

Oracle® F2 Long Range InfiniBand Module User's Guide

ORACLE®

Part No: E74604-01
December 2016

Part No: E74604-01

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Contents

| | |
|---|----|
| Using This Documentation | 7 |
| Product Documentation Library | 7 |
| Feedback | 7 |
| | |
| Understanding the Module | 9 |
| Installation Task Overview | 9 |
| Shipping Kit Contents | 10 |
| Module Overview | 10 |
| Receptacles and LEDs | 12 |
| Module Status LEDs | 13 |
| Port Status LEDs | 13 |
| | |
| Confirming Specifications and Requirements | 15 |
| Physical Specifications | 15 |
| Power Specifications | 16 |
| Hardware and Firmware Requirements | 16 |
| | |
| Installing the Module | 17 |
| ESD Precautions | 17 |
| ▼ Order Additional Hardware | 18 |
| Supported Cables and Transceivers | 18 |
| Cable Cautions | 19 |
| Related Information | 20 |
| ▼ Remove the Filler Panel | 21 |
| ▼ Install the Module | 24 |
| ▼ Connect Cables | 29 |
| ▼ Verify Module Installation | 30 |
| | |
| Configuring Features | 33 |
| Oracle ILOM Module Targets Overview | 33 |

| | |
|---|-----------|
| Administering Oracle F2 Long Range InfiniBand Module Features | 34 |
| Oracle F2 Long Range InfiniBand Module Commands | 34 |
| General I/O Card Commands | 35 |
| Glossary | 37 |
| Index | 41 |

Using This Documentation

- **Overview** – Describes how to install and administrate the Oracle F2 Long Range InfiniBand module.
- **Audience** – Installers, technicians, system administrators, and authorized service providers.
- **Required knowledge** – Advanced experience installing network hardware.

Product Documentation Library

Documentation and resources for this product and related products are available at <http://www.oracle.com/goto/f2-io-mod/docs>.

Feedback

Provide feedback about this documentation at <http://www.oracle.com/goto/docfeedback>.

Understanding the Module

These topics describe the module and the installation process.

- [“Installation Task Overview” on page 9](#)
- [“Shipping Kit Contents” on page 10](#)
- [“Module Overview” on page 10](#)
- [“Receptacles and LEDs” on page 12](#)

Related Information

- [“Confirming Specifications and Requirements” on page 15](#)
- [“Installing the Module” on page 17](#)
- [“Configuring Features” on page 33](#)

Installation Task Overview

| Step | Description | Links |
|------|--|---|
| 1. | Verify shipped components and accessories. | “Shipping Kit Contents” on page 10 |
| 2. | Familiarize yourself with the module, and the receptacles and LEDs on the front panel of the module. | <ul style="list-style-type: none">■ “Module Overview” on page 10■ “Receptacles and LEDs” on page 12 |
| 3. | Gather necessary cables. | “Supported Cables and Transceivers” on page 18 |
| 4. | Confirm power consumption allowances, and hardware and software requirements. | <ul style="list-style-type: none">■ “Power Specifications” on page 16■ “Hardware and Firmware Requirements” on page 16 |
| 5. | Review handling and ESD precautions. | “ESD Precautions” on page 17 |
| 6. | Remove any filler panel, if installed. | “Remove the Filler Panel” on page 21 |
| 7. | Install the module. | “Install the Module” on page 24 |
| 8. | Connect the cables. | “Connect Cables” on page 29 |
| 9. | Verify the module installation. | “Verify Module Installation” on page 30 |
| 10. | Configure the module features. | “Configuring Features” on page 33 |

Related Information

- [“Shipping Kit Contents” on page 10](#)
- [“Module Overview” on page 10](#)
- [“Receptacles and LEDs” on page 12](#)

Shipping Kit Contents

The carton in which the module was shipped should contain these items:

- I/O module
- *Oracle F2 I/O Module Where To Find Documentation*

Related Information

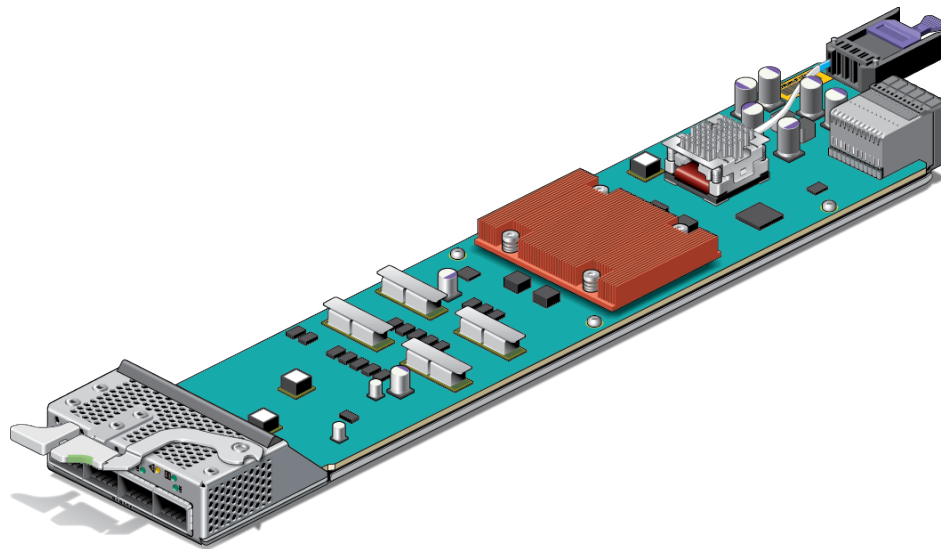
- [“Installation Task Overview” on page 9](#)
- [“Module Overview” on page 10](#)
- [“Receptacles and LEDs” on page 12](#)

Module Overview

| Feature | Specification |
|--------------------------------------|---|
| IB chassis interface | Five IB 4x EDR interfaces [†] |
| I/O Connector | Four IB 4x ports. Each port supports QDR or EDR IB LR [‡] mode depending on the type of transceiver used. See “Supported Cables and Transceivers” on page 18 . |
| Conforms to InfiniBand Specification | IBTA 1.3.1 (Rev1 TS3 protocol) |
| Boot ROM | 32 Mb SPI Flash |
| EMI | FCC Class A |

[†]In an Oracle Fabric Interconnect F2-12 modular switch, only two of these five interfaces can be used.

