



# **InfiniScale® IV 36-Port QSFP 40 Gb/s InfiniBand Switch User Manual**

P/N: MTS3600Q-1BNC, MTS3600Q-2BNC, MTS3600Q-1UNC, MTS3600Q-2UNC,  
MTS3600R-1BNC, MTS3600R-2BNC, MTS3600R-1UNC, MTS3600R-2UNC

Rev 2.7

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QDR InfiniBand Switch Platform User Manual

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# Revision History

**Table 1 - Revision History Table**

Date	Revision	Description
February 2011	Rev 2.7	Updated power numbers. Changed Grounding section
July 2010	Rev 2.6.1	Added “QSFP Cable Power Budget Classification” Added active power cable power level in Appendix A Specs Added “Getting the License Key”
May 2010	Rev 2.6	Updated Section 3.2 to explain the I2C connector use in managed switches. Added safety warnings in Spanish. Added Note: ETH Ports Must be 10/100M
November 2009	Rev 2.5	removed reference to dual air flow for MTS3600
August 2009	Rev 2.4	Added that CONSOLE, Ethernet, and USB interfaces do not work in Unmanaged switches
August 2009	Rev 2.3	Updated Figures 4 and 5. Updated interfaces to reflect CONSOLE interface.
August 2009	Rev 2.2	Updated references to initial start up connecting to a host PC.
August 2009	Rev 2.1	Removed procedure to replace the battery.
June 2009	Rev 2.0	Added Management module label and RS232 DB9 to DB9 harness Added part numbers for the two management modules.
June 2009	Rev 1.9	Made fixes to management section added Disassembly instructions
June 2009	Rev 1.8	Added Fabric IT section
April 2009	Rev 1.7	inserted procedure to replace the battery.
April 2009	Rev 1.6	Changes to installation kit and procedure
January 2009	Rev 1.5	added installation instructions added ECM Removed Watermark
November 2008	Rev 1.4	fixed weight in specs
October 2008	Rev 1.3	Minor Formatting changes.
September 2008	Rev 1.2	Added Reprogramming the MT3600 Through The I2C Port section. Added power cord OPNs to table 11 in Appendix D.
September 2008	Rev 1.1	Fixed link to Software package page.
September 2008	Rev 1.0	Initial release

# About this Manual

This manual describes the installation and basic use of the Mellanox MTS3600 switch, which is based on the InfiniScale IV InfiniBand switch device.

## Intended Audience

This manual is intended for users and system administrators responsible for installing and setting up the switch platforms listed above.

The manual assumes familiarity with the InfiniBand® Architecture Specification.

## Related Documentation

Additional Documentation available from Mellanox:

**Table 2 - Reference Documents**

<i>Switch Firmware and Firmware Update Tools</i>	See <a href="http://www.mellanox.com">http://www.mellanox.com</a> > Support > Download Firmware Tools Note that the Switch System described in this manual is based on Mellanox Technologies' InfiniScale® IV switch device.
<i>Mellanox OFED Stack for Linux User's Manual</i>	See <a href="http://www.mellanox.com">http://www.mellanox.com</a> > Support > InfiniBand Software and Drivers Click "Mellanox OpenFabrics Enterprise Distribution for Linux (MLNX_OFED)" Select the Linux User's Manual The embedded OS and tools on the CPU in the management module is a subset of the Mellanox OFED stack.
<i>FabricIT Enterprise Fabric Management Software CLI User's Manual</i>	Talk to your Mellanox representative for information regarding licensing and implementation of the FabricIT Enterprise Fabric Management Software System.
<i>Mellanox Firmware Tools (MFT) User's Manual Document # 2329</i>	The MFT (Mellanox Firmware Tools) package is a set of firmware tools. The manual supplied with this package provides an overview of the firmware its installation and replacement. The MFT can be downloaded with its documentation at: <a href="http://www.mellanox.com">http://www.mellanox.com</a> > Support > Download Firmware Tools



## Conventions

Throughout this manual, the name MTS3600 and the term switch are used to describe both the 36-port QSFP 40Gb/s InfiniBand Switch and the 36-port QSFP 20Gb/s InfiniBand Switch, unless explicitly indicated otherwise.

## Mellanox Part Numbering Legend

**Table 3 - Part Numbering Legend**

Place	Field	Decoder
MT	Mellanox Technologies	
S	System Type	S = Switch
MM	Model	36 = InfiniScale IV
FF	Form factor	00 = Rack mounted switch, 10 = Chassis
C	InfiniBand Port Config.	G = CX4 DDR, J = CX4 QDR, Q = QSFP QDR, R = QSFP DDR,
-	Separator	
P	# Power Supplies	0 = 0, 1 = 1, 2 = 2
M	Management	U = Unmanaged, B = Managed
Y	Module Config.	N = IB modules
R	RoHS	C = RoHS w/ Exemption, R = RoHS Lead-Free

# 1 Overview

Mellanox MTS3600 switch systems provide the highest performing fabric solution by delivering high bandwidth and low latency to Enterprise Data Centers, High-Performance Computing and Embedded environments. Networks built with MTS3600 systems can carry converged traffic with the combination of assured bandwidth and granular quality of service. Built with Mellanox's 4th generation InfiniScale® IV InfiniBand switch device, MTS3600 systems provide up to 40Gb/s full bidirectional bandwidth per port. With 36 ports, these systems are among the densest switching systems available. These stand-alone switches are an ideal choice for top-of-rack leaf connectivity or for building small to medium size clusters.

The switch comes pre-installed with all necessary firmware and is configured for standard operation within an InfiniBand fabric. This switch requires an InfiniBand compliant Subnet Manager running from one of the hosts or Fabric Management software running on the switch. All that is required for normal operation is to follow the usual precautions for installation and to connect the switch to the HCAs. Once connected, the Subnet Management software automatically configures and begins utilizing the switch.

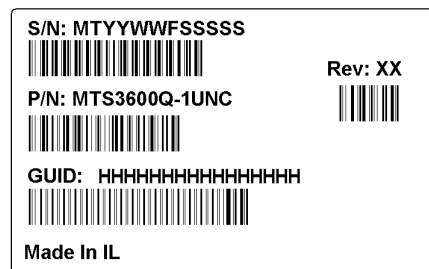
It is recommended that the Mellanox OpenFabrics software package be installed on all nodes connected to the MTS3600. The software package provides a subnet manager and network management tools as well as connectivity software for servers and storage, and is available on the Mellanox web site. See Chapter 3 for more information.

Basic installation, hot-swapping components and hardware maintenance is covered in “Basic Operation and Installation” on page 13.

## 1.1 Serial Number and Product Version Information

The serial number and product version information are found on the label seen in the figure below.

**Figure 1: Generic Product label**



Also on this label is the GUID identifier for the switch. There is also a label with the MAC for the management module.

**Figure 2: Management Module Label**

## 2 Internally Managed vs. Unmanaged (Externally Managed)

The following table shows which switches come with a management CPU and which do not. Managed switches can be upgraded from simple chassis management to full fabric management by purchasing an additional license. For more information on buying a license see Section 6.

Unmanaged switches are plug and play out of the box. All switches come with the latest FW burned on the Flash and EEPROM. Update the FW on unmanaged switches in-band only. When new FW is available you will receive an email with the link to the Mellanox FW download site. The download site has the Mellanox FW tool package and full instructions for updating FW.

All managed switches have internal chassis management. Managed switches need an initial configuration before they will start working. See the Installation Guide for initial configuration instructions. With the purchase of a license this management module can manage the IB fabric. See Table 4 for details.

**Table 4 - Switch Management**

Family	Managed / Unmanaged	Management Connections
MTS3600-UNC	Unmanaged	Plug and play All firmware updates should be done in-band using Mellanox Firmware Management Tools. I2C port access using MTUSB-1 device is required for firmware updates if in-band burning is not possible. No Management
MTS3600-BNC	Managed	RS232 cable DB9 to DB9 included in the box to connect to host PC for initial configuration of the switch. After initial configuration the switch can be managed through the ethernet using a remote connection. Chassis Management is included with purchase, and an additional fabric management option, FabricIT-EFM, can be used with purchase of an additional license.

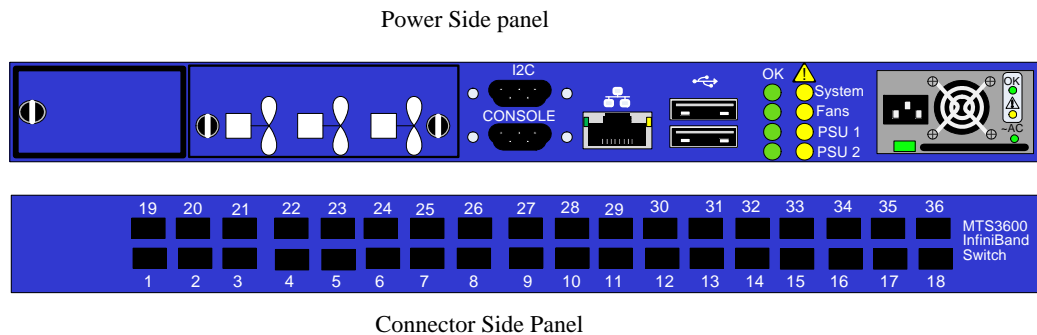
Should your unmanaged switch have CONSOLE, Ethernet, and USB connectors, they will not work. Only the I2C connector will work on unmanaged switches.

## 3 Basic Operation and Installation

### 3.1 Switch Platform Hardware Overview

Figure 3 shows the power side panel and connector side panel views of the QSFP switch. The figure shows port configurations for the switch systems, the dual hot-swap power supplies, and hot-swap fan module, I2C connector, USB connectors, Ethernet port connector, RS232 DB9 connector, and various status LEDs. Unmanaged switches have an I2C DB9 connector.

**Figure 3: QSFP Switch System Power and Connector Side Panels**



All InfiniBand connectivity is via the connector side panel. All connectors can support active cables.

#### 3.1.1 Status LEDs

##### 3.1.1.1 System Status Indicators

The System Status Indicators are located just to the left of the primary power supply unit, and labeled “System.”.

The system status indicators should display as follows:

- When the switch is plugged in, within three minutes the STATUS LED should light up green.
- The PSU LED for the plugged in PSU should light up green.
- The PSU LED for the second PSU should light up green only if a second PSU is installed in the switch for redundancy and Hot-Swap ability and it is connected to a power source. If two PSUs are installed and only one PSU is connected to a power supply the second PSU LED will be red. If only one PSU is installed in the switch, the second PSU LED will be off.



