

# QLogic HCA and QLogic OFED Software Install Guide

QLogic OFED Version 1.4

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The QHT7040, QHT7140, QLE7140, QLE7240, and QLE7280 QLogic Host Channel Adapters are covered by the following patent: 7308535.

<b>Document Revision History</b>	
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Changes	Sections Affected
Product name changed from <i>InfiniPath</i> to <i>QLogic OFED</i> . Version number is set to 1.4. Instances of <i>InfiniPath</i> changed where appropriate; some file-names and output messages keep old name.	All
Updated Contact Information.	<a href="#">"Contact Information" on page 1-5</a>
Removed <i>InfiniPath</i> from 1st paragraph; replaced with <i>QLogic adapters</i> , etc.	<a href="#">"Hardware Installation" on page 4-1</a>
Changed section title from What's New in this Release to Features.	<a href="#">"Features" on page 2-1</a>

Replace EM64T with 64-bit Intel Xeon.	<a href="#">“Supported Linux Distributions” on page 5-1</a>
Added more information on VNIC interface.	<a href="#">“OpenSM” on page 6-3</a>
Split the Install section into three separate sections.	<a href="#">“Software Installation” on page 5-1</a> <a href="#">“Configuring Drivers and Services” on page 6-1</a> <a href="#">“Installation Verification and Additional Settings” on page 7-1</a>
Modified installation checklist. Clarified which drivers are configured, which are optional. Added two methods of installation to the list.	<a href="#">“Software Installation” on page 3-2</a>
Remove sections on configuring ipath_ether. ipath_ether now deprecated.	Was <a href="#">“Configuring the ipath_ether Network Interface” on page 5-12</a>
Updated the supported distributions information.	<a href="#">Table 5-1 on page 5-2</a>
Distribution identifiers are now RHEL4, RHEL5, and SLES10.	<a href="#">Table 5-2 on page 5-2</a>
Delete reference to ipath_ether.	<a href="#">“Removing Software Packages” on page 5-24</a>
Updated Lustre information; patches are no longer needed.	<a href="#">“Installing Lustre” on page 5-23</a>
Updated compiler support information.	<a href="#">“Compiler Support” on page 5-3</a>
Updated information on software components.	<a href="#">“Software Components” on page 2-4</a>
Removed paragraph about this release adding support for QLE7240/7280, since this is outdated.	<a href="#">“Features” on page 2-1</a>
Added new “Configuration Issues” to Troubleshooting.	<a href="#">“ibsrpdm Command Hangs When Two HCAs are Installed but Only Unit 1 is Connected to the Switch” on page A-5</a>
Deleted Troubleshooting item: ifup on ipath_ether on SLES 10 Reports “unknown device”	<a href="#">Appendix A</a>
Deleted entries pertaining to ipath_ether in this table.	<a href="#">Table C-1 on page C-1</a>

<p>Sections rearranged, renamed, and expanded due to multiple install methods. Previous sections:          Installing the InfiniPath and Open fabrics RPMs          Downloading and Unpacking the InfiniPath and OpenFabrics Software</p>	<p><a href="#">“Choose the Appropriate Download Files” on page 5-4</a>  <a href="#">“Install QLogicIB-Basic with the Installer Tool” on page 5-7</a>  <a href="#">“About rpm Installation” on page 5-13</a>  <a href="#">“Install QLogic OFED Using Rocks” on page 5-20</a>  <a href="#">“Install QLogic OFED Using a Platform OCS Kit” on page 5-22</a>  <a href="#">“Using rpm to Install InfiniPath and OpenFabrics” on page 5-14</a></p>
<p>Added new section about installing using the Installer Tool.</p>	<p><a href="#">“Install QLogicIB-Basic with the Installer Tool” on page 5-7</a></p>
<p>Moved introductory information about RPM installation before sections on installing using the two different methods.</p>	<p><a href="#">“About rpm Installation” on page 5-13</a></p>
<p>Removed paragraph about kernel module support being part of InfiniPath RPMs; was relevant to previous release.</p>	<p>Was in old section <a href="#">“Installing the InfiniPath and Open fabrics RPMs”</a></p>
<p>Added note about need to use prefixed install if using QLogic MPI with mpi-selector.</p>	<p><a href="#">“Using rpm to Install InfiniPath and OpenFabrics” on page 5-14</a></p>
<p>Modified module for installed layout. New location for ipath modules. Location of other OFED modules listed here.</p>	<p><a href="#">“Installed Layout” on page 5-23</a></p>
<p>Modified module for driver overview.</p>	<p><a href="#">“InfiniPath and OpenFabrics Driver Overview” on page 6-1</a></p>
<p>Modified module for configuring IPoIB. Only restart information has been changed.</p>	<p><a href="#">“Configuring the IPoIB Network Interface” on page 6-2</a></p>
<p>Modified module for configuring VNIC interface. Changed infinipath start/stop commands, and added some introductory material.</p>	<p><a href="#">“SRP stands for SCSI RDMA Protocol. It was originally intended to allow the SCSI protocol to run over InfiniBand for Storage Area Network (SAN) usage. SRP interfaces directly to the Linux file system through the SRP Upper Layer Protocol. SRP storage can be treated as another device.” on page 6-4</a></p>
<p>Modified module for configuring SRP.</p>	<p><a href="#">“SRP” on page 6-4</a></p>
<p>Modified module for uDAPL configuration.</p>	<p><a href="#">“MPI over uDAPL” on page 6-13</a></p>
<p>Deleted reference to MTRR BIOS setting.</p>	<p><a href="#">“Configuring the BIOS” on page 4-4</a>  <a href="#">“BIOS Settings” on page A-2</a></p>

New Appendix for Write Combining. MTRR settings information moved here.	<a href="#">“Write Combining” on page B-1</a>
Minor wording change to introduction section.	<a href="#">“Software Installation” on page 5-1</a>
Added new issue in Troubleshooting.	<a href="#">“openmpi_gcc Fails to Install Because of Dependency on gfortran (RHEL 4)” on page A-4</a>
Added new issue in Troubleshooting.	<a href="#">“Outdated ipath_ether Configuration Setup Generates Error” on page A-5</a>
Configuration file <code>qlogic_vnic.cfg</code> changed to <code>qlgc_vnic.cfg</code> .	<a href="#">Table C-1 on page C-1</a>
Added new section.	<a href="#">“Uninstalling Software with Rocks or Platform OCS” on page 5-25</a>
Added new section.	<a href="#">“Install QLogic OFED Using Rocks” on page 5-20</a>
Change name of Appendix RPM Descriptions to Package Descriptions. Updated information.	<a href="#">“Package Descriptions” on page D-1</a>
Removed phrase “and Transmission Control Protocol (TCP)” from introduction; related to now-obsolete <code>ipath_ether</code> .	<a href="#">“Interoperability” on page 1-3</a>
Removed this issue from the Troubleshooting section.	Was “OpenFabrics Library Dependencies”
Combined What’s New in This Release and Features section.	<a href="#">“Feature Overview” on page 2-1</a>
Deleted Note about Fedora Core 6 not supported in this release.	This was noted in InfiniPath 2.2.1 release notes.
Removed this line “Please check the QLogic web site for updated information on supported compilers.” This information is not on the web site.	<a href="#">“Software Components” on page 2-4</a>
Added more details about setting the switch MTU default to 4K.	<a href="#">“Other Configuration: Changing the MTU Size” on page 6-14</a>
Deleted the section “Installing QLogic MPI in an Alternate Location with rpm”; merged instructions into rpm install section.	<a href="#">“Using rpm to Install InfiniPath and OpenFabrics” on page 5-14</a>
Minor text changes to this section. Modified title from Additional Installation Instructions to Install Additional Software. Moved this section to be with the rest of the installation instructions.	<a href="#">“Install Additional Software” on page 5-23</a>

Changed title of Troubleshooting issue. Was "ipath_ether Configuration Setup Generates Error"	"Outdated ipath_ether Configuration Setup Generates Error" on page A-5
Change main configuration file from /etc/sysconfig/infinipath to /etc/infiniband/openib.conf. The infinipath file is still to enable or disable the ipath_mtrr script.	Table C-1 on page C-1 and "SRP" on page 6-4.
Updated note about setting datagram mode.	"Configuring the IPoB Network Interface" on page 6-2
Deleted Troubleshooting Issue OpenFabrics Dependencies.	"Software Installation Issues" on page A-2
Deleted Troubleshooting Issue Version Number Conflict with opensm-* on RHEL5 Systems	"Software Installation Issues" on page A-2
Two new tables showing OS package requirements. Replaces some bullet points in "Distribution Identifiers" on page 5-2	Table on page 5-4 and Table on page 5-4
Removed section "Check for Missing Files or RPMs"	Was "Check for Missing files or RPMs" on page 5-5
Merged the two sections Downloading the QLogic OFED Software and Choose the Appropriate Download Files	"Choose the Appropriate Download Files" on page 5-4
Removed Supported Compilers and Supported Linux Distributions from the 2 Feature Overview chapter. Information is still in Software Installation chapter.	2 Feature Overview
Moved table "InfiniPath and OpenFabrics RPMs to Use for Each Node in a Cluster" from Software Installation section to Appendix	"Package Descriptions" on page D-1
Consolidated Configuring the InfiniPath Drivers and InfiniPath and OpenFabrics Driver Overview	6 Configuring Drivers and Services
opensm is now off by default	Various
Merged "Install on an Unsupported Distribution with the rpm Command" with the Rebuilding...section.	Now "Rebuilding the kernel-ib Driver on an Unsupported Distribution or an Unsupported Distribution/Kernel Pair" on page 5-19
Removed \$ or # at beginning of lines indicating commands. The #, if cut and pasted from the document, may be interpreted as a shell command.	All. Also Table 1-1
Updated footnote b.	Table D-11

Adapter Settings section name changed. Also added new bullet point "Check the PCIe bus width"	<a href="#">"Adapter and Other Settings" on page 7-1</a>
Updated tables of RPMs. Moved all documentation RPMs together. New table for OpenSM-Devel RPMs. Updated OtherMPis.	All tables in <a href="#">D Package Descriptions</a>
Deleted table 5-7 RPMs to Install, as information is repeated in <a href="#">"Using rpm to Install InfiniPath and OpenFabrics" on page 5-14</a>	<a href="#">"Using rpm to Install InfiniPath and OpenFabrics" on page 5-14</a>
Moved RPM Organization section under RPM Installation.	<a href="#">"RPM Organization" on page 5-16</a>
Merge two sections Uninstalling InfiniPath and OpenFabrics RPMs and Uninstalling OFED 1.3 Software.	<a href="#">"Uninstalling InfiniPath and OpenFabrics RPMs" on page 5-24</a>
Reference to this location <code>/sys/bus/pci/drivers/ib_ipath/00/</code> changed to <code>/sys/class/infiniband/ipath*/device/</code>	<a href="#">"Form Factors" on page 4-2</a>
Removed note: "OpenFabrics programs (32-bit) using the Verbs interfaces are not supported in this release, but may be supported in a future release."	<a href="#">"Software Components" on page 2-4</a>

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## Notes

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## Notes

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# 1 Introduction

This chapter describes the contents, intended audience, and organization of the *QLogic HCA and QLogic OFED Software Install Guide*.

The *QLogic HCA and QLogic OFED Software Install Guide* contains instructions for installing the QLogic Host Channel Adapters (HCAs) and the QLogic InfiniPath and OpenFabrics software. The following adapters are covered in this guide:

- QLE7140 PCI Express<sup>®</sup> (PCIe)
- QLE7240 PCI Express
- QLE7280 PCI Express
- QHT7040/QHT7140 HyperTransport Expansion (HTX™)

## Who Should Read this Guide

This installation guide is intended for cluster administrators responsible for installing the QLogic QLE7140, QLE7240, QLE7280 or QHT7040/QHT7140 adapter and QLogic InfiniPath software on their Linux<sup>®</sup> cluster. Additional detailed installation information and instructions for administering the QLogic cluster can be found in the *QLogic HCA and QLogic OFED Software Users Guide*.

The *QLogic HCA and QLogic OFED Software Install Guide* assumes that you are familiar with both cluster networking and the specific hardware that you plan to use. Before installing the HCA, you should have basic knowledge of your host and target operating systems, and working knowledge of message passing concepts.

This document does not contain all the information you need to use basic Linux commands or to perform all system administration tasks. For this information, see the software documentation you received with your system.

