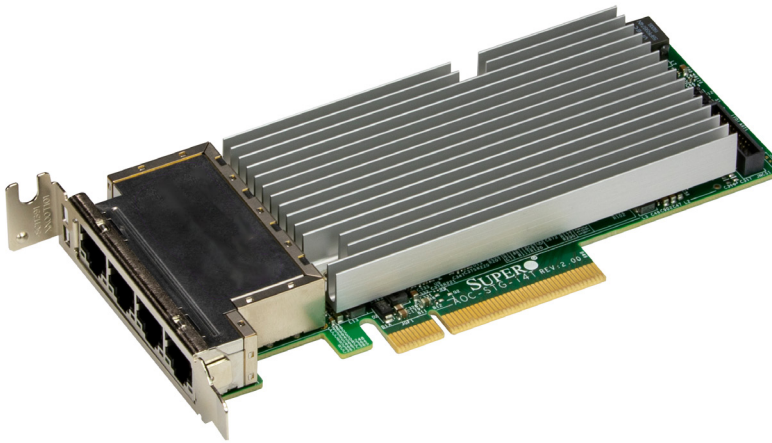
AOC-STG-i4T



User's Guide

Revision 1.0a

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User's Guide Revision 1.0a

Release Date: April 10, 2023

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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-STG-i4T add-on card.

About this Add-on Card

The AOC-STG-i4T is the most energy-efficient and cost-effective 4-port 10GBase-T adapter solution for data centers in today's market. Based on the Intel® XL710 and X557 chipsets with virtualization features such as VxLAN and NVGRE, the AOC-STG-i4T addresses the demands of bandwidth-intensive applications at a fraction of the cost of a traditional 10GbE adapter by utilizing RJ-45 connections for a longer cabling distance. The AOC-STG-i4T 10GbE adapter is truly a best-in-class solution for advanced data centers.

Important Notes to the User

This add-on card is intended to be used with Supermicro's servers or motherboards as an integrated solution package. For more information regarding product support or updates, please refer to our website at http://www.supermicro.com/products/nfo/networking.cfm#adapter.

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 for Standard Network Adaptors

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 A: Advanced IO Module (AIOM), AH: AIOM 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), HFI: Host Fabric Interface
4th	Chipset Model (Optional)	N: Niantec (82599), P: Powerville (i350), S: Sageville (X550), F: Fortville (XL710/X710), L: Lewisburg (PCH)
5th	Chipset Manufacturer	i: Intel, m: Mellanox, b: Broadcom
6th	Number of Ports	1: 1 port, 2: 2 ports, 4: 4 ports, 8: 8 ports
7th	Connector Type (Optional)	S: SFP/SFP+/SFP28, T: 10GBase-T, Q: QSFP+, C: QSFP28
8th	2nd Controller/Connector Type (Optional)	G: 1x GbE RJ45, 2G: GbE 2x RJ45, S: 1x 10G SFP+, T: 10GBase-T, 2T: 2x 10GBase-T, 2S: 2x SFP+
9th	Bracket	For SIOM – Non-M: swappable bracket for Storage systems, M: Internal bracket for Twin systems. For AIOM – Non-M: 1U height bracket for Edge systems, M: 0.5U height bracket for all other systems.

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Table of Contents

Preface

Chapter 1 Overview

1-1 Overview 1-1
1-2 Product Highlights 1-1
1-3 Technical Specifications 1-2
1-4 Compliance/Operating Environment 1-5

Chapter 2 Hardware Components

2-1 Add-On Card Image and Layout 2-1
2-2 Major Components 2-3
2-3 LAN Ports and LAN LED indicators 2-4
2-4 NC-SI Header & PCI-E 3.0 x8 Connector 2-5
2-5 Overheat LED & DIP Switch 2-6

Chapter 3 Installation

3-1 Static-Sensitive Devices 3-1
3-2 Before Installation 3-2
3-3 Installing the Add-on Card 3-2
3-4 Installing Drivers on Windows 3-3
3-5 Installing Drivers on Linux 3-4
3-6 Installing Drivers on FreeBSD 3-6
3-7 Asset Management Features 3-8

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 of 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 Product Highlights

The product highlights of this add-on card include the following:

- Intel® Ethernet Controller XL710/X557 10GBase-T
- Low-profile standard short-length form factor
- PCI Express 3.0 (8GT/s)
- Four (4) RJ45 connectors
- Network Virtualization Offloads: VxLAN and NVGRE
- Intel® Ethernet Flow Director
- Data Plane Developer Kit for Efficient Packet Processing
- Small packet performance
- Intelligent Traffic Offloads
- Unified Networking Support for NAS
- Asset Management Features (AMF)
- NC-SI for remote management (IPMI)