As long as there is power to the switch (one PSU is connected), and the switch is booted up and running, the status LED will be green.

- The FAN LED should light up green.



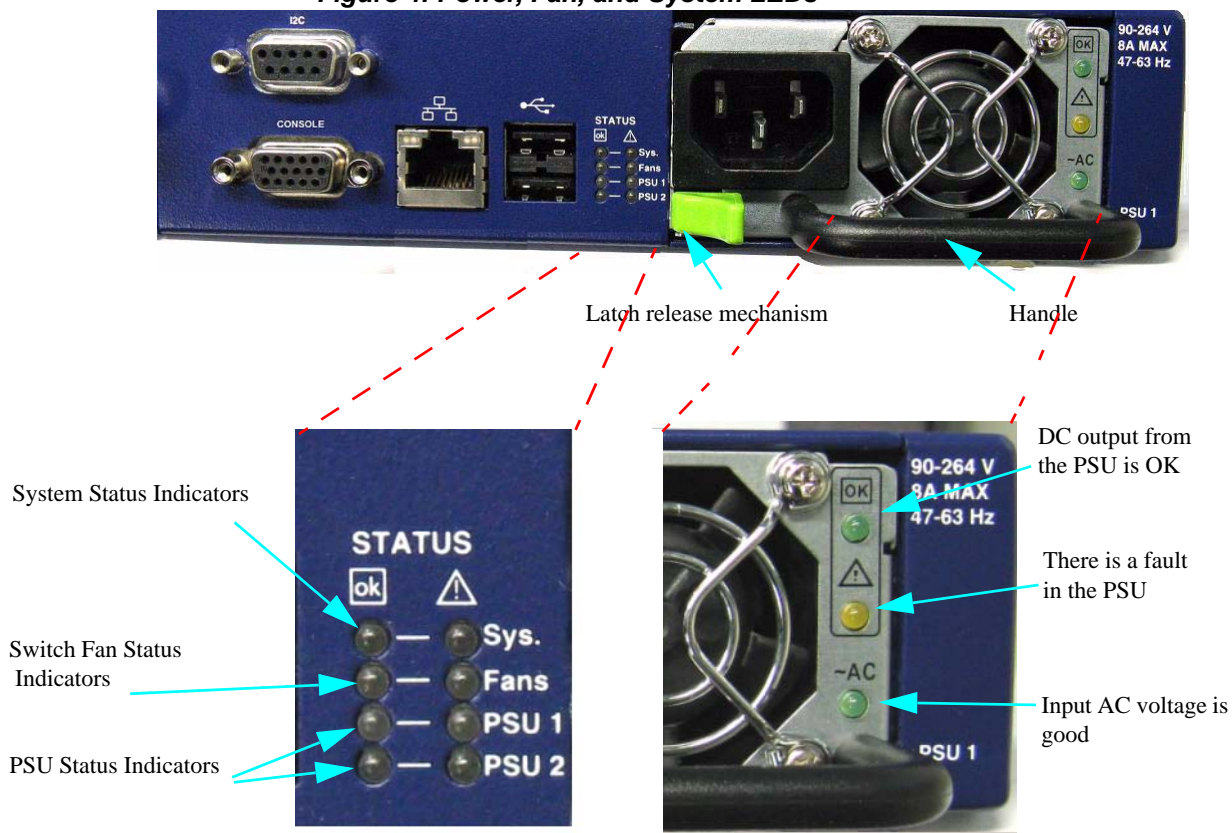
If the STATUS LED shows red after three minutes unplug the switch and call your Mellanox representative for assistance.

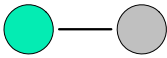
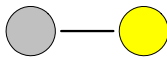
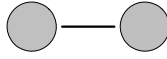
If the FAN LED shows red, troubleshoot the fan module.



If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 43.

If the PSU LEDs are not green, this indicates a problem with the power supplies. Only run the switch if at least one of the PSU LEDs is green.

**Figure 4: Power, Fan, and System LEDs****Table 5 - System Status LED Configurations**

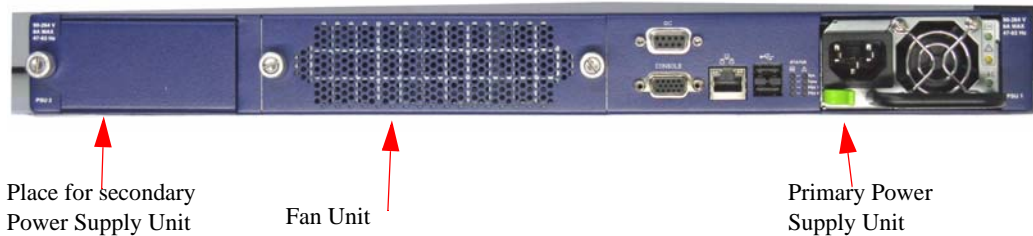
LED Configuration	Status
 Green      Off	OK – The system is up and running.
 Off      Yellow	Error – A fault in the system.
 Off      Off	Off – The system has no power.

### 3.1.1.2 Power Supply Status Indicators

The MTS3600 36 Port Switch is available with one or two factory installed Power Supply Units. For switches with only one unit installed, a second Power Supply Unit can be added to increase

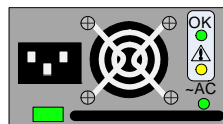
security, hot-swap ability and to add redundancy. See Section D, “Replacement Parts Ordering Numbers,” on page 54 for ordering part numbers.

**Figure 5: MTS3600 QSFP Power Side Panel**



The primary power supply unit (PSU1) is located on the right side of the power side panel, with PSU2 on the left side. Status indicators are located to the left of the primary power supply unit. Each PSU also has three status LEDs on the right side of the PSU, that indicate the internal status of the unit.

**Figure 6: PSU Status LEDs**



**Table 6 - PSU Status LED Configurations**


LED Configuration	Status
~AC	This LED when lit indicates input voltage between 100 and 240 Volts.
	This LED when lit indicates a fault in the power supply.
OK	This LED when lit indicates that the output from the power supply is +12VDC.

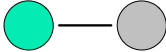
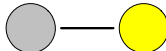
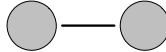
Figure 4 on [page 15](#) shows the explanation of the PSU Status LED colors.

### 3.1.1.3 Fan Status Indicators

The indicator labeled “Fans” is located just to the left of the primary power supply unit, next to PSU 1. The following fan status conditions are possible:



**Table 7 - Fan Status LED Configurations**

LED Configuration	Status
 Green      Off	OK – All fans are operating.
 Off      Yellow	Error – One or more fans is not operating. Repair or replace the fan unit.
 Off      Off	Off – The fan unit is not receiving any power. Check that the fan unit is properly and completely inserted.



All fans must be operating while the power supply is plugged in.



If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 43.

## 3.2 QSFP Cable Power Budget Classification

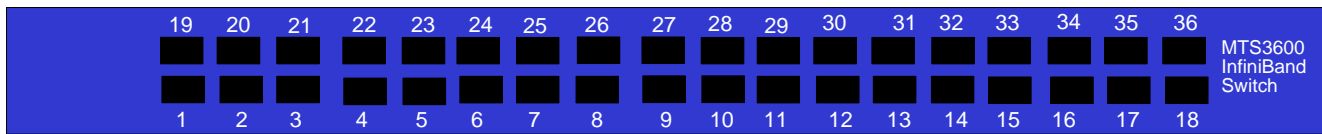
All MTS3600 QSFP switches are designed for active cables with a max power per module of 3.5W. This is power level 4 according to the QSFP Public Specification.

## 3.3 Interfaces

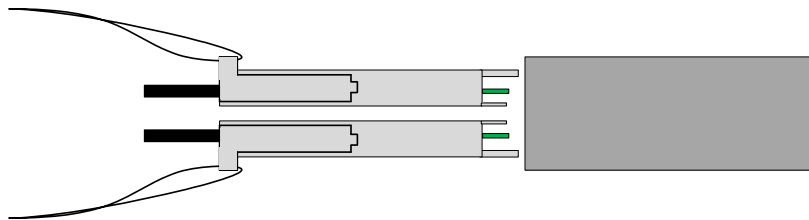
### 3.3.1 Port Connector Interfaces

#### 3.3.1.1 36 Port Switches

The Connector side of the switch has 36 QSFP ports. These are placed in two rows, 18 ports to a row. The ports are labelled as shown in Figure 7. The bottom row ports are flipped from the top row. See Figure 8 for bottom row - top row port orientation.

**Figure 7: Port Numbering**

### 3.3.1.2 Top and Bottom Orientation

**Figure 8: Top and Bottom Ports**



### 3.3.2 Management and FW updating Interfaces

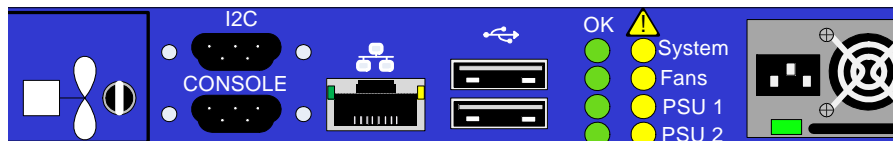
There are five interfaces to connect to the MTS3600. They are:

- 1 I2C DB9 interface is labelled “I2C”. On managed switches this interface is a service interface only.



Do not use the I2C DB9 interface to update the FW in the managed switches. Update FW in managed switches by using FabricIT™ EFM Web User Interface (WebUI) or FabricIT™ EFM Command Line Interface (CLI).

- 1 Ethernet connector is labelled . Use this connector to connect to the Ethernet for remote management. This connector does not work in unmanaged switches.
- 2 USB ports are labelled . These connectors do not work in unmanaged switches.
- 1 serial CONSOLE port. Use this to connect to a local host PC. This connector does not work in unmanaged switches.


**Figure 9: Management Interfaces**

### 3.3.2.1 Serial CONSOLE Interface

The port labelled “CONSOLE” is for a local host connection to the management module. This is used the first time the switch is connected. Connecting to a local host PC and following the instructions in the Installation Guide, “Configuring the Switch for the First Time”, must be done before any remote management is available. This connector does not work in unmanaged (externally managed) switches.

