file using the `iscsiutl` program by typing the following command at the command prompt:

```
ISCSIUTL -SAVE -FILE <FILENAME> -NIC <#>
```


where **FILENAME** is the name of the iSCSI boot configuration file and **#** is the NIC number.

 **NOTE:** It is recommended that you include the NIC number in the file name. For example, to name the iSCSI boot configuration file of the first NIC use the following command:

```
ISCSIUTL -SAVE -FILE dell11 -NIC 1
```

where **NIC 1** is the NIC number for the first NIC. To name the iSCSI boot configuration file of the second NIC use the following command:

```
ISCSIUTL -SAVE -FILE dell12 -NIC 2
```

 **NOTE:** The `iscsiutl` program identifies each port of a dual-port NIC separately. If you have configured both ports on a dual-port NIC to boot from iSCSI, you must run the command in step 3 for each port.

Preparing the Host and Operating System Boot Image

- 1 In the host system, go to the BIOS menu and confirm that the boot order lists the local hard drive before the iSCSI LUN.



NOTICE: The following step is mandatory. Failure to follow the step may cause the operating system to display a blue screen and fail to boot.

- 2 Log in to the operating system. Open the **Disk Management Console** and verify that the iSCSI LUN is recognized.



NOTE: It is strongly recommended that you do not login to the iSCSI target manually. The iSCSI Software Initiator automatically retrieves the iSCSI boot configuration from the Intel PRO/1000 adapter iSCSI Boot firmware. If you manually add connections inside the initiator with the same paths as configured in the iSCSI boot firmware, the system may hang, display a blue screen or reboot during failover.

- 3 Boot to a bootable device such as a diskette drive, media, or USB key and run a disk imaging software such as Symantec Ghost.
- 4 Clone the local disk to the iSCSI LUN (disk to disk).
- 5 Reboot the host.
- 6 Go to the BIOS menu, change the boot order to disable the local hard drive and reboot. The host now boots from the iSCSI LUN.

Cloning

If you intend to create an operating system image to deploy to multiple hosts, run Sysprep prior to cloning the LUN.

- 1 In the system drive root, create a directory and name it as **Sysprep**.
- 2 In your operating system media, locate the archive file `support\tools\deploy.cab` and copy all the contents to the **Sysprep** directory.
- 3 Use the `setupmgr.exe` utility to create the `sysprep.inf` file and follow the on the screen instructions to provide specific information.
- 4 In the `Sysprep.inf` file, edit the `[Unattended]` section as shown below:
`[Unattended]`
`LegacyNic=1`

- 5 Run Sysprep.
- 6 To create an operating system image, select **Reseal and Shutdown**. You can clone additional iSCSI LUNs so that they can be used to boot additional hosts. The following section describes various methods that you can use to clone one iSCSI LUN to additional iSCSI LUNs.



NOTE: After you have created the clone(s), boot the new systems from their respective LUNs by following the steps in "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.

Method 1—Using Snapshot Virtual Disks and Virtual Disk Copy (Preferred Method)

- 1 Configure the host system to boot from an iSCSI LUN.
- 2 Turn off the system
- 3 Use the **PowerVault Modular Disk Storage Manager** to create a snapshot virtual disk of the source virtual disk.
- 4 Configure a different system to boot from the snapshot virtual disk. For instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.
- 5 Run Sysprep and turn off the system.
- 6 Use the **PowerVault Modular Disk Storage Manager** to create a virtual disk copy of the snapshot virtual disk.
- 7 After the virtual disk copy is created, remove the copy pair using the **PowerVault Modular Disk Storage Manager**.
- 8 Configure the system to boot from the new iSCSI LUN. For instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.



NOTE: For more information about creating snapshot virtual disks and virtual disk copy, see the *PowerVault Modular Disk Storage Manager User's Guide* located on the Dell Support website at support.dell.com.

Method 2—Using Virtual Disk Copy Premium Feature

- 1 Configure the host system to boot from an iSCSI LUN.
- 2 Run Sysprep and turn off the system.
- 3 Using the **PowerVault Modular Disk Storage Manager** create a virtual disk copy of the snapshot virtual disk.
- 4 After the virtual disk copy is created, remove the copy pair using the **Dell PowerVault Modular Disk Storage Manager**.
- 5 Configure each system to boot from the assigned iSCSI LUN. For more instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.



NOTE: For more information about creating snapshot virtual disks and virtual disk copy, see the *PowerVault Modular Disk Storage Manager User's Guide* located on the Dell Support website at support.dell.com.

Method 3—Using an Imaging Server

This procedure uses an imaging server to clone the boot image of one system (that boots from an iSCSI LUN) to multiple iSCSI LUNs. The images on the multiple iSCSI LUNs can then be used to configure BFi on multiple systems. Perform the following steps to clone the boot image:



NOTE: Before you perform the following steps, ensure that the imaging server is configured with an iSCSI connection to the iSCSI target.

- 1 Configure the host system to Boot from an iSCSI LUN.
- 2 Run Sysprep and turn off the system.
- 3 Unassign the iSCSI LUN from the original host system and assign the iSCSI boot LUN to the imaging server.
- 4 Execute the imaging software (such as Ghost32) and create an image file of the iSCSI LUN (disk to image).
- 5 Unassign the original iSCSI LUN from the imaging server.
- 6 Assign the iSCSI LUN(s) on which you are creating clone(s) to the imaging server.

- 7 Execute an imaging software such as Ghost 32 and image each iSCSI LUN with the boot image that you created in step 4 (image to disk).
- 8 Unassign all iSCSI LUNs from the imaging server.
- 9 Assign each iSCSI LUN to the system that it boots to. Follow the instructions in "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63 to configure each system to boot from the assigned iSCSI LUN.

Troubleshooting

If iSCSI Boot BIOS fails to detect iSCSI Target, perform the following steps and try to boot the system from iSCSI:

- Disable the spanning tree protocol on the switch ports on which the iSCSI boot NIC is configured. For information about disabling the spanning tree, see the documentation that shipped with the switch.
- Check for typographic errors in the BIOS settings. The configuration options must match the instructions provided. For more troubleshooting procedures, see the *Intel iSCSI Boot User Guide* and the Dell Support website at support.dell.com.
- To eliminate switch problems, test by connecting the initiator to the target directly using a standard Ethernet cable. Do not use a cross-over cable.

During initial setup, if the host displays a blue screen or continues to reboot when you boot from the iSCSI LUN, perform the following steps:



NOTE: The following steps are applicable only to newly-configured Boot from iSCSI host systems.

- 1 Change the boot order in the BIOS screen to re-enable the local hard drive.
- 2 Reinstall the supported boot version of the iSCSI Software Initiator. During installation, the GUI displays the previously selected options, ensure that you select the correct boot option.
- 3 Re-install **Power Vault Modular Disk Storage Manager** host software.

- 4 Open the iSCSI Software Initiator GUI to ensure that there are no entries in the Discovery tab or in the **Persistent Targets** tab.
- 5 Open the **Disk Management** console and verify the iSCSI LUN is recognized.
- 6 Replicate the operating system boot image from the local hard drive to an image then to the iSCSI LUN and then boot from the iSCSI LUN.
- 7 Disable the local hard drive and boot from the iSCSI LUN.

Additional Information

- If you are using two NICs — one as primary and one as the secondary boot NIC, ensure that they are configured to use separate subnets.
- NIC teaming is not supported for iSCSI traffic on the host or on the PowerVault MD3000i storage array.
- After the host is configured to use BFi, you can configure additional paths to other targets in the Microsoft iSCSI Software Initiator.
- *Do not* log in to ports that were configured in the iSCSI boot BIOS, these logins are automatically performed through the NIC iSCSI boot firmware table.

Configuring Boot From iSCSI (BFI) Using Intel PRO Network Adapter on a System That is Not Configured With a Local Disk Using the F6 Option


This section provides information about configuring BFI using Intel® PRO network adapter on a Dell™ PowerEdge™ system that is not configured with a local disk using the F6 option.

To create the operating system base image, you must initially configure the PowerEdge system with a local hard drive. After you create the operating system image and clone the image to an iSCSI Logical Unit Number (LUN), the PowerEdge system does not require a local hard drive for booting from.

Before implementing a boot from iSCSI LUN:


- See "Additional Information" on page 38 and in the *Intel iSCSI Boot User Guide*
- Configure IP addresses for the iSCSI ports on the Dell PowerVault™ MD3000i storage array

Pre-Installation Requirements

 **NOTE:** It is strongly recommended that you configure redundant paths to the target from all hosts that are configured with boot from iSCSI. The following instructions incorporate Multi-path I/O (MPIO) configuration. Misconfigured networks or networks under heavy load may interfere with critical communication between the host and the associated boot LUN on the target, causing the system to hang or display a bluescreen. To work-around this issue, configure multiple paths between the host and target. For best practices, configure a redundant iSCSI network on a separate subnets and monitor the network performance. For more information , see the whitepaper *Creating Multipath Connections to Dell iSCSI Storage Arrays* available on the Dell Techcenter website at www.dell.com/TechCenter.

Before configuring your system for BFi, read this document completely, complete the "Configuration Worksheet" on page 77 and ensure that you have the following:


- Two Intel® PRO/1000 Peripheral Component Interconnect Express (PCIe) single-port Network Interface Cards (NICs) or One Intel PRO/1000 PCIe dual-port network adapter or One Intel PRO/1000 PCIe quad-port network adapter
- Download the Intel PRO PCIe Gigabit drivers, Intel setup drivers and firmware from the Dell support website at support.dell.com. For the supported versions for drivers and firmware, see the *Dell PowerVault MD3000i Support Matrix* located on the Dell Support website at support.dell.com.
- *Intel iSCSI Boot User Guide* located on the Intel NIC media or on the Dell Support website at support.dell.com.
- Microsoft® iSCSI Software Initiator with boot support version mentioned in the *Dell PowerVault MD3000i Support Matrix* located on the Dell Support website at support.dell.com.
- Media of the supported Microsoft operating system or a copy of the Sysprep utility.
- Any disk imaging software such as Symantec™ Ghost.



 **NOTE:** Ensure that all systems that use the operating system base image are of the same hardware configuration.

Creating the Operating System Boot Image

The following subsections describe the process of creating the operating system boot image on the virtual disk.

