Neousys Technology Inc.

PCIe-PoE572bt/ PCIe-N572 Series

User Manual

Revision 1.0

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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-PoE527bt and PCIe-N572 10Gb frame grabber cards. The cards offer stable expandability, flexibility and fast Ethernet access to peripheral devices.

Revision History

| Version	Date	Description
1.0	Dec. 2024	Initial release

1   Introduction

The PCIe-PoE572bt is a rugged, wide-temperature dual-port 10G network adapter equipped with Remote Direct Memory Access (RDMA) and IEEE 802.3bt PoE++ support. Powered by the Broadcom® BCM57416 Ethernet controller, it supports jumbo frames up to 9.6 KB, making it ideal for applications such as RDMA-enabled cameras and outdoor Wi-Fi access points (APs).
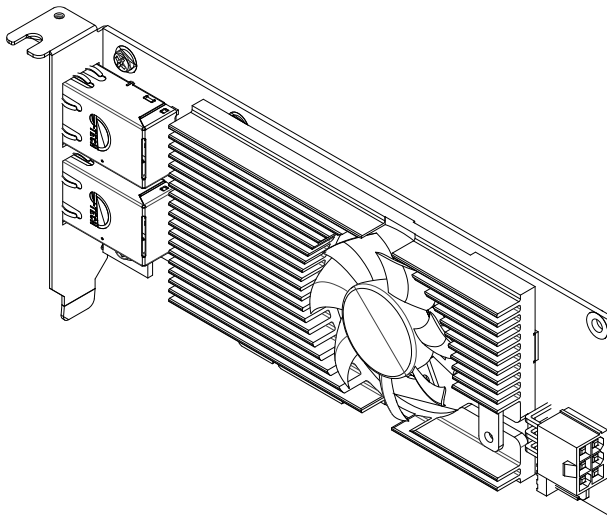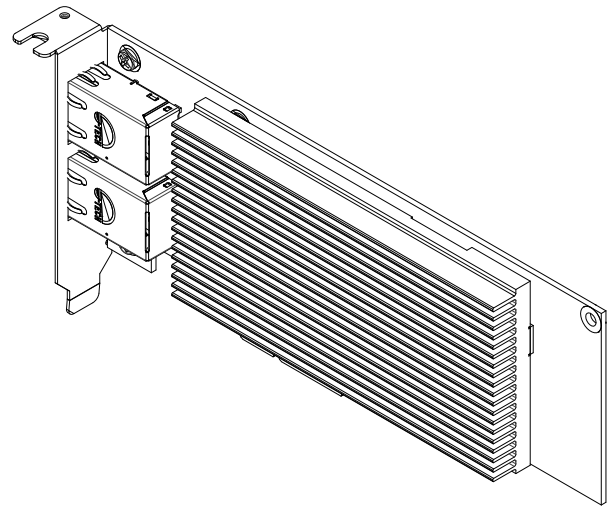
PCIe-PoE572bt   **PCIe-N572**

As demand for 10 GigE industrial cameras grows in machine vision, traditional systems often suffer from high CPU usage due to packet handling and error checking. The PCIe-PoE572bt addresses this challenge with RDMA technology, reducing CPU usage by up to 90% compared to TCP/UDP protocols. RDMA enables direct, zero-copy data transfer to the host PC's memory, bypassing the CPU and operating system to free up computing resources for critical tasks like image processing algorithms.

The adapter also supports IEEE 802.3bt PoE++, providing up to 90W per port to power high-consumption PoE devices. Its -25 to 70°C wide operating temperature range ensures reliable performance in harsh environments, making it an excellent choice for powering PTZ cameras and outdoor Wi-Fi APs, which frequently require more than 30W and are exposed to outdoor conditions.

For enhanced flexibility, the PCIe-PoE572bt comes in a low-profile form factor, with a non-PoE version (PCIe-N572) available for applications not requiring PoE. As the first wide-temperature 10GbE RDMA frame grabber card with PoE++ support, the PCIe-PoE572bt delivers unparalleled performance and efficiency for machine vision, outdoor surveillance, and Wi-Fi infrastructure.

1.1 PCIe-PoE572bt Specifications

Product Model	PCIe-PoE572bt
Bus Interface	x4, Gen3 PCI Express
# of 10 GbE Port	2x 10 GbE ports by Broadcom 57416 controller, supporting 9.6 KB jumbo frame
Network Protocol Support	IEEE 802.3 Ethernet interface for 10GBASE-T (IEEE 802.3an) and 1000BASE-T (IEEE 802.3ab)
Support Link Speed	Support 10G/ 1G / 100M/ 10M link speed (CAT 6a cable required for 10G)
PoE Capability	Compliant with IEEE 802.3bt PoE++ Type 3/Type 4 PSE, with a maximum output of 90W on a single port. Compatible with 802.3bt (PoE++), 802.3at (PoE+), and 802.3af (PoE) PD. Different configuration for PoE power budgets: **Configuration A**: 66W from PCIe connector **Configuration B**: 180W from 6-pin power connector
RDMA over Converge Ethernet	Support RoCEv2 *Throughput over 9.62 Gbps (verified through Perftest)
Cable Requirement	CAT 6a or better Ethernet cable (Max 100 meters)
EMC	CE/FCC Class B, according to EN 55032 & EN 55035
Operating Temperature*	-25°C to 70°C rugged operation with airflow
Dimension	Optional low-profile bracket: 167.65 mm (W) x 68.9 mm (H) Standard-height bracket: 167.65 mm (W) x 111.2 mm (H)

*Ensure 70°C ambient and 1.2 m/s airflow at the heatsink center to ensure 100% performance.

*PCIe-PoE572bt/PCIe-N572 supports x8, x4, x1 PCIe lanes.

1.2   PCIe-N572 Specifications

Product Model	PCIe-N572
Bus Interface	x4, Gen3 PCI Express
# of 10 GbE Port	2x 10 GbE ports by Broadcom 57416 controller, supporting 9.6 KB jumbo frame
Network Protocol Support	IEEE 802.3 Ethernet interface for 10GBASE-T (IEEE 802.3an) and 1000BASE-T (IEEE 802.3ab)
Support Link Speed	Support 10G/ 1G / 100M/ 10M link speed (CAT 6a cable required for 10G)
RDMA over Converge Ethernet	Support RoCEv2 *Throughput over 9.62 Gbps (verified through Perftest)
Cable Requirement	CAT 6a or better Ethernet cable (Max 100 meters)
EMC	CE/FCC Class B, according to EN 55032 & EN 55035
Operating Temperature*	-25°C to 70°C rugged operation with airflow
Dimension	Optional low-profile bracket: 167.65 mm (W) x 68.9 mm (H) Standard-height bracket: 167.65 mm (W) x 111.2 mm (H)

*Ensure 70°C ambient and 1.2 m/s airflow at the heatsink center to ensure 100% performance.

*PCIe-PoE572bt/PCIe-N572 supports x8, x4, x1 PCIe lanes.

1.3   Dimension

> ✎ **NOTE**
>
> *The cards share the same dimensions, therefore PCIe-PoE572bt will be shown here for demonstration purposes.*
>
> *All measurements are in millimeters (mm).*

68.9

169.35

20.06
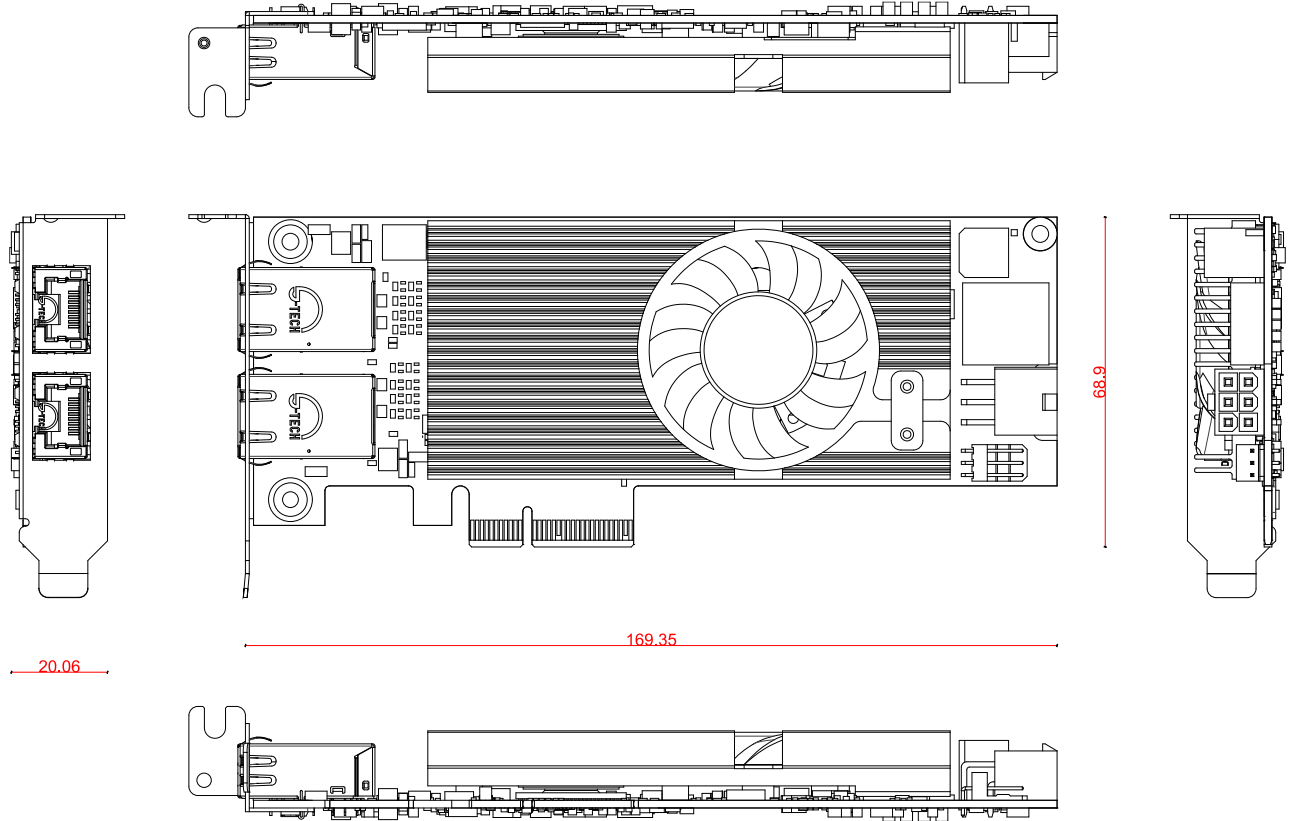
2   Setting Up Your Card

2.1   Unpacking Your PCIe-PoE572bt

Upon receiving the PCIe-PoE572bt 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-PoE572bt	1
2	Screw/ standoff pack	1

