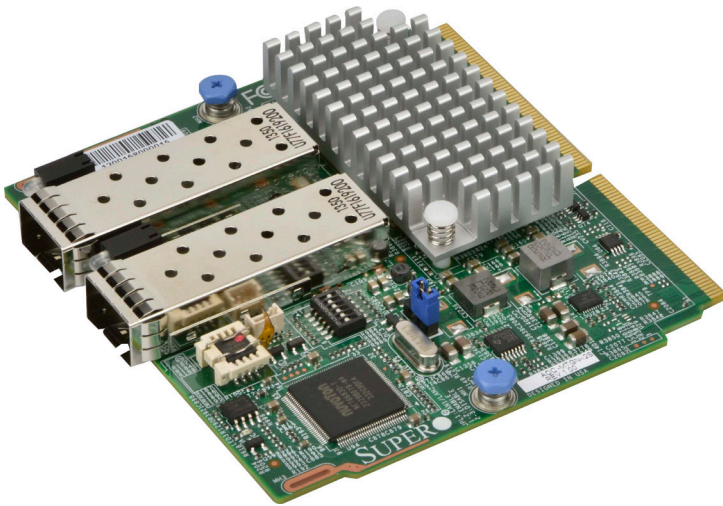# SUPERMICRO®

AOC-MTGN-i2S

User's Guide

Revision 1.0a

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WARNING: Handling of lead solder materials used in this product may expose you to lead, a chemical known to the State of California to cause birth defects and other reproductive harm.

Preface

About this User's Guide

This user's guide is written for system integrators, IT technicians and knowledgeable end users. It provides information for the installation and use of the AOC-MTGN-i2S add-on card.

About this Add-on Card

The Supermicro® Super I/O Modules provide flexible I/O networking options, and the AOC-MTGN-i2S is the most flexible and scalable 10GbE SFP+ SIOM controller for today's demanding data center environments. Based on the Intel 10GbE network controller 82599, the AOC-MTGN-i2S addresses the demanding needs of the next generation data center by providing unmatched features for virtualization, flexibility for LAN and SAN networking.

Please note that this product is sold only as part of an integrated solution with Supermicro server systems.

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 motherboard 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/RmaForm/).

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:

Warning: Important information given to ensure proper system installation or to prevent damage to the components or injury to yourself.

Note: Additional information given to differentiate between various models or provides information for correct system setup.

Naming Convention

A O C – MH IBF – 2 Q G

1 – 2 3 – 6 7 8

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 (Optional)	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	2nd Controller/Connector Type (Optional)	G: GbE RJ45, S: 10G SFP+, T: 10GBase-T

SMC Networking Add-on Cards

Model	Type	Form Factor	Controller	Connection	Dimension (w/o Brackets) (L x H)	Power (W)
SGP-i2	GbE	Standard LP	Intel® i350 AM2	2 RJ45 (1Gb/port)	3.9" (99mm) x 2.73" (69mm)	3.5
SGP-i4	GbE	Standard LP	Intel® i350 AM4	4 RJ45 (1Gb/port)	3.9" (99mm) x 2.73" (69mm)	5
STG-b4S	10GbE	Standard LP	Broadcom® BCM57840S	4 SFP+ (10Gb/port)	5.4" (137mm) x 2.73" (69mm)	14
STG-i2T	10GbE	Standard LP	Intel® X540-AT2	2 RJ45 (10GBase-T)	5.9" (150mm) x 2.73" (69mm)	13
STGN-i2S	10GbE	Standard LP	Intel® 82599ES	2 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	11.2
STGN-i1S	10GbE	Standard LP	Intel® 82598EN	1 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	10
STG-i4S	10GbE	Standard LP	Intel® XL710-AM1	4 SFP+ (10Gb/port)	5.9" (150mm) x 2.73" (69mm)	8
S40G-i2Q	40GbE	Standard LP	Intel® XL710 AM2	2 QSFP+ (40Gb/port)	5.9" (150mm) x 2.73" (69mm)	7
PTG-i1S	10GbE	Proprietary	Intel® 82599EN	1 SFP+ (10Gb/port)	10.04" (255mm) x .78" (20mm)	7.5
UG-i4	GbE	UIO FH	Intel® i350 AM2	4 RJ45 (1Gb/port)	6.6" (167mm) x 3.9" (98mm)	10
CGP-i2	GbE	MicroLP	Intel® i350 AM2	2 RJ45 (1Gb/port)	4.45" (113mm) x 1.54" (39mm)	4
CG-i2	GbE	MicroLP	Intel® 82580	2 RJ45 (1Gb/port)	4.45" (113mm) x 1.3" (34mm)	4
CIBF-m1	FDR IB	MicroLP	Mellanox® ConnectX-3	1 QSFP (56Gb/port)	4.85" (123mm) x 1.54" (39mm)	7
CIBQ-m1	QDR IB	MicroLP	Mellanox® ConnectX-3	1 QSFP (40Gb/port)	4.85" (123mm) x 1.54" (39mm)	7
CTG-i1S	10GbE	MicroLP	Intel® 82599EN	1 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	10
CTG-i2S	10GbE	MicroLP	Intel® 82599ES	2 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	11
CTG-i2T	10GbE	MicroLP	Intel® X540	2 RJ45 (10GBase-T)	4.8" (123mm) x 2.75" (77mm)	13
CTGS-i2T	10GbE	MicroLP	Intel® X550	2 RJ45 (10GBase-T)	4.45" (113mm) x 1.54" (39mm)	12
MGP-i2	GbE	SIOM	Intel® i350 AM2	2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.1mm)	3.7
MGP-i4	GbE	SIOM	Intel® i350 AM4	4 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.1mm)	4.4
MTGN-i2S	10GbE	SIOM	Intel® 82599ES	2 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.1mm)	7.2
MTG-i4S	10GbE	SIOM	Intel® XL710-AM1	4 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.1mm)	7

