NPort 6000-G2 Series User Manual

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www.moxa.com/products

NPort 6000-G2 Series User Manual

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1. Introduction

By leveraging the IEC 62443-4-1 secure development life-cycle process, Moxa has created a new line of secure terminal servers. The NPort 6000-G2 Series secure terminal servers follow the IEC 62443-4-2 design and guidelines to connect your legacy serial devices to industrial networks securely. Furthermore, Moxa's 35 years of experience in serial-connectivity contributes to an enhanced user experience with flexible installation options and a convenient troubleshooting tool for maintenance.

The NPort 6000-G2 Series of secure serial device servers has many exceptional features. The NPort 6000-G2 Series includes a lineup of over 20 models. What distinguishes the models apart are the number of ports and the type of network connection they employ. The NPort 6000-G2 Series shares the same instructions and information across all its models. We will specify any variations between models. To learn more about the variations between models in the series, please refer to the Product Selection Chart section in this chapter.

Overview

The NPort 6000-G2 enables connection of serial devices to Ethernet networks and supports multiple operation modes. In particular, the NPort 6000-G2 has support for Secure Real COM, Secure TCP Server, Secure TCP Client, and Secure Pair Connection modes. This makes it ideal for security-critical applications like banking, telecom, access control, and remote site management. With these secure operation modes, you'll have access to supported protocols, authentication control, advanced data encryption, and more.

The NPort 6000-G2's Any Baudrate feature, which is based on Moxa's UART IC, allows the use of nonstandard baudrates. For example, some special applications may require a baudrate of 500 kbps. Most device servers can only support a baudrate of 460.8 kbps, leading to an error rate of 7.84%. The margin of error allowed for serial communication is just 3%. With the NPort 6000-G2, you can configure the baudrate more precisely and transmit serial data at a rate of 491.5 kbps. This is only a 1.7% margin of error, which is well within the acceptable margin for serial data.

Even when communication is disrupted, reliable data delivery is crucial for certain applications. The NPort 6000-G2 has an exceptional feature that buffers data in case of communication failure. In case of a communication failure, the NPort 6000-G2 stores the data. Upon resumption of communication, the buffered data will be sent to the destination. Each port has a default buffer size of 64 KB. Users can expand the buffer size for the NPort 6250-G2 with an external SD card.

Package Checklist

Each NPort 6000-G2 serial device server is packaged individually with various standard accessories. When you receive your shipment, please check the contents of the box carefully and notify your Moxa sales representative if any of the items are missing or appear to be damaged.

NPort 6150-G2 and NPort 6250-G2

The supported models of NPort 6150-G2 and NPort 6250-G2:

Model Name	No. of Ethernet Ports	No. of Serial Ports	SD Card Support	Power Supply Included	Operating Temperature
NPort 6150-G2	1	1	–	✓	-10 to 60°C
NPort 6150-G2-T	1	1	–	–	-40 to 75°C
NPort 6250-G2	1	2	Up to 2 TB (high speed, 25 MB/s)	✓	-10 to 60°C
NPort 6250-G2-T	1	2	Up to 2 TB (high speed, 25 MB/s)	–	-40 to 75°C

Standard Accessories for the NPort 6150-G2 and NPort 6250-G2

- Quick installation guide (printed)
- Power adapter (standard temp. models only)
- 1 wall-mounting kit (WK-35-02)

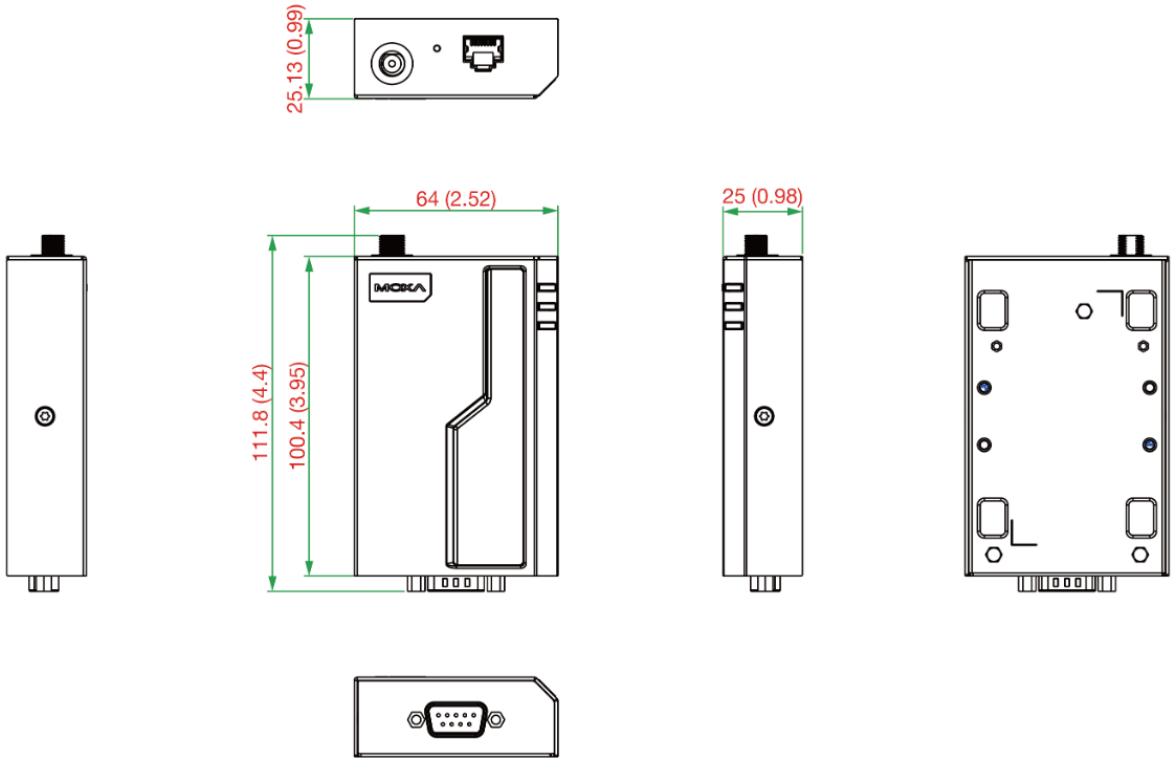
2. Getting Started

This chapter covers the hardware installation of the NPort 6000-G2. The software installation is covered in the following chapters.

Panel Layout

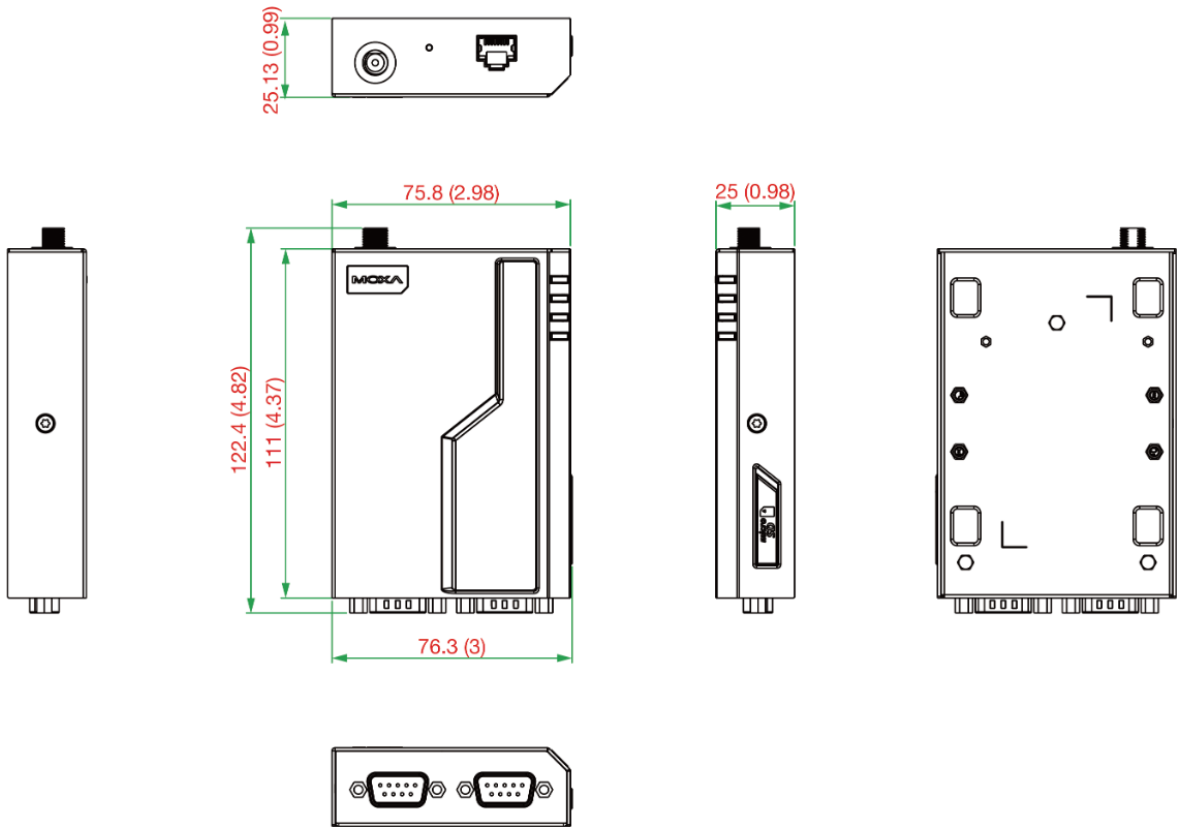
NPort 6150-G2

Unit: mm (inch)



NPort 6250-G2

Unit: mm (inch)



Connecting the Hardware

This section describes how to connect the power supply to the NPort 6000-G2.

Wiring Requirements

ATTENTION

Disconnect the power before installing and wiring

Disconnect the power cord before installing and/or wiring your NPort 6000-G2.

Do not exceed the maximum current for the wiring

Determine the maximum possible current for each power wire and common wire. Adhere to electrical codes that dictate the maximum current allowed for each wire size.

If the current exceeds the maximum rating, the wiring could overheat, causing serious damage to your equipment.

Server may get hot; use caution when handling

Exercise caution when handling the NPort 6000-G2 after it has been plugged in. The internal components generate heat, and the casing may get too hot to touch.

You should also heed the following guidelines:

- Use separate paths to route wiring for power and devices. If power-wiring and device-wiring paths must cross, make sure the wires are perpendicular at the intersection point.

NOTE

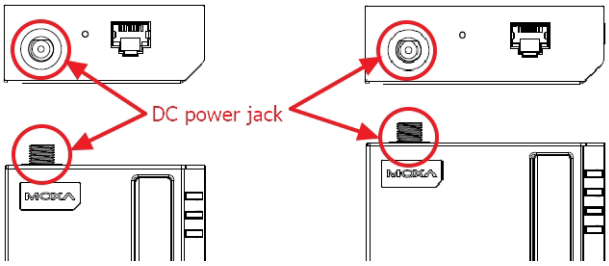
Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- The type of signal transmitted through a wire should determine which wires should be kept separate. The rule of thumb is that wires sharing similar electrical characteristics may be bundled together.
- Keep input wiring and output wiring separately.
- It is good practice to label the wiring to all devices in the system.

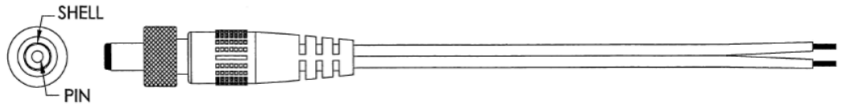
Powering the NPort 6100-G2/6200-G2

Unbox the device server and power it up using the power adapter provided in the box. The position of the DC outlet on the device server is shown in the following figures:

NPort 6150-G2 **NPort 6250-G2**



If you are connecting the DC outlet to a DIN-rail power supply, you will need a separate power cable, CBL-PJ21NOPEN-BK-30 w/Nut, to convert the terminal block output to the DC outlet on the NPort 6100-G2/6200-G2.

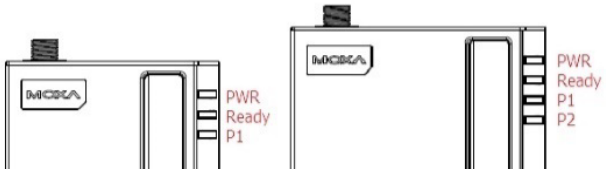


The power cable CBL-PJ21NOPEN-BK-30

If you use a DIN-rail power supply or another vendor's power adapter, please make sure the ground pin is properly connected. The ground pin must be connected with the chassis ground of the rack or the system.

The Power (PWR) LED will change to green once the device is powered up. In a matter of seconds, the Ready LED will switch to green and a beep will sound, signifying that the device is ready. The behavior of the LED indicators is outlined below.