2.2   Unpacking Your PCIe-N572

Upon receiving the PCIe-N572 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-N572	1
2	Screw/ standoff pack	1

2.3 Status LEDs
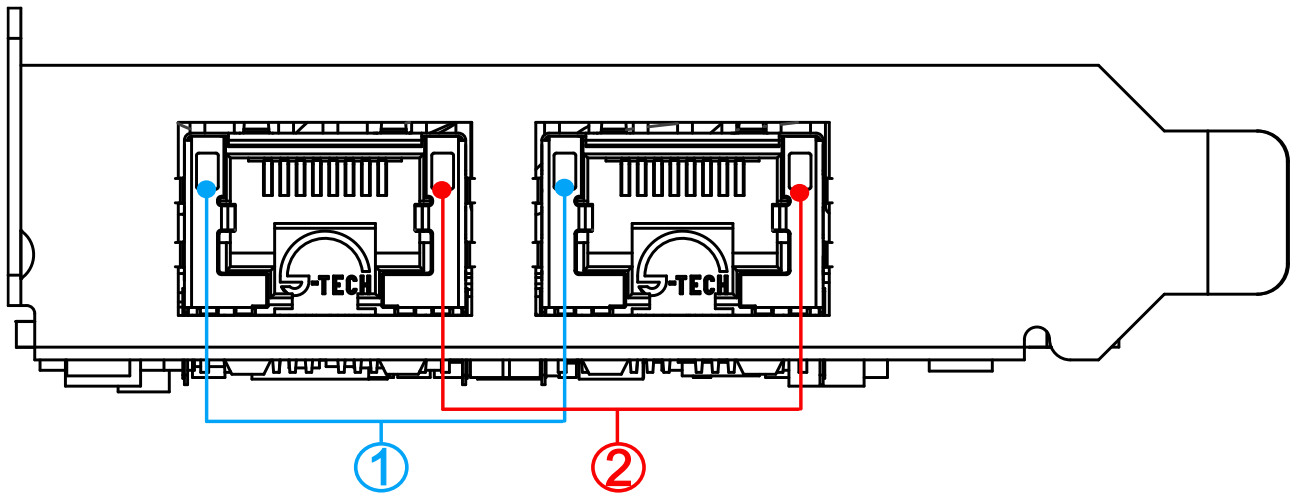
Speed LED (1)

LED Color	Status	Description
Green or orange	Green	10000 Mbps
	Orange	1000 Mbps
	Off	Not connected

Active/Link LED (2)

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

2.4   DIP Switches

PCIe-PoE572bt 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.
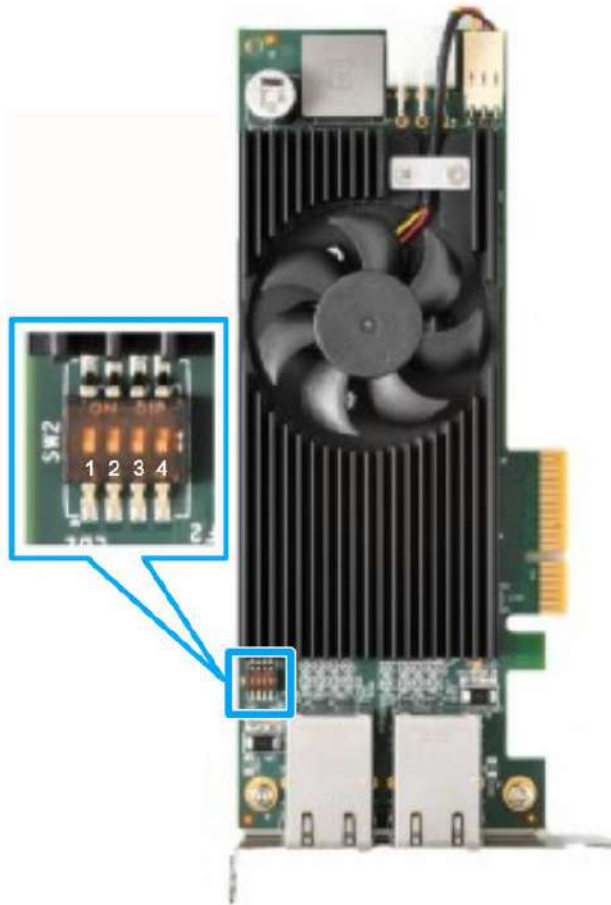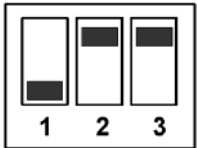
2.4.1   Switching Between at and bt Modes
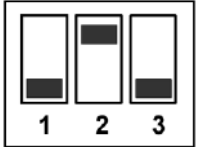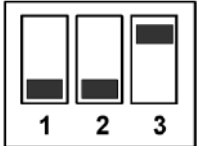
The PCIe-PoE572bt card offers two power supply source methods. Users can choose between at mode (IEEE 802.3at) or high at mode (IEEE 802.3bt) by configuring DIP switch 4.

Mode	DIP Switch 4 Position	Power Supplied
at	4	Internal 12V from gold finger (total 65W)
bt	4	External 12V from 6-pin power connector (total 180W)

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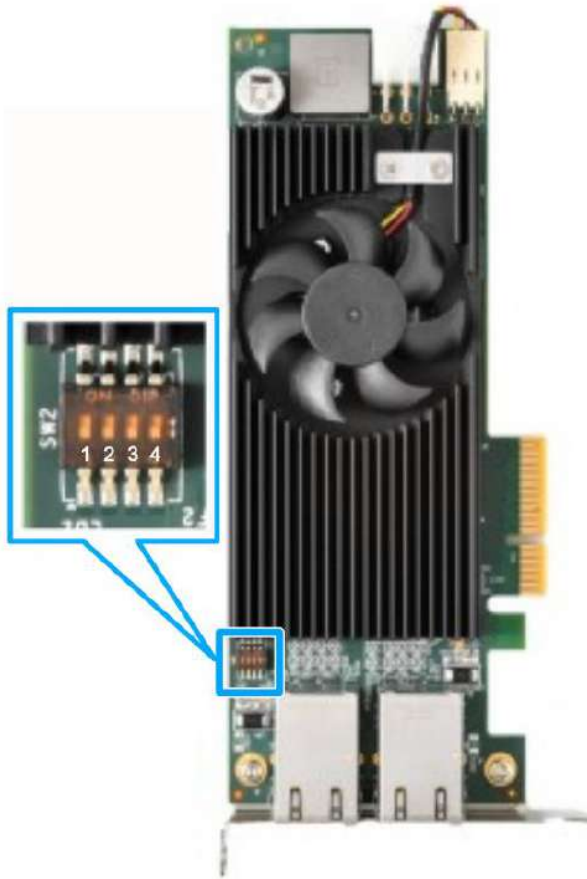
The following illustrations describe DIP switch board ID settings. When installing multiple cards, please remember to set a different ID for each card.

| Board ID	DIP Switch Position (P1 - P3)
0	
1	
2	
3	

3   PCIe-PoE572bt/ PCIe-N572 Card Installation

Once you have set up the DIP switch ID of your card for multi-card installation, then you are ready to install it 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 bag 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 card into.