## How this Guide is Organized

The *QLogic HCA and QLogic OFED Software Install Guide* is organized into these sections:

- [Section 1, Introduction](#), contains an overview of the HCAs and software, describes interoperability with other products, lists all related documentation, and provides QLogic contact information.
- [Section 2, Feature Overview](#), contains features for this release, the supported QLogic adapter models, supported distributions and kernels, and a list of the software components.

- [Section 3, Step-by-Step Installation Checklist](#), provides a high-level overview of the hardware and software installation procedures.
- [Section 4, Hardware Installation](#), includes instructions for installing the QLogic QLE7140, QLE7240, QLE7280, QHT7040, and QHT7140 HCAs.
- [Section 5, Software Installation](#), includes instructions for installing the QLogic InfiniPath and OpenFabrics software.
- [Section 6, Configuring Drivers and Services](#), includes instructions for configuring the QLogic InfiniPath and OpenFabrics drivers and services.
- [Section 7, Installation Verification and Additional Settings](#), describes tools for verifying the installation, and adapter settings for best performance.
- [Appendix A, Installation Troubleshooting](#) contains troubleshooting information about issues that may occur during installation.
- [Appendix B, Write Combining](#) contains information about settings that will ensure better performance.
- [Appendix C, Configuration Files](#) contains descriptions of the configuration used by the QLogic InfiniPath and OpenFabrics software.
- [Appendix D, Package Descriptions](#) contains RPM Descriptions.
- [Index](#) lists major subjects and concepts with page numbers for easy reference.

## Overview

The material in this documentation pertains to a QLogic OFED *cluster*. A cluster is defined as a collection of nodes, each attached to an InfiniBand™-based fabric through the QLogic interconnect. The nodes are Linux-based computers, each having up to 16 processors.

The QLogic HCAs are InfiniBand 4X. The Double Data Rate (DDR) QLE7240 and QLE7280 adapters have a raw data rate of 20Gbps (data rate of 16Gbps). For the Single Data Rate (SDR) adapters, the QLE7140 and QHT7140, the raw data rate is 10Gbps (data rate of 8Gbps). The QLE7240 and QLE7280 can also run in SDR mode.

The QLogic adapters utilize standard, off-the-shelf InfiniBand 4X switches and cabling. The QLogic interconnect is designed to work with all InfiniBand-compliant switches.

### **NOTE:**

If you are using the QLE7240 or QLE7280, and want to use DDR mode, then DDR-capable switches must be used.

QLogic OFED OpenFabrics software is interoperable with other vendors' InfiniBand Host Channel Adapters (HCAs) running compatible OpenFabrics releases. There are several options for subnet management in your cluster:

- Use the embedded Subnet Manager (SM) in one or more managed switches supplied by your InfiniBand switch vendor.
- Use a host-based Subnet Manager. QLogic provides one, HSM, as a part of the InfiniBand fabric Suite download.
- Use the Open source Subnet Manager (OpenSM) component of OpenFabrics.

## Interoperability

QLogic InfiniPath participates in the standard InfiniBand subnet management protocols for configuration and monitoring. Note that:

- InfiniPath OpenFabrics (including Internet Protocol over InfiniBand (IPoIB)) is interoperable with other vendors' InfiniBand HCAs running compatible OpenFabrics releases.
- The QLogic MPI stack is not interoperable with other InfiniBand HCAs and Target Channel Adapters (TCAs). Instead, it uses an InfiniBand-compliant, vendor-specific protocol that is highly optimized for QLogic MPI and for MPI over verbs.

**NOTE:**

See the OpenFabrics web site at [www.openfabrics.org](http://www.openfabrics.org) for more information on the OpenFabrics Alliance.

## Conventions Used in this Guide

This guide uses the typographical conventions listed in [Table 1-1](#).

**Table 1-1. Typographical Conventions**

Convention	Meaning
command	Fixed-space font is used for literal items such as commands, functions, programs, files and pathnames, and program output.
variable	Italic fixed-space font is used for variable names in programs and command lines.

**Table 1-1. Typographical Conventions (Continued)**

Convention	Meaning
<i>concept</i>	Italic font is used for emphasis and concepts, as well as for documentation names/titles.
<b>user input</b>	Bold fixed-space font is used for literal items in commands or constructs that you type.
\$	Indicates a command line prompt.
#	Indicates a command line prompt as root.
[ ]	Brackets enclose optional elements of a command or program construct.
...	Ellipses indicate that a preceding element can be repeated.
>	A right caret identifies the cascading path of menu commands used in a procedure.
QLogic OFED 1.4	The current version number of the software is included within this documentation.
<b>NOTE:</b>	Indicates important information.

## Documentation

The product documentation includes:

- The *QLogic HCA and QLogic OFED Software Install Guide*
- The *QLogic HCA and QLogic OFED Software Users Guide*
- The *QLogic InfiniBand Software Install Guide*
- The *QLogic ULP and Tools Reference Guide (OFED+ Users Guide)*
- Release Notes
- Quick Start Guide
- Readme file

For more information on system administration, using the QLogic Message-Passing Interface (MPI), and troubleshooting adapter hardware and software, see the *QLogic HCA and QLogic OFED Software Users Guide*.

## Contact Information

<b>Support Headquarters</b>	QLogic Corporation 4601 Dean Lakes Blvd Shakopee, MN 55379 USA
QLogic Web Site	<a href="http://www.qlogic.com">www.qlogic.com</a>
Technical Support Web Site	<a href="http://support.qlogic.com">support.qlogic.com</a>
Technical Support Email	support@qlogic.com
Technical Training Email	tech.training@qlogic.com
Additional contact information is available from the Contact Support area of the Technical Support Web Site.	

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## Notes

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# 2 Feature Overview

This section contains the features for this release, the supported QLogic adapter models, supported distributions and kernels, and a list of the software components.

## Features

The QLogic OFED 1.4 software release contains the complete OFED 1.4, plus additional QLogic improvements, including an enhanced QLogic HCA driver. The InfiniPath 2.3 components (libraries, QLogic MPI/PSM, and utilities) are also included. QLogic also supplies MVAPICH and OpenMPI compiled with newer versions of each of four different compilers (GCC, PGI, Intel and PathScale).

The following features and enhancements are included in the QLogic OFED 1.4 release:

- Installation improvements. Provides a single software load for InfiniBand HCAs from QLogic and other vendors supported by OFED. the software is available packaged in the following ways:
  - Text User Interface (TUI) installer available (with the QLogicIB-Basic\* download). TUI is used for install on smaller clusters. Software can be installed either standalone or via FastFabric (if the QLogic InfiniBand Fabric Suite is purchased).
  - Software packaged for use with `rpm` install method.
  - A subset of the software (the accelerated MPI stack, precompiled versions of MVAPICH and Open MPI, and other user-level tools) can be installed on top of stock OFED or on an IB-enabled distribution.
  - Software packaged for Rocks installation method.
  - Software packaged for Platform OCS installation method
- Write-combining (WC) mappings for the PIO buffers is now configured by default using the x86 Page Attribute Table (PAT) mechanism.

- MVAPICH and OpenMPI compiled with newer versions of each of four different compilers (GCC, PGI, Intel and PathScale) are available.
- The QLogic InfiniBand Fabric Suite (IFS) is available separately for purchase. It includes FastFabric, the QLogic Host Subnet Manager (HSM), and the Fabric Viewer, and the InfiniServ Host Software. The QLogic OFED 1.4 software is supported by IFS.
- Support for newer compiler versions (PathScale 3.x, PGI 7.x, PGI 8.x, Intel 10.x, Intel 11.x)
- Support for newer Linux distributions, including RHEL 4 U7
- Performance enhancements and bug fixes

## Other Changes

- `ipath_ether` Ethernet emulation has been removed; IPoIB-CM may be used instead.
- The `/etc/init.d/infinipath` command to start the InfiniPath service has been replaced by the `/etc/init.d/openibd` command.
- The `infinipath-kernel` RPM no longer exists: it has been integrated into the `kernel-ib` RPM.

## Continued Support

- Multiple high-performance native PSM Message Passing Interface (MPI) implementations. (PSM is QLogic's accelerated library for high performance MPIs). In addition to QLogic MPI, the currently supported MPI implementations are HP-MPI, Open MPI, MVAPICH, and Scali (Platform). Open MPI provides MPI-2 functionality, including one-sided operations and dynamic processes. These all offer the same high performance as QLogic MPI.
- Dual PCIe QLogic adapters per node.
- QLogic MPI supports running exclusively on a single node without the installation of the HCA hardware.
- 4K Maximum Transfer Unit (MTU) is supported and is on by default. To take advantage of 4KB MTU, use a switch that supports 4KB MTU. QLogic also supports 2KB switches, and 4KB MTU switches configured for 2KB MTU. QLogic switches with firmware version 4.2.x or later are recommended.

This version of the QLogic OFED software provides support for all of the QLogic HCAs in [Table 2-1](#).

**Table 2-1. QLogic Adapter Model Numbers**

QLogic Model Number	Description
QHT7040	Single port 10Gbps SDR 4X InfiniBand to HTX adapter. For systems with HTX expansion slots.
QHT7140 <sup>a</sup>	Single port 10Gbps SDR 4X InfiniBand to HTX adapter. For systems with HTX expansion slots.
QLE7140	Single port 10Gbps SDR 4X InfiniBand to PCI Express x8 adapter. Supported on systems with PCI Express (PCIe) x8 or x16 slots.
QLE7240	Single port 20Gbps DDR 4X InfiniBand to PCI Express x8 adapter. Supported on systems with PCI Express x8 or x16 slots.
QLE7280	Single port 20Gbps DDR 4X InfiniBand to PCI Express x16 adapter. Supported on systems with PCI Express x16 slots. The QLE7280 is backward compatible; it can also be used with PCIe adapters that connect to x8 slots.

Table Notes

PCIe is Gen 1

<sup>a</sup> The QHT7140 has a smaller form factor than the QHT7040, but is otherwise the same. Throughout this document, the QHT7040 and QHT7140 will be collectively referred to as the *QHT7140* unless otherwise noted.

Additional up-to-date information can be found on the QLogic web site, specifically:

- The high performance computing page at [www.qlogic.com/Products/HPC\\_products\\_landingpage.aspx](http://www.qlogic.com/Products/HPC_products_landingpage.aspx)
- The InfiniBand HCA page at [www.qlogic.com/Products/HPC\\_products\\_infipathhcas.aspx](http://www.qlogic.com/Products/HPC_products_infipathhcas.aspx)

## Software Components

This release includes all of OFED 1.4 with enhancements (QLogic OFED 1.4), including a new version of the VNIC tools and driver, and support for the QHT7xxx and QLE7xxx adapters. The software includes the QLogic InfiniPath HCA driver, libraries, QLogic MPI, Subnet Management Agent, and associated utilities. Included components are:

- InfiniPath driver
- InfiniPath libraries, InfiniPath utilities, configuration, and support tools, including `ipath_checkout`, `ipath_control`, `ipath_pkt_test`, and `ipathstats`
- QLogic MPI
- PSM support for accelerated MPI
- OpenMPI and MVAPICH (with PSM support) built with the GNU, PGI, PathScale, and Intel compilers, with corresponding `mpitests` and `mpi-selector`
- QLogic MPI benchmarks and utilities
- OpenFabrics protocols
- OpenFabrics libraries and utilities
- QLogic VNIC module
- FastFabric Enablement tools

This release provides support for the following protocols and transport services:

- IPoIB (TCP/IP networking in either Connected or Datagram mode)
- Sockets Direct Protocol (SDP)
- Open source Subnet Manager (OpenSM)
- Reliable Datagram Sockets (RDS)
- iSCSI Extensions for RDMA (iSER)

This release supports two versions of SCSI RDMA Protocol (SRP):

- OFED SRP
- QLogic SRP

No support is provided for Reliable Datagram (RD).

More details about the hardware and software can be found in [Section 4](#) and [Section 5](#).

# 3 Step-by-Step Installation Checklist

This section provides an overview of the hardware and software installation procedures. Detailed steps are found in [Section 4 “Hardware Installation”](#) and [Section 5 “Software Installation”](#).

## Hardware Installation

The following steps summarize the basic hardware installation procedure:

1. Check that the adapter hardware is appropriate for your platform. See [Table 4-1](#).
2. Check to see that you have the appropriate cables and switches, as described in [“Cabling and Switches” on page 4-3](#).
3. Check to see that you are running a supported Linux distribution/kernel. See [Table 5-1](#).
4. Verify that the BIOS for your system is configured for use with the QLogic adapter. See [“Configuring the BIOS” on page 4-4](#).
5. Following the safety instructions in [“Safety with Electricity” on page 4-5](#). Unpack the adapter ([“Unpacking Information” on page 4-5](#)) and verify the package contents.
6. Install the adapter by following the instructions in [“Hardware Installation” on page 4-9](#).
7. Cable the adapter to the switch, as described in [“Cabling the Adapter to the InfiniBand Switch” on page 4-17](#). Check that all InfiniBand switches are configured.
8. Follow the steps in [“Completing the Installation” on page 4-18](#) to finish the installation.