[‡]IB LR mode is Oracle proprietary.



Oracle's F2 Long Range InfiniBand Module occupies one chassis slot in the Oracle Fabric Interconnect F2-12 modular switch. The module slots in the Oracle Fabric Interconnect F2-12 modular switch can be populated with up to 12 I/O modules to provide InfiniBand fabric attached servers with Ethernet and Fibre Channel connectivity.

The Oracle F2 Long Range InfiniBand Module contains a Saturn ASIC device that provides high performance EDR InfiniBand switching capabilities for the next generation of Oracle engineered systems. Four 4x IB ports from Saturn connects to the 1x4 QSFP+ connector on the IB-LR module. Each QSFP+ port supports IB LR mode only on the module. Additionally, this module enables the Oracle EDR InfiniBand Fabric to extend geographically distributed data centers, in which speed and distance support are based on the configuration options, as defined by the software release. For more information on configuration options, supported speed and distance combinations, and system level features for this module, refer to the *Oracle Fabric Interconnect F2-12 Product Notes* at: <http://www.oracle.com/goto/f2-12/docs>.

Temperature sensors are used to monitor the operation temperature of critical components. The sensors are programmed with default threshold settings. High temperature conditions will be reported as alerts to the switch and its event monitoring systems, for example, SNMP or Oracle ILOM.

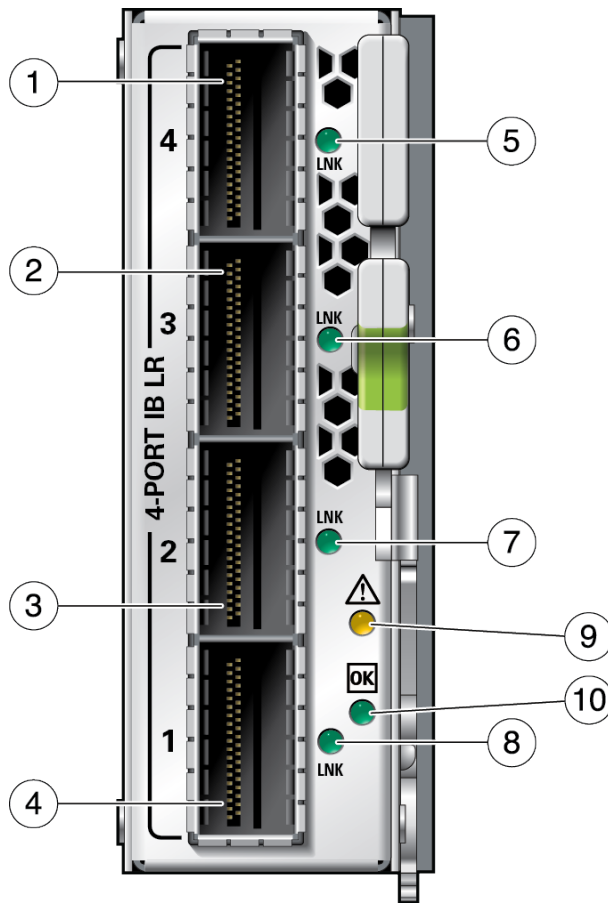
For information about switch temperature readings and temperature alerts, refer to the *Oracle EDR InfiniBand Switches and Virtualized I/O Systems Administration Guide*.

Related Information

- [“Installation Task Overview” on page 9](#)
- [“Shipping Kit Contents” on page 10](#)

- [“Receptacles and LEDs” on page 12](#)

Receptacles and LEDs



On the front panel there are four link (LNK) LEDs to the right of each port and two LEDs above and to the right of the bottom LNK LED, that signal the port state. This figure and this table explains the meaning of the LEDs for port 1 through port 4.



| No. | Description |
|-----|---------------|
| 1 | QSFPP+ port 4 |
| 2 | QSFPP+ port 3 |

| No. | Description |
|------------|--------------------------|
| 3 | QSFP+ port 2 |
| 4 | QSFP+ port 1 |
| 5, 6, 7, 8 | QSFP+ link LEDs (Green) |
| 9 | Module FAULT LED (Amber) |
| 10 | Module OK LED (Green) |

Related Information

- [“Installation Task Overview” on page 9](#)
- [“Shipping Kit Contents” on page 10](#)
- [“Module Overview” on page 10](#)

Module Status LEDs

| Glyph | Name | Color | State and Meaning |
|---|-----------|-------|---|
|  | Attention | Amber | Indicates these conditions: <ul style="list-style-type: none"> ■ On: Module fault and requires attention ■ Blink: Initializing ■ Off: Module normal operation |
|  | OK | Green | Indicates these conditions: <ul style="list-style-type: none"> ■ On: Module Powered and operational ■ Blink: Initializing (Hot-plug is not allowed) ■ Off: Module not operational |

Related Information

- [“Installation Task Overview” on page 9](#)
- [“Shipping Kit Contents” on page 10](#)
- [“Module Overview” on page 10](#)
- [“Receptacles and LEDs” on page 12](#)

Port Status LEDs

During runtime operation, each port's LED indicates real-time status for the port.

