Neousys Technology Inc.

PCIe-PoE454at

User Manual
Revision 1.0

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Notices

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Conformity

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Safety Precautions

Read these instructions carefully before you install, operate, or transport the system.

- Install the system or DIN rail associated with, at a sturdy location
- Install the power socket outlet near the system where it is easily accessible
- Secure each system module(s) using its retaining screws
- Place power cords and other connection cables away from foot traffic.
- Do not place items over power cords and make sure they do not rest against data cables
- Shutdown, disconnect all cables from the system and ground yourself before touching internal modules
- Ensure that the correct power range is being used before powering the device
- Should a module fail, arrange for a replacement as soon as possible to minimize down-time
- If the system is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

Service and Maintenance

- ONLY qualified personnel should service the system
- Shutdown the system, disconnect the power cord and all other connections before servicing the system
- When replacing/ installing additional components (expansion card, memory module, etc.), insert them as gently as possible while assuring proper connector engagement

ESD Precautions

- Handle add-on module, motherboard by their retention screws or the module's frame/ heat sink.
- Avoid touching the PCB circuit board or add-on module connector pins
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or maintaining the system
- Avoid dust, debris, carpets, plastic, vinyl and styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation

About This Manual

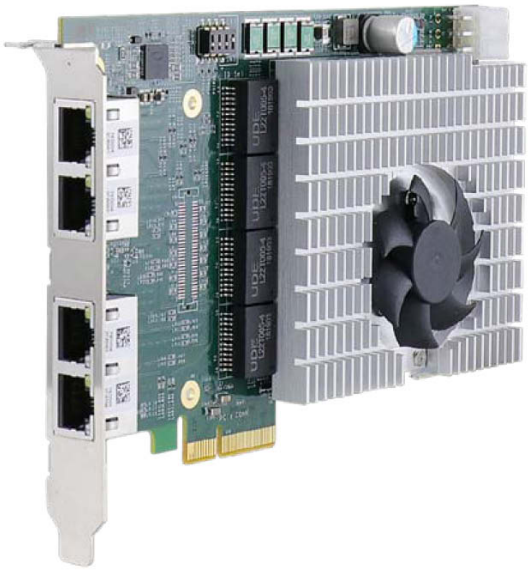
This manual introduces and describes how to setup/ install Neousys Technology PCIe-PoE454at. As one of the first 5GBASE-T industrial Power over Ethernet frame grabber cards on the market, it offers expandability, stability, flexibility and fast Ethernet access to peripheral devices.

Revision History

Version	Date	Description
1.0	Dec. 2022	Initial release

1 Introduction

PCIe-PoE454at is an industrial-grade 4-port 5GBASE-T frame grabber card with 802.3at PoE+ capability for advanced machine vision applications. It leverages Marvel AQC111C 5GBASE-T Ethernet controller to offer dedicated 5 Gb/s Ethernet bandwidth for each port. Furthermore, it is backward compatible with 2.5G, 1G, 100M link speeds to support legacy Ethernet devices and can transmit data utilizing economical Cat 5e Ethernet cables up to 100 meters without bandwidth degradation.



5GBASE-T, or NBASE-T, is an emerging technology, especially for the machine vision market. Cameras with a 5GBASE-T Ethernet interface have up to 5 times the Ethernet bandwidth compared to Gigabit Ethernet, thus supporting higher resolution and frame rate. PCIe-PoE454at provides high port density to provide four 5GbE ports in a standard half-size PCIe card form factor. In addition, it comes with IEEE 802.3at PoE+ PSE function so you can simply power the NBASE-T camera using a single Ethernet cable.

For machine vision systems requiring multiple high-resolution 5GBASE-T cameras, PCIe-PoE454at is the ideal frame grabber that provides high port density, 24/7 reliable operation, and excellent throughput performance without frame loss.

1.1 PCIe-PoE454at Specification

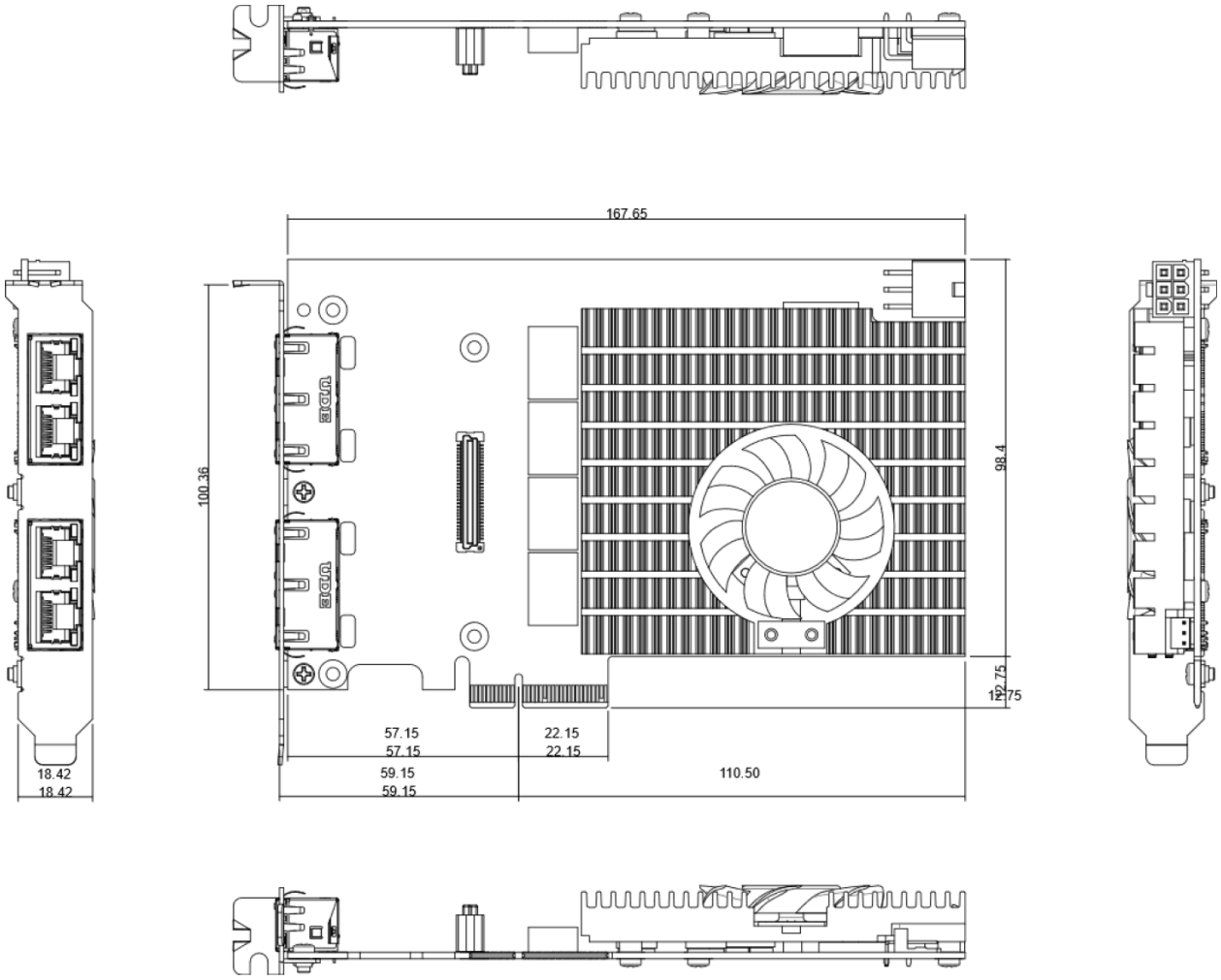
Bus interface	4-lanes, Gen3 PCI Express interface
Gigabit Ethernet Port	4x 5GBASE-T Ethernet ports by four Marvel AQC111C 5G controllers, supporting 5G, 2.5G, 1G, 100M link speeds
PoE Capability	In compliant with IEEE 802.3at-2009 (PoE+), each port delivers up to 25.5 W
Cable Requirement	CAT-5e or CAT-6 cable, 100 meters maximum
Power requirement	Maximum 5.5A @ 12V (66W) from PCIe gold finger connector Maximum 8.5A @ 12V (102W) with onboard 6-pin PCIe power connector connected
Operating temperature	0°C ~ 55°C with airflow*
Dimension	167.7 m (W) x 111.2 mm (H)

*The recommended airflow under the specific operating temperature range is to ensure operation and longevity of the card. Please refer to the following airflow for the stated operating temperature range:

46°C to 50°C: **0.4m/s**

51°C to 55°C: **0.65m/s**

1.2 Dimension



NOTE

All measurements are in millimeters (mm).

