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# User's Guide
# IOCTL to Open-iSCSI Interface

QLogic 4000 Series iSCSI Adapters and 8200 Series Converged Network Adapters

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| Document Revision History | |
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| **Changes** | **Sections Affected** |
| Initial release | |

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# Preface

Starting with Red Hat® Enterprise Linux® (RHEL™) 6.2 and Novell® SUSE® Linux Enterprise Server (SLES®) 11 SP2, the QLogic `qla4xxx` driver (iSCSI driver for Linux) supports the Open-iSCSI tool `iscsiadm`. As a result, `iscsiadm` can now be used to perform management functions (configuring network settings, managing iSCSI targets, and so on) on QLogic 4000 Series 1GbE iSCSI Adapters and 8200 Series 10GbE Converged Network Adapters.

## What is in This Guide

This document describes the differences between the legacy (IOCTL-based) and Open-iSCSI management models of the QLogic `qla4xxx` driver, and provides brief guidelines for migrating from the legacy to the Open-iSCSI model.

This preface specifies the intended audience, lists related documents, describes the typographic conventions used in this guide, and provides technical support and contact information.

The remainder of this user's guide is organized into the following chapters:

- Section 1 Legacy vs. Open-iSCSI describes the major differences between the legacy driver which has an IOCTL-based interface for user space application communications, and the Open-iSCSI model.
- Section 2 Boot from SAN provides information on configuring Boot from SAN (BFS) when migrating to the Open-iSCSI model.
- Section 3 Open-iSCSI User's Guide provides a User's Guide for Open-iSCSI.
- Section 4 Known Issues provides a list of currently known issues.

## Intended Audience

This document is intended for end users who manage QLogic 4000 Series iSCSI adapters or 8200 Series Converged Network Adapters on Linux (RHEL 6.2, SLES 11 SP2, or later), using the IOCTL-based management model.

# Related Materials

For additional information, refer to the following:

- *Technical Note, 2.10. Kernel*

  http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/6/html/6.2_Technical_Notes/kernel_issues.html

- *Release Notes for SUSE Linux Enterprise Server 11 Service Pack 2*

  http://www.novell.com/linux/releasenotes/i386/SUSE-SLES/11-SP2/

- *Linux Open-iSCSI README*

  http://www.open-iscsi.org/docs/README

# Documentation Conventions

This guide uses the following documentation conventions:

- **NOTE** provides additional information.
- Text in blue font indicates a hyperlink (jump) to a figure, table, or section in this guide, and links to Web sites are shown in underlined blue. For example:
  - Table 9-2 lists problems related to the user interface and remote agent.
  - See “Installation Checklist” on page 3-6.
  - For more information, visit www.qlogic.com.
- Text in **bold** font indicates user interface elements such as a menu items, buttons, check boxes, or column headings. For example:
  - Click the **Start** button, point to **Programs**, point to **Accessories**, and then click **Command Prompt**.
  - Under **Notification Options**, select the **Warning Alarms** check box.
- Text in `Courier` font indicates a file name, directory path, or command line text. For example:
  - To return to the root directory from anywhere in the file structure: Type `cd /root` and press ENTER.
  - Enter the following command: `sh ./install.bin`
- Key names and key strokes are indicated with UPPERCASE:
  - Press CTRL+P.
  - Press the UP ARROW key.

- Text in *italics* indicates terms, emphasis, variables, or document titles:
  - For a complete listing of license agreements, refer to the *QLogic Software End User License Agreement*.
  - What are *shortcut keys*?
  - To enter the date type *mm/dd/yyyy* (where *mm* is the month, *dd* is the day, and *yyyy* is the year).
- Topic titles between quotation marks identify related topics either within this manual or in the online help, which is also referred to as *the help system* throughout this document.

# Technical Support

Customers should contact their authorized maintenance provider for technical support of their QLogic products. QLogic-direct customers may contact QLogic Technical Support; others will be redirected to their authorized maintenance provider. Visit the QLogic support Web site listed in Contact Information for the latest firmware and software updates.

For details about available service plans, or for information about renewing and extending your service, visit the Service Program web page at http://www.qlogic.com/services.

## Downloading Firmware and Documentation

To download firmware and documentation:

1. Go to the QLogic Downloads and Documentation page: http://driverdownloads.qlogic.com.
2. Under QLogic Products, type the QLogic model name in the search box.

   Alternatively, you can click **Guided Search** to obtain assistance in locating the firmware and documentation to download.
3. In the search results list, locate and select the firmware and documentation, for your product.
4. View the product details Web page to ensure that you have the correct firmware and documentation.

   Click the **Read Me** and **Release Notes** icons under Support Files for additional information.
5. Click **Download Now**.
6. Save the file to your computer.
7. If you have downloaded firmware, follow the installation instructions in the *Readme* file.

## Training

QLogic Global Training maintains a Web site at www.qlogictraining.com offering online and instructor-led training for all QLogic products. In addition, sales and technical professionals may obtain Associate and Specialist-level certifications to qualify for additional benefits from QLogic.

## Contact Information

QLogic Technical Support for products under warranty is available during local standard working hours excluding QLogic Observed Holidays. For customers with extended service, consult your plan for available hours. For Support phone numbers, see the Contact Support link at support.qlogic.com.

| | |
|---|---|
| **Support Headquarters** | QLogic Corporation<br>4601 Dean Lakes Blvd.<br>Shakopee, MN 55379 USA |
| **QLogic Web Site** | www.qlogic.com |
| **Technical Support Web Site** | http://support.qlogic.com |
| **Technical Support E-mail** | support@qlogic.com |
| **Technical Training E-mail** | training@qlogic.com |

## Knowledge Database

The QLogic knowledge database is an extensive collection of QLogic product information that you can search for specific solutions. We are constantly adding to the collection of information in our database to provide answers to your most urgent questions. Access the database from the QLogic Support Center: http://support.qlogic.com.

# 1 Legacy vs. Open-iSCSI

This section describes the major differences between the legacy driver which has an IOCTL-based interface for user space application communications, and the Open-iSCSI model.

This section includes the following topics:

# Summary of Major Differences

Table 1-1 summarizes the major differences between the legacy IOCTL-based and Open-iSCSI models.

***Table 1-1. Differences Between IOCTL and Open-iSCSI Driver Models***

| Serial No. | Feature | IOCTL-based Driver | Open-iSCSI-based Driver | Remarks |
|---|---|---|---|---|
| 1 | Firmware Operational Mode | Firmware is configured in AUTO CONNECT MODE. In this mode:<br>■ The firmware reads the DDB entries from the predefined area in the Flash.<br>■ For a Send Target the firmware initiates discovery, discovers the target, and initiates login to the discovered target.<br>■ The firmware posts an AEN to the driver, identifying each discovered target.<br>■ For the DDBs that represent a Normal target, the firmware logs into them and posts an AEN to the driver to report the login status. | Firmware is configured in NON AUTO CONNECT MODE. In this mode:<br>■ The driver reads the DDB entries from the predefined area in the Flash.<br>■ For a Send Target the driver initiates a discovery session through the `mailbox` command, queries the firmware for discovered targets, and then initiates login to the targets using the `mailbox` command.<br>■ The firmware posts an AEN to the driver to report login status after login completes.<br>■ For DDBs which represent a Normal Target, driver initiates login using mailbox command. Then, the firmware posts an AEN to the driver to report the login status after login completes. | |
| 2 | Target Persistence | Persistence is maintained by storing Discovery Target and Normal Target records on the adapter Flash using the QLogic application[a]. | Persistence is maintained by storing Discovery Target and Normal Target records in the local file system using the `iscsiadm` tool. | |

*Table 1-1. Differences Between IOCTL and Open-iSCSI Driver Models (Continued)*

| Serial No. | Feature | IOCTL-based Driver | Open-iSCSI-based Driver | Remarks |
|---|---|---|---|---|
| 3 | Boot Target | During driver load, the firmware performs auto discovery and login to the boot targets based on the target information saved in the Flash, and posts an AEN to inform the driver of the targets and their login status. | Login to boot targets is triggered by the driver, or the user space is dependent on the `ql4xdisablesysfsboot` driver command line parameter:<br>■ For RHEL 6.2 it is enabled by default, so that the driver initiates the login.<br>■ For SLES 11 SP2 it is disabled by default, so that `yast2-iscsi-client` must be used to perform login. | Note: For more details on adapter mode and the `ql4xdisables-ysfsboot` driver, refer to "Configuring Boot from SAN on RHEL 6.2" on page 2-19. |
| 4 | Re-login Handling | Session management or re-login is handled by the driver. | Re-login is handled either by `iscsiadm` and `iscsid`, or by the driver, depending how the session is initiated:<br>■ If `iscsiadm` created the session, session management is handled using `iscsid` (in other words, handled by the user space).<br>■ For the target record which is persistent in the Flash, the driver initiates the session and is responsible for re-login or session management. | Session re-login is also initiated on chip or adapter reset. |
| 5 | Network configuration | Adapter ports are configured using the QLogic application[a]. | Adapter ports are configured using `iscsiadm` for network configuration. By default, `iscsiadm` creates an iface for each QLogic adapter port. The iface name is of the form **`qla4xxx.00:0e:1e:04:8b:2e`**. You can change or update the network setting for the port using various iface parameters and iface operations. | |

***Table 1-1. Differences Between IOCTL and Open-iSCSI Driver Models (Continued)***

| Serial No. | Feature | IOCTL-based Driver | Open-iSCSI-based Driver | Remarks |
|---|---|---|---|---|
| 6 | How to view sessions logged in | Qlogic application[a] | Use the following command:<br>`iscsiadm -m session` | |
| 7 | Target scanning | Login and target scanning is done in kernel space as follows:<br>1. When the driver receives an AEN for the DDB indicating that the target is logged in, the driver publishes the session to the iSCSI transport layer and unblocks the session.<br>2. This triggers the SCSI midlayer LUN scanning to discover all LUNs behind the target. | Login and target scanning is done by user space as follows:<br>1. When the driver receives an AEN for the DDB indicating that the target is logged in, it sends an event to the `iscsid` (user space) indicating that the session is in the logged-in state.<br>2. `iscsid` then unblocks the session and kicks off the target/LUN scanning. | |
| 8 | Link Down impact on SCSI Device Handling | No change in the behavior of session and SCSI device state handling.<br>The default session recovery time-out is equal to the firmware keep alive timeout. The default value is 30 seconds. This can be modified by the driver command line parameter `ql4xkeepalive`. | No change in the behavior of session and SCSI device state handling.<br>For Open-iSCSI, default recovery time-out is 120 seconds. This can be configured on an individual session basis dynamically; that is, it does not require driver unload.<br>Session recovery time-out can be configured by modifying the `replacement_timeout` parameter in the node record. | |

***Table 1-1. Differences Between IOCTL and Open-iSCSI Driver Models (Continued)***

| Serial No. | Feature | IOCTL-based Driver | Open-iSCSI-based Driver | Remarks |
|---|---|---|---|---|
| 9 | Dynamic mapping/unmapping of LUNs added to the back-end storage | The driver handles the following check condition/sense data:<br>UNIT_ATTENTION ASC/ASCQ : 0x3F/0x0E<br>to figure out that a new LUN has been added on the back-end storage and makes an upcall to the SCSI midlayer to trigger a LUN scan for that particular target. | No explicit support to dynamically discover newly added LUNs on the back-end storage. Requires manual rescanning using `iscsiadm` command line option. | |
| 10 | Tearing Down Session/Connection objects | The session object can be destroyed using QLogic applications[a] | The session object lifecycle is completely determined by Open-iSCSI. If the node record exists, sessions will be created by `iscsid` and will remain there unless logout is explicitly issued using `iscsiadm`. | |
| 11 | Multisession handling | The QLogic application[a] allows you to create multiple sessions using the duplicate target option. This duplicate target is persistent in the Flash | Open-iSCSI also has multiple session support—`iscsiadm` allows creating multiple sessions for a single iface or a single port. The main difference is that target records are persistent in user space as part of node records. | Multisession using `qla4xxx` will be available from RHEL 6.3 and above. |

***Table 1-1. Differences Between IOCTL and Open-iSCSI Driver Models (Continued)***

| Serial No. | Feature | IOCTL-based Driver | Open-iSCSI-based Driver | Remarks |
|---|---|---|---|---|
| 12 | Flash DDBs with Open-iSCSI model driver | Not applicable | The Open-iSCSI driver will support existing Flash DDB entries in the adapter. `iscsiadm` has no control over these sessions. Session management of Flash DDB entries is done by the driver itself. | **Note:** `iscsiadm` is not capable of managing the Flash target entries.<br>Before migrating to the Open-iSCSI model, save this DDB/target information to node records using `iscsiadm` and use the QLogic application[a] to delete Flash entries apart from boot targets before the upgrade. Then, upgrade to the Open-iSCSI model. Boot targets are always in the Flash in both models. |

*Table 1-1. Differences Between IOCTL and Open-iSCSI Driver Models (Continued)*

| Serial No. | Feature | IOCTL-based Driver | Open-iSCSI-based Driver | Remarks |
|---|---|---|---|---|
| 13 | CHAP | CHAP settings are applied using the QLogic application[a]. | With CHAP support in `iscsiadm`, CHAP entries can now be added, deleted, and listed from the user space. | **Note:** Before you migrate, delete all CHAP information from Flash using the QLogic application[a], and then update the same CHAP information in the respective node records using `iscsiadm` commands.<br>When migration begins, any CHAP information in the Flash will be honored, but it must be updated in the node records using `iscsiadm`.<br>Open-iSCSI CHAP management is not supported in RHEL 6.2 and SLES 11 SP2.<br>CTRL+Q options let you set unidirectional and bidirectional CHAP only for boot targets. In both models, CHAP information for boot targets is always stored in Flash. |

[a] The QLogic management applications are `iscli` (SANsurfer® iSCSI CLI) and `qaucli` (QConvergeConsole® CLI).

# Functional Flows

This section provides functional flow diagrams for discovery, target login, and session recovery.

# Discovery

Figures 1-1 through 1-3 provide functional flow diagrams of the discovery process for IOCTL and Open-iSCSI.

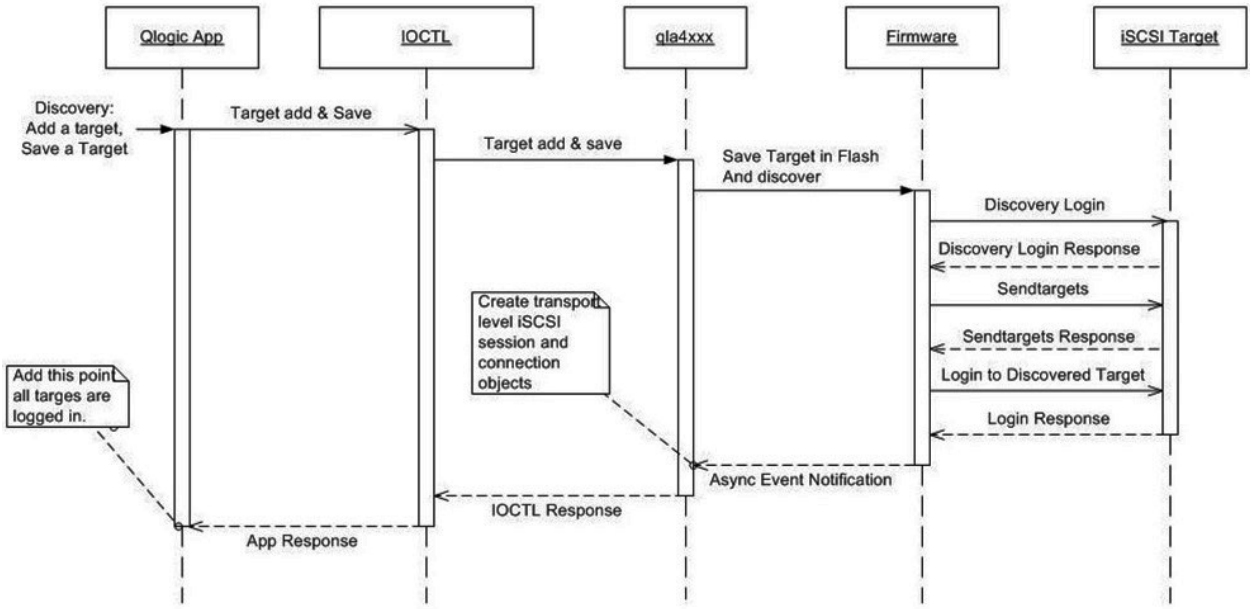


***Figure 1-1. Noninteractive Discovery in IOCTL Mode (Legacy)***

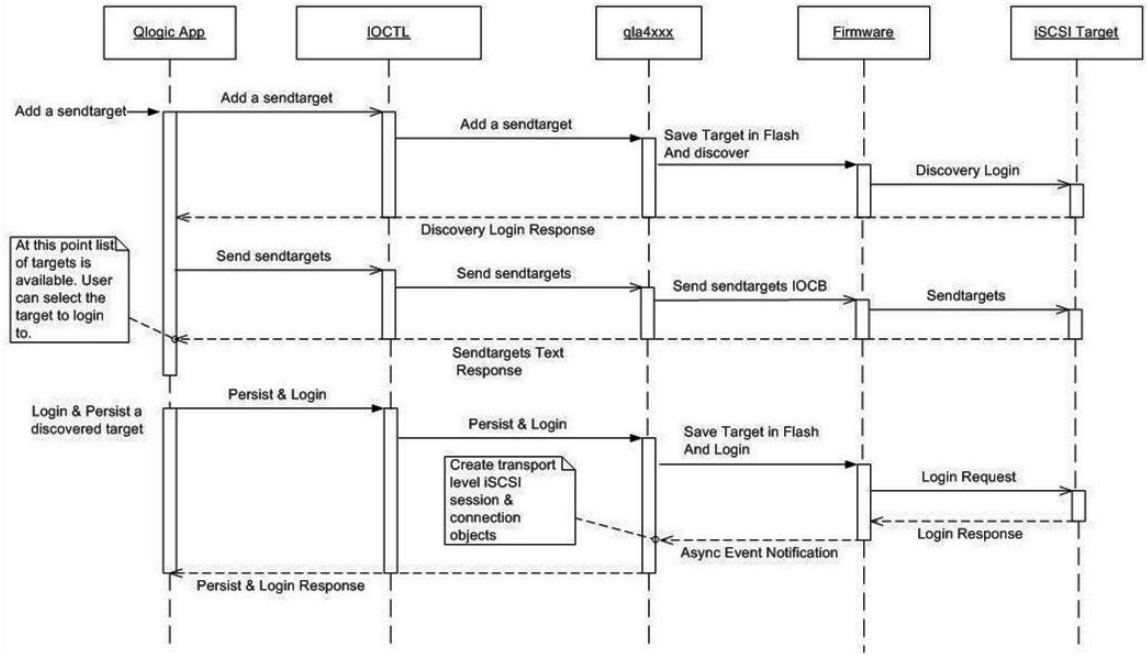


***Figure 1-2. Interactive Discovery in IOCTL Mode (Legacy)***

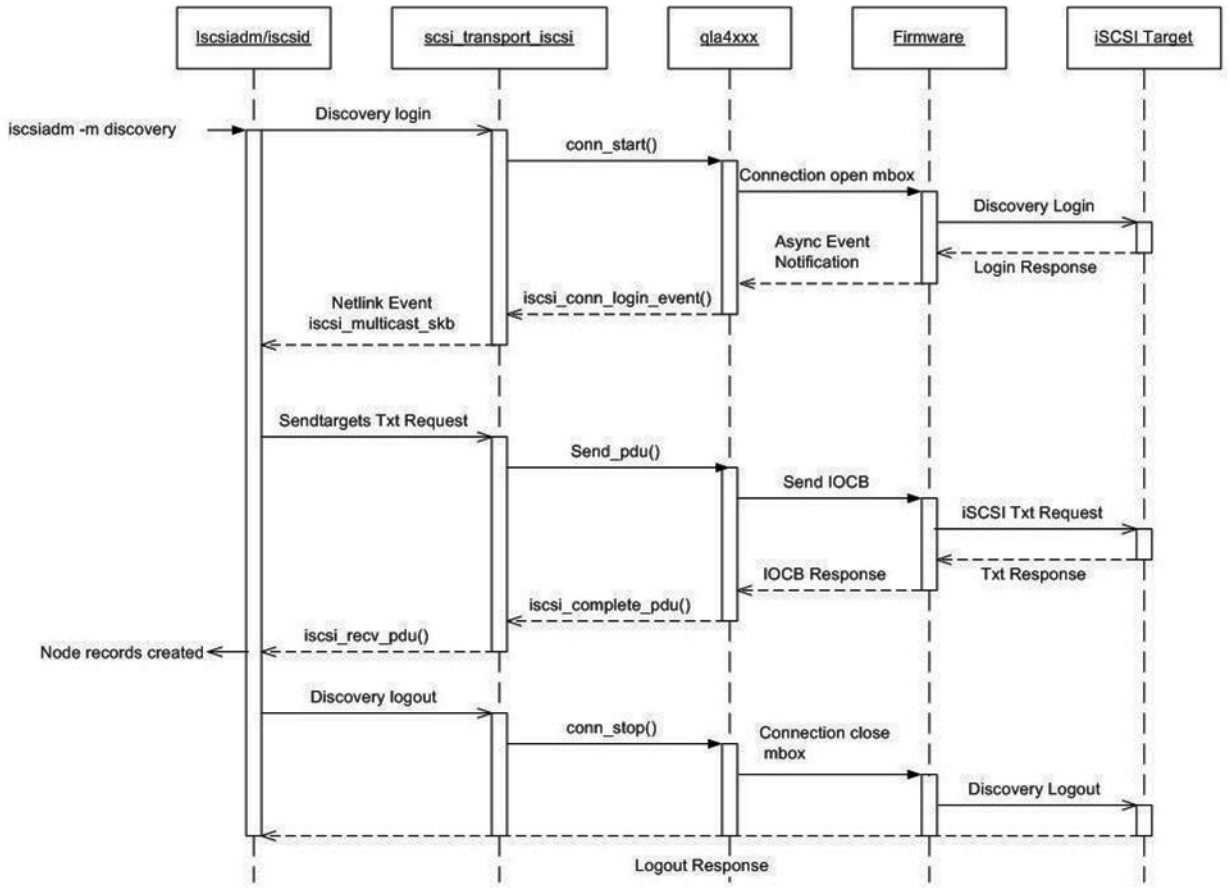


***Figure 1-3. Open-iSCSI Discovery***

# Target Login

Figures 1-4 through 1-5 provide functional flow diagrams of the target login process for IOCTL and Open-iSCSI.