Each port's LNK/ACT LEDs work together to indicate the port's current status.

| Name | Color | State and Meaning |
|------|-------|--|
| LNK | Green | Indicates these conditions: <ul style="list-style-type: none"><li data-bbox="951 422 1122 447">■ On – Link is up.<li data-bbox="951 451 1149 476">■ Off – Link is down. |

Related Information

- [“Installation Task Overview” on page 9](#)
- [“Shipping Kit Contents” on page 10](#)
- [“Module Overview” on page 10](#)
- [“Receptacles and LEDs” on page 12](#)
- [“Module Status LEDs” on page 13](#)

Confirming Specifications and Requirements

These topics describe the module specifications and requirements.

- [“Physical Specifications” on page 15](#)
- [“Power Specifications” on page 16](#)
- [“Hardware and Firmware Requirements” on page 16](#)

Related Information

- [“Understanding the Module” on page 9](#)
- [“Installing the Module” on page 17](#)
- [“Configuring Features” on page 33](#)

Physical Specifications

| Dimension | Metric | U.S. |
|-----------|----------|-----------|
| Length | 405.5 mm | 15.96 in. |
| Height | 81.6 mm | 3.21 in. |
| Weight | 1.04 kg | 2.3 lb |

Related Information

- [“Power Specifications” on page 16](#)
- [“Hardware and Firmware Requirements” on page 16](#)

Power Specifications

| Description | Value |
|---------------------------|--|
| Maximum power consumption | 126.32W |
| Typical power consumption | 115.82W |
| Operating voltage | Input: 12V +/- 5% (minimum: 11.4V, maximum: 12.6V) |

Related Information

- [“Physical Specifications” on page 15](#)
- [“Hardware and Firmware Requirements” on page 16](#)

Hardware and Firmware Requirements

For the latest information regarding the minimum requirements, supported configurations, and interoperability of the module, refer to the *Oracle Fabric Interconnect F2-12 Product Notes*:

<http://www.oracle.com/goto/f2-12/docs>

Related Information

- [“Physical Specifications” on page 15](#)
- [“Power Specifications” on page 16](#)

Installing the Module

Perform these tasks in the order presented to install the module.

| Description | Links |
|--|--|
| If necessary, order additional hardware. | “Order Additional Hardware” on page 18 “Supported Cables and Transceivers” on page 18 |
| Follow cable cautions and ESD precautions. | “Cable Cautions” on page 19 “ESD Precautions” on page 17 |
| Understand the connectors. | “Receptacles and LEDs” on page 12 |
| Install the module. | “Install the Module” on page 24 |
| Verify the module installation. | “Verify Module Installation” on page 30 |

- [“ESD Precautions” on page 17](#)
- [“Order Additional Hardware” on page 18](#)
- [“Cable Cautions” on page 19](#)
- [“Supported Cables and Transceivers” on page 18](#)
- [“Remove the Filler Panel” on page 21](#)
- [“Install the Module” on page 24](#)
- [“Connect Cables” on page 29](#)
- [“Verify Module Installation” on page 30](#)

Related Information

- [“Installing the Module” on page 17](#)
- [“Confirming Specifications and Requirements” on page 15](#)
- [“Configuring Features” on page 33](#)

ESD Precautions

When installing the module, follow antistatic precautions:

- Use an antistatic mat as a work surface.
- Wear an antistatic wrist strap that is attached to either the mat or a metal portion of the switch chassis.

Related Information

- [“Order Additional Hardware” on page 18](#)
- [“Supported Cables and Transceivers” on page 18](#)
- [“Cable Cautions” on page 19](#)
- [“Remove the Filler Panel” on page 21](#)
- [“Install the Module” on page 24](#)
- [“Connect Cables” on page 29](#)
- [“Verify Module Installation” on page 30](#)

▼ Order Additional Hardware

- **Ensure that you have the appropriate cables.**
See [“Supported Cables and Transceivers” on page 18](#).

Related Information

- [“ESD Precautions” on page 17](#)
- [“Supported Cables and Transceivers” on page 18](#)
- [“Cable Cautions” on page 19](#)
- [“Remove the Filler Panel” on page 21](#)
- [“Install the Module” on page 24](#)
- [“Connect Cables” on page 29](#)
- [“Verify Module Installation” on page 30](#)

Supported Cables and Transceivers

This module comes with a factory default port mode of QDR IB LR.¹This module supports MPO or LC duplex type of optical fiber cables, depending on the optical transceiver installed.

| Transceiver | Cable-Length |
|-------------|-------------------------|
| 40GBase-SR4 | Up to 100m of OM3 fiber |

¹IB LR is Oracle proprietary.

| Transceiver | Cable-Length |
|--------------|--|
| 40GBase-LR4 | Up to 10km of SM (single mode) fiber |
| 100GBase-SR4 | Up to 30m of OM3 fiber or 70m of OM4 fiber |
| 100GBase-LR4 | Up to 10km of SM (single mode) fiber |

Check for available cables and transceivers in the *Oracle EDR Infiniband Fabric Connectivity Guide* at:

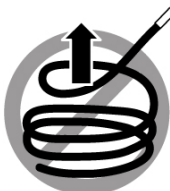


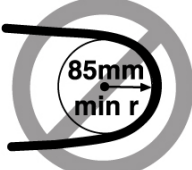
<https://community.oracle.com/docs/DOC-1006347>.