Configuring the PowerVault MD3000i Storage Array

- 1 Perform the following procedure to manually register a host:
 - a Open the **PowerVault Modular Disk Storage Manager**, and connect to the PowerVault MD3000i storage array to be used by the host for booting.
 - b Select the **Configure** tab, and then click **Configure Host Access (Manual)**.
 - c In the **host** field, enter the host name, select the **host type** from the drop down list, and then click **Next**.
 - d In the **Selected iSCSI initiators** field, click the **New** button.
 - e In the **iSCSI initiator name** field, enter the **iSCSI Qualified Name (IQN)** of the host initiator and leave the iSCSI Initiator label to the default.
Fully qualified IQN format is <iqn><yyyy-mm>.com<company name>:<server name>.
Example: `iqn.1984-04.com.dell:server-name`. Record the IQN of the host initiator in the "Configuration Worksheet" on page 77. The IQN of the host initiator is required to configure Intel iSCSI boot BIOS.
 - f Click **Add** and then click **Next**.
 - g Ensure that the option **No, This host will NOT share access to the same virtual disks with other hosts** is selected and then click **Next**.
 - h In the **Confirm Host Definition** page, click **Finish**.
 - 2 Create a virtual disk and assign it to the host:
 - a Select the **Configure** tab and click **Create Virtual Disks**.
 - b Create a virtual disk which is of the same size as the boot partition and assign it to the host. Enter the virtual disk capacity.
-  **NOTE:** It is recommended that the capacity you allocate to the virtual disk be equal to or more than the boot partition capacity. A minimum boot partition size of 16 GB is recommended.

- c Enter a Name for the virtual disk.
 -  **NOTE:** It is recommended that you use the service tag of the PowerEdge system and the term boot-LUN in the description field.
 - d In the **Virtual Disk I/O characteristics** field, select **File system**, and click **Next**.
 - e Select **Map now** and the host you are preparing to boot, and then click **Finish**.
- 3** After creating the virtual disk, assign the preferred path for the virtual disk to the appropriate Redundant Array of Independent Disks (RAID) controller. For systems with only one boot NIC, ensure that you assign the virtual disk to the RAID controller the NIC is connecting to. For systems with two boot NICs, configure the primary path to the RAID controller that the Primary NIC is configured to boot from. To configure the preferred path:
- a Click the **Modify** tab and select the **Change Virtual Disk Ownership/Preferred Path** option.
 - b Select the **virtual disk** and the **preferred path**, and then click **Change** if required.
- 4** Record the **IQN** of the PowerVault MD3000i storage array in the "Configuration Worksheet" on page 77:
- a Select the **iSCSI** tab, and then click **Change Target Identification**.
 - b Record the iSCSI target name.
-  **NOTE:** The iSCSI Target Alias cannot be used by a host for booting.
- 5** Record the iSCSI host port IP addresses of the RAID controllers in the "Configuration Worksheet" on page 77:
- a Select the **iSCSI** tab and click **Configure iSCSI Host Ports**.
 - b Select each **iSCSI host port** from the drop down list. Record the IP address of the port to which the host system is configured to boot from. If the host system has redundant paths, select a port on a controller that is on a separate subnet.

Configuring the Intel iSCSI Boot Menu

- 1 Use the **iSCSI DOS** utility located in the **iSCSI/DOS** directory on the media that shipped with the Intel NIC to flash the Intel NIC with the iSCSI Boot PROM. For more instructions, see the *Intel iSCSI Boot User Guide*.

Boot to a bootable MS-DOS® diskette drive or a bootable USB key, and run the iSCSI DOS utility using the following commands:

```
ISCSIUTL -ALL -FLASHENABLE
```

```
ISCSIUTL -ALL -UP
```

For additional help, type `ISCSIUTL -?` at a command prompt.

- 2 Boot to the **Intel iSCSI Boot Setup** menu. For more information, see the "Firmware Setup" section in the *Intel iSCSI Boot User Guide*.


- a Select a NIC from the list, and then press <P> to configure as **Primary**. Record the PCI location **Loc** from the iSCSI Boot menu for the Primary NIC, and the Secondary NIC which is configured later. The PCI location information is required when installing the drivers later.



NOTE: Use the **Blink** function to identify each port to ensure that each NIC is cabled to the correct subnet.

- b Press <Enter> to display the **iSCSI port configuration** menu. Select **iSCSI Boot Configuration** and press <Enter>.
- c Enter the **IQN**, IP address, subnet, and gateway of the host's initiator that you recorded in step 1 of "Configuring the Intel iSCSI Boot Menu" on page 29.
- d Enter the **IQN** and IP address of the iSCSI target that you recorded in step 2 of "Configuring the Intel iSCSI Boot Menu" on page 29.
- e Retain the default value of the target port number as 3260 and Boot LUN number as 0, unless you need to change them.
- f Select **OK**, and then press <Enter> to go back to the **Intel iSCSI Boot Setup** menu.

g Select **Save changes and Exit** and press <Enter> to save the changes.

 **NOTE:** Ensure that only one NIC is configured for iSCSI boot at this time.


h Press <Esc> to exit the **Intel iSCSI Boot Setup** menu. Observe the Power-On Self-Test (POST) output to ensure that the iSCSI LUN is detected. If the iSCSI LUN is not detected during POST, stop the process and verify the configuration on the PowerVault MD3000i storage array and the **Intel iSCSI Boot Setup** menu.


 **NOTE:** *Do not* continue if the iSCSI LUN is not detected during POST.

Installing the Operating System on the iSCSI LUN


To install an operating system boot image on the iSCSI LUN:


- 1 Copy the Intel iSCSI setup drivers from the Intel iSCSI Boot media to a diskette drive.
- 2 Turn on the system and boot from the Microsoft Windows Server® 2003 32-bit SP1 or SP2 installation media.


 **NOTE:** The Windows Server 2003 x64 operating system does not support the F6 installation method with an iSCSI LUN.

-  **NOTICE:** A 20 MB LUN with LUN ID 31 is displayed in the list of available iSCSI LUNs. This LUN is displayed as the PowerVault MD3000i MPIO driver is not loaded during installation. During installation, do not format this LUN to avoid LUN corruption. To workaround the LUN corruption and to remove the LUN from the Disk Manager, install the PowerVault Modular Disk Storage Manager after the operating system installation is complete.
- 3 Press <F6> when prompted with **Press F6 if you need to install a third-party SCSI or RAID driver.**
 - 4 Press <S> when prompted to install third-party storage device.
 - 5 Select **Intel PRO/1000 iSCSI Setup Driver**, then press <Enter>, and proceed to complete the operating system installation.
 - 6 After the installation is complete, open the **Device Manager**, and expand **Other devices**. Right-click each **Ethernet Controller** and select **Properties**.
 - 7 To identify the primary and secondary adapters, go to **Ethernet Controller Properties**→**General**→**Location**. Verify the primary and secondary adapter information with the information you recorded during step 2 of "Configuring the Intel iSCSI Boot Menu" on page 29.

- 8 Select the NIC that you are configuring as the Secondary NIC and install the network driver using **Device Manager**→ **Plug and Play installation**.


 **NOTE:** Do not install the drivers for the network adapter that was configured as the primary boot NIC at this time.

 **NOTE:** You must install the driver using the **Device Manager** and not through the **Install Drivers and Software** button in the **Autorun** utility.

 **NOTE:** *Do not* configure the IP addresses of the NICs manually. You must configure the NICs with Dynamic Host Configuration Protocol (DHCP). The IP address is assigned automatically when the iSCSI LUN is detected by the boot firmware of the Intel NIC.


- 9 Turn on the system and log in to the operating system.

- 10 Install Microsoft iSCSI Software Initiator supported version with integrated software boot support on the PowerEdge system. To download the iSCSI Software Initiator boot version, search www.microsoft.com for **iSCSI initiator** and follow the link.

 **NOTE:** Ensure that you download the iSCSI initiator boot version by carefully reading the page, as the link may be in text, and not hyperlinked.

- 11 To ensure that BFi is configured correctly, select the following options when prompted during the installation:


- a Select **Initiator Service, Software Initiator, and Microsoft Multipath I/O (MPIO) Support** for iSCSI.

 **NOTE:** Do not select **Microsoft Multipath I/O (MPIO) Support** for iSCSI.

- b Select **Configure iSCSI Network Boot Support** and highlight at least one Intel NIC with an *express service name*.

- c Select **Do not restart now** when prompted to restart the system, and then click **Finish**.

- d Select **No** when prompted for reboot.

 **NOTE:** It is strongly recommended that you do not login to the iSCSI target manually. The iSCSI Software Initiator automatically retrieves the iSCSI boot configuration from the Intel PRO/1000 adapter iSCSI Boot firmware. If you manually add connections inside the initiator with the same paths as configured in the iSCSI boot firmware, the system may hang, display a blue screen or reboot during failover.

- 12 Disable the page file since the PowerEdge system will not have a local hard drive configured on the host. To disable the page file:
 - a Right-click **My Computer**, and select **Properties**.
 - b In the **System Properties** screen, click the **Advanced** tab.
 - c In the **Performance** section, click **Settings**.
 - d In the **Performance Options** screen, click the **Advanced** tab.
 - e In the **Virtual Memory** section, click **Change**.
 - f In the **Virtual Memory** screen, select the **No paging file** option, click **Set**, and then click **OK**.



NOTICE: The following step is mandatory. Failure to perform the step may cause the operating system to display a blue screen and fail to boot. For more information, see the Microsoft Knowledge Base article [934235](https://support.microsoft.com/934235) on the Microsoft Support website at support.microsoft.com.

- 13 If you add or update any hardware or software components such as network drivers or operating system service pack updates that may impact the networking stack, you must re-run the `iscsibcg.exe` utility with the `/verify /fix` command line option.

To configure the `iscsibcg.exe` utility to run every time the system is turned off:

- a Click **Start**→**Run**.
 - b Type `gpedit.msc`, and click **OK**.
 - c In the **Group Policy** window, expand **Computer Configuration**→**Windows Settings**→**Scripts (Startup/Shutdown)**.
 - d In the **Scripts (Startup/Shutdown)** screen, double-click **Shutdown**.
 - e In the **Shutdown Properties** screen, click **Add**.
 - f In the **Script Name** field, browse to the `iscsibcg.exe` (default location is `c:\windows\system32\`), and then type `/verify /fix` in the **Script Parameters** field. Click **OK**.
- 14 Install the **Dell PowerVault Modular Disk Storage Manager** host software available on the *Dell PowerVault Resource* media.
 - 15 Select the installation type as either **Typical** or **Host**. The typical installation installs both host software and management software; the host installation installs only the necessary host software.
 - 16 After the installation is complete, reboot the system.

