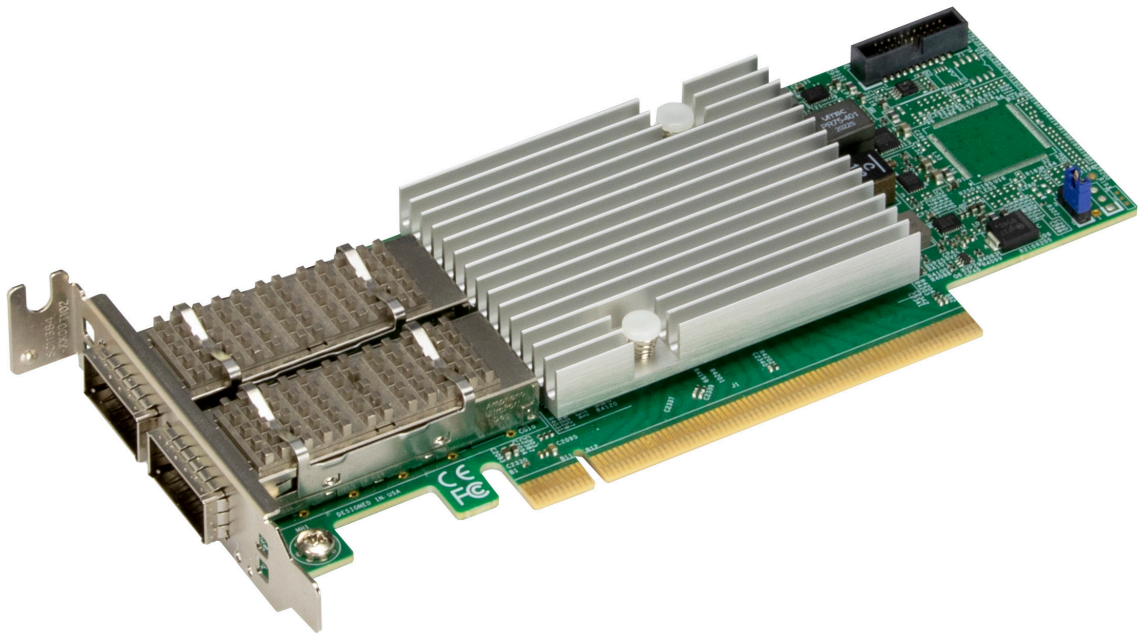




AOC-S100G-b2C



USER'S MANUAL

Revision 1.0b

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Manual Revision 1.0b

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# Preface

## About This Manual

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-S100G-b2C add-on card.

## About This Add-On Card

The Supermicro® AOC-S100G-b2C is the most advanced Network-Controller Sideband Interface (NC-SI) Ethernet LAN card on the market today. This add-on card provides unprecedented network interface connectivity with the Broadcom® BCM57508 Controller. Featuring Asset Management for Supermicro system and server platforms, this add-on card supports the TruFlow™ Technology, SR-IOV, multi-queueing, stateless offloads, network overlay, NIC partitioning, and RDMA over Converged Ethernet (RoCE). The AOC-S100G-b2C offers high-performance connectivity and superb remote sideband manageability to meet the growing needs of high-end computing platforms. For more information regarding product support or updates, refer to our website at <https://www.supermicro.com/en/products/accessories/addon/AOC-S100G-b2C.php>.

## 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 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. For faster service, RMA authorizations may be requested online (<http://www.supermicro.com/support/rma/>).

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 Manual

Special attention should be given to the following symbols for proper installation and to prevent damage done to the components or injury.



**Warning!** Indicates important information given to prevent equipment/property damage or personal injury.



**Warning!** Indicates high voltage may be encountered while performing a procedure.



**Important:** Important information given to ensure proper system installation or to relay safety precautions.



**Note:** Additional information given to differentiate various models or to provide information for proper system setup.

## Important Links

For your system to work properly, follow the links to download all necessary drivers/utilities and the user's manual for your server.

- Supermicro product manuals: <http://www.supermicro.com/support/manuals/>
- Product drivers and utilities: <https://www.supermicro.com/wdl/driver>
- Product safety info: [http://www.supermicro.com/about/policies/safety\\_information.cfm](http://www.supermicro.com/about/policies/safety_information.cfm)
- A secure data deletion tool designed to fully erase all data from storage devices can be found at our website: [https://www.supermicro.com/about/policies/disclaimer.cfm?url=/wdl/utility/Lot9\\_Secure\\_Data\\_Deletion\\_Utility/](https://www.supermicro.com/about/policies/disclaimer.cfm?url=/wdl/utility/Lot9_Secure_Data_Deletion_Utility/)
- If you have any questions, contact our support team at: [support@supermicro.com](mailto:support@supermicro.com)
- Frequently Asked Questions: <https://www.supermicro.com/FAQ/index.php>
- If you have any feedback on Supermicro product manuals, contact our writing team at: [Techwriterteam@supermicro.com](mailto:Techwriterteam@supermicro.com)

This manual may be periodically updated without notice. Check the Supermicro website for possible updates to the manual revision level.

## Naming Convention for Networking Adapters

### AOC-ATG-i2T2SM



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), 100G: 100GbE (100Gb/s), 200G: 200GbE (200Gb/s), 400G: 400GbE (400Gb/s)
4th	Chipset Model (Optional)	N: Niantic (82599), P: Powerville (i350), S: Sageville (X550), F: Fortville (XL710/X710), C: Columbiaville (E810) or Carlsville (X710-AT2/TM4), L: Linkville (E610), CN: Connersville (E830), 6: ConnectX-6, 7: ConnectX-7
5th	Chipset Manufacturer	i or I: Intel, b or B: Broadcom, m or M: Mellanox, N: NVIDIA
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/QSFP56/QSFP112/QSFP-DD
8th	2 <sup>nd</sup> 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	<b>For AIOM – None:</b> 1U height bracket for Edge systems only, <b>B:</b> 0.5U height bracket (internal lock) for Blade systems only, <b>G:</b> 0.5U height (Narrow) for Grand Twin Front IO systems only, <b>M:</b> 0.5U height bracket (Pull-Tab) for all other systems.

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RMA@supermicro.com.tw (RMA Support)

Website: [www.supermicro.com.tw](http://www.supermicro.com.tw)

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# Chapter 1


## Introduction

### 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, refer to our website at <https://www.supermicro.com/en/products/networking/adapters>.