All firmware updates should be done in-band using Mellanox Firmware Management Tools.

### 3.3.2.2 RJ-45 Ethernet Connector

The Ethernet connection  provides access for remote management.



Each Ethernet connector gets connected to Ethernet switches. These switches must be configured to 10/100M auto-negotiation.

This connector does not work in unmanaged (externally managed) switches.

### 3.3.2.3 I2C Connector

The I2C connection provides access to Flash and EEPROMs.

*This connector is for use on unmanaged switches only. On unmanaged switches this connector is used to update FW.*



The unmanaged switches are Plug and Play and all firmware updates should be done in-band. The I2C connection should only be used if the FW image was corrupted to the point that the regular FW tools cannot successfully return the correct image.

*Do not use this connector on managed switches.*



Do not use the I2C DB9 interface to update the FW in the managed switches. Update FW in managed switches by using FabricIT™ EFM Web User Interface (WebUI) or FabricIT™ EFM Command Line Interface (CLI).

## 3.4 Package Contents

Before you install your new MTS3600 switch, unpack the system and check to make sure that all the parts have been sent, check this against the parts list. Check the parts for visible damage that may have occurred during shipping.

The switch comes packed with the following items:

- 1) switch
- 1) power cable for each PSU– Type B 6ft US 125V 10A chord. See “Replacement Parts Ordering Numbers” on page 54. to order power cords for various countries. A single power cord for each power supply unit can be ordered at no extra charge.
- 1) rail kit;MTR003600
- 1) harness; HAR000017 or HAR000040
- 1) CD
- 1) Quick Start Guide
- 1) Installation Guide

Note: If anything is damaged or missing, contact your customer representative immediately.

## 3.5 Switch Platform Installation and Operation

Installation and initialization of the switch platform are straightforward processes, requiring attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

The unmanaged (externally managed) switch platform does not require any programming or configuration to operate as a basic InfiniBand switch and includes all of the necessary functionality to operate with external standard InfiniBand Subnet Management software.

The managed switch platform requires initial configuration to operate as an InfiniBand switch. An Internal Management option is available for the switch platform which includes InfiniBand Subnet Management software embedded internally in the switch. This section describes the installation process and basic operation of the switch platform. Please first read the warnings sub-section carefully before carrying on with installation procedures.

### 3.5.1 Installation Safety Warnings

For Safety Warnings in French see Section E, “Avertissements de sécurité d’installation (French),” on page 55, for German see Section F, “Installation - Sicherheitshinweise (German),” on page 57, and for Spanish see Section G, “Advertencias de seguridad para la instalación (Spanish),” on page 59.

For special regulations regarding Finland, Sweden, Denmark, and Norway see Section H, “Special Regulations Regarding Finland, Sweden, Denmark, and Norway,” on page 62.

#### 1. Installation Instructions



Read all installation instructions before connecting the equipment to the power source.

## 2. Over-temperature



This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 45°C (113°F). Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

## 3. Stacking the Chassis



The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.

## 4. Redundant Power Supply Connection - Electrical Hazard



This product includes a blank cover over the space for the redundant power supply. Do not operate the product if the blank cover is not securely fastened or if it is removed.

## 5. During Lightning - Electrical Hazard



During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

## 6. Copper InfiniBand Cable Connecting/Disconnecting



Copper InfiniBand cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings and instructions.

## 7. Rack Mounting and Servicing



When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

## 8. Equipment Installation



This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

## 9. Equipment Disposal



Disposal of this equipment should be in accordance to all national laws and regulations.

## 10. Local and National Electrical Codes



This equipment should be installed in compliance with local and national electrical codes.

### 3.5.2 Mechanical Installation

The switch platform can be rack mounted and is designed for installation in a standard 19" rack. The power side of the switch includes a hot-swap power supply module, a blank cover for an optional second PSU for redundancy, a hot-swap fan tray, system LEDs, and management connection ports. The connector side of the switch has the QSFP ports.

The switch platform contains auto-sensing 100 - 240 VAC connections for all possible PSUs.

The installer should use a rack capable of supporting the mechanical and environmental characteristics of a fully populated platform.



The rack mounting holes conform to the EIA-310 standard for 19-inch racks. Take precautions to guarantee proper ventilation in order to maintain good air-flow at ambient temperature. Cable routing in particular should not impede the air exhaust from the chassis.

This switch can be installed in any standard 19" racks with depths of 670mm to 900mm.

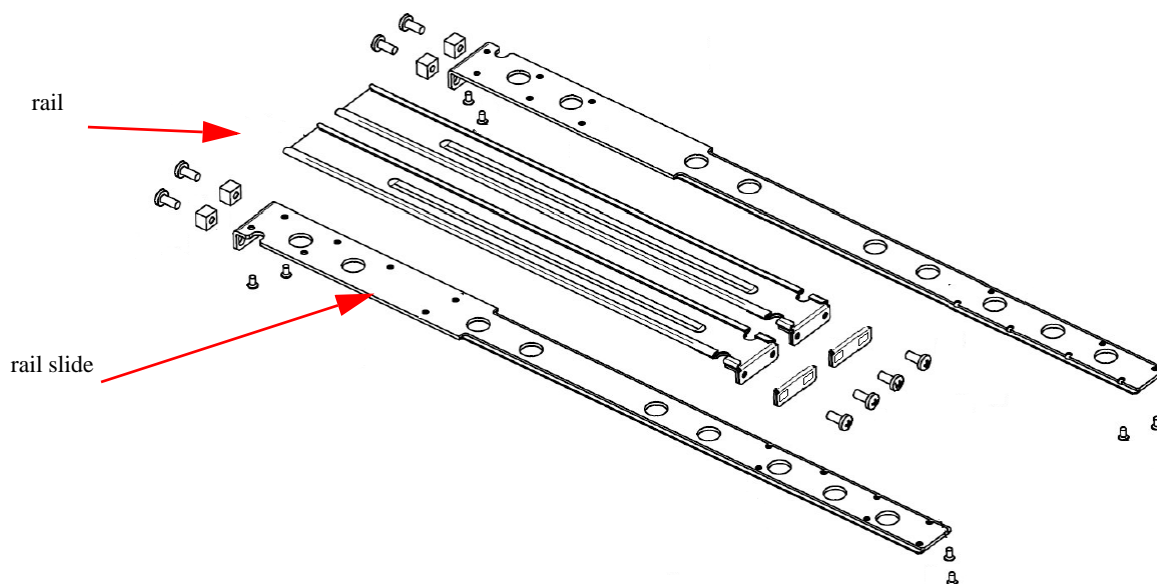
#### 3.5.2.1 Installing the Switch in the Rack

##### Tools and Customer Supplied Parts

- Phillips Screwdrivers #1 and #2
- ESD strap
- ESD mat
- grounding screw
- grounding wire sufficient to reach a valid ground.

##### Parts included in the installation kit:

- 2 rails
- 2 rail slides
- 8 pan head screws M6
- 8 recessed flat head screws
- 4 caged nuts
- 2 metal washers

**Figure 10: Rack Installation Kit Parts**

Before you install your new MTS3600 switch, unpack the system and check to make sure that all the parts have been sent, check this against the parts list. Check the parts for visible damages that may have occurred during shipping.



If anything is damaged or missing, contact your customer representative immediately.

**Procedure**

1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2. Choose which side of the switch you want even with the vertical rack support. Either the side with the power supply units or the side with the IB connectors can be even with the vertical rack support. The other side of the switch will be further inside of the rack.

Things to consider before choosing where to mount the rails and rail slides.

**Figure 11: Which Side of the Rack Do You Want the Connectors?**



The distance between the rack and the door can be as little as 4 cm on one side of the rack and as much as 18 cm on the other side of the rack. Keep in mind that there can be as many as 36 cables connected to the switch.

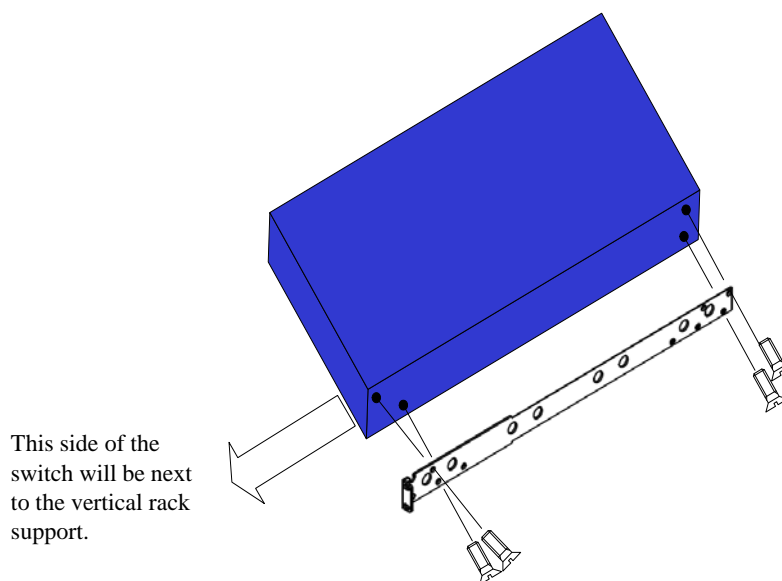
- Do you want the connector side recessed in the rack to allow for larger cable bending radius?
- Will the connector side be recessed past other equipment in the rack and will this be problematic?



The rails are to be installed on the side of the rack where the switch will be recessed into the rack

3. Install the rail slides onto the switch. Place the end of the rail slide with the 90° angle on the side of the switch that you want to be even with the vertical support of the 19" rack. Use four of the flat head screws for each rail slide. There are two sets of holes in the rail slide. Select the set of holes to either mount the switch closer or farther away from the rack vertical support. Tighten the screws to 3Nm or 26.5 pound inches.

