



Intel® True Scale Fabric Adapter Hardware

Installation Guide

May, 2013



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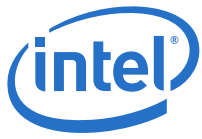
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Date	Revision	Description
May, 2013	001US	Initial release

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1.0 Introduction

This chapter describes the contents, intended audience, and organization of the *Intel® True Scale Fabric Adapter Hardware Installation Guide*.

The *Intel® True Scale Fabric Adapter Hardware Installation Guide* contains instructions for installing the adapters. The following adapters are covered in this guide:

- QLE7340 PCI Express
- QLE7342 PCI Express

1.1 Intended Audience

This installation guide is intended for administrators responsible for installing the Intel® QLE7340 or QLE7342 adapter in their Linux* cluster. Additional detailed information and instructions for administering an Intel® cluster can be found in the *Intel® True Scale Fabric OFED+ Host Software User Guide*.

The *Intel® True Scale Fabric Adapter Hardware Installation Guide* assumes that you are familiar with the specific hardware that you plan to use. Before installing the adapter, you should have basic knowledge of your host and target operating systems.

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.

1.2 How this Guide is Organized

The *Intel® True Scale Fabric Adapter Hardware Installation Guide* is organized into these sections:

- [Chapter 1.0, "Introduction"](#), contains an overview of the host channel adapters and software, describes interoperability with other products, lists all related documentation, and provides Intel contact information.
- [Chapter 2.0, "Hardware Installation Checklist"](#), provides a high-level overview of the hardware installation procedures.
- [Chapter 3.0, "Hardware Installation"](#), includes instructions for installing the Intel® QLE7340, and QLE7342 adapters.

1.3 Overview

The material in this documentation pertains to an OFED+ *cluster*. A cluster is defined as a collection of nodes, each attached to an InfiniBand*-based fabric through the Intel® interconnect. The nodes are generally Linux*-based computers having multiple processors/cores.

The Intel® adapters are InfiniBand* 4X. The Quad Data Rate (QDR) QLE7340 and QLE7342 adapters have a raw data rate of 40Gbps.

The Intel® adapters utilize Intel® True Scale Fabric switches and cabling. The Intel interconnect is designed to work with all InfiniBand*-compliant switches.

Note: If you are using the QLE7340 or QLE7342, and want to use QDR mode, then QDR-capable switches must be used.



Intel® OFED+ Host Software is interoperable with other vendors' host channel adapters running compatible OFED+ 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 such as the Intel® True Scale Fabric Suite Fabric Manager, as a part of the Intel® True Scale Fabric Suite download.
- Use the Open source Subnet Manager (OpenSM) component of OFED+.

1.4 Related Materials

- *Intel® True Scale Fabric Switches 12000 Series Users Guide*
- *Intel® True Scale Fabric Software Installation Guide*
- *Intel® True Scale Fabric OFED+ Host Software User Guide*
- *Intel® True Scale Fabric Suite FastFabric User Guide*
- *Intel® True Scale Fabric Suite Fabric Manager User Guide*
- *Intel® True Scale Fabric Suite FastFabric Command Line Interface Reference Guide*
- *Intel® True Scale Fabric OFED+ Host Software Release Notes*
- *Intel® True Scale Fabric Suite Software Release Notes*

1.5 Documentation Conventions

This guide uses the following documentation conventions:

- *Note*: provides additional information.
- *Caution*: indicates the presence of a hazard that has the potential of causing damage to data or equipment.
- *Warning*: indicates the presence of a hazard that has the potential of causing personal injury.
- Text in **blue** font indicates a hyperlink (jump) to a figure, table, or section in this guide, and links to Web sites are also shown in **blue**. For example:
 - **Table 2** lists problems related to the user interface and remote agent.
 - See **"Installation Checklist" on page 6**.
 - For more information, visit **www.intel.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.

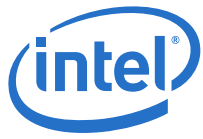


- Text in *italics* indicates terms, emphasis, variables, or document titles. For example:
 - For a complete listing of license agreements, refer to the *Intel Software End User License Agreement*.
 - What are *shortcut keys*?
 - To enter the date type *mm/dd/yyyy* (where *mm* is the month, *dd* is the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

1.6 License Agreements

Refer to the *Intel Software End User License Agreement* for a complete listing of all license agreements affecting this product.