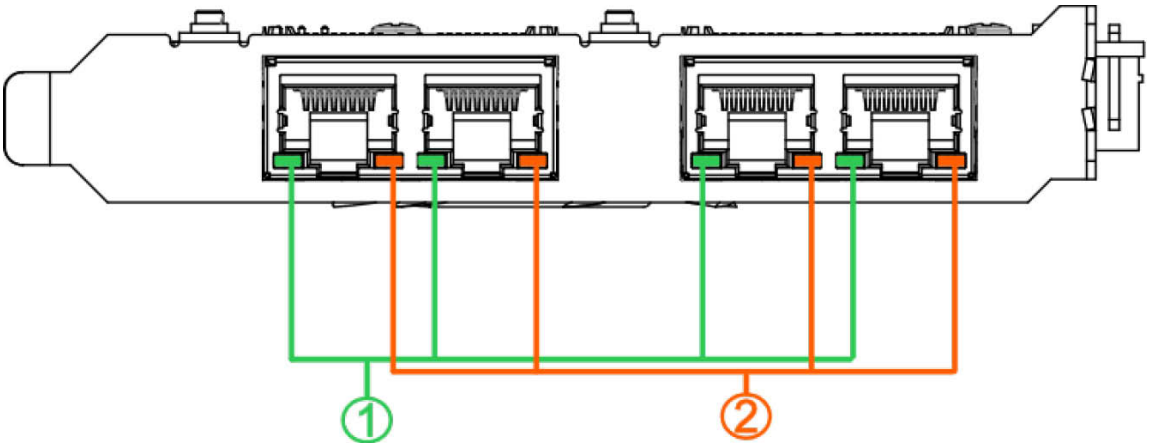
2 Setting Up Your PCIe-PoE454at Card

2.1 Unpacking Your PCIe-PoE454at

Upon receiving the PCIe-PoE454at package, please check immediately if the package contains all the items listed in the following table. If any item is missing or damaged, please contact your local dealer or Neousys Technology.

Item	Description	Qty
1	PCIe-PoE454at	1

2.2 Status LEDs



Speed LED (1)

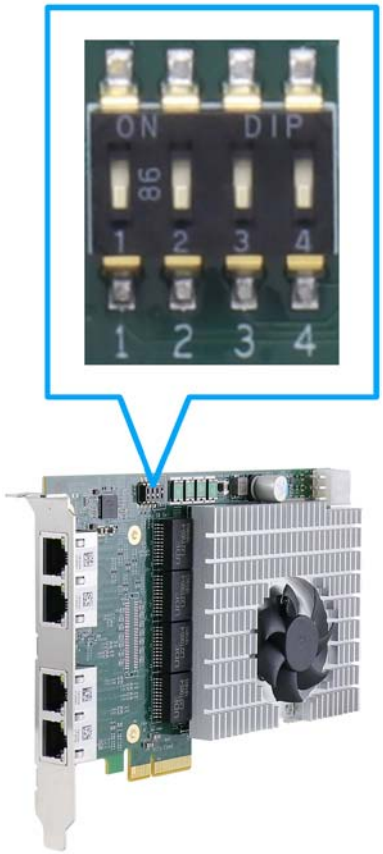
LED Color	Status	Description
Green or Orange	Green	5000 Mbps
	Orange	2500 Mbps
	Orange	1000 Mbps
	Orange	100 Mbps

Active/Link LED (2)

LED Color	Status	Description
Orange	Off	Ethernet port is disconnected
	On	Ethernet port is connected and no data transmission
	Flashing	Ethernet port is connected and data is transmitting/receiving

2.3 DIP Switches

PCIe-PoE454at features individual per-port power on/off control via Neousys' API so you may manually cut off or resume the power delivery to the connected PoE device. This feature is designed for failure recovery in the field to reset connected devices. In case you have installed multiple cards, there is a set of DIP switches (indicated in **blue**) for users to configure board ID. The board ID can be used as a parameter in API to specify the card.



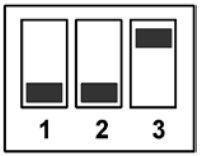
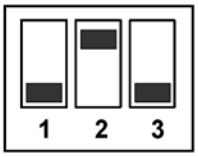
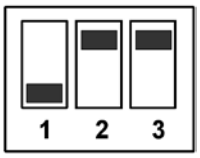
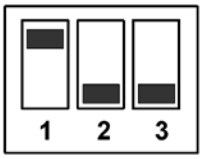
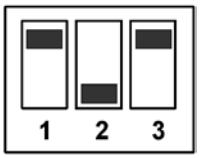
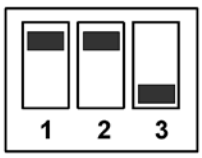
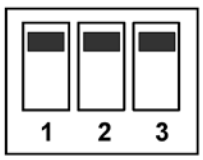
2.3.1 Switching Between INT and EXT Mode

The PCIe-PoE454at card offers two power supply source methods. Users can choose between PCIe (INT mode) or from 6-pin (EXT mode) by configuring DIP switch 4.

Mode	DIP Switch 4 Position	Power Supplied
INT	 4	Internal 12V from gold finger
EXT	 4	External 12V from 6-pin power connector

2.3.2 Board ID Settings

The following illustrations describe DIP switch board ID settings. When installing multiple cards, please remember to set a different ID for each card.

Board ID	DIP Switch Position (P1 ~ P3)
0	
1	
2	
3	
4	
5	
6	
7	

3 PCIe-PoE454at Card Installation

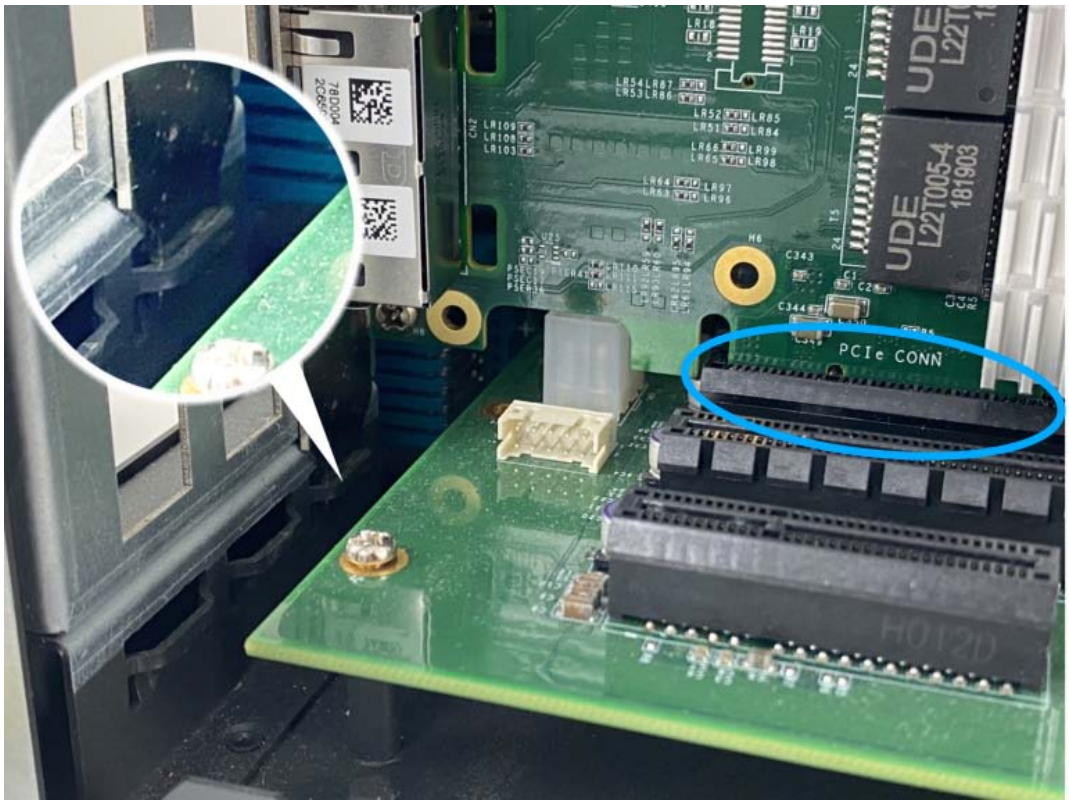
Once you have set up the DIP switch ID of your PCIe-PoE454at for multi-card installation, then you are ready to install the PCIe-PoE454at into the system. Please refer to the following installation procedures.