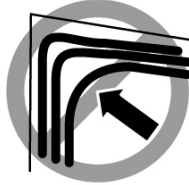
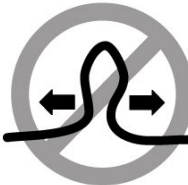
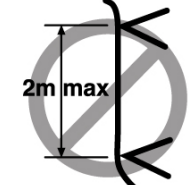

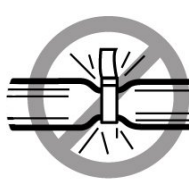
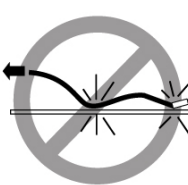
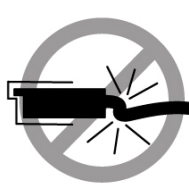
Related Information

- “ESD Precautions” on page 17
- “Order Additional Hardware” on page 18
- “Cable Cautions” on page 19
- “Remove the Filler Panel” on page 21
- “Install the Module” on page 24
- “Connect Cables” on page 29
- “Verify Module Installation” on page 30

Cable Cautions

To prevent data cable damage, you must follow these cautions.

| | | | |
|---|--|---|---|
|  | <p>Do not uncoil the cable, as a kink might occur. Hold the coil closed as you unroll the cable, pausing to allow the cable to relax as it is unrolled.</p> |  | <p>Do not step on the cable or connectors. Plan cable paths away from foot traffic or rolling loads.</p> |
|  | <p>Do not pull the cable out of the shipping box, through any opening, or around any corners. Unroll the cable as you lay it down and move it through turns.</p> |  | <p>Do not bend the cables to a radius tighter than 85 mm (3.4 inches). Ensure that cable turns are as wide as possible.</p> |

| | | | |
|--|--|--|--|
|  | <p>Do not twist the cable to open a kink. If it is not severe, open the kink by unlooping the cable.</p> |  | <p>Do not pack the cable to fit a tight space. Use an alternative cable route.</p> |
|  | <p>Do not straighten the cable to correct a bend that is too tight. Leave the cable bend as is.</p> |  | <p>Do not hang the cable for a length more than 2 meters (7 feet). Minimize the hanging weight with intermediate retention points.</p> |
|  | <p>Do not drop the cable or connectors from any height. Gently set the cable down, resting the cable connectors on a stable surface.</p> |  | <p>Do not cinch the cable with hard fasteners or cable ties. Use soft hook-and-loop fastener for bundling and securing cables.</p> |
|  | <p>Do not drag the cable or its connectors over any surface. Carry the entire cable to and from the points of connection.</p> |  | <p>Do not force the cable connector into the receptacle by pushing on the cable. Apply connection or disconnection forces at the connector only.</p> |

Note - Unplugged fiber cable ends should be covered with dust caps whenever possible to increase protection against damage or contamination.

Related Information

- [“ESD Precautions” on page 17](#)
- [“Order Additional Hardware” on page 18](#)
- [“Supported Cables and Transceivers” on page 18](#)
- [“Remove the Filler Panel” on page 21](#)
- [“Install the Module” on page 24](#)
- [“Connect Cables” on page 29](#)
- [“Verify Module Installation” on page 30](#)

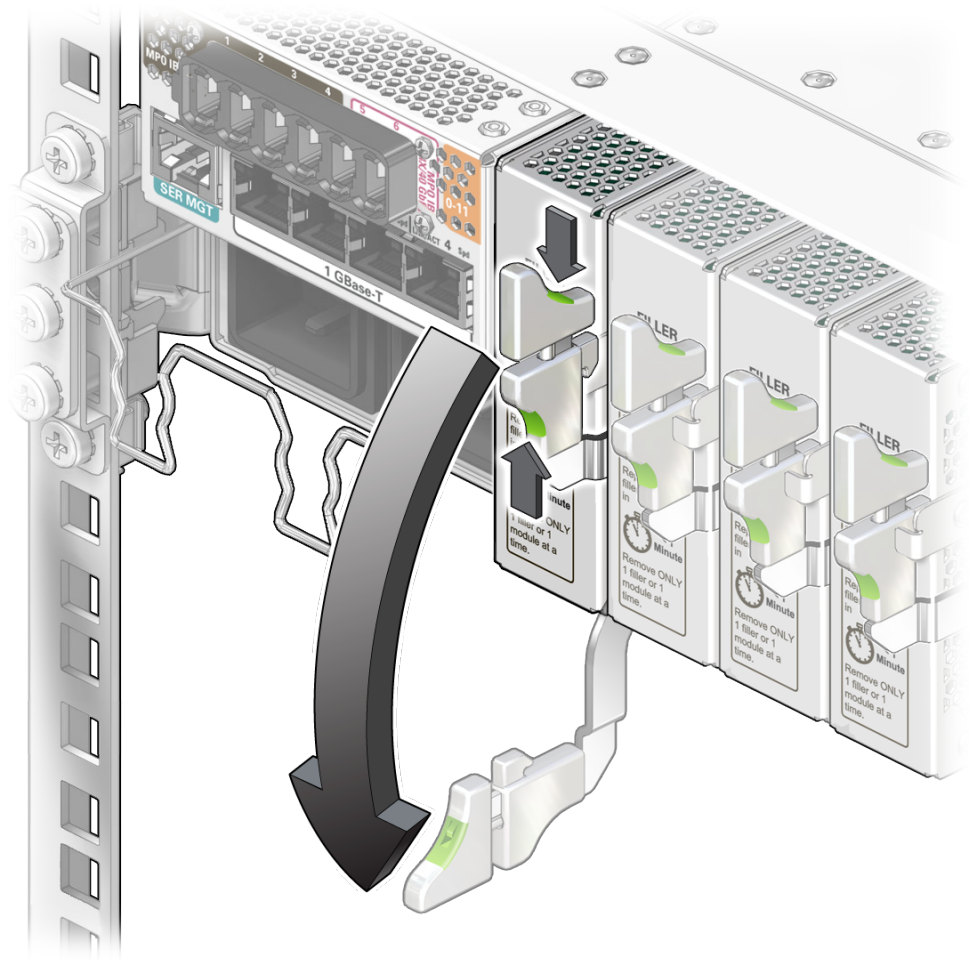
▼ Remove the Filler Panel

Use this procedure to remove a filler panel or existing module from the slot where you are installing the module.

