



AOC-MHIBF-m2Q2G



AOC-MHIBF-m1Q2G



User's Guide

Revision 1.0b

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Preface

About this User's Guide

This user's guide is written for system integrators, PC technicians, and knowledgeable PC users. It provides information for the installation and use of the AOC-MHIBF-m2Q2G and AOC-MHIBF-m1Q2G add-on cards.

About this Add-on Card

The AOC-MHIBF-m2Q2G and AOC-MHIBF-m1Q2G are the most powerful InfiniBand controllers in the market. In the small form factor SIOM, available as part of an integrated solution with Supermicro servers, they provide both InfiniBand FDR 56Gbps and 40Gbps Ethernet as well as remote server management through a dedicated Gigabit LAN controller. Based on Mellanox® ConnectX-3 Pro and Intel® i350 controllers, they provide unparalleled performance and flexible interconnect solutions for Supermicro servers in data centers and enterprise environments.

An Important Note to the User

All images and layouts shown in this user's guide are based upon the latest PCB revision available at the time of publishing. The card you have received may or may not look exactly the same as the graphics shown in this user's guide.

Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning the add-on card to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and the shipping package is mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete. For faster service, You can also request a RMA authorization online (<http://www.supermicro.com>).

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alternation, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Conventions Used in the User's Guide

Pay special attention to the following symbols for proper system installation and to prevent damage to the system or injury to yourself:



Note: Additional information given to provide information for correct system setup.

Naming Convention

AOC-MHIBF-m2Q2G

1st
2nd
3rd
5th
6th
7th
8th

Character	Representation	Options
1st	Product Family	AOC: Add On Card
2nd	Form Factor	S: Standard, P: Proprietary, C: MicroLP, M: Super IO Module (SIOM), MH: SIOM Hybrid
3rd	Product Type/Speed	G: GbE (1Gb/s), TG: 10GbE (10Gb/s), 25G: 25GbE (25Gb/s), 40G: 40GbE (40Gb/s), 50G: 50GbE (50Gb/s), 100G: 100GbE (100Gb/s), IBE: EDR IB (100Gb/s), IBF: FDR IB (56Gb/s), IBQ: QDR IB (40Gb/s), HFI: Host Fabric Interface
4th	Chipset Model (Optional)	N: Niantec (82599), P: Powerville (i350), S: Sageville (X550)
5th	Chipset Manufacturer	i: Intel, m: Mellanox, b: Broadcom
6th	Number of Ports	1: 1 port, 2: 2 ports, 4: 4 ports
7th	Connector Type (Optional)	S: SFP+/SFP28, T: 10GBase-T, Q: QSFP+, C: QSFP28
8th	2 nd Controller/Connector Type (Optional)	G: 1x GbE RJ45, 2G: GbE 2x RJ45, S: 1x 10G SFP+, T: 10GBase-T, 2T: 2x 10GBase-T

SMC Networking Add-on Cards

Model	Type	Form Factor	Controller	Connection	Dimension (w/o Brackets) (L x H)	Power (W)
AOC-MGP-i2	GbE	SIOM	Intel® i350 AM2	2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	3.7
AOC-MGP-i4	GbE	SIOM	Intel® i350 AM4	4 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	4.4
AOC-MTGN-i2S	10GbE	SIOM	Intel® 82599ES	2 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	7.2
AOC-MTG-i4S	10GbE	SIOM	Intel® XL710-BM1	4 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	7
AOC-MTG-b2T	10GbE	SIOM	Broadcom® BCM57416	2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	11
AOC-MTG-i2T	10GbE	SIOM	Intel® X550-AT2	2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	13
AOC-MTG-i4T	10GbE	SIOM	2x Intel® X550-AT2	4 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	26
AOC-MHIBF-m1Q2G	FDR IB GbE	SIOM	Mellanox® ConnectX-3 Pro Intel® i350	1 QSFP (56Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	9
AOC-MHIBF-m2Q2G	FDR IB GbE	SIOM	Mellanox® ConnectX-3 Pro Intel® i350	2 QSFP (56Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	11
AOC-MHIBE-m1CG	EDR IB GbE	SIOM	Mellanox® ConnectX-4 VPI Intel® i210	1 QSFP28 (100Gb/port) 1 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	19
AOC-MH25G-b2S2G	25GbE	SIOM	Broadcom® BCM57414 Intel® i350	2 SFP28 (25Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	9
AOC-MH25G-m2S2T	25GbE	SIOM	Mellanox® ConnectX-4 Lx EN Intel® X550-AT2	2 SFP28 (25Gb/port) 2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	25
AOC-M25G-m4S	25GbE	SIOM	Mellanox® ConnectX-4 Lx EN	4 SFP28 (25Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	20
AOC-M25G-i2S	25GbE	SIOM	Intel® XXV710	2 SFP28 (25Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	11.8
AOC-MHFI-11C	Omni-Path	SIOM	Intel® OP HFI ASIC (Wolf River WFR-B)	1 QSFP28 (100Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	15