### 1.2 Key Features

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

- Standard PCIe Gen 4.0 x16 host interface
- Low profile, standard short-length form factor
- TruFlow™ (Flow-processing engine integrated to reduce CPU overhead)
- SR-IOV with up to 128 VFs
- Low latency
- NC-SI for IPMI Support
- Stateless offloads
- RDMA over Converged Ethernet (RoCE)
- Network overlay: VXLAN and NVGR
- NIC partitioning (NPAR)
- Dual QSFP56 connectors
- PXE support
- Asset management (for Supermicro systems only)
- RoHS support 

- Cable support: Copper cables, fiber cables, and optic cables with optional transceivers
- Card PCB dimensions: 6.6" x 2.713" (167.64 mm x 68.91 mm) (L x W)

## 1.3 Additional Features

### Host Interface

- PCI Express (PCIe) x16, x8, x4, x2, x1 lane configuration
- Interface up to four PCIe hosts
- Function Level Reset (FLR)
- Message Signal Interrupt (MSI-X)
- Advanced Error Reporting (AER)
- Transaction Processing Hints (TPH)

### Network Features

- Jumbo frames (up to 9600 bytes)
- IEEE 802.3x flow control
- Link Aggregation (IEEE 802.3ad)
- Virtual LANs — IEEE 802.1q VLAN tagging

### Performance Features

- Low-chip latency < 1  $\mu$ s TX and RX combined
- Maximum 100 million packets per second

## **Stateless Offload Features**

- TCP, UDP, and IP checksum offloads
- Large Send Offload (LSO)
- Receive Segment Coalescing (RSCO)
- TCP Segmentation Offload (TSO)
- Generic Receive Offload (GRO)
- Receive Side Scaling (RSS)
- Transmit Side Scaling (TSS)
- Accelerated Receive Flow Steering (aRFS)
- Header-Payload Split

## **NIC Partitioning (NPAR)**

- 16 Physical Functions
- Bandwidth allocation per partition
- Partitioning control via sideband communication
- Up to 64 MAC/VLAN filters per partition
- Per partition statistics support
- Stateless offloads configuration per partition
- Software teaming support for partition

## **Virtualization Features**

- NetQueue, NDIS VMQ, and Multi-queue
- PCIe SIG SR-IOV compliant
- Edge Virtual Bridging (EVB) — VEB/VEPA support
- Support for 1K Virtual Functions (VFs)

- VxLAN-aware stateless offloads
- NVGRE-aware stateless offloads
- Geneve-aware stateless offloads
- IP-in-IP-aware stateless offloads
- GRE-aware stateless offloads
- Per Virtual Function (VF) statistics
- VF Receive-Side Scaling (RSS)/Transmit-Side Scaling (TSS)
- VF isolation, source pruning, and anti-spoofing

### **RDMA over Converged Ethernet (RoCE)**

- RoCEv2 and RoCEv1
- Congestion control
- Reliable Connection (RC), Unreliable Datagram (UD), and Raw EtherType
- One million RC queue pairs
- 64K shared receive queues
- One million completion queues
- One million memory regions and windows
- One million protection domains
- Fast memory registration
- OFED 3.18-2 and 4.8-1
- Network Direct Kernel Provider Interface (NDKPI) 2.0
- Network Direct Service Provider Interface (NDSPI) 2.0

## Flow Processing

- Exact match flow lookup
- Wildcard match flow lookup
- Flexible key selection
- Packet recycling
- Connection tracking
- VLAN insertion/deletion
- NAT/NAPT
- Tunnel encapsulation/decapsulation
- Custom tunnel processing
- Flow tracking and aging
- Mirroring
- Metering
- Flow counters/statistics

## Data Center Bridging

- Priority-based flow control (PFC IEEE 802.1Qbb)
- Enhanced transmission selection (ETS IEEE 802.1Qbb)
- Data center bridging capability eXchange (DCBX IEEE 802.1Qbb)
- Up to eight traffic classes per port; fully DCB compliant per IEEE 802.1Qbb)

## Manageability

- Network Controller Sideband Interface (NC-SI) over RMII Based Transport (RBT)

## Environmental Conditions

- Storage temperature: -40°C to 70°C (-40°F to 158°F)
- Storage humidity: 90% non-condensing relative humidity at 35°C (95°F)

## 1.4 Supported Platforms

The AOC-S100G-b2C supports:

- Supermicro motherboards with minimum PCIe x16 expansion slots
- Supermicro server systems with low-profile or full-height PCIe 4.0 x16 expansion slots
- The NC-SI feature with corresponding NC-SI connectors supported by Supermicro motherboards