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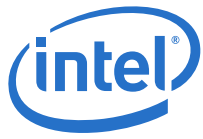
2.0 Hardware Installation Checklist

This section provides an overview of the hardware installation procedures. Detailed steps are found in [Chapter 3.0, "Hardware Installation"](#).

The following steps summarize the basic hardware installation procedure:

1. Check that the adapter hardware is appropriate for your platform. See [Table 1](#).
2. Check to see that you have the appropriate cables and switches, as described in ["Cabling and Switches" on page 11](#).
3. Following the safety instructions in ["Safety with Electricity" on page 12](#). Unpack the adapter (["Unpacking Information" on page 12](#)) and verify the package contents.
4. Install the adapter by following the instructions in ["Hardware Installation" on page 13](#).
5. Cable the adapter to the switch, as described in ["Cabling the Adapter to the Switch" on page 17](#). Check that all switches are configured.
6. Follow the steps in ["Completing the Installation" on page 17](#) to finish the installation.







3.0 Hardware Installation

This section lists the requirements and provides instructions for installing the Intel® adapters. Instructions are included for the Intel® QDR PCI Express adapters, the QLE7340 and QLE7342. 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 Intel interconnect is InfiniBand* 4X, with a raw data rate of 40Gbps for the QLE7340 and QLE7342.

Intel® True Scale Fabric OFED+ Host Software is interoperable with other vendors' host channel adapters running compatible OFED+ releases.

3.1 Hardware Installation Requirements

This section lists hardware and software environment requirements for installing the Intel® QLE7340, QLE7342.

3.1.1 Hardware

Intel® 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 adapters work on different platforms. [Table 1](#) shows the relationship between the adapter model and different types of motherboards.

Table 1. Adapter Models and Related Platforms

Intel Model Number	Platform	Plugs Into
QLE7340	PCI Express systems	Standard PCI Express x8 slot
QLE7342	PCI Express systems	Standard PCI Express x8 slot

Installation of the QLE7340, QLE7342 in a 1U or 2U chassis requires the use of a riser card. See [Figure 5](#) for an illustration of a PCI Express (PCIe) slot in a typical motherboard.

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

3.1.1.1 Form Factors

The **QLE7340** and **QLE7342** 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.

3.1.2 Cabling and Switches

The adapters use standard InfiniBand* cables. These cables can be passive copper, active copper, fiber optic or Quad Small Form-factor Pluggable (QSFP) active optical.

Contact Intel Sales or your authorized Reseller for a list of qualified InfiniBand* cables.



Note: If you want to use the QLE7340 or QLE7342 in QDR mode, a QDR-capable InfiniBand* switch must be used.

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

3.2 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.

3.3 Unpacking Information

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

3.3.1 Verify the Package Contents

The Intel® 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.

3.3.2 List of the Package Contents

The package contents for the QLE7340 adapter are:

- Intel® QLE7340
- Additional short bracket
- Readme First

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

The package contents for the QLE7342 adapter are:

- Intel® QLE7342
- Additional short bracket
- Additional standard bracket
- Readme First