- RoHS compliant 6/6

- Supports both Direct Attach Copper and fiber cables

1-3 Technical Specifications

General

- Intel® Ethernet Controller XL710/X557 10GBase-T
- Half-length low-profile standard form factor
- PCI-E 3.0 x8 (8GT/s) interface
- Quad RJ45 connectors with speeds up to 10Gb/s per port
- Load balancing on multiple CPUs
- Intel® PROSet Utility for Windows Device Manager

I/O Features

- Intel® Flow Director
- MSI-X support to minimize interrupt overhead and to allow load-balancing between multiple cores/CPUs
- Multiple queues: 1,536 Tx and Rx queues per port
- Tx/Rx IP, SCTP, TCP, and UDP checksum offloading (IPv4, IPv6) capabilities

Virtualization Features

- Next-Generation VMDq with up to 256 VMDq VMs supported
- SR-IOV with up to 128 virtuals ports
- Virtual Machine Load Balancing (VMLB)

- Advanced Packet Filtering
- VLAN support for up to 4,096 VLAN tags
- VXLAN and NVGRE support

Storage Interface Features

- Preboot eXecution Environment (PXE) support
- iSCSI remote boot
- iSCSI Acceleration
- Simple Network Management Protocol (SNMP) and Remote Network Monitoring (RMON) static counters

Management Features

- Asset Management support on Supermicro® X10 generation platforms
- Controller asset tags such as part number, revision, serial number, and MAC addresses
- Controller thermal sensor
- NC-SI for Remote Management

Advanced Software Features

- Teaming support
- IEEE 802.3ad (link aggregation control protocol)
- IEEE 802.1Q VLANs
- IEEE 802.3 2005 flow control support
- IEEE 802.1p

- TCP segmentation/large send offload
- Interrupt moderation

OS Support

The AOC-STG-i4T add-on card supports the following operating systems (OS):

- Windows® Server 2012 R2, 2012, 2008 R2 x86-64
- Linux RedHat EL 6.5 and 7.0 IA-32, X86-64, and IA-64
- Linux SuSE SLES 11 SP3 and 12 IA-32, X86-64, and IA-64
- FreeBSD 9 and 10 IA-32, X86-64, and IA-64
- UEFI 2.1 and 2.3 X86-64 and I-64
- VMware ESXi 5.1 and ESXi 5.5 X86-64

Power Consumption

- Typical power consumption: 15.5W
- Maximum power consumption: 19.8W

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: 5.9 in (14.99 cm) x 2.73 in (6.90 cm) (L x H)
- Height of end brackets: standard – 4.725 in (12 cm), low-profile – 3.13 in (7.94 cm)

Supported Platforms

- Supermicro motherboards with minimum PCI-E 3.0 x8 slot
- Supermicro server systems with low-profile or full-height PCI-E 3.0 x8 expansion slots
- NC-SI is supported by Supermicro motherboards with corresponding connection

Note: This product is intended to be used with Supermicro server systems or motherboards as an integrated solution package.

1-4 Compliance/Operating Environment

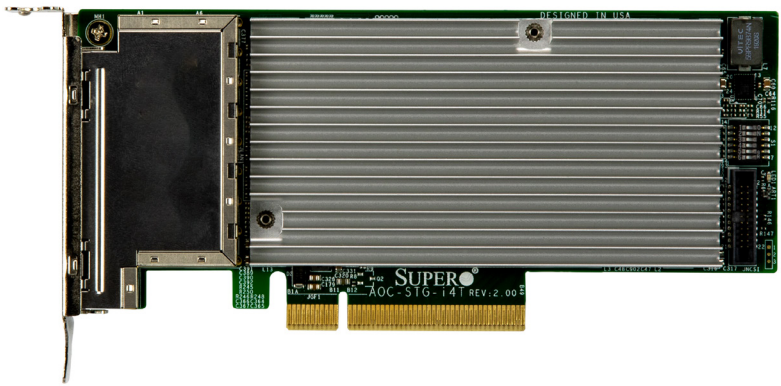
The AOC-STG-i4T add-on card is compliant with the following environmental regulations:

- RoHS Compliant 6/6, Pb Free

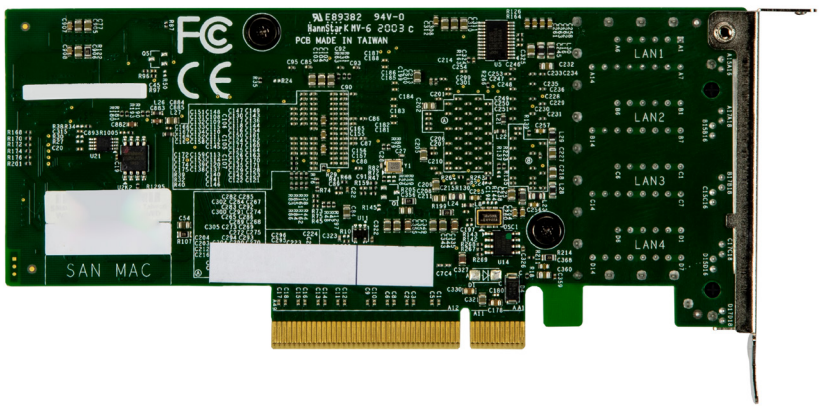
Chapter 2

Hardware Components

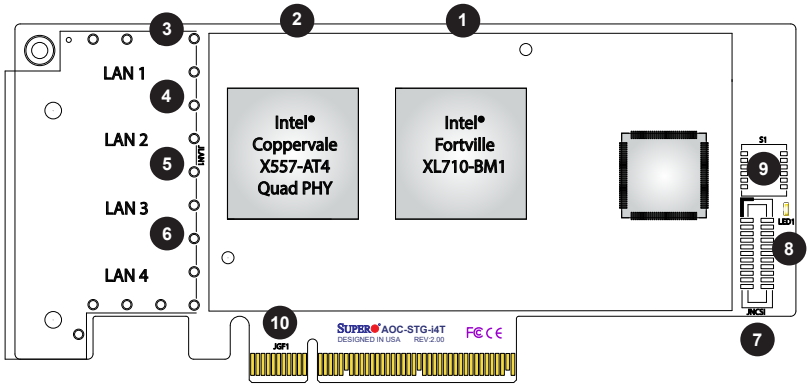
2-1 Add-On Card Image and Layout



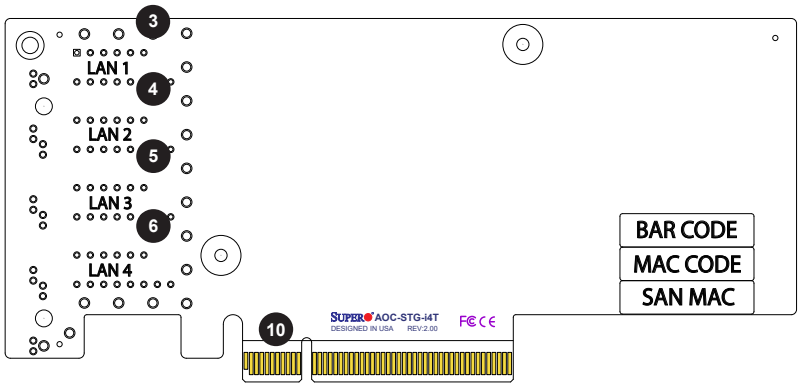
AOC-STG-i4T Top View



AOC-STG-i4T Bottom View



AOC-STG-i4T Top Layout



AOC-STG-i4T Bottom View

2-2 Major Components

The following major components are installed on the AOC-STG-i4T:

AOC-STG-i4T Major Components		
No	**Component Name**	**Definition**
1	Intel® XL710-BM1	Ethernet 4x10GbE LAN controller
2	Intel® X557-AT4	Ethernet 4x10GbE PHY controller
3	LAN1	RJ45 LAN Port 1
4	LAN2	RJ45 LAN Port 2
5	LAN3	RJ45 LAN Port 3
6	LAN4	RJ45 LAN Port 4
7	JNCSI	NC-SI header
8	LED1	Overheat LED
9	S1	DIP Switch
10	JGF1	PCI-E 3.0 x8

2-3 LAN Ports and LAN LED indicators

LAN Ports

There are four LAN ports on the AOC-STG-i4T. These LAN ports support connection speeds of 10Gbps. Use a direct-attach RJ45 type LAN cable. See the layout below for the location.