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Table of Contents

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

- Dual SFP+ Connectors

- Super I/O Module (SIOM) Form Factor

- Intel® QuickData Technology

- VMDq, Next-Generation VMDq, and PC-SIG SR-IOV for Virtualized Environments

- Load Balancing on Multiple CPUs

- iSCSI Remote Boot Support

- Fibre Channel over Ethernet (FCoE) Support

- Support for most Network Operating Systems

- NC-SI for Remote Management

- RoHS compliant 6/6

- Supports both Direct Atttach Copper and Fiber Cables

1-3   Specifications

General

- Intel® 82599ES 10GbE controller

- Super I/O Module (SIOM) Form Factor

- Dual SFP+ ports

- Load balancing on multiple CPUs

- iSCSI remote boot support

- Fibre Channel over Ethernet (FCoE) support

- Intel® PROSet Utility for Windows® Device Manager

- Time Sync IEEE 1588

I/O Features

- Direct Cache Access (DCA) to avoid cache misses

- MSI-X support to minimize the overhead of interrupts, allowing load-balancing between multiple cores/CPUs

- Tx/Rx IP, SCTP, TCP and UDP checksum offloading capabilities (IPv4, IPv6)

- Receive and Transmit Side Scaling for Windows environments and scalable I/O for Linux environments

Virtualization Features

- VMDq, Next-Generation VMDq (64 queues per port)

- PC-SIG SR-IOV implementation (64 virtual functions per port)

- Advanced Packet Filtering

- VLAN support to allow creation of multiple VLAN segments

- VXLAN through Software

Management Features

- Preboot eXecution Environment (PXE) support

- Simple Network Management Protocol (SNMP) and Remote Network Monitoring (RMON) statistics counters

- iSCSI remote boot

- NC-SI for remote management

- Asset Management support on Supermicro® platforms

- Controller asset tags such as part number, revision, serial number, and MAC addresses

Advanced Software Features

- Teaming support

- IEEE 802.3ad (link aggregation control protocol)

- IEEE 802.1Q VLANs

- IEEE 802.3 2005 flow control support

OS Support

- Windows Server 2012 R2, 2012, 2008 R2 (x64 Edition)

- Windows 8.1, 8, 7 (x64 Edition)

- RedHat Linux

- SUSE Linux

- FreeBSD

- UEFI

- VMware

Cables Support

- SFP+ direct attach twinaxial copper cables up to 7m

- Fiber-optic cables (with required optional SFP+ transceivers)

Power Consumption

- Typical power consumption: 6.2W

- Maximum power consumption: 7.2W

Operating Conditions

- 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) (W x D)

Optional Accessories

- AOC-E10GSFPSR: SFP+ transceiver module for short range fiber cables (up to 300m), 10G/1G, 850nm, MMF, LC

- AOC-E10GSFPLR: SFP+ transceiver module for long range fiber cables (up to 10km), 10G/1G, 1310nm, MMF, LC

- AOC-TSR-FS: SFP+ transceiver module for short range fiber cables (up to 300m), 10G/1G, 850nm, MMF, LC

- AOM-TSFP-709DMZ-AVG: SFP+ transceiver module for short range fiber cables, 10G/1G, 850nm, MMF, LC

