

SUPER[®]

AOC-CTG-i2T



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, IT technicians and knowledgeable end users. It provides information for the installation and use of the AOC-CTG-i2T add-on card.

About this Add-on Card

The Supermicro AOC-CTG-i2T is a low-powered and cost-effective 10GBase-T adapter designed for data centers in today's market. The AOC-CTG-i2T offers auto-negotiation, which supports backwards compatibility for smooth transitioning between 1GbE and 10GbE. The adapter meets the demands of bandwidth-intensive applications by utilizing RJ-45 connections for a longer cabling distance. For more information regarding product support or updates, please refer to our website at <http://www.supermicro.com/products/nfo/networking.cfm#adapter>.

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>).

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



Character	Representation	Options
1st	Product Family	AOC: Add On Card
2nd	Form Factor	S: Standard, P: Proprietary, C: MicroLP, U: UIO
3rd	Product Type/Speed	G: GbE (1Gb/s), TG: 10GbE (10Gb/s), 40G: 40GbE (40Gb/s), IBF: FDR IB (56Gb/s), IBQ: QDR IB (40Gb/s)
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+, T: 10GBase-T, Q: QSFP+

SMC Networking Add-on Cards

Model	Type	Form Factor	Interface	Controller	Connection	Dimension (w/o Brackets) (L x H)	Power (W)
SGP-i2	GbE	Standard LP	PCI-E x4	Intel® i350 AM2	2 RJ45 (1Gb/port)	3.9" (9.9cm) x 2.73" (6.9cm)	3.5
SGP-i4	GbE	Standard LP	PCI-E x4	Intel® i350 AM4	4 RJ45 (1Gb/port)	3.9" (9.9cm) x 2.73" (6.9cm)	5
STG-b4S	10GbE	Standard LP	PCI-E x8	Broadcom® BCM57840S	4 SFP+ (10Gb/port)	5.4" (13.7cm) x 2.73" (6.9cm)	14
STG-i2T	10GbE	Standard LP	PCI-E x8	Intel® X540	2 RJ45 (10Gb/port)	5.9" (14.99cm) x 2.73" (6.9cm)	13
STGN-i2S	10GbE	Standard LP	PCI-E x8	Intel® 82599ES	2 SFP+ (10Gb/port)	4.0" (10.2cm) x 2.73" (6.9cm)	11.2
STGN-i1S	10GbE	Standard LP	PCI-E x8	Intel® 82598EN	1 SFP+ (10Gb/port)	4.0" (10.2cm) x 2.73" (6.9cm)	10
STG-i4S	10GbE	Standard LP	PCI-E x8	Intel® XL710-AM1	4 SFP+ (10Gb/port)	5.9" (14.9cm) x 2.73" (6.9cm)	8
S40G-i2Q	40GbE	Standard LP	PCI-E x8	Intel® XL710 AM2	2 QSFP+ (40Gb/port)	5.9" (14.9cm) x 2.73" (6.9cm)	7
PTG-i1S	10GbE	Proprietary	PCI-E x8	Intel® 82598EN	1 SFP+ (10Gb/port)	10.04" (25.5cm) x .78" (2.0cm)	7.5
UG-i4	GbE	UIO FH	PCI-E x8	Intel® 82571EB	4 RJ45 (1Gb/port)	6.6" (16.7cm) x 3.9" (9.8cm)	10
UIBF-m1	FDR IB	UIO LP	PCI-E x8	Mellanox® ConnectX-3	1 QSFP (56Gb/port)	5.63" (14.3cm) x 2.73" (6.9cm)	7
UIBQ-m1	QDR IB	UIO LP	PCI-E x8	Mellanox® ConnectX-2	1 QSFP (40Gb/port)	5.63" (14.3cm) x 2.73" (6.9cm)	7
UIBQ-m2	QDR IB	UIO LP	PCI-E x8	Mellanox® ConnectX-2	2 QSFP (40Gb/port)	5.63" (14.3cm) x 2.73" (6.9cm)	8
CGP-i2	GbE	MicroLP	PCI-E x4	Intel® i350 AM2	2 RJ45 (1Gb/port)	4.45" (11.3cm) x 1.54" (3.9cm)	4
CG-i2	GbE	MicroLP	PCI-E x4	Intel® 82580	2 RJ45 (1Gb/port)	4.45" (11.3cm) x 1.3" (3.4cm)	4
CIBF-m1	FDR IB	MicroLP	PCI-E x8	Mellanox® ConnectX-3	1 QSFP (56Gb/port)	4.85" (12.3cm) x 1.54" (3.9cm)	7
CIBQ-m1	QDR IB	MicroLP	PCI-E x8	Mellanox® ConnectX-3	1 QSFP (40Gb/port)	4.85" (12.3cm) x 1.54" (3.9cm)	7
CTG-i1S	10GbE	MicroLP	PCI-E x8	Intel® 82599EN	1 SFP+ (10Gb/port)	4.85" (12.3cm) x 1.54" (3.9cm)	10
CTG-i2S	10GbE	MicroLP	PCI-E x8	Intel® 82599ES	2 SFP+ (10Gb/port)	4.85" (12.3cm) x 1.54" (3.9cm)	11
CTG-i2T	10GbE	MicroLP	PCI-E x8	Intel® X540	2 RJ45 (10Gb/port)	4.8" (12.3cm) x 2.75" (7.7cm)	13
CTGS-i2T	10GbE	MicroLP	PCI-E x4	Intel® X550	2 RJ45 (10Gb/port)	4.45" (11.3cm) x 1.54" (3.9cm)	12

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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/info/networking.cfm#adapter>.