NPort 6150-G2 **NPort 6250-G2**



LED Indicators

The LED indicators on the front panel of the NPort 6000-G2 are described in the following table.

LED Name	LED Color	LED Function
PWR	Green	Power is being supplied to the power input.
Ready	Red	Steady on: Power is on, and the NPort 6000-G2 is booting up. Blinking: Showed an IP conflict occurs, or the DHCP or BOOTP server does not respond properly.
	Green	Steady on: Power is on, and the NPort 6000-G2 is functioning normally. Blinking: The device server has been located by the NPort Search Utility.
	Off	Power is off, or there is a power error condition.
P1, P2	Yellow	The serial port is receiving data.
	Green	The serial port is transmitting data.
	Off	No data is being transmitted or received through the serial port.

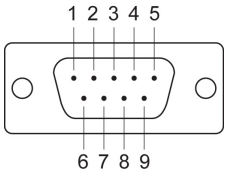
When the device is ready, connect an Ethernet cable to the NPort 6100-G2/6200-G2 directly with computer's Ethernet port or an Ethernet port of a switch.

To connect the serial device to the serial port of the NPort 6100-G2/6200-G2, follow the pin assignment below.

Pin Assignments of the Serial Ports

RS-232/422/485 pin assignment (male DB9):

Pin	RS-232	RS-422 4-wire RS-485	2-wire RS-485
1	DCD	TxD-(A)	–
2	RxD	TxD+(B)	–
3	TxD	RxD+(B)	Data+(B)
4	DTR	RxD-(A)	Data-(A)
5	GND	GND	GND
6	DSR	–	–
7	RTS	–	–
8	CTS	–	–
9	–	–	–



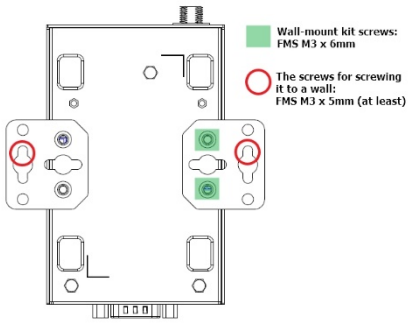
The serial cables needed to connect the NPort 6100-G2/6200-G2 to a serial device can be purchased separately. Please refer to Appendix A.

Mounting Options

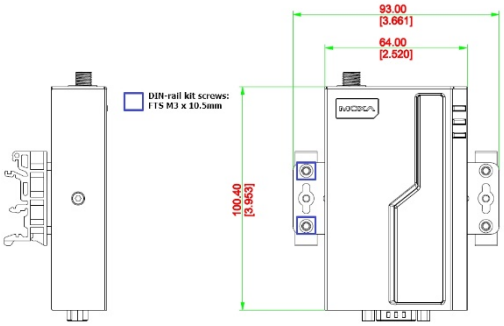
The NPort 6100-G2/6200-G2 device servers come with wall-mount kit, which can be used to mount the NPort to a wall or the inside of a cabinet. There are options to order a DIN-rail kit or side-mount kit separately for different placement.

The NPort 6100-G2/6200-G2 can be placed flat on a desktop or other horizontal surface. In addition, you may use the DIN-rail mount, wall-mount, or side-mount options (DIN-rail and side-mounting kits need to be ordered separately), as illustrated in the following diagrams.

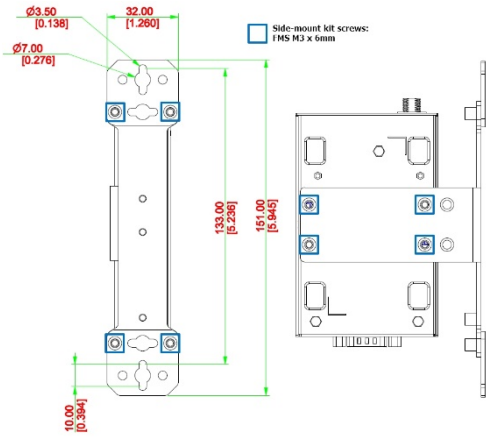
Wall Mounting



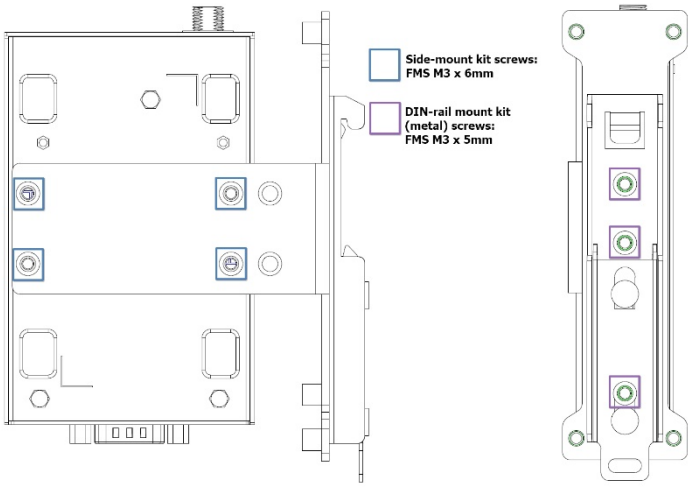
DIN-rail Mounting (plastic)



Side Mounting



DIN-rail Mounting (metal) With Side-mounting Kit

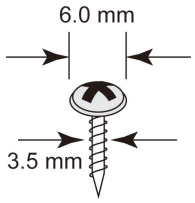


The mounting kit packages include screws. However, if you prefer to buy your own, refer to the dimensions below:

- Wall-mounting kit screws: FMS M3 x 6 mm
- DIN-rail mounting kit screws: FTS M3 x 10.5 mm
- Side-mounting kit screws: FMS M3 x 6 mm
- Metal DIN-rail kit screws (on side-mount kit): FMS M3 x 5 mm

For attaching the device server to a wall or the inside of a cabinet, we recommend using a M3 screw with the following specifications:

- The head of the screw should be between 4 to 6.5 mm in diameter.
- The shaft should be 3.5 mm in diameter.
- The length should be longer than 5 mm.



Connecting to the Network

Connect one end of the Ethernet cable to the NPort 6000-G2's 10/100M Ethernet port and the other end of the cable to the Ethernet network.

If the cable is properly connected, the NPort 6000-G2 will show a valid connection to the Ethernet:

- The Ethernet LED glows solid green when connected to a 100 Mbps Ethernet network.
- The Ethernet LED glows solid orange when connected to a 10 Mbps Ethernet network.
- The Ethernet LED flashes when Ethernet packets are being transmitted or received.

LED Name	LED Color	LED Function
High speed of the RJ45 connector	Green	Steady on: The 100 Mbps Ethernet is connected Blinking: The Ethernet packets are being transmitted or received
	Off	The 100 Mbps Ethernet is disconnected
Low speed of the RJ45 connector	Yellow	Steady on: The 10 Mbps Ethernet is connected Blinking: The Ethernet packets are being transmitted or received
	Off	The 10 Mbps Ethernet is disconnected

3. First-time Setup

The NPort 6000-G2 device server allows IP access to traditional serial devices (RS-232/422/485). The device server is a small computer with a CPU and TCP/IP protocols that can convert data between serial and Ethernet formats in both directions. With your computer, you can remotely control, manage, and configure facilities and equipment from any location in the world using the Internet.

Traditional SCADA and data collection systems rely on serial ports to collect data from various kinds of instruments. With the NPort 6000-G2, your SCADA and data collection system can access all instruments on a standard TCP/IP network, whether they are used locally or remotely, thanks to its compatibility with RS-232, RS-422, and RS-485 communication ports.

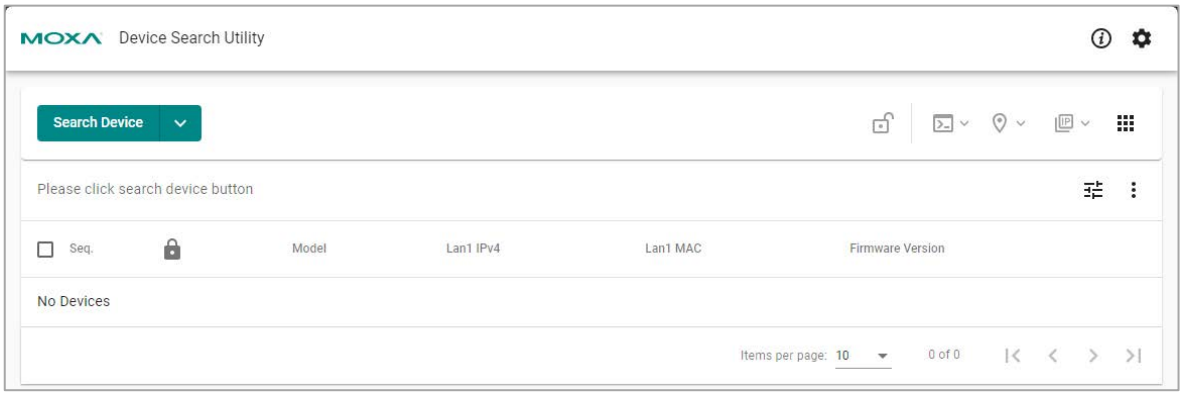
The NPort 6000-G2 is an external network device that adds more serial ports to a host computer as needed. If your host computer is TCP/IP protocol compatible, you won't be restricted by bus limitations or lack of drivers for a variety of operating systems.

To combat the rising number and complexity of cyberattacks, network device vendors are including protective functions to secure sensitive business and personal information. Thanks to our dedicated efforts, all Moxa products meet the security standard, allowing customers to use them worry-free.

To accomplish this, the services will be disabled until you set up the first username and password for the unit. The unit can only be configured and made functional using a web console (HTTPS) or Moxa service.

Find the Device

The default IP address of each NPort 6000-G2 Series is https://192.168.127.254. Directly input the IP address at the address bar of a browser to open the web console to set up the first username and password. Or download the **Device Search Utility (DSU) v3.0** and search for the device to access its web console.



DSU is a handy tool for easily finding NPort device servers and deploying single or multiple devices. DSU v3.0 functions as a web-based application that works on Chrome, Firefox and (Microsoft) Edge.

To use the web-based application DSU v3.0, your browser version and operating system must meet certain minimum requirements:

- Chrome:
  - For Windows 7, 8/8.1, Server 2012 and Server 2012 R2: Chrome 109 and newer
  - For Windows 10 and newer, Server 2016 and newer: All Chrome versions
- Firefox:
  - For Windows 7 and newer versions, Server 2012 and newer versions: All Firefox ESR versions
- Edge:
  - For Windows 7 and newer versions, Server 2012 and newer versions: All Firefox ESR versions

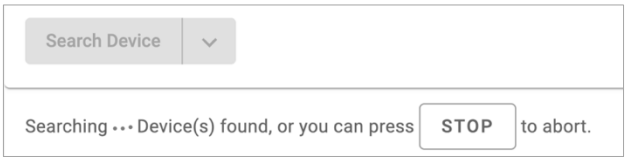
NOTE

For detailed instruction of how to use **DSU**, please download the user manual from moxa.com.

Search Device

When connecting the NPort device server to the network, the DSU's **Search Device** function for him to find the target NPort device server. Searching can be done in three different ways. To see the options, click on the pull-down menu:

Search	Default button action. It will search the devices by multicasting.
Search by IP	Search the device by a specific IP
Search by IP range	Search the device in a certain IP range; the search results will only display the corresponding IP type. For example, if you search by IPv4, only IPv4 values will be displayed.

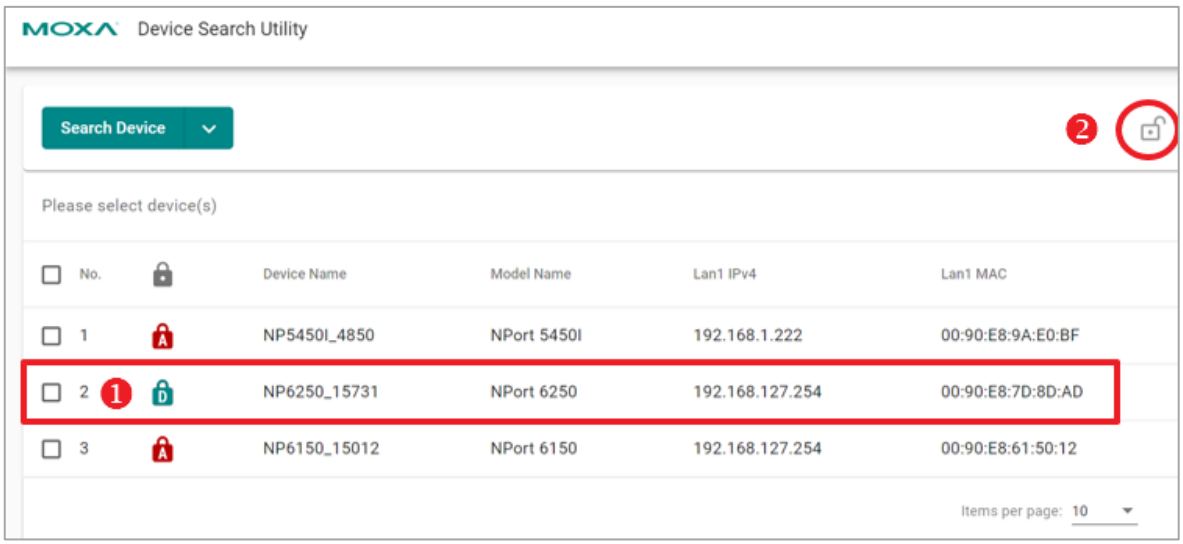


It's possible to stop the search at any stage of the process. A **STOP** button appears on top of the table; click it to halt the search and keep the already searched devices on the list.