## Software Installation

The following steps summarize the basic QLogic OFED 1.4 software installation and startup. These steps must be performed on each node in the cluster:

1. Make sure that the HCA hardware installation has been completed according to the instructions in [“Hardware Installation” on page 4-1](#).
2. Verify that the Linux kernel software is installed on each node in the cluster. The required kernels and supported Linux distributions for both QLogic InfiniPath and OpenFabrics are defined in [Table 5-1](#).
3. Make sure that your environment has been set up as described in [“Setting Up Your Environment” on page 5-3](#).
4. Download your version of the QLogic InfiniPath/OpenFabrics software from the QLogic web site to a local server directory. See [“Choose the Appropriate Download Files” on page 5-4](#).
5. Install the selected packages on each cluster node using the corresponding method as described in one of the following: [“Install QLogicIB-Basic with the Installer Tool” on page 5-7](#), [“Using rpm to Install InfiniPath and OpenFabrics” on page 5-14](#), [“Install QLogic OFED User-level Software with the rpm Command” on page 5-17](#), [“Install QLogic OFED Using Rocks” on page 5-20](#), [“Install QLogic OFED Using a Platform OCS Kit” on page 5-22](#), [“Install FastFabric Software CD/ISO Image” on page 5-22](#).
6. The system can be rebooted after all the software has been installed.
7. The configuration file for the `ib_ipath` driver is set up correctly at installation and is loaded automatically during system boot once the RPMs have been installed. However, if you wish to change the configuration file, see [“Managing the InfiniPath Driver” on page 6-15](#).
8. If you want to configure the optional OpenFabrics driver `ipoib`, and you have not configured it yet with the Install tool, or if you have used the `rpm` install method, configure it as described in [“Configuring the IPoIB Network Interface” on page 6-2](#).
9. If you want to use the optional OpenFabrics services (`opensm`, `srp`, or VNIC), configure them as described in [“OpenSM” on page 6-3](#), [“SRP” on page 6-4](#), or [“SRP stands for SCSI RDMA Protocol. It was originally intended to allow the SCSI protocol to run over InfiniBand for Storage Area Network \(SAN\) usage. SRP interfaces directly to the Linux file system through the SRP Upper Layer Protocol. SRP storage can be treated as another device.” on page 6-4](#).
10. Check the system state by observing the LEDs. See [“LED Link and Data Indicators” on page 7-1](#).

11. You can optimize your system and adapter for the best performance. See [“Adapter and Other Settings” on page 7-1](#). Also see the Performance Settings and Management Tips section in the *QLogic HCA and QLogic OFED Software Users Guide*.
12. Perform the recommended health checks. See [“Customer Acceptance Utility” on page 7-2](#).
13. After installing the QLogic InfiniPath and OpenFabrics software, refer to the *QLogic HCA and QLogic OFED Software Users Guide* for more information about using QLogic InfiniPath, QLogic MPI, and OpenFabrics products. Refer to the *QLogic ULP and Tools Reference Guide* for more information about configuring and using QLogic SRP, QLogic VNIC, and the Enablement Tools. The *InfiniBand Software Installation Guide* also has information on installing the QLogic InfiniBand Fabric Suite.

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# 4 Hardware Installation

This section lists the requirements and provides instructions for installing the QLogic InfiniPath Interconnect adapters. Instructions are included for the QLogic DDR PCI Express adapters, the QLE7240 and QLE7280; the QLogic PCIe adapter and PCIe riser card, QLE7140; and the QHT7040 or QHT7140 adapter hardware and HTX riser card. These components are collectively referred to as the *adapter* and the *riser card* in the remainder of this document.

The adapter is a low-latency, high-bandwidth, high message rate cluster interconnect for InfiniBand. The QLogic interconnect is InfiniBand 4X, with a raw data rate of 20Gbps (data rate of 16Gbps) for the QLE7240 and QLE7280; and 10Gbps (data rate of 8Gbps) for the QLE7140, QHT7040, and QHT7140.

OpenFabrics is interoperable with other vendors' InfiniBand Host Channel Adapters (HCAs) running compatible OpenFabrics releases.

## Hardware Installation Requirements

This section lists hardware and software environment requirements for installing the QLogic QLE7240, QLE7280, QLE7140, QHT7040, or QHT7140.

### Hardware

QLogic interconnect adapters are for use with UL listed computers. The following statement is true for all the adapters:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operations.

Different adapter cards work on different platforms. [Table 4-1](#) shows the relationship between the adapter model and different types of motherboards.

**Table 4-1. Adapter Models and Related Platforms**

QLogic Model Number	Platform	Plugs Into
QLE7240	PCI Express systems	Standard PCI Express x8 or x16 slot
QLE7280	PCI Express systems	Standard PCI Express x16 slot

**Table 4-1. Adapter Models and Related Platforms (Continued)**

QLogic Model Number	Platform	Plugs Into
QLE7140	PCI Express systems	Standard PCI Express x8 or x16 slot
QHT7040	Motherboards with HTX connectors	HyperTransport HTX slot
QHT7140	Motherboards with HTX connectors	HyperTransport HTX slot

Installation of the QLE7240, QLE7280, QLE7140, QHT7040, or QHT7140 in a 1U or 2U chassis requires the use of a riser card. See [Figure 4-4](#) for an illustration of a PCI Express (PCIe) slot in a typical motherboard. See [Figure 4-7](#) for an illustration of an HTX slot for a typical Opteron motherboard.

The motherboard vendor is the optimal source for information on the layout and use of HyperTransport and PCI Express-enabled expansion slots on supported motherboards.

## Form Factors

The **QLE7240**, **QLE7280**, and **QLE7140** are the model numbers for the adapters that ship in the standard PCI Express half-height, short-form factor. These adapters can be used with either full-height or low-profile face plates.

The **QHT7040** is the model number for the adapter that shipped in the HTX full-height factor. The HTX low-profile form factor is referred to as the **QHT7140**. It is the same as the QHT7040, except for its more compact size. In either case, the adapter is backward and forward compatible for the motherboards in which it is supported. The QHT7040 and QHT7140 HTX adapters are collectively referred to as the *QHT7140* unless otherwise stated.

When the QHT7040 or QHT7140 adapter is installed with the riser card, it may prevent some or all of the other PCI expansion slots from being used, depending on the form factor of the adapter and motherboard.

Run `ipath_control -i` to see information on which form adapter is installed. The file `/sys/class/infiniband/ipath0/device/boardversion` contains the same information. For more information, see the Useful Programs and Files appendix in the *QLogic HCA and QLogic OFED Software Users Guide*.

## Cabling and Switches

The cable installation uses a standard InfiniBand (IB) 4X cable. Any InfiniBand cable that has been qualified by the vendor should work. For SDR, the longest passive copper IB cable that QLogic has currently qualified is 20 meters. For DDR-capable adapters and switches, the DDR-capable passive copper cables cannot be longer than 10 meters. Active cables can eliminate some of the cable length restrictions.

InfiniBand switches are available through QLogic.

**NOTE:**

If you are using the QLE7240 or QLE7280 and want to use DDR mode, then DDR-capable switches must be used.

The copper cables listed in [Table 4-2](#) are available from QLogic:

**Table 4-2. QLogic InfiniBand Cables**

Product Number	Description
7104-1M-Cable	4x-4x cable—1 meter
7104-2M-Cable	4x-4x cable—2 meters
7104-3M-Cable	4x-4x cable—3 meters
7104-4M-Cable	4x-4x cable—4 meters
7104-5M-Cable	4x-4x cable—5 meters
7104-6M-Cable	4x-4x cable—6 meters
7104-7M-Cable	4x-4x cable—7 meters
7104-8M-Cable	4x-4x cable—8 meters
7104-9M-Cable	4x-4x Cable—9 meters
7104-10M-Cable	4x-4x cable—10 meters
7104-12M-Cable	4x-4x cable—12 meters (SDR only)
7104-14M-Cable	4x-4x cable—14 meters (SDR only)
7104-16M-Cable	4x-4x cable—16 meters (SDR only)
7104-18M-Cable	4x-4x cable—18 meters (SDR only)

For cabling instructions, see [“Cabling the Adapter to the InfiniBand Switch” on page 4-17.](#)

## Optical Fibre Option

The QLogic adapter also supports connection to the switch by means of optical fibres through optical media converters such as the EMCORE™ QT2400. Not all switches support these types of convertors. For more information on the EMCORE convertor, see [www.emcore.com](http://www.emcore.com).

Intel® and Zarlink™ also offer optical cable solutions. See [www.intel.com](http://www.intel.com) and [www.zarlink.com](http://www.zarlink.com) for more information.

## Configuring the BIOS

To achieve the best performance with QLogic adapters, you need to configure your BIOS with specific settings. The BIOS settings, which are stored in non-volatile memory, contain certain parameters characterizing the system. These parameters may include date and time, configuration settings, and information about the installed hardware.

This setting is required:

- Advanced Configuration and Power Interface (ACPI) BIOS option must be enabled.

For more information, see “[Enable Advanced Configuration and Power Interface \(ACPI\)](#)” on page A-2 and the Troubleshooting section of the *QLogic HCA and QLogic OFED Software Users Guide*.

Some other BIOS settings can be adjusted for better adapter performance. See “[Adapter and Other Settings](#)” on page 7-1.

For specific instructions about BIOS settings, follow the hardware documentation that came with your system.

### **NOTE:**

The x86 Page Attribute Table (PAT) mechanism that allocates write-combining (WC) mappings for the PIO buffers has been added and is now the default. This was previously a BIOS setting. For more information, see “[Write Combining](#)” on page B-1.

## Safety with Electricity

Observe these guidelines and safety precautions when working around computer hardware and electrical equipment:

- Locate the power source shutoff for the computer room or lab where you are working. This is where you will turn OFF the power in the event of an emergency or accident. Never assume that power has been disconnected for a circuit; always check first.
- Do not wear loose clothing. Fasten your tie or scarf, remove jewelry, and roll up your sleeves. Wear safety glasses when working under any conditions that might be hazardous to your eyes.
- Shut down and disconnect the system's power supply from AC service before you begin work, to insure that standby power is not active. Power off all attached devices such as monitors, printers, and external components. Note that many motherboards and power supplies maintain standby power at all times. Inserting or removing components while standby is active can damage them.
- Use normal precautions to prevent electrostatic discharge, which can damage integrated circuits.

## Unpacking Information

This section provides instructions for safely unpacking and handling the QLogic adapter. To avoid damaging the adapter, always take normal precautions to avoid electrostatic discharge.

### Verify the Package Contents

The QLogic adapter system should arrive in good condition. Before unpacking, check for any obvious damage to the packaging. If you find any obvious damage to the packaging or to the contents, please notify your reseller immediately.

### List of the Package Contents

The package contents for the QLE7240 adapter are:

- QLogic QLE7240
- Additional short bracket
- Quick Start Guide

Standard PCIe risers can be used, typically supplied by your system or motherboard vendor.

The package contents for the QLE7280 adapter are:

- QLogic QLE7280
- Additional short bracket
- Quick Start Guide

Standard PCIe risers can be used, typically supplied by your system or motherboard vendor.