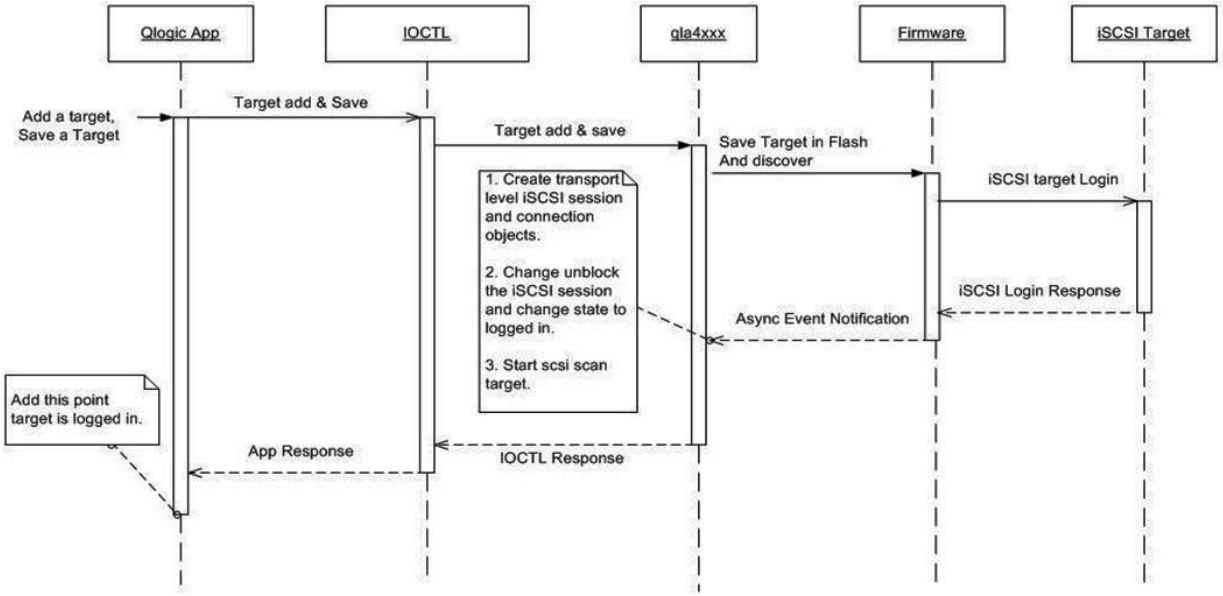


***Figure 1-4. IOCTL iSCSI Target Login***

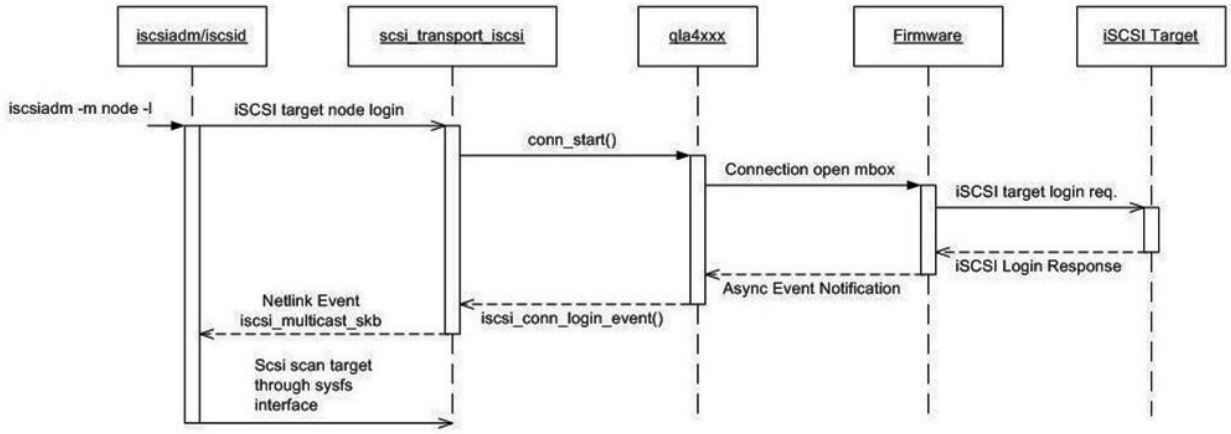


***Figure 1-5. Open-iSCSI Target Login***

# Session Recovery

Figures 1-6 through 1-7 provide functional flow diagrams of the session recovery process for IOCTL and Open-iSCSI.

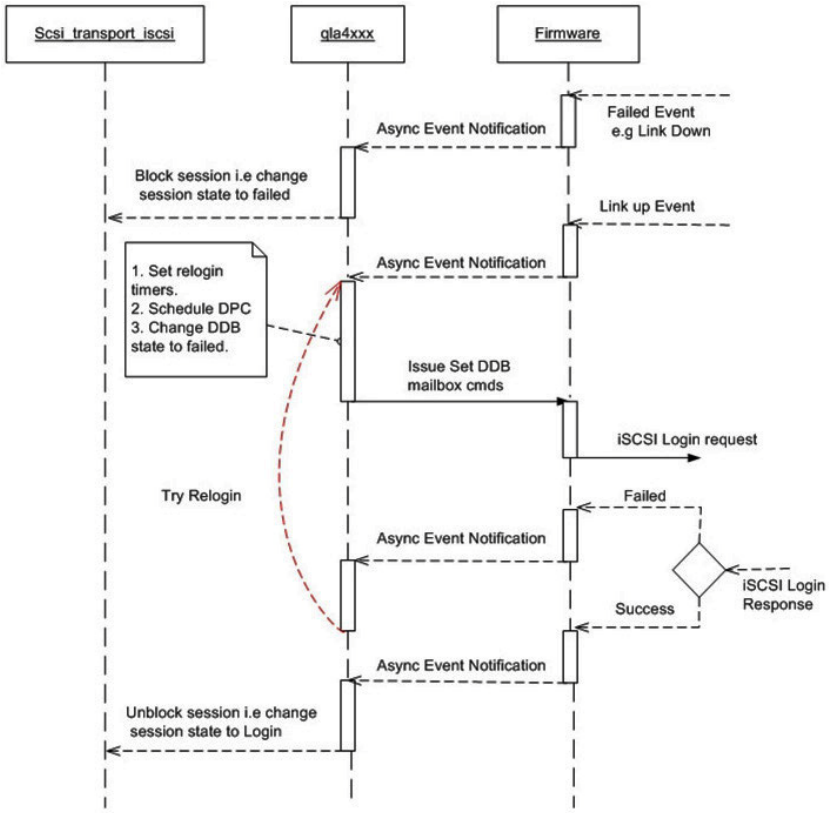


***Figure 1-6. IOCTL Session Recovery***

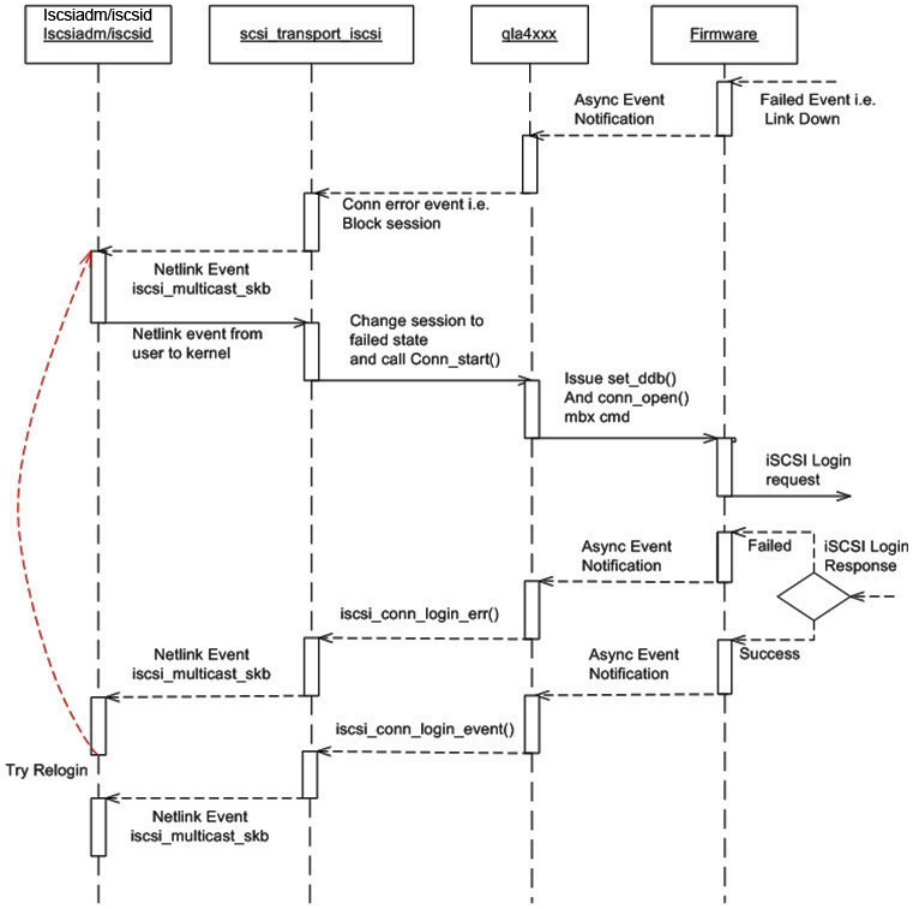


***Figure 1-7. Open-iSCSI Session Recovery***

# State Transition Diagrams

Figures 1-8 through 1-9 provide state transition diagrams for IOCTL and Open-iSCSI. These diagrams illustrate the management of the session/target life cycle.

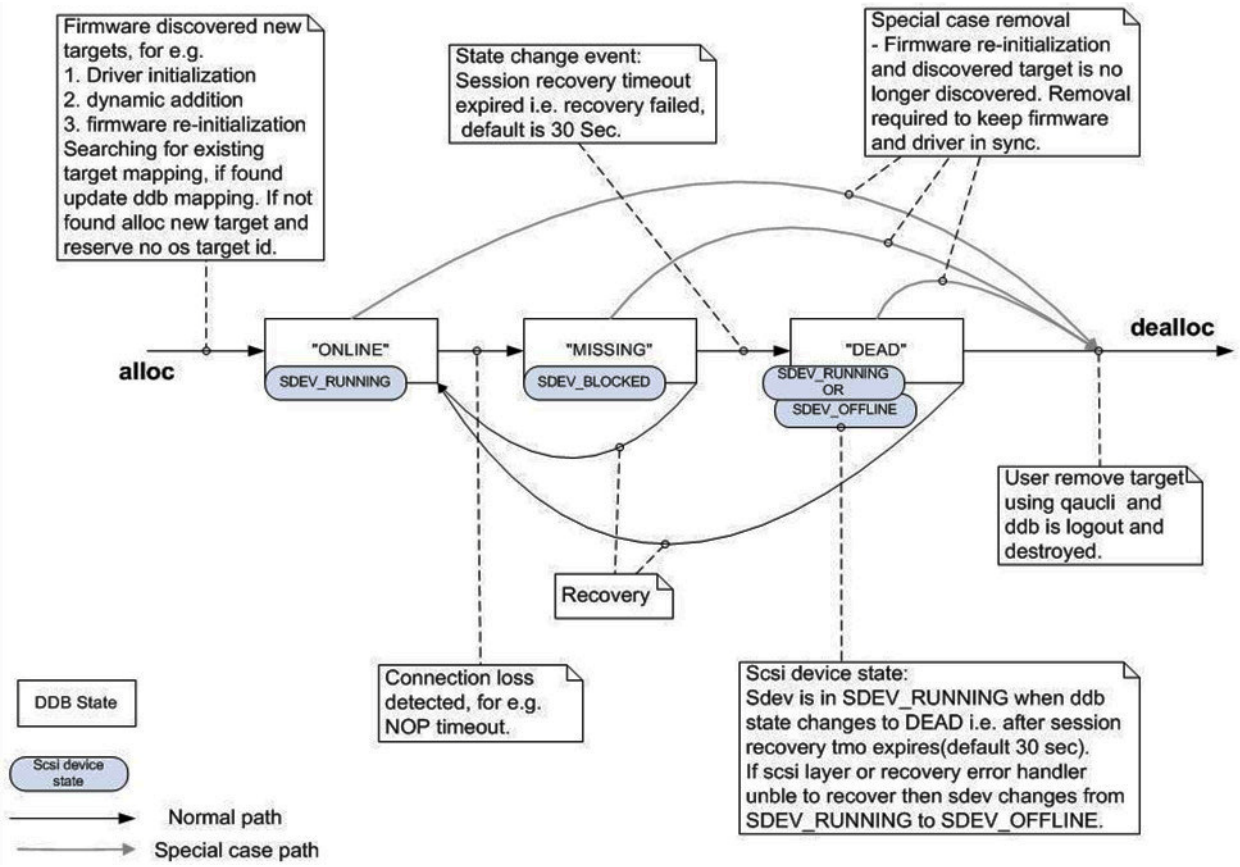


***Figure 1-8. IOCTL State Transition Diagram***

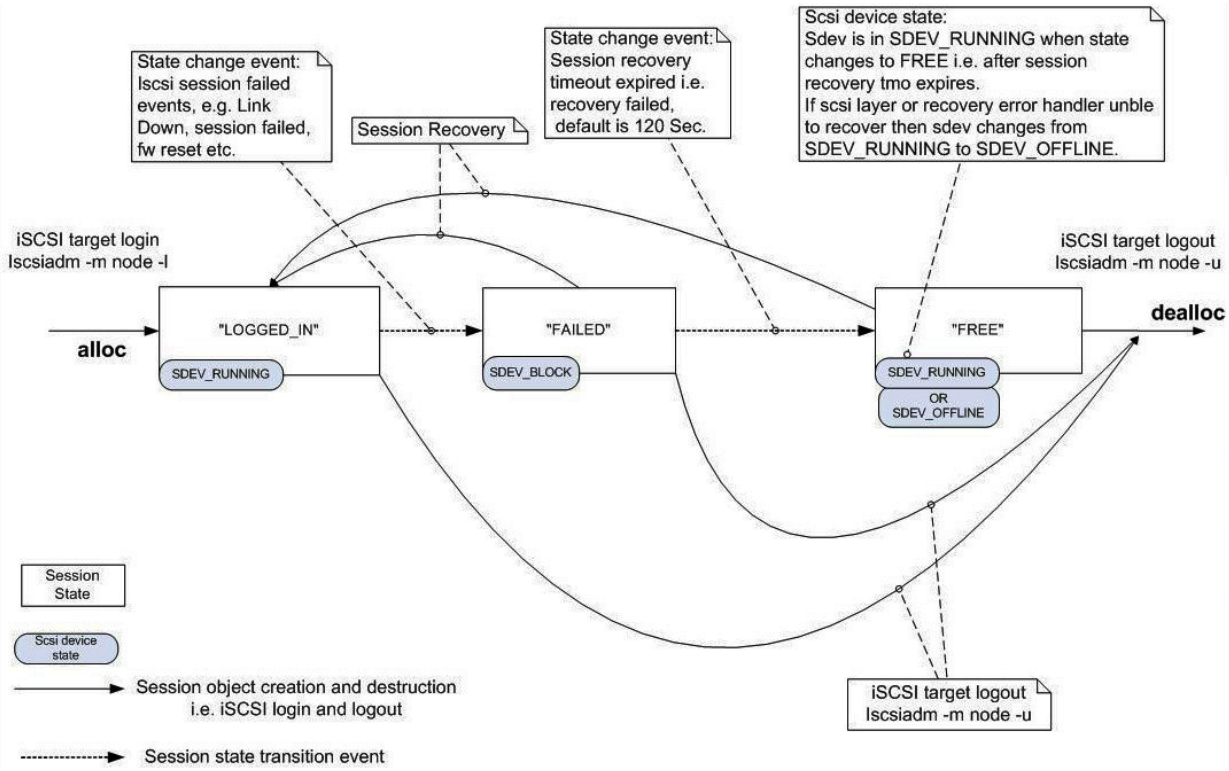


***Figure 1-9. Open-iSCSI State Transition Diagram***

# 2 Boot from SAN

This section provides information on configuring Boot from SAN (BFS) when migrating to the Open-iSCSI model.

This section includes the following topics:

# New Parameter: ql4disablesysfsboot

The ql4disablesysfsboot parameter is a new driver module parameter for the Open-iSCSI based driver model (it is not supported by the ioctl based driver). This parameter controls the behavior of boot target login in the Open-iSCSI base driver, which provides two ways to log in to the boot targets.

- Option 1: If ql4disablesysfsboot is 0, the Boot targets are exported through sysfs and iscsistart will issue a login to the boot target (that is, the login to the boot target will be triggered from the user space).
- Option 2: If ql4disablesysfsboot is 1, the qla4xxx driver will handle the login to the boot targets.

Some environments require support for driver login (Option 2) to the boot targets for these reasons:

- If the boot entry is a sendtarget entry, then iscsistart or open-iscsi cannot discover and log in to the discovered target.
- The system will not boot up if you only do the kernel upgrade and do not upgrade the iSCSI tools.

# Boot from SAN Configuration Matrix

Table 2-1 lists the different boot from SAN combinations for the ql4xdisablesysfsboot module parameter and its corresponding effect on the behavior of sysfs, iscsistart, and the qla4xxx driver when using the sendtarget entry (ST) and the iSCSI target entry (NT).

**NOTE**

All boot from SAN cases assume that iSCSI BIOS is enabled.