- CBL-0347L: 1m 10GbE SFP+ to SFP+ copper cable, Passive, 30AWG, Pull Type

- CBL-NTWK-0347: 1m 10GbE SFP+ to SFP+ copper cable, Passive, 30AWG, Push Type

- CBL-NTWK-0456: 2m 10GbE SFP+ to SFP+ copper cable, Passive, 30AWG, Push Type

- CBL-0348L: 3m 10GbE SFP+ to SFP+ copper cable, Passive, 24AWG, Pull release

- CBL-0349L: 5m 10GbE SFP+ to SFP+ copper cable, Passive, 24AWG, Pull release

- CBL-SFP+AOC-1M: 1m 10GbE SFP+ to SFP+ Fiber Active Optical Cable (AOC)

- CBL-SFP+AOC-3M: 3m 10GbE SFP+ to SFP+ Fiber Active Optical Cable (AOC)

- CBL-SFP+AOC-5M: 5m 10GbE SFP+ to SFP+ Fiber Active Optical Cable (AOC)

Compliance/Environmental

- RoHS Compliant 6/6, Pb Free

Supported Platforms

- Supermicro® motherboards with Super I/O Module slot

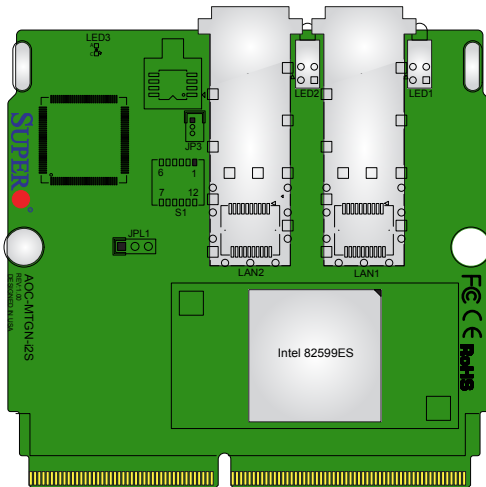- Supermicro® server systems with Super I/O Module slot

Notes

Chapter 2

Hardware Components

2-1 Add-On Card Image and Layout
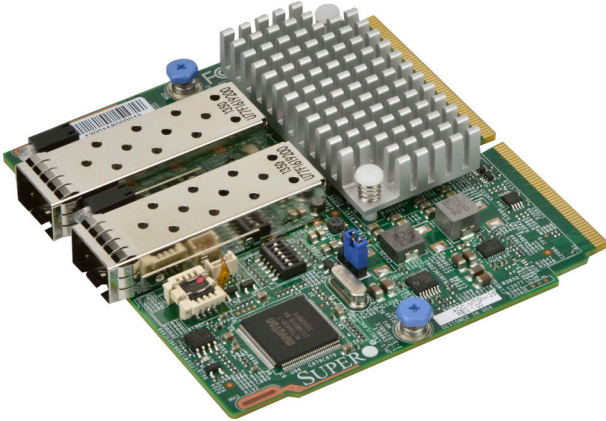
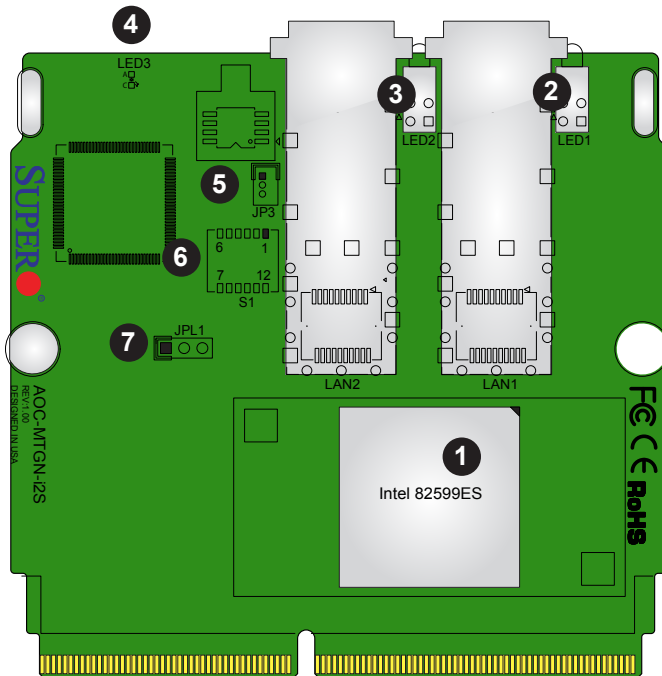

The AOC-MTGN-i2S Image

The AOC-MTGN-i2S Layout

2-2   Major Components

The following major components are installed on the AOC-MTGN-i2S:

1. Intel 82599 10GbE Controller

2. LAN Port 1 and LED1 Indicator

3. LAN Port 2 and LED2 Indicator

4. LED3 - Thermal Alert LED

5. JP3 - Thermal Alert Connector

6. S1 - DIP Switch

7. JPL1 - LAN Port Enable/Disable

2-3   Connectors and LEDs

LAN Ports

Two SFP+ LAN ports (LAN1 and LAN2) are located on the add-on card. These LAN ports support connection speeds of 10Gbps. Use SFP+ direct attach twinaxial copper cables for network connections.