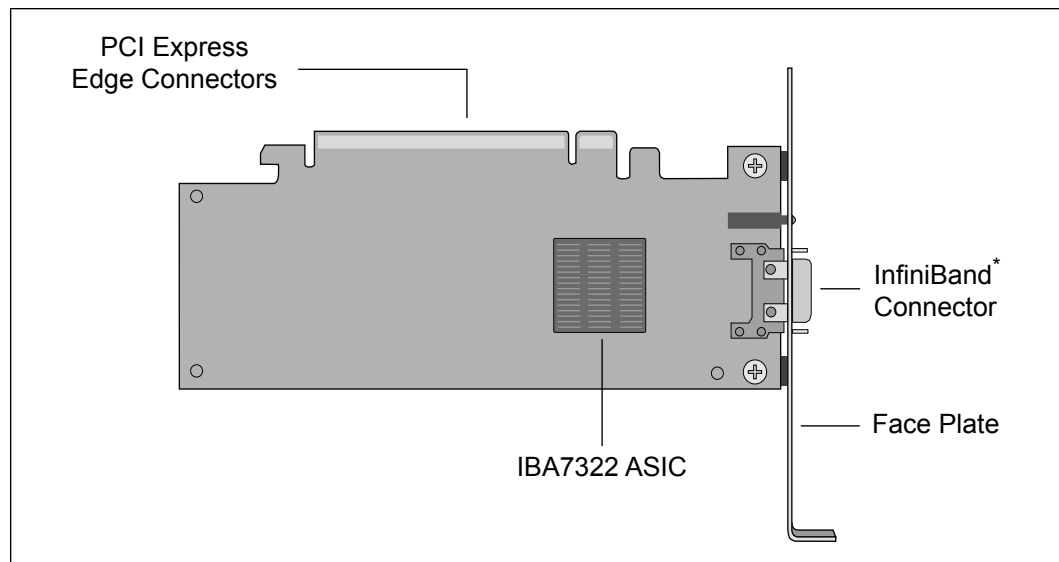


Standard PCIe risers can be used, typically supplied by your system or motherboard vendor.

The IBA7322 is the Intel® ASIC that is the central component of the interconnect. The location of the IBA7322 ASIC on the adapter is shown in [Figure 1](#).

Note: The QLE7342 also contains the IBA7322 ASIC. The only difference is the QLE7342 has two external InfiniBand® ports.

Figure 1. Intel® QLE7340 with IBA7322 ASIC



3.3.3 Unpacking the Intel Adapter

Follow these steps when unpacking the Intel® adapter:

1. When unpacking, ground yourself before removing the Intel® adapter from the anti-static bag.
2. Grasping the Intel® 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.

3.4 Hardware Installation

This section contains hardware installation instructions for the QLE7340 and QLE7342.

3.4.1 Hardware Installation for QLE734x with PCI Express Riser

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. .

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

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

3.4.1.1 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 QLE7340 adapters can be installed, but not a QLE7340 adapter and a QLE7342 adapter. Check the design of your motherboard to see how riser cards can be used.

Follow the instructions in “Installation Steps” on page 14.

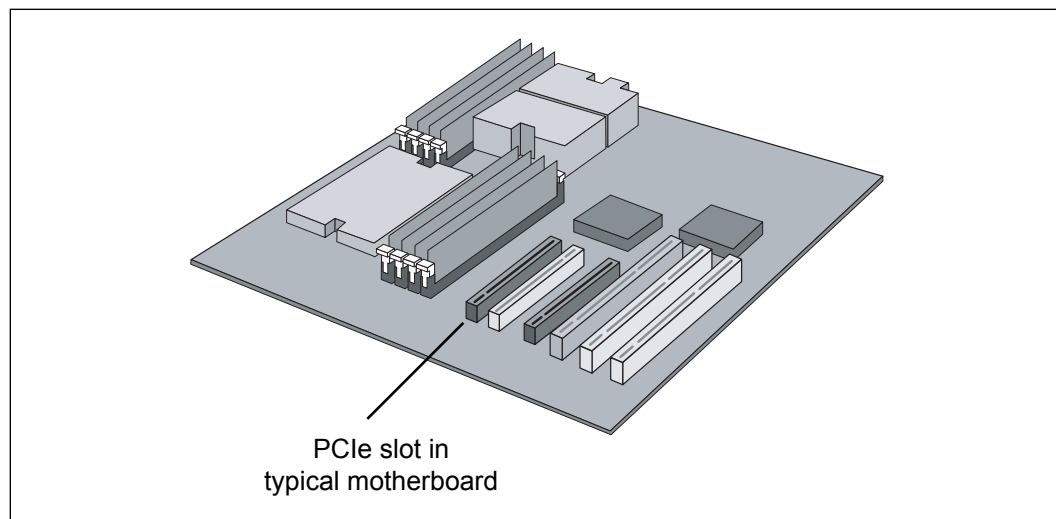
See the Using MPI section in the *Intel® True Scale Fabric OFED+ Host Software User Guide* for information on using the `IPATH_UNIT` environment variable to control which host channel adapter to use.