***Table 2-1. Boot from SAN Configuration Matrix***

| | ql4xdisablesysfsboot = 0 | | ql4xdisablesysfsboot = 1 | |
|---|---|---|---|---|
| | **Boot Target as sendtarget (ST)** | **Boot Target as Normal target (NT)** | **Boot Target as sendtarget (ST)** | **Boot Target as Normal target (NT)** |
| Export boot target through sysfs (/sys/firmware/iscsi_boot*x*/ where *x* is 1, 2,...) | The Boot Target will be exported through sysfs (with IP address and port only)<br>Note: If the iSCSI BIOS login is disabled, the entry made at the boot index will not be exported to sysfs. | The Boot Target will be exported through sysfs.<br>Note: If the iSCSI BIOS login is disabled, the entry made at the boot index will not be exported to sysfs. | The Boot Target will *not* be exported through sysfs. | The Boot Target will *not* be exported through sysfs. |
| iscsistart | `iscsistart` does *not* do discovery and login to the discovered targets. | `iscsistart` logs in to the NT.<br>Note: If the iSCSI BIOS login is disabled, the driver will handle logging in to the boot target. | `iscsistart` will *not* log in to ST targets. | `iscsistart` will *not* log in to NT targets. |
| Driver (`qla4xxx`) | The driver scans the Flash entries, creates the list of sendtargets, and discovers and logs in to the targets. | The driver does not log in to normal targets. The open-iscsi tools (iscsistart) log in to boot targets. | The driver scans the Flash entries, creates the list of sendtargets, and discovers and logs in to the targets. | The driver does the login to the normal target which is configured as boot targets. |

# Configuring Boot from SAN

## Boot from SAN Installation on SLES 11 SP2 and RHEL 6.2

To configure the adapter for BFS on SLES 11 SP2 or RHEL 6.2, follow these steps:

1. While the system is booting up, press CTRL+Q to enter Fast!UTIL on the iSCSI BIOS banner, as shown in Figure 2-1.

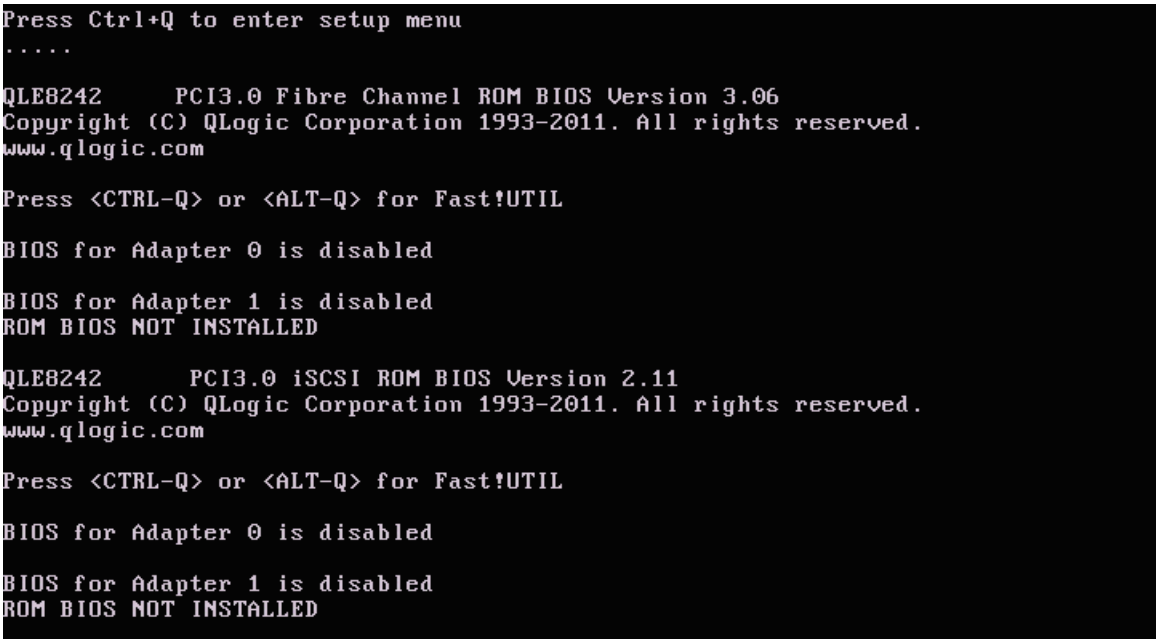


***Figure 2-1. Entering Fast!UTIL from the Adapter's BIOS***

2. Once in, select the port to be configured, as shown in Figure 2-2.

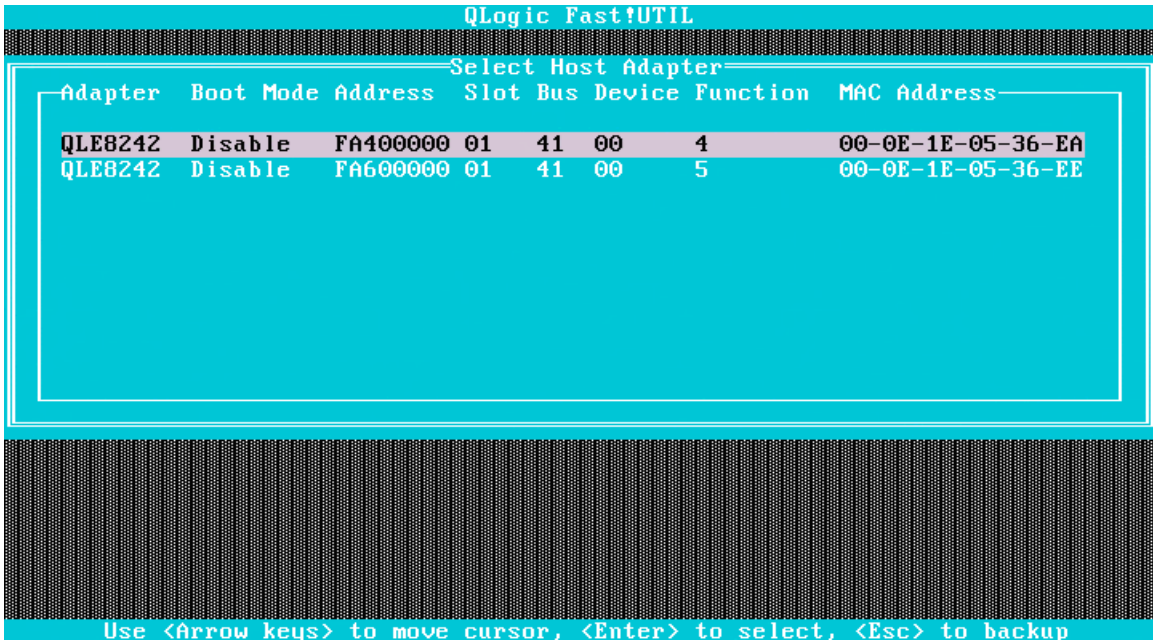


***Figure 2-2. Selecting the Port to Be Configured***

3. Select **Configuration Settings**, as shown in Figure 2-3.


***Figure 2-3. Fast!UTIL Options Menu—Selecting Configuration Settings***

4. Select **Host Adapter Settings**, as shown in Figure 2-4.

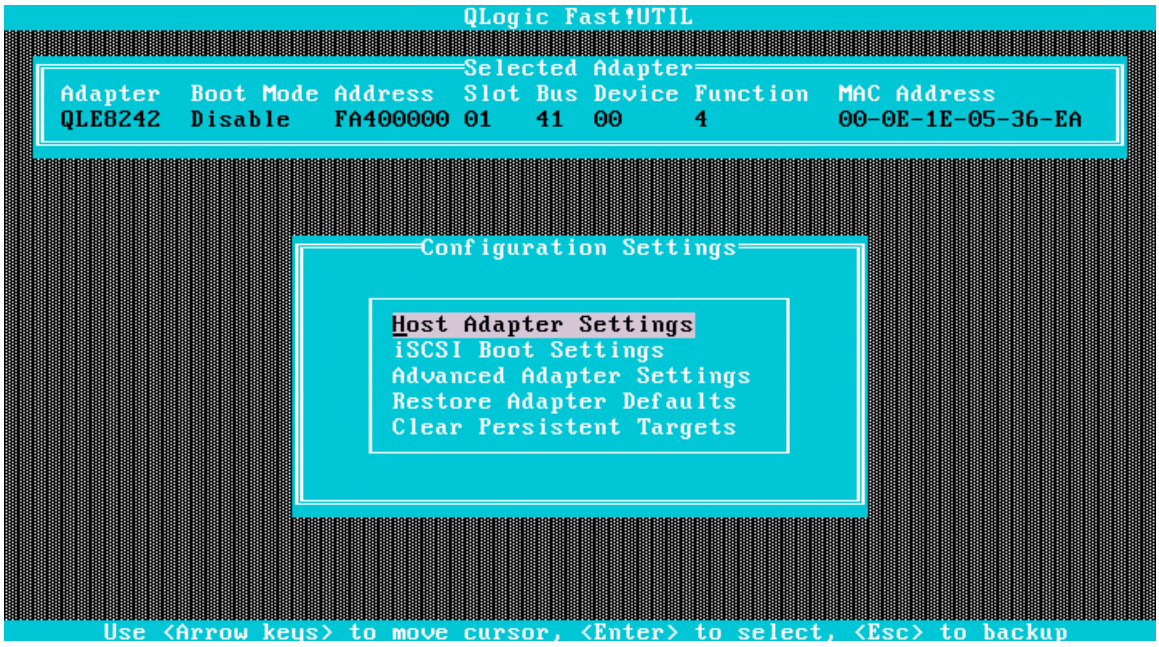


***Figure 2-4. Selecting the Host Adapter Settings Option***

5. Select the Initiator IP Settings field, as shown in Figure 2-5.

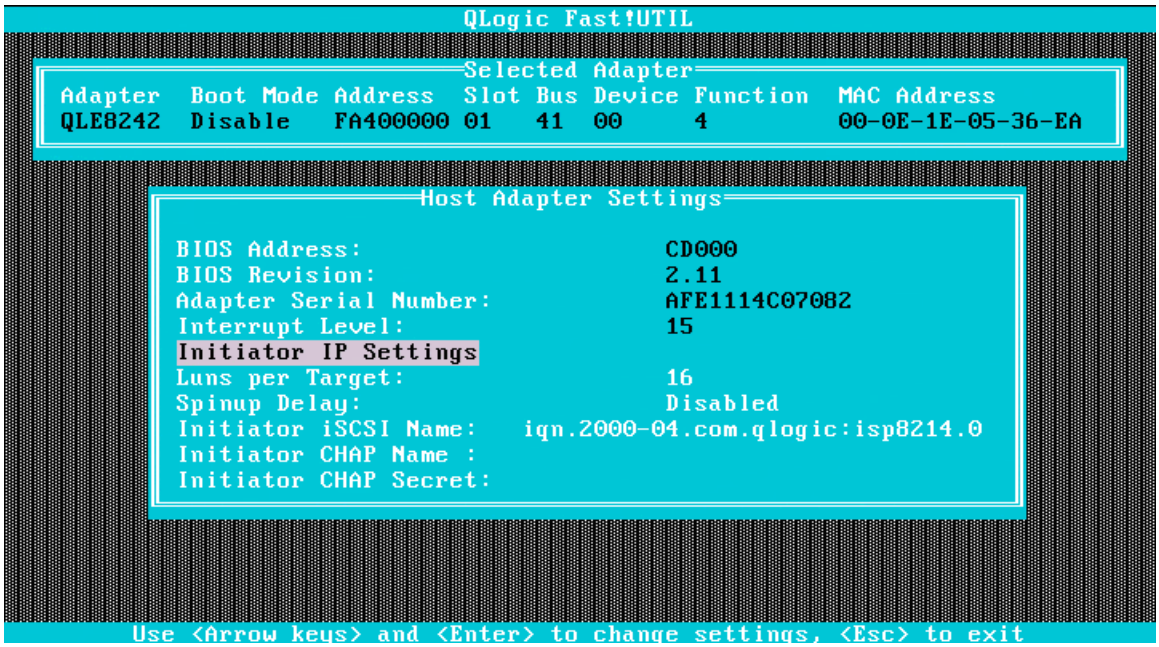


***Figure 2-5. Selecting the Initiator IP Settings***

6. Provide the initiator IP address, as shown in Figure 2-6.

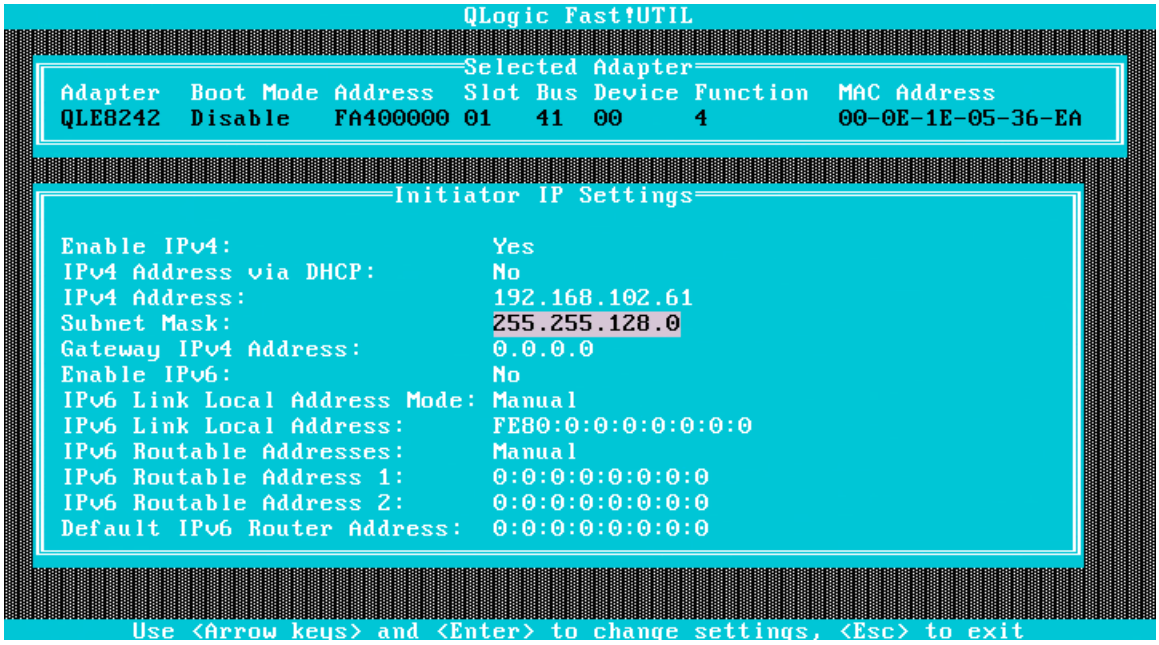


***Figure 2-6. Providing the Initiator IP Address***

7. Press ESC repeatedly until the screen shown in Figure 2-7 appears. Then, select the iSCSI Boot Settings option.

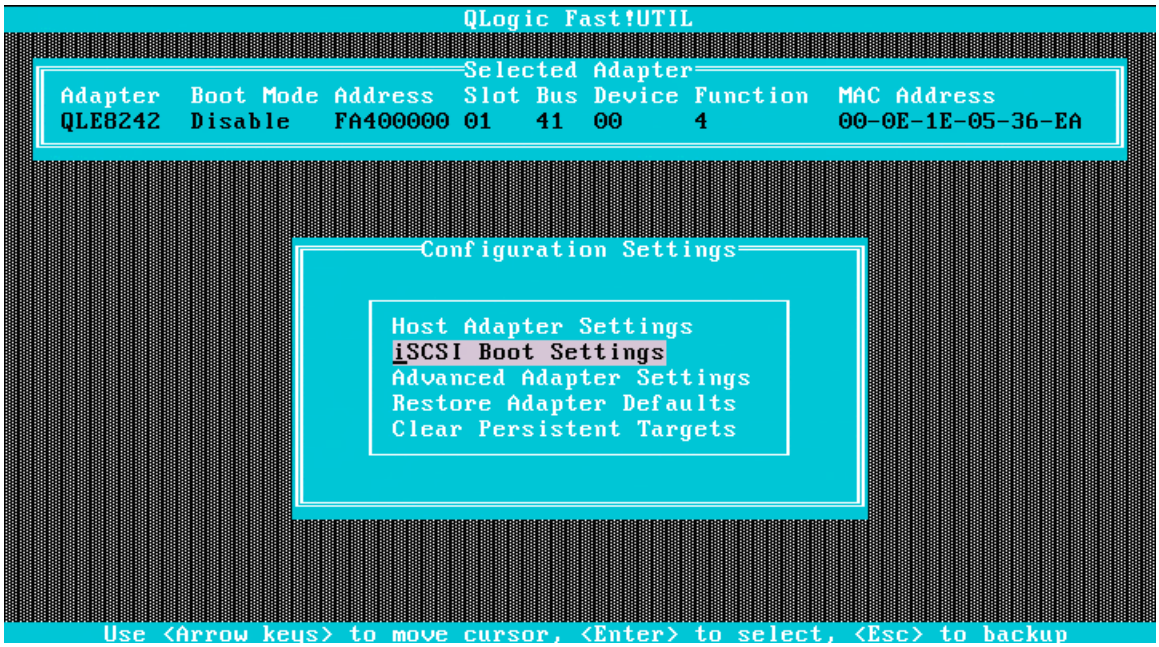


***Figure 2-7. Configuration Settings Menu***

8. Select Primary Boot Device Settings, as shown in Figure 2-8.

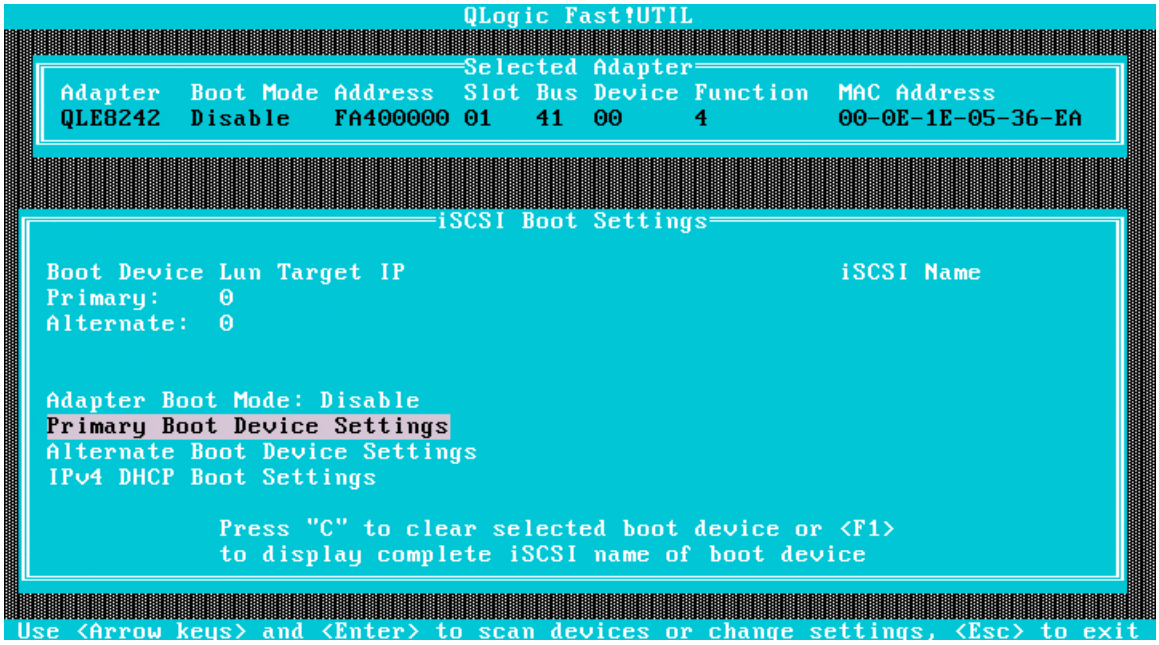


***Figure 2-8. Selecting Primary Boot Device Settings***

9. Provide the target IP address, as shown in Figure 2-9.

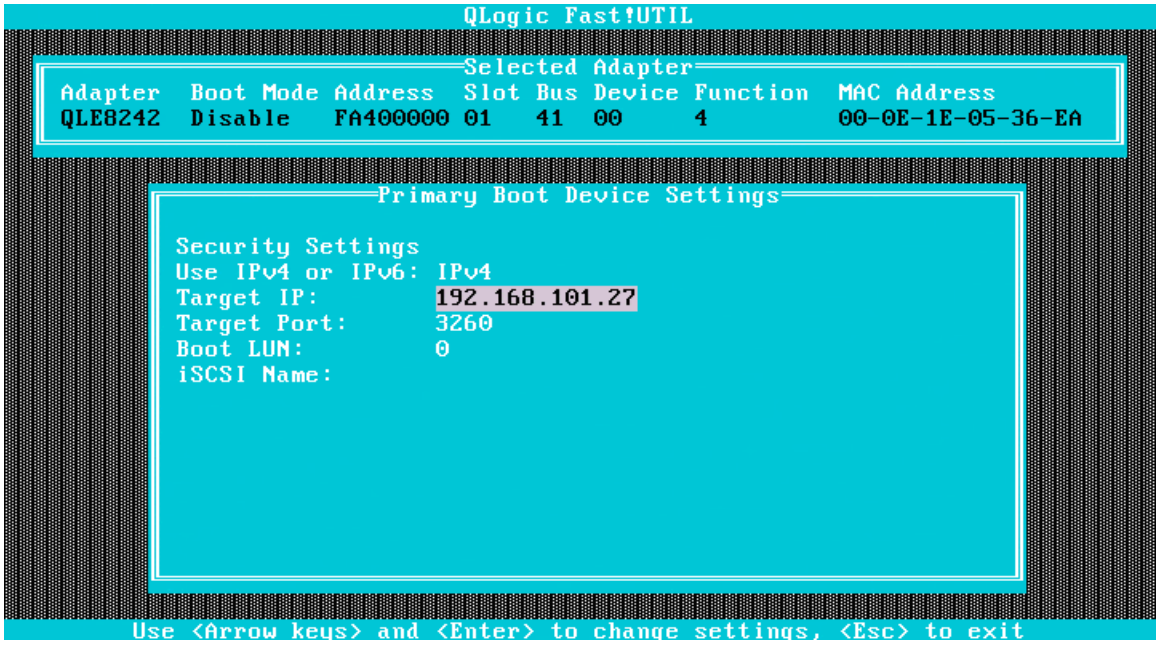


***Figure 2-9. Providing Target IP Address for Primary Boot Device***

10. Select Alternate Boot Device Settings, as shown in Figure 2-10.

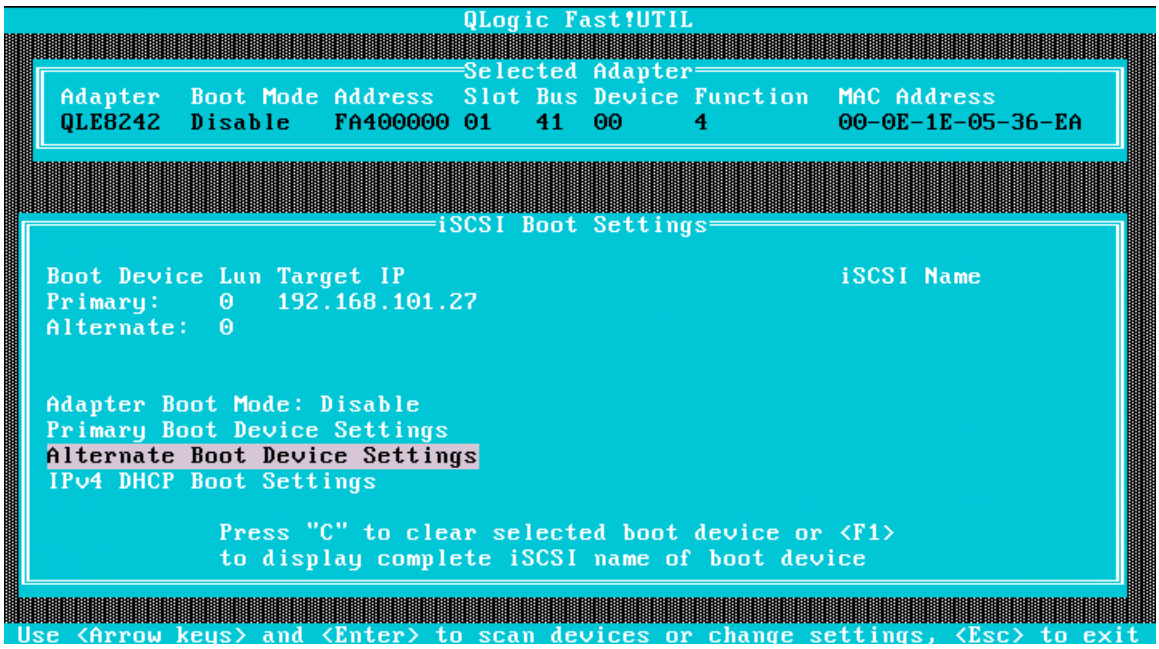


***Figure 2-10. Selecting Alternate Boot Device Settings***

11. Provide the target IP address, as shown in Figure 2-11.

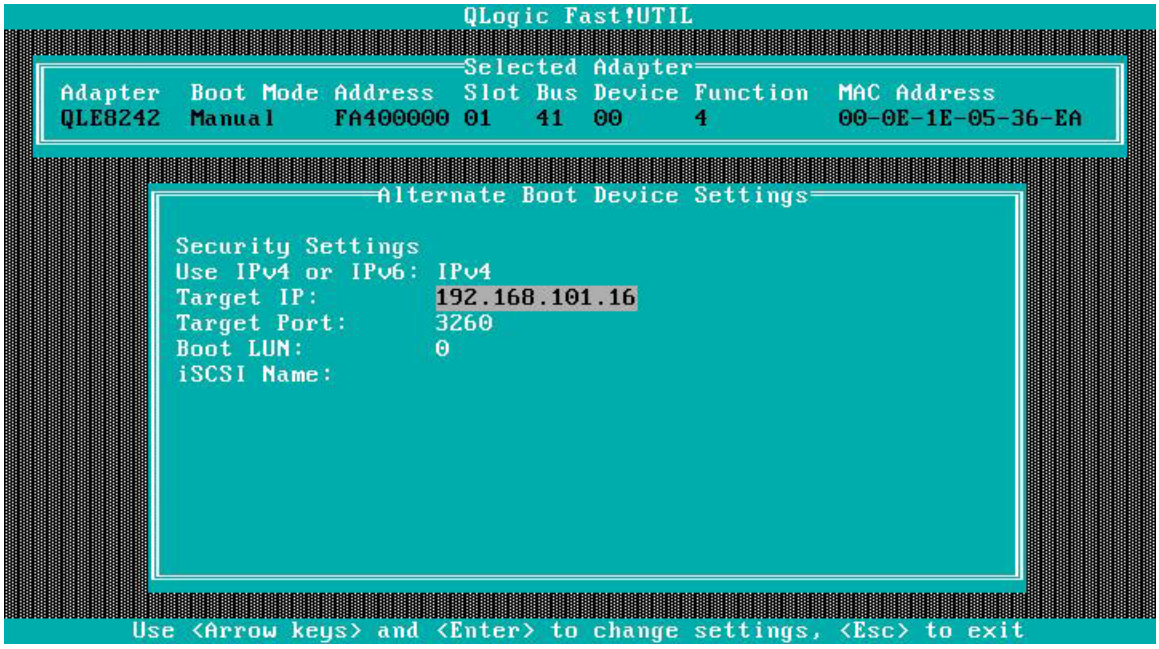


***Figure 2-11. Providing Target IP Address for Alternate Boot Device***

12. Press ESC until the menu in Figure 2-12 appears. Select **Reinit Adapter** to save all IP settings.


***Figure 2-12. Fast!UTIL Options***

13. In iSCSI Boot Settings, select **Primary** (LUN), as shown in Figure 2-13.

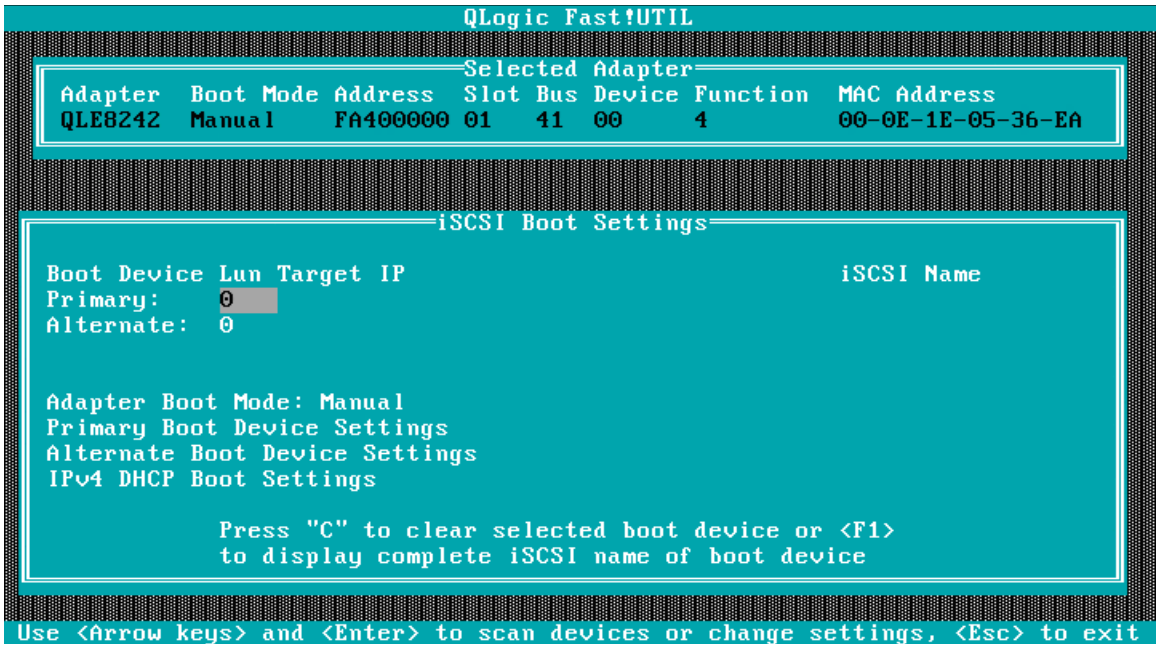


***Figure 2-13. Selecting the Primary LUN***

14. A list of the port's devices is displayed, as shown in Figure 2-14. Select the device to be used as the boot device and press ENTER.

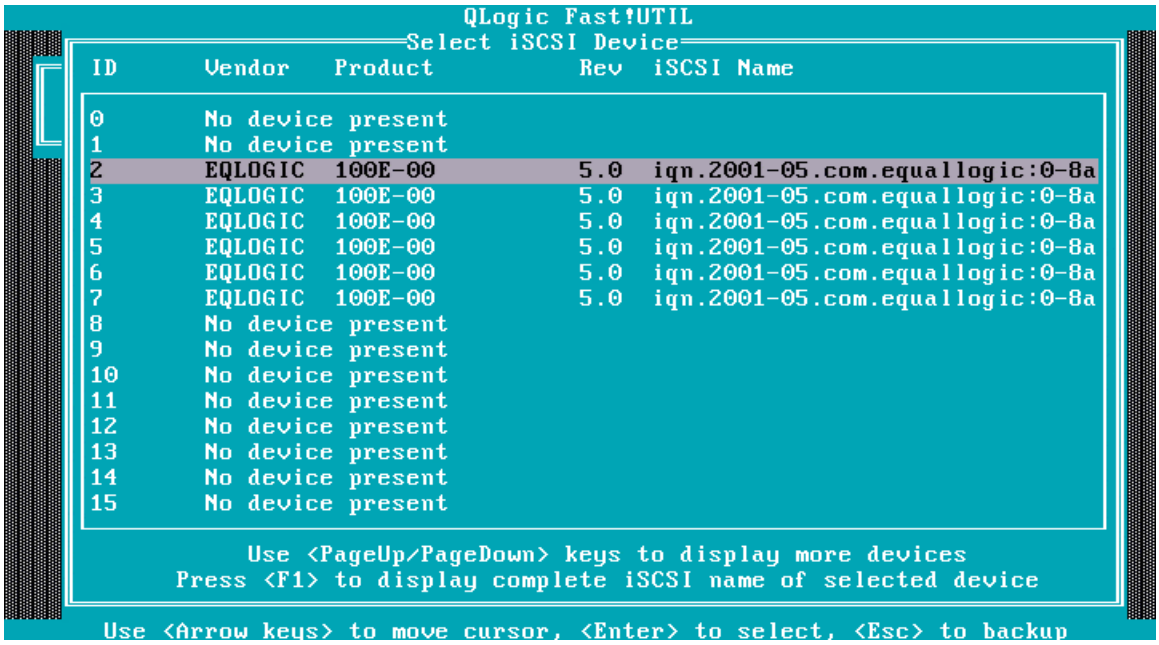


***Figure 2-14. List of Devices on the Port***

15. Repeat steps 13–14 to edit the alternate boot device setting, as in Figure 2-15.

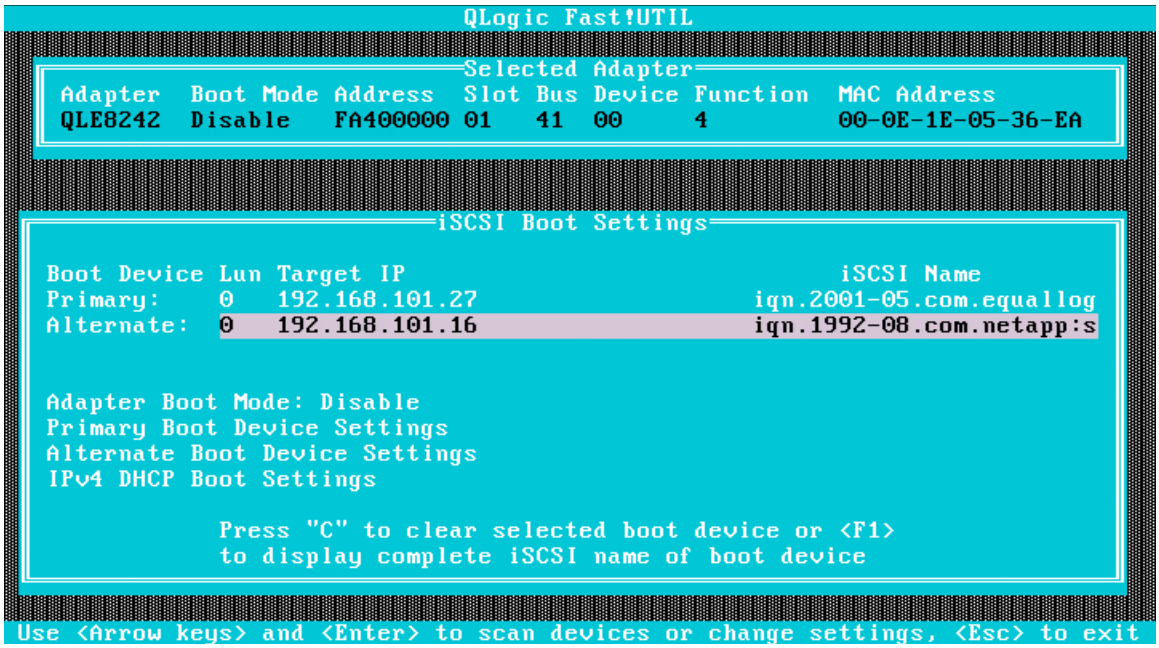


***Figure 2-15. Editing Alternate Boot Device Settings***

16. Change the adapter's boot mode to **Manual**, as Figure 2-16 shows.

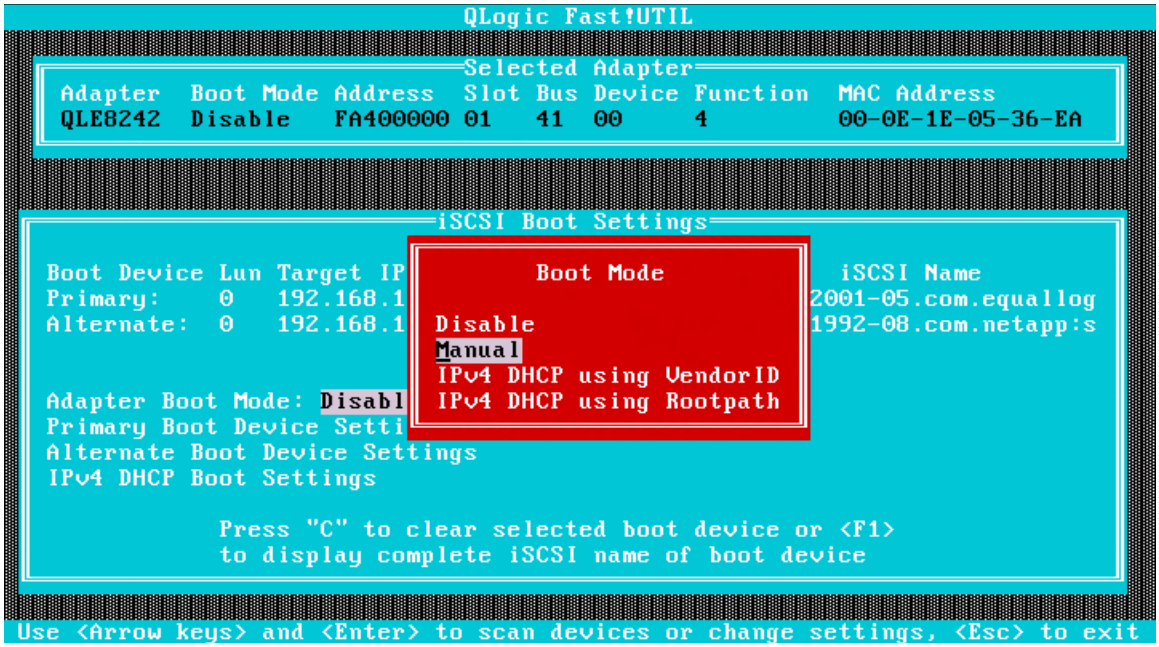


***Figure 2-16. Setting the Boot Mode to Manual***

17. Save the settings for the port.
18. Repeat steps 2–14, but select the second port, and configure the boot targets on the port.
19. Save the settings and reboot the system with the installation disk.

# Boot from SAN Installation on SLES 11 SP2

To configure the adapter for BFS on SLES 11 SP2, follow these steps:

1. Boot from the SLES 11 SP2 DVD, as shown in Figure 2-17.


***Figure 2-17. Entering the Boot BIOS***

2. Provide the `withiscsi=1` boot option, as shown in Figure 2-18.


***Figure 2-18. Providing the `withiscsi` Boot Option***

3. The Welcome screen appears, as shown in Figure 2-19. Follow the instructions on this screen to begin the installation.

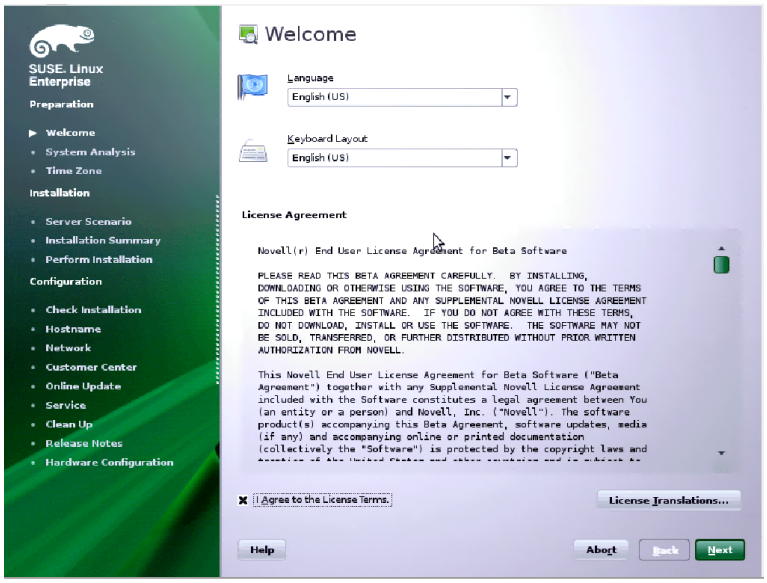


***Figure 2-19. Installation Welcome Screen***

4. Complete the installation by following the instructions on all subsequent screens, as shown in Figures 2-20 through 2-27.