- 17** Boot into the **Intel iSCSI Boot Setup** menu. For more information, see the section titled "Firmware Setup" in the *Intel iSCSI Boot User Guide*.
- a** Select the NIC that you are configuring for the secondary boot, and then press <S> to configure as secondary.
 - b** Press <Enter> to display **iSCSI port configuration** menu. Select **iSCSI Boot Configuration** and press <Enter>.
 - c** Enter the IQN, IP address, subnet, and gateway of the host initiator that you recorded in the "Configuration Worksheet" on page 77.
 - d** Enter the IQN and IP address of the iSCSI target that you recorded in the Configuration Worksheet during step 2 of "Configuring the Intel iSCSI Boot Menu" on page 29.
 - e** Retain the default values of the Target Port number as 3260 and Boot LUN number as 0, unless you need to change them.
 - f** Select **OK**, and then press <Enter> to go back to the main menu.
 - g** Select **Save changes and Exit** and press <Enter> to save the changes.



NOTE: Ensure that the primary NIC and the secondary NIC are configured on separate subnets.

- 18** To save the iSCSI boot configuration to a file, perform the following steps:
- a** Boot to a bootable device.
 - b** Save the configuration to a file using the **iscsiutl** program by typing the following command at the command prompt:

```
ISCSIUTL -SAVE -FILE <FILENAME> -NIC <#>
```

where **FILENAME** is the name of the iSCSI boot configuration file and **#** is the NIC number.



NOTE: It is recommended that you include the NIC number in the file name. For example, to name the iSCSI boot configuration file of the first NIC use the following command:


```
ISCSIUTL -SAVE -FILE dell1 -NIC 1
```

where **NIC 1** is the NIC number of the first NIC. To name the iSCSI boot configuration file of the second NIC use the following command:

```
ISCSIUTL -SAVE -FILE dell2 -NIC 2
```



NOTE: The iSCSI DOS utility identifies each port of a dual-port NIC separately. If you have configured both ports on a dual-port NIC to BFi, consider each port as a separate NIC.

- 19 Restart the system and log in to the operating system.
- 20 Open the **Disk Management Console** and verify that the iSCSI LUN is recognized.
 -  **NOTE:** It is strongly recommended that you do not login to the iSCSI target manually. The iSCSI Software Initiator automatically retrieves the iSCSI boot configuration from the Intel PRO/1000 adapter iSCSI Boot firmware. If you manually add connections in the initiator with the same paths as configured in the iSCSI boot firmware, the system may hang, display a blue screen or reboot during failover.
- 21 Run the Intel iSCSI utility—**SCSIApp.exe** to uninstall the Intel PRO/1000 iSCSI setup driver.
- 22 Reboot the system and log in to operating system.
- 23 Install network driver for the port that was being used by Intel PRO/1000 iSCSI Setup Driver.
- 24 Restart the system.

Cloning

If you intend to create an operating system image to deploy to multiple hosts, run **Sysprep** prior to cloning the LUN.

- 1 In the system drive root, create a directory and name it as **Sysprep**.
- 2 In your operating system media, locate the archive file `support\tools\deploy.cab` and copy all the contents to the **Sysprep** directory.
- 3 Use the **setupmgr.exe** utility to create the **sysprep.inf** file and follow the on the screen instructions to provide specific information.
- 4 In the **Sysprep.inf** file, edit the **[Unattended]** section as shown below:
[Unattended]
LegacyNic=1
- 5 Run **Sysprep**.
- 6 To create an operating system image, select **Reseal and Shutdown**.

You can clone additional iSCSI LUNs so that they can be used to boot additional hosts. The following section describes various methods that you can use to clone one iSCSI LUN to additional iSCSI LUNs.



NOTE: After you have created the clone(s), boot the new systems from their respective LUNs by following the steps in "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.

Method 1—Using Snapshot Virtual Disks and Virtual Disk Copy (Preferred Method)

- 1 Configure the host system to boot from an iSCSI LUN.
- 2 Turn off the system
- 3 Use the **PowerVault Modular Disk Storage Manager** to create a snapshot virtual disk of the source virtual disk.
- 4 Configure a different system to boot from the snapshot virtual disk. For instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.
- 5 Run **Sysprep** and turn off the system.
- 6 Use the **PowerVault Modular Disk Storage Manager** to create a virtual disk copy of the snapshot virtual disk.
- 7 After the virtual disk copy is created, remove the copy pair using the **PowerVault Modular Disk Storage Manager**.
- 8 Configure the system to boot from the new iSCSI LUN. For instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.



NOTE: For more information about creating snapshot virtual disks and virtual disk copy, see the *PowerVault Modular Disk Storage Manager User's Guide* located on the Dell Support website at support.dell.com.

Method 2—Using Virtual Disk Copy Premium Feature

- 1 Configure the host system to boot from an iSCSI LUN.
- 2 Run **Sysprep** and turn off the system.
- 3 Using the **PowerVault Modular Disk Storage Manager** create a virtual disk copy of the snapshot virtual disk.

- 4 After the virtual disk copy is created, remove the copy pair using the **Dell PowerVault Modular Disk Storage Manager**.
- 5 Configure each system to boot from the assigned iSCSI LUN. For more instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.



NOTE: For more information about creating snapshot virtual disks and virtual disk copy, see the *PowerVault Modular Disk Storage Manager User's Guide* located on the Dell Support website at support.dell.com.

Method 3—Using an Imaging Server

This procedure uses an imaging server to clone the boot image of one system (that boots from an iSCSI LUN) to multiple iSCSI LUNs. The images on the multiple iSCSI LUNs can then be used to configure BFi on multiple systems. Perform the following steps to clone the boot image:



NOTE: Before you perform the following steps, ensure that the imaging server is configured with an iSCSI connection to the iSCSI target.

- 1 Configure the host system to Boot from an iSCSI LUN.
- 2 Run **Sysprep** and turn off the system.
- 3 Unassign the iSCSI LUN from the original host system and assign the iSCSI boot LUN to the imaging server.
- 4 Execute the imaging software (such as Ghost32) and create an image file of the iSCSI LUN (disk to image).
- 5 Unassign the original iSCSI LUN from the imaging server.
- 6 Assign the iSCSI LUN(s) on which you are creating clone(s) to the imaging server.
- 7 Execute an imaging software such as Ghost 32 and image each iSCSI LUN with the boot image that you created in step 4 (image to disk).
- 8 Unassign all iSCSI LUNs from the imaging server.
- 9 Assign each iSCSI LUN to the system that it boots to. Follow the instructions in "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63 to configure each system to boot from the assigned iSCSI LUN.

Troubleshooting

If iSCSI Boot BIOS fails to detect iSCSI target, perform the following steps and try to boot the system from iSCSI:

- Disable the spanning tree protocol on the switch ports on which the iSCSI boot NIC is configured. For information about disabling the spanning tree, see the documentation that shipped with the switch.
- Check for typographic errors in the BIOS settings. The configuration options must match the instructions provided. For more troubleshooting procedures, see the *Intel iSCSI Boot User Guide* and the Dell Support website at support.dell.com.
- To eliminate switch problems, test by connecting the initiator to the target directly using a standard Ethernet cable. *Do not* use a cross-over cable.

During initial setup, if the host displays a blue screen or continues to reboot when you boot from the iSCSI LUN, perform the following troubleshooting steps:



NOTE: The following steps are applicable only to newly-configured BFi host systems.

- 1** Change the boot order in the BIOS screen to re-enable the local hard drive.
- 2** Re-install the supported boot version of the iSCSI Software Initiator. During installation the GUI displays the previously selected options, ensure that you select the correct boot option.
- 3** Re-install **PowerVault Modular Disk Storage Manager** host software.
- 4** Open the **iSCSI Software Initiator** GUI to ensure that there are no entries in the **Discovery** tab or in the **Persistent Targets** tab.
- 5** Open the **Disk Management** console and verify the iSCSI LUN is recognized.
- 6** Replicate the operating system boot image from the local hard drive to an image then to the iSCSI LUN and then boot from the iSCSI LUN.
- 7** Disable the local hard drive and boot from the iSCSI LUN.

Additional Information

- NIC teaming is not supported for iSCSI traffic on the host or on the PowerVault MD3000i storage array.
- If you are using two NICs — one as primary NIC and one as the secondary boot NIC, ensure that they are configured to use separate subnets.
- After the host is configured to use BFi, you can configure additional paths to other targets in the Microsoft iSCSI Software Initiator.
- Do not log in to ports that were configured in the iSCSI boot BIOS, these logins are automatically performed through the NIC iSCSI boot firmware table.

Configuring Boot From iSCSI (BFi) Using Broadcom™ NetXtreme Network Adapter on a System That is Configured With a Local Disk

This section provides information about configuring a Dell™ PowerEdge™ system to boot from an Internet Small Computer System Interface (iSCSI) solution using the Broadcom® NetXtreme® network adapter when the base system has a local disk.


To create the operating system base image, you must initially configure the PowerEdge system with a local hard drive. After the operating system image is created and is cloned to the iSCSI Logical Unit Number (LUN), the PowerEdge system does not require a local hard drive for booting. Before implementing a boot from iSCSI LUN:

- See "Additional Information" on page 53 and the *Broadcom iSCSI Boot User's Guide*.
- Configure IP addresses for the iSCSI ports on ton the Dell PowerVault™ MD3000i storage array.




NOTE: Throughout this document, the term *host* refers to the PowerEdge system on which you configure Boot From iSCSI (BFi). The terms iSCSI LUN and iSCSI target refer to the LUN in the Dell PowerVault MD3000i Integrated solution from which you perform the boot.


Pre-Installation Requirements

 **NOTE:** It is strongly recommended that you configure redundant paths to the target from all hosts that are configured with boot from iSCSI. The following instructions incorporate Multi-path I/O (MPIO) configuration. Misconfigured networks or networks under heavy load may interfere with critical communication between the host and the associated boot LUN on the target, causing the system to hang or display a bluescreen. To work-around this issue, configure multiple paths between the host and target. For best practices, configure a redundant iSCSI network on a separate subnets and monitor the network performance. For more information , see the whitepaper *Creating Multipath Connections to Dell iSCSI Storage Arrays* available on the Dell Techcenter website at www.dell.com/TechCenter.