The package contents for the QLE7140 adapter are:

- QLogic QLE7140
- Quick Start Guide

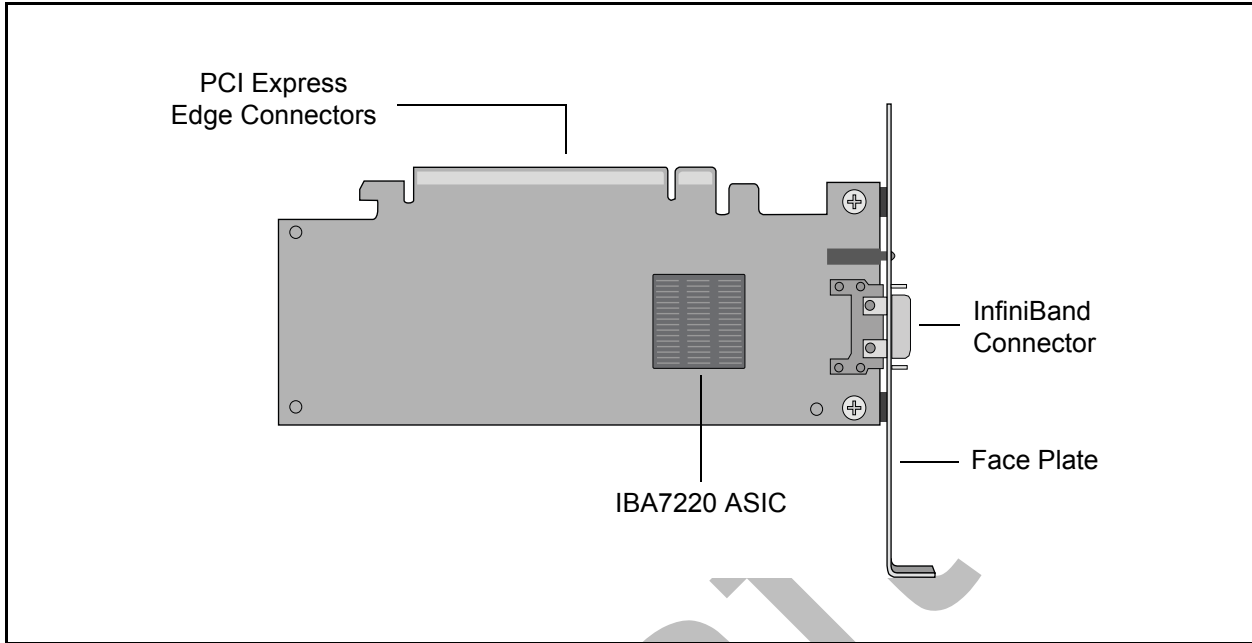
Standard PCIe risers can be used, typically supplied by your system or motherboard vendor. The contents are illustrated in [Figure 4-2](#).

The package contents for the QHT7140 adapter are:

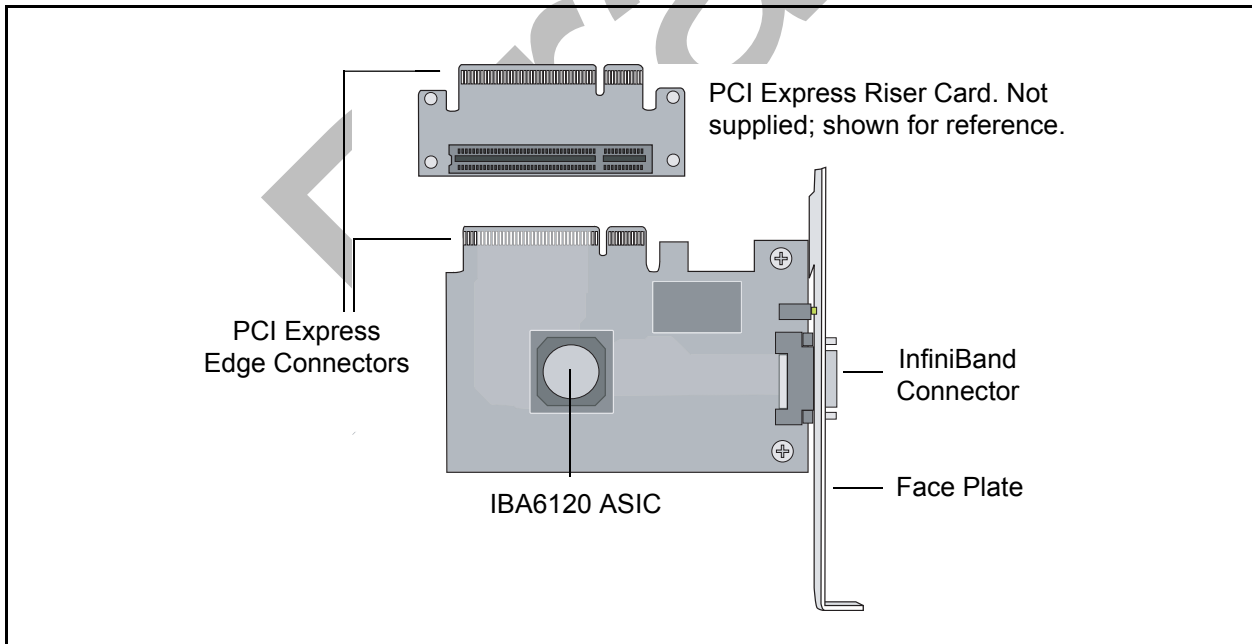
- QLogic QHT7140
- HTX riser card for use in 1U or 2U chassis
- Quick Start Guide

The contents are illustrated in [Figure 4-3](#).

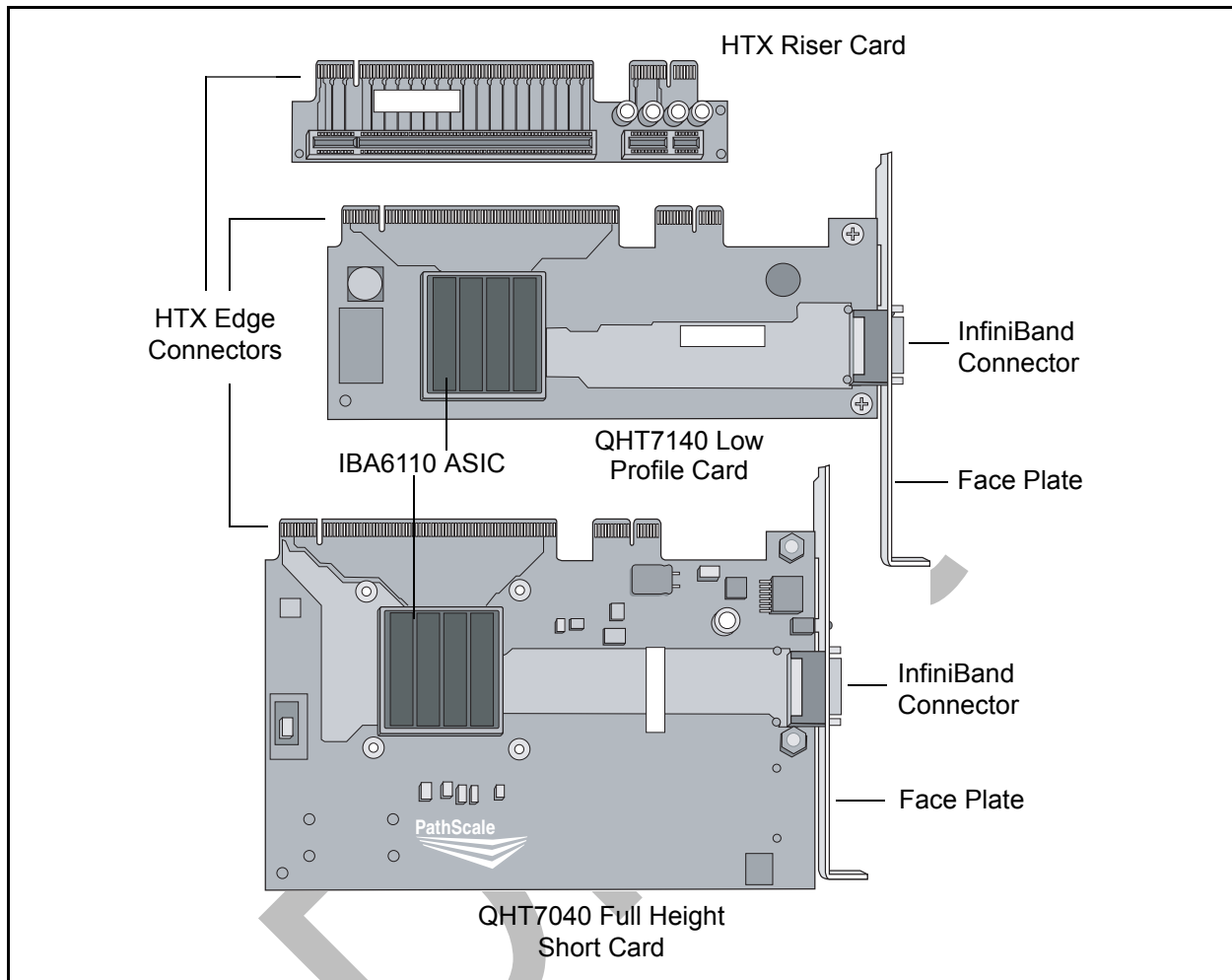
The IBA6120, IBA6110, and IBA7220 are the QLogic ASICs, which are the central components of the interconnect. The location of the IBA7220 ASIC on the adapter is shown in [Figure 4-1](#). The location of the IBA6120 ASIC on the adapter is shown in [Figure 4-2](#). The location of the IBA6110 ASIC on the adapter is shown in [Figure 4-3](#).



**Figure 4-1. QLogic QLE7280 with IBA7220 ASIC**



**Figure 4-2. QLogic QLE7140 Card with Riser, Top View**



**Figure 4-3. QLogic QHT7040/QHT7140 Full and Low Profile Cards with Riser, Top View**

## Unpacking the QLogic Adapter

Follow these steps when unpacking the QLogic adapter:

1. When unpacking, ground yourself before removing the QLogic adapter from the anti-static bag.
2. Grasping the QLogic adapter by its face plate, pull the adapter out of the anti-static bag. Handle the adapter only by its edges or the face plate. Do not allow the adapter or any of its components to touch any metal parts.
3. After checking for visual damage, store the adapter and the riser card in their anti-static bags until you are ready to install them.

## Hardware Installation

This section contains hardware installation instructions for the QLE7240, QLE7280, QLE7140, QHT7040, and QHT7140.

### Hardware Installation for QLE7240, QLE7280, or QLE7140 with PCI Express Riser

Installation for the QLE7240, QLE7280, and QLE7140 is similar. The following instructions are for the QLE7140, but can be used for any of these three adapters.

Most installations will be in 1U and 2U chassis, using a PCIe right angle riser card. This results in an installation of the adapter that is parallel to the motherboard. This type of installation is described first. Installation in a 3U chassis is described in [“Hardware Installation for the QHT7140 Without an HTX Riser” on page 4-16](#).

Installing the QLogic QLE7140 in a 1U or 2U chassis requires a PCIe right angle riser card.

A taller riser card can be used if necessary. The QLE7140 can connect to any of the standard compatible PCI Express riser cards.

#### Dual Adapter Installation

If you have a motherboard with dual PCIe slots, dual adapters can be installed. The adapters must match. For example, on a motherboard with two x16 slots, dual QLE7280 adapters can be installed, but not a QLE7240 adapter and a QLE7280 adapter. Check the design of your motherboard to see how riser cards can be used.

Follow the instructions in [“Installation Steps” on page 4-9](#).

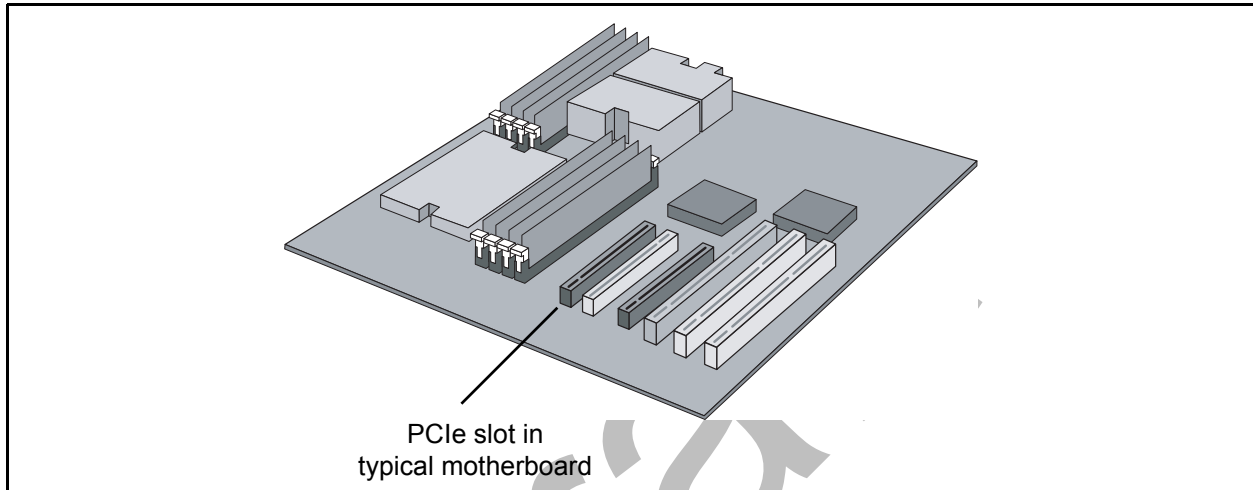
See the Using MPI section in the *QLogic HCA and QLogic OFED Software Users Guide* for information on using the `IPATH_UNIT` environment variable to control which HCA to use.