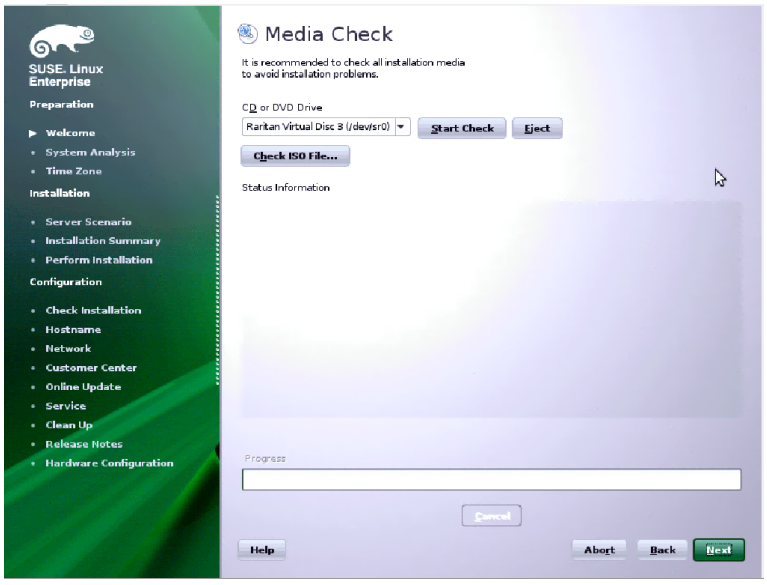


***Figure 2-20. Media Check***

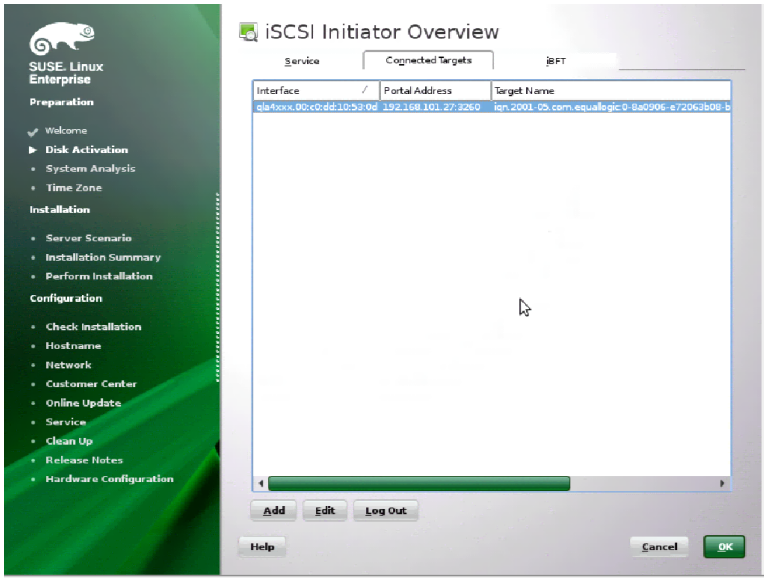


***Figure 2-21. iSCSI Initiator Overview***

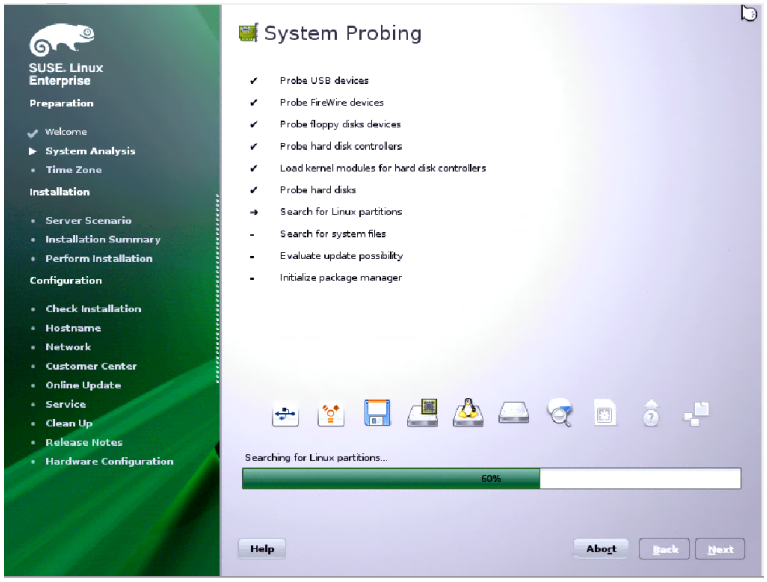


***Figure 2-22. Selecting System Probing***

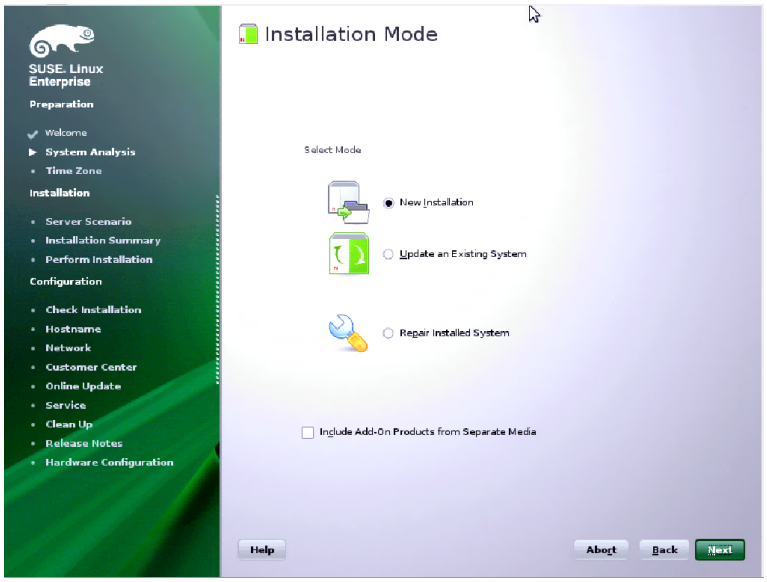


***Figure 2-23. Selecting the Installation Mode***


***Figure 2-24. Setting the Clock and Time Zone***

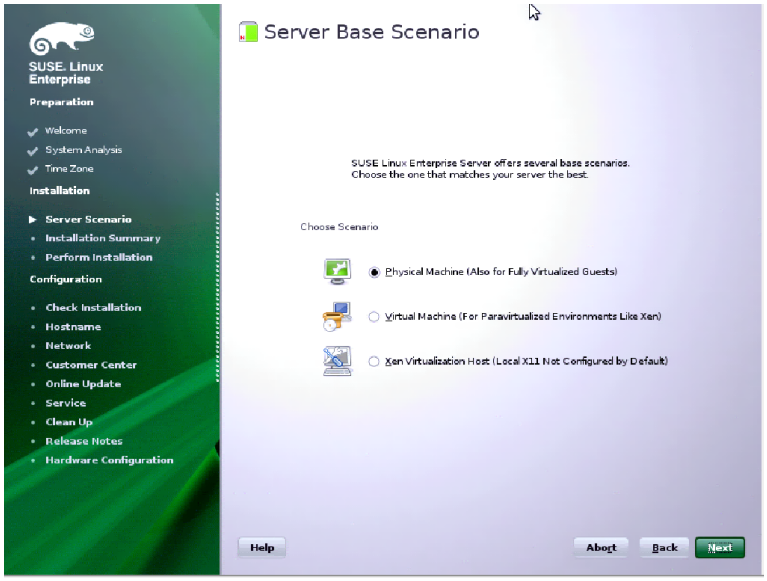


***Figure 2-25. Selecting the Server Base Scenario***

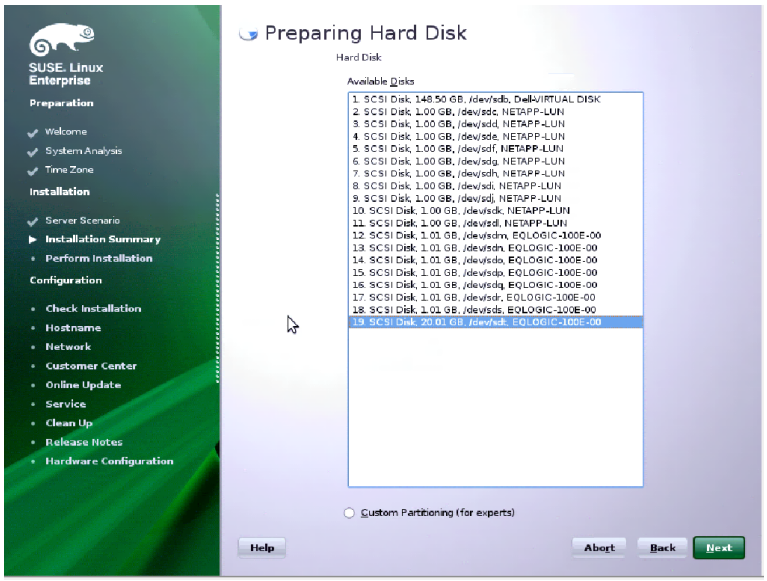


***Figure 2-26. Preparing the Hard Disk***

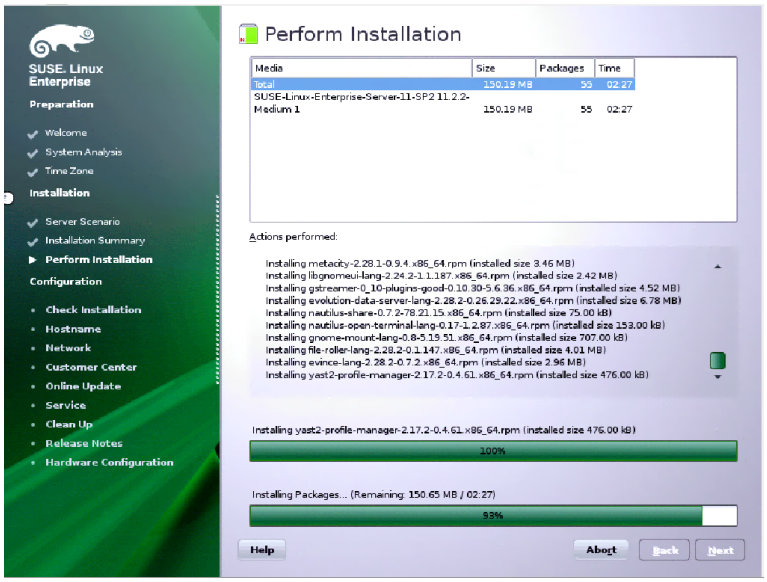


***Figure 2-27. Performing the Installation***

5. When the installation is completed, reboot the system and boot from the iSCSI adapter.

# Configuring Boot from SAN on RHEL 6.2

## Installing RHEL 6.2

To install RHEL 6.2, follow these steps:

1. Boot from the installation media, as shown in Figure 2-28.


***Figure 2-28. Booting From the Installation Media***

2. Choose either to test the media disk or skip the test, as Figure 2-29 shows.

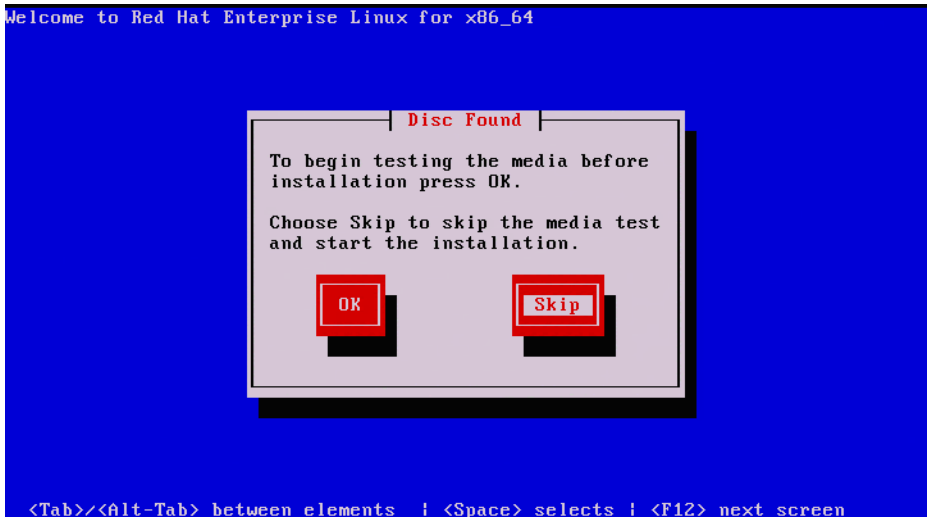


***Figure 2-29. Choosing to Test Media Disk or Skip Test***

3. Select the network interface through which the installation is to be done, as Figure 2-30 shows.

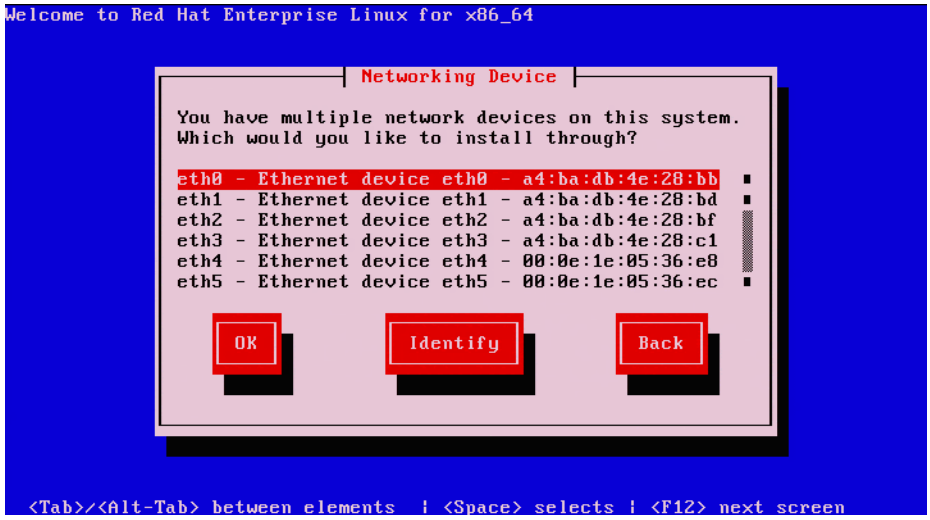


***Figure 2-30. Selecting Network Interface for Installation***

4. Configure the IP address either statically or using, as Figure 2-31 shows.

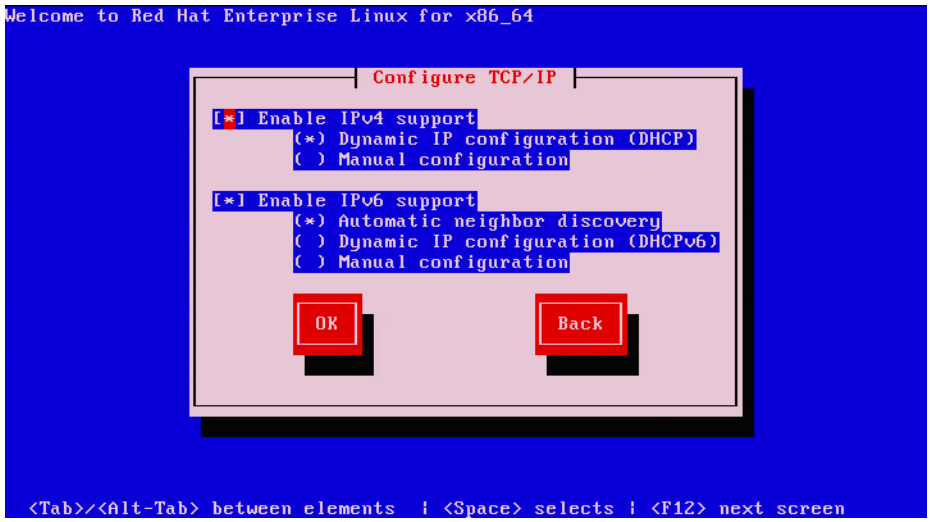


***Figure 2-31. Configuring the IP Address***

5. Once the network interface is configured, the installation starts, as shown in Figure 2-32.

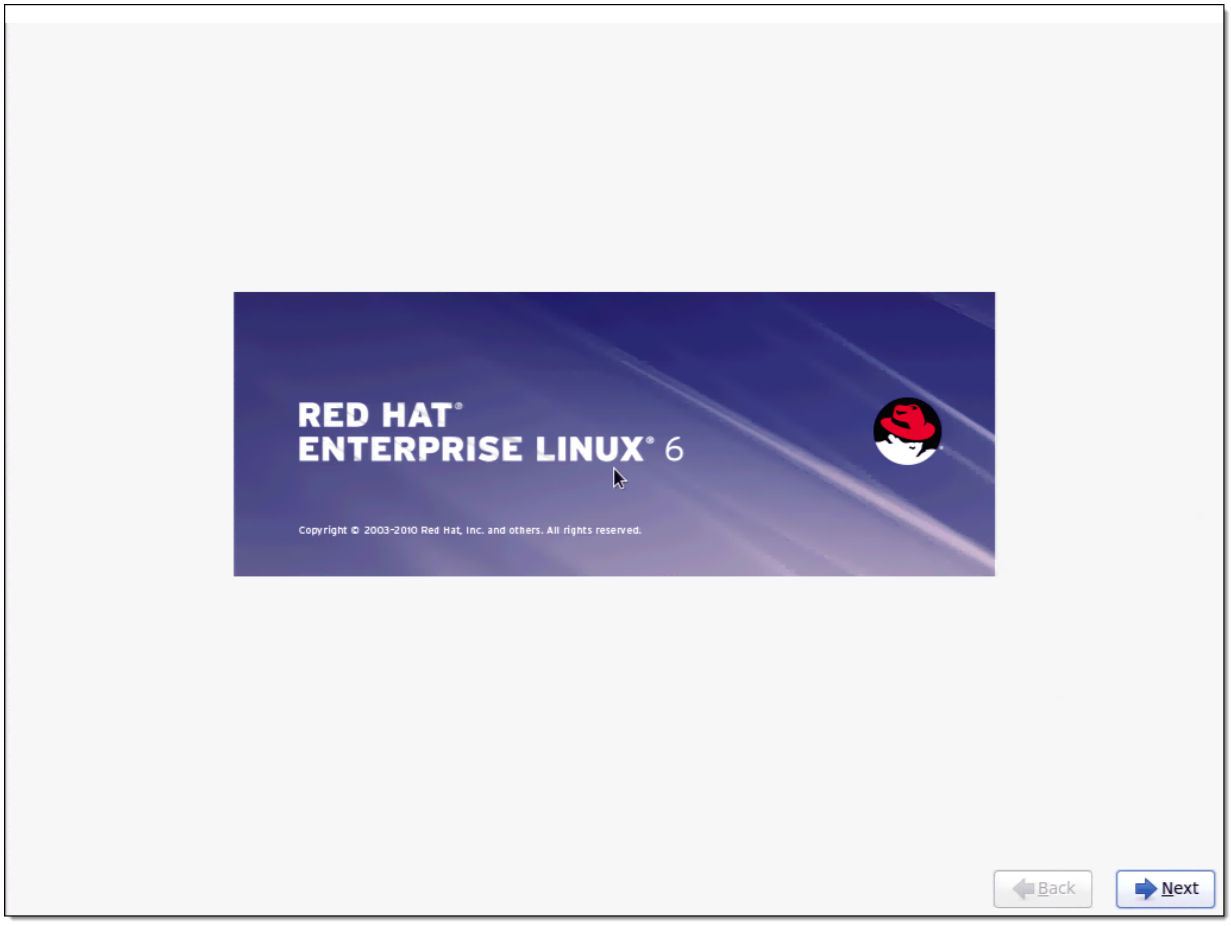


***Figure 2-32. Start of RHEL 6.2 Installation***

6. Select the language to use during the installation, as shown in Figure 2-33.

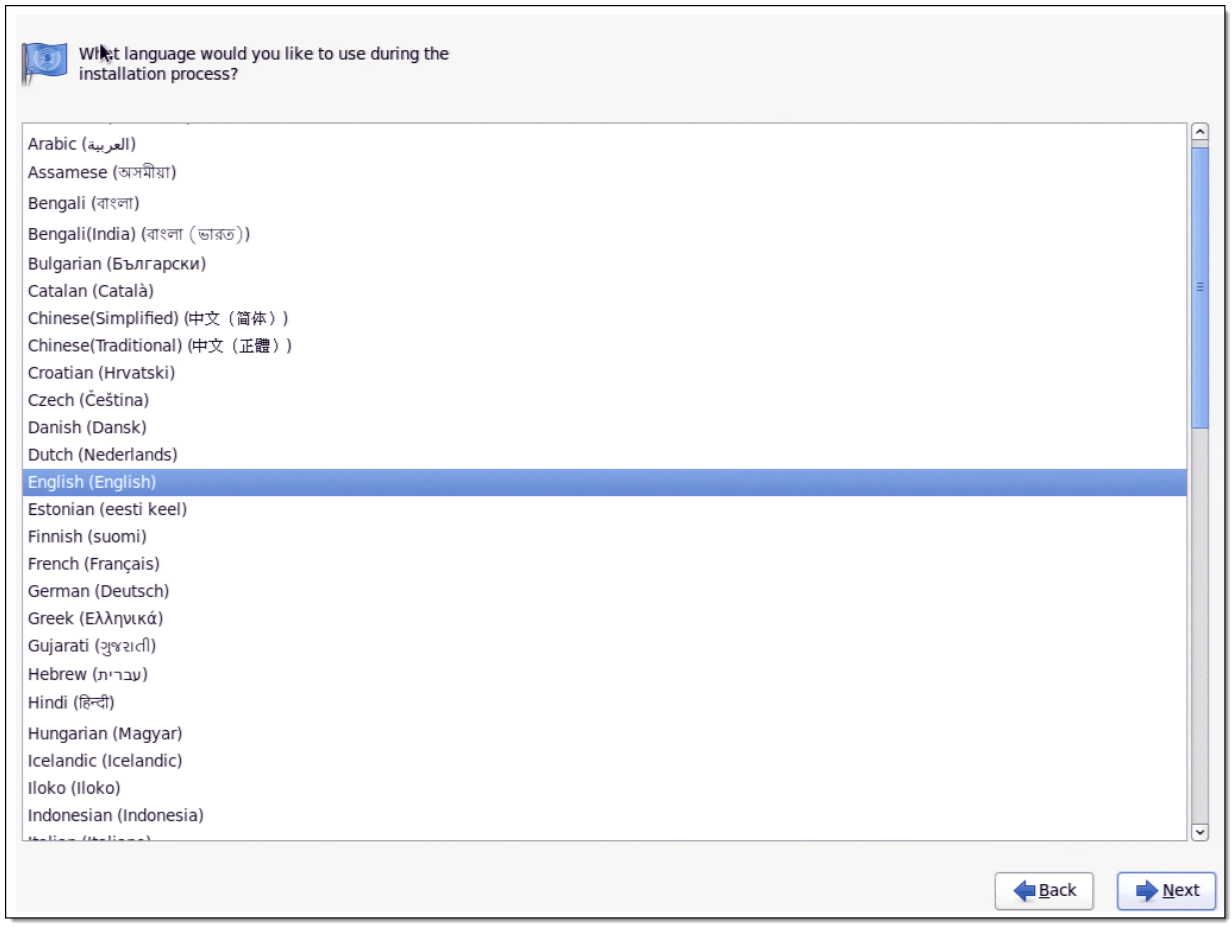


***Figure 2-33. Selecting the Language for the Installation***

7. Select the type of keyboard that is connected to your system, as shown in Figure 2-34.

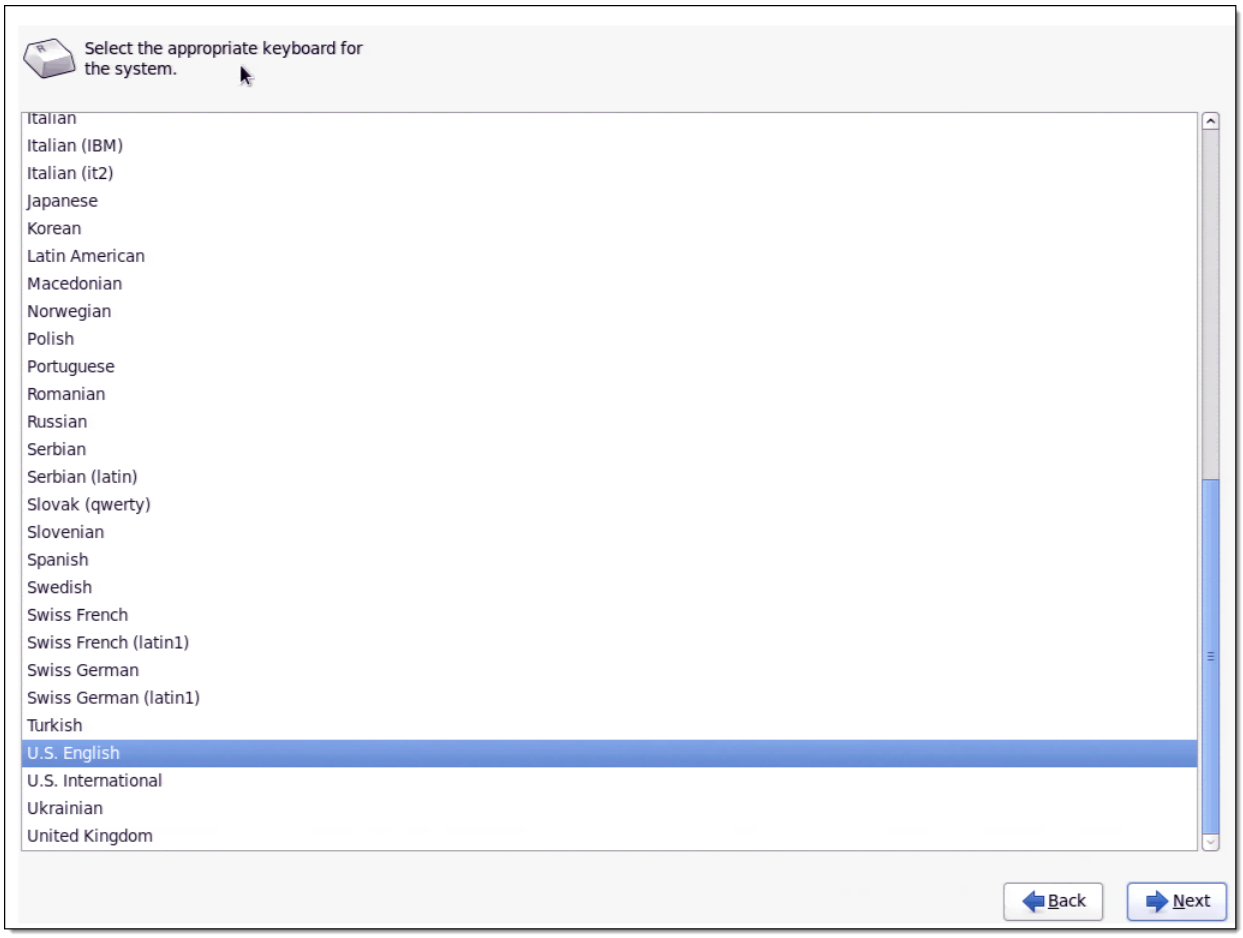


***Figure 2-34. Selecting the Keyboard***

8. Select one the two options shown in Figure 2-35: **Basic Storage Devices** or **Specialized Storage Devices**. You may select either option since the LUN has been added in the adapter's BIOS.