Model	Type	Form Factor	Interface	Controller	Connection	Dimension (w/o Brackets) (L x H)	Power (W)
AOC-SGP-i2	GbE	Standard LP	PCI-E x4	Intel® I350 AM2	2 RJ45 (1Gb/port)	3.9" (99mm) x 2.73" (69mm)	3.5
AOC-SGP-i4	GbE	Standard LP	PCI-E x4	Intel® I350 AM4	4 RJ45 (1Gb/port)	3.9" (99mm) x 2.73" (69mm)	5
AOC-STG-i2T	10GbE	Standard LP	PCI-E x8	Intel® X540-AT2	2 RJ45 (10GBase-T)	5.9" (150mm) x 2.73" (69mm)	13
AOC-STGS-i1T	10GbE	Standard LP	PCI-E x4	Intel® X550-AT	1 RJ45 (10GBase-T)	5.9" (150mm) x 2.73" (69mm)	9
AOC-STGS-i2T	10GbE	Standard LP	PCI-E x4	Intel® X550-AT2	2 RJ45 (10GBase-T)	5.9" (150mm) x 2.73" (69mm)	11
AOC-STG-b2T	10GbE	Standard LP	PCI-E x8	Broadcom® BCM57416	2 RJ45 (10GBase-T)	5.6" (142mm) x 2.73" (69mm)	13.1
AOC-STG-i4T	10GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	4 RJ45 (10GBase-T)	5.9" (149mm) x 2.73" (69mm)	15.5
AOC-STGN-i1S	10GbE	Standard LP	PCI-E x8	Intel® 82598EN	1 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	10
AOC-STGN-i2S	10GbE	Standard LP	PCI-E x8	Intel® 82598ES	2 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	11.2
AOC-STGF-i2S	10GbE	Standard LP	PCI-E x8	Intel® X710-BM2	2 SFP+ (10Gb/port)	5.19" (132mm) x 2.73" (69mm)	5.6
AOC-STG-b4S	10GbE	Standard LP	PCI-E x8	Broadcom® BCM57840S	4 SFP+ (10Gb/port)	5.4" (137mm) x 2.73" (69mm)	14
AOC-STG-i4S	10GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	4 SFP+ (10Gb/port)	5.9" (150mm) x 2.73" (69mm)	8
AOC-S25G-m2S	25GbE	Standard LP	PCI-E x8	Mellanox® CX-4 LX	2 SFP28 (25Gb/port)	5.6" (142mm) x 2.713" (69mm)	8.7
AOC-S25G-b2S	25GbE	Standard LP	PCI-E x8	Broadcom® BCM57414	2 SFP28 (25Gb/port)	5.6" (142mm) x 2.713" (69mm)	5.2
AOC-S25G-i2S	25GbE	Standard LP	PCI-E x8	Intel® XXV710	2 SFP28 (25Gb/port)	6.1" (155mm) x 2.713" (69mm)	7.2
AOC-CGP-i2	GbE	MicroLP	PCI-E x4	Intel® I350 AM2	2 RJ45 (1Gb/port)	4.45" (113mm) x 1.54" (39mm)	4
AOC-CTG-i1S	10GbE	MicroLP	PCI-E x8	Intel® 82598EN	1 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	10
AOC-CTG-i2S	10GbE	MicroLP	PCI-E x8	Intel® 82598ES	2 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	11
AOC-CTG-i2T	10GbE	MicroLP	PCI-E x8	Intel® X540-AT2	2 RJ45 (10GBase-T)	4.8" (123mm) x 2.75" (77mm)	13
AOC-CTGS-i2T	10GbE	MicroLP	PCI-E x4	Intel® X550-AT2	2 RJ45 (10GBase-T)	4.45" (113mm) x 1.54" (39mm)	12
AOC-C250-m1S	25GbE	MicroLP	PCI-E x8	Mellanox® CX-4 Lx EN	1 SFP28 (28Gb/port)	4.45" (113mm) x 1.54" (39mm)	8.5

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Chapter 1


Overview

1-1 Overview

Congratulations on purchasing your add-on card from an acknowledged leader in the industry. Supermicro products are designed with the utmost attention to detail to provide you with the highest standards in quality and performance. For product support and updates, please refer to our website at <http://www.supermicro.com/products/nfo/networking.cfm#adapter>.

1-2 Key Features

The key features of this add-on card include the following:

- Super I/O Module (SIOM) form factor
- Mellanox® ConnectX-3 Pro InfiniBand FDR controller
- Dual and single QSFP connector models
- Up to 56Gbps InfiniBand or 40Gbps Ethernet
- Virtual Protocol Interconnect (VPI)
- VXLAN and NVGRE
- Intel® i350 GbE controller
- Dual RJ45 connectors
- NC-SI for remote management
- Asset Management features with thermal sensor
- RoHS compliant 6/6 

1-3 Specifications

General

- Super I/O Module (SIOM) form factor
-

- Mellanox® ConnectX-3 Pro FDR controller
- Intel® i350 GbE controller
- Dual QSFP ports and dual RJ45 ports (AOC-MHIBF-m2Q2G)
- Single QSFP port and dual RJ45 ports (AOC-MHIBF-m1Q2G)

Cables Support

- InfiniBand FDR: QSFP 56Gbps copper cables
- GbE: RJ45 category 5/5e up to 100m

Power Consumption

- AOC-MHIBF-m2Q2G: Maximum 11W
- AOC-MHIBF-m1Q2G: Maximum 9W

Operating Condition

- Operating temperature: 0°C to 55°C (32°F to 131°F)
- Storage temperature: -40°C to 70°C (-40°F to 158°F)
- Storage humidity: 90% non-condensing relative humidity at 35°C

Physical Dimensions

- Card PCB dimensions: 92mm (3.62in) x 87.1mm (3.43in) (WxD)

Supported Platforms

- Supermicro® motherboards with Super I/O Module (SIOM) slot
- Supermicro® server systems with Super I/O Module slot (see SIOM Compatibility Matrix online at http://www.supermicro.com/support/resources/AOC/AOC_Compatibility_SIOM.cfm)



Note: This product is sold only as part of an integrated solution with Supermicro server systems.

InfiniBand FDR QSFP Specifications

Connectivity

- Interoperable with InfiniBand or 40GbE switches
- Passive copper cable with ESD protection

InfiniBand

- IBTA specification 1.2.1 compliant
- Hardware-based congestion control
- 256 to 4K byte MTU, 2GB messages

Enhanced InfiniBand

- Hardware-based reliable transport
- Collective operations offloads
- Hardware-based reliable multicast
- Extended reliable connected transport
- Enhanced atomic operations

Ethernet

- IEEE 802.3ba 40 Gigabit Ethernet
- IEEE Std 802.3ad Link Aggregation
- IEEE Std 802.3az Energy Efficient Ethernet
- IEEE Std 802.1Q, 802.1P VLAN tags and priority
- IEEE P802.1bb D1.0 priority-based flow control
- IEEE 1588
- Jumbo frame support (9600B)

Hardware-based I/O Virtualization

- Single root IOV
- Address translation and protection
- Dedicated adapter resources
- Multiple queues per virtual machine
- Enhanced QoS for vNICs
- VMware NetQueue support

Overlay Networks

- VXLAN and NVGRE

Additional CPU Offloads

- RDMA over converged Ethernet (RoCE)
- TCP/UDP/IP stateless offload
- Intelligent interrupt coalescence

FlexBoot™ Technoloty

- Remote boot over InfiniBand
- Remote boot over Ethernet
- Remote boot over iSCSI

Protocol Support

- Open MPI, OSU MVAPICH, Intel® MPI, MS
- MPI, Platform MPI
- TCP/UDP, EoIB, IPoIB, RDS
- SRP, iSER, NFS RDMA

