



AOC-STG-b2T



User's Guide

Revision 1.0a

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Preface

About this User's Guide

This user's guide is written for system integrators, IT professionals, and knowledgeable end users. It provides information for the installation and use of the AOC-STG-b2T add-on card.

An Important Note to the User

All graphic images and layout drawings shown in this user's guide are based upon the latest PCB revision available at the time of publishing of this user's guide. The add-on 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 to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.


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

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

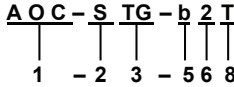
Conventions Used in the User's Guide

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 differentiate between various models or provides information for correct system setup.

Naming Convention

Naming Convention for SIOM Network Adapters



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

SMC Networking Adapter List

SMC Networking Adapter List with a Super I/O Module (SIOM) form factor

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-44	GbE	SIOM	Intel® i350 AM4	4 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	4.4
AOC-MTGN-i25	10GbE	SIOM	Intel® 82599ES	2 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	7.2
AOC-MTG-445	10GbE	SIOM	Intel® XL710-BM1	4 SFP+ (10Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	7
AOC-MTG-i2T	10GbE	SIOM	Intel® X550-A T2	2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	13
AOC-MTG-i4T	10GbE	SIOM	2x Intel® X550-A T2	4 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	26
AOC-MHIBF-m1Q2Q	FDR IB GbE	SIOM	Mellanox® ConnectX-3 Pro Intel® i350	1 QSFP (50Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	9
AOC-MHIBF-m2Q2Q	FDR IB GbE	SIOM	Mellanox® ConnectX-3 Pro Intel® i350	2 QSFP (50Gb/port) 2 RJ45 (1Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	11
AOC-MHIBE-m1Q	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)	9
AOC-MH25G-b25Q2	25GbE	SIOM	Broadcom® BCM57414 Intel® i350	2 SFP28 (25Gb/port) 2 RJ45 (10Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	19
AOC-MH25G-m252T	25GbE	SIOM	Mellanox® ConnectX-4 Lx EN Intel® X550-A T2	2 SFP28 (25Gb/port) 2 RJ45 (10GBase-T)	3.622" (92mm) x 3.428" (87.08mm)	25
AOC-M25G-m45	25GbE	SIOM	Mellanox® ConnectX-4 Lx EN	4 SFP28 (25Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	20
AOC-M25G-i25	25GbE	SIOM	Intel® XXV710	2 SFP28 (25Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	11.8
AOC-MHFI-i1C	Omni-Path	SIOM	Intel® OP HFI 8iC (Wolf River WFR-B)	1 QSFP28 (100Gb/port)	3.622" (92mm) x 3.428" (87.08mm)	15