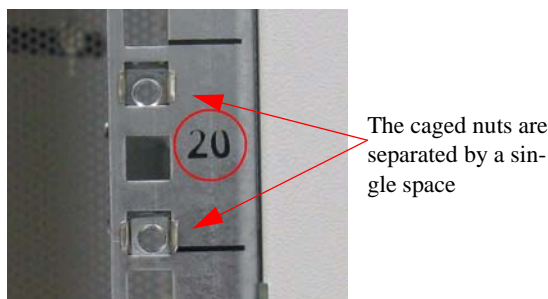
**Figure 12: Screwing the Rail Slide onto the switch**





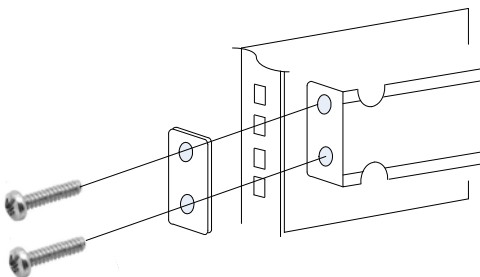
4. Clip the nuts into the holes in the rack you will be using to connect the rail slides. Check that both sides of the switch are in the same position number on the rack.

**Figure 13: Caged Nut Spacing**



5. Using two of the pan head screws and one washer, for each rail, install the rails to the other end of the rack. Place the rail behind the holes in the rack and screw the screws through the holes in the washer then through the rails. Tighten the pan head screws that hold the rails to 9.2 Nm or 81.5 pound inches.

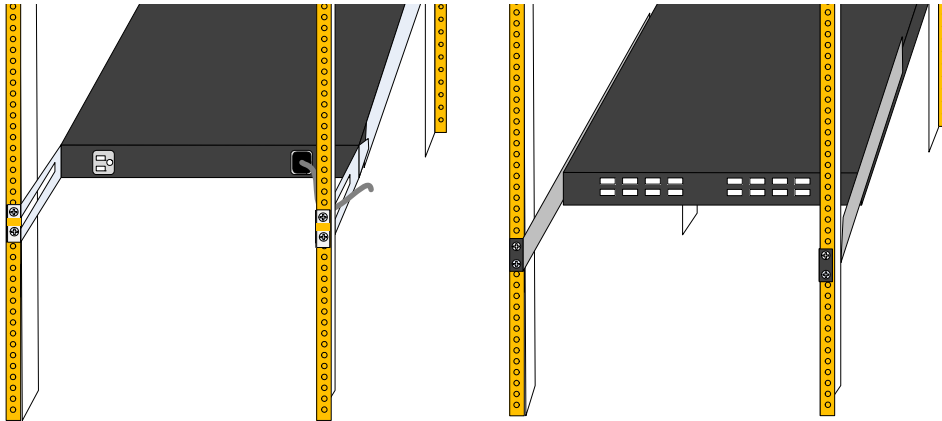
**Figure 14: Screwing in the Rails**



6. Place the four bolts for the caged nuts within reach.
7. Slide the switch into the rails.
8. Put the switch into place and screw the bolts into the nuts from step 4. Tighten the bolts to 9.2 Nm or 81.5 pound inches.
9. Tighten all of the screws.
10. Plug in the power cables.
11. Check the Status LEDs and confirm that all of the LEDs show status lights consistent with normal operation.
12. You can start connecting all of the cables to the switch.

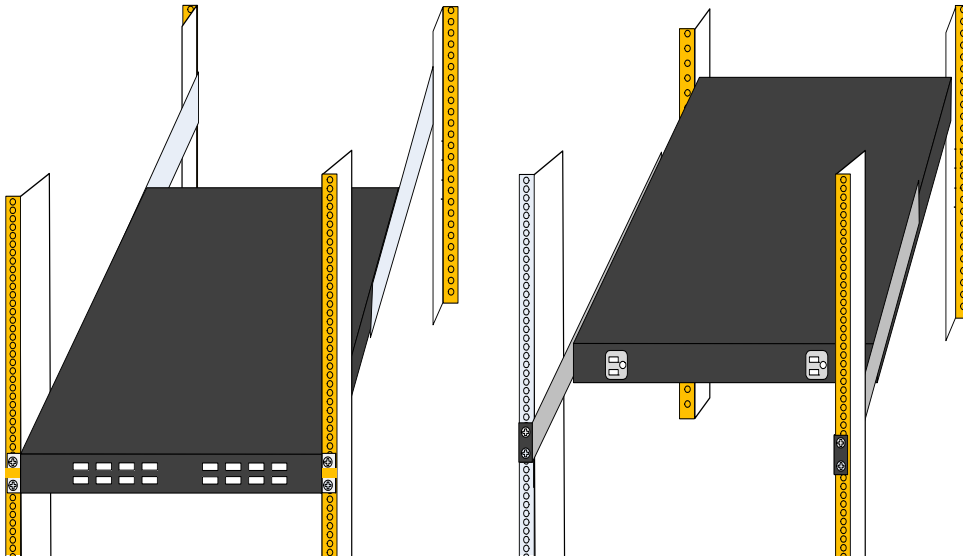
Make sure that the Rail kit is compatible with your rack.

**Figure 15: Which Side of the Rack Do You Want the Connectors?**



The figure above shows the power side next to the door and the connector side away from the door. This configuration has more room for the cables and a larger bending radius.

The figure below shows the connector side next to the door and the power side away from the door. This configuration may be necessary to conform to your rack configuration.



Warning: Any yellow status LEDs is cause for concern and must be dealt with immediately.

It can take up to 3 minutes to boot up, during which time the status LED may indicate red.

### 3.5.3 Grounding the Switch

Check to determine if your local or national electrical codes require an external ground to all IT components. If so, connect a ground wire to one of the casing screws and connect the other end to a valid ground. If you choose to not use the ground screw, make sure that the rack is properly grounded and that there is a valid ground connection between the chassis of the switch and the rack. Test the ground using an Ohm meter.



Some national and/or local codes may require IT components to be bonded and externally grounded (not including the power cord ground). You must follow all national and local codes when installing this equipment.

### 3.5.4 Power Connections and Initial Power On

The switch platform ships with one or two Power Supply Units. For switches with only one unit installed, a second PSU may be installed at a later time. Each supply has a separate AC receptacle. The input voltage is auto-adjusting for 100 - 240 VAC, 50-60Hz power connections. The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.



Caution: The switch platform will automatically power on when AC power is applied. There is no power switch. Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.



Caution: After inserting a power cable and confirming the green system status LED light is on; make sure that the Fan Status indicator shows green.

If the fan status indicator is not green then unplug the power connection and check that the fan module is inserted properly and that the mating connector of the fan unit is free of any dirt and/or obstacles.



Caution: When turning off the switch, make sure **ALL LEDS** are off to ensure a powered down status.



Do not hot swap the power supply if your switch has only one power supply. You must power down the system to replace the power supply unit when there is only one PSU in the switch.

**Figure 16: Two Power Inlets - Electric Caution Notifications**

**CAUTION**

Risk of electric shock and energy hazard. The two PSUs are independent.

Disconnect all power supplies to ensure a powered down state inside of the switch platform.

**ACHTUNG**

Gefahr des elektrischen Schocks. Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen sind die Netzstecker aller Netzteile zu entfernen

**ATTENTION**

Risque de choc et de danger électriques. Le débranchement d'une seule alimentation stabilisée ne débranch uniquement qu'un module "Alimentation Stabilisée". Pour isoler complètement le module en cause, Il faut débrancher toutes les alimentations stabilisées.

### 3.5.5 Extracting and Inserting the Power Supply Unit

With both power supplies installed in the redundant configuration, either PSU may be extracted without bringing down the system.



Make sure that the PSU that you are NOT replacing is showing all green, for both the PSU and status indicators.

**Figure 17: Power Supply Unit Extraction**

To extract a PSU:

1. Remove the power cord from the power supply unit.
2. Grasping the handle with your right hand, push the latch release with your thumb while pulling the handle outward. As the PSU unseats, the PSU status indicators will turn off.
3. Remove the PSU.

To insert a PSU:

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.



Do not attempt to insert a PSU with a power cord connected to it.

2. Insert the PSU by sliding it into the opening until a slight resistance is felt.
3. Continue pressing the PSU until it seats completely. The latch will snap into place confirming the proper installation.
4. Insert the power cord into the supply connector.
5. Insert the other end of the power cord into an outlet of the correct voltage.



The green PSU indicator should light and the yellow indicator should remain off. If not, repeat the whole procedure to extract the PSU and re-insert it.

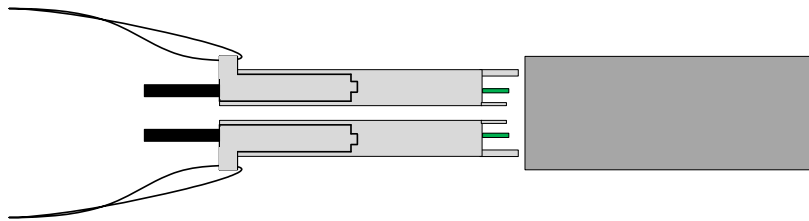
### 3.5.6 InfiniBand Cable Installation

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The GREEN LED indicator, corresponding to each QSFP port, will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When a logical connection is made the yellow light will come on. When data is being transferred the yellow light will blink.



Cables in the bottom row should be inserted up side down in relation to the how the cables are inserted in the top row.

**Figure 18: Top and Bottom Ports**



To remove, disengage the locks and slowly pull the connector away from the port receptacle. Both LED indicators will turn off when the cable is unseated.

Care should be taken not to impede the air exhaust flow through the ventilation holes next to the InfiniBand ports. Cable lengths should be used which allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.

**Figure 19: Cable connections to the Switch**

### 3.5.7 Extracting and Inserting the Fan Unit

This switch can operate indefinitely with one of the three fans in the fan module inoperable so long as the ambient temperature is below 45° Celsius.



Operation without a fan unit should not exceed two minutes.

During fan hot-swap, if both indicators are OFF then the fan unit is disconnected.

To extract a Fan Unit

1. Loosen the two thumb screws locking the fan tray in place. One of the fan status indicators (either green or yellow) will remain on.
2. Pull the fan unit out by pulling on the thumbscrews. As the fan unseats, the fan status indicator will turn off.

To insert a FAN Unit:

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
2. Insert the fan unit by sliding it into the opening until slight resistance is felt. Continue pressing the fan unit until it seats completely.

3. Turn the two thumb screws to lock the fan unit in place.



The green fan status indicator should light and the yellow fan status should remain off. If not, extract the fan unit and reinsert it. After two unsuccessful attempts to install the fan unit, power off the switch before attempting any system debug.

### 3.6 Disassembly of the Switch from the Rack

To disassemble the switch from the rack:

1. Unplug and remove all connectors.
2. Unplug all power cords.
3. Remove the ground wire.
4. Unscrew the 4 bolts from the side of the switch with the rail slides.