LED1 and LED2

Each LAN port has a corresponding LED to indicate speed and data activity. LED1 is for LAN port 1 and LED2 is for LAN port 2. For the location of the LEDs, see the card layout on the previous page. For LED color and definition, see the table below.

LED	Color	Definition
LNK	Yellow	1Gb Link Speed
	Green	10Gb Link Speed
ACT	Blinking Green	Activity

Thermal Alert LED

A thermal alert LED is located at LED3. The yellow LED indicates there is a thermal alert. Refer to the table on the right for the LED status. Refer to page 2-2 for the location of the LED.

Thermal Alert LED Status	
Color	Status
Yellow	Thermal Alert

2-4 Jumpers

Explanation of Jumpers

To modify the operation of the add-on card, a jumper can be used to choose between optional settings. A jumper creates shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the add-on card layout on page 2-2 for the jumper location.

🖊 **Note:** On two-pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.

LAN Port Enable/Disable

Use jumper JPL1 to enable or disable LAN ports 1 and 2. See the table below for jumper settings. The default setting is Enabled.

| LAN Port Enable/Disable Jumper Settings	
Jumper setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

Thermal Alert Connector

Connect an external cable (not included) from the motherboard to the thermal alert connector at JP3 to monitor the external temperature. Refer to the table on the right for the pin definition. Refer to page 2-2 for the location of the jumper.

Thermal Alert Pin Definition	
Pin	Definition
1	GND
2	Thermal_Alert_N
3	GND

S1 DIP Switch

This DIP Switch provides SMBUS address selection. You can configure the card with static SMBUS address. Refer to the tables below for address selections.
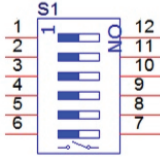
S1:DIP switch for user selection

Switch Position	OFF (default)	ON
1	SMBUS ARP mode	Static SMBUS address mode
2~5	Static SMBUS address selection	
6	Thermal Reading Enable	Thermal Reading Disable

Static SMBUS address selection table by DIP switch S1

SMBUS Address	S1 position #5	S1 position #4	S1 position #3	S1 position #2
30/D0	OFF/ON	OFF	OFF	OFF
32/D2	OFF/ON	OFF	OFF	ON
34/D4	OFF/ON	OFF	ON	OFF
36/D6	OFF/ON	OFF	ON	ON
38/D8	OFF/ON	ON	OFF	OFF
3A/DA	OFF/ON	ON	OFF	ON
3C/DC	OFF/ON	ON	ON	OFF
3E/DE	OFF/ON	ON	ON	ON

Notes

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, or peripheral chips.

- 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 your system, make sure that you are static protected.

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

3-2   Before Installation

To install the add-on card properly, be sure to follow the instructions below.

1. Power down the system.

2. Remove the power cord from the wall socket.

3. Use industry standard anti-static equipment such as gloves or wrist strap and follow the precautions listed 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.
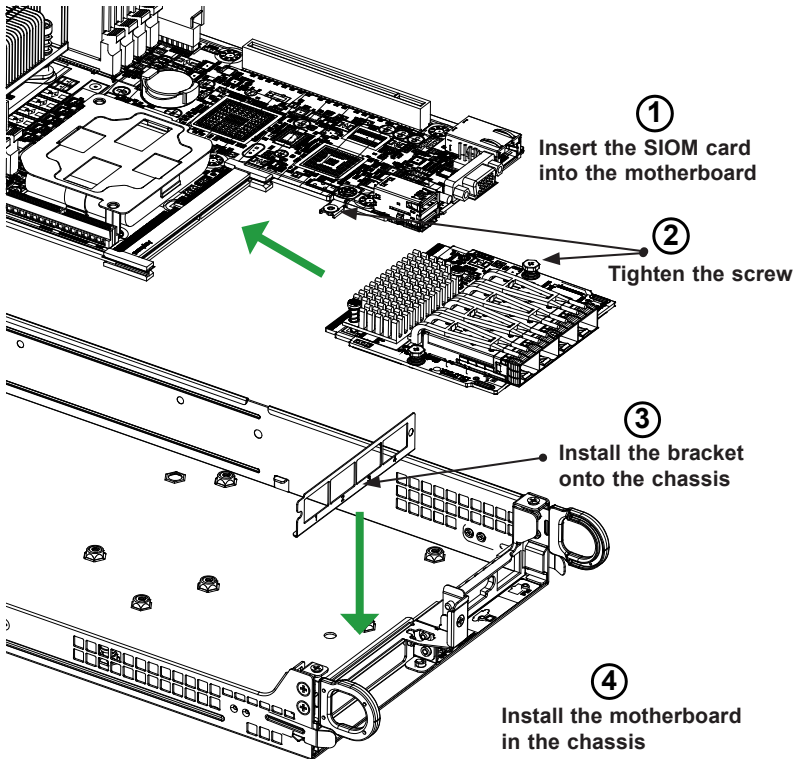
3-3   Installing the Add-on Card