#### Installation Steps

To install the QLogic adapter with a PCIe riser card:

1. The BIOS should already be configured properly by the motherboard manufacturer. However, if any additional BIOS configuration is required, it will usually need to be done before installing the QLogic adapter. See [“Configuring the BIOS” on page 4-4](#).
2. Shut down the power supply to the system into which you will install the QLogic adapter.
3. Take precautions to avoid electrostatic damage (ESD) to the cards by properly grounding yourself or touching the metal chassis to discharge static electricity before handling the cards.

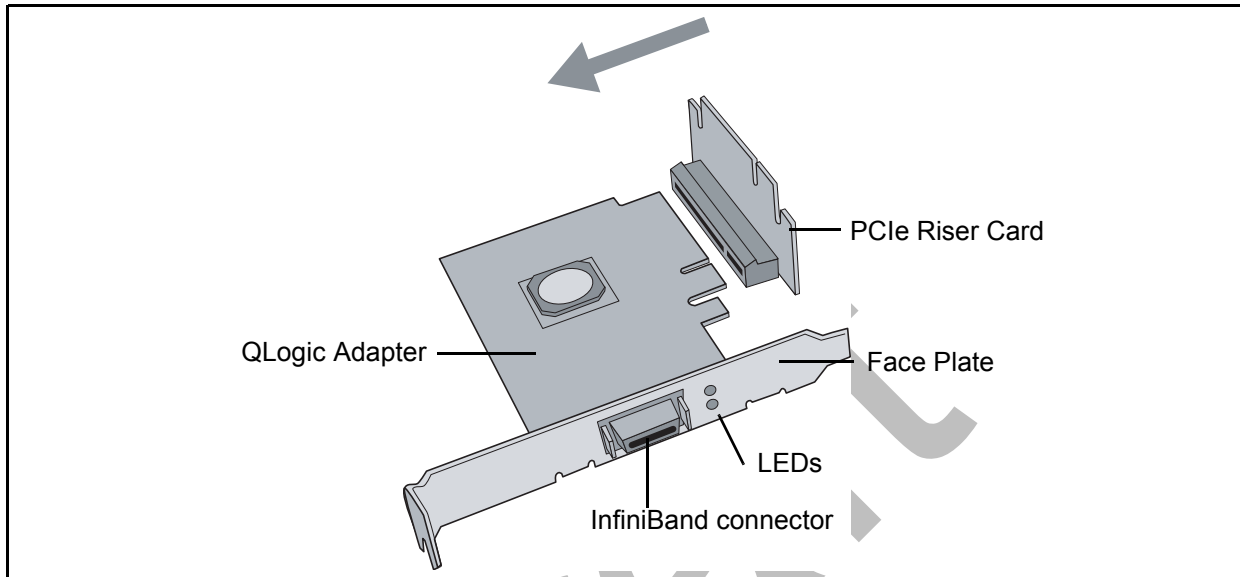
4. Remove the cover screws and cover plate to expose the system's motherboard. For specific instructions on how to do this, follow the hardware documentation that came with your system.
5. Locate the PCIe slot on your motherboard. Note that the PCIe slot has two separate sections, with the smaller slot opening located towards the front (see [Figure 4-4](#)). These two sections correspond to the shorter and longer connector edges of the adapter and riser.



**Figure 4-4. PCIe Slot in a Typical Motherboard**

6. Determine if a blanking panel is installed in your chassis. If it is, remove it so that the InfiniBand connector will be accessible. Refer to your system vendor instructions for how to remove the blanking panel.
7. Remove the QLogic adapter from the anti-static bag.
8. Locate the face plate on the connector edge of the card.

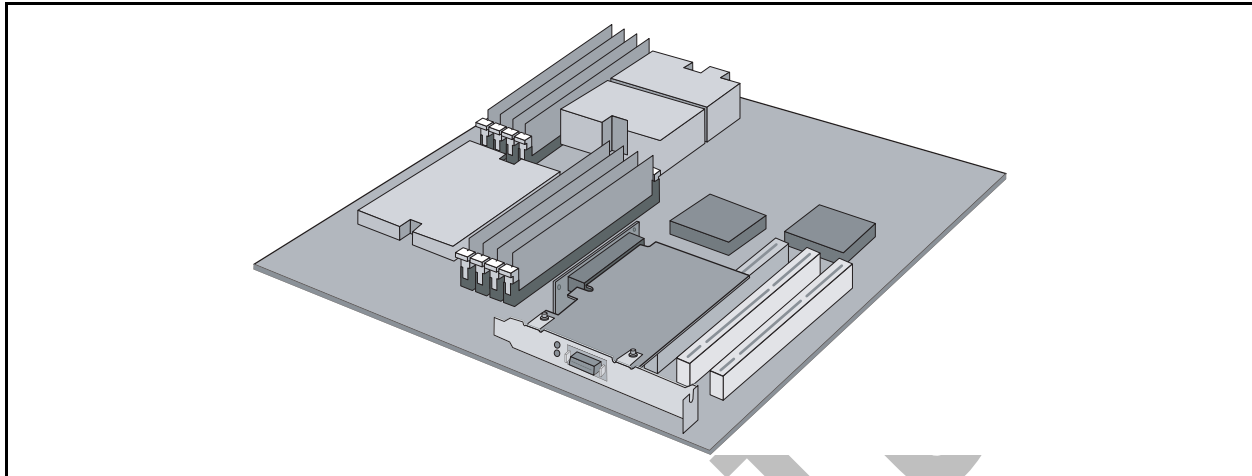
9. Connect the QLogic adapter and PCIe riser card together, forming the assembly that you will insert into your motherboard. First, visually line up the adapter slot connector edge with the edge connector of the PCIe riser card (see [Figure 4-5](#)).



**Figure 4-5. QLogic PCIe HCA Assembly with Riser Card**

10. Holding the QLogic adapter by its edges, carefully insert the card slot connector into the PCIe riser card edge connector, as show in [Figure 4-5](#). The result is a combined L-shaped assembly of the PCIe riser card and QLogic adapter. This assembly is what you will insert into the PCIe slot on the motherboard in the next step.
11. Turn the assembly so that the riser card connector edge is facing the PCIe slot on the motherboard, and the face plate is toward the front of the chassis.
12. Holding this assembly above the motherboard at about a 45 degree angle, slowly lower it so that the connector on the face plate clears the blanking panel opening of the chassis from the inside. Slowly align the connector edge of the riser card with the motherboard's PCIe slot. The short section of the connector must align with the short section of the slot.

13. Insert the riser assembly into the motherboard's PCIe slot, ensuring good contact. The QLogic adapter should now be parallel to the motherboard and about one inch above it (see [Figure 4-6](#)).



**Figure 4-6. Assembled PCIe HCA with Riser**

14. Secure the face plate to the chassis. The QLogic adapter has a screw hole on the side of the face plate that can be attached to the chassis with a retention screw. The securing method may vary depending on the chassis manufacturer. Refer to the system documentation for information about mounting details such as mounting holes, screws to secure the card, or other brackets.

The QLogic PCIe HCA with PCIe riser card is now installed. Next, install the cables as described in [“Cabling the Adapter to the InfiniBand Switch” on page 4-17](#). Then test your installation by powering up and verifying link status (see [“Completing the Installation” on page 4-18](#)).

## Hardware Installation for QHT7140 with HTX Riser

Most installations will be in 1U and 2U chassis, using the HTX riser card. This results in a horizontal installation of the QHT7140. This type of installation is described in this section. Installation in a 3U chassis is described in [“Hardware Installation for the QHT7140 Without an HTX Riser” on page 4-16](#).

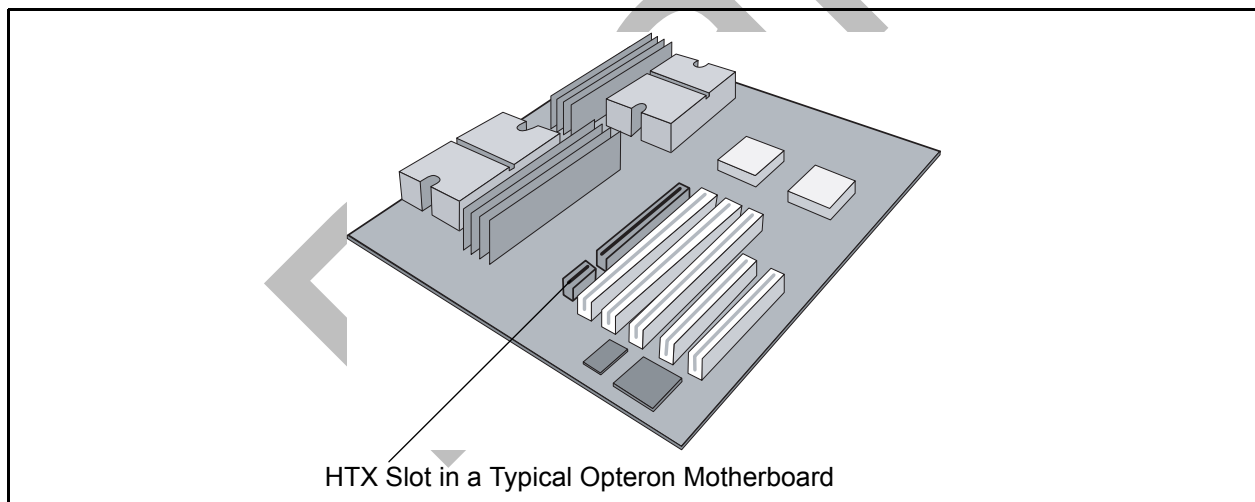
Installation of QLogic QHT7140 in a 1U or 2U chassis requires an HTX riser card.

### **NOTE:**

The illustrations in this section are shown for the full height short form factor. Installation of the HTX low profile form factor follows the same steps.

To install the QLogic adapter with an HTX riser card:

1. The BIOS should be already be configured properly by the motherboard manufacturer. However, if any additional BIOS configuration is required, it will usually need to be done before installing the QLogic adapter. See [“Configuring the BIOS” on page 4-4](#).
2. Shut down the power supply to the system into which you will install the QLogic adapter.
3. Take precautions to avoid electrostatic discharge (ESD) damage to the cards by properly grounding yourself or touching the metal chassis to discharge static electricity before handling the cards.
4. Remove the cover screws and cover plate to expose the system’s motherboard. For specific instructions on how to do this, follow the hardware documentation that came with your system.
5. Locate the HTX slot on your motherboard. Note that the HTX slot has two separate connectors, corresponding to the connector edges of the adapter. See [Figure 4-7](#).



**Figure 4-7. HTX Slot**

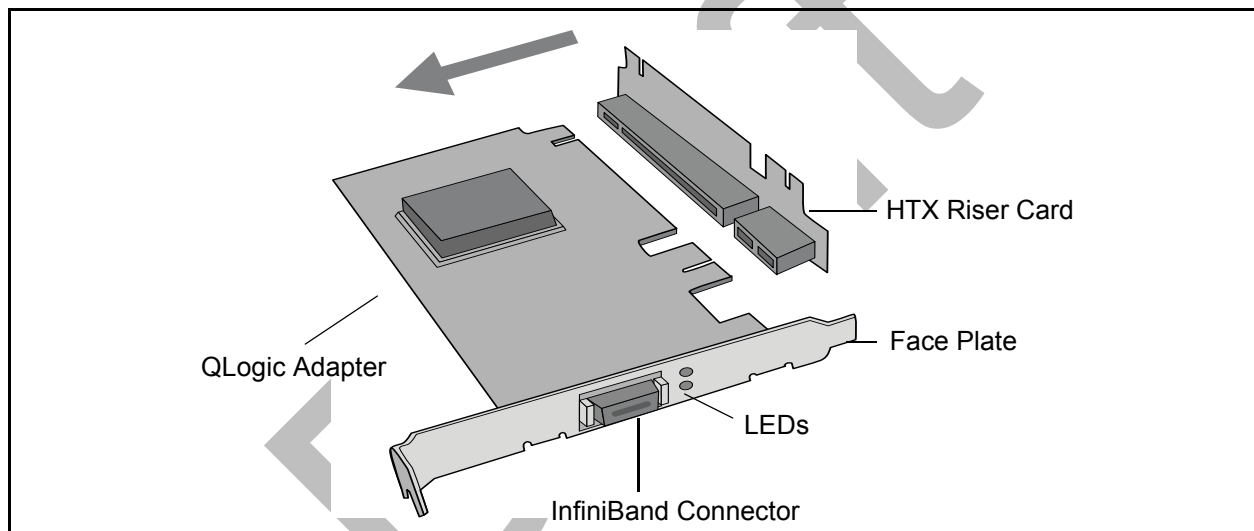
6. Determine if a blanking panel is installed in your chassis. If it is, remove it so that the InfiniBand connector will be accessible. Refer to your system vendor instructions for how to remove the blanking panel.