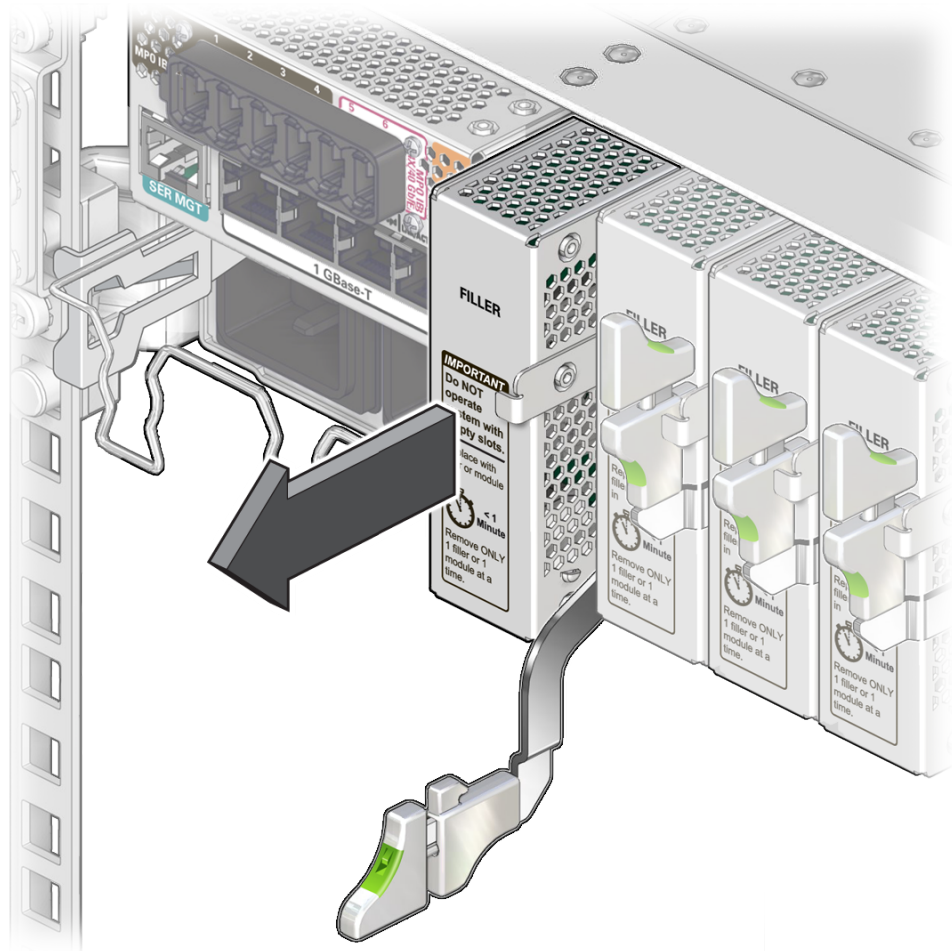
Note - To maintain thermal stability, never operate the switch with an empty slot. Remove filler panels only as you replace them with an I/O module in a one-for-one basis.

1. **Identify the prerequisite and subsequent installation tasks that you must perform in conjunction with this task.**
See [“Installation Task Overview”](#) on page 9.
2. **If the rack rear door is installed, open it.**
3. **At the location where you are installing the module, remove the filler panel, if installed.**
 - a. **Squeeze the top and bottom of the release lever, and pull the lever in a downward motion.**

The filler panel is unseated from the slot connection.



- b. Use the release lever to pull the filler panel from the switch chassis.



- c. Use your free hand to take the weight of the filler panel, as it comes free of the chassis.
 - d. Set the filler panel aside and save it for future use.
4. Install the module.
See [“Install the Module”](#) on page 24.

Related Information

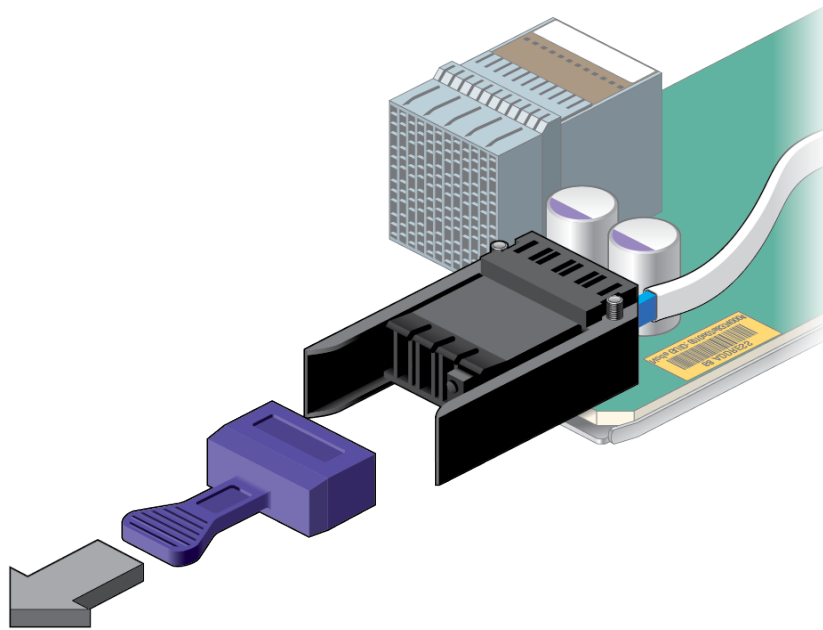
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- [“Verify Module Installation” on page 30](#)

▼ Install the Module

1. **Identify the prerequisite and subsequent installation tasks that you must perform in conjunction with this task.**
See [“Installation Task Overview” on page 9](#).
2. **If the rack rear door is installed, open it.**
3. **Remove the module from its antistatic packaging.**
4. **Remove the port plug from the MBOM connector at the rear of the module.**



Caution - Ensure that the port plug is removed from the module prior to inserting the module in the I/O slot.