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

## Chapter 2

# Hardware Components

## 2.1 Add-On Card Image and Layout

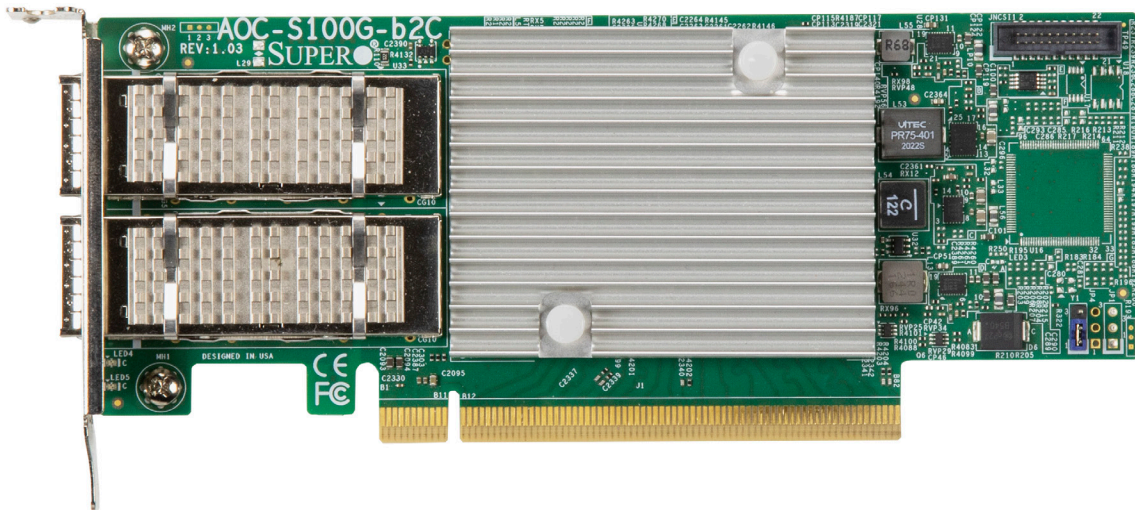


Figure 2-1: AOC-S100G-b2C Top Image

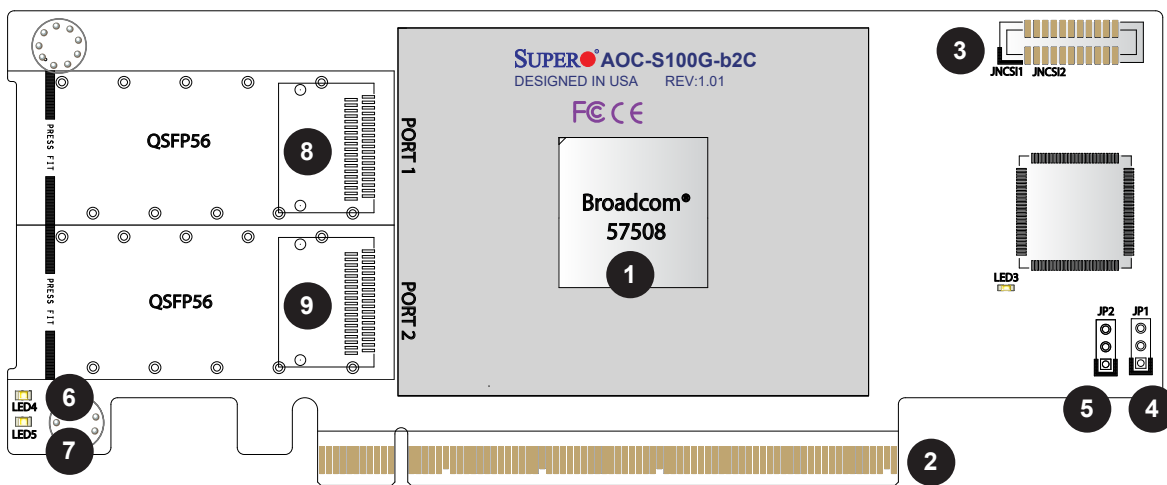


Figure 2-2: AOC-S100G-b2C

## 2.2 Major Components

The following major components are installed on the AOC-S100G-b2C:

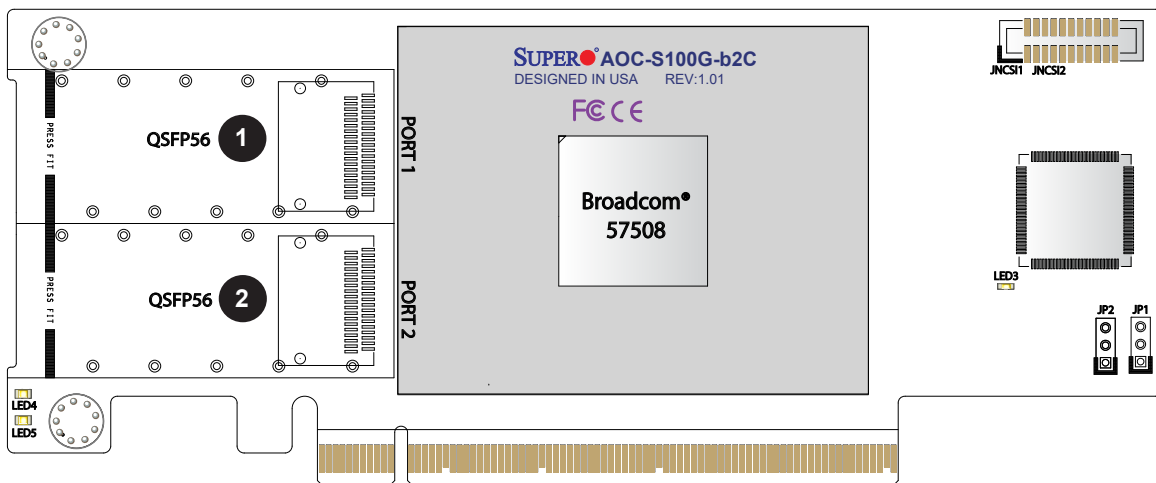
<b>AOC-S100G-b2C Major Components</b>		
<b>No</b>	<b>Component Name</b>	<b>Definition</b>
1	Broadcom BCM57508	Ethernet Controller
2	JGF1	PCIe 4.0 x16 Connector
3	JNCSI1	NC-SI Header
4	JP1	1–2: SMBUS ARP Mode (Default)
		2–3: Static SMBUS Address Mode
5	JP2	1–2: Disable Standby Mode (Default)
		2–3: Enable Standby Mode
6	LED4	QSFP56 Port 1 Link/Active LED
7	LED5	QSFP56 Port 2 Link/Active LED
8	QSFP56	Quad Small Form-Factor Pluggable 56 Port 1
9	QSFP56	Quad Small Form-Factor Pluggable 56 Port 2

## 2.3 QSFP56 Ethernet Connection

### QSFP56 Connector

Two Quad-Small-Form-Factor-Pluggable 56 (QSFP56) connectors are located at QSFP56 on the add-on card. The ports operate at up to 200 Gb/s. Plug the Direct Attached Copper (DAC) cable into the QSFP56 ports for network connections.

1. QSFP56
2. QSFP56



## 2.4 Port and Port LED

### QSFP56 Ports

The QSFP56 adapter ports are located at Port 1 and Port 2 on the add-on card. Connect a Direct Attach Copper cable or an LC Fiber-Optic cable to the port to provide Ethernet communication. Depending on the selected setting, you will either have one port active to provide 200 GbE or dual ports active to provide 100 GbE each. Refer to the expansion card layout on [page 14](#) for the location of the QSFP56 ports.

### QSFP56 Port LEDs

There are two LED located below the two QSFP56 ports as LED4 and LED5 to indicate the link speed and activity of each port. The status of the LED(s) will depend on the selected setting of the ports.

<b>QSFP56 2x 100 GbE Port LED4 and LED5</b>		
<b>LED</b>	<b>Color</b>	<b>Definition</b>
<b>Activity</b>	Blinking Green	Activity
<b>Link</b>	Yellow	< 100 Gbps Link Speed
	Green	100 Gbps Link Speed

<b>QSFP56 1x 200 GbE Port LED4</b>		
<b>LED</b>	<b>Color</b>	<b>Definition</b>
<b>Activity</b>	Blinking Green	Activity
<b>Link</b>	Yellow	< 200 Gbps Link Speed
	Green	200 Gbps Link Speed

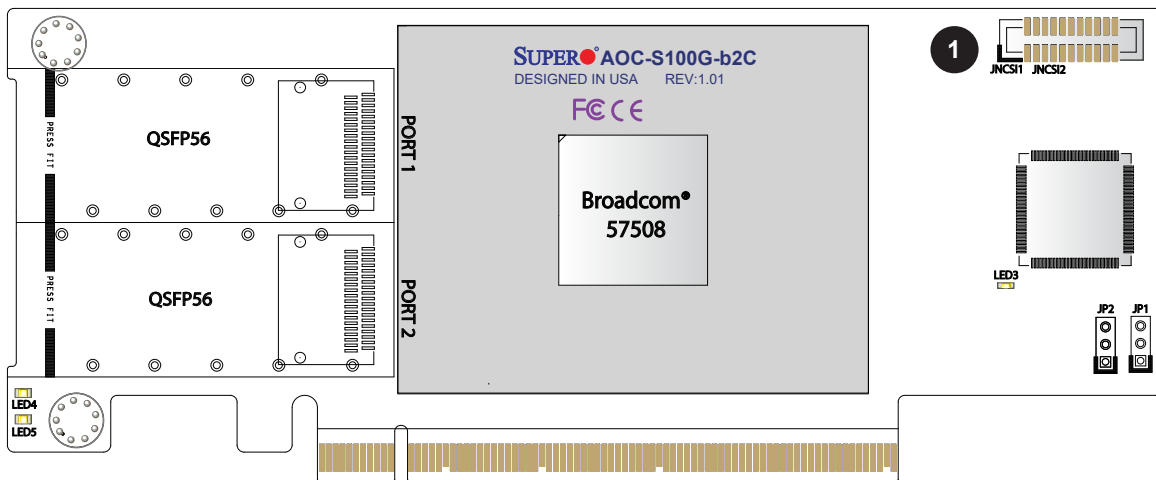
<b>QSFP56 1x 200 GbE Port LED5</b>		
<b>LED</b>	<b>Color</b>	<b>Definition</b>
<b>Activity</b>	N/A	Port 2 Inactive
<b>Link</b>	N/A	Port 2 Inactive