- uDAPL

Operating System Support

- Citrix XenServer 6.1
- RHEL/CentOS 5.X and 6.X, Novell SLES10 SP4; SLES11 SP1, SLES11 SP2, OEL, Fedora 14, 15, 17, Ubuntu 12.04
- Windows Server 2008/2012/2012 R2
- FreeBSD
- OpenFabrics Enterprise Distribution (OFED)
- OpenFabrics Windows Distribution (WinOF)
- VMware ESXi 4.x and 5.x

GbE RJ45 Specifications

Ethernet and Virtualization Features

- PC-SIG SR-IOV support
- Jumbo frames support

Performance and Efficiency Features

- Energy Efficient Ethernet (EEE)
- TCP/UDP, IPv4, and IPv6 checksum offloads to improve CPU usage
- Low latency interrupts

Management Features

- Asset Management support on Supermicro® platforms
- Preboot eXecution Environment (PXE) support

- iSCSI remote boot support
- NC-SI for remote management via Intel® i350 GbE RJ45 connector

Operating System Support

- Windows Server 2012 R2, 2012, 2008 R2 (x64 Edition)
- Windows 8.1, 8, 7 (x64 Edition)
- RedHat Linux
- SUSE Linux
- FreeBSD
- UEFI
- VMware

1-4 Available SKUs

SKUs	Bracket Included	Description
AOC-MHIBF-m2Q2G	BKT-0122L	2-port InfiniBand FDR Adapter with a swappable bracket for 2U+ chassis (Storage Servers)
AOC-MHIBF-m2Q2GM	BKT-0118L	2-port InfiniBand FDR Adapter with an internal bracket for 1U chassis (Twin Servers)
AOC-MHIBF-m1Q2G	BKT-0123L	1-port InfiniBand FDR Adapter with a swappable bracket for 2U+ chassis (Storage Servers)
AOC-MHIBF-m1Q2GM	BKT-0119L	1-port InfiniBand FDR Adapter with an internal bracket for 1U chassis (Twin Servers)

1-5 Similar Products

Model	Form Factor	Speed	Connector Type	Total Ports	Controller
AOC-MGP-i2	SIOM	GbE	RJ45	2	Intel® i350
AOC-MGP-i4	SIOM	GbE	RJ45	4	Intel® i350
AOC-MTGN-i2S	SIOM	10GbE	SFP+	2	Intel® 82599ES
AOC-MTG-i4S	SIOM	10GbE	SFP+	4	Intel® XL710-BM1
AOC-MTG-i2T	SIOM	10GbE	RJ45	2	Intel® X550
AOC-MTG-i4T	SIOM	10GbE	RJ45	4	Intel® X550
AOC-MTG-b2T	SIOM	10GbE	RJ45	2	Broadcom® BCM57416
AOC-MH25G-m2S2T	SIOM	25GbE 10GbE	SFP28 RJ45	2 2	Mellanox® CX-4 Lx EN Intel® X550
AOC-MH25G-b2S2G	SIOM	25GbE 1GbE	SFP28 RJ45	2 2	Broadcom® BCM57414 Intel® i350
AOC-M25G-i2S	SIOM	25GbE	SFP28	2	Intel® XXV710
AOC-M25G-m4S	SIOM	25GbE	SFP28	4	Mellanox® CX-4 Lx EN
AOC-MHIBE-m1CG	SIOM	EDR IB /100GbE GbE	QSFP28 RJ45	1 1	Mellanox® CX-4 VPI Intel® i210
AOC-MHFI-i1C	SIOM	Omni-Path	QSFP28	1	Intel® OP HFI ASIC (Wolf River WFR-B)

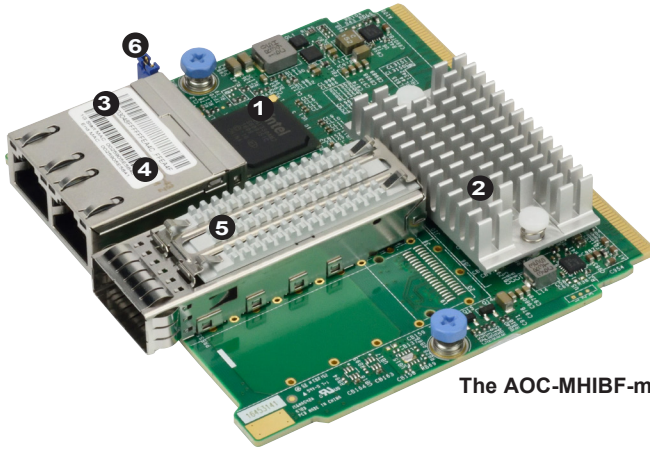
1-6 Optional Accessories

Product Part Number	Part Number	Description
QSFP Copper Cable	CBL-0490L	1M QSFP to QSFP InfiniBand FDR 56Gb/s Passive Copper, PBF, 30AWG
QSFP Copper Cable	CBL-NTWK-0642	2M QSFP to QSFP InfiniBand FDR 56Gb/s Passive Copper, PBF, 30AWG
QSFP Copper Cable	CBL-0496L	3M QSFP to QSFP InfiniBand FDR 56Gb/s Passive Copper, PBF, 28AWG
QSFP Active Optical Cable	CBL-QSFP+56-AOC-3M	3M 56 Gb/s QSFP to QSFP FDR Fiber Active Optical Cable
QSFP Active Optical Cable	CBL-QSFP+56-AOC-5M	5M 56Gb/s QSFP to QSFP FDR Fiber Active Optical Cable
QSFP Active Optical Cable	CBL-QSFP+56-AOC-10M	10M 56Gb/s QSFP to QSFP FDR Fiber Active Optical Cable
QSFP Active Optical Cable	CBL-QSFP+56-AOC-15M	15M 56Gb/s QSFP to QSFP FDR Fiber Active Optical Cable