Before configuring your system for BFi, read this document completely, complete the "Configuration Worksheet" on page 77 and ensure that you have the following:

- A PowerEdge system with the latest PowerEdge BIOS version found on the Dell Support website at support.dell.com
- Local hard drive for initial operating system installation
- Either local FAT32 partition or network share to store initial boot image
- Broadcom NetXtreme Network adapter drivers and firmware from the Dell support website at support.dell.com. For the supported versions of drivers and firmware, see the *Dell PowerVault MD3000i Support Matrix* located on the Dell Support website at support.dell.com.
- Broadcom NetExtreme and NetExtreme II User's Guide located on the Broadcom LOM media or on the Dell Support website at support.dell.com.
- Microsoft® iSCSI Software Initiator with boot support version as mentioned in the *Dell PowerVault MD3000i Support Matrix* located on the Dell Support website at support.dell.com.
- Media of the supported Microsoft Windows® operating system or a copy of the Sysprep utility.
- Any disk imaging software such as Symantec™ Ghost.

 **NOTE:** If deploying a base image to multiple systems, ensure that all systems that use the operating system base image are of the same hardware configuration.

 **NOTE:** For the latest supported firmware and driver versions, see the *Dell PowerVault MD3000i Systems Support Matrix* located on the Dell Support website at support.dell.com.

Creating the Operating System Boot Image

The following subsections describe the process of creating the operating system boot image on the virtual disk.

Configuring the Host

To create an operating system boot image:

- 1 Configure a PowerEdge system. To configure:
 - a Install Microsoft Windows Server® 2003 SP1, Windows Server 2003 SP2, or Windows Server 2003 R2 operating system on the PowerEdge system that is temporarily configured with a local hard drive.
 - b Install the supported drivers for Broadcom NetXtreme Network adapter; or Broadcom NetExtreme II family of adapters.



NOTE: *Do not* configure the IP addresses of the LOMs or NICs manually. Configure the LOMs or NICs with DHCP so that the IP address is assigned when the iSCSI LUN is detected by the Broadcom NIC's iSCSI boot firmware.



NOTE: NIC teaming is not supported with the NIC that is used for BFi.

- 2 Install the latest supported version of the Microsoft iSCSI Software Initiator with integrated software boot support on the PowerEdge system. To download the iSCSI Software Initiator boot version, search www.microsoft.com for **iSCSI initiator** and follow the link.



NOTE: Ensure that you download the iSCSI initiator boot version by carefully reading the page, as the link may be in text, and not hyperlinked.

- 3 To ensure that BFi is configured correctly, select the following options when prompted during the installation:
 - a Select **Initiator Service, Software Initiator, and Microsoft Multipath I/O (MPIO) Support for iSCSI**.
 - b Select **Configure iSCSI Network Boot Support** and highlight at least one Intel NIC with an *express service name*.



NOTE: It is strongly recommended that you *do not* login to the iSCSI target manually. The iSCSI Software Initiator automatically retrieves the iSCSI boot configuration from the Broadcom NetXtreme and NetXtreme II Gigabit iSCSI Boot firmware. If you manually add connections in the initiator with the same paths as configured in the iSCSI boot firmware, the system may hang, display a blue screen or reboot during failover.

- 4 Install the **Dell PowerVault Modular Disk Storage Manager** host software. Select the installation type as either **typical** or **host**. The **typical** installation installs both host software and management software; the **host** installation only installs the necessary host software. After the installation is complete, reboot the system.
- 5 Disable the page file since the PowerEdge system will not have a local hard drive configured on the host. To disable the page file:
 - a Right-click **My Computer** and select **Properties**.
 - b In the **System Properties** screen, click the **Advanced** tab.
 - c In the **Performance** section, click **Settings**.
 - d In the **Performance Options** screen, click the **Advanced** tab.
 - e In the **Virtual Memory** section, click **Change**.
 - f In the **Virtual Memory** screen, select **No paging file** option, click **Set**, and then click **OK**.



NOTICE: You must perform the following step. Skipping step 6 may cause the operating system to display a blue screen and fail to boot. For more information, see the Microsoft Knowledge Base article [934235](https://support.microsoft.com/934235) on the Microsoft Support website at support.microsoft.com.

- 6 If you add or update any hardware or software components such as network drivers or operating system service pack updates that may impact the Networking stack, you must re-run the **icsibcg.exe** utility with the `/verify /fix` command line option.



Configure the **icsibcg.exe** utility to run every time the system is turned off:

- a Click **Start**→**Run**.
- b Type `gpedit.msc` and click **OK**.
- c In the **Group Policy** window, expand **Computer Configuration**→**Window Settings**→**Scripts (Startup/Shutdown)**.
- d In the **Scripts (Startup/Shutdown)** screen, double-click **Shutdown**.
- e In the **Shutdown Properties** screen, click **Add**.


In the **Script Name** field, browse to the **icsibcg.exe** (default location, `c:\windows\system32\`), and then type `/verify /fix` in the **Script Parameters** field.

- f Click **OK**.


Configuring the PowerVault MD3000i Storage Array

- 1 Perform the following procedure to manually register a host:
 - a Open the **PowerVault Modular Disk Storage Manager**, and connect to the PowerVault MD3000i storage array to be used by the host for booting.
 - b Select the **Configure** tab, and then click **Configure Host Access (Manual)**.
 - c In the **host** field, enter the host name, select the **host type** from the drop down list, and then click **Next**.
 - d In the **Selected iSCSI initiators** field, click the **New** button.
 - e In the **iSCSI initiator name** field, enter the **iSCSI Qualified Name (IQN)** of the host initiator and leave the iSCSI Initiator label to the default. Fully qualified IQN format is
`<iqn><yyyy-mm>.com<company name>:<server name>`.
Example: `iqn.1984-04.com.dell:server-name`.
Record the IQN of the host initiator in the "Configuration Worksheet" on page 77. The IQN of the host initiator is required to configure Intel iSCSI boot BIOS.
 - f Click **Add** and then click **Next**.
 - g Ensure that the option **No, This host will NOT share access to the same virtual disks with other hosts** is selected and then click **Next**.
 - h In the **Confirm Host Definition** page, click **Finish**.
- 2 Create a virtual disk and assign it to the host:
 - a Select the **Configure** tab and click **Create Virtual Disks**.
 - b Enter the virtual disk capacity.
 **NOTE:** It is recommended that the capacity you allocate to the virtual disk be equal to or more than the boot partition capacity.
 - c Enter a Name for the virtual disk.
 **NOTE:** It is recommended that you use the service tag of the PowerEdge system and the term boot-LUN in the description field.
 - d In the **Virtual Disk I/O characteristics** field, select **File system**, and click **Next**.
 - e Select **Map now** and the host you are preparing to boot, and then click **Finish**.

- 3 After creating the virtual disk, assign the preferred path for the virtual disk to the appropriate Redundant Array of Independent Disks (RAID) controller. For systems with only one boot NIC, ensure that you assign the virtual disk to the RAID controller the NIC is connecting to. For systems with two boot NICs, configure the primary path to the RAID controller that the Primary NIC is configured to boot from. To configure the preferred path:
 - a Click the **Modify** tab and select the **Change Virtual Disk Ownership/Preferred Path** option.
 - b Select the **virtual disk** and the **preferred path**, and then click **Change** if required.
- 4 Record the IQN of the PowerVault MD3000i storage array in the "Configuration Worksheet" on page 77:
 - a Select the **iSCSI** tab, and then click **Change Target Identification**.
 - b Record the iSCSI target name.

 **NOTE:** The iSCSI Target Alias cannot be used by a host for booting.
- 5 Record the iSCSI host port IP addresses of the RAID controllers in the "Configuration Worksheet" on page 77:
 - a Select the **iSCSI** tab and click **Configure iSCSI Host Ports**.
 - b Select each iSCSI host port from the drop down list. Record the IP address of the port to which the host system is configured to boot from. If the host system has redundant paths, select a port on a controller that is on a separate subnet.

Configuring the Broadcom iSCSI Boot Menu

 **NOTE:** For Broadcom NetXtreme and NetXtreme II stand-up NICs and add-in cards, skip step 1 to step 4 listed below.

- 1 Turn on the system and press <F2> to enter BIOS.
- 2 From the BIOS menu, select **Integrated Devices**, and press <Enter>.
- 3 Configure both NICs to **Enable for iSCSI boot**. Record the MAC addresses of the two NICs.
- 4 Verify the changes in the BIOS menu, press <Enter> and select **Save changes and Exit**.

- 5 Boot into the **Broadcom Managed PC Boot Agent (MBA)** configuration menu by pressing <Ctrl><s> during Power-On Self-Test (POST).
- 6 Press <Ctrl><k> to enter the **iSCSI Boot Configuration** menu. In the **iSCSI Boot Configuration** menu, ensure that the boot protocol is configured for iSCSI. If you are using a Broadcom NetXtreme II add-on NIC, you can change the boot protocol in the MBA Configuration menu.
- 7 In the **Device List** menu, select the device from the list that has the same MAC address you recorded in step 3 and press <Enter>.
- 8 From the **Main Menu**, select **General Parameters**, and press <Enter>.
- 9 Configure the general parameters as shown in Figure 4-1.

Figure 4-1. Configuration of General Parameters


```
iSCSI Configuration Utility v2.4.5
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-----
                                General Parameters
-----
TCP/IP Parameters via DHCP: Disabled
iSCSI Parameters via DHCP: Disabled
CHAP Authentication:      Disabled
Boot to iSCSI target:     Disabled
DHCP Vendor ID:          BCM ISAN
Link Up Delay Time:       0
Use TCP Timestamp:        Disabled
Target as First HDD:      Disabled
LUN Busy Retry Count:    0
Windows HBA Boot Mode:   Disabled

Current Adapter: Primary, Bus=15 Device=00 Func=00, MAC=00:10:18:26:A9:16

Acquire TCP/IP configuration via DHCP
```

The above configuration is applicable when you are using static IP address to configure BFi. To configure BFi dynamically, set the **TCP/IP parameters via DHCP** and **iSCSI parameters via DHCP** to Enabled. For additional information, see the *Broadcom Netxtreme II User's Guide*.

 **NOTE:** If you wish to use OIS (Offload) to boot, set Windows HBA Mode to Enabled in the <Ctrl><k> menu of the NIC/LOM firmware.

 **NOTE:** Do not enable CHAP at this time. It is recommended to configure any advanced features after connectivity between host and target is established.

- 10 Press <Esc> to go back to the **Main Menu**.

- 11 In the **Main Menu**, select **Initiator parameters**. Enter the IP address, subnet, gateway, and DNS of the host.
- 12 Press <Esc> to go back to the **Main Menu**.
- 13 In the **Main Menu**, select **1st Target parameters** and enter the target's IP address and IQN. Retain the default values of the port number as 3260 and LUN number as 0, unless you need to change them.