7. Remove the QLogic QHT7140 from the anti-static bag.

**NOTE:**

Be careful not to touch any of the components on the printed circuit board during these steps. You can hold the adapter by its face plate or edges.

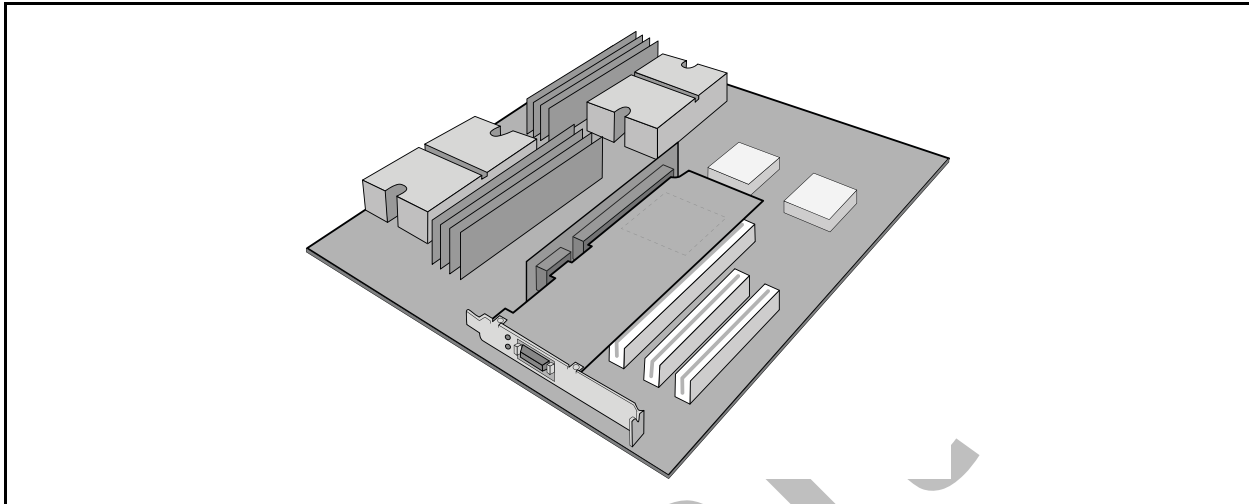
8. Locate the face plate on the connector edge of the card.
9. Connect the QLogic adapter and HTX riser card together, forming the assembly that you will insert into your motherboard. First, visually line up the adapter slot connector edge with the edge connector of the HTX riser card (see [Figure 4-8](#)).



**Figure 4-8. QLogic QHT7140 Adapter with Riser Card**

10. Holding the QLogic adapter by its edges, carefully insert the card slot connector into the HTX riser card edge connector, as show in [Figure 4-8](#). The result is a combined L-shaped assembly of the HTX riser card and QLogic adapter. This assembly is what you will insert into the HTX slot on the motherboard in the next step.
11. Turn the assembly so that the riser card connector edge is facing the HTX slot on the motherboard, and the face plate is toward the front of the chassis.
12. Holding this assembly above the motherboard at about a 45 degree angle, slowly lower it so that the connector on the face plate clears the blanking panel opening of the chassis from the inside. Slowly align the connector edge of the HTX riser card with the motherboard's HTX slot. The HTX riser and HTX slot must line up perfectly.

13. Insert the HT riser assembly into the motherboard's HTX slot, ensuring good contact. The QLogic adapter should now be parallel to the motherboard and about one inch above it, as shown in [Figure 4-9](#).



**Figure 4-9. Assembled QHT7140 with Riser**

14. Secure the face plate to the chassis. The QLogic adapter has a screw hole on the side of the face plate that can be attached to the chassis with a retention screw. The securing method may vary depending on the chassis manufacturer. Refer to the system documentation for information about mounting details such as mounting holes, screws to secure the card, or other brackets.

The QLogic QHT7140 with HTX riser card is now installed. Next, install the cables as described in [“Cabling the Adapter to the InfiniBand Switch”](#) on page 4-17. Then test your installation by powering up and verifying link status (see [“Completing the Installation”](#) on page 4-18).

## Hardware Installation for QLE7240, QLE7280, and QLE7140 Without a PCI Express Riser

Installing the QLogic QLE7240, QLE7280, or QLE7140 without a PCI Express riser card requires a 3U or larger chassis.

Installation is similar to the QHT7140 HTX adapter, except that the card slot connectors on these adapters fit into the PCIe slot rather than the HTX slot. Follow the instructions in [“Hardware Installation for the QHT7140 Without an HTX Riser”](#) on page 4-16, substituting the PCIe slot for the HTX slot.

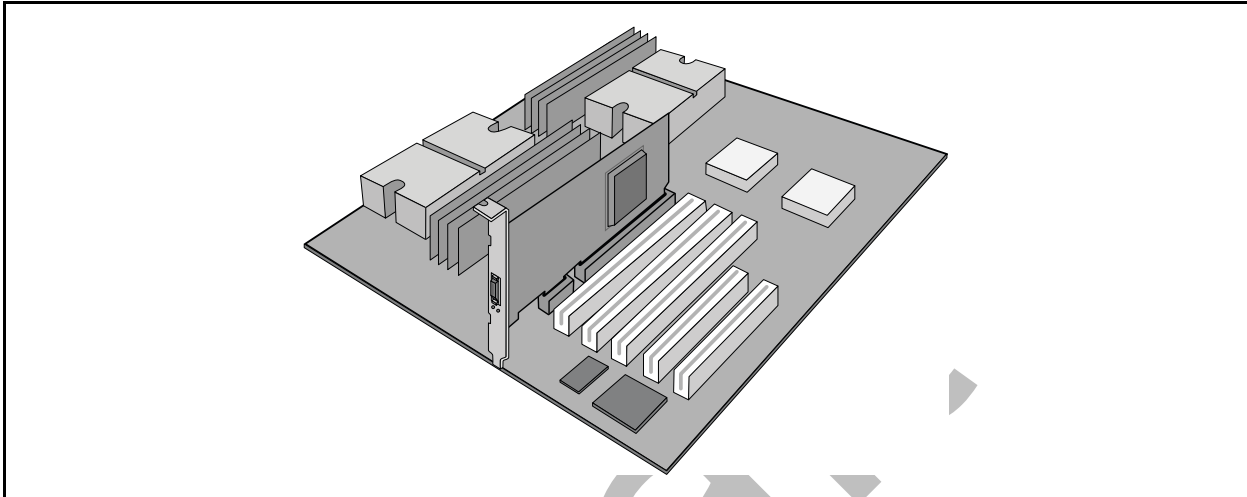
## Hardware Installation for the QHT7140 Without an HTX Riser

Installing the QLogic QHT7140 without an HTX riser card requires a 3U or larger chassis. The card slot connectors on the QHT7140 fit into the HTX slot in a vertical installation.

To install the QLogic adapter without the HTX riser card:

1. The BIOS should already be configured properly by the motherboard manufacturer. However, if any additional BIOS configuration is required, it will usually need to be done before installing the QLogic adapter. See [“Configuring the BIOS” on page 4-4](#).
2. Shut down the power supply to the system into which you will install the QLogic adapter.
3. Take precautions to avoid electrostatic discharge (ESD) damage to the cards by properly grounding yourself or touching the metal chassis to discharge static electricity before handling the cards.
4. If you are installing the QLogic adapter into a covered system, remove the cover screws and cover plate to expose the system’s motherboard. For specific instructions on how to do this, follow the hardware documentation that came with your system.
5. Locate the HTX slot on your motherboard (see [Figure 4-7](#)).
6. Remove the QLogic adapter from the anti-static bag. Hold the card by the top horizontal section of the bracket, and the top rear corner of the card. Be careful not to touch any of the components on the printed circuit card.
7. Without fully inserting, gently align and rest the HTX card’s gold fingers on top of the motherboard’s HTX slot.

8. Insert the card by pressing firmly and evenly on the top of the horizontal bracket and the top rear corner of the card simultaneously. The card should insert evenly into the slot. Be careful not to push, grab, or put pressure on any other part of the card, and avoid touching any of the components. See [Figure 4-10](#).



**Figure 4-10. QHT7140 Without Riser Installed in a 3U Chassis**

9. Secure the face plate to the chassis. The QLogic adapter has a screw hole on the side of the face plate that can be attached to the chassis with a retention screw. The securing method may vary depending on the chassis manufacturer. Refer to the system documentation for information about mounting details such as mounting holes, and screws to secure the card, or other brackets.

Next, install the cables, as described in [“Cabling the Adapter to the InfiniBand Switch” on page 4-17](#). Then test your installation by powering up the system (see [“Completing the Installation” on page 4-18](#)).

## Switch Configuration and Monitoring

The QLogic interconnect is designed to work with all InfiniBand-compliant switches. Follow the vendor documentation for installing and configuring your switches.

## Cabling the Adapter to the InfiniBand Switch

Follow the recommendations of your cable vendor for cable management and proper bend radius.

The QLE7240, QLE7280, QLE7140, QHT7040, and QHT7140 adapters are all cabled the same way.

To install the InfiniBand cables:

1. Check that you have removed the protector plugs from the cable connector ends.
2. Different vendor cables might have different latch mechanisms. Determine if your cable has a spring-loaded latch mechanism.
  - If your cable is spring-loaded, grasp the metal shell and pull on the plastic latch to release the cable. To insert, push and the cable snaps into place. You will hear a short “click” sound from the cable connector when it snaps in.
  - If your cable latch mechanism is not spring-loaded, push on the metal case, then push the plastic latch to lock the cable in place.
3. The InfiniBand cables are symmetric; either end can be plugged into the switch. Connect the InfiniBand cable to the connector on the QLogic QLE7240, QLE7280, QLE7140 or QHT7140. Depress the side latches of the cable when connecting. (On some cables, this latch is located at the top of the cable connector.) Make sure the lanyard handle on the cable connector is slid forward toward the card connector until fully engaged.
4. Connect the other end of the cable to the InfiniBand switch.

## Completing the Installation

To complete the hardware installation:

1. Complete any other installation steps for other components.
2. Replace the cover plate and back panel.
3. Verify that the power cable is properly connected.
4. Turn on the power supply and boot the system normally.
5. Watch the LED indicators. The LEDs will flash only once, briefly, at power-up. The LEDs are functional only after the InfiniPath software has been installed, the driver has been loaded, and the system is connected to an InfiniBand switch. To use the LEDs to check the state of the adapter, see [“LED Link and Data Indicators” on page 7-1.](#)

# 5 Software Installation

This section provides instructions for installing QLogic OFED 1.4, which includes QLogic InfiniPath and the OpenFabrics software. The software includes drivers, protocol libraries, QLogic's implementation of the MPI message passing standard, associated utilities, and example programs, including benchmarks. A complete list of the provided software is in ["Software Components" on page 2-4](#).

## Cluster Setup

Information on clusters, supported distributions and kernels, and environment setup is provided in ["Types of Nodes in a Cluster Environment" on page 5-1](#), ["Supported Linux Distributions" on page 5-1](#), and ["Distribution Identifiers" on page 5-2](#).

## Types of Nodes in a Cluster Environment

In a cluster environment, different nodes can be used for different functions, such as launching jobs, developing software, or running jobs. The nodes are defined as follows:

- **Front end node.** This node launches jobs.
- **Compute node.** This node runs jobs.
- **Development or build node.** These are the machines on which examples or benchmarks can be compiled.

Any machine can serve any combination of these three purposes, but a typical cluster has many compute nodes and just a few (or only one) front end nodes. The number of nodes used for development will vary. These node names are used throughout this guide.

## Supported Linux Distributions

The QLogic interconnect runs on AMD™ Opteron™ and 64-bit Intel Xeon systems running Linux®. The currently supported distributions and associated Linux kernel versions for InfiniPath and OpenFabrics are listed in [Table 5-1](#).

The kernels are the ones that shipped with the distributions. All are for the x86\_64 architecture.