Support the weight of the switch when you remove the screws so that the switch does not fall.

5. Slide the switch from the rack.
6. Remove the rails from the rack.
7. Remove the eight caged nuts.

### 3.7 Disposal

For proper disassembly instructions to comply with the WEEE Directive 2002/96/EC see the Mellanox website.



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.



## 4 Management and Tools Overview



The Ethernet ports for remote management connect to Ethernet switches. These switches must be configured to 10/100M auto-negotiation.

### 4.1 Network Management and Clustering Software

Download and install, on all nodes, the Mellanox OpenFabric software package for Linux, Windows, or other operating systems from the Mellanox software website:

<http://www.mellanox.com>.=> Downloads => InfiniBand SW/Drivers.

This software package provides connectivity for server and storage systems utilizing High Performance Computing (HPC) or enterprise data center (EDC) applications across an InfiniBand fabric. It also provides a subnet manager for simple network configuration and network administration and diagnostic tools for network management.

### 4.2 Internally Managed Switch System

The management module runs SW that manages the switch chassis. An optional licensing fee will allow you to manage the whole fabric up to 108 nodes with the chassis management module. See your Mellanox representative for information and pricing regarding this upgrade.

Management modules will have the capability to allow remote monitoring and remote management of the chassis from any host connected to the fabric.

The managed switch system includes a CPU which contains:

- embedded OS, secure in-band, out-band access
- chassis manager and system BIST
- SNMP agent, 3rd party tool integration
- GUI
- subnet manager
- performance/provisioning manager
- congestion and notification manager
- QoS manager
- adaptive routing manager
- cluster diagnostics manager

The Subnet management features include:

- upgrading drivers

- upgrading software
- monitoring of:
  - AC power to the PSUs
  - DC power out from the PSUs
  - board temperature
  - fan module unit
  - failure in the switch system
  - system failure in the switch system
- querying for board serial numbers and their revisions

In addition, the tools enable firmware management capabilities such as:

- querying for existing firmware versions
- burning new firmware (from scratch or for recovery from damaged firmware)
- querying for and changing system GUIDs
- checking for duplicate or bad GUIDs

#### 4.2.1 Configuring the Switch for the First Time



Unmanaged (Externally managed) switches, that is the MTS 3600-UNC do not get configured. On unmanaged switches, the CONSOLE, Ethernet, and USB connectors do not work.

See the Installation Guide of the MTS3600 switch, “Configuring the Switch for the First Time”. The port labelled CONSOLE must be connected to a local host PC. This must be used the first time the switch is connected. This must be done before any remote management is available.

#### 4.2.2 Accessing the Switch Locally

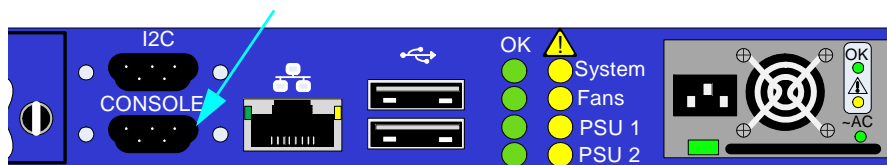
For local access out of band management of the switch system use the two procedures below Section 4.2.2.1 for initial configuration and Section 4.2.3 to start a remote connection.

##### 4.2.2.1 Accessing the CPU via a host PC

Hook up the supplied harness cable (HAR00040) from the connector labelled CONSOLE to the DB9 connector of the local host PC.

**Figure 20: Host Connection**

Connect the host PC to here



8. Follow the instructions in the Installation guide Rev 1.3 *“Configuring the Switch for the First Time”*

## 4.2.3 Starting a Remote Connection to the Switch

### 4.2.3.1 Accessing the CPU via the Ethernet Connector

Once the initial configuration is completed the management tools can be accessed through:

- SSH
- Telnet
- the WEB

## 4.2.4 Downloading Firmware

Firmware for this switch system can be found at and downloaded from:

<http://www.mellanox.com> => Downloads => Firmware.

Be sure to read and follow all of the instructions regarding the updating of the firmware on your switch system. Firmware for the HCA cards connected to this switch system can be downloaded from the same site.

## 4.3 Unmanaged (Externally Managed) Switch

### 4.3.1 I2C Connector

The I2C connection provides access to Flash and EEPROMs. This connection allows access to the switch for updating FW when in-band FW updating is impossible.

Unmanaged (Externally managed) switches, that is the MTS 3600-UNC do not get configured. On unmanaged switches, the CONSOLE, Ethernet, and USB connectors do not work. The I2C connector should only be used when the FW cannot be updated in-band.



The unmanaged switches are Plug and Play and all firmware updates should be done in-band. The I2C connection should only be used if the FW image was corrupted to the point that the regular FW tools cannot successfully return the correct image.

When you install the switch, it comes with the latest firmware burned on the board. All firmware updates should be done in-band. This is only done when you receive an email that a newer FW version for your switch is available. Download the latest FW from

<http://www.mellanox.com> => Downloads => Firmware. For instructions on downloading FW see <http://www.mellanox.com> => Downloads => Firmware Tools. Be sure to download the user manual appropriate to your OS. Read the instructions in the User manual for the FW update procedure.

### 4.3.2 Updating Firmware

The switch is delivered with the latest Firmware available at the time of production. New firmware versions will be posted on the Mellanox firmware download page:

<http://www.mellanox.com> => Downloads => Firmware.

You will need the Mellanox Firmware Tools package available in the Mellanox OpenFabrics software package, to update firmware for this switch. It can also be downloaded from:

<http://www.mellanox.com>. => Downloads => InfiniBand SW/Drivers.

You will also need to download and unzip the firmware binary image. This is provided in the Mellanox Web site at: <http://www.mellanox.com> => Downloads => Firmware and go to the InfiniScale IV Switch systems. Click in the Table for the FW image that you need.

#### 4.3.2.1 Instructions for Reprogramming Over the InfiniBand Network

To update an InfiniScale IV switch device having a specific GUID (for example, 0x00000006660abcd0) or LID, the following are the recommended steps to update the device firmware.

1. Make sure all subnet ports are in the active state. One way to check this is to run opensm, the Subnet Manager.

```
[root@mymach]> /etc/init.d/opensmd start
```

```
opensm start      [ OK ]
```

2. Make sure the local ports are active by running 'ibv\_devinfo'.
3. Obtain the device LID. There are two ways to do that:

**I. Using the “mst ib add” command:**

The “mst ib add” runs the ibdiagnet tool to discover the InfiniBand fabric and then lists the discovered IB nodes as an mst device under /dev/mst/ directory. These devices can be used for access by other MFT tools.

```
[root@mymach]> mst ib add
```

```
-I- Running ibdiagnet to discover the fabric ...
```

```
Loading IBDIAGNET from: /usr/local/lib/ibdiagnet1.2
```

```
-W- Topology file is not specified.
```

```
Reports regarding cluster links will use direct routes.
```

```
Loading IBDM from: /usr/local/lib/ibdm1.2
```

```
-I- Using port 1 as the local port.
```

```
-I- Discovering ... 3 nodes (2 Switches & 1 CA-s) discovered.
```

```
-I-----
```

```
-I- Bad Guids/LIDs Info
```

```
-I-----
```

```

-I- skip option set. no report will be issued
-I-----
-I- Links With Logical State = INIT
-I-----
-I- skip option set. no report will be issued
-I-----
-I- PM Counters Info
-I-----
-I- skip option set. no report will be issued
-I-----
-I- Fabric Partitions Report (see ibdiagnet.pkey for a full hosts list)
-I-----
-I- skip option set. no report will be issued
-I-----
-I- IPoIB Subnets Check
-I-----32
-I- skip option set. no report will be issued

-I-----
-I- Bad Links Info
-I-----
-I- No bad link were found
-----

-I- Stages Status Report:

```

STAGE	Errors	Warnings
Bad GUIDs/LIDs Check	0	0
Link State Active Check	0	0
Performance Counters Report	0	0

Partitions Check	0	0
IPoIB Subnets Check	0	0

Please see /tmp/ibdiagnet.log for complete log

-----

-I- Done. Run time was 1 seconds.

-I- Added 3 in-band devices

[root@mymach]>

**To list the discovered mst inband devices run “mst status”.**

[root@mymach]> mst status

MST modules:

-----

MST PCI module loaded

MST PCI configuration module loaded

...

Inband devices:

-----

/dev/mst/CA\_MT25418\_sw005\_HCA-1\_lid-0x0001

/dev/mst/SW\_MT47396\_lid-0x0011

/dev/mst/SW\_MT48438\_lid-0x0003

[root@mymach]>

## II. Using the ibnetdiscover tool:

Run:

[root@mymach]# ibnetdiscover | grep 00000006660abcd0 | grep -w Switch

Switch 24 "S-00000006660abcd0" "MT47396 Infiniscale-III Mellanox Technologies"

base port 0 lid 17 lmc 0

Note: The resulting LID is given as a decimal number.

4. Run `mlxburn` with the LID retrieved in step #3 above to perform the In-Band burning operation.

**Burn the InfiniScale IV switch:**

```
[root@mymach]> mlxburn -d /dev/mst/SW_MT48438_lid-0x0003 -fw ./fw-IS4.mlx -qq
-I- Querying device ...
-I- Using auto detected configuration file: ./MTS3600Q-1UNC_A1.ini (PSID
    =
MT_0C20110003)
-I- Generating image ...
*** WARNING *** Running quick query - Skipping full image integrity checks.
Current FW version on flash: 7.0.135
New FW version:                7.0.138
Burning second FW image without signatures - OK
Restoring second signature      - OK
-I- Image burn completed successfully.
```

### 4.3.3 How to Get Mellanox Firmware Tools (MFT)

Mellanox Firmware Tools (MFT) and documentation are available for download via <http://www.mellanox.com> > Downloads > Firmware Tools.

The MFT kit includes:

- `mlxburn`
- `flint`
- `spark`
- `IBspark`
- debug utilities

See “Related Documentation” on page 7.

### 4.3.4 Open SM

To manage the Mellanox switch system using OFED, download Mellanox Open Fabrics from <http://www.mellanox.com> > Downloads > InfiniBandSW/Drivers.

Be sure to read and follow all of the instructions regarding the installation and use of these tools.