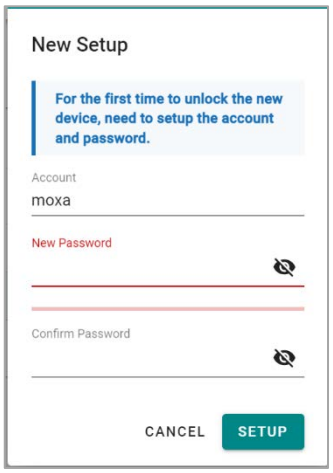
The default search time is 10 seconds. DSU will continue searching until time runs out. If your device(s) does not appear, you may change the search timeout limit in **Preferences > Device Search > Timeout limit for device searching**, to give the network a bit more time to respond.

First-time login with Device Search Utility

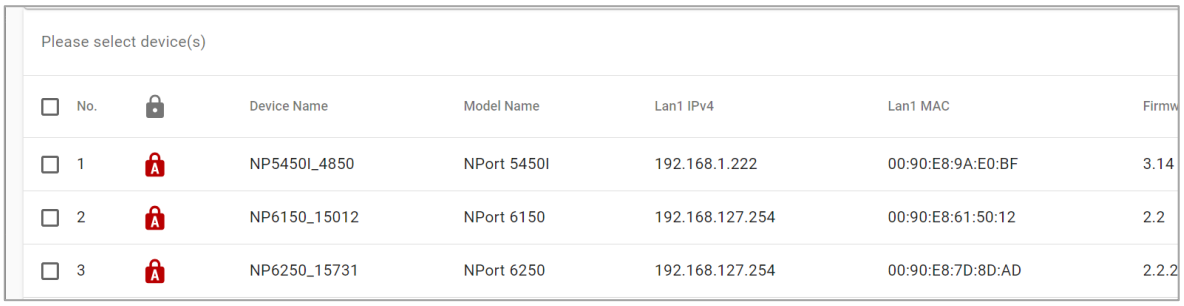
To address cybersecurity concerns, the NPort device server found through DSU will prompt for an account name and password during the first login.



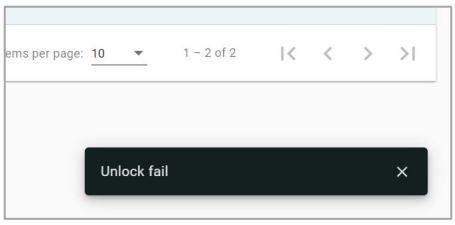
Please select the target device and click the unlock button . The login window will remind you to set up the account name and password, and it will show the password minimum requirements as tips below the password field.



Once you configure the first account and password successfully, the device may restart. After completing a new search, the lock icon will change to **Advance** type:



If there is an error during the unlocking process, like entering the wrong password, you will be notified with an error message at the bottom right of the screen.



Unlock

When selecting one or multiple NPort device servers, use can click the **Unlock** button to unlock them. Because of different product series, there are four types of the login permission types:

	Login Permission Type	Definition
D	Default	The device has not completed the first-time login process, which requires setting the first account name and password.
B	Basic	The device only has password protection; the login requires to input the password only.
A	Advance	The device has username and password protection; the login requires inputting both account name and password.
	Legacy/Unlocked	The device is unlocked, or not requiring any protection to log in.

To unlock multiple devices at once, they must be of the same model name.

NOTE

The DSU solely facilitates unlocking the device; for account name or password changes, you must access the web console and find the Account Management function.

Assign IP

The device(s) needs to be unlocked before the **Assign IP** function can be used.

Assign IPv4 or IPv6 (if supported) for the device. Clicking the button will show you all the options under **Assign IP**:

- Assign IPv4
- Assign IPv6
- Assign IPv4 & IPv6

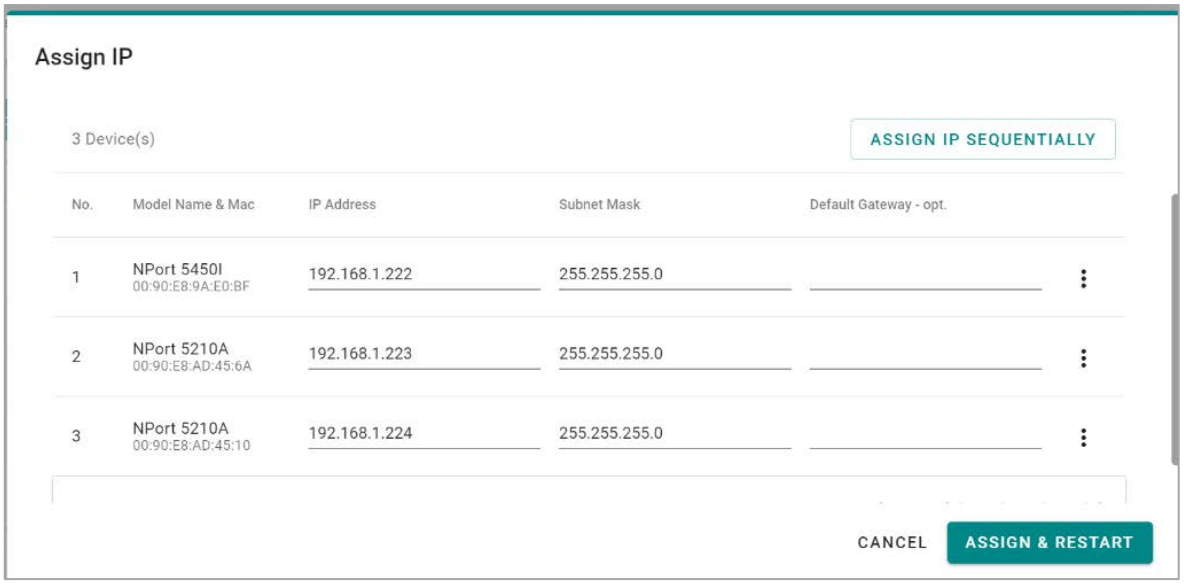
If your device does not support certain options, they will be disabled.

Assign IPv4

Mode: Static or DHCP

Click on the field of **IP Address, Subnet Mask, Default Gateway – opt**, to manually key in the values.

If you have selected multiple devices and the specific IP is not required for each device, you may consider using **ASSIGN IP SEQUENTIALLY** to quickly set up an IP. The function increments the IP address based on the IP value of the first device in the list.



Clone "Network Mask" / "Default Gateway" to All Devices

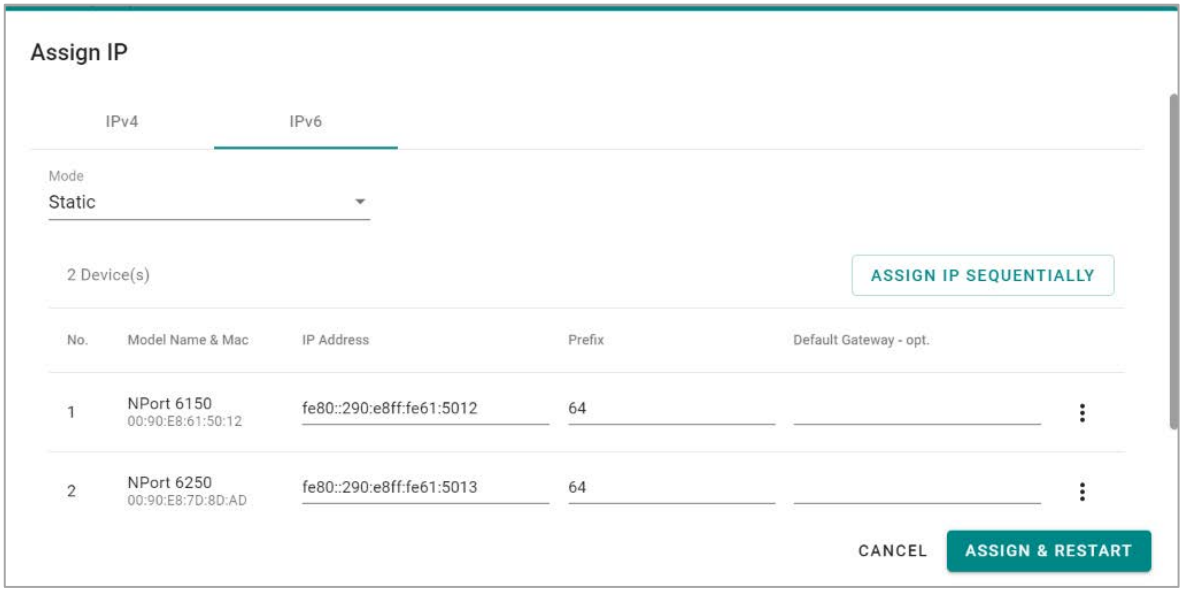
This is a quick way to copy and paste Netmask or gateway values to all the selected devices. Edit **Subnet Mask** and **Default Gateway – Opt** of any device first, and find the options in the menu icon at the end of the list and apply:

Assign IPv6

Mode: Static or DHCP

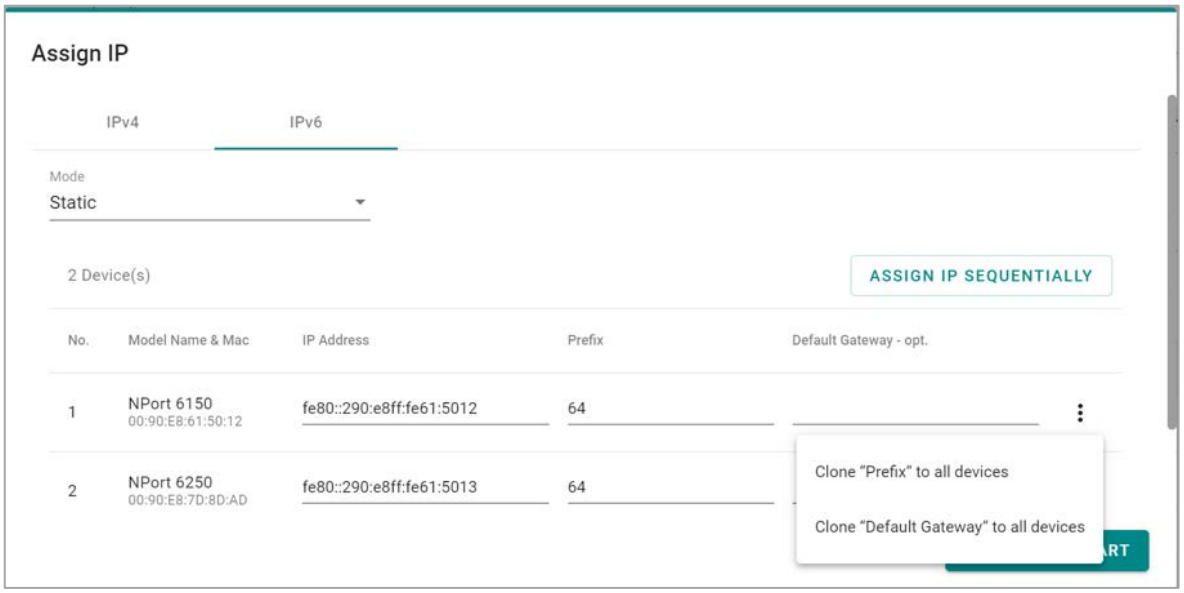
Click on the field of **IP Address, Prefix, Default Gateway – opt**, to manually key in the values.

If you have selected multiple devices and specific IP is not required for each device, you may consider using **ASSIGN IP SEQUENTIALLY** to quickly set up an IP. The function increments the IP address based on the IP value of the first device in the list .