NOTE: Configuring the second iSCSI target is not supported at this time.

- 14 Press <Esc> twice to exit the **Configuration Menu**. Select **Exit and Save Configuration** and press <Enter>.



NOTE: If Windows HBA mode is set to **Enabled**, skip step 15 to step 16. If you are using iSCSI boot through HBA, redundant paths to the target are not supported. You can create redundancy for Data I/O by creating a connection manually in the Microsoft iSCSI initiator for the additional network adapters.




NOTE: Skip step 15 to step 16 if Windows HBA mode is set to **Enabled**. Redundant paths to the target is not supported for iSCSI boot over HBA. You can create redundancy for Data I/O by creating a connection manually in the Microsoft iSCSI initiator for the additional Network adapters. Refer to the iSCSI target user manual for specific guidance to create the connection.

- 15 Select **Secondary Device Parameters**. In the **Secondary Device Parameters** screen, select **Secondary Device** and press the <Enter> key. In the device list, select the MAC address of the second adapter that you recorded in the step 3.
- 16 Select **Configure Secondary** and press the <Enter> key. Repeats step 8 to step 13 to configure the secondary adapter.



NOTE: If Windows HBA mode is set to **Enabled**, skip step 17 to step 19. If you are using iSCSI boot through HBA, redundant paths to the target are not supported. You can create redundancy for data I/O by creating a connection manually in the Microsoft iSCSI initiator for the additional Network adapters.


- 17 Press <Esc> and <F4> to save and exit from the Broadcom MBA configuration menu.

 **NOTE:** It is recommended that you save the iSCSI boot configuration to a file to enable faster recovery if you need to replace the NIC.

- 18 To save the iSCSI boot configuration to a file:

- a Boot your system to a bootable device.
- b Save the configuration to a file using the `ibcfg.exe` program by typing the following command at the command prompt:


```
IBCFG -get <FILENAME> -dev <MAC address>
```

 **NOTE:** It is recommended that you include the NIC number in the file name. For example, to name the iSCSI boot configuration file of the NIC-enabled for iSCSI boot, use the following command where 00:18:8B:FD:F9:1A is the MAC address of the iSCSI boot NIC.


```
IBCFG -get dell1 -dev 00:18:8B:FD:F9:1A
```

Preparing the Host and Operating System Boot Image

- 1 In the host's BIOS, confirm that the boot order lists the Broadcom Embedded NIC 1 before the local hard drive.
- 2 Press <Esc> twice and select **Save changes and exit** to exit from BIOS.
- 3 BIOS reboots the system and boot into the operating system in local hard drive.
- 4 Log in to the operating system. Open the **Disk Management** Console and verify that the iSCSI LUN is recognized.

 **NOTE:** It is strongly recommended that you do not login to the iSCSI target manually. The iSCSI Software Initiator automatically retrieves the iSCSI boot configuration from the Intel PRO/1000 adapter iSCSI Boot firmware. If you manually add connections in the initiator with the same paths as configured in the iSCSI boot firmware, the system may hang, display a blue screen or reboot during failover.

- 5 Create a new FAT32 partition on the local hard drive using the disk management console.

 **NOTE:** You can skip step 5 if you have saved the image to a network share.

- 6 Boot to a bootable device such as a diskette drive, media, or USB key and run a disk imaging software such as Symantec Ghost.

- 7 Clone the operating system partition to the Fat32 partition (partition to image) or network share (disk to image).
- 8 Reboot the host and boot into the operating system on the local hard drive.
- 9 Launch Windows compatible cloning software such as Ghost32 application and write the image in Fat32 partition (or network share) to the remote LUN.
- 10 Go to the BIOS menu, disable the local hard drive and reboot.
- 11 During BIOS POST, press <Ctrl><s> to enter Broadcom MBA configuration menu.
- 12 Press <Ctrl><k> to enter iSCSI boot configuration menu.
- 13 Select the device from the list that was previously configured for iSCSI boot and press <Enter>.
- 14 Select **General Parameters** from the menu and press <Enter>.
- 15 Configure Boot to iSCSI target to **Enabled** as shown in Figure 4-2.

Figure 4-2. Configuring General Parameters

```

iSCSI Configuration Utility v2.4.5
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----- General Parameters -----
TCP/IP Parameters via DHCP: Disabled
iSCSI Parameters via DHCP: Disabled
CHAP Authentication: Disabled
Boot to iSCSI target: Enabled
DHCP Vendor ID: BRCM ISAN
Link Up Delay Time: 0
Use TCP Timestamp: Disabled
Target as First HDD: Disabled
LUN Busy Retry Count: 0
Windows HBA Boot Mode: Disabled

Current Adapter: Primary, Bus=15 Device=00 Func=00, MAC=00:10:18:26:A9:16
Enable/Disable Booting to iSCSI target after logon_

```


- 16 Press <Esc> twice to exit the **Configuration Menu**. Select **Exit and Save Configuration** and press <Enter>.

NOTE: Skip step 17 to step 19 if Windows HBA mode is set to **Enabled**. Redundant paths to the target is not supported for iSCSI boot over HBA. You can create redundancy for Data I/O by creating a connection manually in the Microsoft iSCSI initiator for the additional Network adapters. Refer to the iSCSI target user manual for specific guidance to create the connection.

- 17 Press <Esc> to go back to the main menu. Select **Secondary Device Parameters** and press the <Enter> key.
- 18 In the **Secondary Device Parameters** screen, select **Configure Secondary** and press <Enter>.
- 19 Repeat step 14 and step 15.
- 20 Press <Esc> and <F4> to save and exit from the **Broadcom MBA Configuration** menu.

The host now boots from the iSCSI LUN.

Cloning

If you intend to create an operating system image to deploy to multiple hosts, run **Sysprep** prior to cloning the LUN.

- 1 In the system drive root, create a directory and name it as **Sysprep**.
- 2 In your operating system media, locate the archive file `support\tools\deploy.cab` and copy all the contents to the **Sysprep** directory.
- 3 Use the **setupmgr.exe** utility to create the **sysprep.inf** file and follow the on the screen instructions to provide specific information.
- 4 In the **Sysprep.inf** file, edit the [Unattended] section as shown below:
[Unattended]
LegacyNic=1
- 5 Run **Sysprep**.
- 6 To create an operating system image, select **Reseal and Shutdown**.

You can clone additional iSCSI LUNs so that they can be used to boot additional hosts. The following section describes various methods that you can use to clone one iSCSI LUN to additional iSCSI LUNs.



NOTE: After you have created the clone(s), boot the new systems from their respective LUNs by following the steps in "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.

Method 1—Using Snapshot Virtual Disks and Virtual Disk Copy (Preferred Method)

- 1 Configure the host system to boot from an iSCSI LUN.
- 2 Turn off the system
- 3 Use the **PowerVault Modular Disk Storage Manager** to create a snapshot virtual disk of the source virtual disk.
- 4 Configure a different system to boot from the snapshot virtual disk. For instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.
- 5 Run **Sysprep** and turn off the system.
- 6 Use the **PowerVault Modular Disk Storage Manager** to create a virtual disk copy of the snapshot virtual disk.
- 7 After the virtual disk copy is created, remove the copy pair using the **PowerVault Modular Disk Storage Manager**.
- 8 Configure the system to boot from the new iSCSI LUN. For instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.



NOTE: For more information about creating snapshot virtual disks and virtual disk copy, see the *PowerVault Modular Disk Storage Manager User's Guide* located on the Dell Support website at support.dell.com.

Method 2—Using Virtual Disk Copy Premium Feature

- 1 Configure the host system to boot from an iSCSI LUN.
- 2 Run **Sysprep** and turn off the system.
- 3 Using the **PowerVault Modular Disk Storage Manager** create a virtual disk copy of the snapshot virtual disk.

- 4 After the virtual disk copy is created, remove the copy pair using the **Dell PowerVault Modular Disk Storage Manager**.
- 5 Configure each system to boot from the assigned iSCSI LUN. For more instructions, see "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63.



NOTE: For more information about creating snapshot virtual disks and virtual disk copy, see the *PowerVault Modular Disk Storage Manager User's Guide* located on the Dell Support website at support.dell.com.

Method 3—Using an Imaging Server

This procedure uses an imaging server to clone the boot image of one system (that boots from an iSCSI LUN) to multiple iSCSI LUNs. The images on the multiple iSCSI LUNs can then be used to configure BFi on multiple systems. Perform the following steps to clone the boot image:



NOTE: Before you perform the following steps, ensure that the imaging server is configured with an iSCSI connection to the iSCSI target.

- 1 Configure the host system to Boot from an iSCSI LUN.
- 2 Run Sysprep and turn off the system.
- 3 Unassign the iSCSI LUN from the original host system and assign the iSCSI boot LUN to the imaging server.
- 4 Execute the imaging software (such as Ghost32) and create an image file of the iSCSI LUN (disk to image).
- 5 Unassign the original iSCSI LUN from the imaging server.
- 6 Assign the iSCSI LUN(s) on which you are creating clone(s) to the imaging server.
- 7 Execute an imaging software such as Ghost 32 and image each iSCSI LUN with the boot image that you created in step 4 (image to disk).
- 8 Unassign all iSCSI LUNs from the imaging server.
- 9 Assign each iSCSI LUN to the system that it boots to. Follow the instructions in "Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters" on page 63 to configure each system to boot from the assigned iSCSI LUN.

Troubleshooting

If iSCSI Boot BIOS fails to detect iSCSI target, perform the following steps and try to boot the system from iSCSI:

- Disable the spanning tree protocol on the switch ports on which the iSCSI boot NIC is configured. For information about disabling the spanning tree, see the documentation that shipped with the switch.
- Check for typographic errors in the BIOS settings. The configuration options must match the instructions provided. For more troubleshooting procedures, see the *Broadcom NetExtreme and NetXtreme II User Guide* at the Dell Support website at support.dell.com.
- To eliminate switch problems, test by connecting the initiator to the target directly using a standard Ethernet cable. *Do not* use a cross-over cable.

During initial setup, if the host displays a blue screen or continues to reboot when you boot from the iSCSI LUN, perform the following troubleshooting steps:



NOTE: The following steps are applicable only to newly-configured Boot from iSCSI host systems.