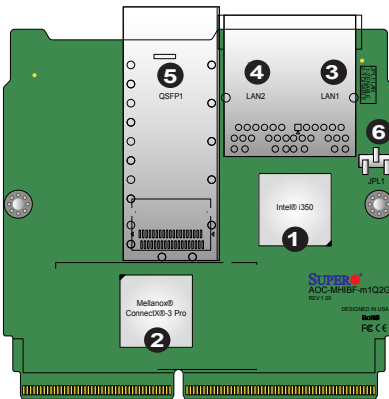
Chapter 2

Hardware Components

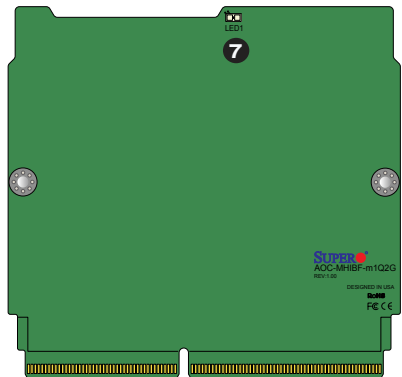
2-1 Add-On Card Image and Layout



The AOC-MHIBF-m1Q2G Image

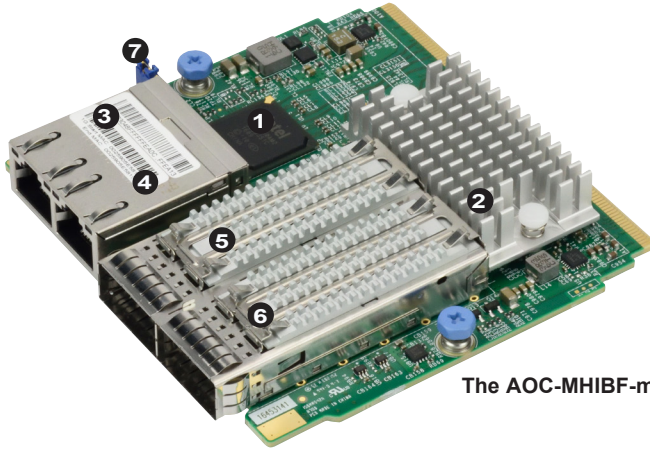


The AOC-MHIBF-m1Q2G Layout
(Top View)

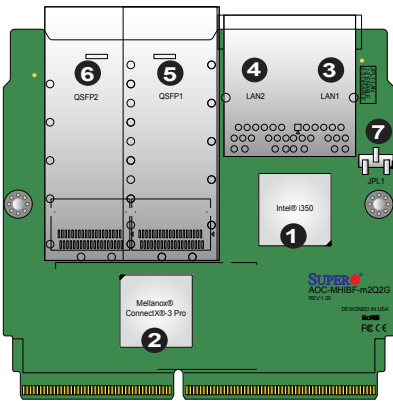


The AOC-MHIBF-m1Q2G Layout
(Bottom View)

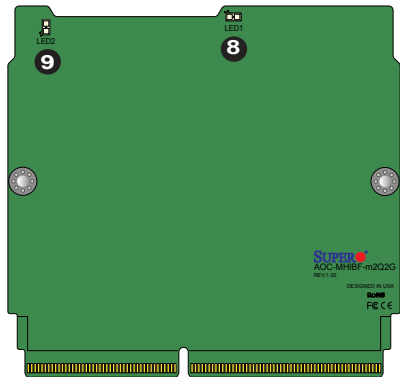
1. Intel® i350	5. QSFP1: QSFP Port1
2. Mellanox® ConnectX-3 Pro	6. JPL1: RJ45 LAN Ports Enable/Disable
3. LAN1: RJ45 Port1	7. LED1: QSFP Link LED
4. LAN2: RJ45 Port2	



The AOC-MHIBF-m2Q2G Image



The AOC-MHIBF-m2Q2G Layout (Top View)



The AOC-MHIBF-m2Q2G Layout (Bottom View)

1. Intel® i350	6. QSFP2: QSFP Port2
2. Mellanox® ConnectX-3 Pro	7. JPL1: RJ45 LAN Ports Enable/Disable
3. LAN1: RJ45 Port1	8. LED1: QSFP Port1 Link LED
4. LAN2: RJ45 Port2	9. LED2: QSFP Port2 Link LED
5. QSFP1: QSFP Port1	

2-2 Major Components

The following major components are installed on the AOC-MHIBF-m1Q2G:

1. Intel® i350
2. Mellanox® ConnectX-3 Pro
3. Dual RJ45 LAN ports
4. Single QSFP (Small Form Factor Pluggable) port
5. JPL1: RJ45 LAN ports Enable/Disable
6. LED1: QSFP Link LED


The following major components are installed on the AOC-MHIBF-m2Q2G:

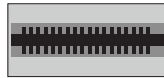
1. Intel® i350
2. Mellanox® ConnectX-3 Pro
3. Dual RJ45 LAN ports
4. Dual QSFP (Small Form Factor Pluggable) ports
5. JPL1: RJ45 LAN ports Enable/Disable
6. LED1/LED2: QSFP Link LEDs

2-3 QSFP Ethernet Connections and LED indicators

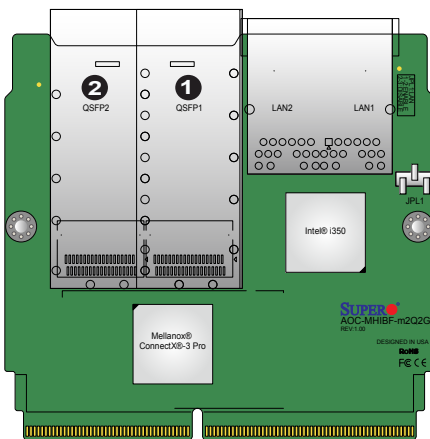
QSFP Ports

A single QSFP port is located on the AOC-MHIBF-m1Q2G. Two QSFP ports are located on the AOC-MHIBF-m2Q2G. Connect a QSFP cable to the port to provide Infiniband (56Gb/s) and Ethernet (40Gbp/s) communication. See the layout below for the locations.

 **Note:** Please refer to "Optional Accessories" on page 1-8 for recommended cables.



QSFP Port

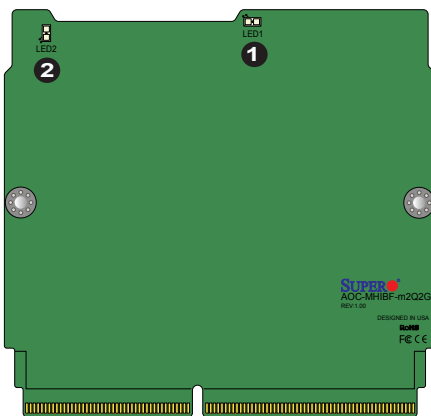


1. QSFP Connector
 2. QSFP Connector
- (for AOC-MHIBF-m2Q2G only)

QSFP PCB LEDs

On the back of the AOC-MHIBF-m2Q2G/m1Q2G, two LEDs are on the AOC-MHIBF-m2Q2G, and one LED is on the AOC-MHIBF-m1Q2G. A solid green LED indicates the link-up connection. Refer to the layout below for the locations.