SMC Networking Adapter List with Standard LP and MicroLP form factors

Model	Type	Form Factor	Interface	Controller	Connection	Dimension (w/o Brackets) (L x H)	Power (W)
AOC-S0P-i2	GbE	Standard LP	PCI-E x4	Intel® i350 AM2	2 RJ45 (1Gb/port)	3.9" (99mm) x 2.73" (69mm)	2.5
AOC-S0P-44	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-A T2	2 RJ45 (10GBase-T)	5.9" (150mm) x 2.73" (69mm)	13
AOC-STG-5i1T	10GbE	Standard LP	PCI-E x4	Intel® X550-A T	1 RJ45 (10GBase-T)	5.9" (150mm) x 2.73" (69mm)	9
AOC-STG-5i2T	10GbE	Standard LP	PCI-E x4	Intel® X550-A T2	2 RJ45 (10GBase-T)	5.9" (150mm) x 2.73" (69mm)	11
AOC-STG-i4T	10GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	4 RJ45 (10GBase-T)	5.9" (14.95cm) x 2.73" (6.8cm)	15.5
AOC-STGN-i15	10GbE	Standard LP	PCI-E x8	Intel® 82598EN	1 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	10
AOC-STGN-i25	10GbE	Standard LP	PCI-E x8	Intel® 82599ES	2 SFP+ (10Gb/port)	4.0" (102mm) x 2.73" (69mm)	11.2
AOC-STGF-i25	10GbE	Standard LP	PCI-E x8	Intel® X710-8M2	2 SFP+ (10Gb/port)	5.19" (132mm) x 2.73" (69mm)	5.6
AOC-STG-345	10GbE	Standard LP	PCI-E x8	Broadcom® BCM578405	4 SFP+ (10Gb/port)	5.4" (137mm) x 2.73" (69mm)	14
AOC-STG-445	10GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	4 SFP+ (10Gb/port)	5.9" (150mm) x 2.73" (69mm)	8
AOC-S25G-m25	25GbE	Standard LP	PCI-E x8	Mellanox® CX-4 LX	2 SFP28 (25Gb/port)	5.9" (142mm) x 2.713" (69mm)	8.7
AOC-S25G-b25	25GbE	Standard LP	PCI-E x8	Broadcom® BCM57414	2 SFP28 (25Gb/port)	5.9" (142mm) x 2.713" (69mm)	5.2
AOC-S40G-i1Q	40GbE	Standard LP	PCI-E x8	Intel® XL710-BM1	1 QSFP+ (40Gb/port)	5.9" (150mm) x 2.73" (69mm)	6
AOC-S40G-i2Q	40GbE	Standard LP	PCI-E x8	Intel® XL710-BM2	2 QSFP+ (40Gb/port)	5.9" (150mm) x 2.73" (69mm)	7
AOC-S100G-m2C	100GbE	Standard LP	PCI-E x16	Mellanox® CX-4 EN	2 QSFP28 (100Gb/port)	6.6" (168mm) x 2.73" (69mm)	16.3
AOC-C0P-i2	GbE	MicroLP	PCI-E x4	Intel® i350 AM2	2 RJ45 (1Gb/port)	4.45" (113mm) x 1.54" (39mm)	4
AOC-C0G-i2	GbE	MicroLP	PCI-E x4	Intel® 82580	2 RJ45 (1Gb/port)	4.45" (113mm) x 1.54" (39mm)	4
AOC-CTG-i15	10GbE	MicroLP	PCI-E x8	Intel® 82599ES	1 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	10
AOC-CTG-i25	10GbE	MicroLP	PCI-E x8	Intel® 82599ES	2 SFP+ (10Gb/port)	4.85" (123mm) x 1.54" (39mm)	11
AOC-CTG-i2T	10GbE	MicroLP	PCI-E x8	Intel® X540-A T2	2 RJ45 (10GBase-T)	4.8" (123mm) x 2.78" (77mm)	13
AOC-CTG-5i2T	10GbE	MicroLP	PCI-E x4	Intel® X550-A T2	2 RJ45 (10GBase-T)	4.45" (113mm) x 1.54" (39mm)	12
AOC-C25G-m15	25GbE	MicroLP	PCI-E x8	Mellanox® CX-4 Lx EN	1 SFP28 (25Gb/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/info/networking.cfm#adapter>.

1-2 About this Add-on Card

Supermicro AOC-STG-b2T features latest Broadcom NetXtreme BCM57416 Ethernet controller that is designed for today's rapid growing data center and cloud-scale applications. The auto-negotiation feature offers the user the backward compatibility between 1GbE and 10GbE. It also supports VXLAN, NVGRE, and Geneve along with Broadcom TruFlow technology. It allows the user to reduce the CPU load and increase the VM (Virtual Machine) density. In addition, NPAR (NIC Partitioning) technology provides flexible connectivity for different networking requirements. The Supermicro AOC-STG-b2T is a truly exceptional 10GbE Ethernet adapter for your continuously growing cloud applications and datacenter.

1-3 Product Highlights

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

- Dual RJ45 connectors
- Low-profile, Short Length standard form factor
- PIC-E 3.0 x8 interface
- Asset Management Features with thermal sensor
- Broadcom dual-port 10Gbps PCI Express Ethernet controller
- Pass-through Energy Efficient Ethernet (IEEE STD 802.3az-2010)
- TruFlow Technology

- NPAR (NIC Partitioning)
- VXLAN, NVGRE, and Geneve
- Low Latency RDMA over Converged Ethernet (RoCE)
- SR-iOV, VMQueue, NetQueue, Multiqueue
- Jumbo Frames (up to 9600-byte)

1-4 Technical Specifications

General

- Broadcom BCM57416 dual-port 10Gbps controller
- Compact size low-profile standard form factor
- PCI-E 3.0 x8 (8GT/s) interface
- Dual RJ45 connectors
- TruFlow Technology

Host Interface

- PCI-E v3.0 (8GT/s)
- MCTP (Management Component Transport Protocol) over SMBus (System Management Bus)
- Function Level Rest (FLR) support
- Message Signal Interrupt (MSI-X)

Networking Features

- Jumbo Frames (up to 9600-byte)
- 802.3x flow control
- Link Aggregation (802.3ad)
- Virtual LANs 802.1q VLAN tagging
- Configurable Flow Acceleration
- IEEE 1588 and Time Sync

Stateless Offload Features

- TCP, UDP, IPv4, IPv6 checksum offload
- Large send offload
- Receive Segment Coalescing
- TCP segmentation offload
- Large receive offload
- Receive Side Scaling (RSS)
- Transmit Side Scaling (TSS)

NIC partitioning

- 16 physical functions
- QoS per partition
- Partitioning control via sideband communication
- Up to 64MAC/VLAN filter per partition
- Stateless offload configuration per partition
- VEB/VEPA support