## 2.5 NC-SI Header

### NC-SI Header

A Network-Controller Sideband Interface (NC-SI) header is located at JNCSI1 on the add-on card. Connect an appropriate cable from this header to a motherboard to provide an 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 and also need to have a special cable. If needed, contact Supermicro at [www.supermicro.com](http://www.supermicro.com) to purchase the cable for this header.

#### 1. NC-SI Header



## 2.6 Jumper Settings

### Explanation of Jumpers

To modify the operation of the motherboard, jumpers can be used to choose between optional settings. Jumpers create 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 motherboard layout page for jumper locations.

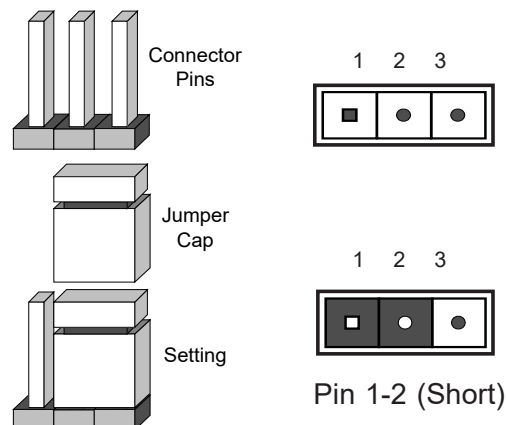


Figure 2-3: Three Pin Jumper

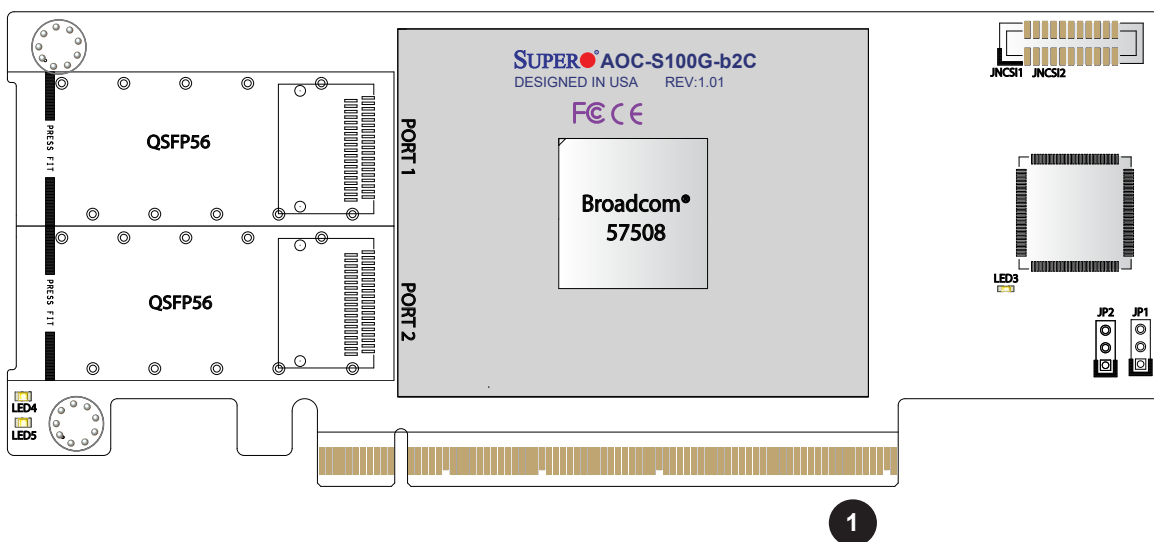
JPAUX1 for Standby Power	IPMI Support	FailOver Support	WoL Support
Disable <i>No standby power to AOC NIC</i>	Yes	Yes	No
Enable <i>Standby power to AOC NIC</i>	Yes	Yes	Yes

JPAUX1 for Standby Power	Function	Notes
Disable <i>No standby power to AOC NIC</i>	Disable jumper to disconnect the standby power	Default
Enable <i>Standby power to AOC NIC</i>	Enable jumper to connect standby power to AOC NIC	WoL is supported on port 1 ONLY but limited to platforms with sufficient airflow when it is in standby mode (S5 state). Consult Supermicro before enabling it.

## 2.7 PCIe 4.0 x16 Connector

A PCIe 4.0 x16 connector is located at JGF1 on the add-on card. To use the host interface on this expansion card, insert this connector into a PCIe 4.0 x16 slot on a motherboard.

1. PCIe 4.0 x16 connector



# Chapter 3

## Installation

Your system came with the AOC-S100G-b2C add-on card which is designed as a part of an integrated solution. We do not recommend that any part of your system components be removed and re-installed. However, if you do need to remove or re-install a system component, including this add-on card, follow the instructions to ensure proper system setup. Also, be sure to remove the power cord first before adding, removing or changing any hardware components to avoid damaging the system or components.

### 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 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

To install the add-on card properly, be sure to take the following steps:

1. Power down the system.
2. Remove the power cord from the wall socket.
3. Use industry-standard antistatic equipment (such as gloves or wrist strap) and follow the instructions listed on [page 21](#) 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 hot fixes.