- 1 Change the boot order in the BIOS screen to re-enable the local hard drive.
- 2 Re-install the latest supported boot version of the iSCSI Software Initiator. During installation the GUI displays the previously selected options, ensure that you select the correct boot option.
- 3 Re-install the **Power Vault Modular Disk Storage Manager** host software.
- 4 Open the **iSCSI Software Initiator** GUI to ensure that there are no entries in the **Discovery** tab or in the **Persistent Targets** tab.
- 5 Open the **Disk Management** console and verify the iSCSI LUN is recognized.
- 6 Replicate the operating system boot image from the local hard drive to an image then to the iSCSI LUN and then boot from the iSCSI LUN.
- 7 Disable the local hard drive and boot from the iSCSI LUN.

Additional Information

- NIC teaming is not supported for iSCSI traffic on the host or on the PowerVault MD3000i storage array.
- If you are using two NICs — one as primary NIC and one as the secondary boot NIC, ensure that they are configured to use separate subnets.
- After the host is configured to use BFi, you can configure additional paths to other targets in the Microsoft iSCSI Software Initiator.
- Do not log in to ports that were configured in the iSCSI boot BIOS, these logins are automatically performed through the NIC iSCSI boot firmware table.



Replacing the Intel Network Adapter Configured for Boot From iSCSI

If the Intel® PCIe network interface card (NIC) used in your Dell™ PowerEdge™ system fails and you replace the NIC, you must re-configure the iSCSI boot configuration settings to ensure that your PowerEdge system successfully boots from the virtual disk.

You must perform the following steps to replace and reconfigure the NIC that has been configured to boot from iSCSI:

- 1** Retrieve the boot configuration settings from the previous boot configuration file. For more information, see "Restoring the iSCSI Boot Configuration from a Backup File" on page 56 or "Determining iSCSI Boot Configuration Settings from a Failed NIC" on page 57.
- 2** Replace the NIC and update the firmware. For detailed instructions to replace the NIC, see the documentation that has shipped along with your system. For latest firmware, refer to the NX1950 support matrix and download the appropriate files from the Dell Support website at support.dell.com.
- 3** Restore the boot configuration settings. If you have the iSCSI boot configuration settings file, you can restore these settings. If you do not have the iSCSI boot configuration settings file, you must manually enter this information. For more information, see "Manually Entering Boot Settings from the iSCSI Boot Menu" on page 59.

The following sections describe how to configure, save, and restore virtual disk boot settings to the replacement NIC.

Retrieving the iSCSI Boot Configuration Information

You can configure the virtual disk iSCSI boot configuration settings on the PowerEdge system in three ways:

- Restore the settings from an existing boot configuration backup file (that you previously saved to a diskette or USB key, or any other storage device).
- Attempt to save the failed NIC's current boot settings stored in Nonvolatile Random Access Memory (NVRAM) and restore these settings to the replacement NIC (depending on the type of failure, this may not be always possible).
- Manually enter boot configuration settings using the **iSCSI Boot** menu.

Restoring the iSCSI Boot Configuration from a Backup File



NOTE: Before installing the replacement NIC, ensure that you have the iSCSI backup configuration file available (that is, you have the file stored on removable media such as a USB key or diskette).



NOTE: If the backup file is not available, *do not* install the replacement NIC. Skip this section and proceed to the next sections "Saving iSCSI Boot Configuration Settings from NVRAM" on page 58 and "Manually Entering Boot Settings from the iSCSI Boot Menu" on page 59.

After you replace the failed iSCSI network adapter, run the `iscsiutl.exe` utility to enable the iSCSI Boot menu and restore previously saved iSCSI settings to the replacement NIC from the backup file:

- 1 Download the `iscsiutl` program from the Dell Support website at support.dell.com.



NOTE: The `iscsiutl` program is also available on the media that ships with your new replacement NIC. However, it is recommended that you download it from the Dell Support website at support.dell.com to ensure that you have the latest version.

- 2 Replace the failed NIC. For more instructions, see the *Hardware Owners Manual* that shipped with your system or the documentation that shipped with the NIC.
- 3 Copy the `iscsiutl` program to a MS-DOS bootable device, such as diskette or USB key.
- 4 Boot to the bootable device.

5 Execute the `iscsiutl` program and type:

a `ISCSIUTL -FE -ALL`

b `ISCSIUTL -UP -ALL`

c `ISCSIUTL -RESTORE -FILE <FILENAME> -NIC <#>`
where *FILENAME* is the name that you enter and # is the NIC number.



NOTE: For a list applicable commands/parameters, see "iSCSI Utility MS-DOS Commands" on page 60.

6 If you are working with a dual-port NIC, repeat sub-step c for the second port.

Determining iSCSI Boot Configuration Settings from a Failed NIC

In the event the NIC fails and the boot configuration file has not been saved, depending on the type of failure, it may be possible to identify the settings and save them to a new configuration file.

Functional NIC

If your NIC card is defective but still functioning, you can use the iSCSI utility program (`iscsiutl.exe`) to attempt to save the configuration that may be stored in the defective NIC's NVRAM.

If the configuration is not retrievable from the defective NIC's NVRAM (using the `iscsiutl` program), you can manually enter the configuration settings into the **iSCSI Boot** menu prior to replacing the failed NIC and record the settings.



NOTICE: Ensure that you record the settings accurately. Any incorrect setting may cause the host to not boot.

Non-functional NIC


If the NIC is non-functional and the settings cannot be retrieved, some of the settings can be obtained from the storage system.



NOTE: If your system uses CHAP, the boot settings cannot be retrieved from the storage system management software. This may impact other hosts connected to the server. In this scenario, you must remove and reconfigure the CHAP settings similar to a new deployment.

Retrieving iSCSI Boot Configuration Settings From the Dell PowerVault MD3000i Storage Array


- 1** Record the IQN of the PowerVault MD3000i storage array:
 - a** Open the **Dell PowerVault Modular Disk Storage Manager**.
 - b** Select the **iSCSI** tab, and click **Change Target Identification**.
 - c** Record the iSCSI target name.

 **NOTE:** The iSCSI Target Alias cannot be used by a host for booting.
- 2** Record the RAID Controllers iSCSI host port IP Addresses:
 - a** Open the **Dell PowerVault Modular Disk Storage Manager**.
 - b** Select the **iSCSI** tab, and then click **Configure iSCSI Host Ports**.
 - c** Use the drop down list to select each iSCSI host port. Record the IP Address of the port the system boots to. If the system has redundant paths select a port on the other controller that is on a separate subnet.
- 3** Record the IQN of the host:
 - a** Open the **Dell PowerVault Modular Disk Storage Manager**.
 - b** Select the **Modify** tab, and then click **Edit Host Topology**.
 - c** Expand the affected host by clicking on the **+** symbol.
 - d** Record the IQN.


Saving iSCSI Boot Configuration Settings from NVRAM


If an iSCSI boot configuration backup file is not available, you can attempt to save the settings from the failed NIC's NVRAM and restore the settings to the replacement NIC. However, depending on the type of failure, this may not always be possible. For more information, see "Determining iSCSI Boot Configuration Settings from a Failed NIC" on page 57.


- 1** Download the `iscsiutl` program from the Dell Support website at support.dell.com.

 **NOTE:** The `iscsiutl` program is also available on the media that shipped with your new replacement NIC. However, it is recommended that you download it from the Dell Support website at support.dell.com to ensure that you have the latest version.
- 2** Copy the `iscsiutl` program to a MS-DOS bootable device, such as a diskette or USB key.

- 3 Boot your system from the bootable device.
- 4 Save the configuration to a file using the `iscsiutil` program and save the configuration by typing the following command:
`ISCSIUTL -SAVE -FILE <FILENAME> -NIC <#>`
where `FILENAME` is the name of the iSCSI boot configuration file and `#` is the NIC number.

 **NOTE:** It is recommended that you include the NIC number in the filename.

 **NOTE:** The `iscsiutil` program identifies dual-port NICs as separate cards. If both ports on the card are dedicated to BFi, run the command in step 4 for each single port.

 **NOTE:** For a list applicable MS-DOS commands/parameters, see "iSCSI Utility MS-DOS Commands" on page 59.

Manually Entering Boot Settings from the iSCSI Boot Menu

In the event that you cannot restore the boot configuration from a backup file or cannot save the configuration from the failed NIC's NVRAM, you must manually configure the iSCSI boot configuration settings from the **iSCSI Boot** menu.

Configuring the Intel iSCSI Boot Menu

- 1 Use the iSCSI DOS utility located in the `iSCSI/DOS` directory on the media that shipped with the Intel NIC to flash the Intel NIC with the iSCSI Boot PROM. For more instructions, see the *Intel iSCSI Boot User Guide*.




Boot to a bootable MS-DOS diskette drive or a bootable USB key and run the iSCSI DOS utility using the following commands:

```
ISCSIUTL -ALL -FLASHENABLE
```

```
ISCSIUTL -ALL -UP
```

For additional help, type `ISCSIUTL -?` at a command prompt.

- 2 Boot into the Intel iSCSI Boot Setup menu. For more information, see the section titled "Firmware Setup" in the *Intel iSCSI Boot User Guide*.
 - a Configure one NIC as primary.
 - b Enter the host's initiator name, IP address, subnet, and gateway that you recorded in step 3 of "Retrieving iSCSI Boot Configuration Settings From the Dell PowerVault MD3000i Storage Array" on page 58.

- c Enter the target's name (IQN) and IP address.
- d Do not change the default port number of 3260. Retain the LUN number value as 0, unless you need to change it.
- e Select **OK** and save the changes.
- f Repeat step a to step e to configure a secondary NIC if required.
 -  **NOTE:** Ensure that the primary NIC and the secondary NIC are configured on separate subnets.
- g Observe the Power-On Self-Test (POST) output to ensure that the iSCSI LUN is detected. If the iSCSI LUN is not detected during POST, halt the process and verify the configuration on the PowerVault NX1950 Integrated solution and the Intel iSCSI Boot Setup menu.
 -  **NOTE:** *Do not* continue if the iSCSI LUN is not detected during POST.
 -  **NOTE:** It is strongly recommended that you save the iSCSI boot configuration to a file to enable faster recovery when you replace the NIC.

Backing Up iSCSI Boot Settings

After you replace the failed NIC and configure the boot settings, during deployment of the host, it is recommended that you backup the boot configuration to speed recovery in the event the replacement NIC fails. Additionally, it is recommended that you create a new backup file each time you make a change to the existing configuration.

For instructions on how to save the boot configuration to a backup file, see "Saving iSCSI Boot Configuration Settings from NVRAM" on page 58

iSCSI Utility MS-DOS Commands

Table A-1 describes the different iSCSI Utility (`iscsiutil.exe`) MS-DOS commands that you can use to save or restore your virtual disk boot settings on your replacement NIC.