QSFP PCB LEDs	
Color/Status	Definition
Off	No Connection
Green	Physical Link-up



1. LED1: QSFP Link LED
 2. LED2: QSFP Link LED
- (for AOC-MHIBF-m2Q2G only)

**The AOC-MHIBF-m2Q2G Layout
(Bottom View)**

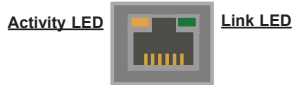
2-4 RJ45 LAN Ports and LAN LED indicators

RJ45 LAN Ports (LAN1/LAN2)

There are two RJ45 LAN ports (LAN1/LAN2) on the AOC-MHIBF-m2Q2G/m1Q2G. These LAN ports support connection speeds of 1Gbps. Use a direct-attach RJ45 type LAN cable. See the layout below for the locations.

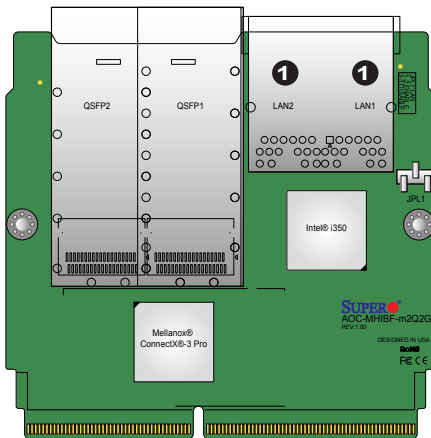
RJ45 LAN Port LED Indicators

Each LAN port has two LEDs to indicate speeds and data activities. Refer to the tables below for LED color and definition.



RJ45 LAN Port Activity LED (Left) LED State		
LED Color	Status	Definition
Off	Off	No Connection
Amber	Solid	Link
Amber	Flashing	Active

RJ45 LAN Port Link LED (Right) LED State	
LED Color	Definition
Green	100 Mbps
Amber	1 Gbps
Off	10 Mbps

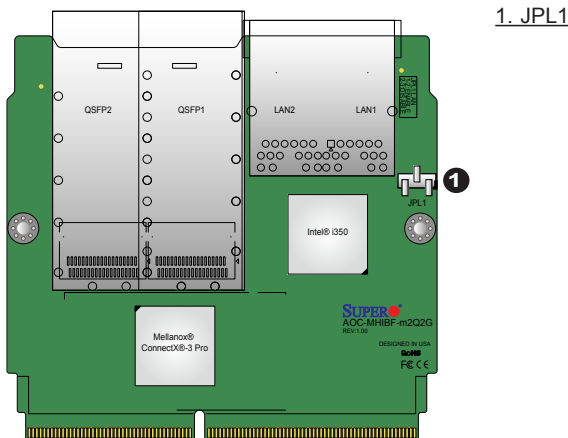


1. RJ45 LAN Ports

2-5 RJ45 LAN Ports Enable/Disable

Use Jumper JPL1 to enable or disable LAN1 and LAN2. See the table and layout below for jumper settings and locations. The default setting is **Enabled**.

RJ45 LAN Ports Enable/Disable Jumper Settings	
Jumper setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled



Chapter 3

Installation

3-1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To avoid damaging your add-on card, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing the add-on card from the antistatic bag.
- Handle the add-on card by its edges only; do not touch its components.
- Put the add-on card back into the antistatic bags when not in use.
- For grounding purposes, make sure that your system chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the add-on card.

Unpacking

The add-on card is shipped in antistatic packaging to avoid static damage. When unpacking your component or system, make sure you are static protected.



Note: To avoid damaging your components and to ensure proper installation, always connect the power cord last, and always unplug it before adding, removing, or changing any hardware components.

3-2 Before Installation

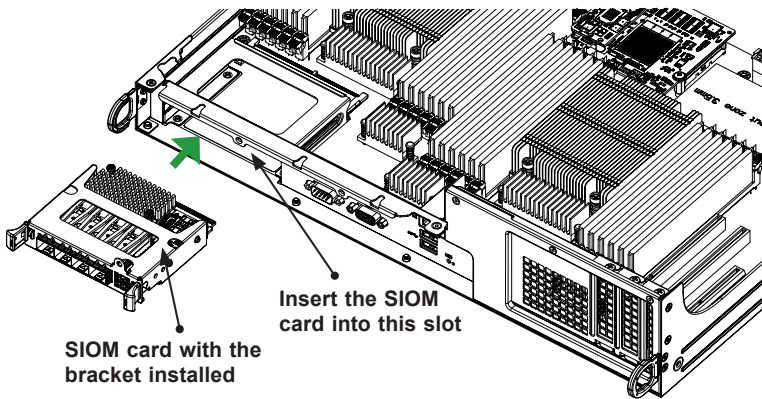
Before you install the add-on card, follow the instructions below.


1. Power down the system.
2. Unplug the power cord.
3. Use industry-standard anti-static equipment such as gloves or a wrist strap and follow the precautions on page 3-1 to avoid damage caused by ESD.
4. Familiarize yourself with the server, motherboard, and/or chassis documentation.
5. Confirm that your operating system includes the latest updates and hotfixes.

3-3 Installing the Add-on Card

Follow the steps below to install the add-on card into your system.

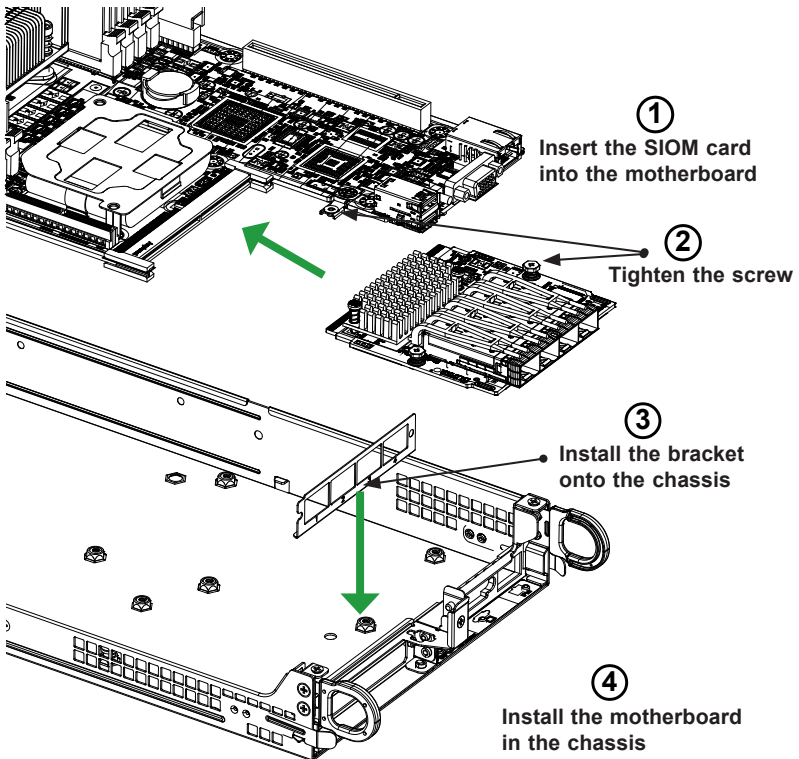
1. Remove the server cover and, if any, set aside any screws for later use.
2. Remove the add-on card slot cover. If the slot cover has a screw, place it aside for later use.
3. Position the add-on card in front of the SIOM slot and gently push in both sides of the card until it slides into the slot.