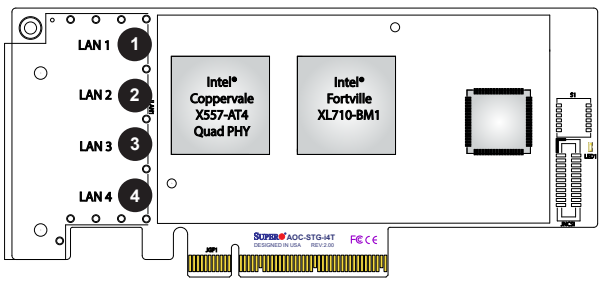
Note: Please refer to page 1-2 for recommended cables.

LAN Port LED Indicators

Each LAN port has two LEDs to indicate speed and data activity. Refer to the table below for LED color and definition.

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

LAN Port Activity LED (Right) LED State		
LED Color	Status	Definition
Off	Off	No Connection
Green	Solid	Link
Green	Flashing	Active



1. LAN Port 1
2. LAN Port 2
3. LAN Port 3
4. LAN Port 4

2-4 NC-SI Header & PCI-E 3.0 x8 Connector

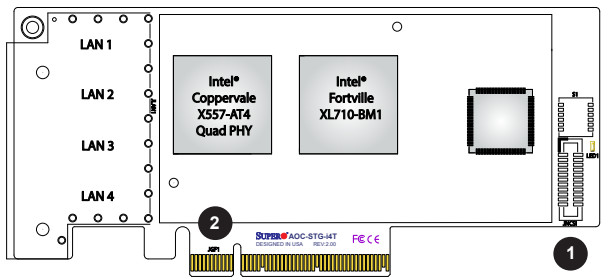
NC-SI Header

A Network-Controller Sideband Interface (NC-SI) header is located at JNCSI on the add-on card. Connect an appropriate cable from this header to a motherboard to provide the out-of-band (sideband) connection between the onboard Baseboard Management Controller (BMC) and a Network Interface Controller (NIC) for remote management. For the network sideband interface to work properly, you will need to use a special cable and a motherboard that supports NC-SI. Please contact Supermicro at www.supermicro.com to purchase the cable for this header. See the layout below for the location.

PCI-E 3.0 x8 Connector

A PCI-E 3.0 x8 connector is located at JGF1 on the add-on card. Insert this connector into a PCI-E 3.0 x8 slot on a motherboard to use the AOC-STG-i4T add-on card. See the layout below for the location.

1. NC-SI Header
2. PCI-E 3.0 x8 Connector

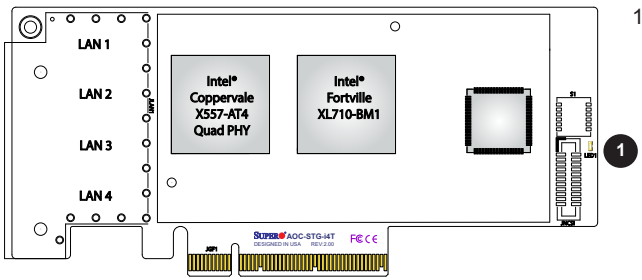


2-5 Overheat LED & DIP Switch

Overheat LED

An overheat LED at LED1 displays a warning if the add-on card is overheating. Refer to the table below for the LED status. See the layout below for the location.

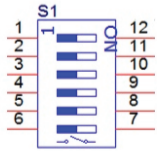
Overheat LED Status	
State	Definition
Solid	Overheat



1. Overheat LED

DIP Switch

The DIP Switch at S1 provides SMBUS address selection. You can configure the card with a static SMBUS address. Refer to the tables below for address selections. See the layout below for the location.

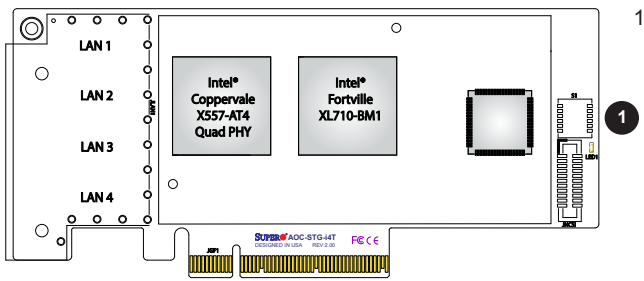


S1:DIP switch for user selection

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



1. DIP Switch

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 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. Unplug the power cord.
3. Use industry standard anti-static equipment (such as gloves or 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.