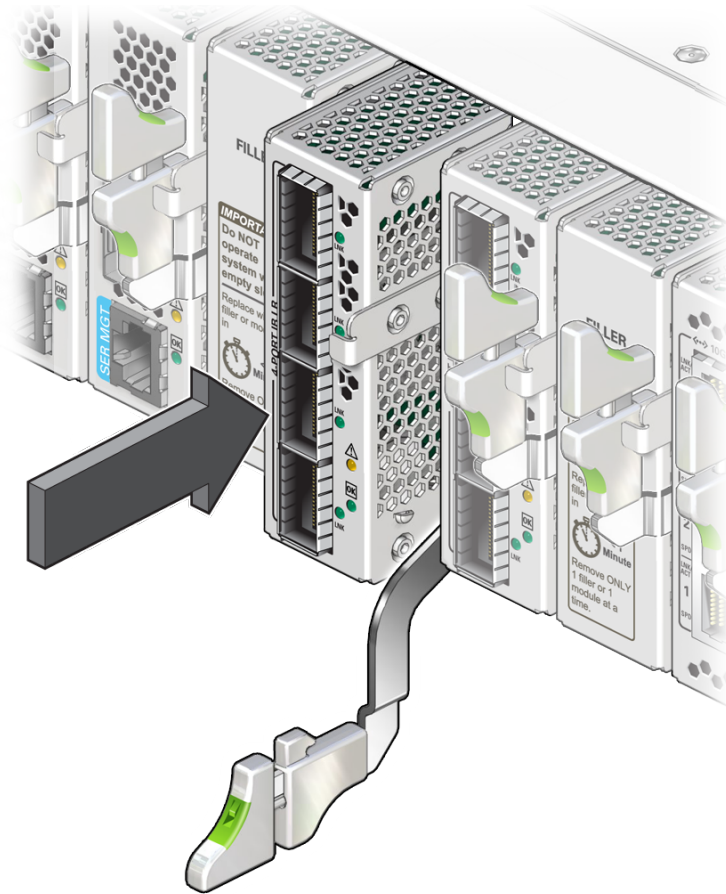


5. **Squeeze the top and bottom of the release lever, and move the release lever to the fully open position.**



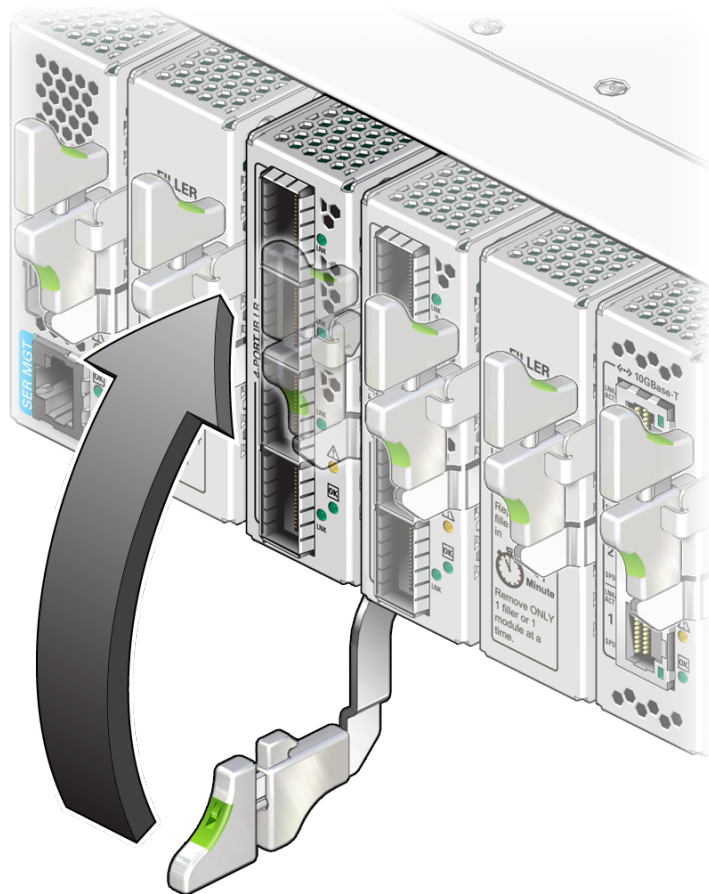
6. **Align the module to the slot where you are installing it.**
The LEDs and data cable receptacles face you, and the release lever is to the upper right.

7. Slide the module into the chassis.



8. When the module is almost completely seated in the slot and the release lever begins to rise, press down slightly on the top of the module to ensure that the notch at the end of the release lever catches on to the groove in the slot in order to secure the module.

Note - Ensure the handle appears in the fully locked position, as in the illustration, when fully engaged.