 **Note:** This add-on card does not support hot plug. Please turn off the AC power and remove the power cord from the wall socket before you install or remove the add-on card.

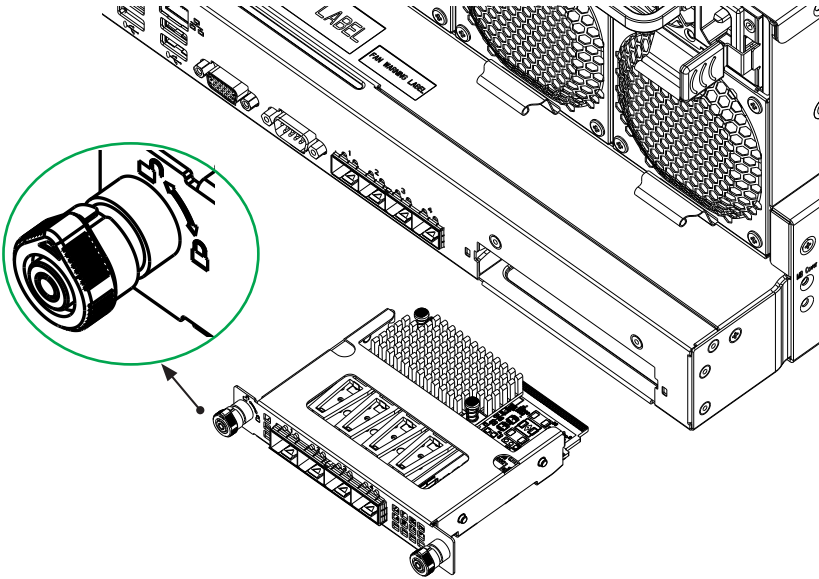
4. Secure the add-on card to the chassis. If required, use the screws that you previously removed.
5. Attach any necessary external cables to the add-on card.
6. Replace the system cover.
7. Plug in the power cord and power up the system.

Follow this step to install the add-on card if your system does not support a swappable bracket. Insert the SIOIM card into the motherboard and then install the motherboard in the chassis. An internal bracket comes with the SIOIM card 1U chassis SKU. It needs to be installed onto the chassis.



 **Note:** Supermicro recommends that this SIOIM card be installed by a system integrator or by the manufacturer.

Follow the steps below to install the add-on card into your system that supports a swappable bracket. The add-on card must be installed in the swappable bracket before it can be installed in the your system

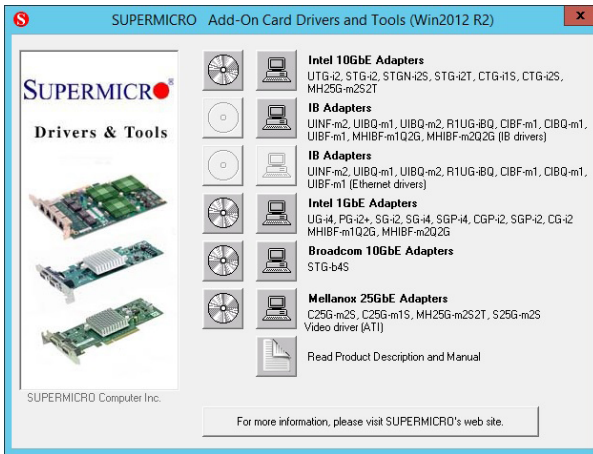


1. Install the add-on card into the swappable bracket.
2. Position the add-on card in front of the SIOM slot and gently push in both sides of the card until it slides into the slot.
3. Once the card is in the slot, push both knobs in and turn to the right to lock the card in the system. The left knob has the unlock/lock symbols next to it. To ensure that the add-on is locked, make sure that the knob position indicator is pointing to the lock symbol.

3-4 Installing Drivers on Windows (for Intel® i350)

Follow the steps below to install the drivers for Windows. Download the driver from the Supermicro CDR-NIC LAN driver CD, the Intel® support website that contains the latest driver, or go to the Supermicro site at https://www.supermicro.com/wftp/Networking_Drivers/.

1. Run CDR-NIC.
2. When the SUPERMICRO window appears, click on the computer icon next to the product model.



 **Note:** If the *FOUND NEW HARDWARE WIZARD* screen displays on your system, click CANCEL.

3. Click on INSTALL DRIVERS AND SOFTWARE.
4. Follow the prompts to complete the installation.

3-5 Installing Drivers on Linux (for Intel® i350)

Follow the steps below to install the drivers for Linux or refer to the Intel® support website for more driver installation information.

Build a Binary RPM Package

1. Run `'rpmbuild -tb <filename.tar.gz>'`

2. Replace <filename.tar.gz> with the specific filename of the driver.



Note: For the build to work properly, the current running kernel **MUST** match the version and configuration of the installed kernel sources. If you have just recompiled the kernel, reboot the system at this time.

Follow the instructions below to build the driver manually.

1. Move the base driver tar file to the directory of your choice. For example:

```
/home/username/ixgbe
```

or

```
/usr/local/src/ixgbe
```

2. Untar/unzip archive, where <x.x.x> is the version number for the driver tar file:

```
tar xzf ixgbe-x.x.x.tar.gz
```

3. Change to the driver src directory, where <x.x.x> is the version number for the driver tar:

```
cd ixgbe-x.x.x/src/
```

4. Compile the driver module:

```
make install
```

The binary will be installed as:

```
/lib/modules/[KERNEL_VERSION]/kernel/drivers/net/ethernet/intel/ixgbe/ixgbe.  
[k]o
```

The install locations listed above are the default locations. They may not be correct for certain Linux distributions. For more information, see the `ldistrib.txt` file included in the driver tar.