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.

Insert the SIOM card into this slot

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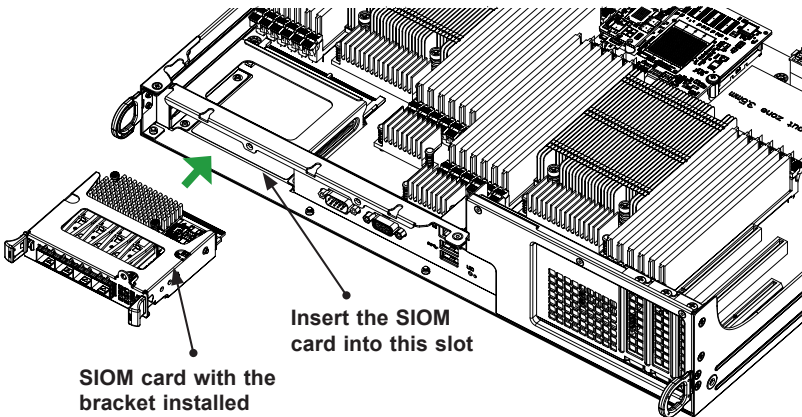
🖉 **Note**: This add-on card does not support hot plug. Please turn off the AC power and remove the power cord from the wall socket before you install or remove the add-on card.

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

① **Insert the SIOM card into the motherboard**

② **Tighten the screw**

③ **Install the bracket onto the chassis**

④ **Install the motherboard in the chassis**

✎ **Note**: It is recommended that the SIOM card installation above be completed by a system integrator or the manufacturer.

4. Secure the add-on card to the chassis. If required, use the screw 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.

3-4 Installing Drivers on Windows

Follow the steps below to install the drivers for Windows. Download the drivers from the Supermicro FTP site at ftp://ftp.supermicro.com/Networking_Drivers/.

1. Run the 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.
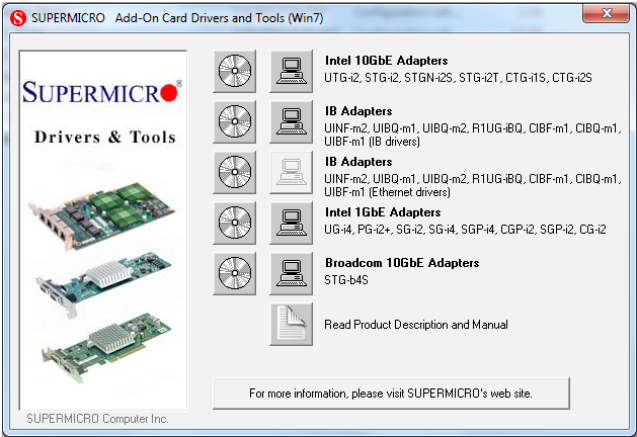
3. Click on INSTALL DRIVERS AND SOFTWARE.

4. Follow the prompts to complete the installation.

3-5 Installing Drivers on Linux

Follow the steps below to install the driver to a Linux system.

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 zxf 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/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 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/
   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:

```
rmmod ixgbe; modprobe ixgbe
```

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

Follow the instructions below to install the drivers in FreeBSD kernel 4.8 or later. In the instructions below, x.x.x is the driver version as indicated in the name of the drive 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 dirctory of your choice. For example, use /home/username/ixgb or /usr/local/src/ixgb.

2. Untar/unzip the archive:

```
tar xfz 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). Edit /etc/rc.conf, and create the appropriate ifconfig_ixgb<interface_num> entry:

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

Example 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 line:

```
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.

(Disclaimer Continued)