4. Locate the x4 PCIe slot or a spare and compatible x16/ x8 PCIe slot.

5. Align and insert PCIe card's gold finger into the PCIe slot (indicated in **blue**) while making sure the card's bracket is inserted into the hinge (indicated in **red**).
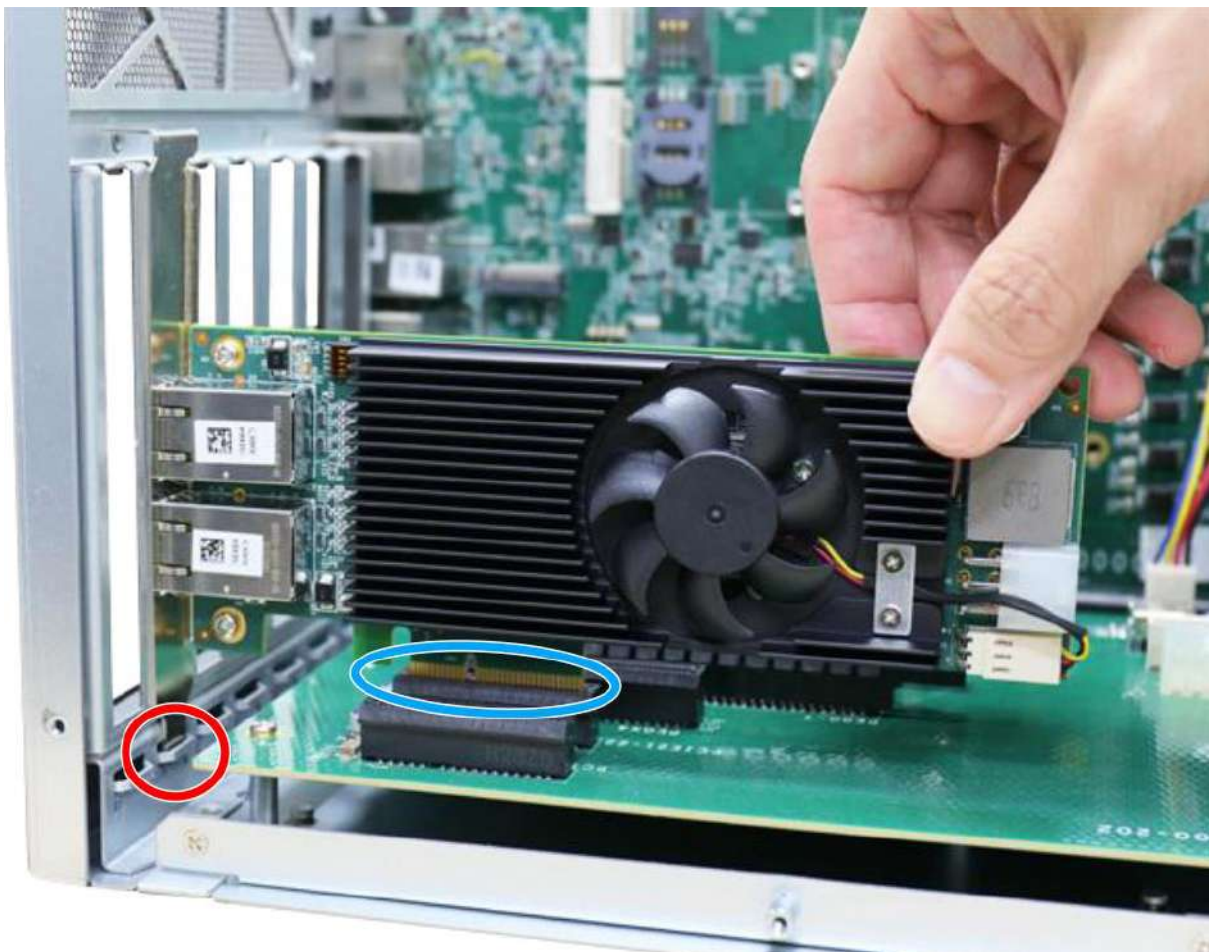
6. Secure the PCIe card to the chassis with a screw. If you wish to utilize full power load of PoE (PCIe-PoE572bt only), please refer to the following steps. If not, please reinstall the enclosure when done to complete the installation.
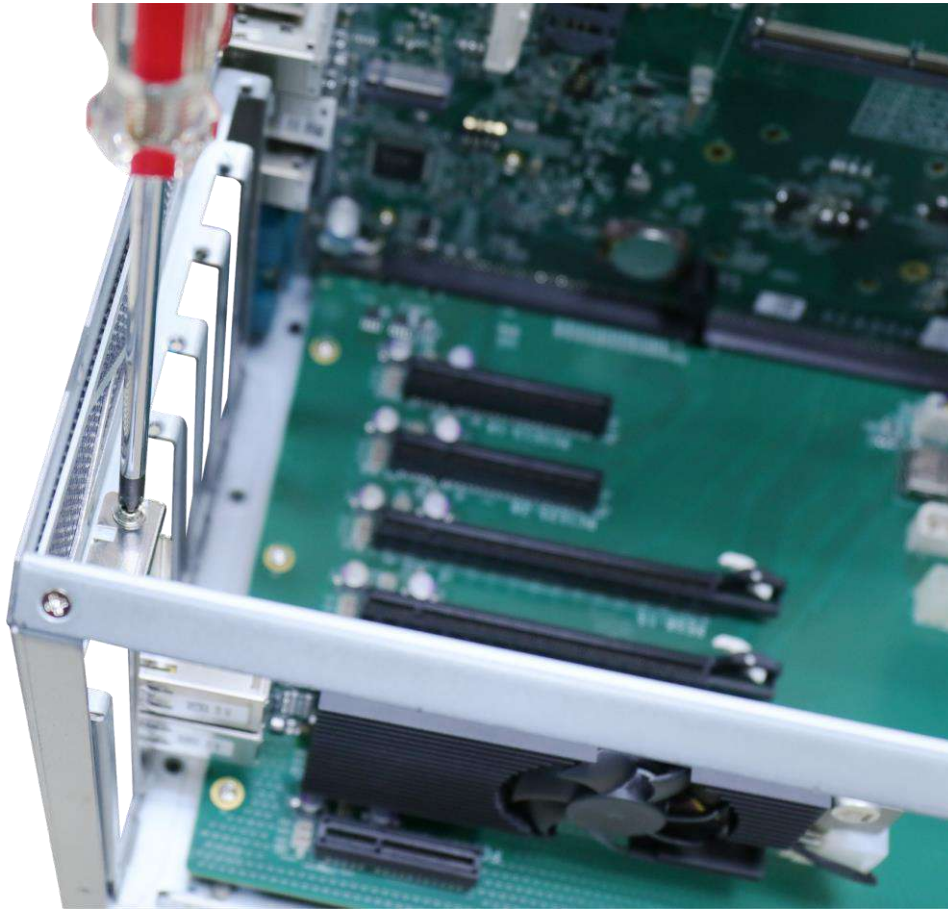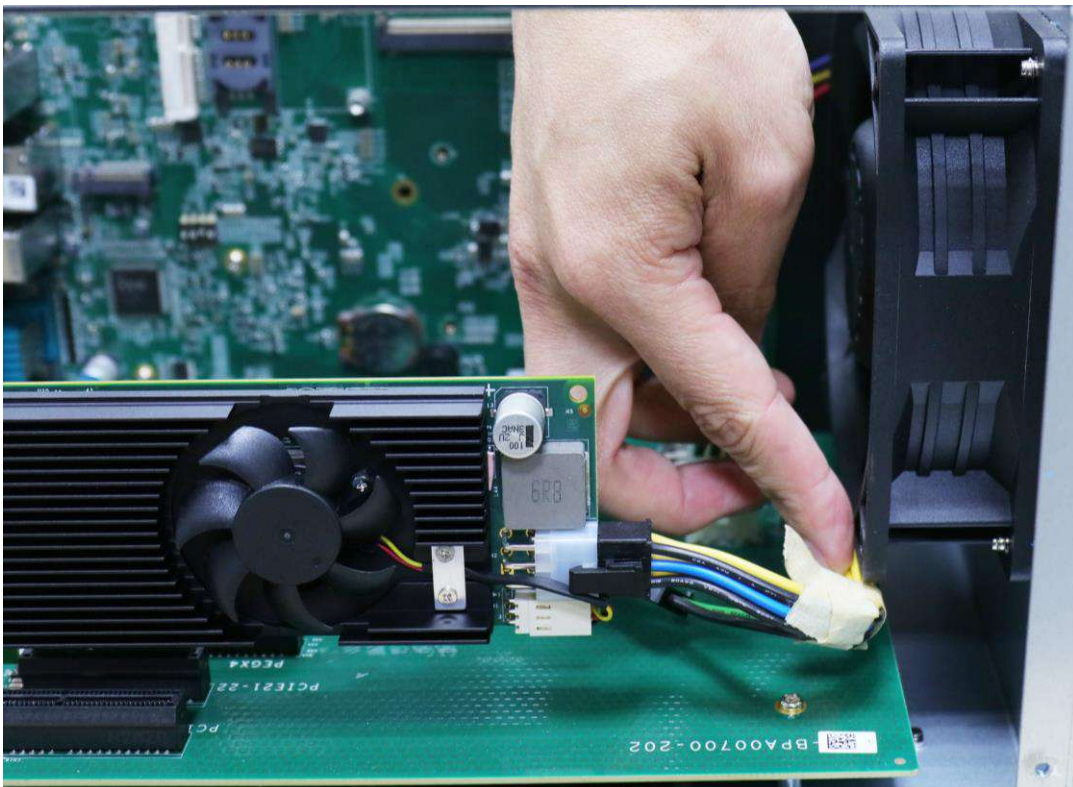

7. To utilize the full power load of PoE (PCIe-PoE572bt only), please connect the 6-pin PCIe power cable to the daughter board.
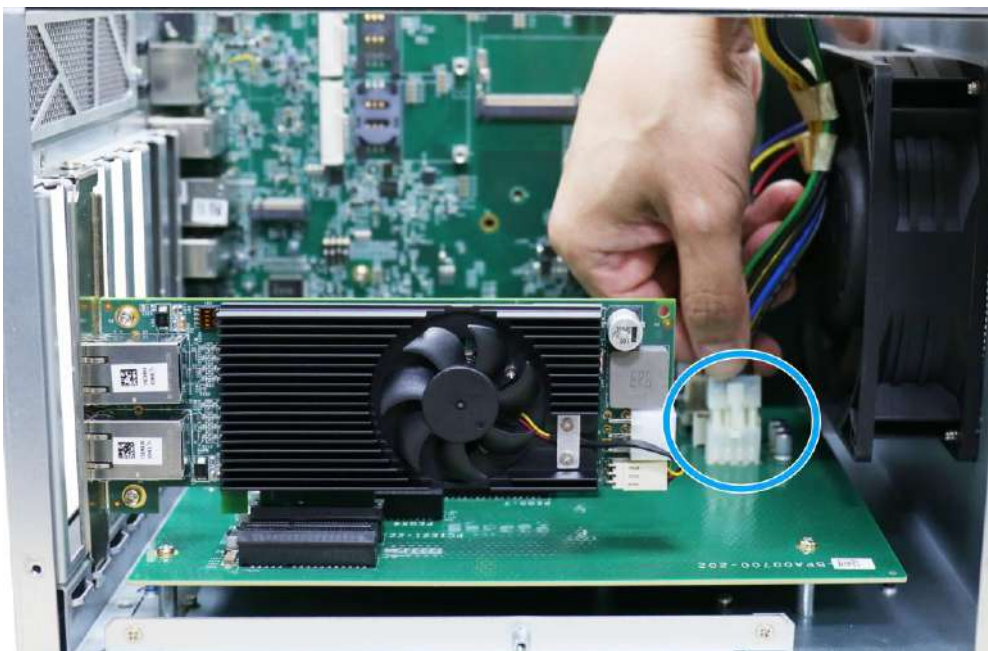
8. Connect the other end of the 6-pin PCIe power cable to 6-pin connector at the end of PCIe-PoE572bt.