Note: `IXGBE_NO_LRO` is a compile time flag. The user can enable it at the compile time to remove support for LRO from the driver. The flag is used by adding `CFLAGS_EXTRA="-DIXGBE_NO_LRO"` to the make file when it's being compiled.

```
make CFLAGS_EXTRA="-DIXGBE_NO_LRO" install
```

5. Load the module:

For kernel 2.6.x, use the modprobe command:

```
modprobe ixgbe <parameter>=<value>
```

For 2.6 kernels, the *insmod* command can be used if the full path to the driver module is specified. For example:

```
insmod/lib/modules/[KERNEL_VERSION]/kernel/drivers/net/  
ethernet/intel/ixgbe/ixgbe.ko
```

In addition, when using 2.6-based kernels, make sure that older ixgbe drivers are removed from the kernel before loading the new module. To do this, use:

```
rmmmod ixgbe; modprobe ixgbe
```



Note: For more driver installation information, please refer to the Intel® support website.

6. Assign an IP address to the interface by entering the following, where x is the interface number:

```
ifconfig ethx <IP_address> netmask <netmask>
```

7. Verify that the interface works. Enter the following, where <IP_address> is the IP address for another machine on the same subnet as the interface that is being tested:

```
ping <IP_address>
```

3-6 Installing Drivers on FreeBSD (for Intel® i350)

Follow the instructions below to install the drivers for FreeBSD kernel 4.8 or later or refer to the Intel® support website for more driver installation information. In the instructions below, x.x.x is the driver version as indicated in the name of the driver tar file.



Note: You must have kernel sources installed in order to compile the driver module.

1. Move the base driver tar file to the directory of your choice. For example, use `/home/username/ixgb` or `/usr/local/src/ixgb`.
2. Untar/unzip the archive:

```
tar xzf ixgb-x.x.x directory
```

3. To install man page:

```
cd ixgb-x.x.x
gzip -c ixgb.4 > /usr/share/man/man4/ixgb.4.gz
```

4. To load the driver onto a running system, perform the following steps:

```
cd ixgb-x.x.x
make

or

cd ixgb-x.x.x/src
make load
```

5. To assign an IP address to the interface, enter the following:

```
ifconfig ixgb<interface_num> <IP_address>
```

6. Verify that the interface works. Enter the following, where <IP_address> is the IP address for another machine on the same subnet as the interface that is being tested:

```
ping <IP_address>
```

7. If you want the driver to load automatically when the system is booted:

```
cd ixgb-x.x.x/src
make load
cp if_ixgb.ko /modules
```

Edit /boot/loader.conf, and add the following line:

```
if_ixgb_load="YES"
```

or

compile the driver into the kernel (see item 8 below). Edit /etc/rc.conf, and create the appropriate ifconfig_ixgb<interface_num> entry:

```
ifconfig_ixgb<interface_num>="<ifconfig_settings>"
```

Example of usage:

```
ifconfig_ixgb0="inet 192.168.10.1 netmask 255.255.255.0"
```

8. If you want to compile the driver into the kernel, enter:

```
cd ixgb-x.x.x/src
mkdir /usr/src/sys/dev/ixgb
```

```
cp if_ixgb* /usr/src/sys/dev/ixgb
cp ixgb* /usr/src/sys/dev/ixgb
cp Makefile.kernel /usr/src/sys/modules/ixgb/Makefile
```

Edit the `/usr/src/sys/conf/files.i386` file, and add the following lines:

```
dev/ixgb/ixgb_hw.c optional ixgb
dev/ixgb/ixgb_ee.c optional ixgb
dev/ixgb/if_ixgb.c optional ixgb
```

Remove the following lines from the `/usr/src/sys/conf/files.i386` file, if they exist:

```
/dev/ixgb/if_ixgb_fx_hw.c optional ixgb
/dev/ixgb/if_ixgb_phy.c optional ixgb
```

Edit the kernel configuration file (i.e., `GENERIC` or `MYKERNEL`) in `/usr/src/sys/i386/conf`, and ensure the following line is present:

```
device ixgb
```

Compile and install the kernel. Reboot the system for the kernel updates to take affect.

3-7 Installing Drivers (for Mellanox[®] ConnectX[®]-3 Pro)

Use the procedures below to install drivers for Linux.

Linux Drivers

Use the following procedures to install drivers on the Linux operating system or refer to the Mellanox[®] support website for more driver installation information.

Installing InfiniBand Drivers for the Linux Operating System

1. Download the driver from the Supermicro CDR-NIC LAN driver CD, the Mellanox[®] support website that contains the latest driver, or go to the Supermicro site at https://www.supermicro.com/wftp/Networking_Drivers/Mellanox/. Go to the following directory: Mellanox > Linux.
2. Choose the desired *InfiniBand Linux* driver package file.
3. Install the driver by entering the following commands:

```
tar xzvf MLNX_OFED-<ver>.tgz
cd OFED-<ver>
./mlnoxfedinstall --without-fw-update
```

This installs the Linux drivers to your system. For more driver installation information, please refer to the Mellanox[®] support website.

Windows Drivers

Use the following procedures to install drivers on the Windows operating system or refer to the Mellanox[®] support website for more driver installation information.

Installing InfiniBand Drivers for the Windows Operating System

1. Download the driver from the Supermicro CDR-NIC LAN driver CD, the Mellanox[®] support website that contains the latest driver, or go to the Supermicro site at https://www.supermicro.com/wftp/Networking_Drivers/Mellanox/. Go to the following directory: Mellanox > Windows.
2. Choose the desired InfiniBand Windows driver package file.
3. Double-click to run and install the driver package file.

3-8 Changing from InfiniBand to Ethernet mode

AOC-MHIBF-m1Q2G and AOC-MHIBF-m2Q2G are by default set to InfiniBand mode. To change the setting to Ethernet mode, please follow the instructions below.