9. **Wait approximately 30 seconds to verify that the green OK LED lights.**
10. **Connect the data cables to the module.**
See [“Connect Cables” on page 29.](#)

Related Information

- [“ESD Precautions” on page 17](#)
- [“Order Additional Hardware” on page 18](#)
- [“Supported Cables and Transceivers” on page 18](#)

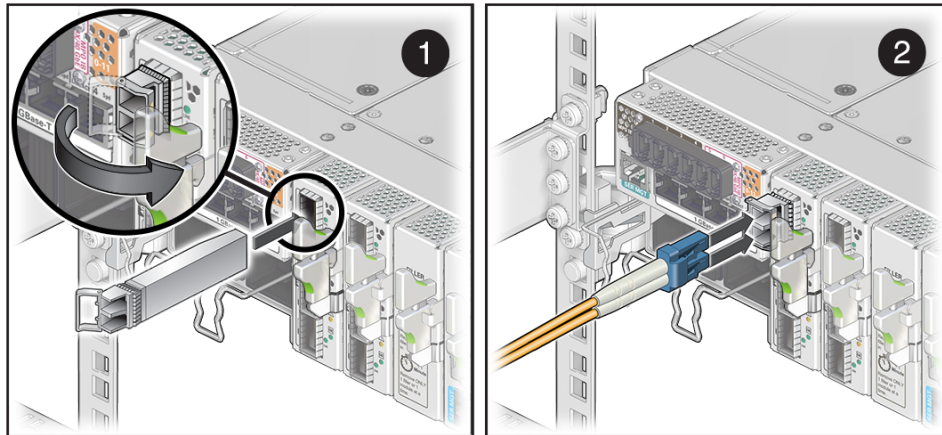
- [“Cable Cautions” on page 19](#)
- [“Remove the Filler Panel” on page 21](#)
- [“Connect Cables” on page 29](#)
- [“Verify Module Installation” on page 30](#)

▼ Connect Cables

1. **Identify the prerequisite and subsequent installation tasks that you must perform in conjunction with this task.**
See [“Installation Task Overview” on page 9](#).
2. **Attach the cable to the appropriate connector of the node or host.**
3. **Route and bundle the data cables through the physical topology.**
4. **Bring the cable to the location in the rack where the module is installed.**
5. **If a plug is present, remove the plug from the optical transceiver receptacle. Orient the optical transceiver squarely and horizontally with the QSFP+ port that you selected, then carefully insert the transceiver into the port on the module until you feel a detent or click.**

Note - Ensure the metal clip on the optical transceiver is in the closed position.

6. Remove the protective cap from the fiber cable connector. Orient the cable connector into the transceiver's receptacle squarely and horizontally, until you feel a detent or click.



7. Repeat [Step 2](#) to [Step 6](#) for any other transceivers and cables to be connected.
8. If the rack rear door is installed, close and secure it.
9. Verify the module installation.
See [“Verify Module Installation”](#) on page 30.

Related Information

- [“ESD Precautions”](#) on page 17
- [“Order Additional Hardware”](#) on page 18
- [“Supported Cables and Transceivers”](#) on page 18
- [“Cable Cautions”](#) on page 19
- [“Remove the Filler Panel”](#) on page 21
- [“Install the Module”](#) on page 24
- [“Verify Module Installation”](#) on page 30

▼ Verify Module Installation

1. Identify the prerequisite and subsequent installation tasks that you must perform in conjunction with this task.
See [“Installation Task Overview”](#) on page 9.

2. **Verify LED status.**
See [“Module Status LEDs” on page 13.](#)
3. **Through software, verify the module status and port status through [Oracle Fabric OS CLI](#), or [Oracle Fabric Manager GUI](#).**
See [“Configuring Features” on page 33.](#)
4. **After verifying module functionality, you can now configure the module.**
See [“Configuring Features” on page 33.](#)

Related Information

- [“ESD Precautions” on page 17](#)
- [“Order Additional Hardware” on page 18](#)
- [“Supported Cables and Transceivers” on page 18](#)
- [“Cable Cautions” on page 19](#)
- [“Remove the Filler Panel” on page 21](#)
- [“Install the Module” on page 24](#)
- [“Connect Cables” on page 29](#)

Configuring Features

This I/O module arrives fully configured according to your specifications. All of the module's I/O ports are automatically activated.

Configuring, managing, and monitoring the module functionality occurs through [Oracle ILOM](#), [Oracle Fabric OS CLI](#), or [Oracle Fabric Manager GUI](#).

- “[Configuring the Virtualization Switch and I/O Modules](#)” in *Oracle Fabric OS 1.0.2 Administration Guide* for configuring, managing, and monitoring the module via CLI.
- *Oracle® Fabric Manager 5.0.2 Administration Guide* at http://docs.oracle.com/cd/E64523_01 for configuring, managing, and monitoring the module via a GUI.
- *Oracle Fabric OS 1.0.2 Command Reference* at http://docs.oracle.com/cd/E64522_01/index.html for syntax and examples.
- *Oracle EDR InfiniBand Switch and Virtualized I/O Systems Administration Guide* at http://docs.oracle.com/cd/E65867_01/html/E65872/index.html for more information on ILOM commands.

These topics describe how to configure features for the module.

- “[Oracle ILOM Module Targets Overview](#)” on page 33
- “[Administering Oracle F2 Long Range InfiniBand Module Features](#)” on page 34

Related Information

- “[Understanding the Module](#)” on page 9
- “[Confirming Specifications and Requirements](#)” on page 15
- “[Installing the Module](#)” on page 17

Oracle ILOM Module Targets Overview

This topic describes the I/O module targets supported by the Oracle ILOM CLI. It also provides a brief introduction to Oracle ILOM commands. Users can find more information on how to get help for Oracle ILOM, and how to issue commands through Oracle ILOM CLI, in the *Oracle*

EDR InfiniBand Switch and Virtualized I/O Systems Administration Guide at http://docs.oracle.com/cd/E65867_01/html/E65872/index.html

The table lists ILOM commands available for I/O modules.

| Task | Commands | Link |
|------------------------|--|--|
| I/O module management. | <pre>start /SYS/MODULES/MODULEx stop /SYS/MODULES/MODULEx reset /SYS/MODULES/MODULEx show /SYS/MODULES/MODULEx</pre> | “Understanding Oracle ILOM Targets” in Oracle EDR InfiniBand Switch and Virtualized I/O Systems Administration Guide |

Administering Oracle F2 Long Range InfiniBand Module Features

This module supports gateway port features through the Oracle Fabric OS or Oracle Fabric Manager interfaces.