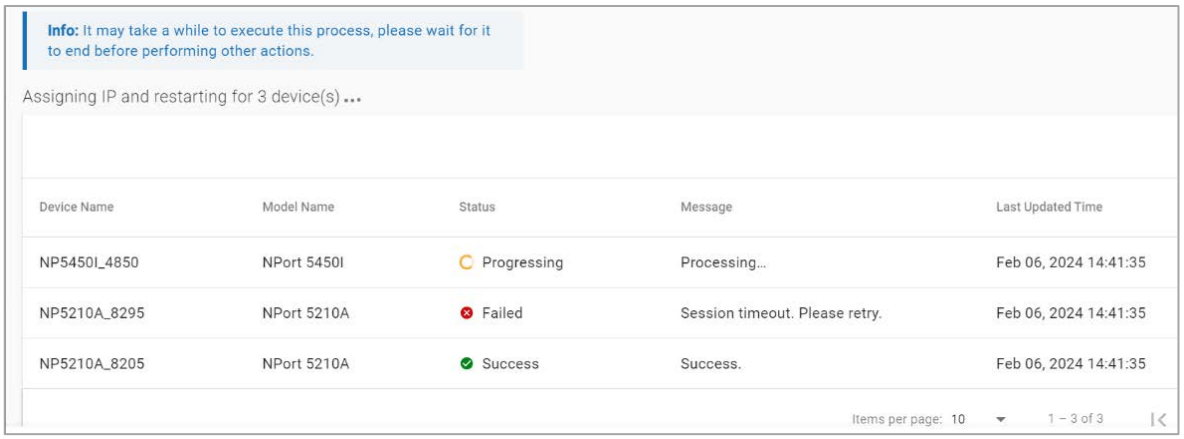
Clone "Network Mask" / "Default Gateway" to all devices

This is a quick way to copy and paste Prefix or gateway value to all the selected devices. Edit **Prefix** and **Default Gateway – Opt** of any device first, and find the options in the menu icon at the end of the list and apply:

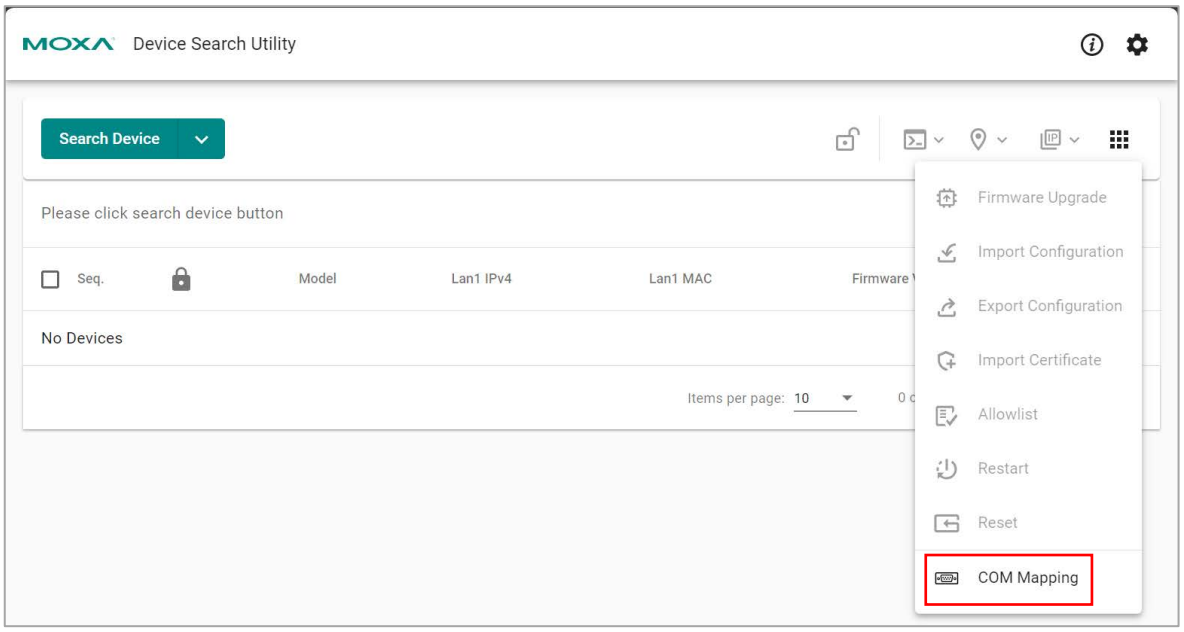


Apply the changes

After you have set everything, click **ASSIGN & RESTART** to restart your device(s) and set a new IP. DSU should display the result, whether it is successful or failed, in the **Status & Message** columns of each device.



COM Mapping



After etting up the first user account, password and IP address, if the software to communicate with the serial devices by opening a COM port/TTY port, you can click the **More functions** to find **COM Mapping** function for next step. Please refer to the Chapter 4 Mapping COM Ports for more information.

Console

When user wants to configure more detail settings, please click the **Console** button to connect to the HTTPS console of the NPort 6000-G2 Series.

For how to use web console for configuration, please refer to Chapter 7. Configuration with the Web Console

Locate

You need to unlock the device before you can use the **Locate** function.

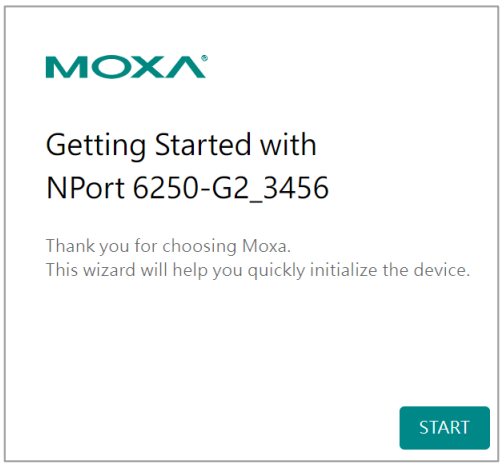
This is to locate the device by triggering the buzzer to help the user to find the target device server easily. Clicking the button would show all options of **Locate**. If your device does not support certain options, they will be disabled:

- Locate (IPv4)
- Locate (IPv6)

First Time Login Process

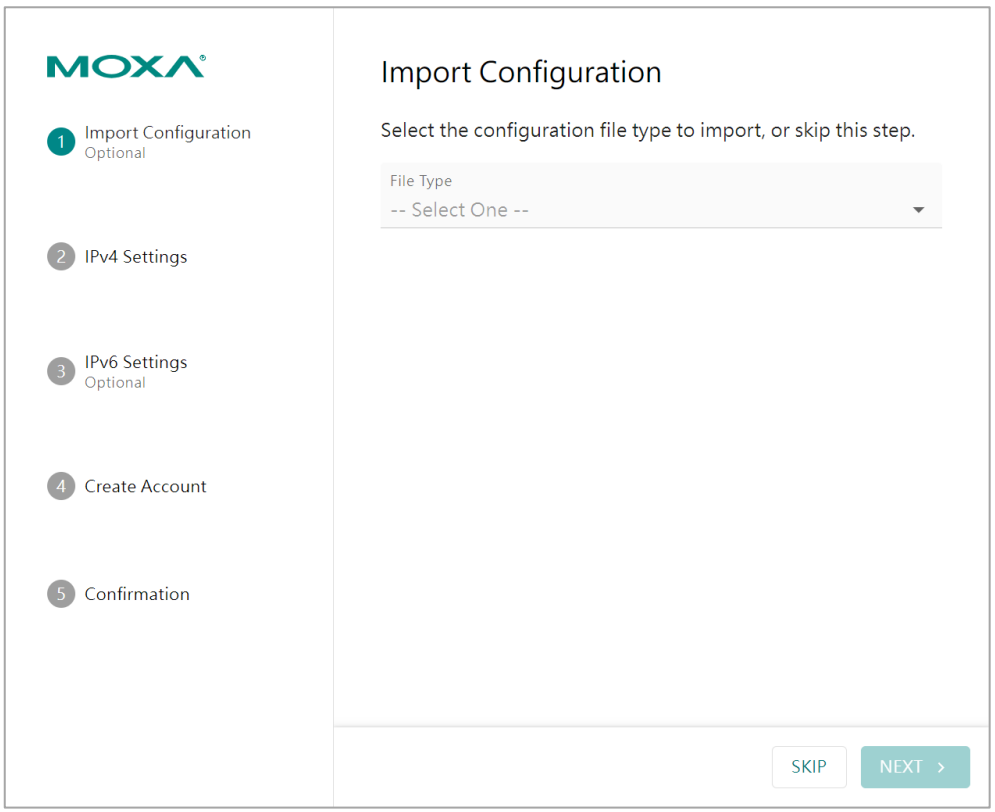
When user clicks the Console button at Device Search Utility or he inputs the default IP address, 192.168.127.254 to first time login to the web console of an NPort 6000-G2 series, there will be a first-time login wizard to guide him/her to initialize the device with setting up the first administrator and the network settings of this device.

When seeing this page, click on the **START** button to start the process.

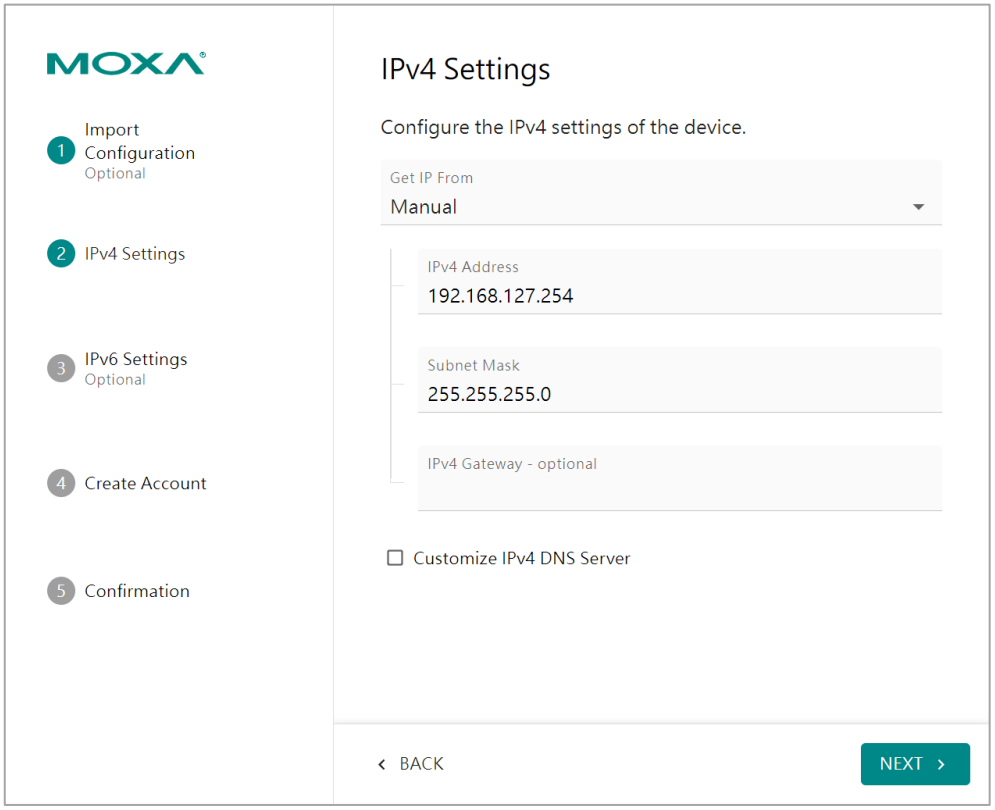


If the user had an existing configuration file of an NPort 6000 or NPort 6000-G2, he/she can select the file and import it at the first step. Then the NPort 6000-G2 will be configured as the old unit he/she has and the wizard will directly jump to step 5 for the user to confirm if the settings are correct?