9. It is recommended to tuck the cable underneath the fan to sure the 6-pin power cable is out of way (from fan blades).

10. Reinstall the system's chassis (panel) to complete the PCIe-PoE572bt installation process.

4 OS Support and Driver Installation

4.1 Operating System Compatibility

Due to Intel's policy, the system only provides driver support for Intel® x86 architecture. For Linux support, please use Linux kernel versions no later than 5.15. The following list contains the operating systems which have been tested in Neousys Technology Inc.

1. Microsoft Window 10 LTSC 2021 (x64)
2. Ubuntu 20.04.5 LTS, 22.04 LTS, 22.04.1 LTS or other distribution with kernel version ≥ 5.15 */**

NOTE

For Linux system, user may need to manually compile and install the driver for Intel®I226 GbE controller if the driver is not embedded in kernel.

Neousys may remove or update operating system compatibility without prior notice. Please contact us if your operating system of choice is not on the list.

4.2 Driver Installation

To manually install the drivers, please click on this link to download the drivers.

5   Network Settings

PCIe-PoE572bt offers Gigabit Ethernet connectivity via Broadcom 57416 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.
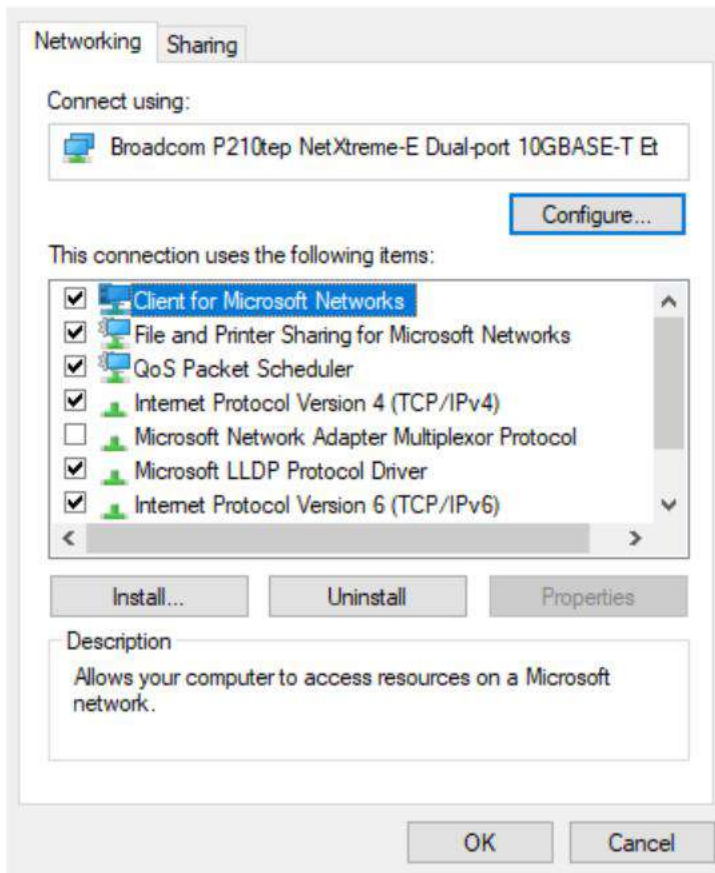
5.1   Jumbo Frame

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. Broadcom 57416 controller supports jumbo frame size of up to 9.5 Kbytes. Once the Broadcom 57416 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**.
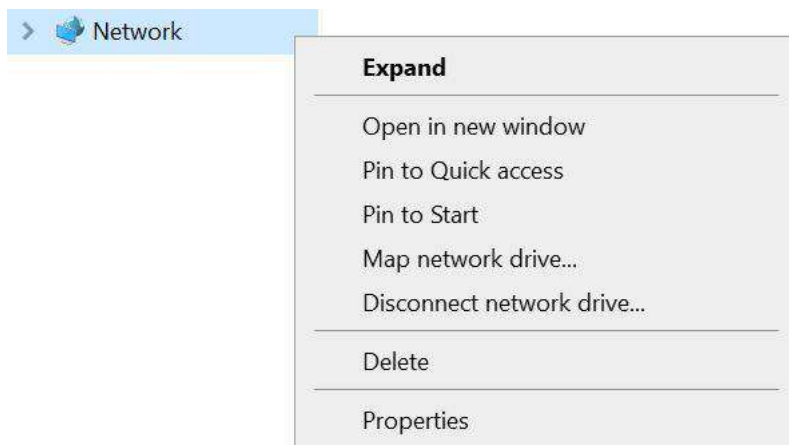
2. Right click on the corresponding **Local Area Connection** and click on **Properties**.

3. Click on the **Configure** button, the following dialog appears and click on the **Advanced** tab. Highlight **Jumbo Packet** and select a jumbo frame size from the Value drop-down list (9014 Byte is recommended for connecting devices with high data rate).
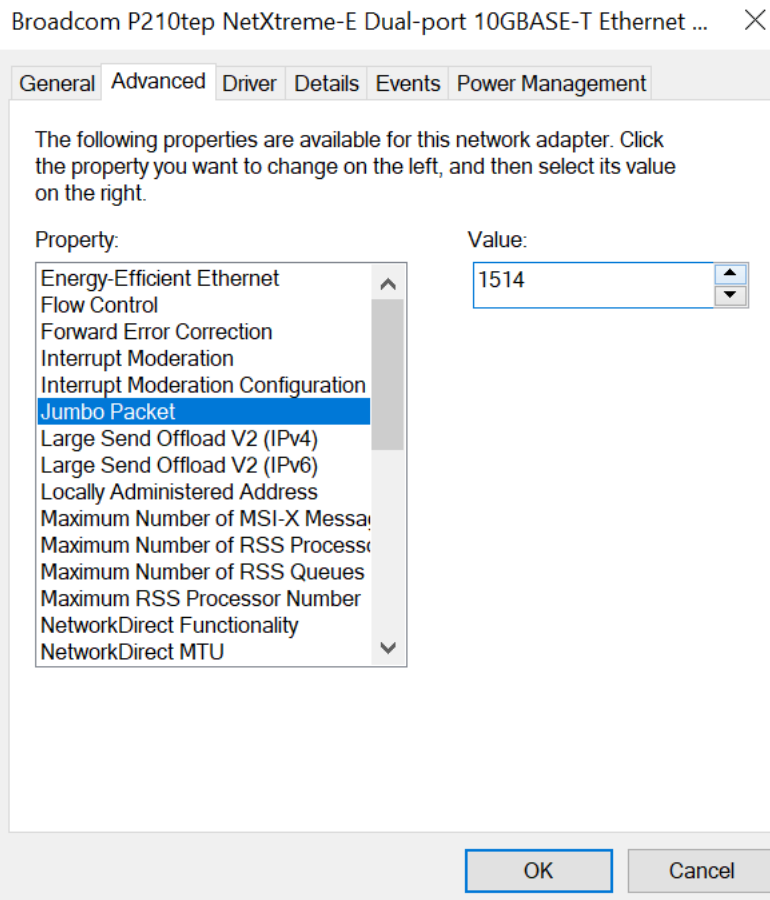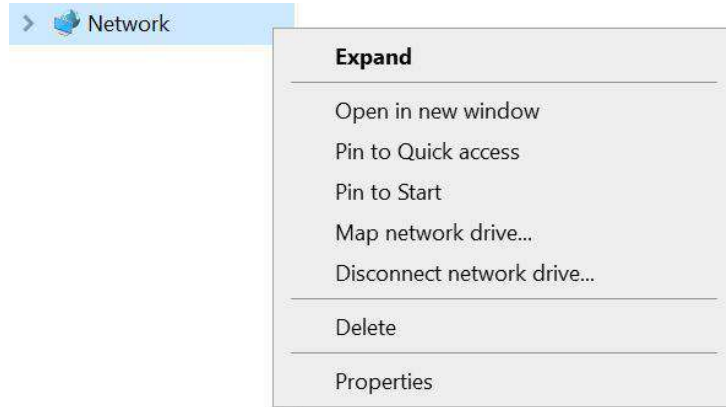
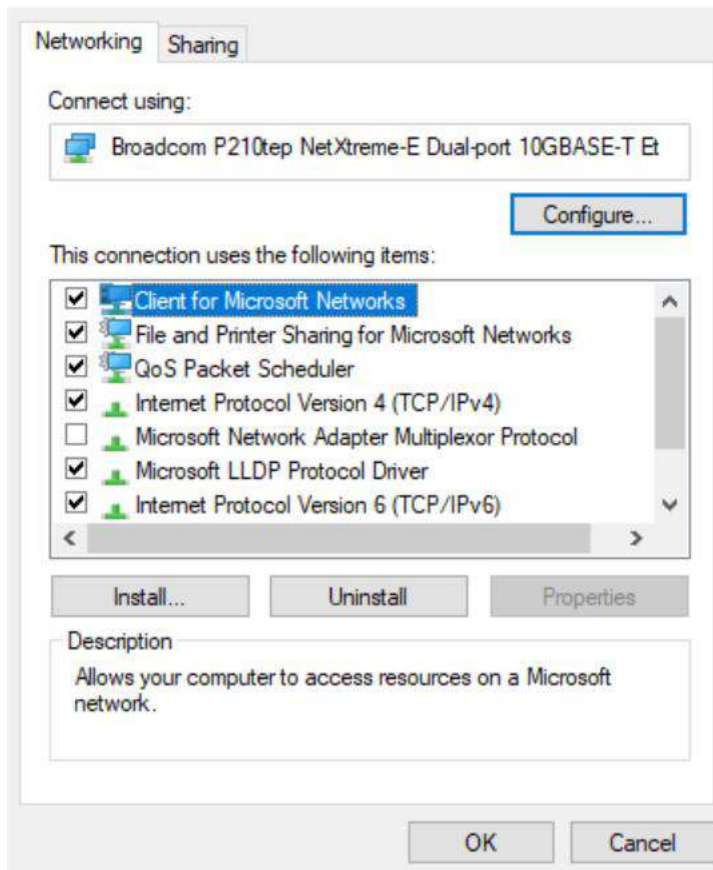## 5.2　NetworkDirect Functionality (RDMA)