Before disassembling the system enclosure and installing the card, please read the following instructions:

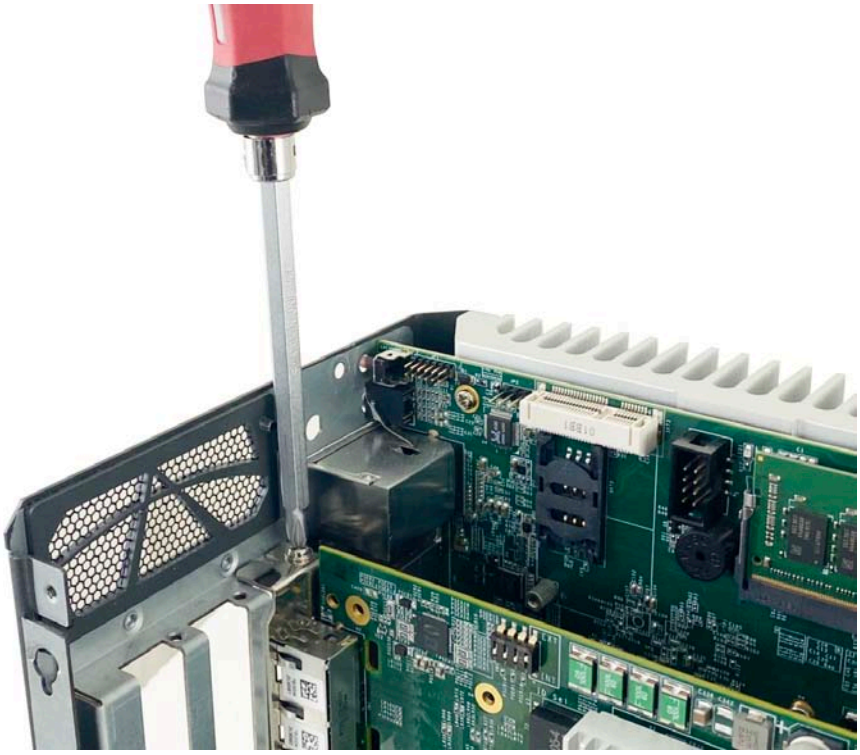
- **DO NOT** remove the card out of the anti-static until you are ready to install it into the system.
- It is recommended that only qualified service personnel should install and service this product to avoid injury or damage to the system.
- Please observe all ESD procedures at all times to avoid damaging the equipment.
- Before disassembling your system, please make sure the system has powered off, all cables and antennae (power, video, data, etc.) are disconnected.
- Place the system on a flat and sturdy surface (remove from mounts or out of server cabinets) before proceeding with the installation/ replacement procedure.

3.1 Hardware Installation

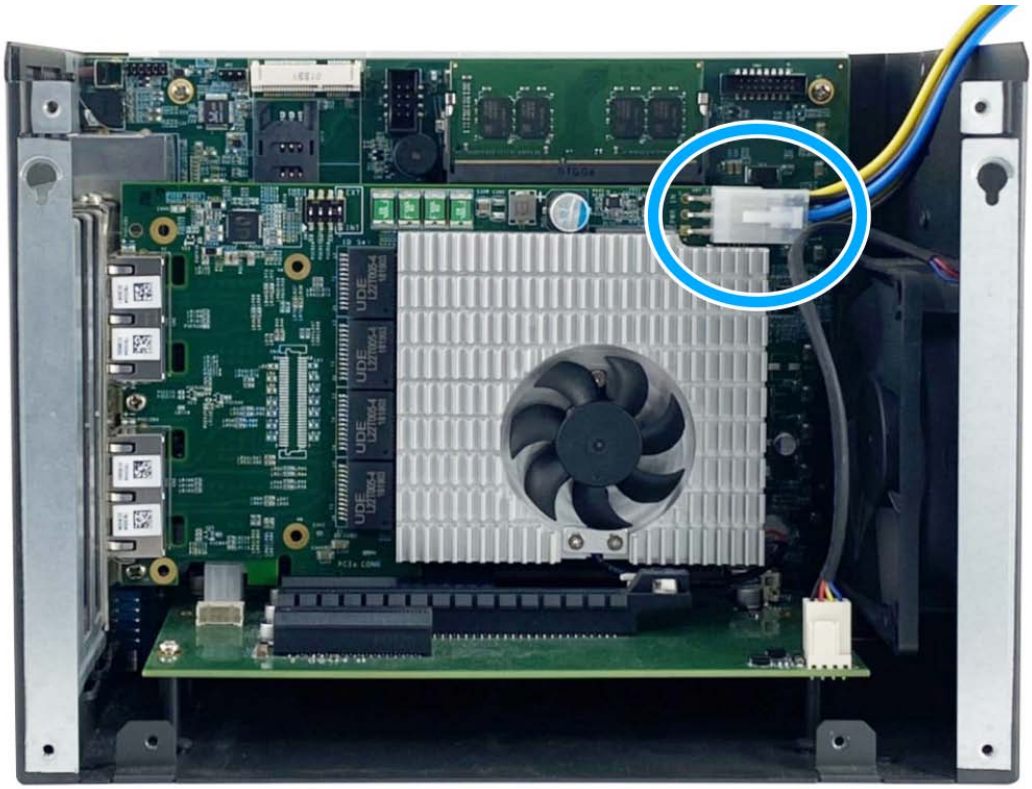
1. Save and close all work in progress.
2. Power off and unplug the power cable from the system you wish to install to.
3. Open the chassis (side panel) of the computer you wish to install the PCIe-PoE454at into.
4. Locate the x4 PCIe slot or a spare and compatible x16/ x8 PCIe slot.
5. Align and insert PCIe-PoE454at's gold finger into the PCIe slot.



6. Secure the PCIe-PoE454at to the chassis with a screw.



7. Connect the 6-pin PCIe power cable if need be.



8. Reinstall the system's chassis (panel) to complete the hardware installation process.

3.2 Software Installation

Some operating systems may have built-in drivers included and automatically complete the installation upon entering the system. However, it is still recommended to run and install drivers provided by Neousys to take advantage of all the functions offered. To install the software component, please click on this link to download the drivers.

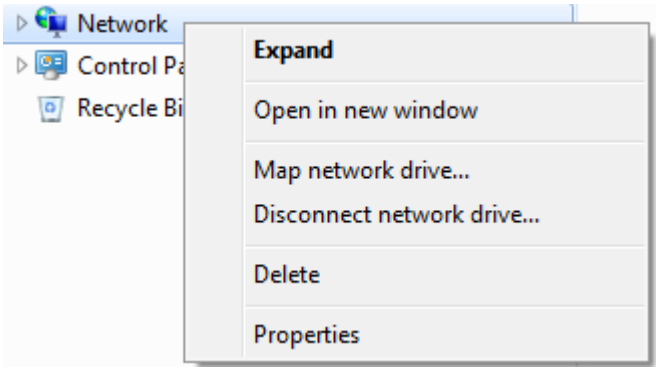
4 Driver and Network Settings

PCIe-PoE454at offers Gigabit Ethernet connectivity via AQC111C controller. When connecting to a high-speed PoE device, such as a GigE camera, you can configure driver settings for optimum transmission throughput and connection stability.

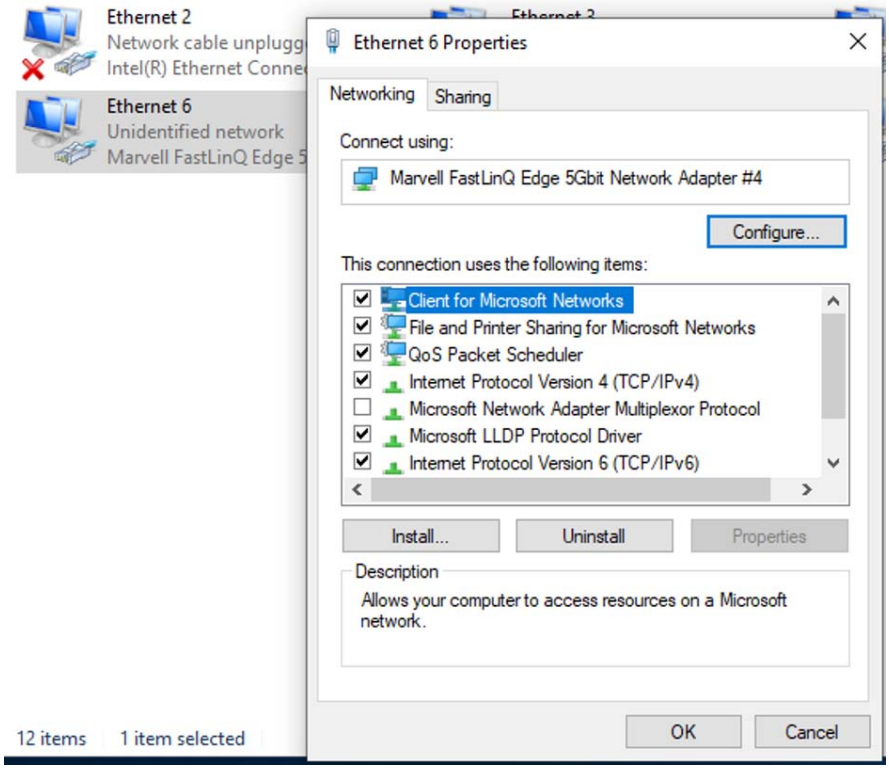
4.1 Jumbo Frame

Jumbo frames are Ethernet frames with more than 1500 bytes of payload. By increasing the payload size, large data packets can be transferred with less interruption, which reduces CPU utilization and increases overall data throughput. Intel® AQC111C controller supports jumbo frame size of up to 16.3 Kbytes. Once the AQC111C driver is installed, you may configure jumbo frame settings by executing the following steps:

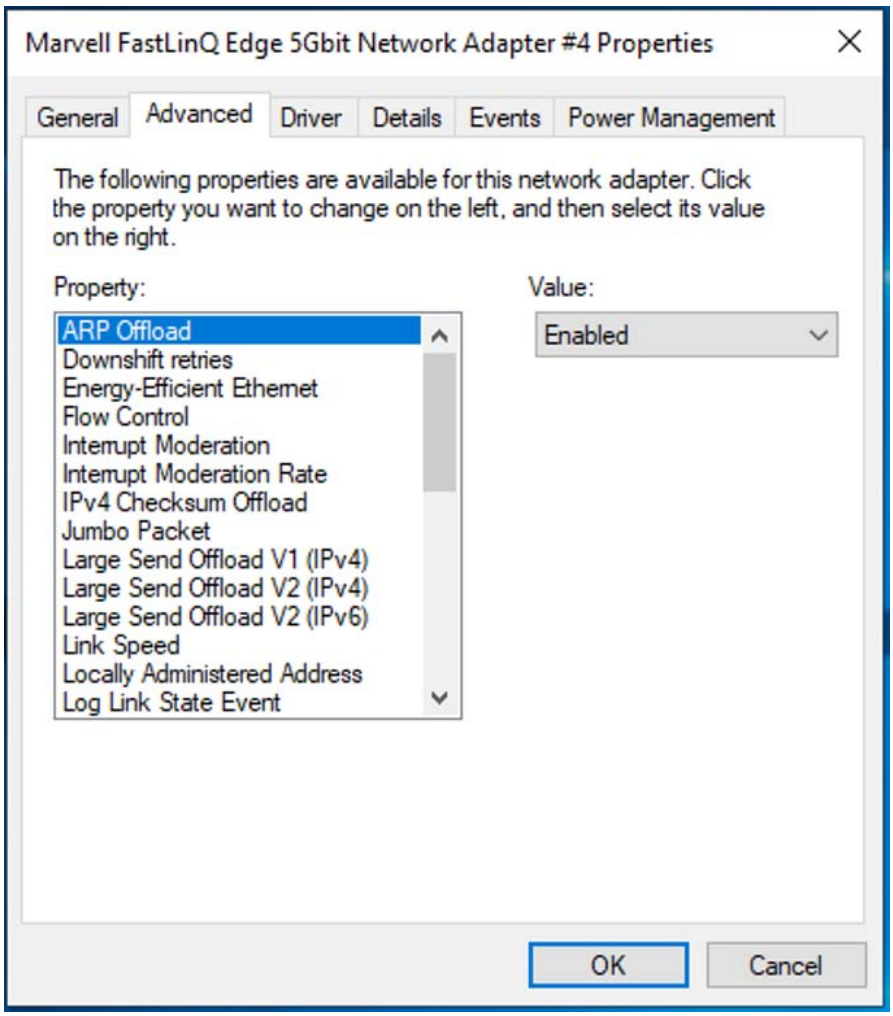
1. On your keyboard, press **Windows key** + **E**, right click on **Network** and select **Properties**.



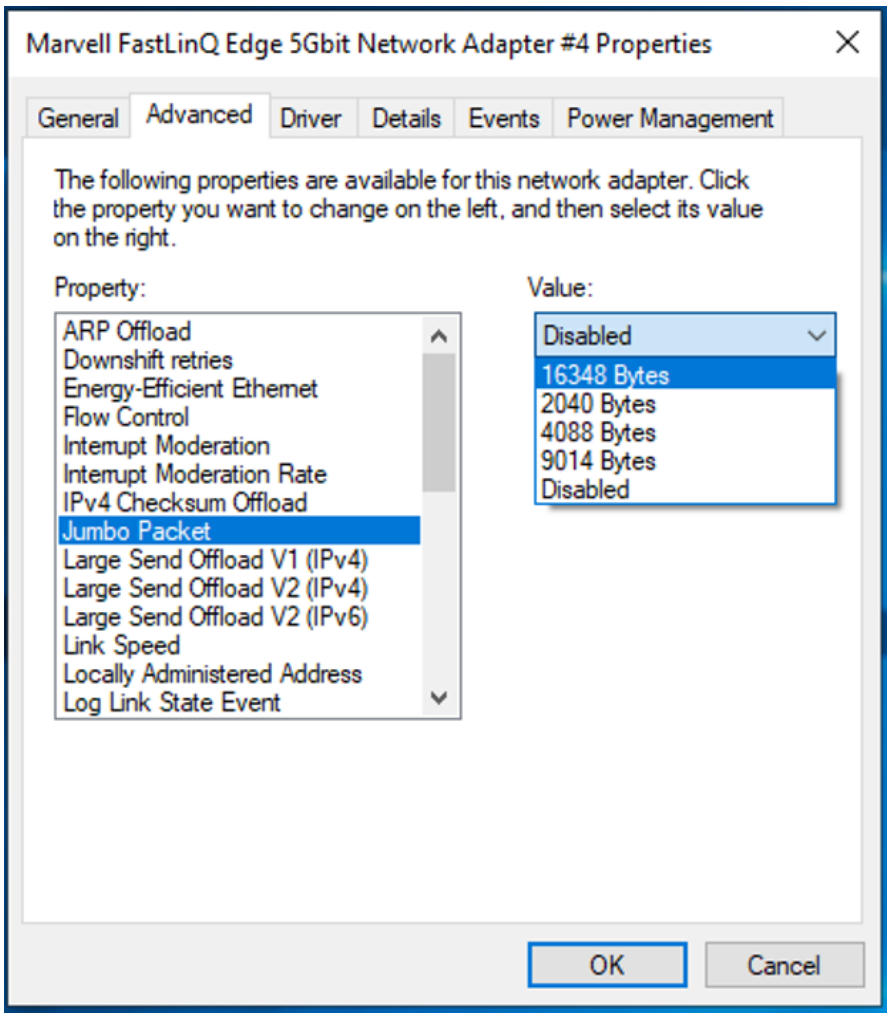
2. Right click on the corresponding **Local Area Connection** (Marvell FastLinQ Edge 5Gbit Network …) and click on **Properties**.



3. Click on the **Configure** button, the following dialog appears and click on the **Advanced** tab.



4. Highlight **Jumbo Packet** and select a jumbo frame size from the Value drop-down list (16348 Byte is recommended for connecting devices with high data rate).