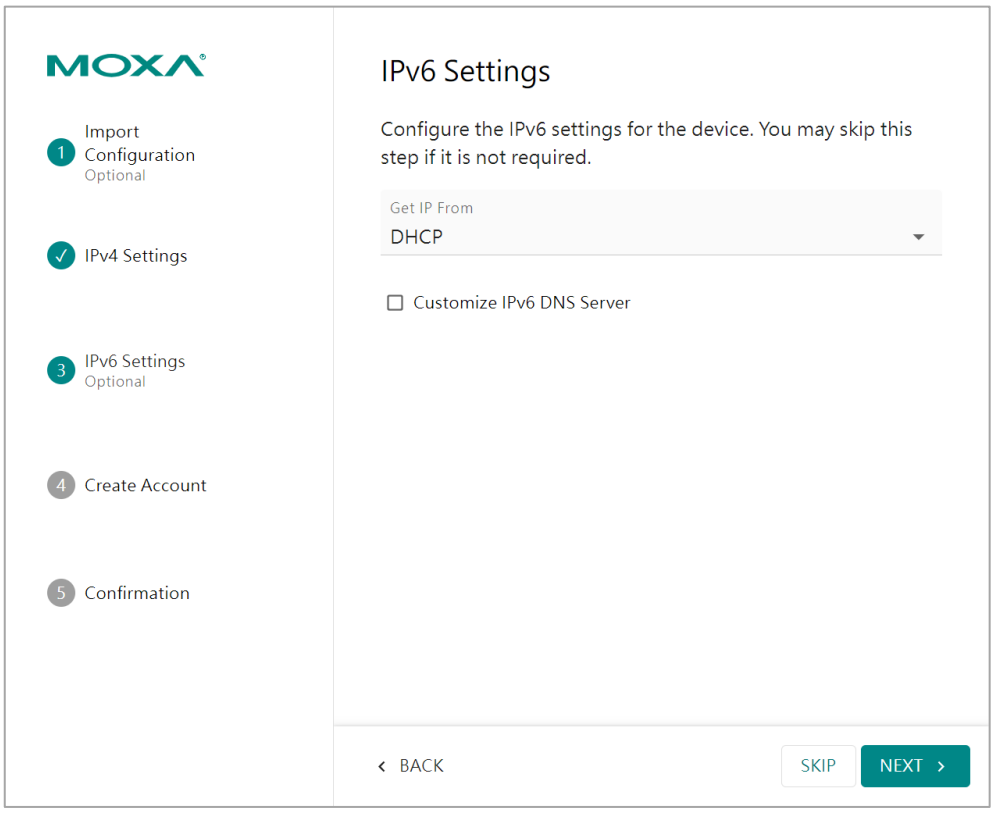
If the user doesn't have an existing configuration file, please click **SKIP** to skip this step.



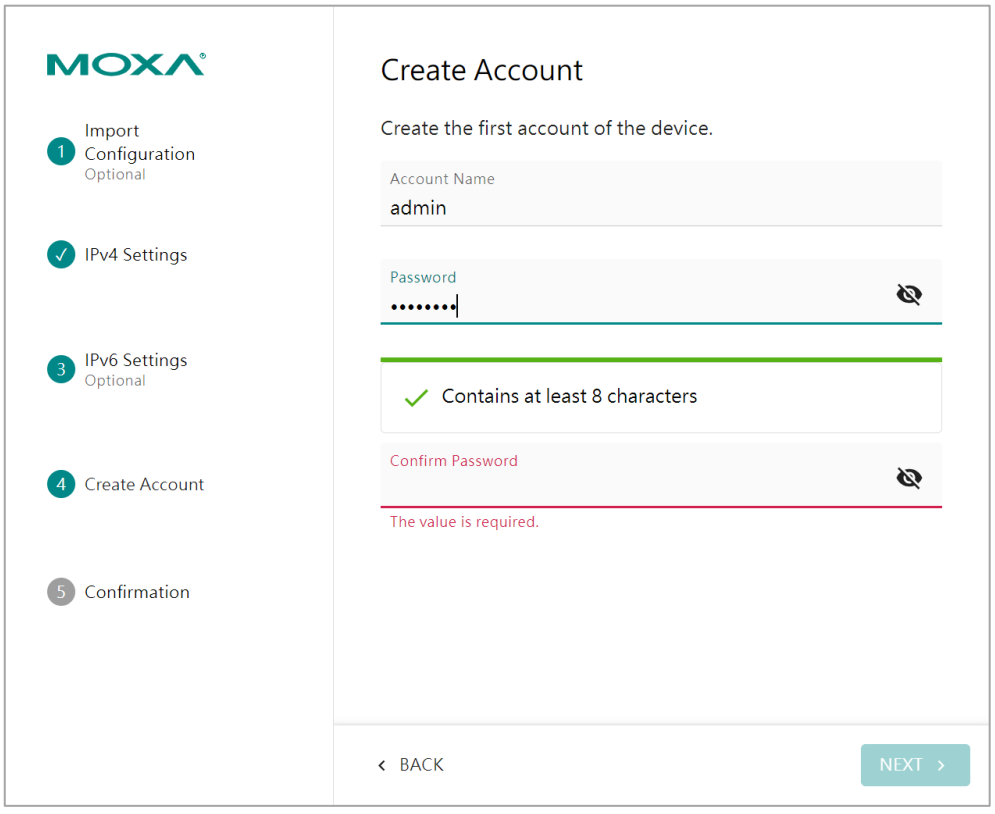
The default IP address of NPort 6000-G2 series is 192.168.127.254/255.255.255.0. User can base on his network topology to modify it to DHCP or a different IP address. Please click **NEXT** to next step.



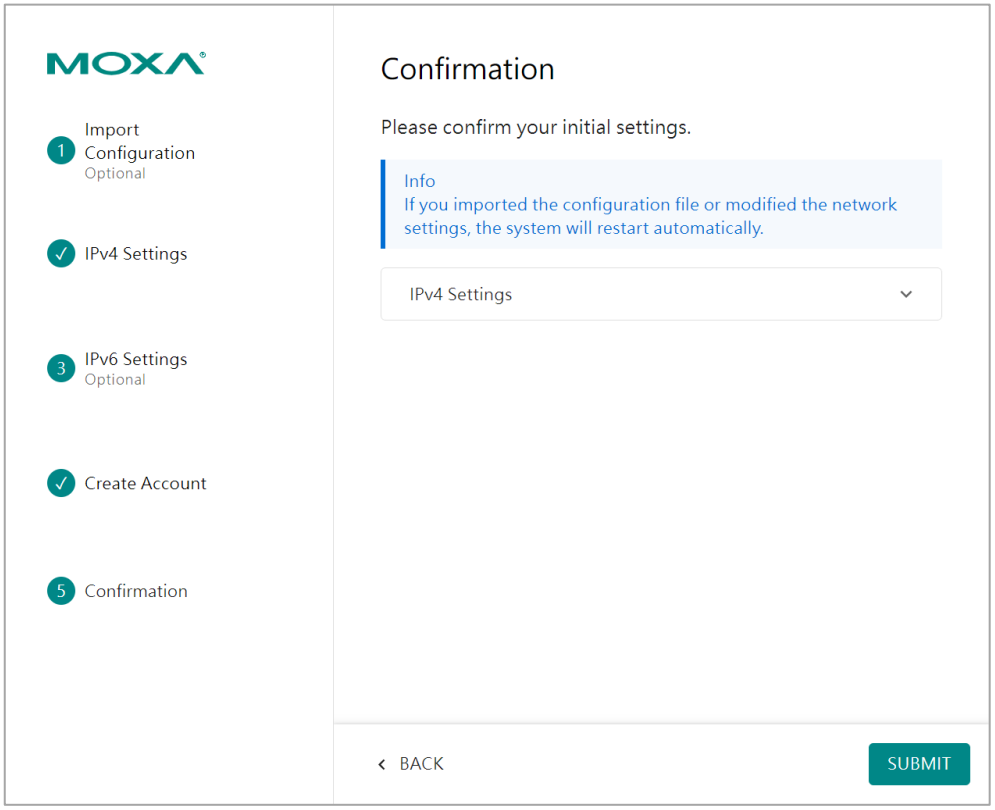
The NPort 6000-G2 Series supports IPv6 networks. If your network environment uses IPv6, configure it at this step. If not, click **SKIP**.



As there is no default username/password for NPort 6000-G2 devices, please set up the first account of this unit. The first user of the device will have full privilege through this account. Keep the account name and password protected. A minimum of 8 characters is required for the default password complexity. The Password Policy function in the Account Management category allows you to change it.



Double-check the network settings at the "Confirmation" step. If everything is OK, click the **SUBMIT** button and the unit will reboot, affecting the above settings.



Once you complete the initial login, you'll have various next steps to choose from:

1. Read Chapter 5 Cybersecurity Considerations for the recommendations from Moxa to securely using the NPort 6000-G2 device server.
2. For using Real COM mode users, refer to Chapter 4 Mapping COM Ports for more information.
3. For other operation mode users, refer to Chapter 7 Configuration with Web Console > Operation Modes for more introductions.
4. For other advanced settings, refer to Chapter 7 Configuration with web Console for more details.

4. Mapping COM Ports

A device server connects devices with RS-232, RS-422, or RS-485 serial interfaces to a local area network, allowing for serial data transmission over Ethernet. Device servers provide network access to connected devices by bridging a physically wired Ethernet network connection on one side and one or more serial ports on the other side, making them appear as if they were directly connected to the serial port. To achieve this, you may have to map a COM port on Windows or a Fixed TTY port on UNIX-like platforms. Once you've configured the IP address using the First-time Login Wizard (introduced in Chapter 3) and mapped the COM port settings, the device server is ready for use. This chapter provides instructions on how to install the driver and map a COM port.

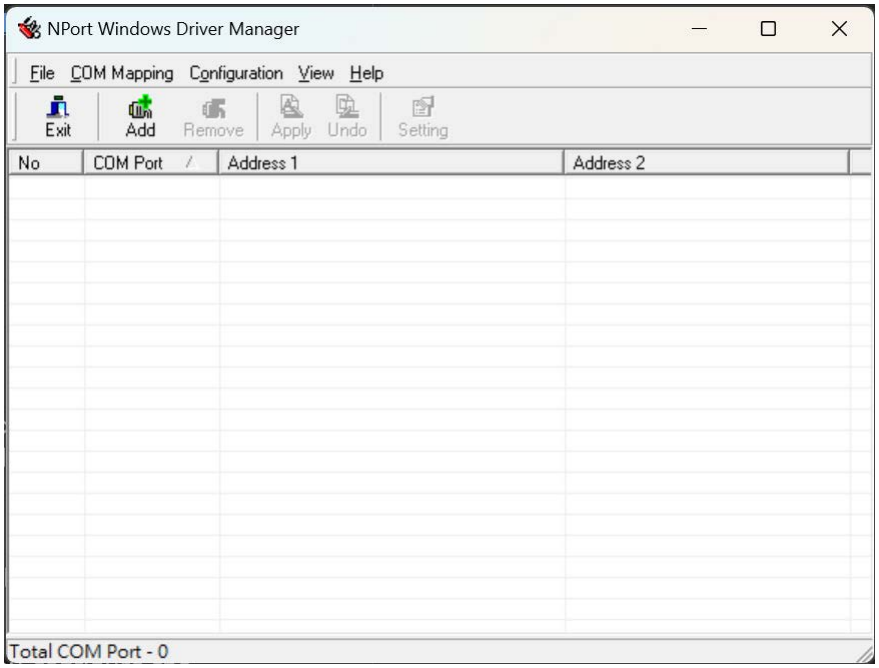
Mapping COM Ports on Windows Platforms

Mapping COM Ports With Real COM Mode

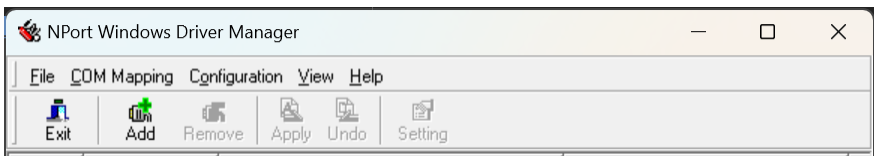
Refer to the "COM Mapping" section in Chapter 3 function triggers the NPort Windows Driver Manager when clicked. Once the software is installed, you can immediately run the NPort Windows Driver Manager.

NOTE

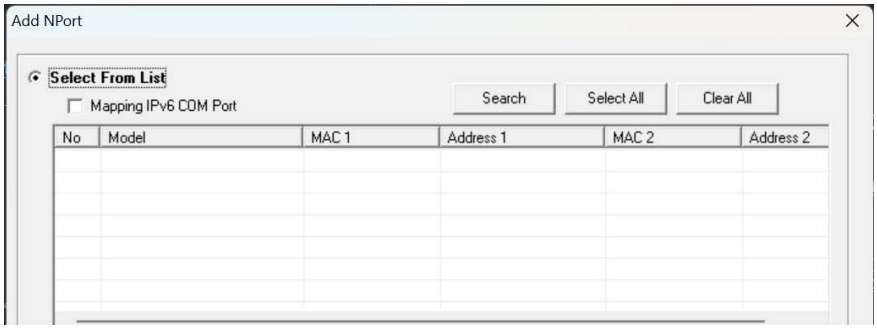
Install Microsoft Visual C++ 2022 Redistributable to use COM mapping in NPort Windows Driver Manager.