NetworkDirect is a high-performance networking interface that enables Remote Direct Memory Access (RDMA) functionality. RDMA allows direct memory access between computers in a network without involving the operating system, minimizing CPU overhead and latency. NetworkDirect supports efficient data transfer by bypassing traditional network stack layers, making it ideal for high-speed, low-latency applications like data centers, HPC (High-Performance Computing), and storage systems. It works with technologies like RoCE (RDMA over Converged Ethernet) to ensure fast and scalable communication. By offloading data movement tasks to hardware, it enhances throughput and reduces resource usage, crucial for performance-critical environments.

To configure NetworkDirect Functionality (RDMA), please refer to the following steps:
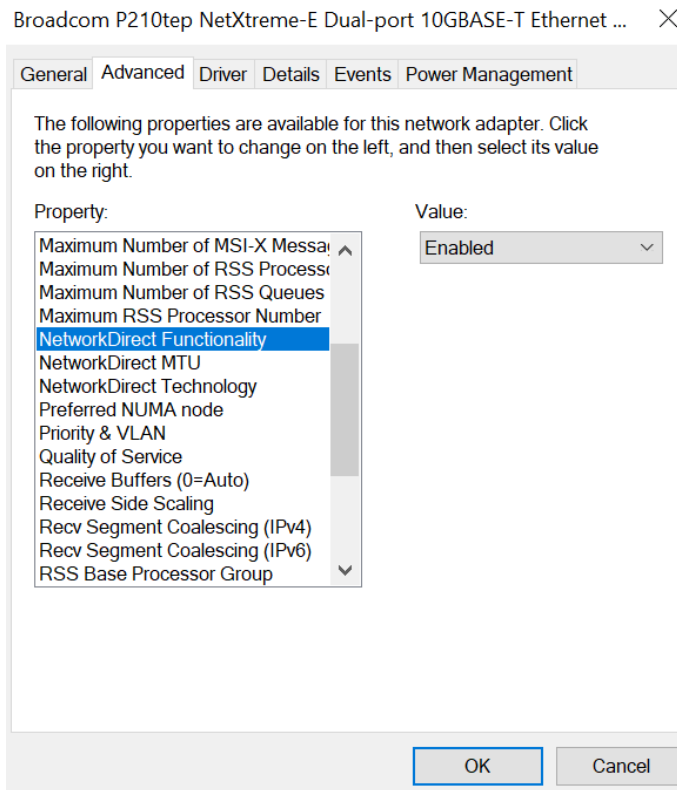
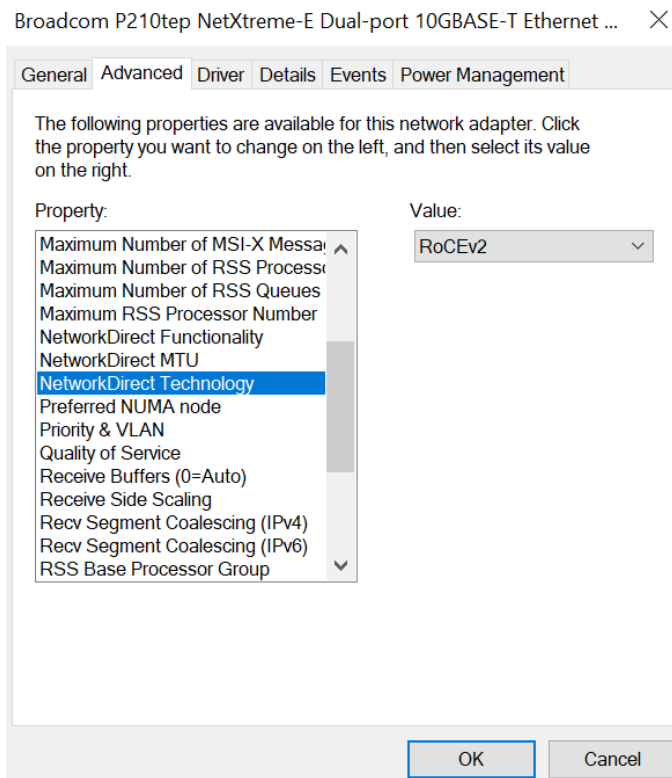1. On your keyboard, press **Windows key + E**, right click on **Network** and select **Properties**.

2.   Right click on the corresponding **Local Area Connection** and click on "**Properties"**.

3.   Click on the **Configure** button, the following dialog appears and click on the **Advanced** tab. Scroll down the Property list and highlight **NetworkDirect Functionality**, select Enabled/ Disenabled.

4.   Scroll down to **NetworkDirect Technology**, you should see RoCEv2 in the Value column has been activated.


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5.3   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 2048 bytes) for better performance.

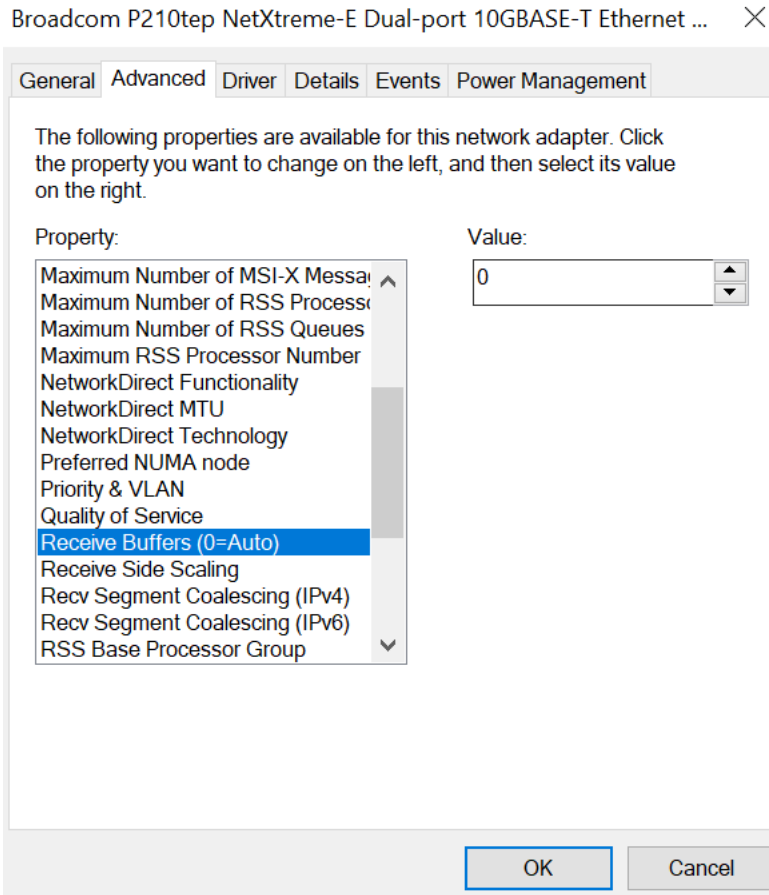To configure Receive Buffers settings, please refer to the following steps:

1. On your keyboard, press **Windows key + E**, right click on **Network** and select **Properties**.
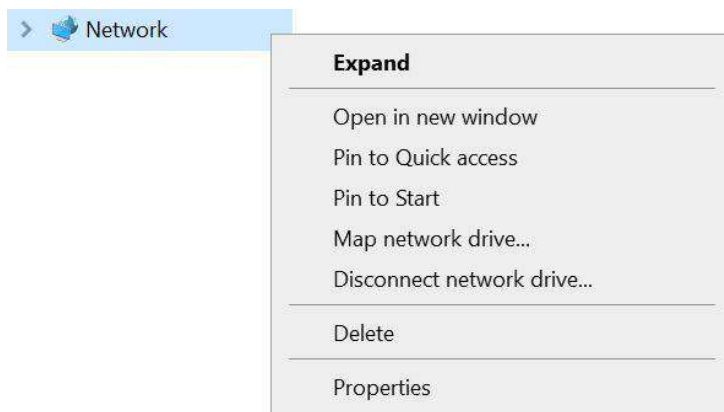
2. Right click on the corresponding **Local Area Connection** and click on "**Properties"**.
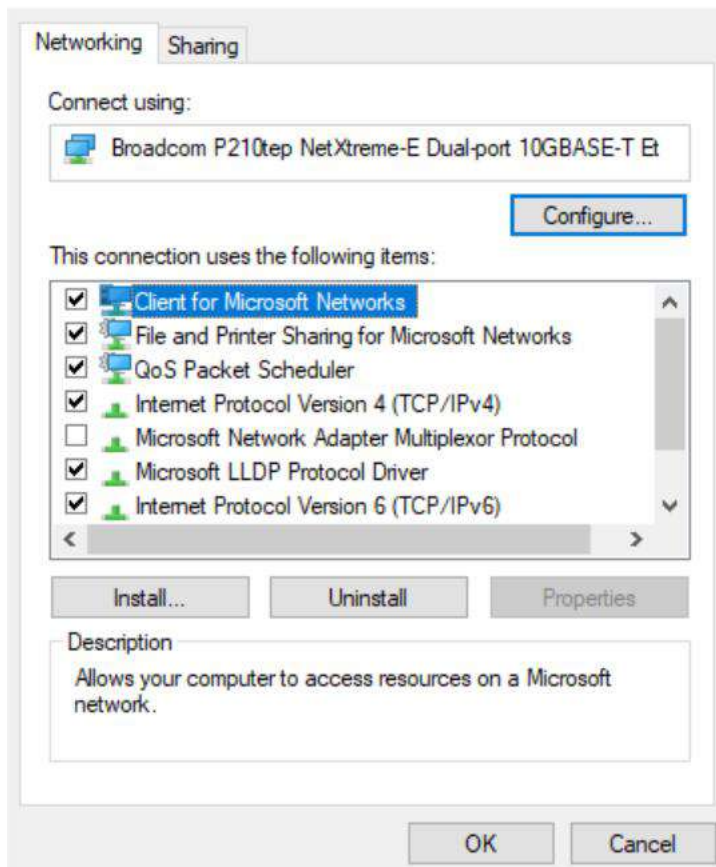
3. Click on the **Configure** button, the following dialog appears and click on the **Advanced** tab. Scroll down the Property list and highlight **Receive Buffers** and enter a setting into the **Value** column (2048 Bytes is recommended for connecting devices with high data rate).
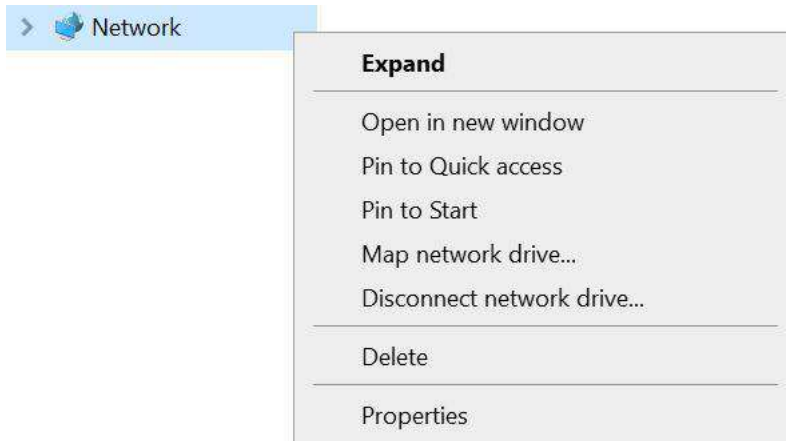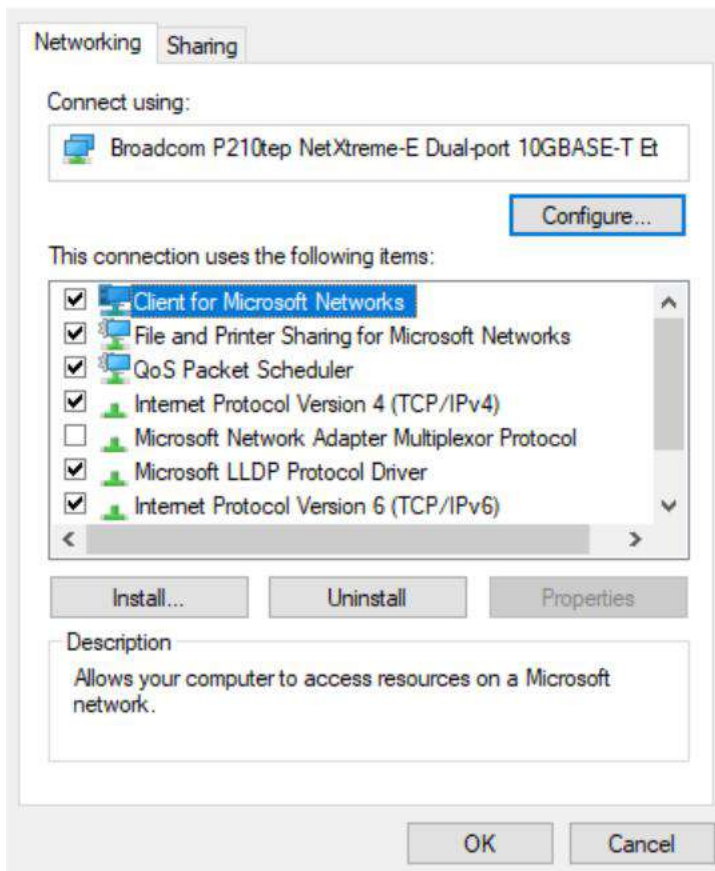
5.4 Transmit Buffers

Like Receive Buffers, Transmit Buffers can affect the transmission performance. The default setting of Transmit Buffers is 1024 bytes. If you encounter a performance issue while transmitting data, you can adjust the size of Transmit Buffers to a larger value (maximum 2048 bytes) for better performance.

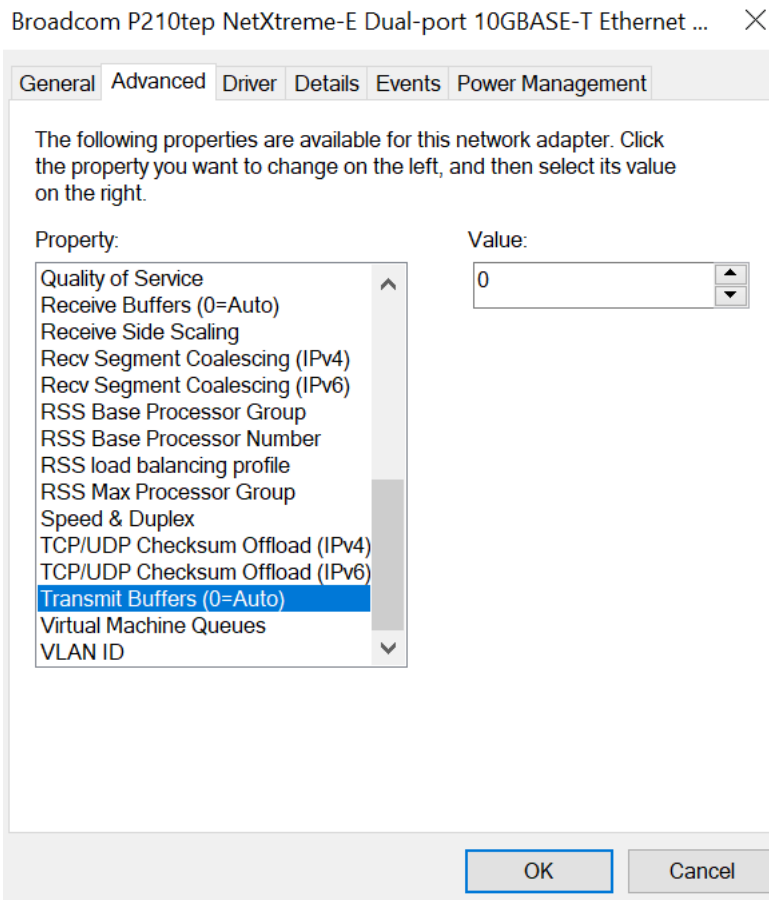To configure Transmit Buffers settings, please refer to the following steps:

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

2. Right click on the corresponding **Local Area Connection** and select **Properties**.

3. Click **Configure** button, the following dialog appears and click on the **Advanced** tab. Scroll down and highlight **Transmit Buffers** and enter a setting into the **Value** column (2048 Bytes is recommended for connecting devices with high data rate).
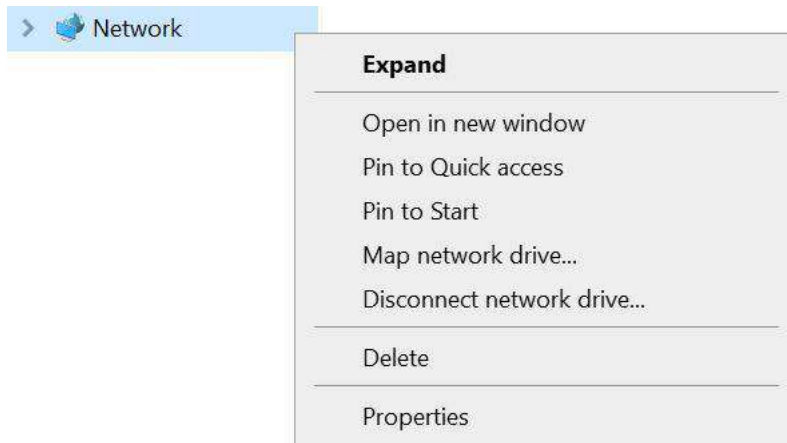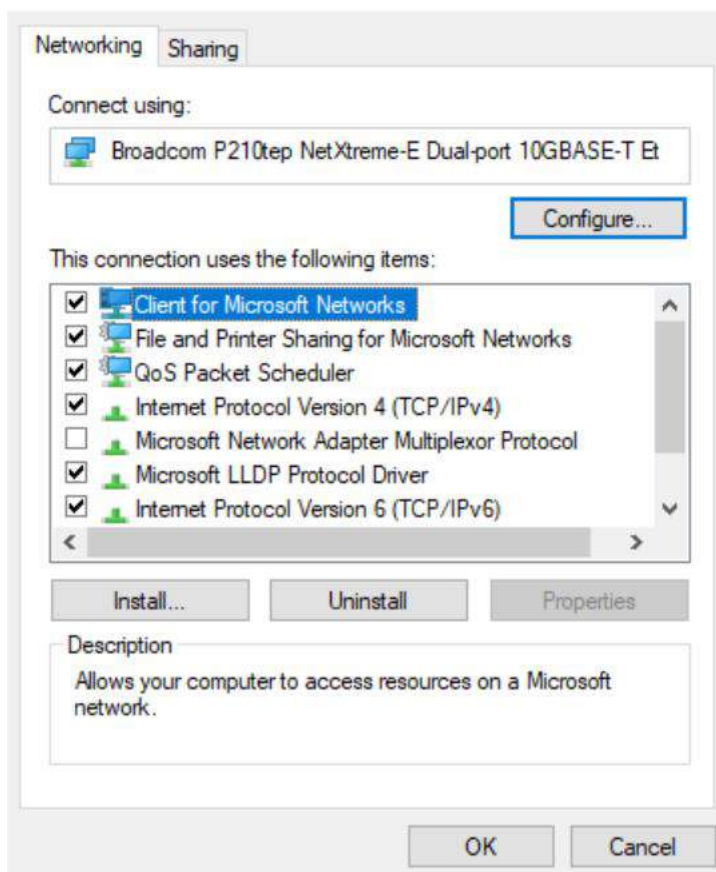
5.5   Port Speed Configuration