Virtualization Features

- NetQueue, VMQueue, and Multiqueue
- Support for 128 virtual functions
- VXLAN (Virtual Extensible LAN)
- NVGRE
- Geneve
- Edge Virtual Bridging (EVB)

Flow Processing

- Exact/Wildcard Match Flow Lookup
- VLAN insertion/deletion
- NAT/NAPT
- Mirroring

Data Center Bridging

- Priority-based Flow Control (PFC; IEEE 802.1Qbb)
- Enhanced Transmission Selection (ETS; IEEE802.1Qau)
- Quantized Congestion Notification (QCN; IEEE802.1Qau)
- Data Center Bridging Capability eXchange (DCBX; IEEE802.1Qaz)
- 8 traffic classes per port; fully DCB compliant per 802.1Qbb

Manageability

- Network Controller Sideband Interface (NC-SI)
- PXE and iSCSI boot
- Asset Management with thermal sensors

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

Power Savings

- ACPI compliant power management
- PCI Express Active State Power Management (ASPM)
- Ultra low-power mode
- Pass-through Energy Efficient Ethernet (IEEE802.3az-2010)

Power Consumption

- Maximum power consumption: 13.1W

Physical Dimensions

- Card PCB dimensions: 14.224cm x 6.89cm (5.6in x 2.71in) (LxW)
- Height of end brackets: standard – 12cm (4.725in), low-profile – 8cm (3.15in)

Supported Platforms

- Supermicro motherboards with minimum PCI-E 3.0 x8 slots
- 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

1-5 Compliance/Operating Environment

The AOC-STG-b2T add-on card is compliant with the following environmental regulations:

- RoHS Compliant 6/6, Pb Free 
- Please check SIOM Compatibility Matrix online http://www.supermicro.com/support/resources/AOC/AOC_Compatibility_SIOM.cfm

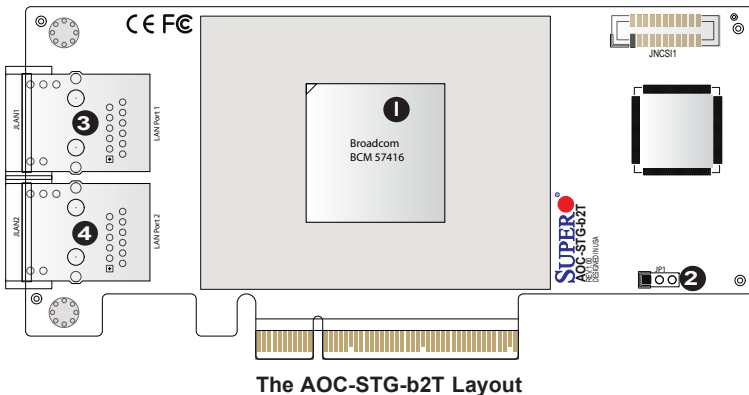
Chapter 2

Hardware Components

2-1 Add-On Card Image and Layout



The AOC-STG-b2T Image



The AOC-STG-b2T Layout

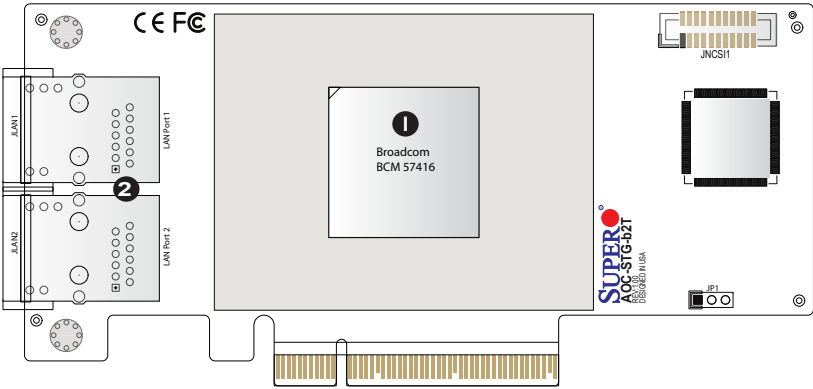
1. Broadcom BCM 57416 Controller	3. LAN1 Port1
2. Jumper JP1	4. LAN2 Port2

2-2 Jumpers and Connectors

Jumper	Description	Default Setting	Note
JP1	I2C Address Mode	1-2: ARP Mode	2-3: Fixed, 0x30

The following major components are installed on the AOC-STG-b2T:

1. Broadcom BCM57416 10GbE Controller
2. Dual RJ45 LAN (LAN 1/LAN 2) Ports



2-3 LAN Ports and LAN LED Indicators

LAN Ports

There are two LAN ports on the AOC-STG-b2T. These LAN ports support connection speeds of 10Gbps. Use RJ45 type LAN cables to provide 10GbE Ethernet connections.