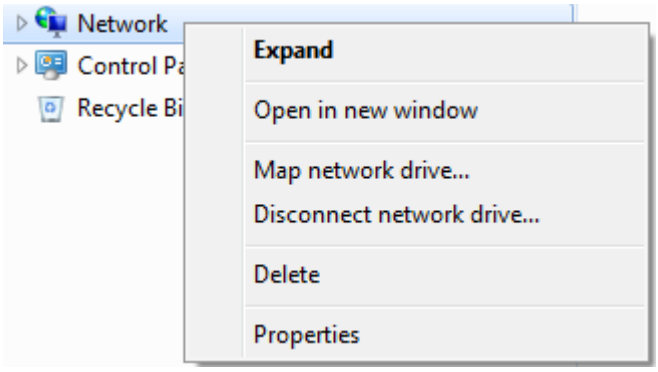


4.2 Receive Buffers

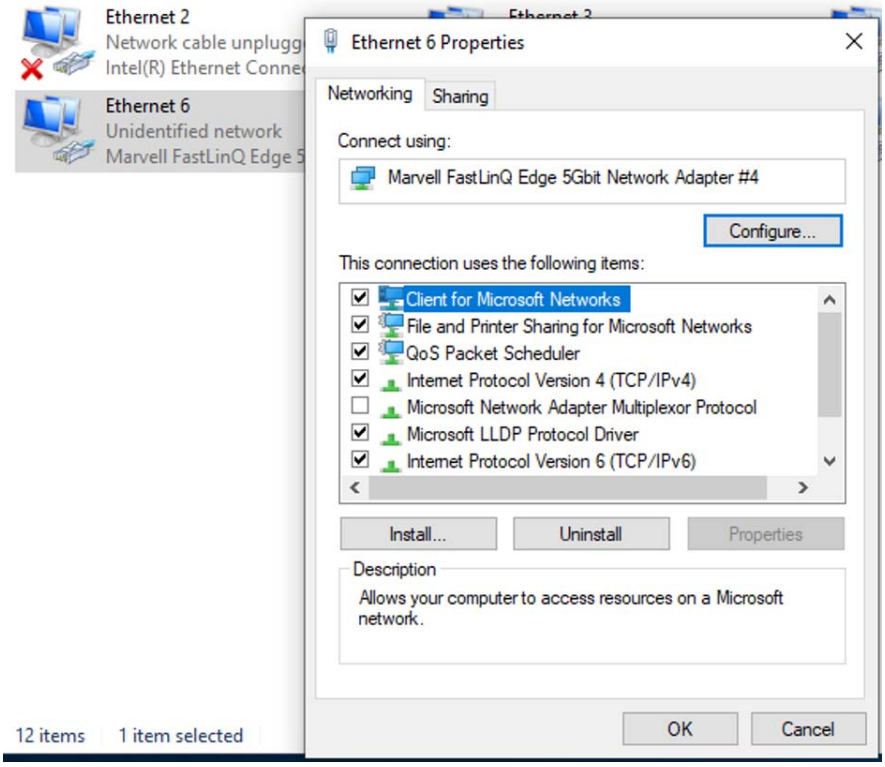
Receive Buffers is another option which can affect data throughput. It determines the size of memory buffer allocated for receiving data. Increasing the size of Receive Buffers can improve the performance of receiving data. The default setting of Receive Buffers is 256 bytes. When connecting to an Ethernet device that generates large amount of data, you can set this option to a larger value (maximum 4096 bytes) for better performance.

To configure Receive Buffers settings, please refer to the following:

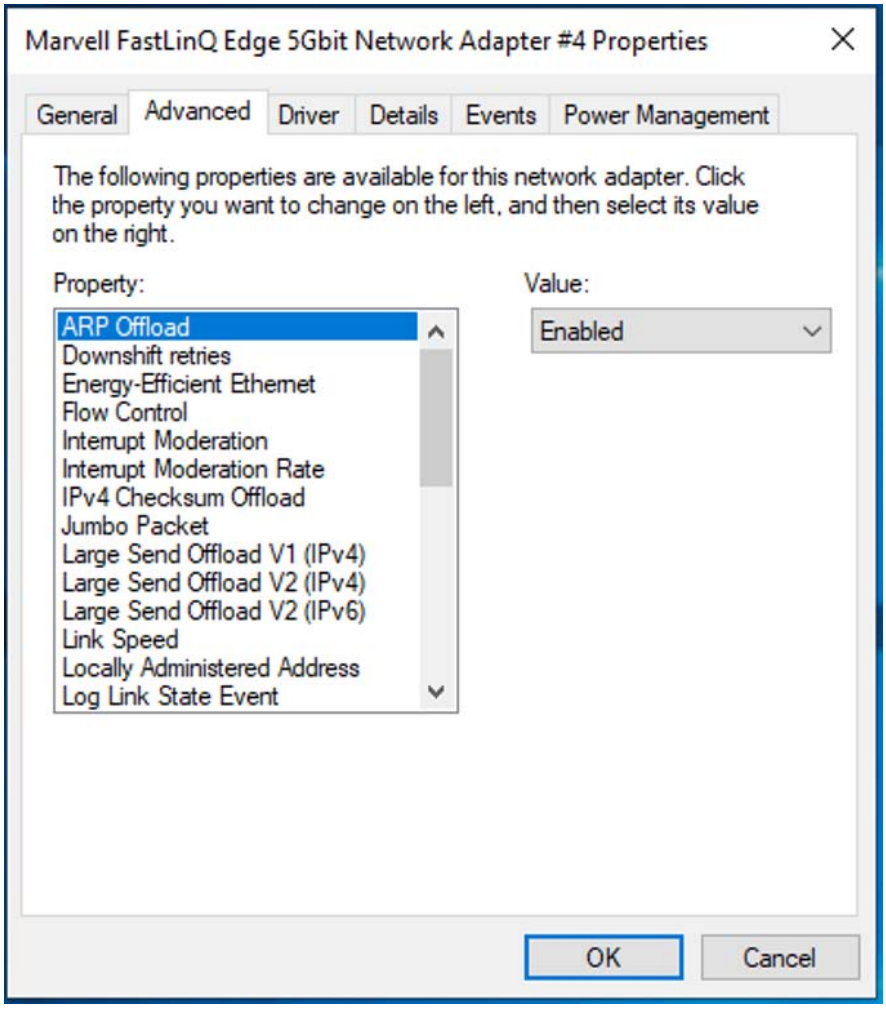
1. On your keyboard, press **Windows key** + **E**, right click on **Network** and select **Properties**.



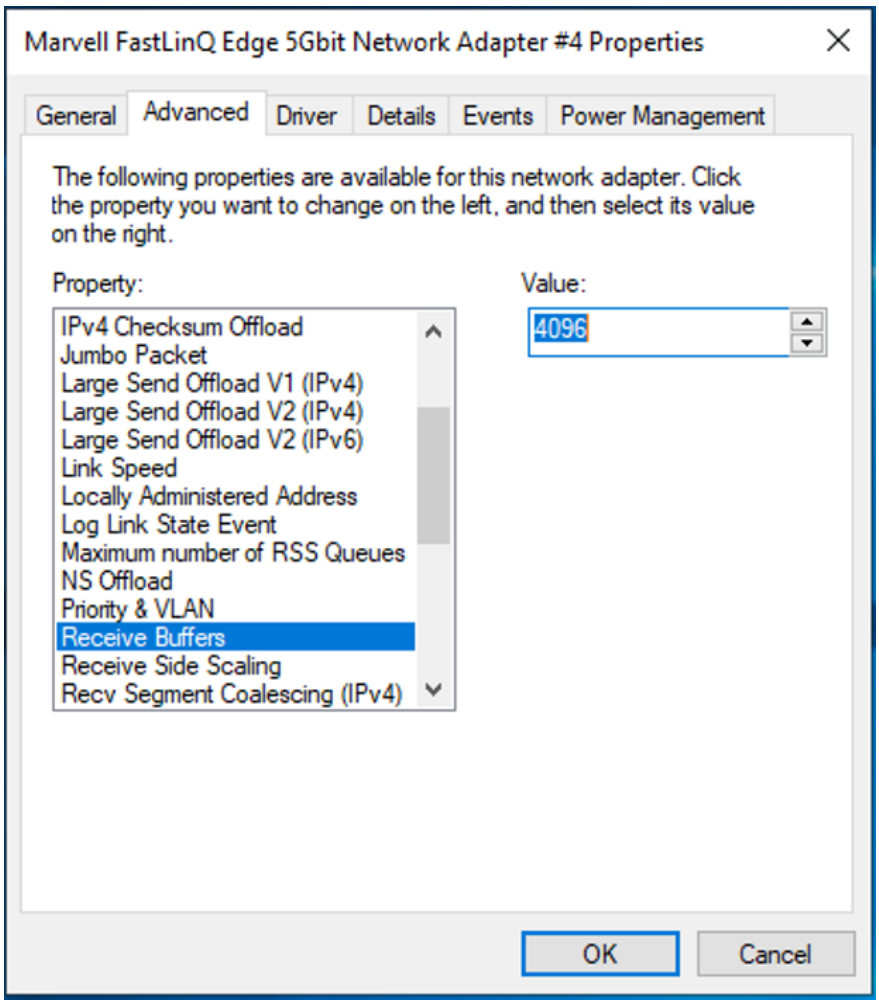
2. Right click on the corresponding **Local Area Connection** (Intel I350 Gigabit Network) and click on "**Properties"**.