## 3.3 Installing the Add-on Card

Take the following steps 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 PCIe 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 the Drivers (for Broadcom BCM57508)

To install drivers for the AOC-S100G-b2C add-on card for either Linux or Windows, follow the instructions:

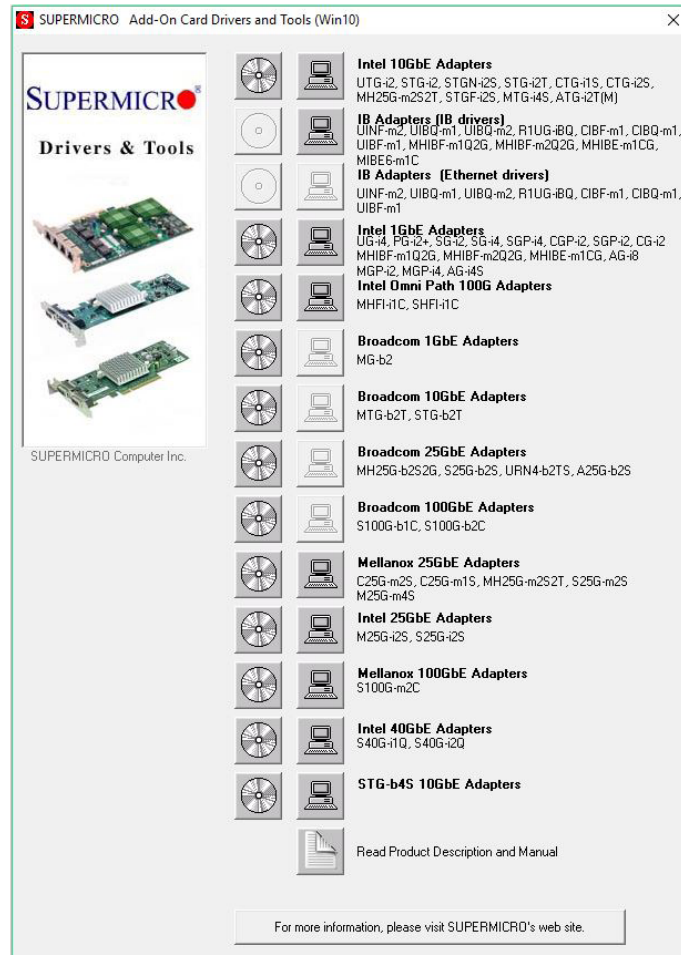


Figure 3-1: Add-On Card Drivers and Tools

### Before Installing the Drivers for the Linux Operating System

Infiniband-diags is a set of utilities designed to help configure, debug, and maintain infiniband fabrics. Installing them from the Linux library is necessary prior to driver installation. To do so, first download the following libraries:

```
yum -y install libibverbs* infiniband-diags perftest qperf librd-
macm-utils
```

```
yum -y install groupinstall "InfiniBand Support"
```

## Installing the 100 GbE Drivers for the Linux Operating System

Take the following steps to install the drivers on the Linux operating system:

1. Download the Linux driver package file: netxtreme-bnxt\_en-<ver>.tar.gz.



**Note:** This driver can be found on either the Supermicro website, or by going to the [Broadcom website](#).

2. Install the driver by entering the following commands:

```
tar xvzf netextreme-bnxt_en-<ver>.tar.gz
cd netextreme-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 it with RoCE, follow the additional steps:

1. Download the Linux driver package file: libbnxt\_re-<ver>.tar.gz.



**Note:** This driver can be found on either the Supermicro website, or by going to the [Broadcom website](#).

2. Install the library by entering the following commands:

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

## Installing the 100 GbE Drivers for the Windows Operating System

Take the following steps to install the drivers on the Windows operating system:

1. From either the Supermicro website, or by going to the [Broadcom website](#), find your desired driver.
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.

## Chapter 4

### Change NIC Link Configuration

This section gives instructions to modify the NIC link configuration from 2x 100 GbE to 1x 200 GbE. Use the up arrow and down arrow keys to scroll and highlight your chosen option, then press <Enter> to select. Press <Esc> to return to the previous page or exit an option menu.

#### 4.1 BIOS HII Settings

##### Converting 2x 100 GbE to 1x 200 GbE

The first method is to modify the NIC link configuration through the BIOS HII settings. To convert 2x 100 GbE to 1x 200 GbE, be sure to follow the instructions:

1. Navigate to the **Advanced** tab.

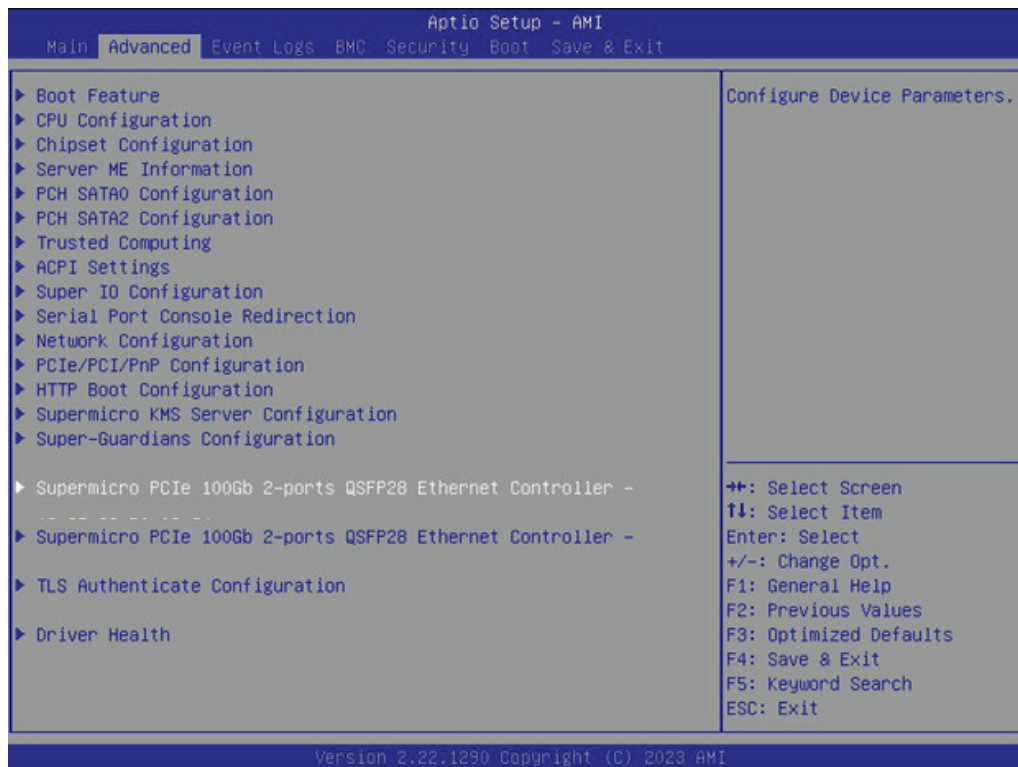