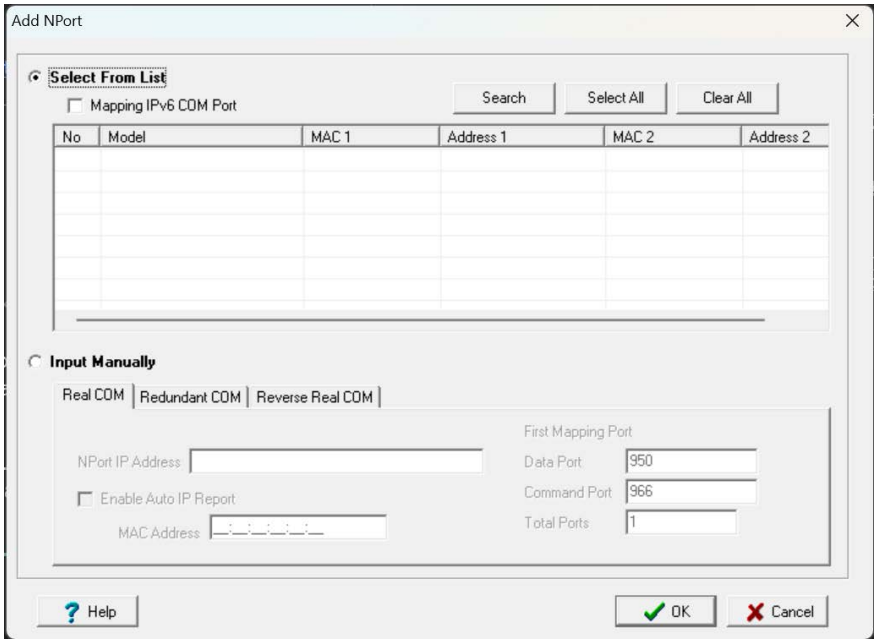
1. Click the **Add** icon.



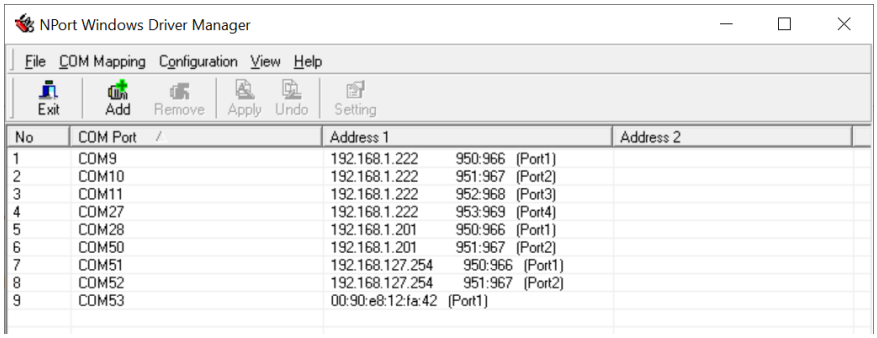
2. Click the **Search** button to search for NPort device servers. Select the server from the list to map the COM ports before clicking **OK**. When you enable the Mapping IPv6 COM Port option, the default IPv4 address will be replaced with an IPv6 address.



3. Alternatively, you can select **Input Manually** and then manually enter the **NPort IP Address**, first **Data Port**, first Command Port, and **Total Ports** to which COM ports will be mapped. Click **OK** to proceed to the next step. Note the Add NPort page will automatically fill in the IP address field if a Fully Qualified Domain Name (FQDN) is used.

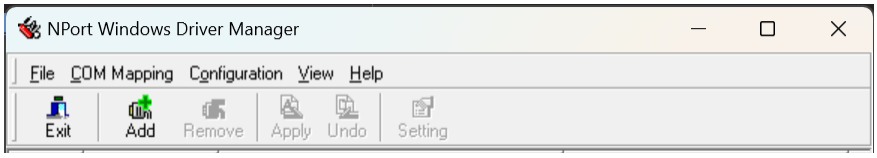


4. COM ports and their mappings will appear in blue until they are activated. Activating the COM ports saves the information in the host system registry and makes the COM port available for use. The host computer will not use the COM port until the COM ports are activated. Click **Yes** to activate the COM ports at this time or click **No** to activate the COM ports later.
5. Activated ports will be displayed in black.

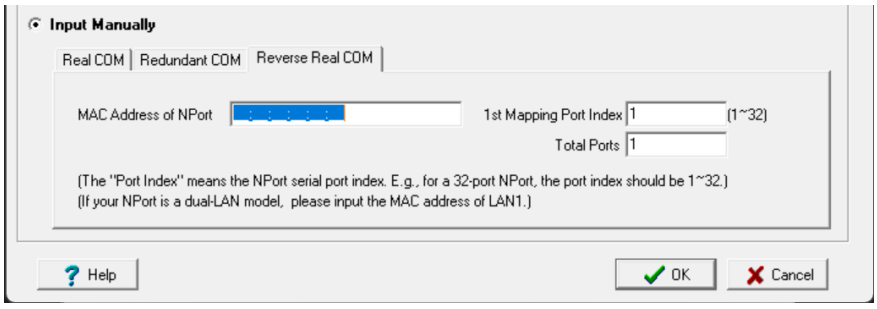


Mapping COM Ports with Reverse Real COM Mode

1. Click the **Add** icon.



2. Select the **Input Manually** checkbox and switch to the **Reverse Real COM** tab. Enter the NPort MAC Address, 1st Mapping Port Index, and Total Ports manually. Proceed to the next step by clicking **OK**.



Depending on your application, maybe only some ports will be set up for Reverse Real COM mode. Assign which ports of which NPorts will be mapped in Reverse RealCOM mode.

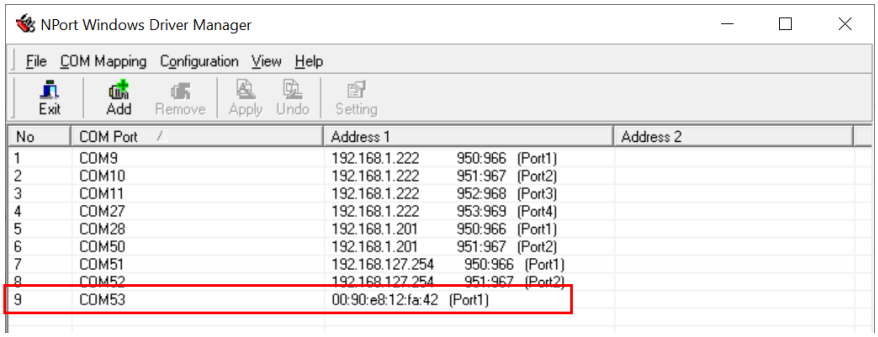
For example: If you want to map port 2 only for an NPort 6250-G2, the configuration will be as follows:

MAC Address of NPort	The MAC address of the NPort 6250-G2 for identification	00:90:E8:E8:F1:36
First Mapping Port Index	Index port 15	15
Total Ports	Only port 15 will be mapped, and the total number of ports should be 1	1

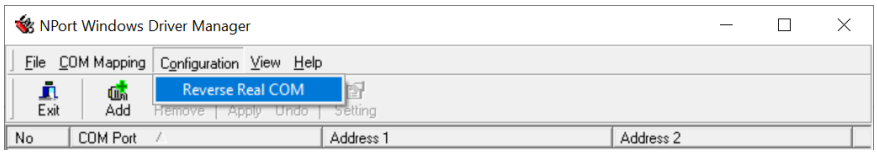
For example: If you want to map both port 1 and port 2 for an NPort 6250-G2, the configuration will be as follows:

MAC Address of NPort	The MAC address of the NPort 6250-G2 for identification	00:90:E8:E8:F1:36
First Mapping Port Index	Index port 1	1
Total Ports	The total number of ports should be 2	2

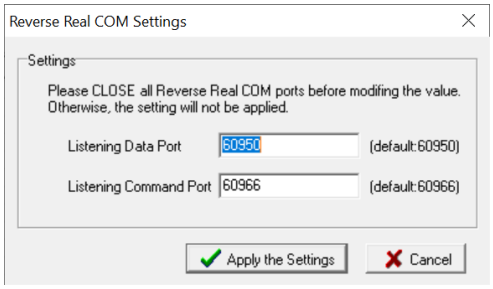
3. Activated ports t will be displayed in black.



4. For Reverse Real COM mode, assign the TCP port number for the Remote Host/Server. Click the Configuration tab to change the port number.



This is the TCP port number assignment for the remote host/server. It is the port number that the serial port of the NPort 6000 uses to establish the connections with Remote Host/Server. To avoid conflicts with well-known TCP ports, the default is set to 60950. Configure the mapped COM port.



Mapping COM Ports on Linux Platforms

Download the Real TTY Linux driver on Moxa website and install it. Remember to check the kernel version that is suitable for your host PC. Before installing it, make sure you've already configured the device server properly:

- The IP address of the device server must comply with the network topology. The default IP address of the NPort 6000-G2 Series is https://192.168.127.254. Please log in to the device and change its location to the same subnet of the host PC.
- Make sure the Operation Mode is Real COM mode. Once the first administration user is set up, the default Operation Mode is Real COM mode. You may not need to change this. If you have a device server that has been modified by others, it' s a good idea to double-check it.

When the IP address and Operation Mode settings are confirmed:

1. Get the driver file from Moxa's website, [waiting for support address]
2. Log in to the console of the host PC as a superuser (root).
3. Execute **# cd /** to go to the root directory.
4. Copy the driver file **npreal2xx.tgz** to the / directory.
5. Execute **# tar xvfz npreal2xx.tgz** to extract all files into the system.
6. Execute **# /tmp/moxa/mxinst**.

   For RedHat AS/ES/WS and Fedora Core1, append an extra argument as follows:

   # /tmp/moxa/mxinst SP1

   The shell script will install the driver files automatically.
7. After installing the driver, you will see several files in the /usr/lib/npreal2/driver folder:

   > **mxaddsvr** (Add Server, mapping tty port)

   > **mxdelsvr** (Delete Server, unmapping tty port)

   > **mxloadsvr** (Reload Server)

   > **mxmknod** (Create device node/tty port)

   > **mxrmnod** (Remove device node/tty port)

   > **mxuninst** (Remove tty port and driver files)

   You are ready to map the NPort serial ports to the system tty port

Mapping TTY Ports

Logging in as a superuser, enter the directory **/usr/lib/npreal2/driver** and then execute **mxaddsvr** to map the target NPort serial port to the host tty ports. The syntax of command **mxaddsvr** is as follows:

 # mxaddsvr [NPort IP Address] [Total Ports] ([Data port] [Cmd port])

The **mxaddsvr** command will perform the following actions:

1. Change **npreal2d.cf**.
   The **npreal2d.cf** is the configuration file of the driver.
2. Create tty ports in directory **/dev** with major & minor number configured in **npreal2d.cf**.
3. Restart the driver.

To map the tty ports with default settings, execute **mxaddsvr** with the IP address and the number of ports, as in the following example:

 # cd /usr/lib/npreal2/driver
 # ./mxaddsvr 192.168.3.4 16

This example involves adding 16 tty ports, each with IP 192.168.3.4. The data ports will span from 950 to 965, while the command ports will go from 966 to 981.

To map the tty ports with preferred data ports and command ports, execute **mxaddsvr** with the following example:

 # cd /usr/lib/npreal2/driver
 # ./mxaddsvr 192.168.3.4 16 4001 966

This example involves adding 16 tty ports, each with IP 192.168.3.4. The data ports will span from 4001 to 4016, while the command ports will go from 966 to 981.

Removing Mapped TTY Ports

Logging in as root, enter the directory **/usr/lib/npreal2/driver** and then execute **mxdelsvr** to delete a server. The syntax of mxdelsvr is:

mxdelsvr [*IP Address*]

Example:

 # cd /usr/lib/npreal2/driver
 # ./mxdelsvr 192.168.3.4

The following actions are performed when executing **mxdelsvr**:

1. Change npreal2d.cf.
2. Remove the relevant tty ports in directory **/dev**.
3. Restart the driver.

If the IP address is not provided in the command line, the program will list the installed servers and total ports on the screen. Choose a server from the list for deletion.

Removing Linux Driver Files

A utility is included that will remove all driver files, mapped tty ports, and unload the driver. To do this, you only need to enter the directory **/usr/lib/npreal2/driver**, then execute **mxuninst** to uninstall the driver. This program will perform the following actions:

- Unload the driver.
- Delete all files and directories in **/usr/lib/npreal2**
- Delete directory **/usr/lib/npreal2**
- Change the system initializing script file.