1-2 Product Highlights

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

- Dual RJ45 Connectors
- Support RJ-45 Category-6 or 6A
- 2U MicroLP Form Factor
- PCI Express 2.1 (2.5GT/s or 5GT/s)
- Intel® QuickData Technology
- VMDq, Next-Generation VMDq, and PC-SIG SR-IOV for Virtualized Environments
- Jumbo Frame Support up to 9KB
- Load Balancing on Multiple CPUs
- iSCSI Remote Boot Support
- Fibre Channel over Ethernet (FCoE)
- Support the most popular Network Operating Systems (NOSs)

1-3 Technical Specifications

General

- Intel® X540 10GbE controller with integrated 10GBase-T copper PHYs
- Compact size 2U MicroLP form factor
- PCI-E x8 2.1 (2.5GT/s or 5GT/s) interface
- Dual RJ-45 connectors with speed up to 10Gb/port
- Load balancing on multiple CPUs
- Intel® PROSet Utility for Windows® Device Manager
- Maximum power consumption: about 13W

I/O Features

- Intel® QuickData Technology: DMA engine that enhances data acceleration and lowers CPU usage
- Support for jumbo frames of up to 9KB
- 802.1q VLAN support
- Two integrated independent 10GBase-T interfaces operate at 10GBase-T (10Gb/s) and 1000Base-T (1Gb/s) modes
- Direct Cache Access (DCA) to avoid cache misses
- MSI-X support to minimize interrupt overhead and to allow load-balancing between multiple cores/CPU's
- Receives and Transmits Side Scaling for Windows environment and Scalable I/O for Linux environments

Performance

- TCP/UDP Segmentation Offload
- IPv6 Support for IP/TCP and IP/UDP Receive Checksum Offload

- Supports Fibre Channel over Ethernet (FCoE)
- Low latency interrupts
- DCA support

Virtualization

- Support for Virtual Machine Device Queues (VMDq and Next-generation VMDq)
- L2 Ethernet MAC address and VLAN filters
- PC-SIG SR-IOV implementation
- Advanced Packet Filtering
- VLAN support to allow creation of multiple VLAN segments
- VXLAN through Software

Manageability

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

Cable Support

- RJ-45 Category-6 up to 55m; Category-6A up to 100m.

OS Support

The AOC-CTG-i2T add-on card supports the following operating systems (OS):

- Windows® 7, 8, Vista, Server 2003, Server 2008, Server 2008 R2, Server 2012
- VMWare
- Linux: RedHat EL, SuSe SLES

- FreeBSD

Dimensions

Card PCB dimensions:

- 4.8 in. (12.3 cm) x 2.75 in (7.0 cm) (L x W)

Platform Support

The AOC-CTG-i2T add-on card supports the following platforms:

- 2UTwin+: 6027TR-D70RF+, 6027TR-D71RF+, 6027TR-DTRF+, 2027TR-D70RF+
- FatTwin: F627R2-D72B+, F627R3-DTB+

		MicroLP Add-On Card Compatibility Chart				
Type	System	AOC-CG-i2	AOC-CGP-i2 AOC-CIBF-m1 AOC-CIBQ-m1	AOC-CTG-i15 AOC-CTG-i25	AOC-CTG-i2T	AOM-CGP-i2M AOM-CTG-i15M AOM-CIBF-m1M
Microcloud	5037MC-H8TRF	√ (1)		√ (1)		
	5037MR-H8TRF		√ (1)			
	5037MC-H86RF	√ (1)				
	5037MC-H12TRF					√
	5038ML-H8TRF			√ (1)		
	5038ML-H12TRF					√
2U Twin ²⁺	2027TR-H70RF+		√ (1)	√ (1)		
	2027TR-H71RF+		√ (1)	√ (1)		
	2027TR-H72RF+		√ (1)	√ (1)		
	2027TR-HTRF+		√ (1)	√ (1)		
	6027TR-H70RF+		√ (1)	√ (1)		
	6027TR-H71RF+		√ (1)	√ (1)		
2U Twin+	6027TR-HTRF+		√ (1)	√ (1)		
	6027TR-D70RF+		√ (2)	√ (2)	√	
	6027TR-D71RF+		√ (2)	√ (2)	√	
	6027TR-DTRF+		√ (2)	√ (2)	√	
	2027TR-D70RF+		√ (2)	√ (2)	√	
Fat Twin (8 Nodes)	F617R2-R72+		√ (1)	√ (1)		
	F617R2-RT+		√ (1)	AOC-CTG-i15		
Fat Twin (4 Nodes)	F627R3-R72B+		√ (2)	√ (2)	√	
	F627R3-RTB+		√ (2)	AOC-CTG-i15	√	