Table A-1. MS-DOS Commands

Command/Parameters	Description
-SAVE	<p>Saves iSCSI boot configuration settings in the Electrically Erasable Programmable Read-Only (EEPROM) to a disk file on the selected iSCSI-capable port. You must specify a file name with the -FILE parameter.</p> <p>NOTE: For security reasons it is recommended that you disable CHAP settings when using the save command. If you do not disable these settings, ensure that you keep the file secure.</p>
- FILE	<p>Specifies a file name for -SAVE or -RESTORE parameters by -FILE = [filename].</p> <p>NOTE: MS-DOS limits the filename to eight characters.</p>
NIC=xx, where xx is the NIC number.	<p>Selects a specific iSCSI Boot-capable adapter in the system. Not valid with use of -UP parameter. Numbering starts with "1".</p>
-RESTORE	<p>Restores previously saved iSCSI boot configuration settings on the selected iSCSI boot-capable port. Use the -FILE parameter to specify the saved data.</p> <p>NOTE: For security reasons it is recommended that you disable Challenge Handshake Authentication Protocol (CHAP) settings when using the restore command. If you do not disable these settings, ensure that you keep the file secure.</p> <p>NOTE: This feature may create multiple primary or secondary ports. Review the boot priority setting in the firmware setup before you reboot the system.</p>

B

Instructions for Booting a New Host From an Operating System Image using Intel Network Adapters





NOTE: NOTE: Use one of the methods listed in "Cloning" on page 19 or any third-party software to install the operating system on the iSCSI LUN that you are using for BFi before performing the following procedure.

Configuring the PowerVault MD3000i Storage Array


- 1 Perform the following procedure to manually register a host:
 - a Open the **PowerVault Modular Disk Storage Manager**, and connect to the PowerVault MD3000i storage array to be used by the host for booting.
 - b Select the **Configure** tab, and then click **Configure Host Access (Manual)**.
 - c In the **host** field, enter the host name, select the **host type** from the drop down list, and then click **Next**.
 - d In the **Selected iSCSI initiators** field, click the **New** button.
 - e In the **iSCSI initiator name** field, enter the **iSCSI Qualified Name (IQN)** of the host initiator and leave the iSCSI Initiator label to the default.

Fully qualified IQN format is `<iqn><yyyy-mm>.com<company name>:<server name>`.

Example: `iqn.1984-04.com.dell:server-name`. Record the IQN of the host initiator in the "Configuration Worksheet" on page 77. The IQN of the host initiator is required to configure Intel iSCSI boot BIOS.
 - f Click **Add** and then click **Next**.

- g Ensure that the option `No, This host will NOT share access to the same virtual disks with other hosts` is selected and then click **Next**.
 - h In the **Confirm Host Definition** page, click **Finish**.
- 2 Create a virtual disk and assign it to the host:
- a Select the **Configure** tab and click **Create Virtual Disks**.
 - b Create a virtual disk which is of the same size as the boot partition and assign it to the host. Enter the virtual disk capacity.
-  **NOTE:** It is recommended that the capacity you allocate to the virtual disk be equal to or more than the boot partition capacity. A minimum boot partition size of 16 GB is recommended.
- c Enter a Name for the virtual disk.
-  **NOTE:** It is recommended that you use the service tag of the PowerEdge system and the term `boot-LUN` in the description field.
- d In the **Virtual Disk I/O characteristics** field, select **File system**, and click **Next**.
 - e Select **Map now** and the host you are preparing to boot, and then click **Finish**.
- 3 After creating the virtual disk, assign the preferred path for the virtual disk to the appropriate Redundant Array of Independent Disks (RAID) controller. For systems with only one boot NIC, ensure that you assign the virtual disk to the RAID controller the NIC is connecting to. For systems with two boot NICs, configure the primary path to the RAID controller that the Primary NIC is configured to boot from. To configure the preferred path:
- a Click the **Modify** tab and select the **Change Virtual Disk Ownership/Preferred Path** option.
 - b Select the **virtual disk** and the **preferred path**, and then click **Change** if required.

- 4 Record the IQN of the PowerVault MD3000i storage array in the "Configuration Worksheet" on page 77:
 - a Select the iSCSI tab, and then click **Change Target Identification**.
 - b Record the iSCSI target name.

 **NOTE:** The iSCSI Target Alias cannot be used by a host for booting.
- 5 Record the iSCSI host port IP addresses of the RAID controllers in the "Configuration Worksheet" on page 77:
 - a Select the iSCSI tab and click **Configure iSCSI Host Ports**.
 - b Select each iSCSI host port from the drop down list. Record the IP address of the port to which the host system is configured to boot from. If the host system has redundant paths, select a port on a controller that is on a separate subnet.
- 6 Use the **iSCSI DOS** utility located in the **iSCSI\DOS** directory on the media that shipped with the Intel NIC to flash the Intel NIC with the iSCSI Boot PROM. For more instructions, see the *Intel iSCSI Boot User Guide*. Boot to a bootable MS-DOS® diskette drive or a bootable USB key, and run the iSCSI DOS utility using the following commands:


```
ISCSIUTL -ALL -FLASHENABLE
ISCSIUTL -ALL -UP
```

 For additional help, type `ISCSIUTL -?` at a command prompt.
- 7 Boot to the **Intel iSCSI Boot Setup** menu. For more information, see the "Firmware Setup" section in the *Intel iSCSI Boot User Guide*.
 - a Configure one NIC as **Primary**.
 - b Enter the initiator name, IP address, subnet, and gateway of the host that you recorded in step 1 of "Configuring the PowerVault MD3000i Storage Array" on page 15.
 - c Enter the IQN and IP address of the target.
 - d Retain the default values of the port number as 3260 and LUN number as 0, unless you need to change them.
 - e Select **OK** and save the changes.

f Repeat step a to step e to configure a secondary NIC if required.



NOTE: Ensure that the primary NIC and the secondary NIC are configured on separate subnets.

g Observe the Power-On Self-Test (POST) output to ensure that the iSCSI LUN is detected. If the iSCSI LUN is not detected during POST, halt the process and verify the configuration on the PowerVault MD3000i storage array and the Intel iSCSI Boot Setup menu.



NOTE: Do not continue if the iSCSI LUN is not detected during POST.



NOTE: It is strongly recommended that you save the iSCSI boot configuration to a file to enable faster recovery when you replace the NIC.

8 To save the iSCSI boot configuration to a file, perform the following steps:

a Boot to a bootable device.

b Save the configuration to a file using the `iscsiutl` program by typing the following command at the command prompt:

```
ISCSIUTL -SAVE -FILE <FILENAME> -NIC <#>
```

where **FILENAME** is the name of the iSCSI boot configuration file and **#** is the NIC number.



NOTE: It is recommended that you include the NIC number in the file name. For example, to name the iSCSI boot configuration file of the first NIC use the following command:

```
ISCSIUTL -SAVE -FILE dell1 -NIC 1
```

where **NIC 1** is the NIC number for the first NIC. To name the iSCSI boot configuration file of the second NIC use the following command:

```
ISCSIUTL -SAVE -FILE dell2 -NIC 2
```

Replacing the Broadcom Network Adapter and Configuring the Boot Menu to Boot From iSCSI



NOTE: In this section, NIC refers to LAN On Motherboard (LOM) or the Broadcom NetExtreme PCIe adapter on the motherboard of the PowerEdge system and replacing the failed NIC is accomplished by replacing the PCIe adapter or the motherboard.

To replace and reconfigure the NIC that is configured to boot from iSCSI:

- 1 Retrieve the boot configuration settings from the previous boot configuration file. For more information, see "Restoring the iSCSI Boot Configuration From a Backup File" on page 68 or "Determining iSCSI Boot Configuration Settings From a Failed NIC" on page 69.
- 2 Replace the NIC and update the NIC firmware. For detailed instructions on replacing the NIC, see the documentation that is shipped along with your system. For the latest firmware, see the Dell Support website at support.dell.com.
- 3 Restore the boot configuration settings. If you have the iSCSI boot configuration settings file, you can restore these settings. If you do not have the iSCSI boot configuration settings file, you must manually enter this information. For more information, see "Manually Entering Boot Settings from the iSCSI Boot Menu" on page 59.

The following section describes how to configure, save, and restore virtual disk boot settings to the replacement NIC.

Retrieving the iSCSI Boot Configuration

You can configure the virtual disk iSCSI boot configuration settings on the PowerEdge system by performing the following steps:

- Restore the settings from an existing boot configuration backup file (that you previously saved to a diskette, USB key, or any other storage device).
- Attempt to save the current boot settings of the failed NIC stored in Non-Volatile Random Access Memory (NVRAM) and restore these settings to the replacement NIC (depending on the type of failure, this may not to be always possible).
- Manually enter boot configuration settings using the **iSCSI Boot** menu.

Restoring the iSCSI Boot Configuration From a Backup File



NOTE: Before installing the replacement NIC, ensure that you have the iSCSI backup configuration file that you previously saved to a diskette, USB key, or any other storage device.



NOTE: If the backup file is not available, *do not* install the replacement NIC. Skip this section and proceed to the next sections.

After you replace the failed iSCSI network adapter, you must run the **ibcfg.exe** utility to enable the iSCSI Boot menu and restore previously saved iSCSI settings to the replacement NIC from the backup file:

- 1 Download **ibcfg.exe** from the Dell Support website at support.dell.com.



NOTE: **ibcfg.exe** is available on the media that ships with your new replacement NIC. However, it is recommended that you download it from the Dell Support website at support.dell.com to ensure that you have the supported version. **ibcfg.exe** is part of the Broadcom DOS utilities provided with each major driver release.

- 2 Replace the failed NIC. For more instructions, see the *Hardware Owners Manual* that shipped with your system or the documentation that shipped with the NIC.
- 3 Copy **ibcfg.exe** to a MS-DOS bootable device, such as diskette or USB key.

4 Boot to the bootable device.

5 Run `ibcfg.exe` and type:

```
ibcfg -set <filename> -dev <MAC address>
```

where *filename* is the name that you enter and *<MAC address>* is the physical address of the NIC.



NOTE: For a list applicable MS-DOS commands/parameters, see "iSCSI Utility MS-DOS Commands" on page 71.

Determining iSCSI Boot Configuration Settings From a Failed NIC

If the NIC fails and the boot configuration file is not saved, it may be possible to identify the settings and save them to a new configuration file, depending on the type of failure.

Functional NIC

If your NIC card is defective but still functioning, you can use the iSCSI utility program (`ibcfg.exe`) to save the configuration that may be stored in the defective NIC's NVRAM.