**Table 5-1. InfiniPath/OpenFabrics Supported Distributions and Kernels**

Distribution	InfiniPath/OpenFabrics Supported Kernels
Red Hat® Enterprise Linux® (RHEL) 4.5	2.6.9-55 (U5),
RHEL 4.6	2.6.9-67 (U6)
RHEL 4.7	2.6.9-78 (U7)
CentOS 4.5	2.6.9-55
CentOS 4.6	2.6.9-67
CentOS 4.7	2.6.9-78
Scientific Linux 4.5	2.6.9-55
Scientific Linux 4.6	2.6.9-67
Scientific Linux 4.7	2.6.9-78
Red Hat Enterprise Linux 5.1 (RHEL 5.1)	2.6.18-53, 2.6.18-92
RHEL 5.2	2.6.18-92
CentOS 5.1	2.6.18-53, 2.6.18-92
CentOS 5.2	2.6.18-92
Scientific Linux 5.1	2.6.18-53, 2.6.18-92
Scientific Linux 5.2	2.6.18-92
SUSE® Linux Enterprise Server 10 SP 1	2.6.16.46
SUSE® Linux Enterprise Server 10 SP 2	2.6.16.60

**NOTE:**

Support for RHEL4 U4 and SLES 10.0 has been removed.

## Distribution Identifiers

Distribution identifiers for this release are listed in the table below. They are used in file naming conventions.

**Table 5-2. Distribution Identifiers**

Distribution Identifier	Used On
rhel4	Red Hat Enterprise Linux 4.5 (RHEL4.5), RHEL4.6, RHEL 4.7, CentOS 4.5-4.7, Scientific Linux 4.5-4.7 for x86_64 systems

**Table 5-2. Distribution Identifiers (Continued)**

Distribution Identifier	Used On
rhel5	Red Hat Enterprise Linux 5.1 (RHEL5.1), RHEL5.2, CentOS 5.1-5.2, Scientific Linux 5.1-5.2, for x86_64 systems
sles10	SLES 10 SP1-SP2 for x86_64 systems

## Compiler Support

QLogic MPI supports use of a number of compilers. These include:

- GNU gcc 3.3.x, 3.4.x, 4.0, 4.1, 4.2.x, and 4.3.x compiler suites
- PathScale Compiler Suite 3.0, 3.1 and 3.2
- PGI 5.2, 6.0, 7.1, 7.2-4, and 8.0-3
- Intel 9.x, 10.1, and 11.0
- gfortran 4.1.x

The PathScale Compiler Suite Version 3.x is now supported on systems that have the GNU 4.0 and 4.1 compilers and compiler environment (header files and libraries).

## Setting Up Your Environment

Keep the following in mind when setting up the environment:

- The runtime and build environments must be the same. Compatibility between executables built on different Linux distributions cannot be guaranteed.
- You will need Administrator privileges on your machine(s).
- If using the `rpm` install method, make sure that all previously existing (stock) OpenFabrics RPMs are uninstalled. See [“Uninstalling InfiniPath and OpenFabrics RPMs” on page 5-24](#) for more information on uninstalling. The Installer tool will uninstall previous RPMs automatically before upgrades.
- It is possible to have a cluster running with different kernel versions. However, QLogic recommends and supports clusters where all nodes run equivalent software.

Some operating system packages are required for OpenFabrics; they are listed in [Table 5-3](#).

**Table 5-3. Required OS Packages**

OS Distribution	Required Packages
All	gcc, glib, glibc
All (For development)	glib-devel, glibc-devel, glibc-devel-32bit (to build 32-bit libraries on x86_86 and ppc64), zlib-devel
Red Hat and Red Hat-derived kernels	kernel-devel, rpm-build
SLES 10	kernel-source, rpm

There are also OS package requirements for some specific components in QLogic OFED.

**Table 5-4. Specific Component Requirements**

QLogic OFED Component	Required OS Packages
QLogic infinipath* software (Listed as TrueScale HCA Libs in the Installer)	openssh and openssh-server. Note that in the SLES 10 distribution, openssh-server is a part of the openssh package.  python, if the Multi-Purpose Daemon (MPD) job launcher or the ipath_mtrr script is to be used. These packages must be on every node.
MVAPICH	a Fortran Compiler
MVAPICH2	libstdc++-devel, sysfsutils (SLES), lib-sysfs-devel (RedHat 5.0)
Open MPI	libstdc++-devel
ibutils	tcl-8.4, tcl-devel-8.4, tk, lib-stdc++-devel
QLogic openmpi_gcc*	libgfortran (on RHEL4)

## Choose the Appropriate Download Files

This section assumes that the correct Linux kernel, a supported distribution, and the required prerequisites (see [Table 5-3](#) and [Table 5-4](#)) have been installed on every node.

The components of the QLogic OFED 1.4 release are available packaged as separate downloads:

- QLogicIB-Basic with the Text User Interface Installer
- QLogic OFED 1.4 RPM Set
- QLogic OFED 1.4 User-level RPM Set
- Rocks Rolls
- Platform OCS Kits
- The InfiniBand Fabric Suite is available for purchase as a CD/ISO image

Check [Table 5-5](#) for the package contents available for each type of download.

All files are available from the QLogic web site: <http://www.qlogic.com>. Follow the Downloads tab to choose the appropriate download for your OS distribution, then follow the instructions for installing the QLogic OFED software in the following sections.

**Table 5-5. Available Packages for QLogic OFED 1.4 Release**

Package	Description	Installation and Documentation
QLogicIB-Basic	Includes: <ul style="list-style-type: none"> <li>■ QLogic OFED 1.4</li> <li>■ InfiniPath HCA driver</li> <li>■ Optimized stack for MPI (PSM)</li> <li>■ QLogic MPI</li> <li>■ Other MPIs (MVAPICH and Open MPI compiled with GCC, PathScale, PGI, and Intel compilers)</li> <li>■ User tools</li> <li>■ QLogic SRP and VNIC</li> <li>■ Text User Interface (TUI) Installer</li> <li>■ FastFabric Enablement Tools</li> </ul>	Install using “ <a href="#">Install QLogicIB-Basic with the Installer Tool</a> ” on page 5-7.  Related Documentation: Readme and Release Notes <i>QLogic HCA and QLogic OFED Software Install Guide</i> <i>QLogic HCA and QLogic OFED Software Users Guide</i> . <i>QLogic ULP and Tools Reference Guide (OFED+ Users Guide)</i>

**Table 5-5. Available Packages for QLogic OFED 1.4 Release (Continued)**

Package	Description	Installation and Documentation
QLogic OFED 1.4 RPM Set	Includes: <ul style="list-style-type: none"> <li>■ QLogic OFED 1.4</li> <li>■ InfiniPath HCA driver</li> <li>■ Optimized stack for MPI (PSM)</li> <li>■ QLogic MPI</li> <li>■ Other MPIs (MVAPICH and Open MPI compiled with GCC, PathScale, PGI, and Intel compilers)</li> <li>■ User tools</li> </ul>	Install using <a href="#">“Using rpm to Install InfiniPath and OpenFabrics”</a> on page 5-14 Related Documentation: Readme and Release Notes <i>QLogic HCA and QLogic OFED Software Install Guide</i> <i>QLogic HCA and QLogic OFED Software Users Guide.</i>
QLogic OFED 1.4 User-level Software RPM Set	Includes: <ul style="list-style-type: none"> <li>■ Optimized stack for MPI (PSM)</li> <li>■ QLogic MPI</li> <li>■ Other MPIs (MVAPICH and Open MPI compiled with GCC, PathScale, PGI, and Intel compilers)</li> </ul>	Install using <a href="#">“Install QLogic OFED User-level Software with the rpm Command”</a> on page 5-17 Related Documentation: Readme and Release Notes <i>QLogic HCA and QLogic OFED Software Install Guide</i> <i>QLogic HCA and QLogic OFED Software Users Guide.</i> For installation over OFED 1.4 supplied from OpenFabrics or with Linux distribution.
QLogic OFED 1.4 Rocks Rolls	Includes: <ul style="list-style-type: none"> <li>■ QLogic OFED 1.4</li> <li>■ InfiniPath HCA driver</li> <li>■ Optimized stack for MPI (PSM)</li> <li>■ QLogic MPI</li> <li>■ Other MPIs (MVAPICH and Open MPI compiled with GCC, PathScale, PGI, and Intel compilers)</li> <li>■ User tools</li> <li>■ QLogic SRP and VNIC</li> <li>■ FastFabric Enablement Tools</li> </ul>	Install using <a href="#">“Install QLogic OFED Using Rocks”</a> on page 5-20 Related Documentation: Readme and Release Notes <i>QLogic HCA and QLogic OFED Software Install Guide</i> <i>QLogic HCA and QLogic OFED Software Users Guide.</i>

**Table 5-5. Available Packages for QLogic OFED 1.4 Release (Continued)**

Package	Description	Installation and Documentation
QLogic OFED 1.4 Platform OCS Kits	Includes: <ul style="list-style-type: none"> <li>■ QLogic OFED 1.4</li> <li>■ InfiniPath HCA driver</li> <li>■ Optimized stack for MPI (PSM)</li> <li>■ QLogic MPI</li> <li>■ Other MPIs (MVAPICH and Open MPI compiled with GCC, PathScale, PGI, and Intel compilers)</li> <li>■ User tools</li> <li>■ QLogic SRP and VNIC</li> <li>■ FastFabric Enablement Tools</li> </ul>	Install using “ <a href="#">Install QLogic OFED Using a Platform OCS Kit</a> ” on page 5-22 Related Documentation: Readme and Release Notes <i>QLogic HCA and QLogic OFED Software Install Guide</i> <i>QLogic HCA and QLogic OFED Software Users Guide.</i>
QLogic Infini-Band Fabric Suite	Includes: <ul style="list-style-type: none"> <li>■ QLogic FastFabric Toolset</li> <li>■ QLogic Host Subnet Manager</li> <li>■ QLogic Fabric Viewer</li> <li>■ InfiniServ Host Software</li> <li>■ QLogicIB-Basic</li> </ul>	Install using “ <a href="#">Install FastFabric Software CD/ISO Image</a> ” on page 5-22 CD/ISO image may be purchased separately. Follow the links on the QLogic download page. Documentation is included.

## Install QLogicIB-Basic with the Installer Tool

The Installer tool has a Text User Interface (TUI) that affords easy installation of the software. Use this method if you have downloaded the QLogic-IB-Basic package. This method is suitable for use on small clusters.

1. Use the Downloads tab on the QLogic web site to locate your adapter model.

<http://www.qlogic.com>

Download the QLogicIB-Basic tar file for your distribution to a directory that will not be deleted upon reboot. Then unpack the tar file:

```
$ tar zxvf <QLogicIB-Basic>.<version>.tgz
```

The `tar` command creates a directory based on the `tar` file name and places the RPMs and other files in this directory.

2. After unpacking the .tgz file, change directory to:

```
cd <QLogicIB-Basic>.<version>
```

3. Become root, then type:

```
# ./INSTALL
```

(Note that if you need 32-bit support on 64 bit OSs, invoke the installer with `./INSTALL --32bit`)

You will see a screen similar to this:

```
QLogic Inc. InfiniBand 4.4.1.0.8 Software
```

- 1) Install/Uninstall Software
  - 2) Reconfigure OFED IP over IB
  - 3) Reconfigure Driver Autostart
  - 4) Update HCA Firmware
  - 5) Generate Supporting Information for Problem Report
  - 6) Fast Fabric (Host/Chassis/Switch Setup/Admin)
- X) Exit

4. Type 1, which will display the screen for software installation. The next screen shows the packages to select for installation:

QLogic Inc. IB Install (4.4.1.0.8 release) Menu

Please Select Install Action (screen 1 of 3):

```

0) OFED IB Stack      [  Install  ][Available] 1.4.0.1.5
1) TrueScale HCA Libs [  Install  ][Available] 2.3.0.0.4237
2) QLogic IB Tools    [  Install  ][Available] 4.4.0.0.29
3) OFED IB Development [  Install  ][Available] 1.4.0.1.5
4) QLogic Fast Fabric [Don't Install][Not Avail]
5) QLogic SRP         [  Install  ][Available] 1.4.0.0.12
6) QLogic Virtual NIC [  Install  ][Available] 1.4.0.0.11
7) OFED IP over IB    [  Install  ][Available] 1.4.0.1.5
8) OFED SDP           [  Install  ][Available] 1.4.0.1.5
9) OFED uDAPL         [  Install  ][Available] 1.4.0.1.5
a) QLogic FM          [Don't Install][Not Avail]
b) MVAPICH (gcc)      [  Install  ][Available] 1.4.0.1.5
c) MVAPICH2 (gcc)     [  Install  ][Available] 1.4.0.1.5
d) OpenMPI (gcc)      [  Install  ][Available] 1.4.0.1.5

N) Next Screen
P) Perform the selected actions      I) Install All
R) Re-Install All                    U) Uninstall All
X) Return to Previous Menu (or ESC)

```

Pressing the keys corresponding to menu items (0-9, a-d in the example above) will toggle the selection for the given item.