1 - 1U Bracket
2 - 2U Bracket

1-4 Compliance/Environmental

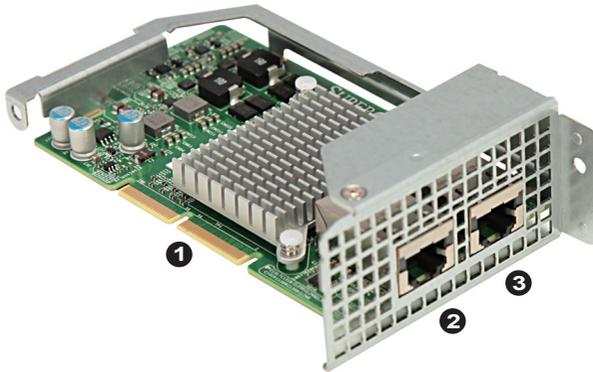
The AOC-CTG-i2T add-on card is compliant with the following environmental regulations:

- RoHS Compliant 6/6, Pb Free 

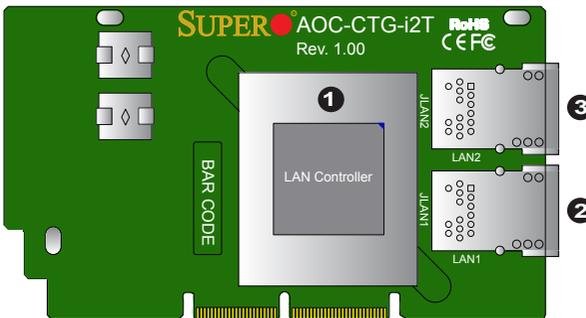
Chapter 2

Hardware Components

2-1 Add-On Card Image and Layout



The AOC-CTG-i2T Image



The AOC-CTG-i2T Layout

2-2 Major Components

The following major components are installed on the AOC-CTG-i2T:

1. Intel® X540 10Gb/1Gb LAN Controller
2. (RJ45 Ethernet) LAN Port 1 & LAN1 LED Indicator
3. (RJ45 Ethernet) LAN Port 2 & LAN2 LED Indicator

2-3 Connectors: LAN Ports and LAN LED Indicators

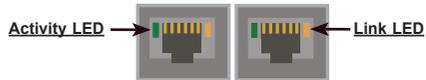
Ethernet Ports

Two Ethernet ports (LAN1/LAN2) are located on the add-on card. These ports support connection speeds of 10Gbps and 1Gbps. Plug the RJ45 type cables into LAN Port1 and LAN Port2 to provide Ethernet connections. Refer to the add-on card layout on Page 2-1 for the locations of the LAN ports. Also, see the table on the left for LAN port pin definitions.

LAN Ports Pin Definition			
Pin#	Definition		
1	M_MDIO_P0		
2	M_MDIO_N0		
3	M_MDIO_P1	9	LINK0_10G
6	M_MDIO_N1	10	LINK0_1G
4	M_MDIO_P2	11	LINK0_LINKUP
5	M_MDIO_N2	12	LINK0_ACT_N
7	M_MDIO_P3	13	GND
8	M_MDIO_N3	14	GND

GLAN Port LEDs

Two LAN ports (LAN 1/LAN 2) are located on the add-on card. Each Ethernet LAN port has two LEDs. The green LED on the left indicates activity; while the other LED on the right may be green, amber or Off to indicate the speeds of the connections. See the tables at right for more information.



LAN 1/LAN 2 Activity LED (Left) LED State		
Color	Status	Definition
Green	Flashing	Active

LAN 1/LAN 2 Link LED (Right) LED State	
LED Color	Definition
Green	10 Gbps
Amber	1 Gbps
Off	100 Mbps or No Connection

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 instructions 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

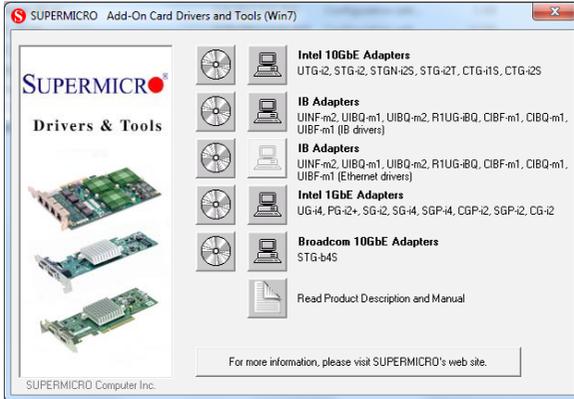
Follow the steps below to install the add-on card into your system.

1. Remove the server cover and, if necessary, 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, and gently push down on both sides of the card until it slides into the PCI connector.
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 chassis cover.
7. 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/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/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 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). 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.

Notes

(Disclaimer Continued)

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