3. Click on the **Configure** button, the following dialog appears and click on the **Advanced** tab.



4. Scroll down the Property list and highlight **Receive Buffers** and enter a setting into the **Value** column (4096 Bytes is recommended for connecting devices with high data rate).

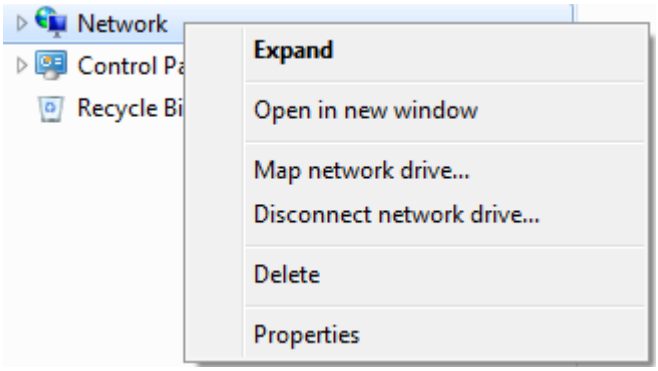


4.3 Transmit Buffers

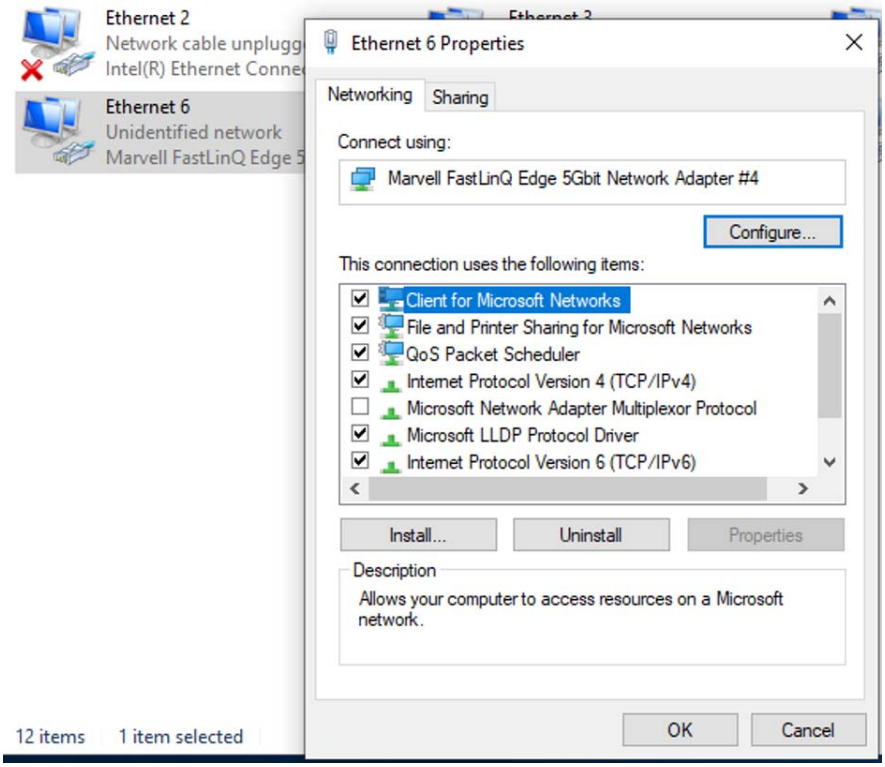
Like Receive Buffers, Transmit Buffers can affect the transmission performance. The default setting of Transmit Buffers is 512 bytes. If you encounter a performance issue while transmitting data, you can adjust the size of Transmit Buffers to a larger value (maximum 8184 bytes) for better performance.

To configure Transmit Buffers settings, please refer to the following:

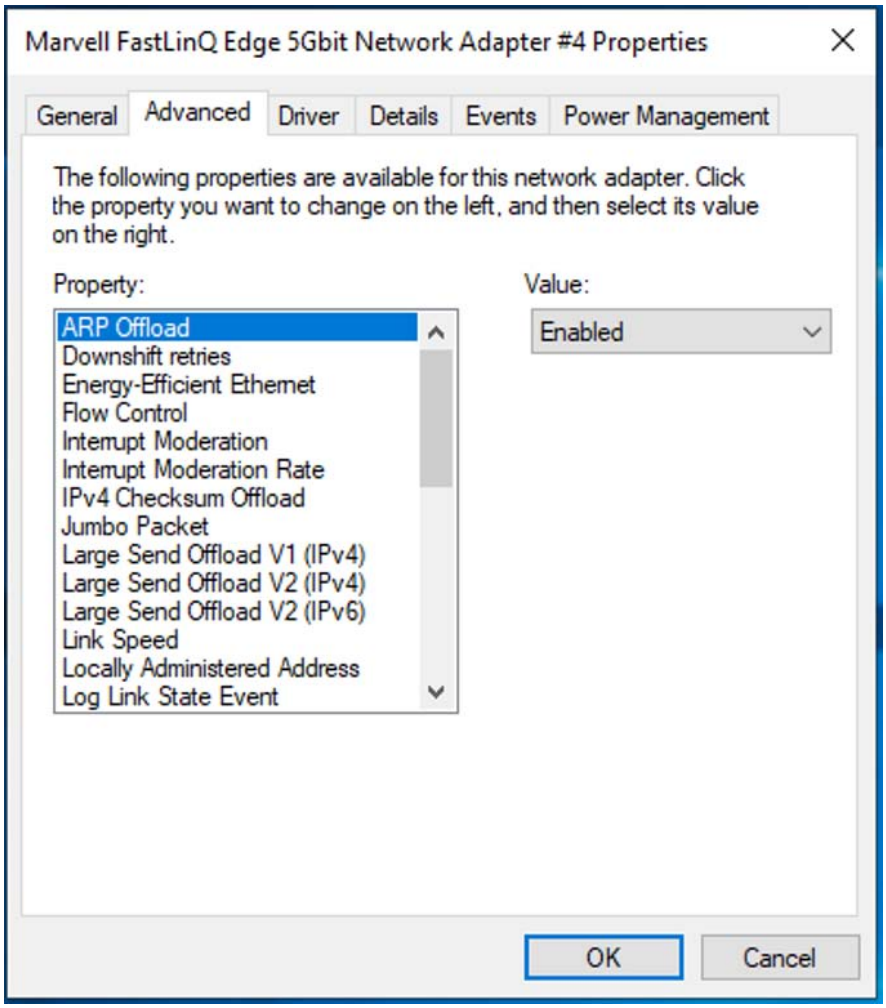
1. On your keyboard, press **Windows key** + **E**, right click on **Network** and select **Properties**.



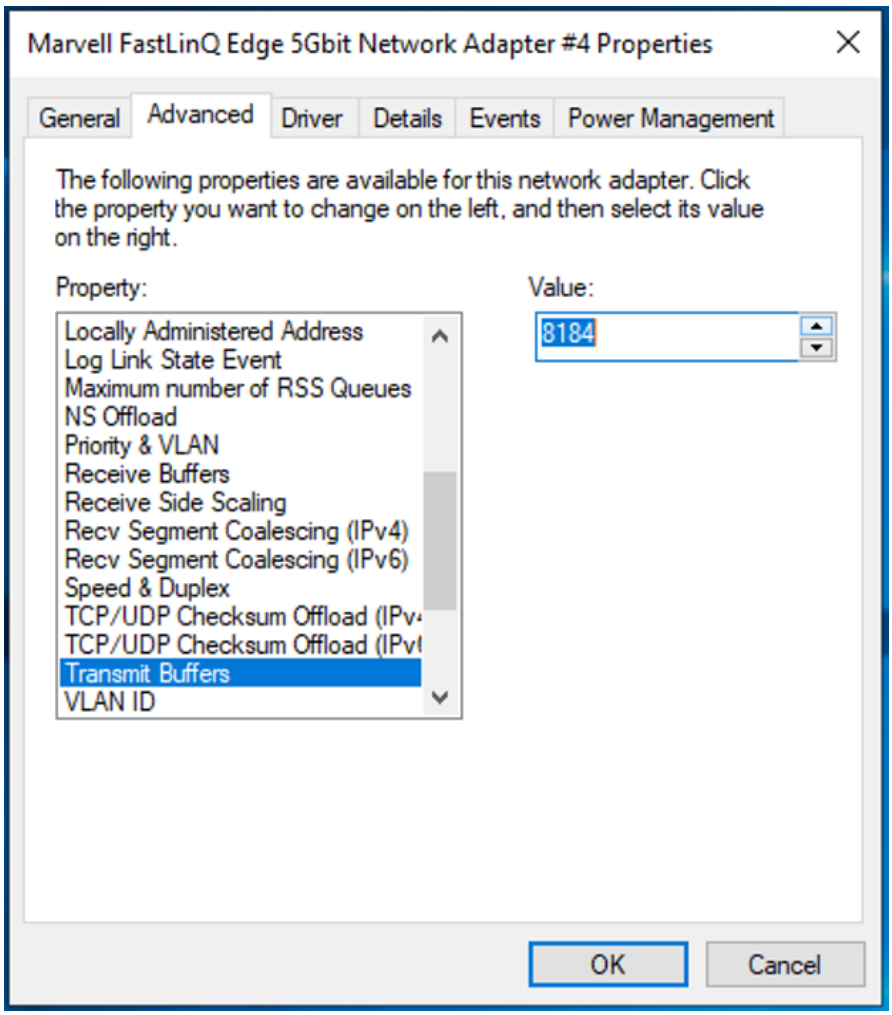
2. Right click on the corresponding **Local Area Connection** (Intel I350 Gigabit Network) and select **Properties**.