The AOC-STG-b2T Image

LAN Port LED Indicators

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



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

RJ45 LAN Port Link LED (Right) LED State		
LED Color	Status	Definition
Off	Off	No Connection
Green	Solid	Link
Green	Flashing	Active

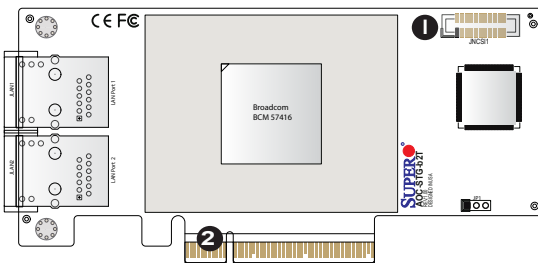
2-4 NC-SI Header & PCI-E 3.0 x8 Connector

NC-SI Header

A Network-Controller Sideband Interface (NC-SI) header is located at JNC51 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 motherboard that supports NC-SI with a special cable. 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

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 remove 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

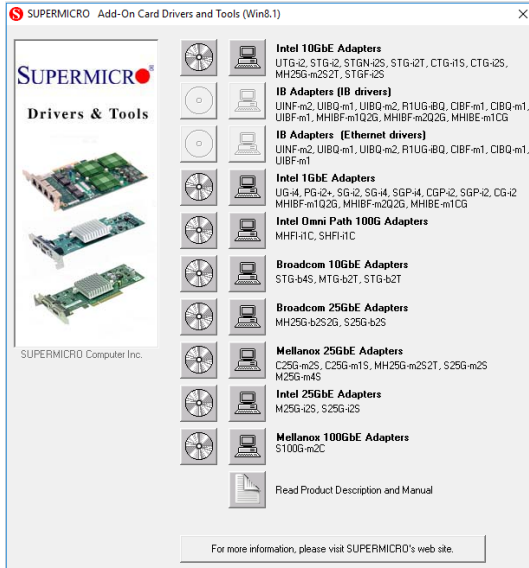
Follow the steps below to install the add-on card into your system.


1. Remove the server cover and, if 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 on the motherboard, and gently push down on both sides of the card until it slides into the PCI connector.
4. Secure the add-on card/motherboard 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 the Windows Operating System

Follow the steps below to install the drivers needed for your Windows OS support. The controller comes with a driver on the CD-ROM CDR-NIC.

1. Run the CDR-NIC. (If you do not have a product CD-ROM, download drivers from the Supermicro Support website and then transfer them to your system.)
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 Broadcom BCM57416)

Linux Drivers

Use the following procedures to install drivers on the Linux operating system.

Installing InfiniBand Drivers for the Linux Operating System

1. Prerequisites: Install the following:


```
yum -y install libibverbs* infiniband-diags perftest qperf librdmacm-utils  
yum -y install groupinstall "InfiniBand Support"
```

2. From the CDR-NIC LAN driver CD or FTP site, go to the following directory:
Broadcom > Linux > Driver.
3. Download the Linux driver package file `netxtreme-bnxt_en-<ver>.tar.gz`
4. Install the driver by entering the following commands:

```
tar xvzf netxtreme-bnxt_en-<ver>.tar.gz  
cd netxtreme-bnxt_en-<ver>  
make build  
make install
```

RDMA over Converged Ethernet (RoCE) is a network protocol that allows remote direct memory access (RDMA) over an Ethernet network. This feature is optional, but if you would like to install with RoCE, please follow the additional steps below:

1. Download the Linux driver package file: `libbnxt_re-.tar.gz`

 **Note:** This driver can be found on either the SuperMicro website or by going to the `Linux_RoCE_Lib` directory from the FTP site (ftp://ftp.supermicro.com/Networking_Drivers). The CDR-NIC LAN driver CD can be found by going to the following directory: `Broadcom > 25G > Linux > Linux_RoCE > RoCE_Lib`.

1. Download libbnxt_re-<ver>.tar.gz
2. Install the library by entering following commands:

```
tar xvzf libbnxt_re-<ver>.tar.gz
cd libbnxt_re-<ver>
sh autogen.sh
./configure --sysconfdir=/etc
make
make install
cp bnxt_re.driver /etc/libibverbs.d
echo "/usr/local/lib" >> /etc/ld.so.conf
ldconfig -v
```

For more driver installation information, please refer to Intel Support website.

Windows Drivers

Follow the steps below to install the drivers on the Windows operating system.

Installing Drivers for the Windows Operating System

1. From the FTP site or CDR-NIC LAN driver CD, go to the following directory:
Broadcom > Windows.
2. Choose the desired Windows driver package folder.
3. As the drivers are in .inf format, you can install the driver from the Device Manager.