- [“Oracle F2 Long Range InfiniBand Module Commands” on page 34](#)
- [“General I/O Card Commands” on page 35](#)

Oracle F2 Long Range InfiniBand Module Commands

This table documents the common tasks for managing this module and the links for the procedures to complete these tasks.

| Task | Commands | Link |
|---|--|--|
| Configure and manage an infiniband port | <pre>set infiniband-port 1/1 up set infiniband-port 1/1 down</pre> | “Configuring IB” in Oracle Fabric OS 1.0.2 Command Reference |
| Display infiniband port information | <pre>show infiniband-port</pre> | |

Related Information

- [“General I/O Card Commands” on page 35](#)

General I/O Card Commands

This table documents the common task for managing I/O modules of any type. For procedures on configuring, managing, and displaying an I/O module, refer to the documentation in the links.

| Task | Command | Links |
|----------------------------------|------------------------------|---|
| Configure and manage an I/O Card | set iocard <i>slot</i> reset | <ul style="list-style-type: none"> ■ “Managing a Module” in Oracle Fabric OS 1.0.2 Administration Guide ■ “iocard” in Oracle Fabric OS 1.0.2 Command Reference ■ “Add I/O Modules to a Domain” in Oracle Fabric Manager 5.0.2 Administration Guide |
| | remove iocard <i>slot</i> | |
| Display I/O card information | show iocard * <i>slot</i> | |

Related Information

- [“Oracle F2 Long Range InfiniBand Module Commands” on page 34](#)

Glossary

C

CLI The Oracle Fabric OS CLI. (This CLI is separate from the Oracle Fabric Manager CLI.)

E

EDR Extended Data Rate. A throughput of InfiniBand (IB) technology, typically 100Gbps. See also IB.

F

fabric Oracle's EDR InfiniBand fabric. A 100-Gb converged fabric for network, storage, and interprocess communication.

G

GB Abbreviation of Gigabyte.

GbE Abbreviation of GigabitEthernet.

Gbit/sec Abbreviation of Gigabits per second.

GUI Graphical user interface. The recommended interface for Oracle Fabric Manager 5.0.1.

H

HBA Host bus adaptor. A Fibre Channel NIC used in a SAN fabric. HBAs are replacing SCSI HBAs.

HCA Host channel adapter. An InfiniBand NIC used in an InfiniBand network. Provides high-speed connectivity and virtual interfaces, based on the IB interface. An HCA can have one or two ports.

I

I/O Input/output. In computer architecture, the combination of the CPU and main memory (that is, memory that the CPU can read and write to directly, with individual instructions) is considered the "heart" of a computer. Any movement of information to or from that complex, for example to or from a disk drive, is considered I/O.

I/O module A user-replaceable physical interface component for the Oracle Fabric Interconnect F2-12 and Oracle InfiniBand Switch IS2-254.

I/O port A single port on an Ethernet module, an [HBA](#) module, or one of the 38 IB server ports.

IB InfiniBand. A high bandwidth messaging technology used for very high performance computing.

ILOM See [Oracle ILOM](#).

L

LID Local identifier for the HCA or local identifier number that the IB path uses.

M

module A user-replaceable component for a switch chassis. Typically externally accessible. See also I/O module.

N

NIC Network interface card.

O

Oracle EDR InfiniBand Fabric The fabric used to build and manage an Oracle cloud network infrastructure.

| | |
|------------------------------|--|
| Oracle Fabric Manager | Oracle Fabric Manager is a GUI that enables you to configure and manage Oracle fabric devices and the virtual network and storage resources associated with the fabric devices. |
| Oracle Fabric OS | The Oracle Fabric OS 1.0.2 runs on the Oracle InfiniBand Switch IS2-46 (leaf switch) and the Oracle Fabric Interconnect F2-12 (virtualization switch). The Oracle Fabric OS manages the switches, the Oracle EDR InfiniBand Fabric devices, and virtual network and storage resources. |
| Oracle ILOM | Oracle Integrated Lights Out Manager (ILOM) is the service processor embedded on all Oracle's SPARC Enterprise T-series and Sun Fire x86 servers, including all rack mounts and blades. Oracle ILOM enables full out-of-band management, providing a remote management capability. |

V

| | |
|------------------------------|---|
| virtualization switch | Oracle Fabric Interconnect F2-12 Switch. This virtualization switch supports several I/O modules that provide FC and Ethernet connectivity. |
| LR transceiver | A transceiver used for long range Fibre Channel communication. |

Index

A

administering features, 34

C

cable

optical, 18

cable overview, 18

cables

connecting, 29

commands

I/O port, 35

commands, infiniband port, 34

configuring features, 33

connecting cables, 29

E

electrical specifications, 16

ESD precautions, 17

F

filler panel, 21

H

hardware and firmware requirements, 16

I

I/O port

commands, 35

infiniband port commands, 34

installation tasks overview, 9

installing the module, 17

L

LEDs, 12

M

module

installation, 17

installing, 24

overview, 10

specifications, 15

understanding, 9

verifying, 30

O

optical cable, 18

Oracle ILOM, administering Targets, 33

Oracle ILOM, overview, 33

overview

installation, 9

module, 10

software, 34, 34

overview, Oracle ILOM, 33

P

physical specifications, 15

Q

QSFP, 18

R

receptacles, 12
removing the filler panel, 21

S

shipping kit, 10
software overview, 34, 34
specifications, 15
 electrical, 16
 physical, 15

T

transceiver overview, 18

U

understanding the module, 9

V

verifying the module, 30