## 5 Switch Management Tools

This chapter describes the management tools. The management module allows the switch to be managed either locally or remotely. The switch can also be managed using Out-of-Band management of the switch via FabricIT EFM. The managed switch comes with a module that will completely manage your switch. An optional management module in combination with the licensing fee for full access to the FabricIT EFM software can manage a fabric of up to 2000 nodes.

### 5.1 Chassis Management

The chassis manager will give the user access to:

- switch temperatures
- power supply voltages
- fan unit information
- power unit information
- Flash memory

The manager also has the ability to burn new FW on the switch.



## 6 FabricIT Management

FabricIT EFM is a software based management system that can be run with either a command line interface or with a GUI interface. The GUI interface can be run through the Web. A license is required for full use of FabricIT. The standard management module, without a license, allows for managing the switch using the Web interface or the command line interface and software supplied on the management chip. Make sure to register your FabricIT license to enable all of the available commands and functions.

See the FabricIT EFM User Manual for instructions and commands available to manage the switches and fabric.

### 6.1 Downloading FabricIT Software and Documents

To download FabricIT software and documentation, please visit the following Web page:

FabricIT [http://www.mellanox.com/content/pages.php?pg=fabric\\_it\\_login](http://www.mellanox.com/content/pages.php?pg=fabric_it_login).

Note that you will need to enter the License Entitlement number and the Switch S/N to obtain the software and documentation, and also to generate an EFM license that enables extended FabricIT management and inspection features on your switch system.

### 6.2 Installing Licenses

A license for extended FabricIT management and inspection features with FabricIT EFM software is available for an additional licensing fee.

#### 6.2.1 Getting the License Key

FabricIT Enterprise Fabric Manager (EFM) license can be purchased from your Mellanox representative at any time. A License Enablement Number will be supplied at the time of purchase. To generate the License Key enter the License Enablement Number and the Switch Serial Number into the Mellanox online license tool at <http://license.mellanox.com>. The Switch Serial Number can be found on the pull-out tab or the box labeling. For the serial number location on the chassis see Section 1.1, “Serial Number and Product Version Information,” on page 10.

**Figure 21: License Key Entitlement Number**

The screenshot shows the Mellanox Technologies website header with navigation links: Company, Products, Solutions, Partners, News, Education & Media, and Where to Buy. Below the header, there is a section titled "License Key Generation with Entitlement Number" containing a text input field for the "Entitlement Number:" and a "Generate" button. Below this section, there is a link that says "If you are an administrator user click here". The footer of the page includes links: Home, Company, Products, Solutions, Partners, News, Investors, Support, and Legal/Privacy.

**Figure 22: License Key Generation Form**

The screenshot shows the Mellanox Technologies website header with navigation links: Company, Products, Solutions, Partners, News, Education & Media, and Where to Buy. Below the header, there is a section titled "License Key Generation Form" containing four text input fields: "Entitlement Number:", "Part Number:", "Number of Ports:", and "Enter Your Switch Serial Number:". Below these fields is a "Generate >>" button. To the left of the form, there is a "Return" link. The footer of the page includes links: Home, Company, Products, Solutions, Partners, News, Investors, Support, and Legal/Privacy Policy, along with the copyright notice "© 2009 Mellanox Technologies. All Rights Reserved."

## 6.2.2 FabricIT Management and Inspection License

If your switch system includes an internal management module, then to activate extended FabricIT management and inspection features you need to install the license that was purchased along with the switch system. Without the license, you will not be able to run a Subnet Manager on the switch nor run advanced fabric diagnostics.

For information on installation, please refer to the *FabricIT Enterprise Fabric Management Software CLI User's Manual*.

## 7 Troubleshooting


As soon as a switch is plugged in make sure that the green power LEDs on the PSUs are on.

### **Status LED and or Status Health LED**

If either of these two LEDs is **red** unplug the switch and call your Mellanox representative.

### **Power supply unit:**

If the ~AC power LED is off, check that the power cable is plugged into a working outlet.

1. Check that the power cable has a voltage within the range of 100 - 240 volts AC.
2. If the LED on the PSU is not lit or is red.
3. Remove and reinstall the power cable.
4. Remove and reinstall the PSU.
5. If the ~AC power LED is green but the OK power LED is off or the  LED is on – Replace the PSU.

### **The Status green power LED for PSU1 or PSU2 does not come on:**

1. If the OK LED on the PSU is on but the system LED is off remove and reinstall the PSU. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
2. If the OK LED on the PSU is off, check if the PSU System LED is on.
3. Remove and reinstall the power cable. Check that the power outlet (in the wall) is working.
4. Remove and reinstall the PSU. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
5. Replace the PSU.

### **The power LED for the switch shuts off:**

1. Check that there is adequate ventilation. Are the fan LEDs showing that the fans are all up and running?
2. Make sure that there is nothing blocking the front or rear of the chassis and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
3. If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.

### **The green power LED for the fans does not come on:**

1. Check that the Power LEDs are on.

2. Remove and reinstall the fan unit. Make sure the mating connector of the new unit is free of any dirt and/or obstacles. See Section 3.5.7, “Extracting and Inserting the Fan Unit,” on page 31.



Caution: Do not run the switch if the System Status LED for the Fans is Yellow!

**The link LED for the InfiniBand connector does not come on:**

1. Check that both ends of the cable are connected.
2. Check that the locks on the ends are secured.
3. Make sure that the latest FW version is installed on both the HCA and the switch.
4. If media adapters are used, check that the all connections are good, tight, and secure.

**The activity LED does not come on:**

Check that the Subnet Manager has been started.

**The switch is off:**

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, Use the FabricIT management CLI or Web GUI to determine the cause of the Shutdown.
6. Check the temperature.
7. Check the Fan status.

**The switch is not working and unresponsive:**

1. Reset the switch.

If resetting the switch does not work:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, use the FabricIT management CLI or Web GUI to determine the cause of the shutdown.

**The last software update did not succeed:**

1. Connect the RS232 connector (CONSOLE) to a laptop.
2. Push the reset button on the switch or management module.
3. You will have ~ 5 seconds to stop the U-Boot by pressing Control-B.

4. Choose the image to upload. Only use image 1 or image 2.

U-Boot 2009.01-mlnx1.4 (May 12 2010 - 14:08:15)

CPU: AMCC PowerPC 460EX Rev. A at 1000 MHz (PLB=200, OPB=100, EBC=100 MHz)  
Security/Kasumi support  
Bootstrap Option H - Boot ROM Location I2C (Addr 0x52)  
Internal PCI arbiter disabled  
32 kB I-Cache 32 kB D-Cache  
Board: Mellanox PPC460EX Board  
FDEF: No  
I2C: ready  
DRAM: 2 GB (ECC enabled, 400 MHz, CL3)  
FLASH: 16 MB  
NAND: 1024 MiB  
PCI: Bus Dev VenId DevId Class Int  
PCIE0: link is not up.  
PCIE1: successfully set as root-complex  
01 00 15b3 bd34 0c06 00  
Net: ppc\_4xx\_eth0, ppc\_4xx\_eth1  
Hit Ctrl+B to stop autoboot: 0

Mellanox FabricIT

Boot Menu:

1. EFM\_PPC\_M460EX EFM\_1.1.1000 2010-06-24 16:32:03 ppc
2. EFM\_PPC\_M460EX EFM\_1.1.1200 2010-06-25 18:00:03 ppc
3. U-Boot prompt

Choice:

5. Select the image to boot.

## Appendix A: Specification

**Table 8 - MTS3600Q Specification Data**

Physical		Power and Environmental	
Size:	1.73" (1U) H x 17.5" W x 23.8" D 44mm X 444mm X 605mm	Input Voltage:	100 - 240 VAC 50-60Hz
Weight:	22.045 lbs. 1 PSU 24.60 lbs. 2 PSUs	Power Consumption:	
Mounting:	19" Rack mount	No management	
Air Flow:	70.5 CFM	CPU	Typical / Max in W
SerDes Speeds:	10, 20, or 40,Gb/s per port	Passive cables:	136.05 / 145.06
Connector Types:	QSFP	Active cables:	213.51 / 248.33
		405EXR management	Typical / Max in W
		Passive cables:	142.01 / 156.97
		Active cables:	219.46 / 260.24
		460 EX CPU management	Typical / Max
		Passive cables:	147.96 / 162.92
		Active cables:	225.41 / 266.19
		QSFP Max	
		Power per port for active cables:	3.5W
		Temperature:	10° to 45° Celsius
		Humidity:	10% - 90% non-condensing
		Shock and Vibration:	ETSI EN 300 019-2-2: 1999-09
Protocol Support		Regulatory Compliance	
InfiniBand:	Auto-Negotiation of (40Gb/s, 20Gb/s, 10Gb/s)	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB
QoS:	8 InfiniBand Virtual Lanes for all ports	EMC (Emissions):	USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A
Management:	Baseboard, Performance, and Device management Agents for full InfiniBand In-Band Management	Environmental:	EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test
Data Rate:	QDR	Acoustic:	ISO 7779 ETS 300 753
		Sound power level:	70.5 dB(A) or 7.1 Bel

Physical		Power and Environmental	
Scalability and Performance		Reliability, Availability and Serviceability Features	
Switching Performance:	Simultaneous wire-speed any port to any port	Hot-Swappable: 1+1 Redundant:	Fan Module and Power Supplies Power Supplies
Addressing:	48K Unicast Addresses Max. per Subnet 16K Multicast Addresses per Subnet		
Switching Capacity:	2.88Tb/s		

**Table 9 - MTS3600R Specification Data**

Physical		Power and Environmental	
Size:	1.73" (1U) H x 17.5" W x 23.8" D 44mm X 444mm X 605mm	Input Voltage:	100 - 240 VAC 50-60Hz
Weight:	22.045 lbs. 1 PSU 24.60 lbs. 2 PSUs	Power Consumption:	No management CPU Typical / Max in W
Mounting:	19" Rack mount	Passive cables:	TBD / TBD
Air Flow:	70.5 CFM	Active cables:	TBD / TBD
SerDes Speeds:	10 or 20 Gb/s per port	405EXR management	Passive cables: Typical / Max in W
Connector Types:	QSFP	Active cables:	TBD / TBD
		460 EX CPU management	TBD / TBD
		Passive cables:	Typical / Max
		Active cables:	TBD / TBD
		QSFP Max	TBD / TBD
		Power per port for active cables:	3.5W
		Temperature:	10° to 45° Celsius
		Humidity:	10% - 90% non-condensing
		Shock and Vibration:	ETSI EN 300 019-2-2: 1999-09
Protocol Support		Regulatory Compliance	

Physical		Power and Environmental	
InfiniBand:	Auto-Negotiation of (20Gb/s or 10Gb/s)	Safety	US/Canada: cTUVus EU: IEC60950 International: CB
QoS:	8 InfiniBand Virtual Lanes for all ports	EMC (Emissions)	USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A
Management:	Baseboard, Performance, and Device management Agents for full InfiniBand In-Band Management		
Data Rate:	DDR		
		Environmental	EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test
		Acoustic	ISO 7779 ETS 300 753
		Sound power level:	70.5 dB(A) or 7.1 Bel
Scalability and Performance		Reliability, Availability and Serviceability Features	
Switching Performance:	Simultaneous wire-speed any port to any port	Hot-Swappable: 1+1 Redundant:	Fan Module and Power Supplies Power Supplies
Addressing:	48K Unicast Addresses Max. per Subnet 16K Multicast Addresses per Subnet		
Switching Capacity:	1.44Tb/s		

## A.1 EMC Certification Statements

Table 10 lists the approved certification status per switch in different regions of the world.