3. Click **Configure** button, the following dialog appears and click on the **Advanced** tab.



4. Scroll down and highlight **Transmit Buffers** and enter a setting into the **Value** column (8184 Bytes is recommended for connecting devices with high data rate).



Appendix A Using Per-Port PoE On/Off Control

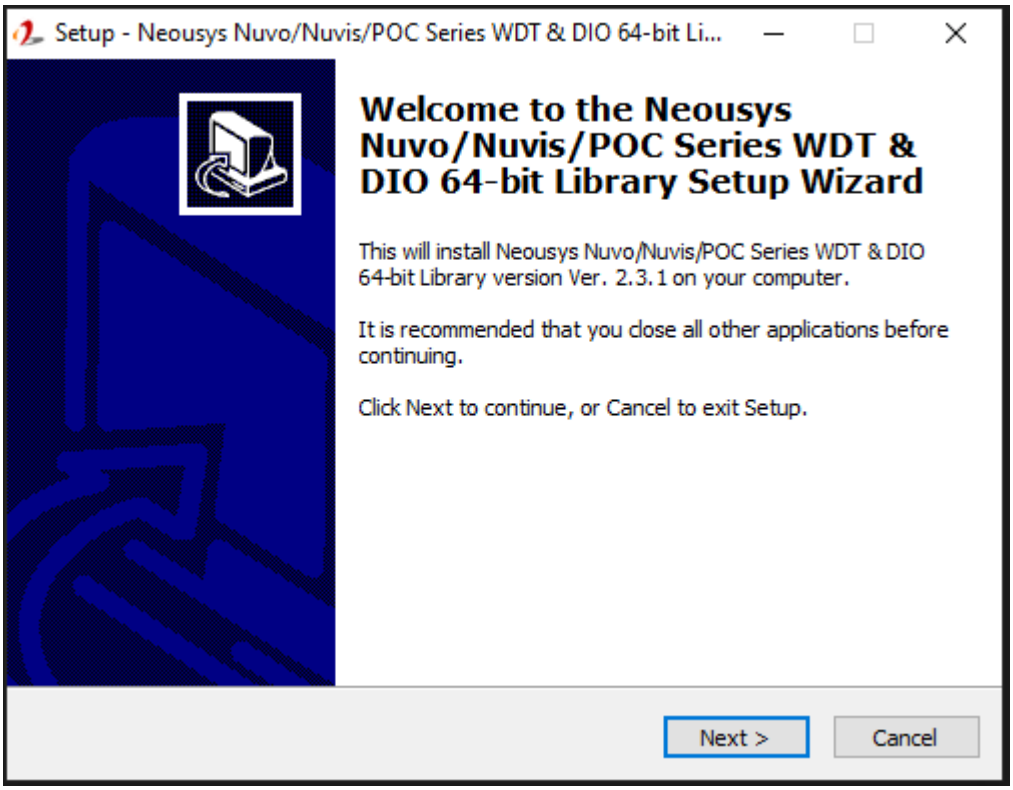
PCIe-PoE454at supports power on/off control for each of its PoE ports. With provided function APIs, users can turn on or turn off the power of each PoE port manually for fault-recovery or device power reset purpose. To use the function, you need to install the WDT_DIO_Setup.exe driver package.

> **NOTE**
> Please install WDT_DIO_Setup_v2.3.1.0 or later versions.

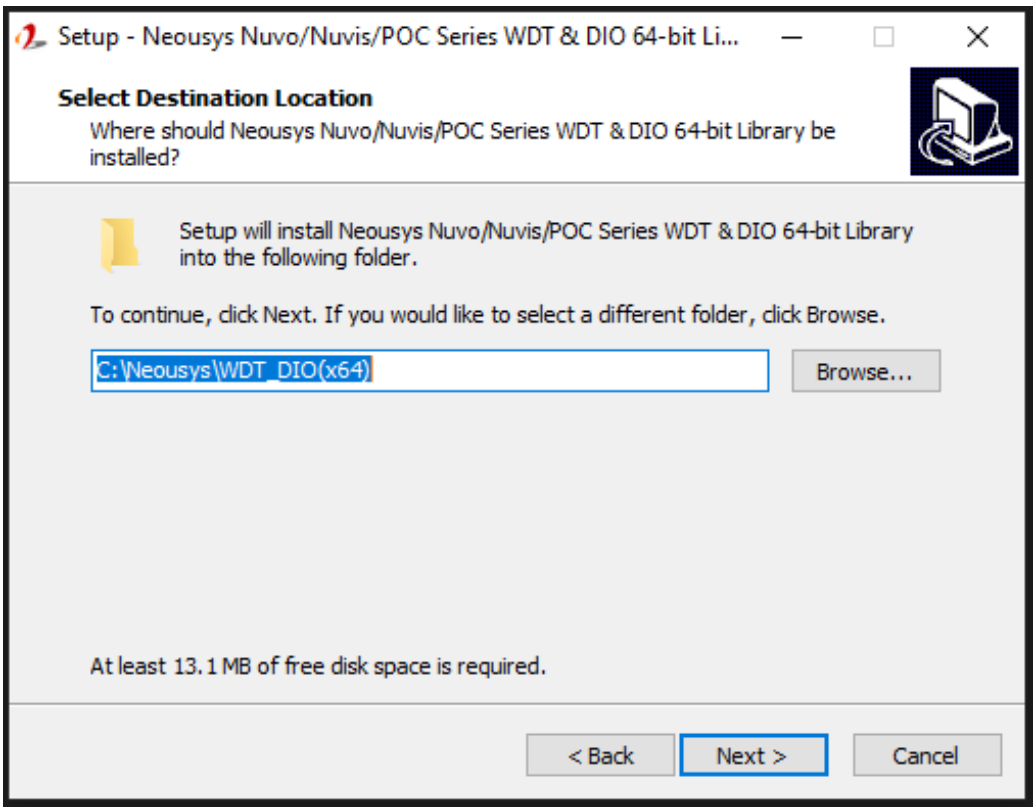
Driver Installation

The per-port PoE on/off control function library is delivered as a part of Neousys driver setup package (WDT_DIO_Setup). Please use **WDT_DIO_Setup_64_ v2.3.1.0.exe** or download the latest version from here.