Mapping COM Ports on macOS Platforms

To map an NPort 6000-G2 serial port to a Mac host's tty port, follow these instructions:

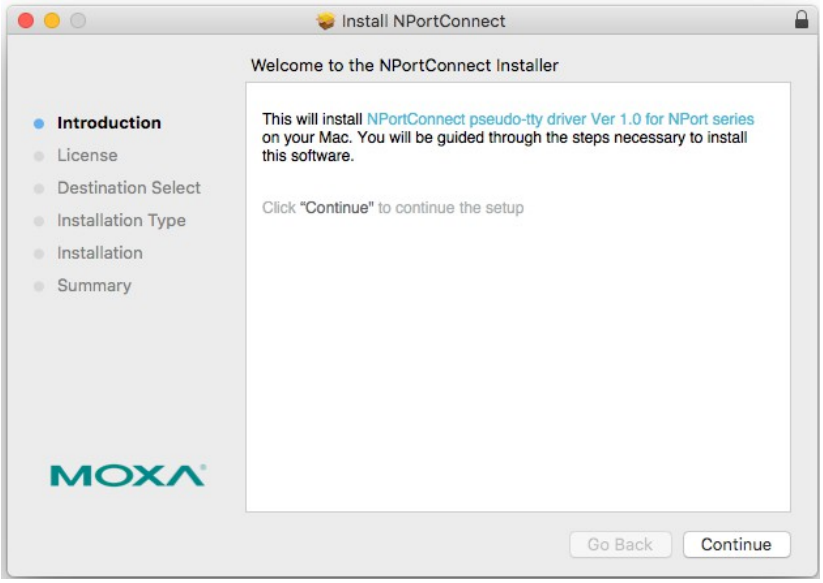
1. Download the macOS driver from Moxa website and install the Mac driver files on the host.
2. Set up the NPort 6000-G2. Verify the IP configuration works by using ping, telnet, etc.
3. Search or manually input the IP address of the NPort to set up a virtual COM port.

Installing macOS TTY Driver Files

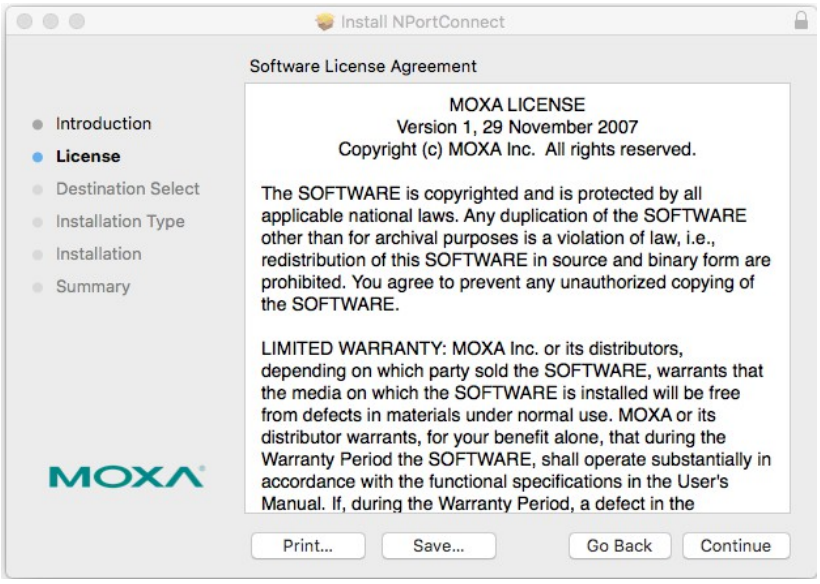
NOTE

For the newest information, please refer to readme.txt on Mac TTY Driver. Resources location of product information, release note, and readme file: /usr/local/share/NportConnect.

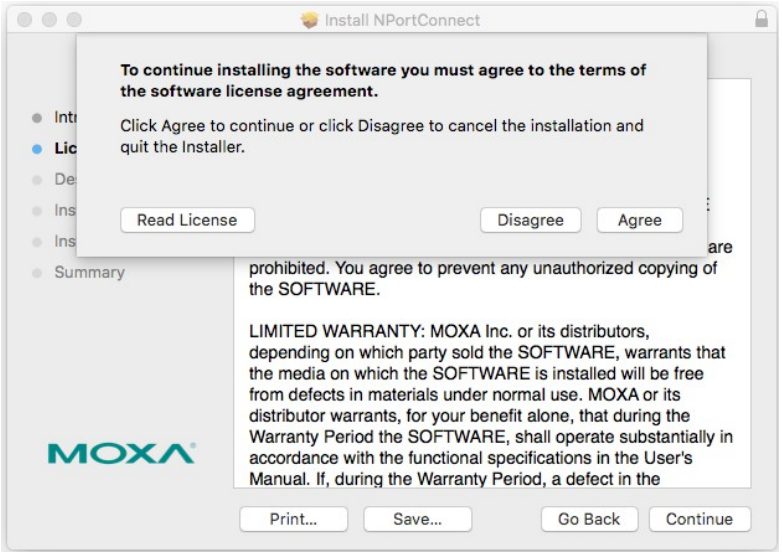
1. Get the driver file from Moxa's website, at https://www.moxa.com. It is in the Resource section under the product page.



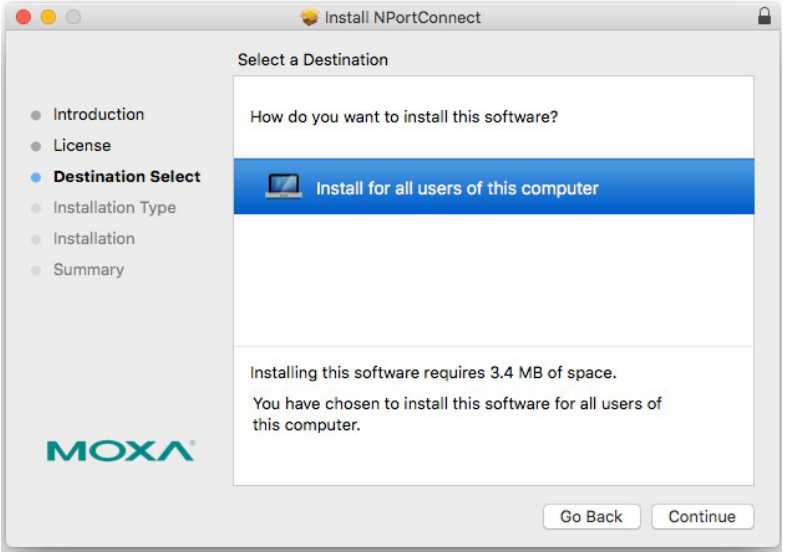
2. Execute the installer package 'moxa-macOS-tty-drivers-for-macOS-10.12-or-later-v1.0.pkg'.



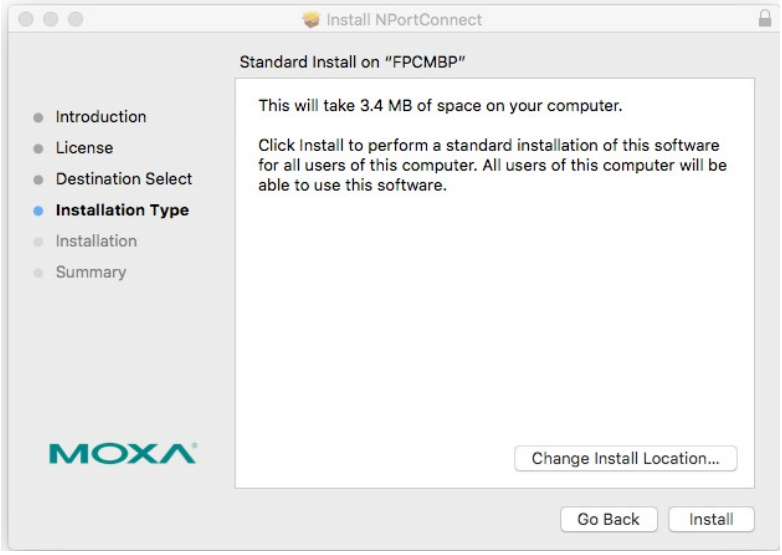
3. Press **Continue** when the **Introduction** window opens to proceed with installation.



4. Press **Continue** in the **Destination Select** window.

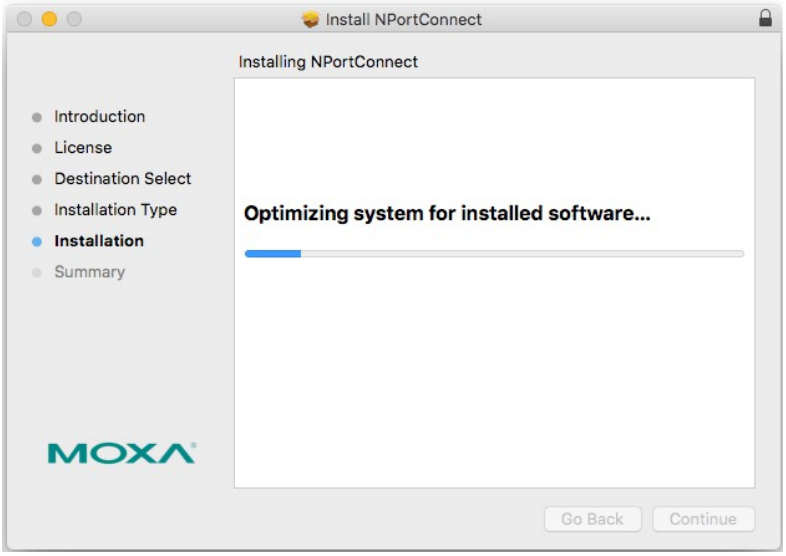


5. Click **Install** to start the installation in the default directory or select an alternative location.

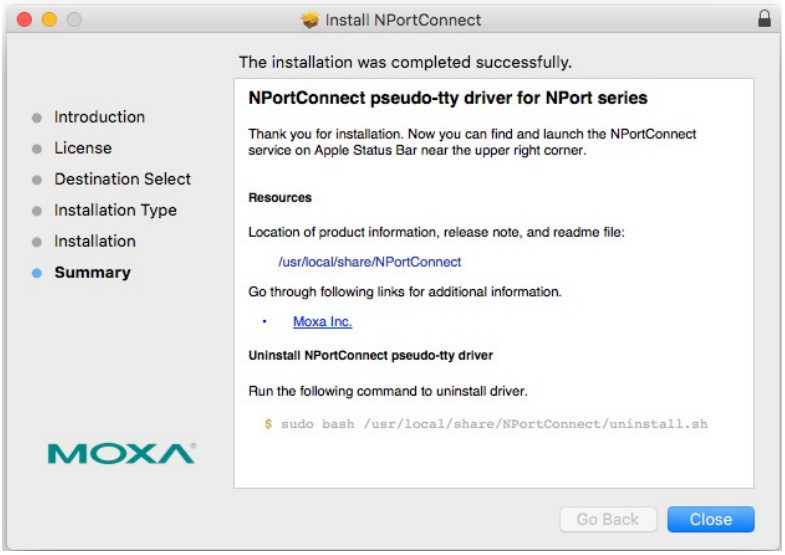


6. Key in your system login username and password to confirm the authentication.

7. The installation window reports the progress of the installation.



8. Click **Close** to complete the installation of the NPort macOS tty driver.

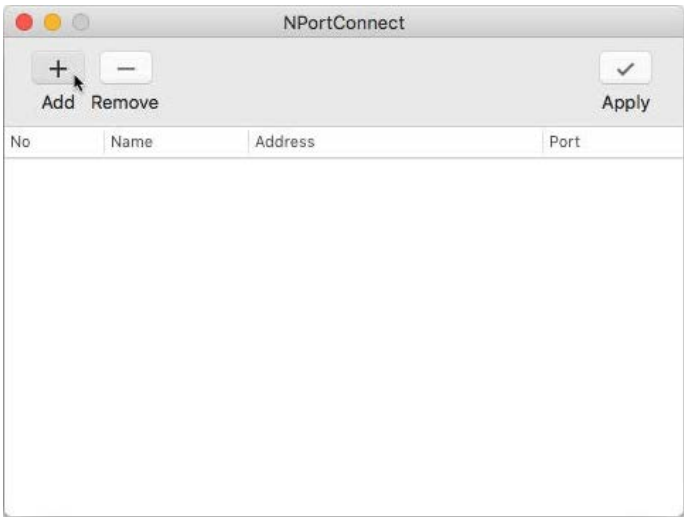


Mapping macOS TTY Port

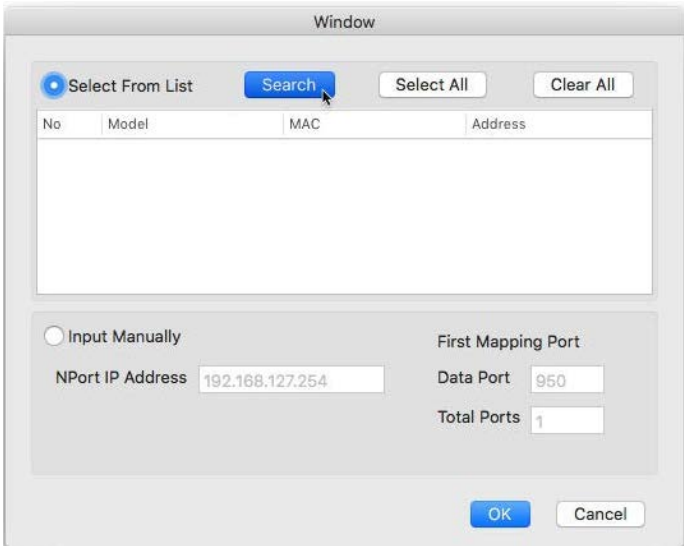
1. In the menu bar, a NPortConnect icon will appear after the installation is completed.