The packages above are recommended for a new install. QLogic Fast Fabric (4) and QLogic FM (Fabric Manager) (a) are only available if you have purchased the InfiniBand Fabric Suite. MVAPICH2 (c) does not run over QLogic PSM; it runs over Open Fabrics Verbs only.

TrueScale HCA Libs (1) contains the enhanced InfiniPath HCA driver, optimized stack for MPI(PSM) and QLogic MPI, and user tools.

5. Then, type n to proceed to the next screen. You can cycle through the available screens by continuing to type n. (Typing x or pressing ESC will return you to the top level menu, and un-set all your current choices.)

The next screen contains these choices:

QLogic Inc. IB Install (4.4.1.0.8 release) Menu

Please Select Install Action (screen 2 of 3):

- 0) MVAPICH/PSM (gcc) [ Install ] [Available] 1.4.0.1.5
- 1) MVAPICH/PSM (PGI) [ Install ] [Available] 1.4.0.1.5
- 2) MVAPICH/PSM (PSc) [ Install ] [Available] 1.4.0.1.5
- 3) MVAPICH/PSM (Intel) [ Install ] [Available] 1.4.0.1.5
- 4) OpenMPI/PSM (gcc) [ Install ] [Available] 1.4.0.1.5
- 5) OpenMPI/PSM (PGI) [ Install ] [Available] 1.4.0.1.5
- 6) OpenMPI/PSM (PSc) [ Install ] [Available] 1.4.0.1.5
- 7) OpenMPI/PSM (Intel) [ Install ] [Available] 1.4.0.1.5
- 8) MPI Source [ Install ] [Available] 1.4.0.1.5
- 9) OFED RDS [ Install ] [Available] 1.4.0.1.5
- a) OFED SRP [ Install ] [Available] 1.4.0.1.5
- b) OFED SRP Target [Don't Install] [Available] 1.4.0.1.5
- c) OFED iSER [Don't Install] [Available] 1.4.0.1.5
- d) OFED iSER Target [Don't Install] [Available]
  
- N) Next Screen
- P) Perform the selected actions I) Install All
- R) Re-Install All U) Uninstall All
- X) Return to Previous Menu (or ESC)

Note that PSc is an acronym for the PathScale compiler. At this time, QLogic recommends choosing all items all items except for OFED SRP Target and the iSER options.

6. Then type n to proceed to the next screen:

QLogic Inc. IB Install (4.4.1.0.8 release) Menu

Please Select Install Action (screen 3 of 3):

- 0) OFED iWARP [Don't Install] [Available] 1.4.0.1.5
- 1) OFED Open SM [Don't Install] [Available] 1.4.0.1.5
- 2) OFED Debug Info [Don't Install] [Available] 1.4.0.1.5
  
- N) Next Screen
- P) Perform the selected actions I) Install All
- R) Re-Install All U) Uninstall All
- X) Return to Previous Menu (or ESC)

Open SM (1) should only be installed on one node in the cluster where it will be used. If desired, Type 1 for Open SM.

7. Finally, type `p` to start the installation.

The installer will uninstall older OFED RPMs, and then will ask for input for a series of operations. You can accept the defaults, by pressing `<Enter>`. Take note of the following cases:

```
Install MPI with prefix compatible with mpi-selector
(/usr/mpi/qlogic) [y]: y
```

This default allows you to use the `mpi-selector` to choose between different MPI implementations.

If you type `y`, make sure, after installation, that the environment variable `$MPICH_ROOT` is set to the same prefix that is used here (`/usr/mpi/qlogic`). When set, the `$MPICH_ROOT` variable allows QLogic MPI to correctly locate header and library files for MPI compilation and running parallel jobs. Typing `n` will cause QLogic MPI to be installed in the default `/usr`.

The next case is:

```
Configure OFED IP over IB IPV4 addresses now? [n]:
```

Answer `y` if the IB IPV4 addresses and netmasks are available, and you want to enter them now. Answer `n` if the IB addresses are not available or you want to add them later. IPoIB can be configured manually by following the instructions for [“Configuring the IPoIB Network Interface” on page 6-2](#).

Finally, QLogic recommends you answer `n` to the following:

```
Enable QLogic SRP (qlgc_srp) to autostart? [y]: n
Enable OFED SRP (openibd) to autostart? [y]: n
```

Further instructions for using SRP are given in [“SRP” on page 6-4](#).

8. Once the install has completed, quit the installer by typing `x` until you have exited. After exiting, rebooting the machine is recommended.

**NOTE:**

If you want support for 32 bit programs, you can install the 32-bit libraries on a 64-bit system like this:

```
# ./INSTALL --32bit
```

The Installer can also be used as a command-line interface (CLI). There are numerous options for installation/upgrade/uninstallation/autostart of all the available components. Here are the available options:

```
./INSTALL [-r root] [-v|-vv] [-a|-n|-U|-F|-u|-s|-i comp|-e comp|-E
comp|-D comp] [-f] [--user_configure_options 'options']
```

**./INSTALL -c** lists all the available components, which include:

```
ib_stack, truescale, oftools, ib_stack_dev, fastfabric, qlgc_srp,
qlgc_vnic, ofed_ipoib, ofed_sdp, ofed_udapl, qlgc_fm, mvapich,
mvapich2, openmpi, mvapich_gcc_qlc, mvapich_pgi_qlc,
mvapich_pathscale_qlc, mvapich_intel_qlc, openmpi_gcc_qlc,
openmpi_pgi_qlc, openmpi_pathscale_qlc, openmpi_intel_qlc,
ofed_mpirsrc, ofed_rds, ofed_srp, ofed_srpt, ofed_iser, ofed_isert,
ofed_iwarp, opensm ofed_debug
```

Additional component names allowed for **-E** and **-D** options:

```
iba_mon, qlgc_fm_snmp
```

**NOTE:**

The component names here are not the same as the RPM names in the RPM downloads, even though they are RPM-based in most cases. See [“Package Descriptions” on page D-1](#) for more package description.

[Table 5-6](#) summarizes Installer command line options.

**Table 5-6. INSTALL Options**

Command	Meaning
-a	Install all ULPs and drivers with default options
-n	Install all ULPs and drivers with default options but with no change to autostart options
-U	Upgrade/re-install all presently installed ULPs and drivers with default options and no change to autostart options
-i comp	Install the given component with default options can appear more than once on command line
-f	Skip firmware upgrade during install
--user_configure_options 'options'	Specify additional OFED build options for user space srpms. Causes rebuild of all user srpms
--kernel_configure_options 'options'	Specify additional OFED build options for driver srpms. Causes rebuild of all driver srpms
--prefix dir	Specify alternate directory prefix for install default is /usr. Causes rebuild of needed srpms
--no32bit	Disable install of 32 bit libraries on 64 bit OSs

**Table 5-6. INSTALL Options (Continued)**

Command	Meaning
<code>--32bit</code>	Enable install of 32 bit libraries on 64 bit OSs default is no32bit
<code>--rebuild</code>	Force OFED rebuild
<code>--force</code>	Force install even if distros don't match Use of this option can result in undefined behaviors
<code>-F</code>	Upgrade HCA Firmware with default options
<code>-u</code>	Uninstall all ULPs and drivers with default options
<code>-s</code>	Enable autostart for all installed drivers
<code>-r</code>	Specify alternate root directory, default is /
<code>-e comp</code>	Uninstall the given component with default options can appear more than once on command line
<code>-E comp</code>	Enable autostart of given component can appear with -D or more than once on command line
<code>-D comp</code>	Disable autostart of given component can appear with -E or more than once on command line
<code>-v</code>	Verbose logging
<code>-vv</code>	Very verbose debug logging
<code>-C</code>	Output list of supported components
<code>--user_queries</code>	Permit non-root users to query the fabric (Default)
<code>--no_user_queries</code>	Non-root users cannot query the fabric. Default options retain existing configuration files.

## About rpm Installation

Linux distributions of QLogic OFED (InfiniPath and OpenFabrics) software can be installed from binary RPMs. RPM is a Linux packaging and installation tool used by Red Hat, SUSE, and CentOS.

Instructions given below are for a single node. Parallel command starters can be used for installation on multiple nodes. The Yellowdog Updater, Modified (YUM) may also be used for installation. However, these subjects are beyond the scope of this document.

RPMs contain `config` files. Your current `config` files will not be overwritten when new RPMs are installed. New `config` files will contain the suffix `.rpmnew` and can be found in `/etc/sysconfig` and `/etc/infiniband`. Check the new files to see if there is anything you want to add to your standard config files

Please note:

- For convenience, QLogic recommends that the same set of RPMs are installed on all nodes (with the exception of OpenSM). Omitting the `*-Static/*` and `*-Debuginfo/*` RPMs is recommended. Use the `*/32bit/*` RPMs only if you need them. Some RPMs are optional depending on which type of node is being used. To see which RPMs are required or optional for each type of node, according to its function as a compute node, front end node, development machine, or Subnet Manager (SM), see [Appendix D “Package Descriptions”](#).
- Install the `OpenSM` RPM only if you do not plan to use a switch-based or host-based SM. The `OpenSM` RPM is normally installed on the node on which it will be used. If installed, it is *off* by default. This behavior can be modified. See [“OpenSM” on page 6-3](#) for more information.
- Programs that incorporate the user IB verbs interfaces, such as diagnostics, benchmarks, verbs-based MPIs (for example, Intel MPI), and SDP sockets must have the OpenFabrics RPMs installed.
- Install the `infinipath` RPM on all nodes where you install the `mpi-frontend` RPM.
- The `mpi-devel` and `infinipath-devel` RPMs will be installed when the `qlogic-mpi-register` RPM is installed, as there are dependencies.
- Check that all older stock OFED RPMs have been uninstalled ([“Uninstalling InfiniPath and OpenFabrics RPMs” on page 5-24](#))

## Using `rpm` to Install InfiniPath and OpenFabrics

1. Use the Downloads tab on the QLogic web site to locate your adapter model.

<http://www.qlogic.com>

After downloading the appropriate tar file, type:

```
$ tar zxvf QLogicOFED<version>-<distribution>-x86_64.tgz
```

The `tar` command creates a directory based on the `tar` file name and places the RPMs and other files in this directory.

2. The RPMs need to be available on each node on which they will be used. You can copy the RPMs to a directory on each node that will need them.

Become root, then:

```
# cd QLogicOFED<version>-<distribution-x86_64
```

(Another way is to put the RPMs in a directory that is accessible (e.g., via Network File System (NFS)) to every node.)

**NOTE:**

If you wish to use the `mpi-selector` to switch between QLogic MPI and other MPI implementations, you need to install QLogic MPI in an alternate location, consistent with that of the other MPIs. Skip to Step 4.

3. To install InfiniPath, QLogic MPI, and OpenFabrics, run the command (as root):

```
# rpm -Uvh InfiniPath/*.rpm InfiniPath-MPI/*.rpm \
InfiniPath-MPI/32bit/mpi-frontend-*.rpm \
InfiniPath-Devel/*.rpm Documentation/*.rpm OtherMPIs/*.rpm \
OpenFabrics/*.rpm OpenFabrics-Devel/*.rpm \
OtherHCAs/*.rpm OtherHCAs-Devel/*.rpm
```

Note that you need to install the `InfiniPath-MPI/32bit/mpi-frontend-*.rpm` even if you do not plan to use any other 32-bit RPMs. However, you can add the other 32bit subdirectories to the `rpm` command, if you need 32-bit support.

Install the `OpenSM` RPM only if you do not plan to use a switch-based or host-based SM. The `OpenSM` RPM is normally installed on the node where it will be used. If installed, it is *off* by default. This behavior can be modified. See [“OpenSM” on page 6-3](#) for more information.

To add Open SM, add this command:

```
# rpm -Uvh OpenSM/*.rpm OpenSM-Devel/*.rpm
```

Add the desired 32bit subdirectories to the `rpm` commands, if you need 32-bit support.

Proceed to Step 5.

4. To install QLogic MPI in an alternate location, use these commands instead of those in Step 3:

```
# mkdir QLogic-MPI-prefixed
# mv InfiniPath-MPI/mpi-* \
InfiniPath-MPI/32bit/mpi-frontend-*.rpm \
InfiniPath-Devel/mpi-devel* \
OtherMPIs/qlogic-mpi-register* \
Documentation/mpi-doc* QLogic-MPI-prefixed/
```





























































































