3.4.1.2 Installation Steps

To install the Intel® adapter with a PCIe riser card:

1. Shut down the power supply to the system into which you will install the Intel® adapter.
2. 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.
3. 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.
4. 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 5](#)). These two sections correspond to the shorter and longer connector edges of the adapter and riser.

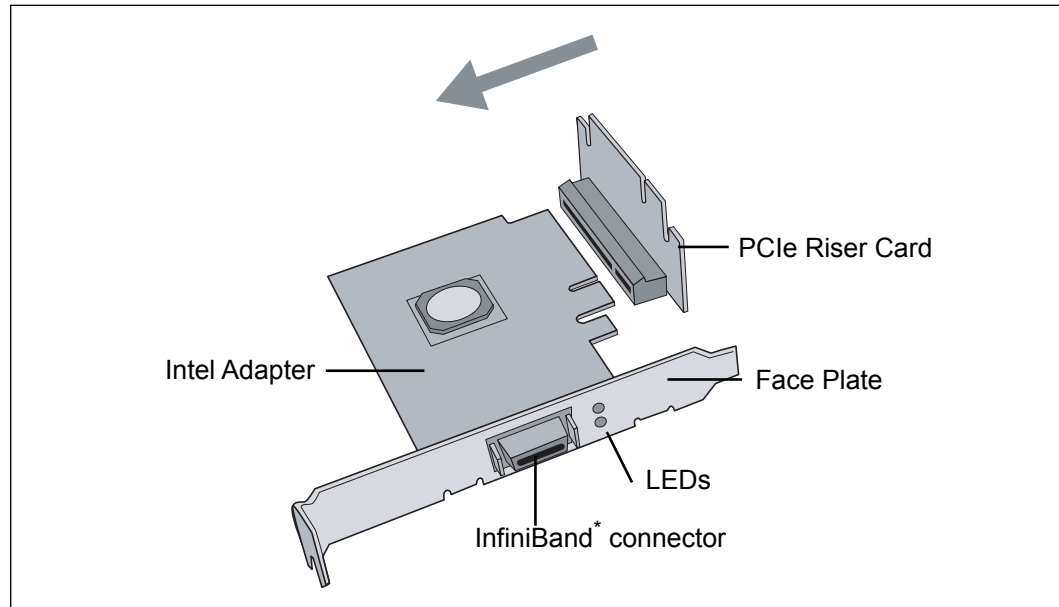
Figure 2. PCIe Slot in a Typical Motherboard



5. 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.
6. Remove the Intel® adapter from the anti-static bag.
7. Locate the face plate on the connector edge of the card.

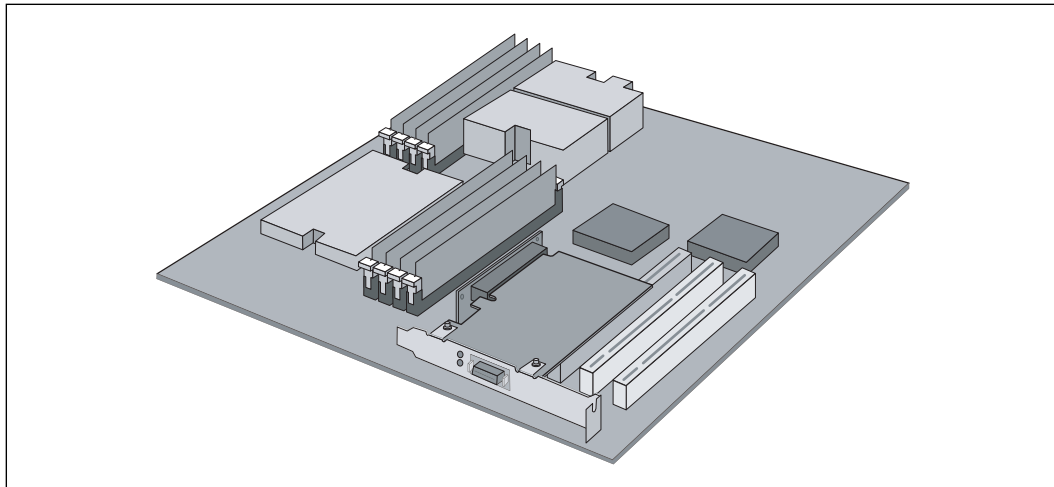
8. Connect the Intel® adapter and PCIe riser card together, forming the assembly that you will insert into your motherboard. First, visually line up the adapter slot connector edge with the edge connector of the PCIe riser card (see [Figure 9](#)).