**Table 10 - Switch Certification Status**

Switch P/N	FCC Class (USA)	EN Class (Europe)	ICES Class (Canada)	VCCI (Japan)	cTUVus	CB
MTS3600Q-1UNC	A	A	A	A	✓	✓
MTS3600R-1BNC	A	A	A	A	✓	✓
MTS3600Q-1BNC	A	A	A	A	✓	✓



## A.1.1 FCC Statements (USA)

### Class A Statements:

#### § 15.19(a)(4)

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 operation.

#### § 15.21

#### Statement

**Warning!** Changes or modifications to this equipment not expressly approved by the party responsible for compliance (Mellanox Technologies) could void the user's authority to operate the equipment.

#### §15.105(a)

#### Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## A.1.2 EN Statements (Europe)

### EN55022 Class A Statement:

#### **Warning**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be

## A.1.3 ICES Statements (Canada)

### Class A Statement:

"This Class A digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada."

## Appendix A.2: VCCI Statements (Japan)

### Class A Statement:

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

A.2.1 (Translation - "This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.")

## A.3 MIC Certification (Korea)

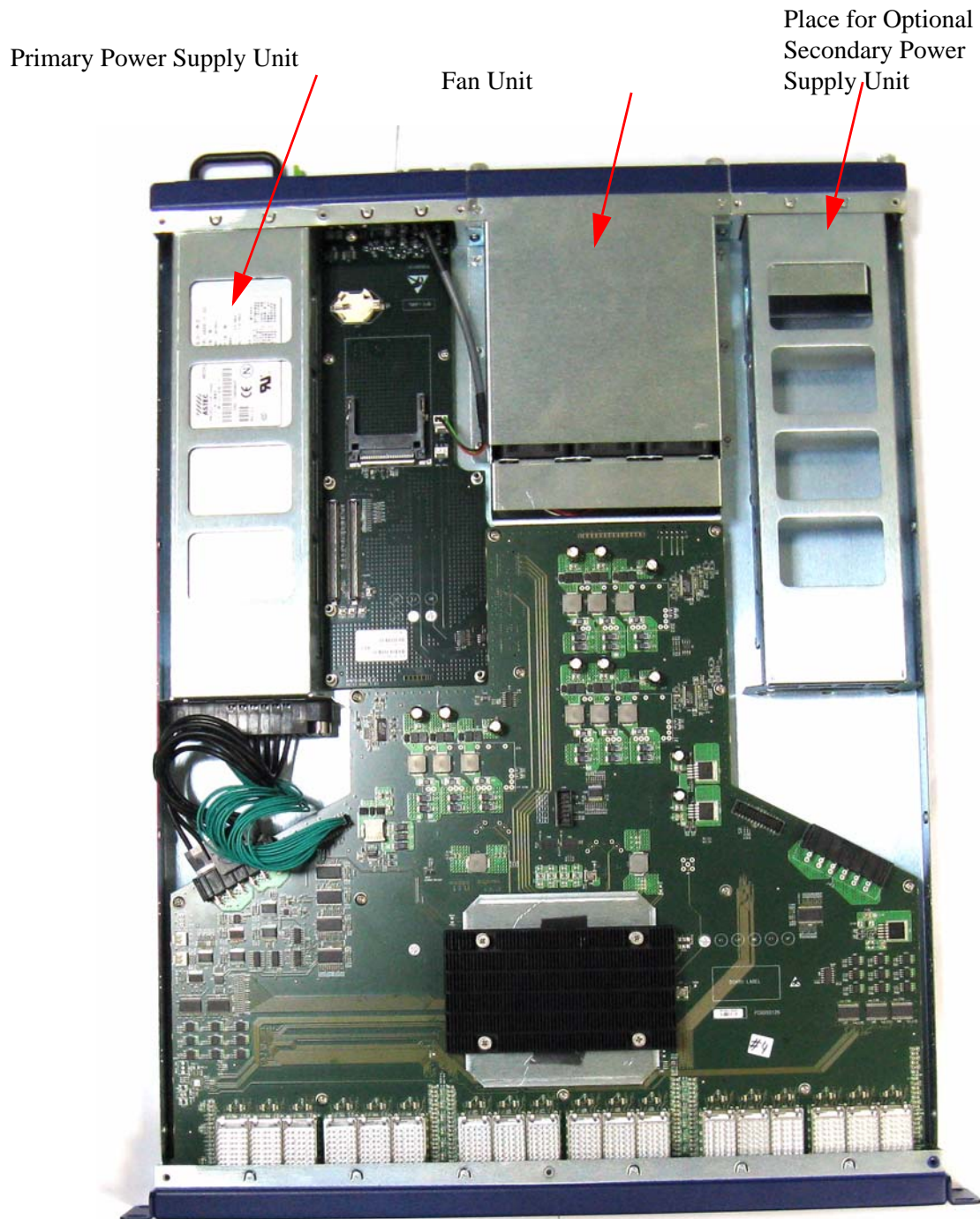
Korea's "Regulation for Certification of Information and Communication Equipment," requires EMC testing and certification for many electronic products. Korean EMC certifications are issued by Radio Research Laboratory (RRL), which is organized under the Ministry of Information and Communications (MIC). EMC testing includes electromagnetic emissions (EMI) and susceptibility (EMS). Certified equipment is labeled with the MIC mark and certification number.

**이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.**

Translation:

**Class A Device** This device is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this type was sold or purchased by mistake, it should be replaced with a residential-use type.

## Appendix B: Switch Hardware Components

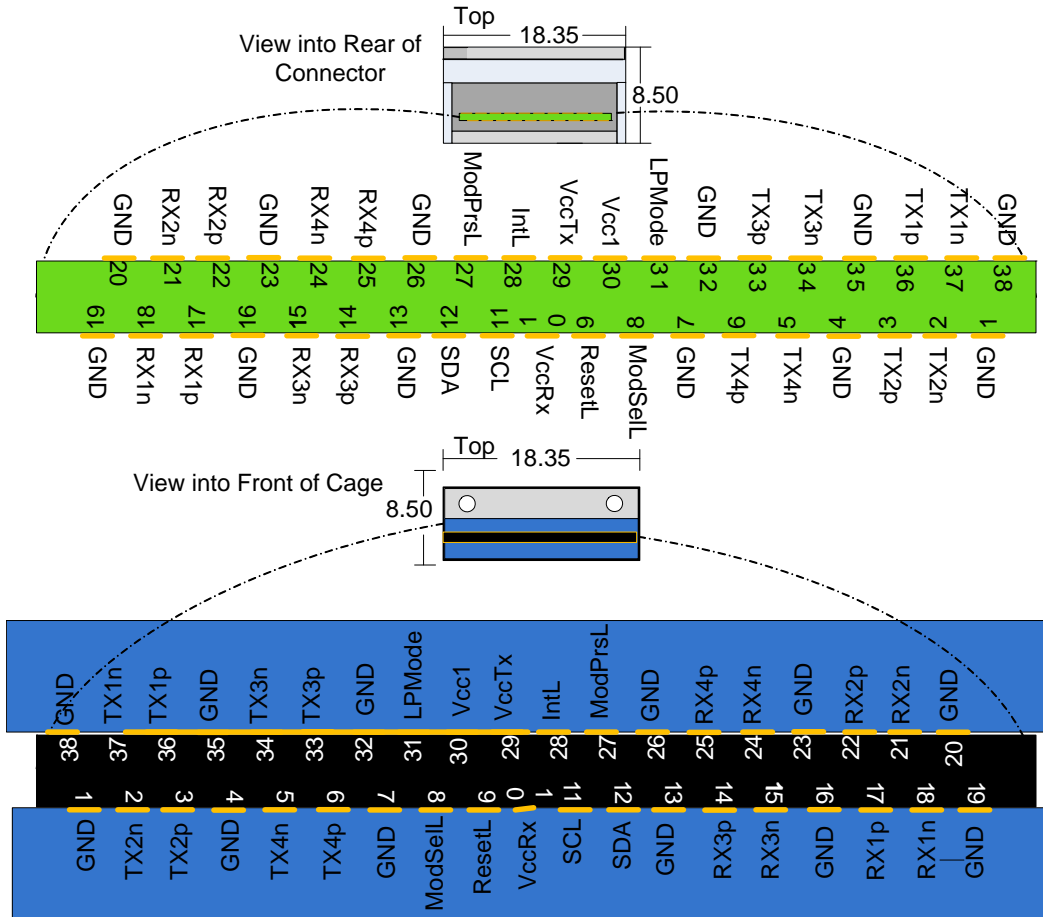


## Appendix C: QSFP Interface

20	GND	GND	19
21	Rx2n	Rx1n	18
22	Rx2p	Rx1p	17
23	GND	GND	16
24	Rx4n	Rx3n	15
25	Rx4p	Rx3p	14
26	GND	GND	13
27	ModPrsL	SDA	12
28	IntL	SCL	11
29	VccTx	Vcc Rx	10
30	Vcc1	ResetL	9
31	LPMODE	ModSelL	8
32	GND	GND	7
33	Tx3p	Tx4p	6
34	Tx3n	Tx4n	5
35	GND	GND	4
36	Tx1p	Tx2p	3
37	Tx1n	Tx2n	2
38	GND	GND	1