The 10Gbps card is backwards compatible with 1Gbps speeds in half or full duplex mode.

To configure speed settings, please refer to the following steps:

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

> Network

Expand

Open in new window
Pin to Quick access
Pin to Start
Map network drive...
Disconnect network drive...

Delete

Properties

2.   Right click on the corresponding **Local Area Connection** and select **Properties**.

Networking   Sharing

Connect using:

Broadcom P210tep NetXtreme-E Dual-port 10GBASE-T Et

Configure...

This connection uses the following items:

☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ QoS Packet Scheduler
☑ Internet Protocol Version 4 (TCP/IPv4)
☐ Microsoft Network Adapter Multiplexor Protocol
☑ Microsoft LLDP Protocol Driver
☑ Internet Protocol Version 6 (TCP/IPv6)

Install...   Uninstall   Properties

Description

Allows your computer to access resources on a Microsoft network.

OK   Cancel

3. Click **Configure** button, the following dialog appears and click on the **Advanced** tab. Scroll down and highlight **Speed & Duplex** and in the Value dropdown column, select a preferred speed.
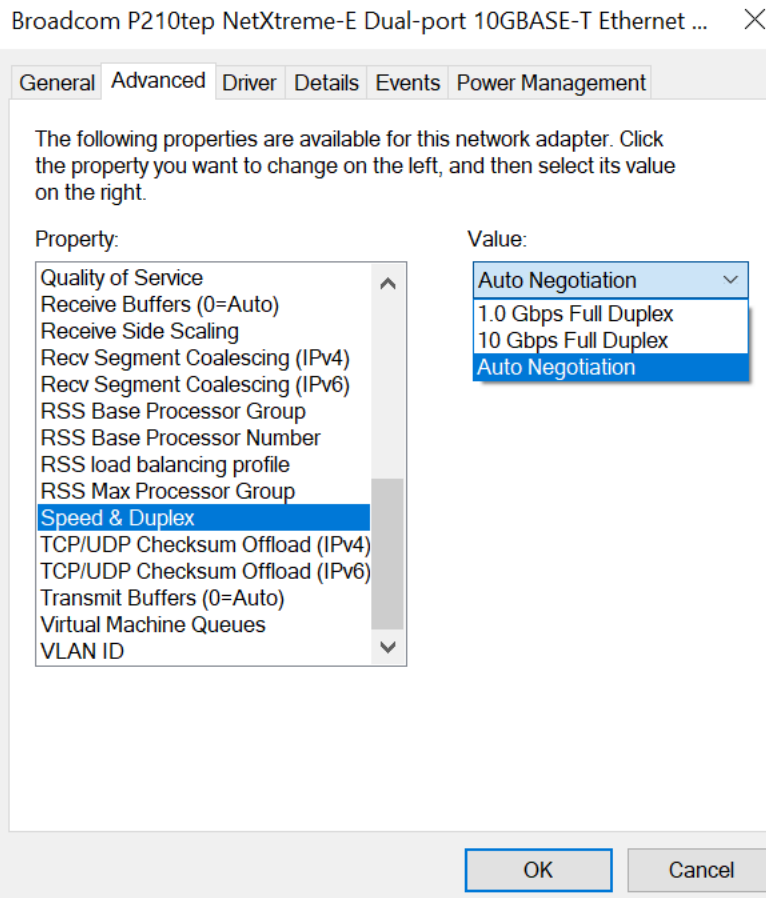
Appendix A Using Per-Port PoE On/Off Control

PCIe-PoE572bt 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.
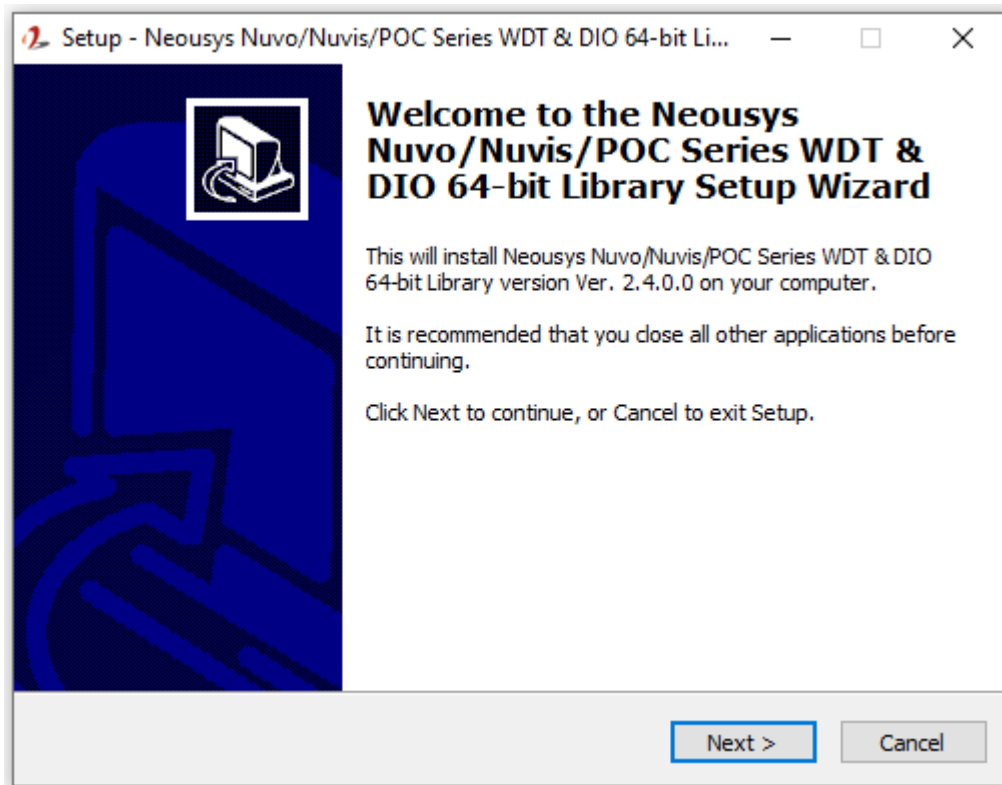
> **NOTE**
> Please install WDT_DIO_Setup_v2.4.0.0 or later versions.

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_ v2.4.0.0.exe** or download the latest version from here.
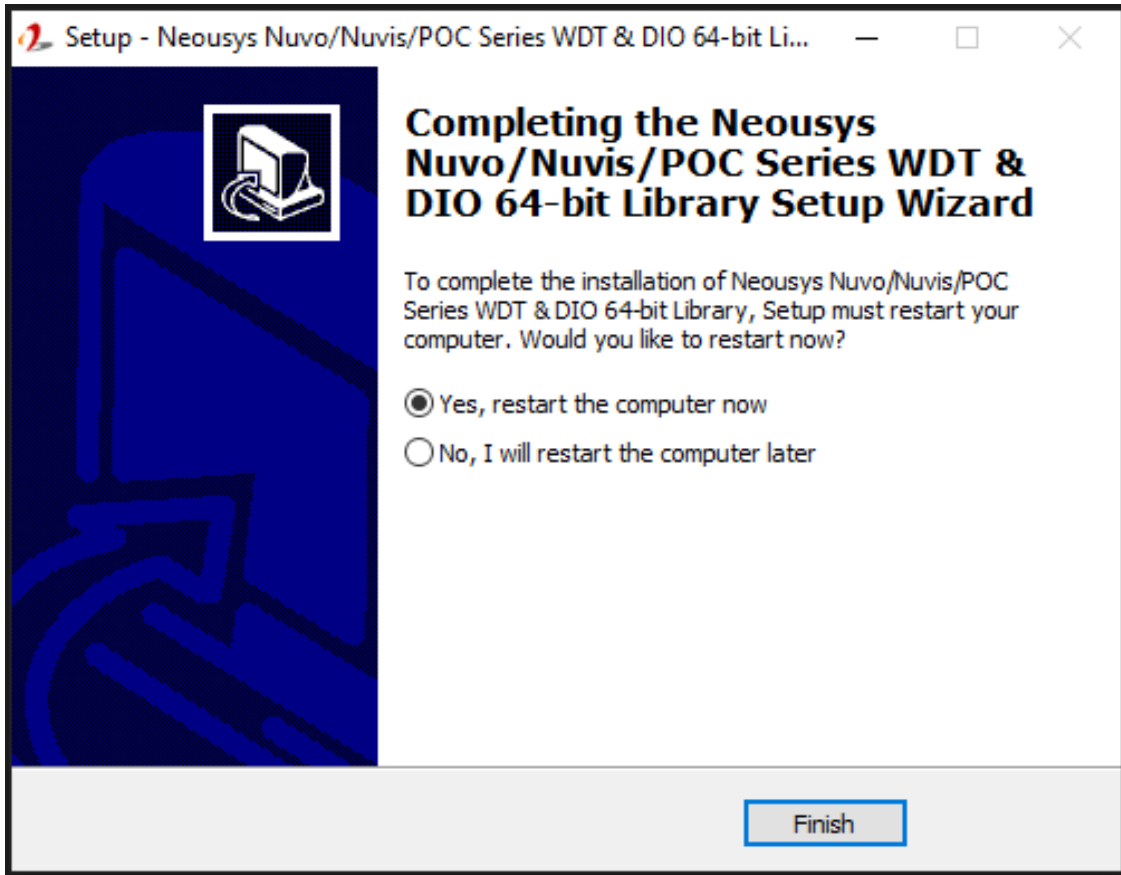
1. Execute **WDT_DIO_Setup_v2.4.0.0.exe**. The following dialog appears.