Figure 3. Intel PCIe Host Channel Adapter Assembly with Riser Card



9. Holding the Intel® adapter by its edges, carefully insert the card slot connector into the PCIe riser card edge connector, as show in [Figure 9](#). The result is a combined L-shaped assembly of the PCIe riser card and Intel® adapter. This assembly is what you will insert into the PCIe slot on the motherboard in the next step.
10. 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.
11. 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.
12. Insert the riser assembly into the motherboard's PCIe slot, ensuring good contact. The Intel® adapter should now be parallel to the motherboard and about one inch above it (see [Figure 4](#)).

Figure 4. Assembled PCIe Host Channel Adapter with Riser



13. Secure the face plate to the chassis. The Intel® 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 Intel® PCIe host channel adapter with PCIe riser card is now installed. Next, install the cables as described in [“Cabling the Adapter to the Switch” on page 17](#). Then test your installation by powering up and verifying link status (see [“Completing the Installation” on page 17](#)).

3.4.2 Hardware Installation for QLE734x Without a PCI Express Riser

Installing the Intel® QLE734x without a PCI Express riser card requires a 3U or larger chassis.

To install the Intel® adapter without a riser card:

1. Shut down the power supply to the system into which you will install the Intel® adapter.
2. 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.
3. If you are installing the Intel® 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.
4. Locate the PCIe slot on your motherboard.
5. Remove the Intel® 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.
6. Without fully inserting, gently align and rest the adapter card's gold fingers on top of the motherboard's PCIe slot.
7. 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.

8. Secure the face plate to the chassis. The Intel® 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 Switch” on page 17](#). Then test your installation by powering up the system (see [“Completing the Installation” on page 17](#)).

3.5 Switch Configuration and Monitoring

The Intel interconnect is designed to work with all InfiniBand*-compliant switches, such as the the Intel® 12000 series. Follow the applicable switch documentation for installing and configuring your switches.

3.6 Cabling the Adapter to the Switch

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

The QLE7340 and QLE7342 are cabled the same way.

To install the 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 cable to the connector on the Intel® QLE7340 and QLE7342. 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 switch.

3.7 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 True Scale 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”](#).



3.8 LED Link and Data Indicators

The LEDs function as link and data indicators once the True Scale software has been installed, the driver has been loaded, and the fabric is being actively managed by a subnet manager.

Table 2 describes the LED states. The green LED indicates the physical link signal; the amber LED indicates the link. The green LED normally illuminates first. The normal state is *Green On, Amber On*. The QLE7342 and QLE7240 have an additional state, as shown in Table 2.

Table 2. LED Link and Data Indicators

LED States	Indication
Green OFF Amber OFF	The switch is not powered up. The software is neither installed nor started. Loss of signal. Verify that the software is installed and configured with <code>ipath_control -i</code> . If correct, check both cable connectors.
Green ON Amber OFF	Signal detected and the physical link is up. Ready to talk to SM to bring the link fully up. If this state persists, the SM may be missing or the link may not be configured. Use <code>ipath_control -i</code> to verify the software state. If all host channel adapters are in this state, then the SM is not running. Check the SM configuration, or install and run <code>opensmd</code> .
Green ON Amber ON	The link is configured, properly connected, and ready. Signal detected. Ready to talk to an SM to bring the link fully up. The link is configured. Properly connected and ready to receive data and link packets.
Green BLINKING (quickly) Amber ON	Indicates traffic
¹ Green BLINKING Amber BLINKING	Locates the adapter This feature is controlled by <code>ipath_control -b [On Off]</code>

1. This feature is available only on the QLE7340 and QLE7342 adapters