1. Double-check and make sure that the add-on card is detected. Run the `lspci` command:

```
[root@localhost ~]# lspci | grep Mellanox
17:00.0 Ethernet controller: Mellanox Technologies
MT27520 Family [ConnectX-3 Pro]
```

2. If the setting remains unchanged, start MST:

```
[root@localhost ~]# mst start
Starting MST (Mellanox Software Tools) driver set
Loading MST PCI module - Success
[warn] mst_pciconf is already loaded, skipping
Create devices
Unloading MST PCI module (unused) - Success
```

3. To check whether the add-on card is set to Ethernet or InfiniBand mode and to verify if the LAN ports are active or not, run the following command:

lby_devinfo

```
[root@localhost ~]# ibv_devinfo
hca_id: mlx4_0
    transport:                InfiniBand (0)
    fw_ver:                    2.42.5000
    node_guid:                  0030:48ff:ffff:eb54
    sys_image_guid:             0030:48ff:ffff:eb57
    vendor_id:                   0x02c9
    vendor_part_id:              4103
    hw_ver:                       0x0
    board_id:                     SM_1171000001000
    phys_port_cnt:                2
    Device ports:
        port: 1
            state:                PORT_DOWN (1)
            max_mtu:                4096 (5)
            active_mtu:              4096 (5)
            sm_lid:                  0
            port_lid:                0
            port_lmc:                0x00
            link_layer:              InfiniBand
        port: 2
            state:                PORT_DOWN (1)
            max_mtu:                4096 (5)
            active_mtu:              4096 (5)
            sm_lid:                  0
            port_lid:                0
            port_lmc:                0x00
            link_layer:              InfiniBand
[root@localhost ~]#_
```

4. Use the command `#mlxfwmanager` to extract the "vendor_part id" parametar.

```
[root@localhost ~]# mlxfwmanager
Querying Mellanox devices firmware...

Device#1:
- - - - -
Device Type:      ConnectX3Pro
Part Number:     Super_Micro_AOC-MHIBF-m2Q2G
Description:     Hybrid SIOM 2-port IB FDR CX3-Pro
PSID:           SM_1171000001000
PCI Device Name: /dev/mst/mt4103_pci_cr0
Port1 GUID:     003048ffffffeb55
Port2 GUID:     003048ffffffeb56
Versions:
  FW             Current          Available
  PXE            2.42.5000                   N/A
  UEFI           3.4.0752                    N/A
  UEFI           14.11.0045                   N/A
Status:         No matching image found
```

5. To change the add-on card to Ethernet mode (`LINK_TYPE=2`), please enter command `#mlxconfig -d<vendor_part id>` and then key in "y" to apply the new configuration. (The command below is using the device ID in step 4.)

```
[root@localhost ~]# mlxconfig -d /dev/mst/mt4103_pci_cr0
set LINK_TYPE_P1=2
Device#1:
- - - - -
Device type:     ConnectX3Pro
Device:         /dev/mst/mt4103_pci_cr0

Configurations:
  LINK_TYPE_P1   Next Boot   New
                IB (1)       ETH (2)
Apply new Configuration? (y/n) [n]:_
```



Note: The command above will change Port1 to Ethernet mode. In changing Port2 to Ethernet mode, replace "LINK_TYPE_P1=2" with "LINK_TYPE_P2=2" at the end of the command line.



Note: To change the LAN ports from Ethernet to InfiniBand mode, the command line must specify "LINK_TYPE_P1=1" for Port1 and "LINK_TYPE_P2=1" for Port2 at the end of the command line.

6. Reboot your computer and then the changes made will take effect.
7. Once the system is rebooted, you can use the following command to verify whether the LAN ports are changed to Ethernet mode or not:

```
[root@localhost ~]# ibv_devinfo
hca_id: mlx4_0
transport:                InfiniBand (0)
fw_ver:                    2.42.5000
node_guid:                  0030:48ff:ffff:eb54
sys_image_guid:             0030:48ff:ffff:eb57
vendor_id:                  0x02c9
vendor_part_id:             4103
hw_ver:                     0x0
board_id:                   SM_1171000001000
phys_port_cnt:              2
Device ports:
  port: 1
    state:                   PORT_DOWN (1)
    max_mtu:                  4096 (5)
    active_mtu:               1024 (3)
    sm_lid:                   0
    port_lid:                 0
    port_lmc:                 0x00
    link_layer:               Ethernet
  port: 2
    state:                   PORT_DOWN (1)
    max_mtu:                  4096 (5)
    active_mtu:               4096 (5)
    sm_lid:                   0
    port_lid:                 0
    port_lmc:                 0x00
    link_layer:               InfiniBand
```

3-9 Using Mellanox Controller for PXE Boot

To use PXE boot, the Mellanox (QSFP) ports need to be configured as either Ethernet or InfiniBand mode depending on the previous setup. Please follow the instructions below to use PXE boot.

1. After a QSFP cable is connected, boot up the system and keep pressing <CTRL+B> to boot into FlexBoot Menu:

```
FlexBoot v3.5.385
FlexBoot PCI 17:00.0 3D00 PCI3.00 PnP PMM+13870000+13894000 C900
Press Ctrl-B to configure FlexBoot v3.5.385 (PCI 17:00.0)...
```

2. When the System setup page appears, select "net0: Port1". (If Port1 is the one you use to connect to PXE.)

```

                                     System setup

Firmware Image Properties
net0 : Port 1 - 00:30:48:ff:eb:54
net1 : Port 2 - 00:30:48:ff:eb:56
Bus:Device:Function..... PCI17:00.0
Chip type..... ConnectX-3Pro
Device name..... ConnectX-3Pro
Banner menu timeout..... 4
PCI device ID..... 4103
Virtualization mode..... SR-IOV
Number of virtual functions..... 8

Ctrl-S - Save and exit  Ctrl-R - Restore device default configurations
```

3. Click on "NIC Configuration" and then select "PXE" under "Legacy boot protocol".

```

                                     NIC Configuration

Legacy boot protocol..... PXE
Boot retry count..... No retries
IPv4/IPv6 support..... IPv4
Undi network wait timeout..... 30
Virtual LAN ID..... 1
Virtual LAN mode..... Disabled

                                     Legacy boot protocol
Select boot protocol priority. If chosen, protocol will be tried first

Ctrl-S - Save and exit  Ctrl-D - Delete setting
```

- Go to BIOS. From the top of the tool bar, select "Boot" to enter the submenu. Select "Network Drive BBS Priorities" and then select "FlexBoot v#.#.###..." under Boot Option #1.



- To boot from PXE automatically, make sure Boot Option #1 is "Network: Flex boot" as the image shown below.