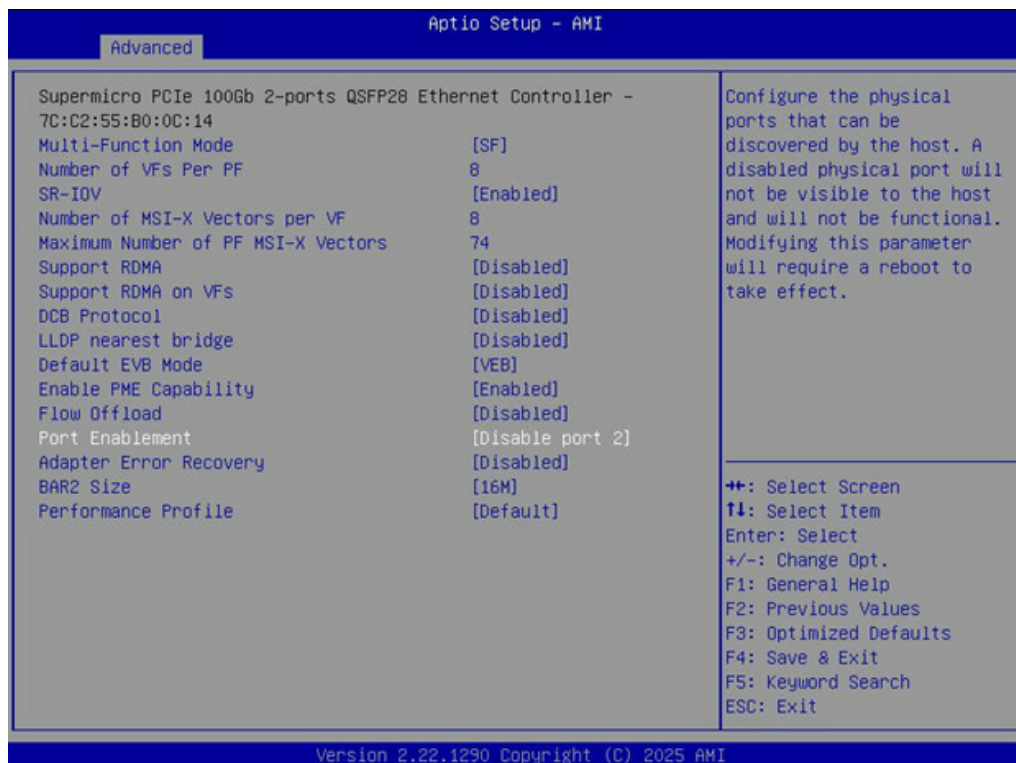


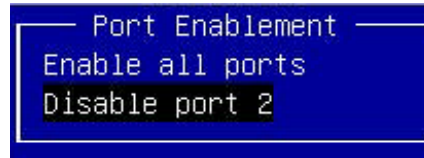
Figure 4-1: Advanced Tab

2. Select the first MAC of the Supermicro 100 GbE Ethernet controllers.
3. Navigate to the **Device Configuration** menu.
4. Select **Port Enablement**.



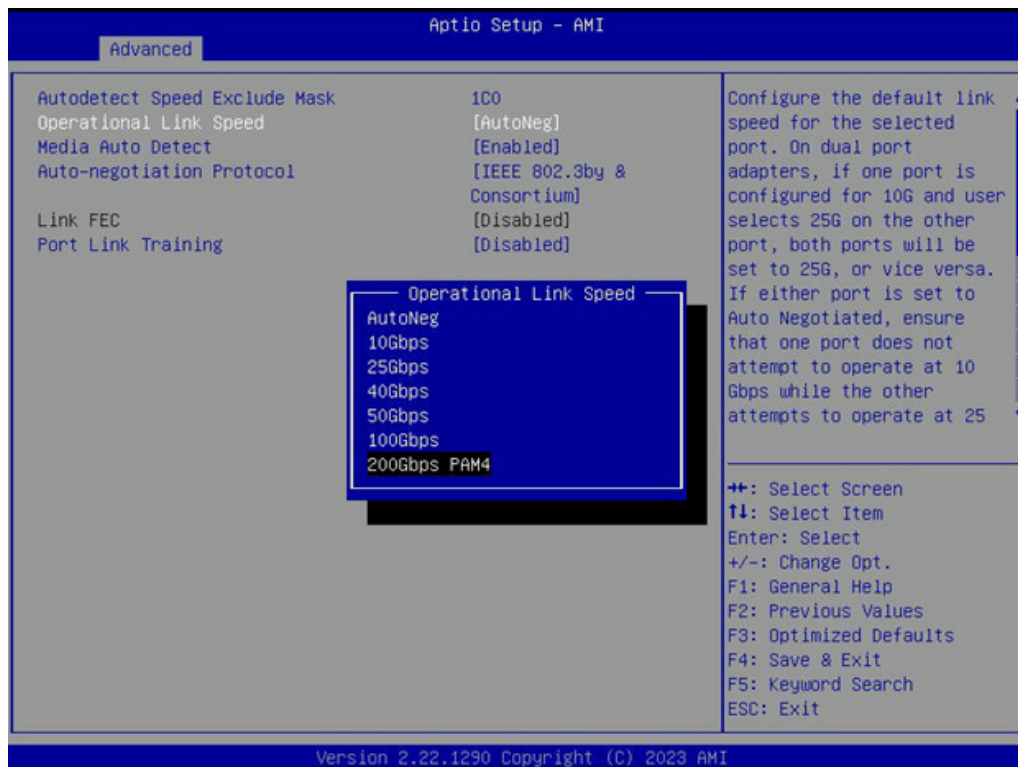
**Figure 4-2: Port Enablement (Disable Port 2)**

- Set port enablement to **Disable port 2**.



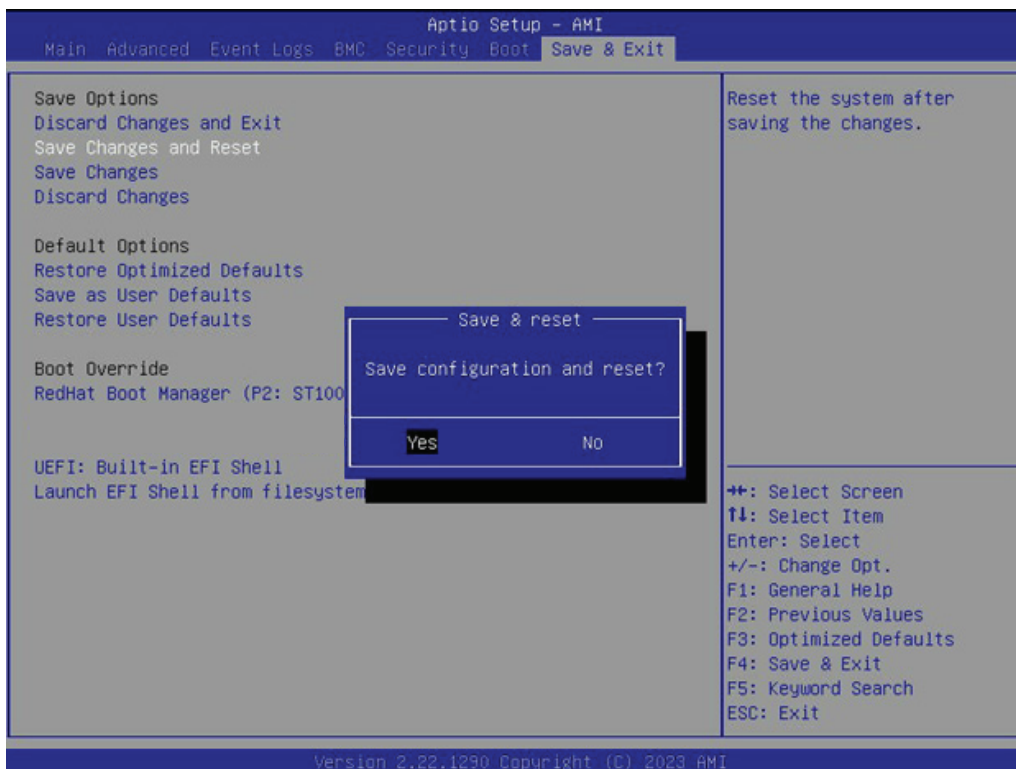
**Figure 4-3: Disable Port 2 Option**

- Return to the **Advanced** Tab.
- Navigate to **Link Configuration**.
- Select **Operational Link Speed**.
- Set the operational link speed to **200Gbps PAM4**.



**Figure 4-4: Operational Link Speed Options (200Gbps PAM4)**

10. Return back to the **Main Menu**.
11. Navigate to the **Save & Exit** tab.
12. Select **Save Changes and Reset**.
13. Select **Yes** to save the modified configuration and reboot to apply changes. If you do not want to save the current configuration or apply changes, select **No**.



**Figure 4-5: Save Configuration and Reset**



**Note:** Merging 2x 100 GbE to 1x 200 GbE will disable port 2.

## Reversing 1x 200 GbE Back to 2x 100 GbE

To reverse the NIC link configuration from 1x 200 GbE back to 2x 100 GbE through the BIOS HII settings, take the following steps:

1. Navigate to the **Advanced** tab.
2. Select the first MAC of the Supermicro 100 GbE Ethernet controllers.
3. Navigate to the **Device Configuration** menu.

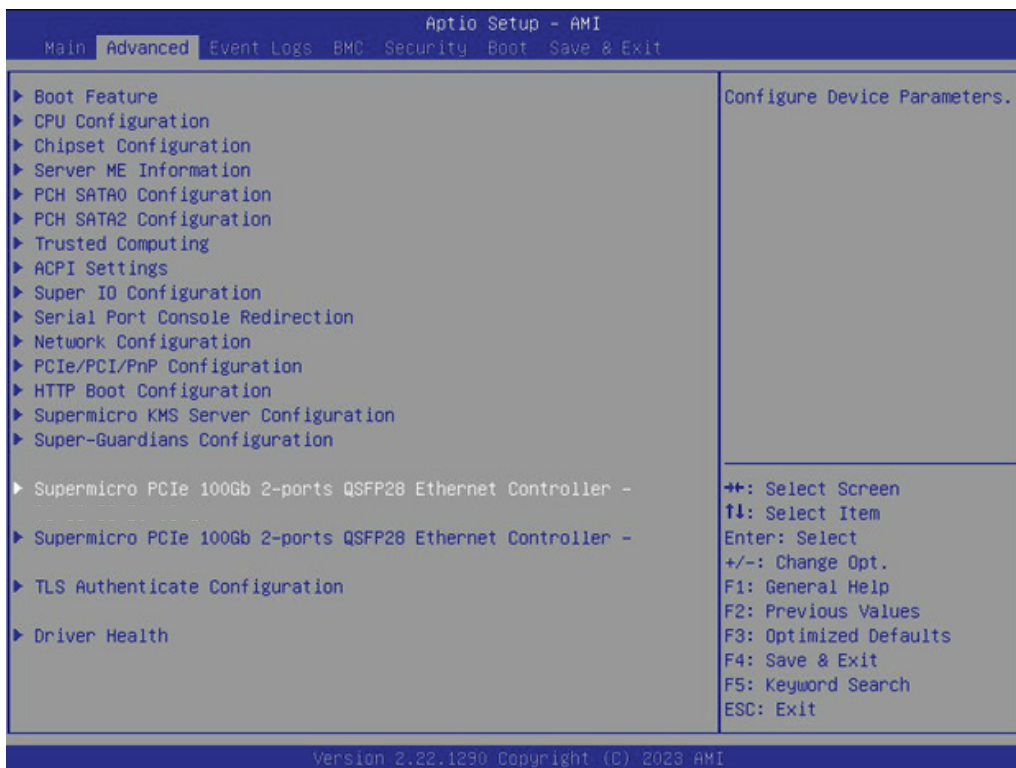
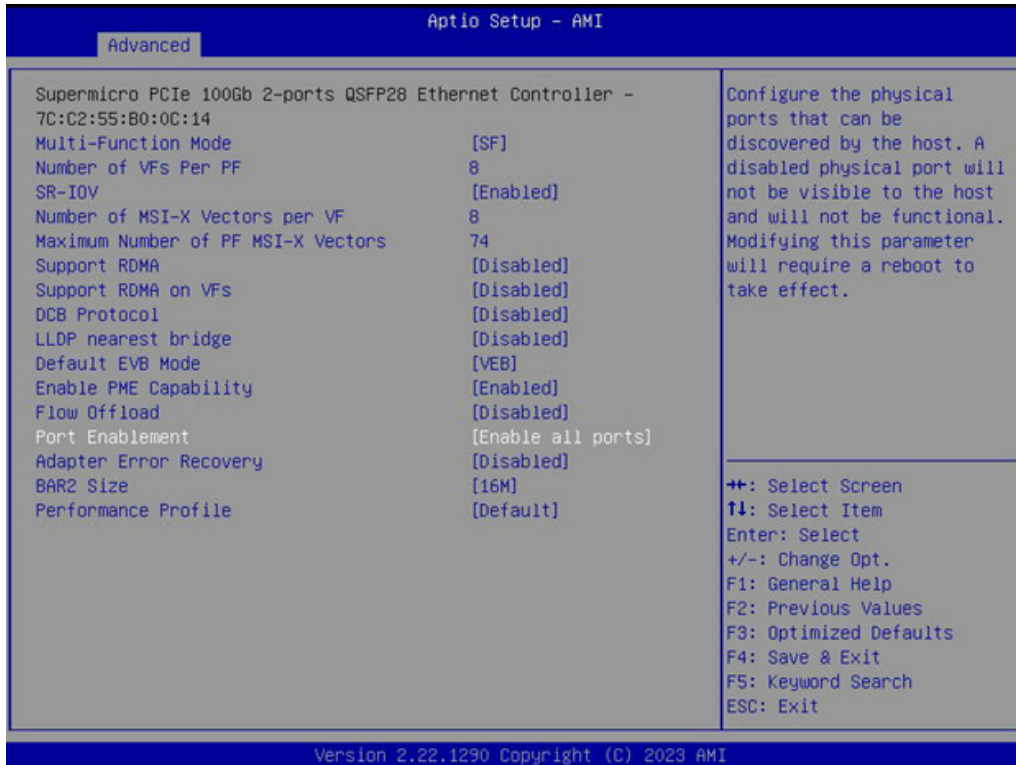


Figure 4-6: Advanced Tab

4. Select **Port Enablement**.
5. Set port enablement to **Enable all ports**.