**Table 11 - InfiniBand QSFP Connector Pinout**

Connector Pin Number	Connector Pin Name	Signal Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3 V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Receiver Inverted Data Output
19	GND	Ground
20	GND	Ground
21	Rx2n	Receiver Inverted Data Output 3
22	Rx2p	Receiver Non-Inverted Data Output 3
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output 3
25	Rx4p	Receiver Non-Inverted Data Output 3
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3 V Power supply transmitter
30	Vcc 1	+3.3 V Power Supply
31	LPMODE	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground



## Appendix D: Replacement Parts Ordering Numbers

**Table 12 - Replacement Parts Ordering Numbers**

Part Description	OPN
Power Supply Unit PSU This Replacement part is for both the PSU 1 and PSU 2.	MTP000018
Power supply blank	MTM003600
Rack installation kit	MTR003600
Fan Unit for QSFP	MTF000960
RS232 Cable DB9 to DB9 Harness	HAR000040
I2C DB9 or RJ45 to USB Adapter	MTUSB-1
Power cord Type C13-C14	ACC000251
Power cord Type B for USA, Canada, Mexico, Taiwan	ACC000204
Power cord Type H for Israel	ACC000205
Power cord Type E/F for Sweden, France, Germany, Netherlands, Russia	ACC000207
Power cord Type G for UK	ACC000208
Power cord Type D for India	ACC000209
Power cord Type I for China	ACC000210
Power cord Type J for Switzerland	ACC000211
Power cord Type B for Japan,	ACC000212
Power cord Type I for Australia	ACC000213

## Appendix E: Avertissements de sécurité d'installation (French)

### 1. Instructions d'installation



Lisez toutes les instructions d'installation avant de brancher le matériel à la source d'alimentation électrique.

### 2. Température excessive



Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 45°C (113°F). En outre, pour garantir un bon écoulement de l'air, laissez au moins 8 cm (3 pouces) d'espace libre autour des ouvertures de ventilation.

### 3. Empilage du châssis



Le châssis ne doit pas être empilé sur un autre matériel. Si le châssis tombe, il peut provoquer des blessures corporelles et des dégradations de biens.

### 4. Connection d'Alimentation électrique excédentaire -dangers électriques



Ce produit comporte un couvercle transparent sur l'espace pour l'alimentation électrique redondante.

Ne pas faire fonctionner le produit si le couvercle transparent n'est pas solidement fixé ou s'il est enlevé.

### 5. Orages – dangers électriques



Pendant un orage, il ne faut pas utiliser le matériel et il ne faut pas brancher ou débrancher les câbles.

### 6. Branchement/débranchement des câbles InfiniBand en cuivre



Les câbles InfiniBand en cuivre sont lourds et ne sont pas flexibles, il faut donc faire très attention en les branchant et en les débranchant des connecteurs. Consultez le fabricant des câbles pour connaître les mises en garde et les instructions spéciales.

### 7. Montage et entretien sur baie



Lorsque ce produit est monté ou entretenu sur baie, il faut prendre des précautions spéciales pour s'assurer que le système reste stable. En général, il faut remplir la baie avec du matériel de bas en haut.

## 8. Installation du matériel



Ce matériel ne doit être installé, remplacé ou entretenu que par du personnel formé et qualifié.

## 9. Elimination du matériel



L'élimination de ce matériel doit s'effectuer dans le respect de toutes les législations et réglementations nationales en vigueur.

## 10. Codes électriques locaux et nationaux



Ce matériel doit être installé dans le respect des codes électriques locaux et nationaux.



## Appendix F: Installation - Sicherheitshinweise (German)

### 1. Installationsanleitungen



Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

### 2. Übertemperatur



Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 45°C (113°F) betrieben werden. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

### 3. Stapeln des Chassis



Das Chassis sollte nicht auf andere Geräte gestapelt werden. Wenn das Chassis herunterfällt, kann es zu Verletzungen und Beschädigungen an Geräten führen.

### 4. Redundanter Stromversorgungsanschluss - Elektrische Gefahr



Dieses Produkt verfügt über eine Abdeckung über dem Bereich für die redundante Stromversorgung. Betreiben Sie das Produkt nicht, wenn diese Abdeckung nicht sicher festsitzt oder entfernt wurde.

### 5. Bei Gewitter - Elektrische Gefahr



Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät, schließen Sie keine Kabel an oder ab.

### 6. Anschließen/Trennen von InfiniBand-Kupferkabel



InfiniBand-Kupferkabel sind schwer und nicht flexible. Deshalb müssen sie vorsichtig an die Anschlüsse angebracht bzw. davon getrennt werden. Lesen Sie die speziellen Warnungen und Anleitungen des Kabelherstellers.

### 7. Rack-Montage und Wartung



Wenn dieses Produkt in einem Rack montiert oder gewartet wird, sind besondere Vorsichtsmaßnahmen zu ergreifen, um die Stabilität des Systems zu gewährleisten. Im Allgemeinen sollten Sie das Gestell von unten nach oben mit Geräten füllen.

### 8. Geräteinstallation



Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

## 9. Geräteentsorgung



Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

## 10. Regionale und nationale elektrische Bestimmungen



Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.

## Appendix G: Advertencias de seguridad para la instalación (Spanish)

### 1. Instrucciones de instalación



Antes de conectar el equipo a la fuente de alimentación, leer todas las instrucciones de instalación.

### 2. Instalación en un lugar con acceso restringido.



Esta unidad ha sido ideada para instalar en lugares de acceso restringido.

### 3. Sobrecalentamiento



No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 45°C. Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

### 4. Apilamiento del chasis



Los chasis no se deben apilar sobre otros equipos. La caída del chasis podría causar lesiones corporales, así como daños al equipo.

### 5. Conexión de fuente de alimentación redundante: peligro de descarga eléctrica



Este producto incluye una fuente de alimentación redundante o, en su lugar, una vacía. Si se dispone de una fuente de alimentación vacía, no utilizar el producto si su tapa está quitada o no está bien cerrada.

### 6. Cuando hay rayos: peligro de descarga eléctrica



No utilizar el equipo ni conectar o desconectar cables durante períodos de actividad de rayos.

### 7. Montaje y mantenimiento de bastidores



Al instalar o realizar el mantenimiento de este aparato en un bastidor, es preciso adoptar precauciones especiales para garantizar que el sistema se mantenga estable. En general, en un bastidor, los equipos se deben instalar comenzando desde abajo hacia arriba.

## 8. Instalación de equipos



La instalación, el reemplazo y el mantenimiento de este equipo estarán a cargo únicamente de personal capacitado y competente.

## 9. Asegurar confinamientos adecuados



El fabricante del producto final o el usuario final deberán suministrar un confinamiento adecuado para componentes eléctricos y mecánicos y contra incendio.

## 10. Eliminación de equipos



La eliminación definitiva de este equipo se debe efectuar conforme a todas las leyes y reglamentaciones nacionales.

## 11. Códigos eléctricos locales y nacionales



Este equipo se debe instalar conforme a los códigos eléctricos locales y nacionales.

## 12. Cable de alimentación homologado por UL y con certificación CSA Fuga > 3,5 mA



En conexiones de América del Norte, seleccionar un cable de alimentación homologado por UL y con certificación CSA de tres conductores, [16 AWG], terminado en un enchufe moldeado con capuchón de 125 voltios nominal, [13 A], con una longitud mínima de 1,5 metros, pero no más de 4,5 metros.

En conexiones europeas, seleccionar un cable de alimentación armonizado internacionalmente y marcado "<HAR>", de tres conductores, hilo de 1,0 mm<sup>2</sup> como mínimo, 300 voltios nominal, con cobertura protectora aislante de PVC. El cable debe tener un enchufe moldeado con capuchón de 250 voltios nominal, 10 A.



**ADVERTENCIA:** Alta corriente de fuga. Es esencial efectuar la conexión a tierra antes de conectar la alimentación.

### 13. Añadir conexión a tierra



Antes de conectar el dispositivo a la línea de alimentación, los tornillos del terminal de la puesta a tierra de protección del dispositivo se deben conectar a la puesta a tierra de protección de la instalación del edificio.

(Información de conexión a tierra):

La instalación del edificio deberá proveer un medio para la conexión con la puesta a tierra de protección y un técnico de servicio deberá conectar permanentemente el equipo a dicho medio de conexión.

Un **TÉCNICO DE SERVICIO** comprobará si la toma eléctrica de la que se suministrará corriente al equipo provee una conexión con la puesta a tierra de protección del edificio. De no ser así, el **TÉCNICO DE SERVICIO** se encargará de instalar un **CONDUCTOR DE CONEXIÓN A TIERRA DE PROTECCIÓN**, del terminal de puesta a tierra de protección separado al conductor de tierra de protección del edificio. El equipo se instalará en un área donde haya conexión equipotencial, como por ejemplo, un centro de telecomunicaciones o una sala de computadoras dedicada.

### 14. Códigos de instalación



Este dispositivo se debe instalar conforme a la versión más reciente de los códigos eléctricos nacionales del país en cuestión. En América del Norte, el equipo se debe instalar de acuerdo con las disposiciones vigentes del Código Eléctrico Nacional de los EE.UU. y del Código Eléctrico de Canadá.

### 15. Directiva sobre RAEE



Conforme a la Directiva 2002/96/CE sobre RAEE, todos los residuos de equipos eléctricos y electrónicos (EEE) se deben recolectar por separado y no se deben eliminar junto con residuos domésticos.

Al deshacerse de este producto y de todas sus partes, hágalo de una manera responsable y respetuosa con el medio ambiente.

## Appendix H: Special Regulations Regarding Finland, Sweden, Denmark, and Norway

**Denmark-** This unit is class I and must be connected with an AC cord compliant with all national electrical codes in Denmark. The AC cord shall have an integral ground wire, and can only be plugged into a fully grounded outlet.



Do not connect this unit to any outlet that is not fully grounded!

- **Finland -**



“Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan”

- **Norway -**



“Apparatet må tilkoples jordet stikkontakt”

Unit is intended for connection to IT power systems for Norway only.

- **Sweden -**



“Apparaten skall anslutas till jordat uttag.”