***Figure 2-35. Selecting Storage Device Type***

9. Select the disk that was added in the adapter's BIOS and verify that it has two paths to it, as shown in Figure 2-36.

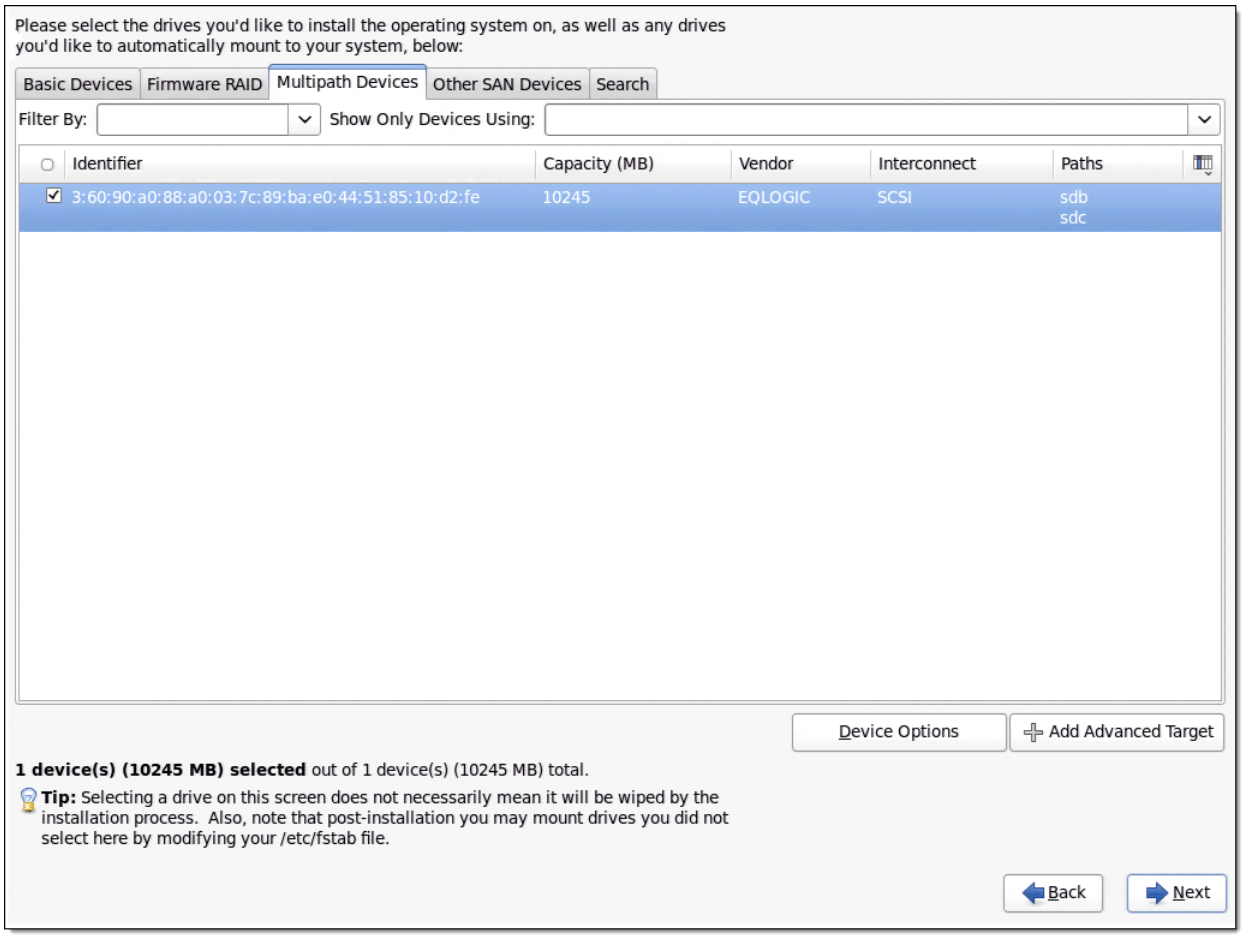


***Figure 2-36. Verifying Paths to the Disk***

10. Enter the host name, as shown in Figure 2-37.


***Figure 2-37. Specifying the Host Name***

11. Select the time zone, as shown in Figure 2-38.


***Figure 2-38. Selecting the Time Zone***

12. Enter the root credentials that you want to set for the system, as shown in Figure 2-39.

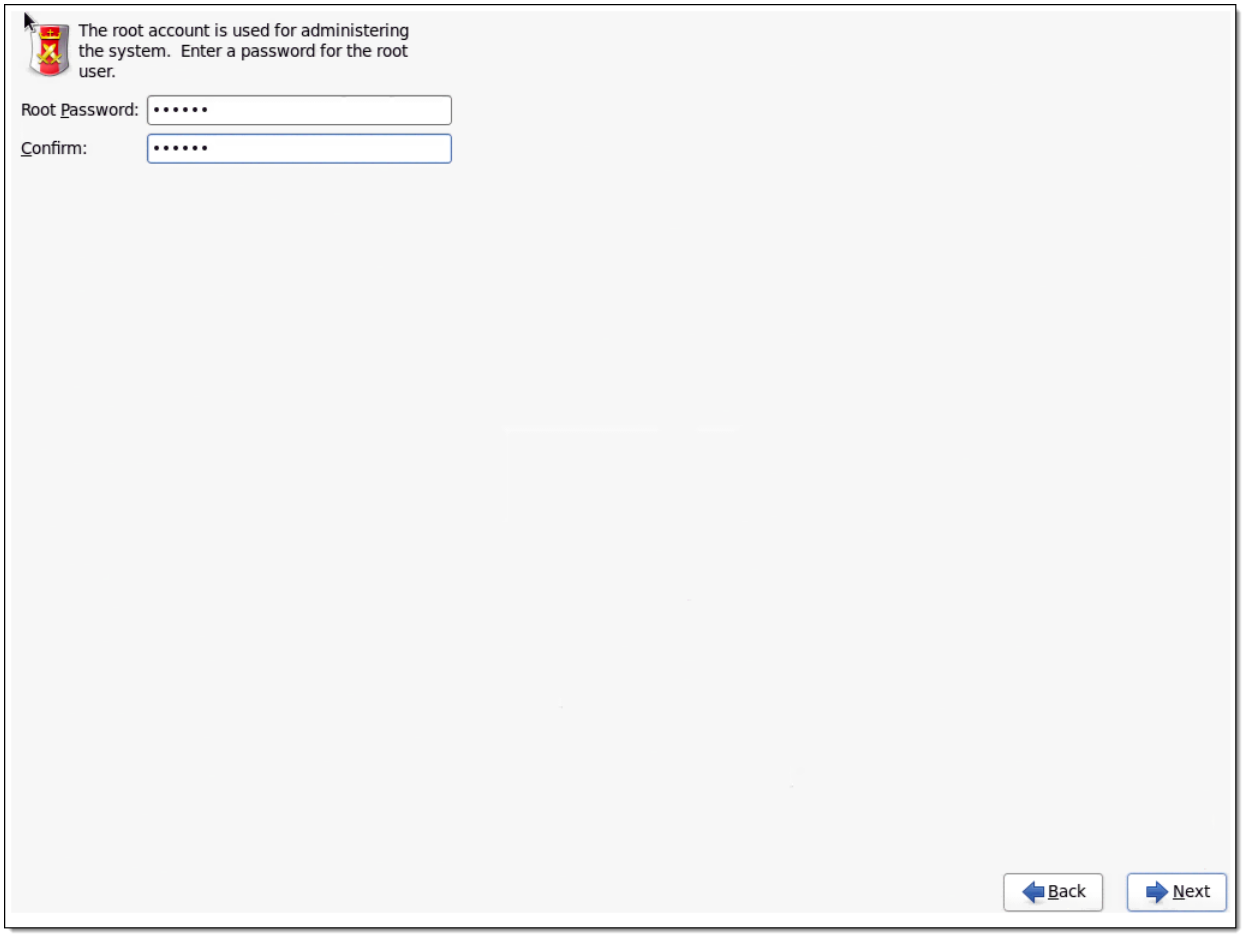


***Figure 2-39. Entering the Root Credentials***

13. Select the type of partition layout you want, as shown in Figure 2-40.

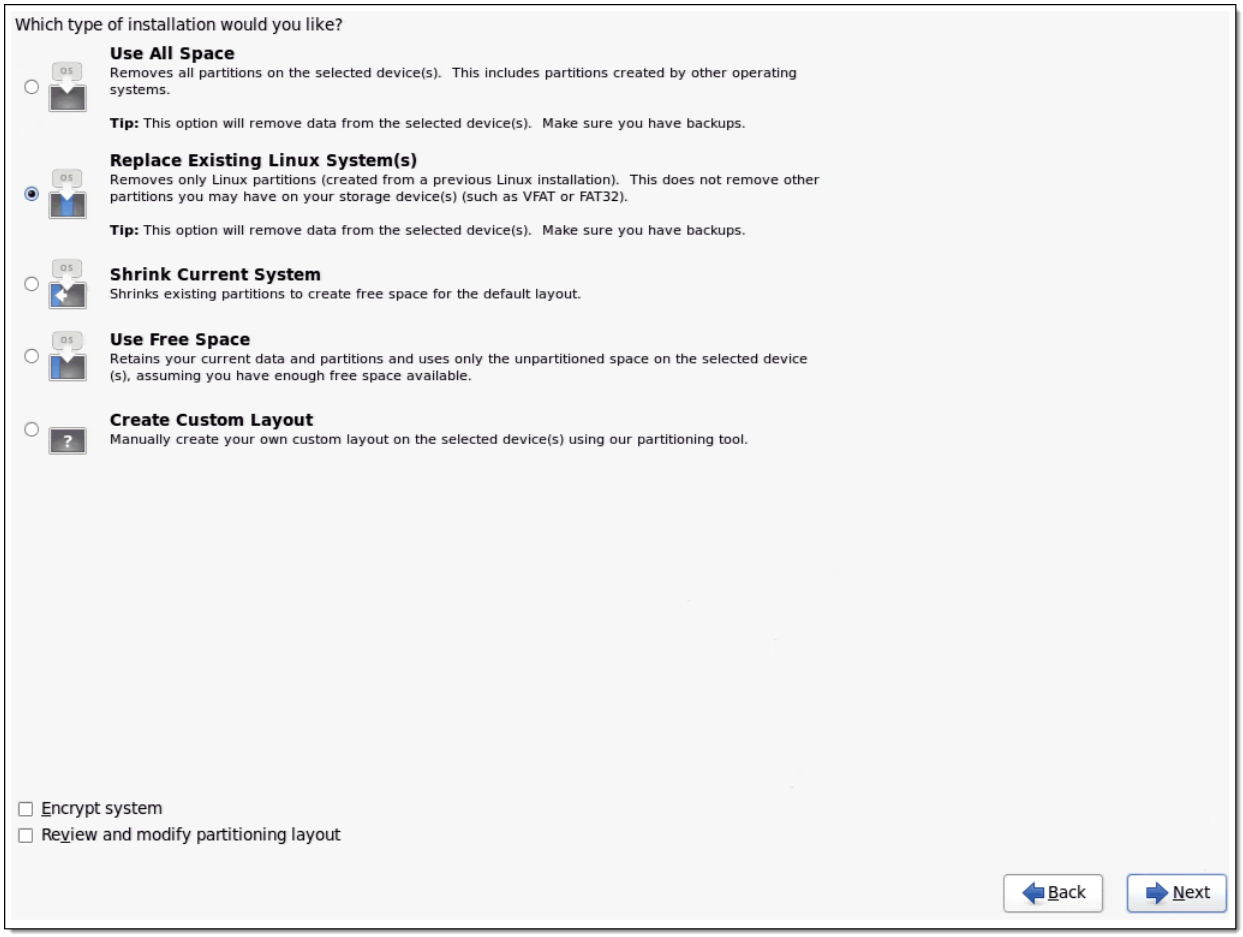


***Figure 2-40. Selecting the Partition Layout Type***

14. Select the type of installation, as shown in Figure 2-41.

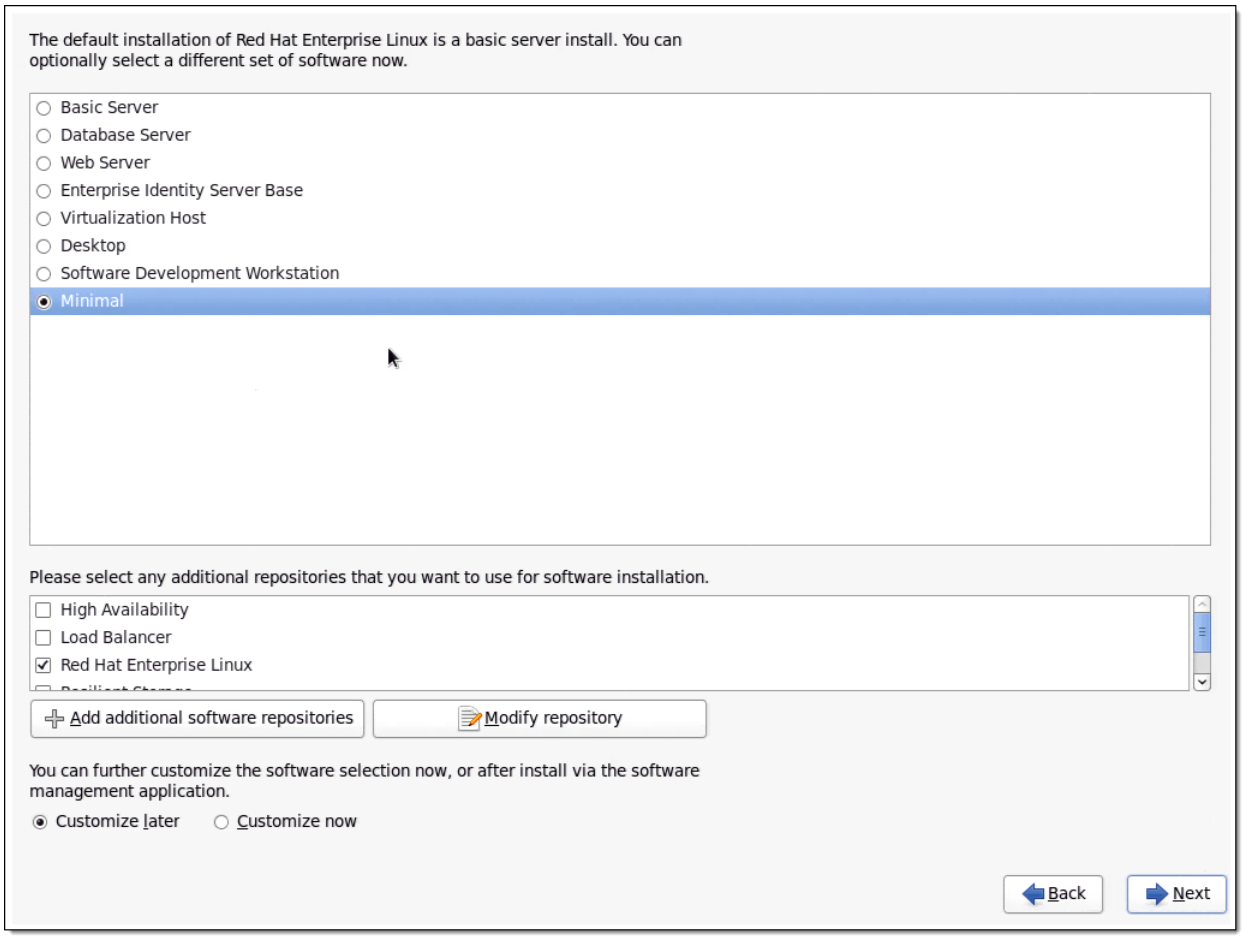


***Figure 2-41. Selecting the Installation Type***

15. The installer creates the partitions on the disk and begins to copy files to it, as shown in Figure 2-42.

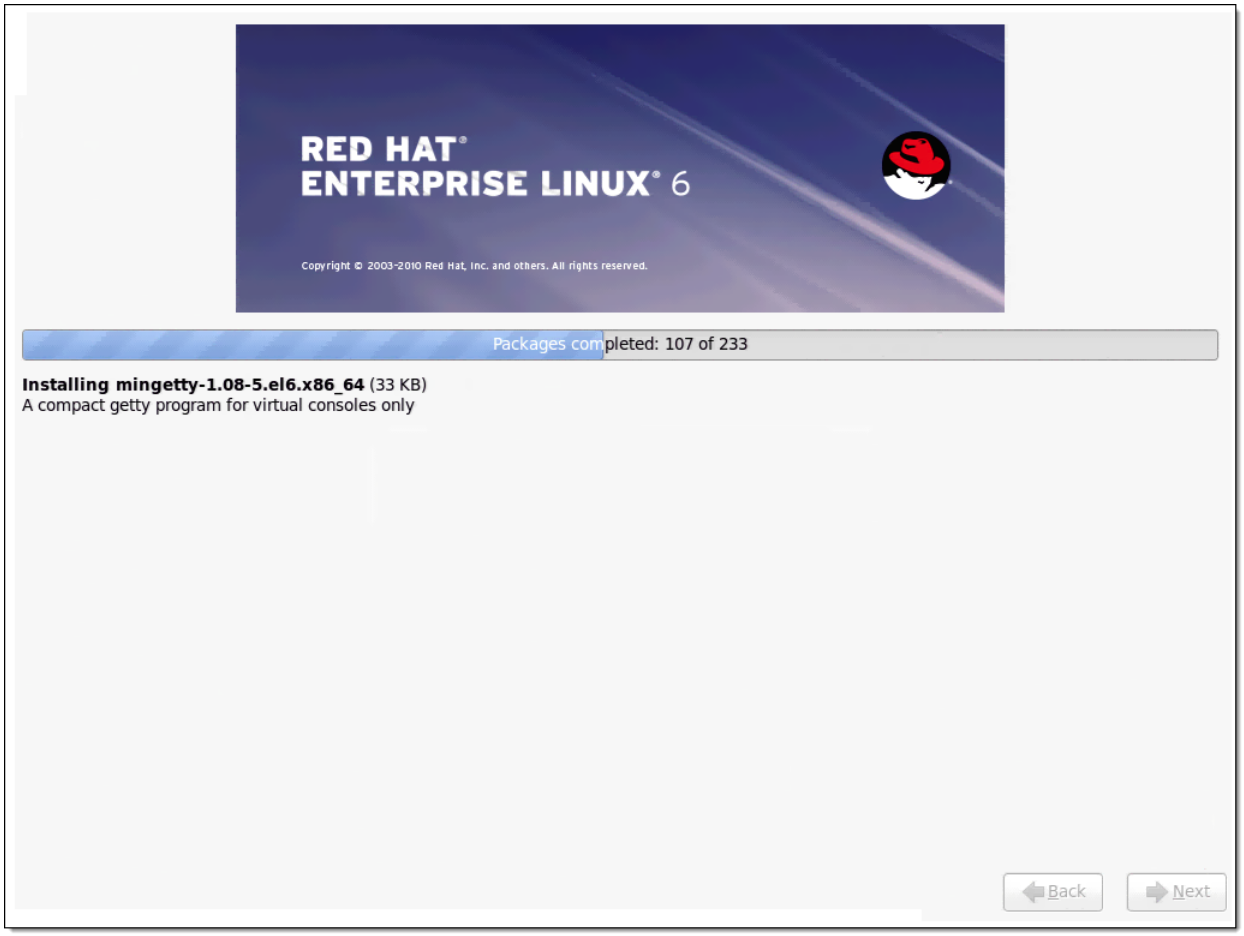


***Figure 2-42. Installation in Progress***

16. Once the files have been copied, the installer will prompt you to reboot the machine, as shown in Figure 2-42.

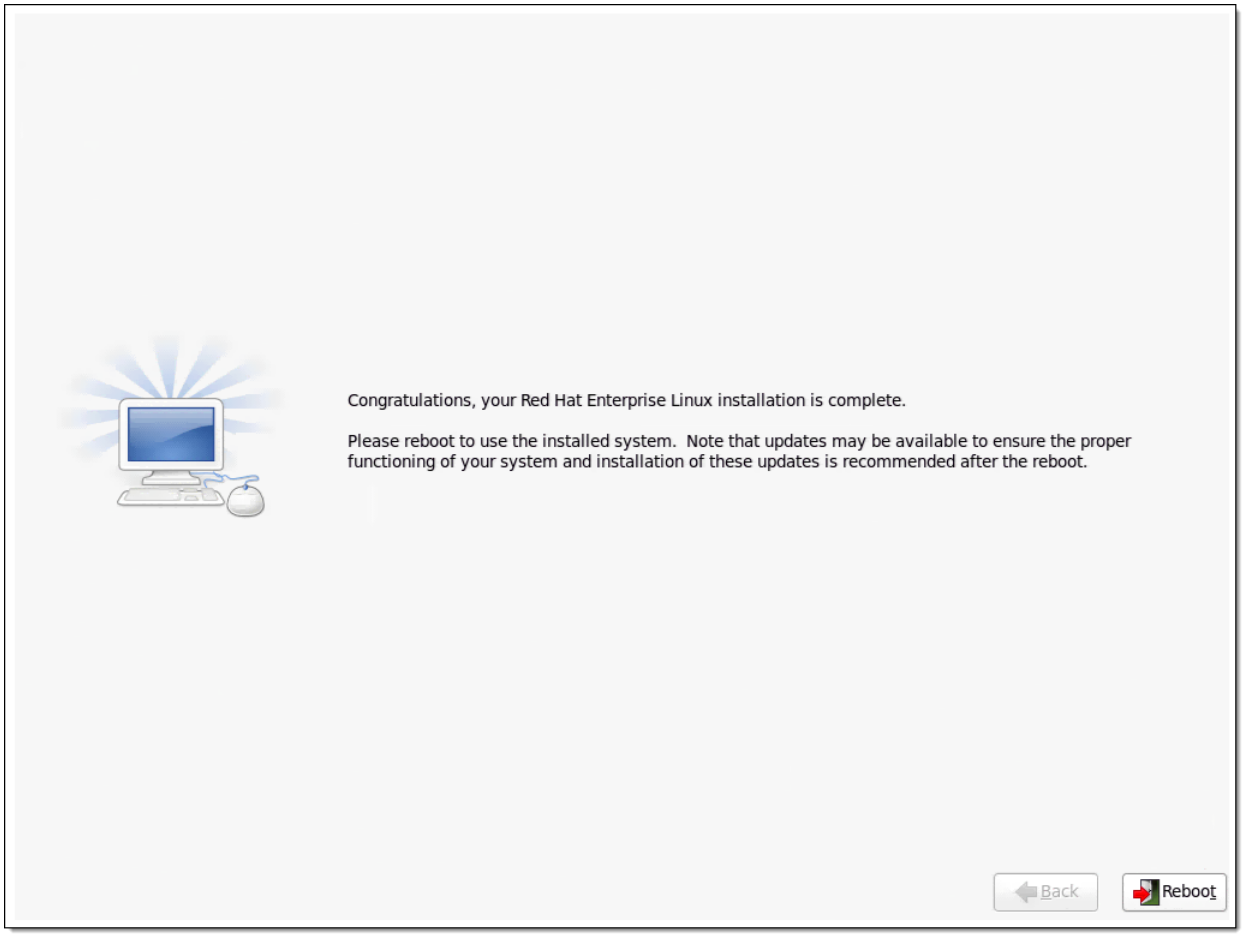


***Figure 2-43. Installation Completed***

# ql4xdisablesysfsboot Settings and Adapter Boot Mode

This section demonstrates the effect of the `ql4xdisablesysfsboot` parameter under different adapter boot modes.

**NOTE**

For target discovery and login to work, the adapter's IP address must be configured using either BIOS settings or `iscsiadm`. The following examples show the `iscsiadm` commands to use to set the IP address.

```
# iscsiadm -m iface -I qla4xxx.00:c0:dd:07:59:f2.ipv4.0 -n
iface.ipaddress  -v 10.0.10.183 -o update
# iscsiadm -m iface -I qla4xxx.00:c0:dd:07:59:f2.ipv4.0 -n
iface.subnet_mask -v 255.255.0.0 -o update
# iscsiadm -m iface -I qla4xxx.00:c0:dd:07:59:f2.ipv4.0 -n
iface.gateway -v 10.0.0.1 -o update
# iscsiadm -m iface -I qla4xxx.00:c0:dd:07:59:f2.ipv4.0 -o apply
```

Use the following sysfs path to check if the IP address has been applied:

`/sys/class/iscsi_host/host<Number>/ipaddress`

Table 2-2 shows the various configurations one can have, as well as the `iscisadm` commands or yast tool to use to check iSCSI sessions.

***Table 2-2. Configurations and Tools for Checking iSCSI Sessions***

| No. | Configu-ration | Target info | `ql4xdisable sysfsboot` | Adapter Boot Mode | `iscsiadm` command | Remarks |
|---|---|---|---|---|---|---|
| 1 | Non-Boot from SAN | Target info is in the firmware (set up using the BIOS) | 1 or 0 | Disable | To check sessions<br>`# iscsiadm -m session` | Since the target info is in the firmware, keep `ql4xdisablesysfs-boot` set to 1. The driver does the login to the target. |

***Table 2-2. Configurations and Tools for Checking iSCSI Sessions (Continued)***

| No. | Configuration | Target info | ql4xdisablesysfsboot | Adapter Boot Mode | iscsiadm command | Remarks |
|---|---|---|---|---|---|---|
| 2 | Non-Boot from SAN[a] | No target info is in the firmware | 1 or 0 | Disable | Use iscsiadm for discovery and login to targets. The correct qla4xxx iface must be used.<br>Discovery:<br># iscsiadm -m discovery -t st -p *<target IP>* -I *<qla4xxx iface>*<br>Login:<br>#iscsiadm -m node -l<br>To check the sessions:<br># iscsiadm -m session | Since there are no entries in Flash or firmware, target management is done by iscsiadm and iscsid. The driver is just pass-through. |
| 3 | Boot from SAN | Boot target info is in the firmware/ Flash | 1 | Manual | To check sessions:<br>#iscsiadm -m session | Since ql4xdisablesysfsboot = 1, the qla4xxx driver does the login to the target.[b] |
| 4 | Boot from SAN | Boot target info is in the firmware/ Flash | 0 | Manual | To check boot target info:<br>#iscsiadm -m fw<br>To check sessions:<br># iscsiadm -m session<br>If login is not done automatically use:<br># iscsiadm -m fw -l | Since ql4xdisablesysfsboot = 0, the driver will not log in to boot targets. The iscsi initiator tools (such as iscsistart in RHEL) do the login to the boot targets. |

[a] In this configuration you can use the iscsi-client from yast to add targets and login to the targets.

[b] This configuration is basically compatible with older qla4xxx infrastructure in SLES 11 SP1.

**NOTE**

In all these configurations you can use the iscsiadm command to do additional discovery and login. The only exception is boot targets for Boot from SAN. For Boot from SAN, target information must be in the firmware or Flash, having been added using the CTRL+Q option of BIOS.

# 3 Open-iSCSI User's Guide

This section provides a User's Guide for Open-iSCSI. It includes the following topics:

# Open-iSCSI Supported Features

Open-iSCSI support has been added to the QLogic iSCSI driver in Red Hat Enterprise Linux 6.2 and SUSE Linux Enterprise Server 11 Service Pack 2. Open-iSCSI infrastructure supports discovery, login to and logout from iSCSI targets, and modification and display of iSCSI configuration parameters. The QLogic iSCSI driver provides persistence through Flash and Open-iSCSI nodes and sendtargets databases.

## Discovery, Login, and Logout

Prior to RHEL 6.2 and SLES 11 SP2, discovery and login to iSCSI targets was hardware offloaded and managed by the QLogic iSCSI adapter firmware. In RHEL 6.2 and SLES 11 SP2, the Open-iSCSI infrastructure allows the system administrator to manage QLogic iSCSI target discovery and login through the QLogic adapter. This provides the system administrator with a uniform and standard way to manage different vendor interfaces.

## Boot Target Login

### Default Behavior on RHEL 6.2

Open-iSCSI is enabled by default on RHEL 6.2 and login to boot targets is triggered by `iscsistart` through sysfs. The default behavior can be changed by setting `ql4xdisablesysfsboot` to 1, this disables exporting boot targets in Flash to sysfs and login to boot targets is done by the driver.

1. With `ql4xdisablesysfsboot`=0, list boot targets if present.

   ```
   # iscsiadm -m fw
   ```

2. Disable sysfs boot.

   ```
   # echo "options qla4xxx ql4xdisablesysfsboot=1" >>
   /etc/modprobe.d/qla4xxx.conf
   ```

3. Reload the `qla4xxx` driver.

   ```
   # rmmod qla4xxx
   # modprobe qla4xxx
   ```

4. Update ramdisk.

Reboot the system, if the system is booted using the iSCSI boot target.

**NOTE**

Refer to the following Red Hat Technical Note about issues and workarounds when upgrading from RHEL 6.1 to RHEL 6.2:

http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/6/html/6.2_Technical_Notes/kernel_issues.html

### Default Behavior on SLES 11 SP2

Open-iSCSI is enabled by default on SLES 11 SP2 and login to boot targets is triggered by `iscsiadm` during installation.

**NOTE**

- The additional command line kernel parameter `withiscsi=1` must be passed before beginning the OS installation. If not, the iSCSI disks will not be detected.
- The modules `qla3xxx` and `qlcnic` should be loaded respectively for the 1G and 10G QLogic iSCSI initiator entries to appear in the iscsi-client through YaST.

The default behavior can be changed by setting the driver parameter `ql4xdisablesysfsboot` to 1, in which case the boot targets in Flash are not exported to sysfs, and the driver logs in to the boot targets. The kernel parameter `withiscsi=1` is not used when `ql4xdisablesysfsboot` is set to 1.

**NOTE**

Refer to the following Release Notes for SLES 11 SP2 for the kernel parameter `withiscsi=1`:

http://www.novell.com/linux/releasenotes/i386/SUSE-SLES/11-SP2/

## Persistence through Flash and Open-iSCSI Database

Prior to RHEL 6.2 and SLES 11 SP2, targets were made persistent by saving the entries in Flash. In RHEL 6.2 and SLES 11 SP2, targets managed by Open-iSCSI are made persistent by saving them in the user space node and sendtarget persistent database.

For targets in Flash, auto-login is triggered by the QLogic iSCSI driver and firmware. For targets saved in the Open-iSCSI persistent database, the iSCSI daemon `iscsid` can be configured to automatically start discovery and login through the sendtarget and node persistent databases.

# Managing QLogic iSCSI Adapters Using iscsiadm

## iSCSI Configuration Files and Persistent Databases

The Open-iSCSI daemon iscsid can be configured to use the default node configuration and persistent database to automatically start discovery on startup. Table 3-1 lists the configuration and persistent database files for SLES 11 SP2 and RHEL6.2.

***Table 3-1. Configuration and Persistent Database Files***

| File Path and Name | Description |
|---|---|
| **Configuration File—SLES 11 SP2 and RHEL 6.2** | |
| /etc/iscsi/iscsid.conf | Read by iscsid and iscsiadm on startup; applied to all newly created nodes |
| **Persistent Database Files—SLES 11 SP2** | |
| /etc/iscsi/nodes/*<node_iqn_name>*/ *<ip_address:port_number>* | Contains node-specific configuration |
| /etc/iscsi/nodes | Persistent node database |
| /etc/iscsi/sendtargets | Persistent Sendtargets discovery database |
| **Persistent Database Files—RHEL 6.2** | |
| /var/lib/iscsi/nodes/*<node_iqn_name>*/ *<ip_address:port_number>* | Contains node-specific configuration |
| /var/lib/iscsi/nodes | Persistent node database |
| /var/lib/iscsi/sendtargets | Persistent Sendtargets discovery database |

## Configuring Targets for qla4xxx Using Open-iSCSI

To configure targets for qla4xxx using Open-iSCSI, follow these steps:

1. Configure the qla4xxx port.

```
# iscsiadm -m iface -I qla4xxx. 00:0e:1e:05:38:42.ipv4.0 -o update -n
iface.ipaddress -v 192.168.1.115

# iscsiadm -m iface -I qla4xxx. 00:0e:1e:05:38:42.ipv4.0 -o apply
```

2. Discover the iSCSI target.

```
# iscsiadm -m discovery -t st -p 192.168.1.11 -I qla4xxx.00:0e:1e:05:38:42.ipv4.0
192.168.1.11:3260,1 iqn.1992-04.com.emc:cx.ckm00101200392.a2
192.168.1.8:3260,3 iqn.1992-04.com.emc:cx.ckm00101200392.a3
192.168.1.12:3260,2 iqn.1992-04.com.emc:cx.ckm00101200392.b2
192.168.1.9:3260,4 iqn.1992-04.com.emc:cx.ckm00101200392.b3
```

3. List all discovered targets.

```
# iscsiadm -m node
192.168.1.8:3260,3 iqn.1992-04.com.emc:cx.ckm00101200392.a3
192.168.1.11:3260,1 iqn.1992-04.com.emc:cx.ckm00101200392.a2
192.168.1.12:3260,2 iqn.1992-04.com.emc:cx.ckm00101200392.b2
192.168.1.9:3260,4 iqn.1992-04.com.emc:cx.ckm00101200392.b3
```

4. Log in to all discovered targets.

```
# iscsiadm -m node -l
Logging in to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.a3, portal: 192.168.1.8,3260] (multiple)
Logging in to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.a2, portal: 192.168.1.11,3260] (multiple)
Logging in to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.b2, portal: 192.168.1.12,3260] (multiple)
Logging in to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.b3, portal: 192.168.1.9,3260] (multiple)
Login to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.a3, portal: 192.168.1.8,3260] successful.
Login to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.a2, portal: 192.168.1.11,3260] successful.
Login to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.b2, portal: 192.168.1.12,3260] successful.
Login to [iface: qla4xxx.00:0e:1e:05:38:42.ipv4.0, target:
iqn.1992-04.com.emc:cx.ckm00101200392.b3, portal: 192.168.1.9,3260] successful.
```

5. List all sessions.

```
#iscsiadm -m session
qla4xxx: [2] 192.168.1.11:3260,1 iqn.1992-04.com.emc:cx.ckm00101200392.a2
qla4xxx: [3] 192.168.1.8:3260,3 iqn.1992-04.com.emc:cx.ckm00101200392.a3
qla4xxx: [4] 192.168.1.12:3260,2 iqn.1992-04.com.emc:cx.ckm00101200392.b2
qla4xxx: [5] 192.168.1.9:3260,4 iqn.1992-04.com.emc:cx.ckm00101200392.b3
```

# iSCSI Interface Configuration

## iSCSI Configuration Parameters

Each iSCSI Host Bus Adapter, NIC, or network interface to which sessions are bound should have its own iSCSI interface config file in /etc/iscsi/ifaces. For hardware offload iSCSI, iscsiadm creates ifaces for QLogic iSCSI ports. Before the iface can be used, the IP address for the port must be set as shown in "Update iface Network Parameters" on page 3-9. Table 3-2 lists hardware iSCSI interface config file fields.