**Figure 4-7: Port Enablement (Enable All Ports)**

- Return back to the **Advanced** tab.



Figure 4-8: Enable All Ports Option

- Navigate to **Link Configuration**.
- Select **Operational Link Speed**.
- Set the the operation link speed to **AutoNeg**.

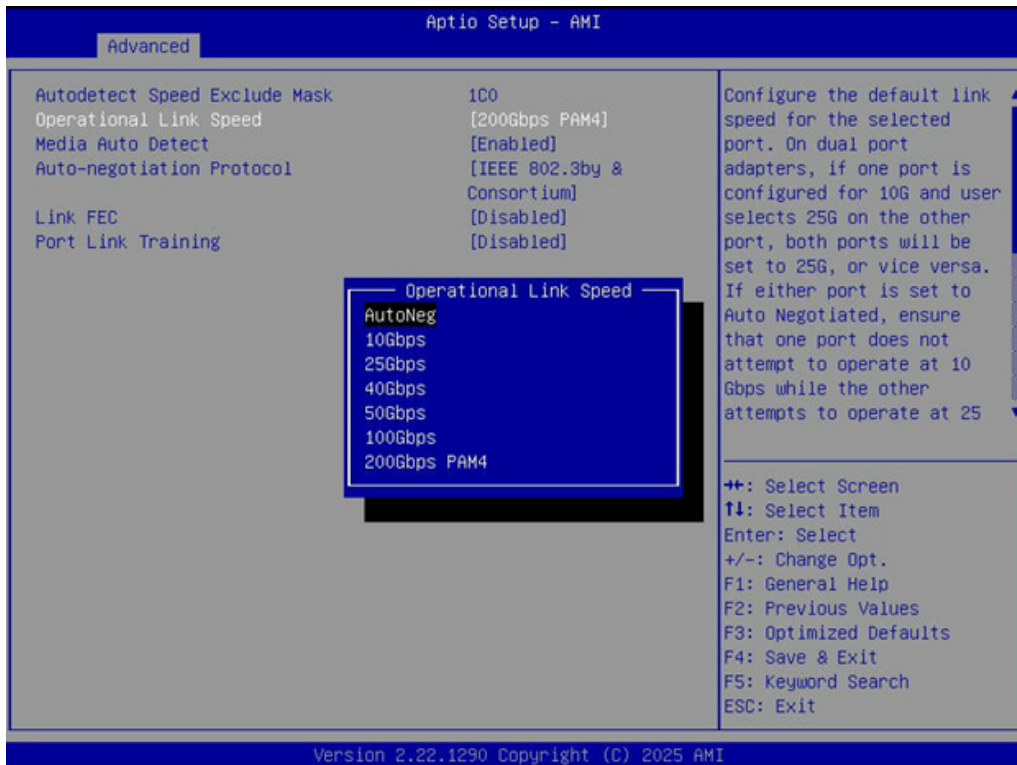
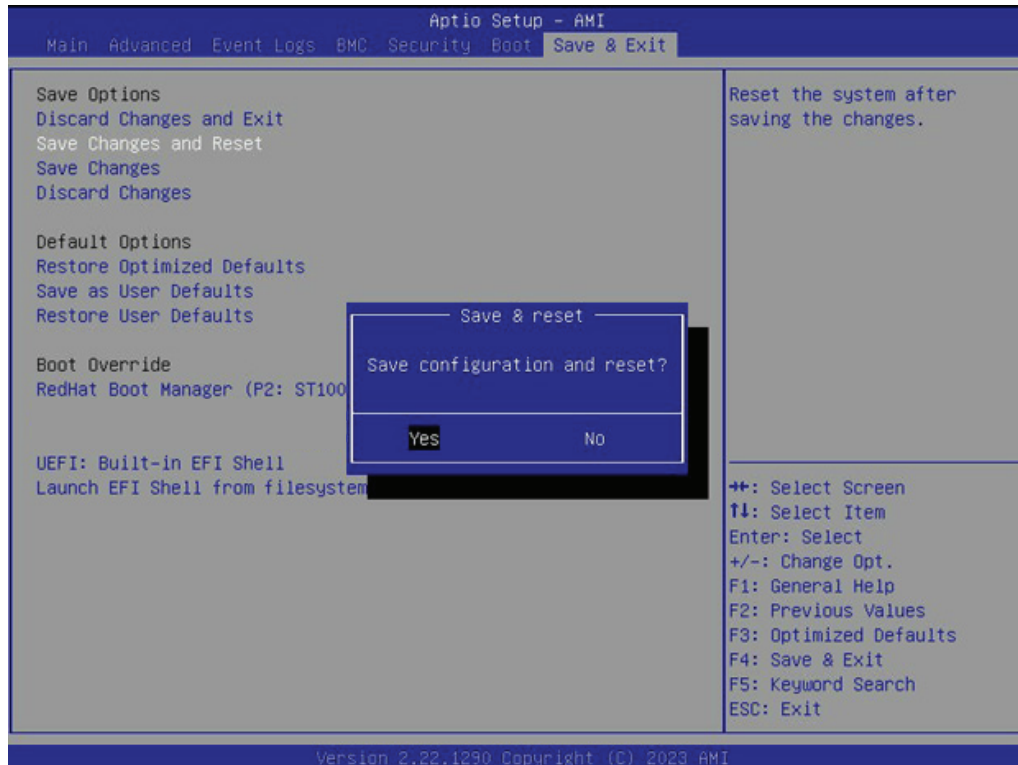


Figure 4-9: Operational Link Speed Options (AutoNeg)

10. Return back to the **Main Menu**.
11. Navigate to the **Save & Exit** tab.
12. Select **Save Changes and Reset**.
13. Select **Yes** to save the modified configuration and reboot to apply changes. If you do not want to save the current configuration or apply changes, select **No**.



**Figure 4-10: Save Configuration and Reset**

## 4.2 NICCLI Utility

### Converting 2x 100 GbE to 1x 200 GbE

The second method is to modify the NIC link configuration using the NICCLI utility. To convert 2x 100 GbE to 1x 200 GbE, be sure to follow the instructions:

1. Use the following command lines:

```
./niccli.x86_64 -i <index> nvm -setoption firmware_link_speed_d0  
-scope 0 -value 7
```

```
./niccli.x86_64 -i <index> nvm -setoption port_hide -value 1
```

2. Reboot to apply changes.



**Note:** Merging 2x 100 GbE to 1x 200 GbE will disable port 2.

### Reversing 1x 200 GbE Back to 2x 100 GbE

To reverse the NIC link configuration from 1x 200 GbE back to 2x 100 GbE using the NICCLI utility, take the following steps:

1. Use the following command lines:

```
./niccli.x86_64 -i <index> nvm -setoption firmware_link_speed_d0  
-scope 0 -value 0
```

```
./niccli.x86_64 -i <index> nvm -setoption port_hide -value 0
```

2. Reboot to apply changes.

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