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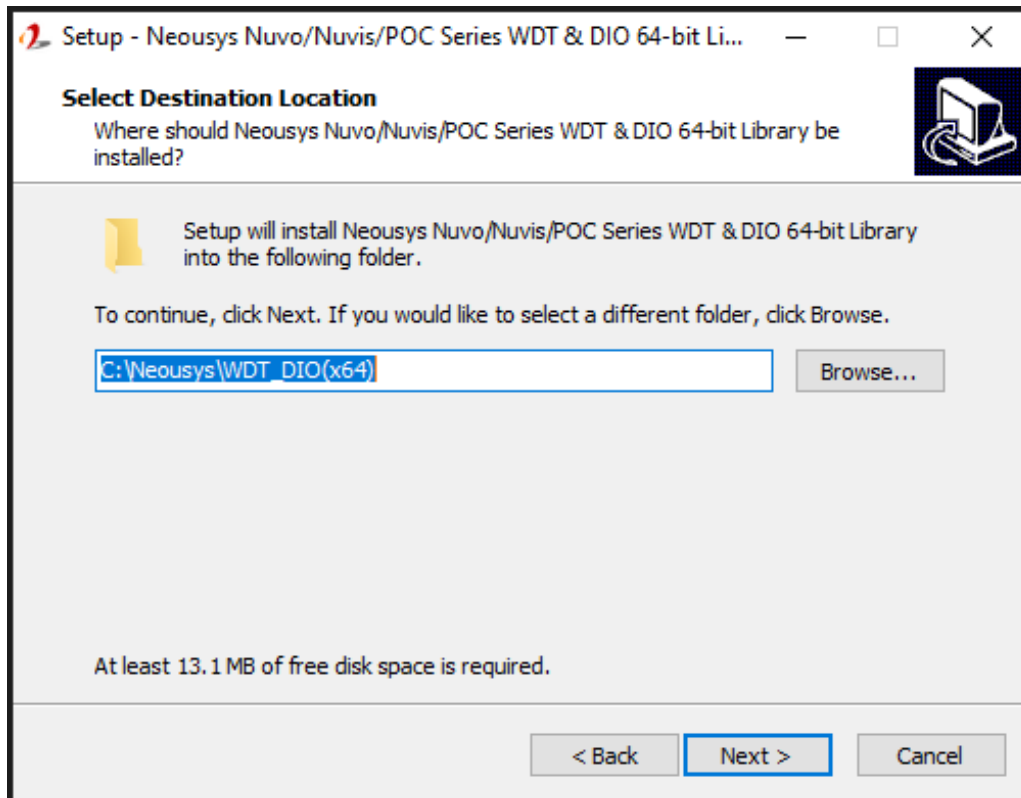
3. Once the installation is finished, a dialog appears to prompt you to reboot the system. The WDT & DIO library will take effect after the system rebooted.
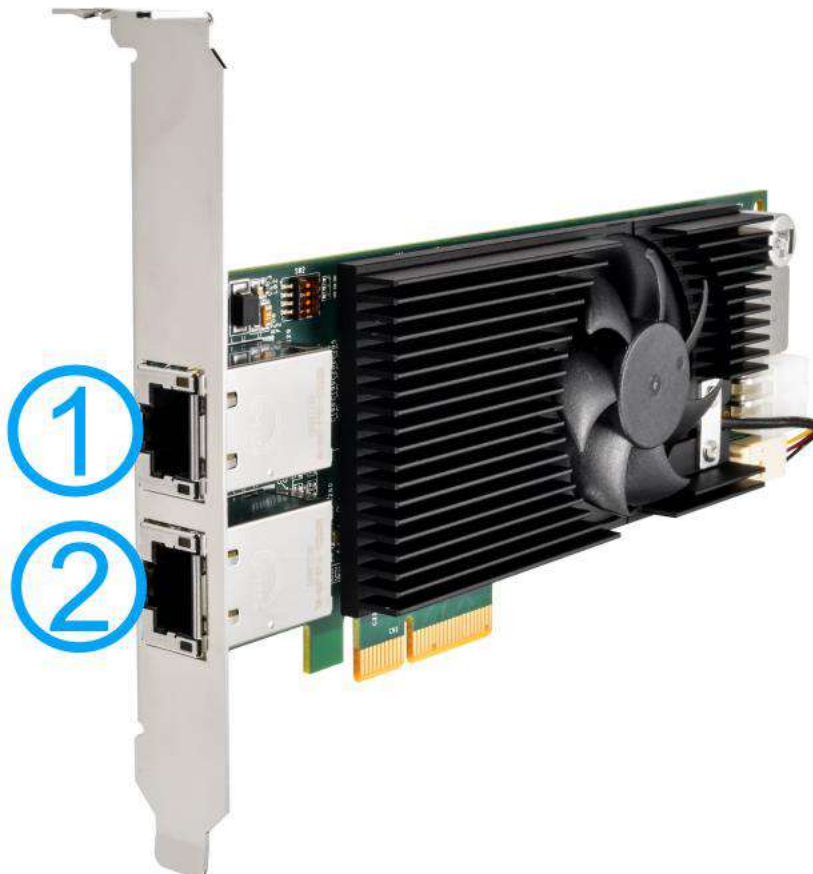

4. When you programming your program, the related files are located in

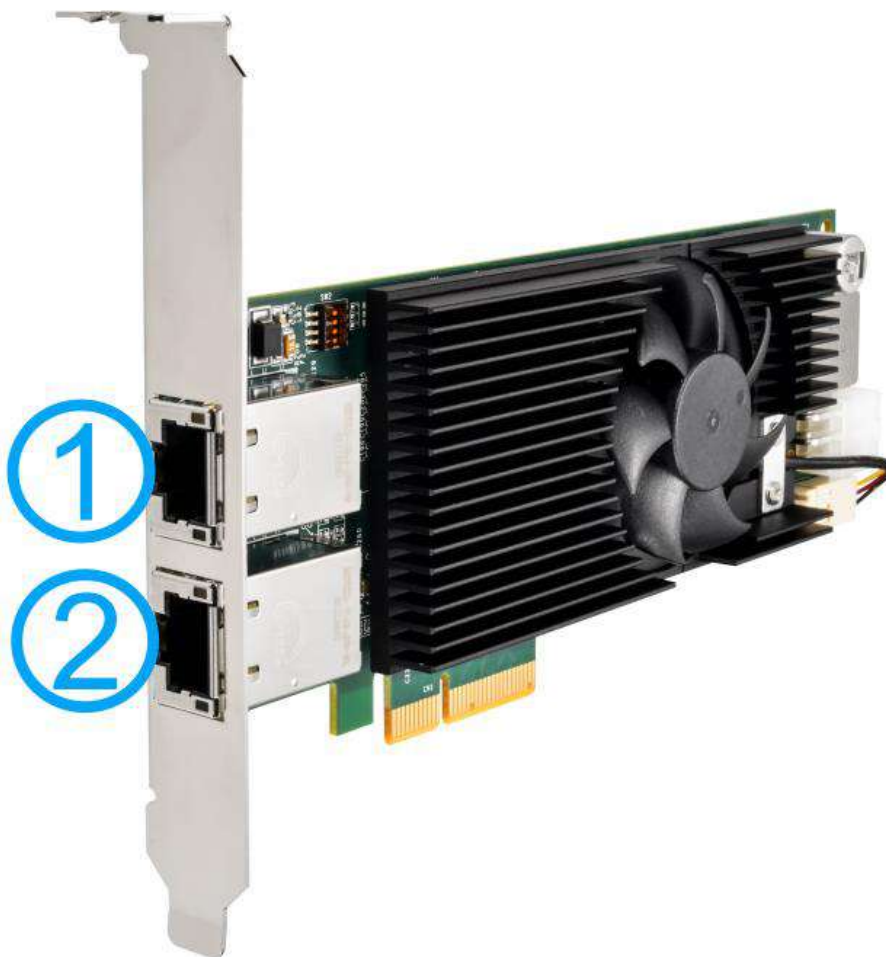|	
Header File:	\Include
Library File:	\Lib
Function Reference:	\Manual
Sample Code:	\Sample\POE_Demo (PoE per-port Control Demo)

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 - 3) to indicate board ID set for your card. Please refer to DIP switch settings for your PCIe-PoE card. **port** DOWRD value (1 - 2) 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 - 3) to indicate board ID set for your card. Please refer to DIP switch settings for your PCIe-PoE card. DOWRD value (1 - 2) 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 - 3) to indicate board ID set for your card. Please refer to <u>DIP switch</u> settings for your PCIe-PoE card. DOWRD value (1 - 2) 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);