If the configuration is not retrievable from the defective NIC's NVRAM, using the `ibcfg.exe` program, you can manually enter the configuration settings into the **iSCSI Boot** menu prior to replacing the failed NIC and record the settings.



NOTICE: Ensure that you record the settings accurately. Any incorrect setting may cause the boot failure on the host.

Non-Functional NIC


If the NIC is non-functional and the settings cannot be retrieved, some of the settings can be obtained from the storage system.



NOTE: If your system uses CHAP, the boot settings cannot be retrieved from the storage system management software and may impact other hosts connected to the server. To avoid this issue, remove and reconfigure the CHAP settings similar to a new deployment.

Retrieving iSCSI Boot Configuration Settings From the Dell PowerVault MD3000i Storage Array


- 1 Record the IQN of the PowerVault MD3000i storage array:
 - a Open the **Dell PowerVault Modular Disk Storage Manager**.
 - b Select the **iSCSI** tab, and click **Change Target Identification**.
 - c Record the iSCSI target name.

 **NOTE:** The iSCSI Target Alias cannot be used by a host for booting.
- 2 Record the RAID Controllers iSCSI host port IP Addresses:
 - a Open the **Dell PowerVault Modular Disk Storage Manager**.
 - b Select the **iSCSI** tab, and then click **Configure iSCSI Host Ports**.
 - c Use the drop down list to select each iSCSI host port. Record the IP Address of the port the system boots to. If the system has redundant paths select a port on the other controller that is on a separate subnet.
- 3 Record the IQN of the host:
 - a Open the **Dell PowerVault Modular Disk Storage Manager**.
 - b Select the **Modify** tab, and then click **Edit Host Topology**.
 - c Expand the affected host by clicking on the + symbol.
 - d Record the IQN.


Saving iSCSI Boot Configuration Settings from NVRAM


If an iSCSI boot configuration backup file is not available, you can attempt to save the settings from the failed NIC's NVRAM and restore the settings to the replacement NIC. However, depending on the type of failure, this may not always be possible. For more information, see "Determining iSCSI Boot Configuration Settings From a Failed NIC" on page 69.

- 1 Download the **ibcfg.exe** program from the Dell Support website at support.dell.com.

 **NOTE:** The **ibcfg.exe** program is also available on the media that shipped with your new replacement NIC. However, it is recommended that you download it from the Dell Support website at support.dell.com to ensure that you have the latest version.
- 2 Copy the **ibcfg.exe** program to a MS-DOS bootable device, such as a diskette or USB key.

- 3 Boot your system from the bootable device.
- 4 Execute the **ibcfg.exe** program and save the configuration by typing:
`ibcfg -get <FILENAME> -dev <MAC address>`
where **FILENAME** is the name that you enter and **<MAC address>** is the NIC number.

 **NOTE:** It is recommended that you include the NIC number in the filename.
For example: `ibcfg1 -get dell11 -dev 00:18:8B:FD:F9:1A.`

 **NOTE:** For a list applicable MS-DOS commands/parameters, see "iSCSI Utility MS-DOS Commands" on page 59.

Manually Entering Boot Settings from the iSCSI Boot Menu

In the event that you cannot restore the boot configuration from a backup file or cannot save the configuration from the failed NIC's NVRAM, you must manually configure the iSCSI boot configuration settings from the **iSCSI Boot** menu. For more information, see "Configuring the Broadcom iSCSI Boot Menu" on page 6.

Backing Up iSCSI Boot Settings

After you replace the failed NIC and configure the boot settings, during deployment of the host, it is recommended that you take a backup of the boot configuration to speed recovery if the replacement NIC fails. Additionally, it is recommended that you run the **ibcfg.exe** program and create a new backup file each time you make a change to the existing configuration.

For instructions on how to save the boot configuration to a backup file, see "Saving iSCSI Boot Configuration Settings from NVRAM" on page 70.

iSCSI Utility MS-DOS Commands

Table C-1 describes the different iSCSI Utility (**ibcfg.exe** program) MS-DOS® commands you can use to save or restore your virtual disk boot settings on your replacement NIC.

Table C-1. MS-DOS Commands

Command/Parameters	Description
-GET	<p>Saves iSCSI boot configuration settings in the Electrically Erasable Programmable Read-Only (EEPROM) to a disk file on the selected iSCSI-capable port. You must specify a file name with the -FILE parameter.</p> <p>NOTE: For security reasons it is recommended that you disable Challenge Handshake Authentication Protocol (CHAP) settings when using the save command. If you do not disable these settings, ensure that you keep the file secure.</p>
-SET	<p>Restores previously saved iSCSI boot configuration settings on the selected iSCSI boot-capable port.</p> <p>NOTE: For security reasons it is recommended that you disable CHAP settings when using the restore command. If you do not disable these settings, ensure that you keep the file secure.</p> <p>NOTE: This feature may create multiple primary or secondary ports. Review the boot priority setting in the firmware setup before you reboot the system.</p>
-DEV <MAC address>	<p>Selects a specific iSCSI Boot-capable adapter in the system.</p> <p>NOTE: MS-DOS limits the filename to eight characters.</p>
Where MAC address is Physical address of the NIC.	



Instructions for Booting a New Host From an Operating System Image With a Broadcom NetXtreme Network Adapter




NOTE: Use one of the methods listed in "Cloning" on page 19 or any third-party software to install the operating system on the iSCSI LUN that you are using for BFI before performing the following procedure.


Configuring the PowerVault MD3000i Storage Array


- 1 Perform the following procedure to manually register a host:
 - a Open the **PowerVault Modular Disk Storage Manager**, and connect to the PowerVault MD3000i storage array to be used by the host for booting.
 - b Select the **Configure** tab, and then click **Configure Host Access (Manual)**.
 - c In the **host** field, enter the host name, select the **host type** from the drop down list, and then click **Next**.
 - d In the **Selected iSCSI initiators** field, click the **New** button.
 - e In the **iSCSI initiator name** field, enter the **iSCSI Qualified Name (IQN)** of the host initiator and leave the iSCSI Initiator label to the default. Fully qualified IQN format is `<iqn><yyyy-mm>.com<company name>:<server name>`.
Example: `iqn.1984-04.com.dell:server-name`. Record the IQN of the host initiator in the "Configuration Worksheet" on page 77. The IQN of the host initiator is required to configure Intel iSCSI boot BIOS.

- f Click **Add** and then click **Next**.
 - g Ensure that the option **No, This host will NOT share access to the same virtual disks with other hosts** is selected and then click **Next**.
 - h In the **Confirm Host Definition** page, click **Finish**.
- 2** Create a virtual disk and assign it to the host:
- a Select the **Configure** tab and click **Create Virtual Disks**.
 - b Create a virtual disk which is of the same size as the boot partition and assign it to the host. Enter the virtual disk capacity.
-  **NOTE:** It is recommended that the capacity you allocate to the virtual disk be equal to or more than the boot partition capacity. A minimum boot partition size of 16 GB is recommended.
- c Enter a Name for the virtual disk.
-  **NOTE:** It is recommended that you use the service tag of the PowerEdge system and the term boot-LUN in the description field.
- d In the **Virtual Disk I/O characteristics** field, select **File system**, and click **Next**.
 - e Select **Map now** and the host you are preparing to boot, and then click **Finish**.
- 3** After creating the virtual disk, assign the preferred path for the virtual disk to the appropriate Redundant Array of Independent Disks (RAID) controller. For systems with only one boot NIC, ensure that you assign the virtual disk to the RAID controller the NIC is connecting to. For systems with two boot NICs, configure the primary path to the RAID controller that the Primary NIC is configured to boot from. To configure the preferred path:
- a Click the **Modify** tab and select the **Change Virtual Disk Ownership/Preferred Path** option.
 - b Select the **virtual disk** and the **preferred path**, and then click **Change** if required.

- 4 Record the IQN of the PowerVault MD3000i storage array in the "Configuration Worksheet" on page 77:
 - a Select the iSCSI tab, and then click **Change Target Identification**.
 - b Record the iSCSI target name.

 **NOTE:** The iSCSI Target Alias cannot be used by a host for booting.
- 5 Record the iSCSI host port IP addresses of the RAID controllers in the "Configuration Worksheet" on page 77:
 - a Select the iSCSI tab and click **Configure iSCSI Host Ports**.
 - b Select each **iSCSI host port** from the drop down list. Record the IP address of the port to which the host system is configured to boot from. If the host system has redundant paths, select a port on a controller that is on a separate subnet.
- 6 Follow the steps in "Configuring the Broadcom iSCSI Boot Menu" on page 6 to configure Broadcom[®] NetXtreme[®] or Broadcom NetXtreme II NICs for iSCSI boot. In the **General Parameters** section, select **Configure Boot to iSCSI Target**.
- 7 Reboot and press <F2> to enter the BIOS.
- 8 In the host's BIOS, confirm that the boot order lists the Broadcom Embedded NIC 1 before the local hard drive.
- 9 Press <Esc> twice and select Save changes and exit to exit from BIOS. The host now boots from the iSCSI LUN.

 **NOTE:** It is recommended that you save the iSCSI boot configuration to a file to enable faster recovery if you need to replace the NIC.
- 10 To save the iSCSI boot configuration to a file:
 - a Boot to a bootable device.
 - b Save the configuration to a file using the **ibcfg.exe** program by typing the following command at the command prompt:
`IBCFG -get <FILENAME> -dev <MAC address>`

 **NOTE:** It is recommended that you include the NIC number in the file name. For example, to name the iSCSI boot configuration file of the NIC enabled for iSCSI boot, use the following command:
`IBCFG -get dell1 -dev 00:18:8B:FD:F9:1A`
 where "00:18:8B:FD:F9:1A" is the MAC address of the iSCSI boot NIC.



Configuration Worksheet

Dell™ PowerEdge™ Server (Host/Initiator)	
NOTE: Fully-qualified IQN format: <iqn><yyyy-mm>.com<company name>:<server name>. Example: iqn.1984-04.com.dell:server-name. For more information, see RFC3720 and RFC3721 at http://rfc.net/ .	
IQN:	
Primary Boot NIC	Secondary Boot NIC (Optional)
IP Address:	IP Address:
Subnet Mask:	Subnet Mask:
Gateway:	Gateway:
Slot Location:	Slot Location:

Dell PowerVault™ MD3000i storage array (Target)	
IQN:	
iSCSI Port:	
LUN Number:	
Primary iSCSI port	Secondary iSCSI port (Optional)
IP Address:	IP Address:

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