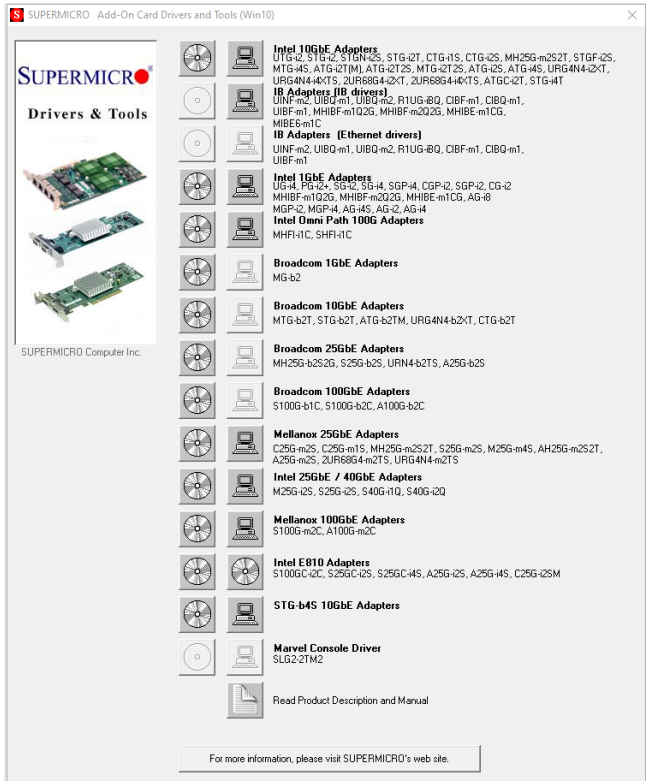
1. Remove the server cover and, if any, set aside any screws for later use.
2. Remove the add-on card slot cover. If the case requires a screw, place the screw aside for later use.
3. Position the add-on card in the slot directly over the connector.
4. Gently push down on both sides of the card until it slides into the PCI connector.
5. Secure the add-on card to the chassis. If required, use the screw that you previously removed.
6. Attach any necessary external cables to the add-on card.
7. Replace the chassis cover.
8. Plug the power cord into the wall socket 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/i40e
```

or

```
/usr/local/src/i40e
```

2. Untar/unzip the archive:

```
tar zxf i40e-x.x.x.tar.gz
```

3. Change to the driver src directory:

```
cd i40e-x.x.x/src/
```

4. Compile the driver module:

```
make

make install
```

The binary will be installed as:

```
/lib/modules/[KERNEL_VERSION]/kernel/drivers/net/i40e/i40e.
[k]o
```

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

```
make CFLAGS_EXTRA="-i40e_NO_LRO" install
```

Note: I40E_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=-"I40E_NO_LRO" to the make file when it's being compiled.

5. Load the module:

   For kernel 2.6.x, use the modprobe command:

   ```
   modprobe i40e <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/
   i40e/i40e.ko
   ```

   In addition, when using 2.6-based kernels, make sure that older i40e drivers are removed from the kernel before loading the new module. To do this, use:

   ```
   rmmod i40e; modprobe i40e
   ```

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 indicated in the drive tar file name.

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 one of the following.

   ```
   /home/username/ixl
   ```

   or

   ```
   /usr/local/src/ixl
   ```

2. Untar/unzip the archive:

   ```
   tar xfz ixl-x.x.x directory
   ```

3. To install the main page:

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

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

   ```
   cd ixl-x.x.x
   make
   ```

   or

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

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

   ```
   ifconfig ixl<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 ixl-x.x.x/src
make load
cp if_ixl.ko /modules
```

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

```
if_ixl_load="YES"
```

or

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

```
ifconfig_ixl<interface_num>="<ifconfig_settings>"
```

Example usage:

```
ifconfig_ixl0="inet 192.168.10.1 netmask 255.255.255.0"
```

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

```
cd ixl-x.x.x/src
mkdir /usr/src/sys/dev/ixl
cp if_ixl* /usr/src/sys/dev/ixl
cp ixl* /usr/src/sys/dev/ixl
cp Makefile.kernel /usr/src/sys/modules/ixl/Makefile
```

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

```
dev/ixl/ixl_hw.c optional ixl
dev/ixl/ixl_ee.c optional ixl
dev/ixl/if_ixl.c optional ixl
```

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

```
/dev/ixl/if_ixl_fx_hw.c optional ixl
/dev/ixl/if_ixl_phy.c optional ixl
```

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

```
device ixl
```

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

3-7 Asset Management Features

Asset Management is a new feature that allows users to monitor selected Supermicro add-on cards in selected Supermicro X10 generation server systems. Using Supermicro's proprietary management software, users will be able to monitor the following:

1. Model name
2. Revision
3. Serial number
4. Temperature

(Disclaimer Continued)

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