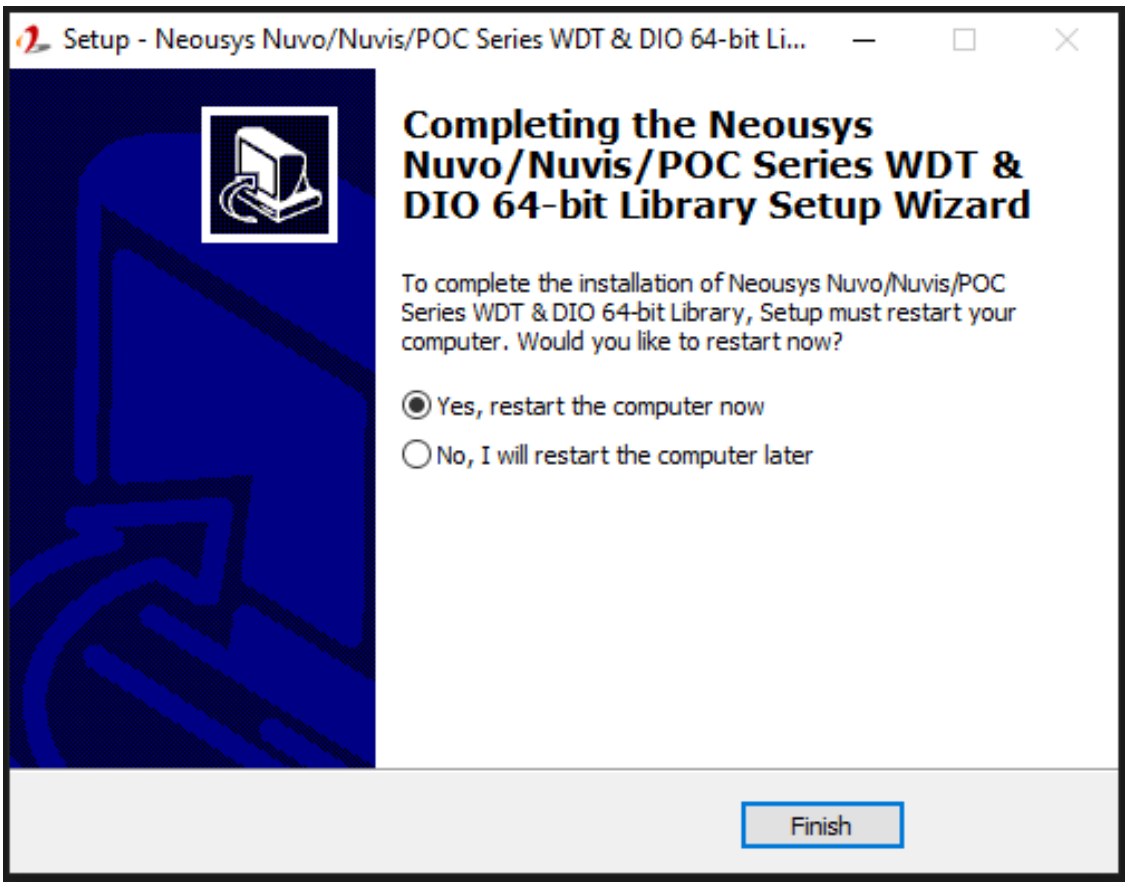
1. Execute **WDT_DIO_Setup_v2.3.1.0.exe**. The following dialog appears.



2. Click “Next >” and you may specify a directory you would like to install the files to or you can install to the default directory “*C:\Neousys\WDT_DIO*”.



3. Once the installation is finished, a dialog appears to prompt you to reboot the system. The WDT & DIO library will take effect after the system rebooted.



4. When you programming your program, the related files are located in

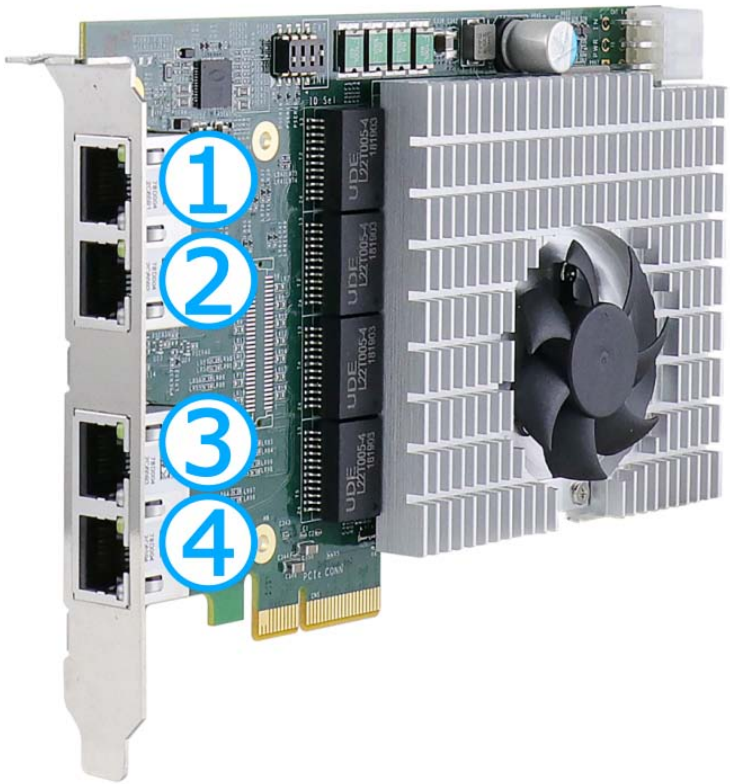
Header File:	\Include
Library File:	\Lib
Function Reference:	\Manual
Sample Code:	\Sample\POE_Demo (PoE per-port Control Demo)

Per-Port On/Off Control Function Reference

PCI_GetStatusPoEPort

Syntax	BYTE PCI_GetStatusPoEPort(DWORD boardId, DWORD port);
Description	Acquire current power on/off status of designated PoE port.
Parameter	***boardId*** DWORD value (0 ~ 7) to indicate board ID set for your card. Please refer to DIP switch settings for your PCIe-PoE card. ***port*** DOWRD value (1 ~ 4) to specify the PoE port.
Return Value	Returns 1 if PoE power is on, 0 if PoE power is off.

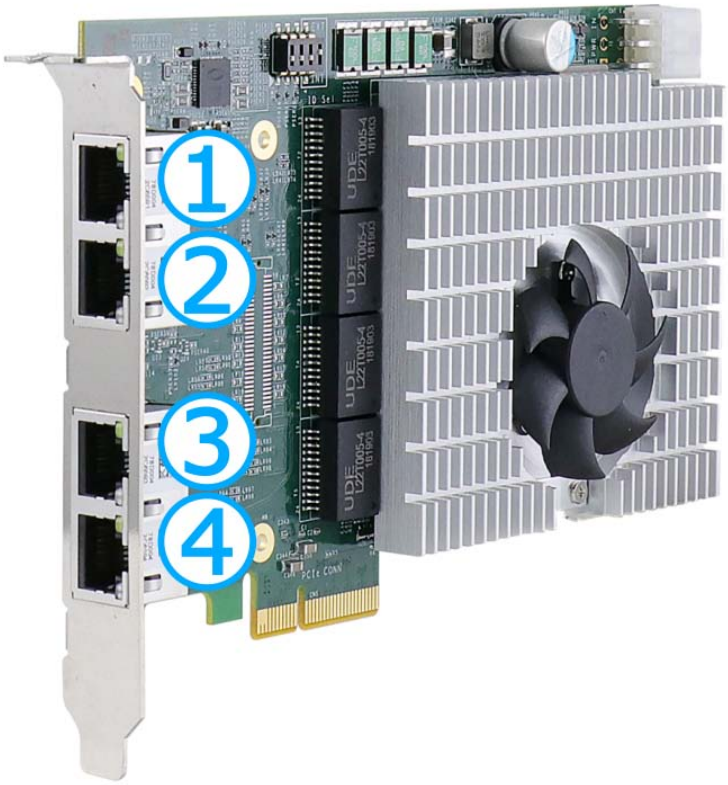
Usage	DWORD boardID;
	DWORD port;
	BYTE PoEStatus;
	
	//Get PoE power status from board #0, port #1.
	boardID = 0;
	port = 1;
	PoEStatus = PCI_GetStatusPoEPort (boardID, port);



PCI_EnablePoEPort

Syntax	BOOL PCI_EnablePoEPort(DWORD boardId, DWORD port);
Description	Enable (turn on) PoE power for designated PoE port.
Parameter	***boardId*** DWORD value (0 ~ 7) to indicate board ID set for your card. Please refer to DIP switch settings for your PCIe-PoE card. DOWRD value (1 ~ 4) to specify the PoE port.
Return Value	Returns TRUE if successful, FALSE if failed.

Usage	DWORD boardID;
	DWORD port;
	BOOL RetVal;
	
	//Enable PoE power status from board #0, port #1.
	boardID = 0;
	port = 1;
	RetVal= PCI_EnablePoEPort (boardID, port);



PCI_DisablePoEPort

Syntax	BOOL PCI_DisablePoEPort(DWORD boardId, DWORD port);
Description	Disable (turn off) PoE power for designated PoE port.
Parameter	***boardId*** DWORD value (0 ~ 7) to indicate board ID set for your card. Please refer to DIP switch settings for your PCIe-PoE card. DOWRD value (1 ~ 4) to specify the PoE port.
Return Value	Returns TRUE if successful, FALSE if failed.

Usage	DWORD boardID;
	DWORD port;
	BOOL RetVal;
	
	//Disable PoE power status from board #0, port #1.
	boardID = 0;
	port = 1;
	RetVal= PCI_DisablePoEPort (boardID, port);