***Table 3-2. Hardware iSCSI Interface Config File Fields***

| Needed | Field Name | Description |
|---|---|---|
| **Yes** | iface.transport_name | The iscsi_transport or driver to use for iface |
| No | iface.initiatorname | Set if the /etc/iscsi/initiatorame.iscsi initiatorname is not to be used for normal sessions. For discovery sessions, /etc/iscsi/initiatorname.iscsi is used. |
| **Yes** | iface.hwaddress | Sets MAC address to bind by hardware address |
| **Yes** | iface.ipaddress | The IP address configured for the iface, on the same subnet as the target |
| No | iface.bootproto | Set to **dhcp** if IPv4 address must be obtained dynamically through DHCP, or set to **static** if IPv4 address is set to a static IP address. |
| No | iface.vlan_priority | Used to set VLAN priority for the iSCSI interface |
| No | iface.vlan_state (disable/enable) | Used to enable or disable the VLAN on the iSCSI interface |
| No | iface.ipv6_linklocal | Used to specify the IPV6 Link Local Address with the link local prefix of FE80::0/64 |
| No | iface.ipv6_autocfg (nd-neighbor discovery) | Used to set the discovery protocol to obtain IPV6 address |
| No | iface.linklocal_autocfg | For transport like qla4xxx, this allows you to autoconfigure the # IPV6 link local address based on the MAC address of the iSCSI interface. |
| No | iface.router_autocfg | Required to set the IPv6 router discovery protocol |
| No | iface.state | Set to **enable** by default.To disable the iface, set it to **disable**. |
| **Yes** | iface.iface_num | Used when more than one interface is configured for a transport |

**Example:** IPv4 sample config file with static IP address

```
# BEGIN RECORD 2.0-872
iface.iscsi_ifacename = qla4xxx-3
iface.ipaddress = 192.168.1.75
iface.hwaddress = 00:0e:1e:04:93:92
iface.transport_name = qla4xxx
iface.bootproto = static
iface.subnet_mask = 255.255.255.0
iface.gateway = 192.168.1.1
iface.state = enable
iface.vlan = <empty>
iface.iface_num = 0
END RECORD
```

## List All ifaces

```
# iscsiadm -m iface
```

**Example**:

```
# iscsiadm -m iface
default tcp,<empty>,<empty>,<empty>,<empty>
iser iser,<empty>,<empty>,<empty>,<empty>
qla4xxx-4032-2 qla4xxx,00:c0:dd:0b:13:f1,192.168.2.214,<empty>,<empty>
qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 qla4xxx,00:c0:dd:0b:13:f1,<empty>,
<empty>,<empty>
qla4xxx.00:0e:1e:04:11:e2.ipv4.0 qla4xxx,00:0e:1e:04:11:e2,192.168.7.9,
<empty>,<empty>
bnx2i.00:00:00:00:00:00 bnx2i,00:00:00:00:00:00,<empty>,<empty>,<empty>
```

## Display iface Configuration Details

```
# iscsiadm -m iface -I <iface_name>
```

**Example:**

```
# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv4.0
# BEGIN RECORD 2.0-872.28.el6-1031
iface.iscsi_ifacename = qla4xxx.00:c0:dd:0b:13:f1.ipv4.0
iface.net_ifacename = <empty>
iface.ipaddress = 192.168.2.214
iface.hwaddress = 00:c0:dd:0b:13:f1
iface.transport_name = qla4xxx
iface.initiatorname = <empty>
iface.bootproto = <empty>
iface.subnet_mask = <empty>
iface.gateway = <empty>
iface.ipv6_autocfg = <empty>
iface.linklocal_autocfg = <empty>
iface.router_autocfg = <empty>
iface.ipv6_linklocal = <empty>
iface.ipv6_router = <empty>
iface.state = <empty>
iface.vlan_id = 0
iface.vlan_priority = 0
iface.vlan_state = <empty>
iface.iface_num = 0
iface.mtu = 0
iface.port = 0
# END RECORD
```

## Create an iface

```
# iscsiadm -m iface -I <iface_name> -o new
```

**NOTE**

The `iface.transport_name` is set to **`tcp`** by default, for a software initiator. The `iface.transport_name` should be updated to **`qla4xxx`** for Hardware Offload iface. The iface parameters `ipaddress`, `hwaddress`, and `initiatorname` can be updated using the -o update option as shown in "Update iface Network Parameters" on page 3-9.

**Example:**

```
# iscsiadm -m iface -I qla4xxx-4
# BEGIN RECORD 2.0-872
iface.iscsi_ifacename = qla4xxx-4
iface.net_ifacename = <empty>
iface.ipaddress = <empty>
iface.hwaddress = <empty>
iface.transport_name = qla4xxx
iface.initiatorname = <empty>
iface.bootproto = <empty>
iface.subnet_mask = <empty>
iface.gateway = <empty>
iface.ipv6_autocfg = <empty>
iface.linklocal_autocfg = <empty>
iface.router_autocfg = <empty>
iface.ipv6_linklocal = <empty>
iface.ipv6_router = <empty>
iface.state = <empty>
iface.vlan_id = 0
iface.vlan_priority = 0
iface.vlan_state = <empty>
iface.iface_num = 0
# END RECORD
```

## Update iface Network Parameters

```
# iscsiadm -m iface -I <iface_name> -o update -n <rec_name> -v <value>
# iscsiadm -m iface -I <iface_name> -o apply
# iscsiadm -m iface -I <iface_name> -o applyall
```

Where:

`update` updates the record *<rec_name>* with the specified *<value>*

`apply` causes the network settings to take effect on the specified `iface`

`applyall` causes the network settings to take effect on every `iface`

**Example:** IPv4 Settings (static)

```
# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 -o update -n
iface.ipaddress -v 192.168.2.214

qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 updated.

# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 -o apply

qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 applied.
```

**Example:** IPv4 Settings (DHCP)

```
# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 -o update -n
iface.bootproto -v dhcp

qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 updated.

# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 -o apply

qla4xxx.00:c0:dd:0b:13:f1.ipv4.0 applied.
```

**Example:** IPv6 Settings (manual)

```
# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 -o update -n
iface.ipaddress -v fec0:ce00:7014:0041:1111:2222:1e04:9392

qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 updated.

# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 -o update -n
iface.ipv6.linklocal -v fe80:0000:0000:0000:0000:0000:1e04:9392

qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 updated.

# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 -o update -n
iface.ipv6.router -v fe80:0000:0000:0000:7ae7:d1ff:fe72:4048

qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 updated.

# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 -o apply

qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 applied.
```

**Example:** IPv6 Settings (neighbor discovery)

```
# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 -o update -n
iface.ipv6.autocfg -v nd

qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 updated.

# iscsiadm -m iface -I qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 -o apply

qla4xxx.00:c0:dd:0b:13:f1.ipv6.0 applied.
```

**NOTE**

The target should be logged out before updating the network parameters. iscsiadm will give the following warning if a network parameter of an iface with active sessions is updated:

```
iscsiadm: Updating iface while iscsi sessions are using
it. You must logout the running sessions then log back
in for the new settings to take affect.
```

## Unidirectional and Bidirectional CHAP settings

```
# iscsiadm -m node -p 192.168.1.84:3260 -T iqn.2011.com.vm-base:disk1 -o
update -n node.session.auth.authmethod -v CHAP

# iscsiadm -m node -p 192.168.1.84:3260 -T iqn.2011.com.vm-base:disk1 -o
update -n node.session.auth.username -v chapuser

# iscsiadm -m node -p 192.168.1.84:3260 -T iqn.2011.com.vm-base:disk1 -o
update -n node.session.auth.password -v chapsecret

# iscsiadm -m node -p 192.168.1.84:3260 -T iqn.2011.com.vm-base:disk1 -o
update -n node.session.auth.username_in -v biuser

# iscsiadm -m node -p 192.168.1.84:3260 -T iqn.2011.com.vm-base:disk1 -o
update -n node.session.auth.password_in -v bidirsecret
```

**Example:** Display changes made to the 192.168.1.84:3260 CHAP settings:

```
# iscsiadm -m node -p 192.168.1.84:3260
.
.
node.session.auth.authmethod = CHAP
node.session.auth.username = chapuser
node.session.auth.password = ********
node.session.auth.username_in = biuser
node.session.auth.password_in = ********
.
.
```

# Target Discovery

## Discover Targets using sendtarget

```
# iscsiadm -m discovery -t st -p <target_ip:target_port> -I
<iface_name> -o new, delete, update, nonpersistent
```

In discovery mode, iscsiadm will use the iscsid.conf discovery settings and overwrite the discovery record settings with it. By default, it will remove records for portals not returned. For portals returned, the discovery command will create a new record or modify an existing one with values from iscsid.conf and the command line.

Values passed with the -o option:

- **new**—iscsiadm will add records for portals that do not yet have records in the database.
- **delete**—iscsiadm deletes records for portals that were not returned during discovery.
- **update**—iscsiadm updates records for portals returned during discovery using info from iscsid.conf and command line.
- **nonpersistent**—iscsiadm will not store the portals found in node database.

**Example:**

```
# iscsiadm -m discovery -t st -p 192.168.2.104 -I qla4xxx-3 -o new

192.168.2.104:3260,1
iqn.2001-05.com.equallogic:0-8a0906-32e33fe02-517000ecd724ea83-karen-1

192.168.2.104:3260,1
iqn.2001-05.com.equallogic:0-8a0906-eddd93203-dc1000ece454e721-karen-2

192.168.2.104:3260,1
iqn.2001-05.com.equallogic:0-8a0906-ef8d93203-e99000ece484e721-karen-3

192.168.2.104:3260,1
iqn.2001-05.com.equallogic:0-8a0906-f16d93203-92d000ece4b4e721-karen-4
```

## Adding a New discoverydb for sendtarget

```
# iscsiadm -m discoverydb -t st -p 192.168.2.105 -I qla4xxx-3 -o new
New discovery record for [192.168.2.105,3260] added.
# cat /var/lib/iscsi/send_targets/192.168.2.105,3260/st_config
# BEGIN RECORD 2.0-872.28.el6-1031
discovery.startup = manual
discovery.type = sendtargets
discovery.sendtargets.address = 192.168.2.105
discovery.sendtargets.port = 3260
discovery.sendtargets.auth.authmethod = None
discovery.sendtargets.timeo.login_timeout = 15
discovery.sendtargets.use_discoveryd = No
discovery.sendtargets.discoveryd_poll_inval = 30
discovery.sendtargets.reopen_max = 5
discovery.sendtargets.timeo.auth_timeout = 45
discovery.sendtargets.timeo.active_timeout = 30
discovery.sendtargets.iscsi.MaxRecvDataSegmentLength = 32768
# END RECORD
# iscsiadm -m discoverydb -t st -p 192.168.2.105 -I qla4xxx-3 -o update -n
discovery.sendtargets.auth.authmethod -v CHAP
# iscsiadm -m discoverydb -t st -p 192.168.2.105 -o update -n
discovery.sendtargets.auth.username -v joe
# iscsiadm -m discoverydb -t st -p 192.168.2.105 -o update -n
discovery.sendtargets.auth.password -v secret
# iscsiadm -m discoverydb -t st -p 192.168.2.105 -I qla4xxx-3 --discover
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-32e33fe02-517000ecd724ea83-karen-1
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-eddd93203-dc1000ece454e721-karen-2
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-ef8d93203-e99000ece484e721-karen-3
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-f16d93203-92d000ece4b4e721-karen-4
```

```
# cat /var/lib/iscsi/send_targets/192.168.2.105,3260/st_config
# BEGIN RECORD 2.0-872.28.el6-1031
discovery.startup = manual
discovery.type = sendtargets
discovery.sendtargets.address = 192.168.2.105
discovery.sendtargets.port = 3260
discovery.sendtargets.auth.authmethod = CHAP
discovery.sendtargets.auth.username = joe
discovery.sendtargets.auth.password = secret
discovery.sendtargets.timeo.login_timeout = 15
discovery.sendtargets.use_discoveryd = No
discovery.sendtargets.discoveryd_poll_inval = 30
discovery.sendtargets.reopen_max = 5
discovery.sendtargets.timeo.auth_timeout = 45
discovery.sendtargets.timeo.active_timeout = 30
discovery.sendtargets.iscsi.MaxRecvDataSegmentLength = 32768
# END RECORD
```

### Remove sendtarget Node

```
# iscsiadm -m discoverydb -t st -p <target IP> -I <iface> -o delete
```

**Example:**

```
# iscsiadm -m discoverydb -t st -p 192.168.2.105 -I qla4xxx-3 -o
delete
```

# Adding and Deleting Targets

## Adding a New Target

```
# iscsiadm -m node -T <target name> -p <target portal> -I <iface>
-o new
```

**Example:**

```
# iscsiadm -m node -T iqn.2001-05.com.equallogic:0-8a0906-2d733fe02-d25000ecd
7a4eac6-bfs-2 -p 192.168.2.104:3260 -I qla4xxx-3 -o new
New iSCSI node [qla4xxx:[hw=00:0e:1e:04:11:e6,ip=192.168.2.212,net_if=,
iscsi_if=qla4xxx-3] 192.168.2.104,3260,-1 iqn.2001-05.com.equallogic:
0-8a0906-2d733fe02-d25000ecd7a4eac6-bfs-2] added
```

### List All Targets

```
# iscsiadm -m node
```

**Example:**

```
# iscsiadm -m node
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-32e33fe02-517000ecd724ea83-karen-1
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-eddd93203-dc1000ece454e721-karen-2
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-ef8d93203-e99000ece484e721-karen-3
192.168.2.105:3260,1
iqn.2001-05.com.equallogic:0-8a0906-f16d93203-92d000ece4b4e721-karen-4
192.168.2.104:3260,-1
iqn.2001-05.com.equallogic:0-8a0906-2d733fe02-d25000ecd7a4eac6-bfs-2
```

### Deleting a Target Node

```
# iscsiadm -m node -T <target name> -p <target portal> -I <iface>
-o delete
```

**Example:**

```
# iscsiadm -m node -T
iqn.2001-05.com.equallogic:0-8a0906-2d733fe02-d25000ecd7a4eac6-bfs
-2 -p 192.168.2.104:3260 -I qla4xxx-3 -o delete
```

## Target Login and Logout

### Login to a Target

```
# iscsiadm -m node -T <target name> -p <target portal> -I <iface> -l
```

**Example:**

```
# iscsiadm -d 7 -m node --targetname
iqn.1986-03.com.hp:storage.msa2012i.0911d7e161.b --portal 192.168.2.24:3260
-I qla4xxx-3 -l
Logging in to [iface: qla4xxx-3, target:
iqn.1986-03.com.hp:storage.msa2012i.0911d7e161.b, portal: 192.168.2.24,3260]
(multiple)
Login to [iface: qla4xxx-3, target:
iqn.1986-03.com.hp:storage.msa2012i.0911d7e161.b, portal: 192.168.2.24,3260]
successful.
```

## Login to All Targets

Not specifying the target name, portal, and iface name results in login to all portals on all nodes/targets through each interface specified in the node configuration.

```
# iscsiadm -m node -l
```

To login to all portals on a node/target through each interface:

```
# iscsiadm -m node -T <target_name> -l
```

To login to all targets from the specified initiator port:

```
# iscsiadm -m node -I <iface_name> -l
```

## Login All Sessions with Specified Parameters

For node mode, login all sessions with the node or conn startup values passed in, except ones marked `onboot`, if `all` is passed in.

```
iscsiadm -m node -T <target_name> -p <target_portal> -I
<iface_name> -L all,manual,automatic
```

## Logout from a Target

```
# iscsiadm -m node -T <target name> -p <target portal> -I <iface>
-u
```

**Example:**

```
# iscsiadm -d 7 -m node --targetname
iqn.1986-03.com.hp:storage.msa2012i.0911d7e161.b --portal
192.168.2.24:3260 -I qla4xxx-3 -u
Logging out of [iface: qla4xxx-3, target:
iqn.1986-03.com.hp:storage.msa2012i.0911d7e161.b, portal:
192.168.2.24,3260]
Logout of [sid: 32, target:
iqn.1986-03.com.hp:storage.msa2012i.0911d7e161.b, portal:
192.168.2.24,3260] successful.
```

## Logout from All Targets

```
# iscsiadm -m node -u
```

To log out from all portals on a node/target through each interface:

```
# iscsiadm -m node -T <target_name> -u
```

To log out from all targets from the specified initiator port:

```
# iscsiadm -m node -I <iface_name> -u
```

**NOTE**

If targets are logged in through Open-iSCSI, all targets should be logged out before unloading the QLogic iSCSI driver, otherwise driver unload will fail with the following error:

```
ERROR: Module qla4xxx is in use
```

# Features Not Supported

The features below are not supported in Red Hat Enterprise Linux 6.2. These features will be supported in Red Hat Enterprise Linux 6.3.

1. iSNS
2. Ping

# Migrating to Open-iSCSI Driver

On a system that was successfully upgraded from RHEL 6.1 to RHEL 6.2, discovery and login of targets in Flash is managed by the QLogic iSCSI driver and firmware. These targets (except boot targets) are exported to sysfs and can be viewed from sysfs.

**NOTE**

For information about upgrading from RHEL 6.1 to RHEL 6.2, refer to the following Technical Note:

http://docs.redhat.com/docs/en-US/Red_Hat_Enterprise_Linux/6/html/6.2_Technical_Notes/kernel_issues.html

Because the RHEL 6.2 Inbox driver does not support the QLogic management applications `iscli` (SANsurfer iSCSI CLI) and `qaucli` (QConvergeConsole CLI), Open-iSCSI must be used for all new target management.

Targets added through `iscsiadm` are saved in the Open-iSCSI persistent database. The operations listed in "Managing QLogic iSCSI Adapters Using iscsiadm" on page 3-4 are available for management of targets added through Open-iSCSI.

**NOTE**

Targets added from Flash *cannot* be managed using the `iscsiadm` interface.

# Linux Open-iSCSI README

Go to http://www.open-iscsi.org/docs/README for more detailed information about Linux Open-iSCSI.

# 4 Known Issues

This section lists currently known issues and provides a brief explanation of each issue.

## QLogic Application Limitations

- The RHEL 6.2 and SLES 11 SP2 inbox drivers do not support the following QLogic applications:
  - `iscli` (SANsurfer iSCSI CLI)
  - `qaucli` (QConvergeConsole CLI)
- The QLogic iSCSI driver and firmware handle discovery and login to targets in Flash and also export them to sysfs where they can be viewed.
- Target entries that have been made persistent in Flash on RHEL 6.2 and SLES 11 SP2 cannot be managed by the Open-iSCSI `iscsiadm` interface. All newly added targets can be managed by Open-iSCSI.

## CHAP Limitations

- At present, the CHAP entries in Flash cannot be updated or deleted using `iscsiadm`.

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