2. Click on the **NPortConnect** icon and select **NPort Mapping** for the port mapping function.

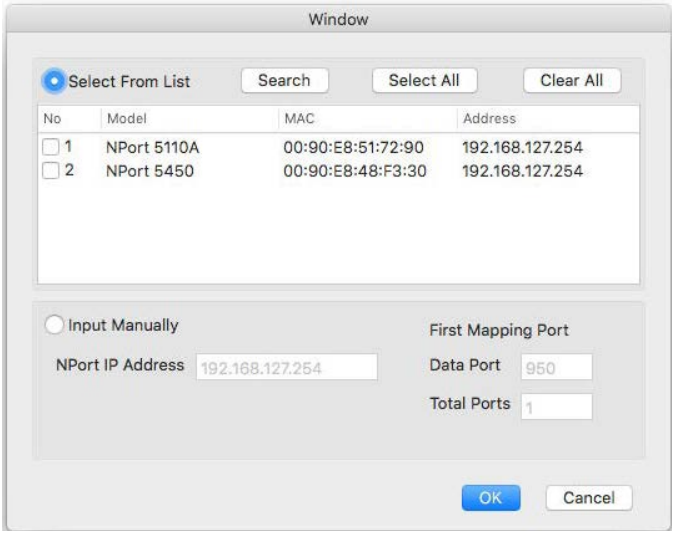
3. Click on **+ Add** to enter the tty port setup.



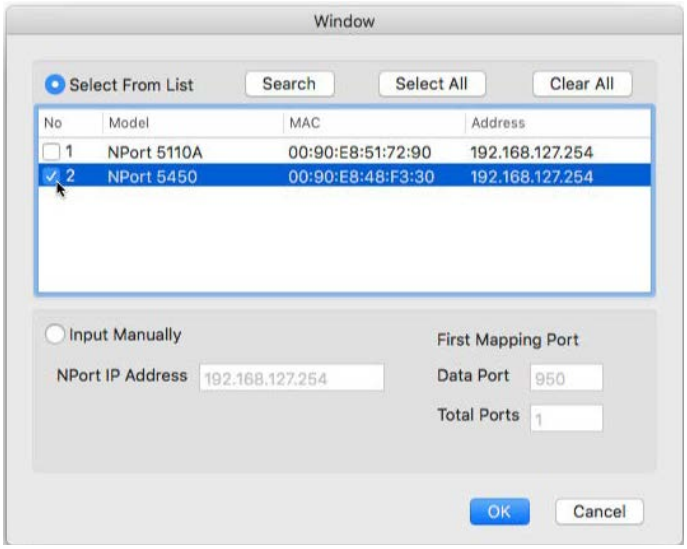
4. Click **Search** to find the NPort already set up in the **Hardware Setup** procedure. The **Search** function broadcasts a search to locate NPort units on the LAN that are connected to your Mac. The Broadcast Search function searches by MAC address and not IP address. The location of all NPort units connected to the LAN will be determined, regardless of their subnet. Alternatively, you can manually enter the IP address to locate the specific NPort.



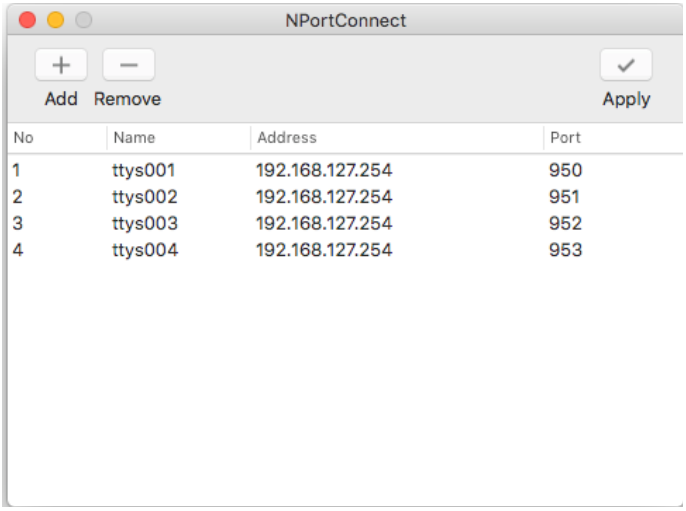
5. Once the search is completed, all the NPort found will appear on the list.



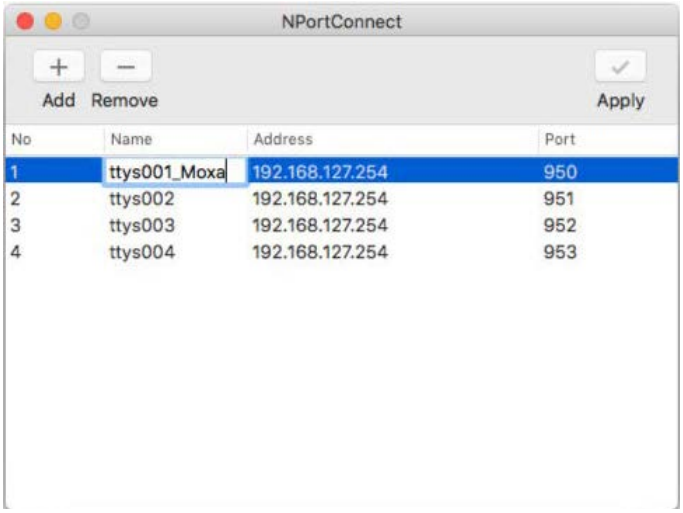
6. Select the model types that are for the tty port mapping and click **OK**.



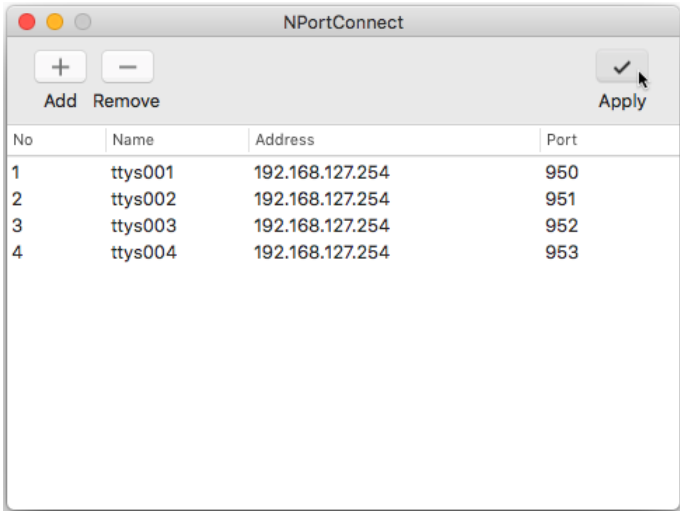
7. NPortConnect auto assigns the tty name and corresponding port number to the IP address of the selected NPort.



8. The tty name and port number are editable. Note these changed values are only for mapping configuration and would not change the values in the NPort settings.



9. When everything is set, click **Apply** to save the configuration.



Uninstalling the macOS Driver

Run the following command to uninstall driver:

$ sudo bash /usr/local/share/NPortConnect/uninstall.sh

Mapping COM Ports on UNIX-Like Platforms

NOTE

For the newest information, please refer to readme.txt on Fixed TTY Driver.

Installing the UNIX Fixed TTY Driver

1. Log in to UNIX and create a directory for the Moxa TTY driver. To create a directory named /usr/etc, execute the command:

   # mkdir –p /usr/etc

2. Copy moxattyd.tar to the directory you created. If you created the /usr/etc directory above, execute the following commands:

   # cp moxattyd.tar /usr/etc

   # cd /usr/etc

3. Extract the source files from the tar file by executing the command:

   # tar xvf moxattyd.tar

   The following files will be extracted:

   README.TXT

   moxattyd.c --- source code

   moxattyd.cf --- an empty configuration file

   Makefile --- makefile

   VERSION.TXT --- fixed tty driver version

   FAQ.TXT

4. Compile and Link

   - For SCO UNIX:

     # make sco

   - For UnixWare 7:

     # make svr5

   - For UnixWare 2.1.x, SVR4.2:

     # make svr42

Configuring the UNIX Driver

Change the configuration:

The configuration used by the **moxattyd program** is defined in the text file **moxattyd.cf**, which is in the same directory that contains the program **moxattyd**. Use **vi** or any text editor to change the file, as follows:

ttyp1 192.168.1.1 950

For more configuration information, view the file **moxattyd.cf**, which contains detailed descriptions of the various configuration parameters.

NOTE

The "Device Name" depends on the OS. See the Device Naming Rule section in README.TXT for more information.

To start the moxattyd daemon after system bootup, add an entry into **/etc/inittab**, with the tty name you configured in **moxattyd.cf**, as in the following example:

ts:2:respawn:/usr/etc/moxattyd/moxattyd –t 1

Device naming rule

For UnixWare 7, UnixWare 2.1.x, and SVR4.2, use:

pts/[*n*]

For all other UNIX operating systems, use:

ttyp[*n*]

Starting moxattyd

Execute the command **init q** or reboot your UNIX operating system.

Adding an additional server

1. Change the text file **moxattyd.cf** to add an additional server. Use **vi** or any text editor to change the file. For more configuration information, refer to the file **moxattyd.cf**, which contains detailed descriptions of the various configuration parameters.
2. Find the process ID (PID) of the program **moxattyd**.

   # ps -ef | grep moxattyd
3. Update configuration of **moxattyd** program.

   # kill -USR1 [PID]

   (e.g., if moxattyd PID = 404, kill -USR1 404)

This completes adding an additional server.

5. Cybersecurity Considerations

As cyberattacks increase and become more sophisticated, network device vendors are incorporating features to safeguard sensitive information. Moxa has made it a priority to develop measures that ensure all products meet security standards, so customers can use them with peace of mind. There are certain details that Moxa cannot do alone; customers and Moxa need to work together to build up a much-secured environment to defend against all kinds of cyberthreats. This chapter introduces the essential steps to enhance the cybersecurity of Moxa's products. Customers may need to refer to other sections in the user manual for the exact settings or commands.

Updating Firmware

Customers who buy products from Moxa or a reseller should be aware that Moxa might have already launched a newer firmware version with enhanced security features. Please check with Moxa's support website to see if there is a newer version of firmware. If so, we recommend upgrading the firmware to the newest.

Turn Off Unused Service and Ports

Imagine living in a house that has many entrances. If all the doors and windows are left unlocked or even open, it sends a message of welcoming to intruders out there. We always recommend turning off services and ports that are not in use to reduce the chances of being attacked.

Refer to the table below for all the ports, protocols and services that are provided to communicate between the NPort 6000-G2 Series and other devices.

Service Name	Option	Default Settings	Type	Port Number	Description
Moxa services	Enable/ Disable	Enable	TCP	443	For Moxa utility communication
			UDP		
DNS_wins	Enable	Enable	UDP	53, 137, 949	Processing DNS and WINS (client) data
SNMP agent	Enable/ Disable	Disable	UDP	161	SNMP handling routine
RIPD_PORT	Enable/ Disable	Disable	UDP	520, 521	Processing RIP routing data
HTTPS server	Enable/ Disable	Enable	TCP	443	Secured web console
RADIUS	Enable/ Disable	Disable	UDP	1645 or 1812	Authentication server, the UDP port can be changed by user
TACACS+	Enable/ Disable	Disable	TCP	49	Authentication server
DHCP client	Enable/ Disable	Disable	UDP	68	The DHCP client needs to get the system IP address from the DHCP server
SNTP	Enable/ Disable	Disable	UDP	Random port	Synchronize the time settings with a time server
Remote System Log	Enable/ Disable	Disable	UDP	Random port	Send the event log to a remote log server

Operation Mode	Option	Default Settings	Type	Port Number
Real COM mode	Enable/ Disable	Disable (Changed to Enable after user set username/password)	TCP	949 + (serial port number) 965 + (serial port number)
RFC2217 mode	Enable/ Disable	Disable	TCP	4000 + (serial port number)
TCP Server mode	Enable/ Disable	Disable	TCP	4000 + (serial port number) 965 + (serial port number)
UDP mode	Enable/ Disable	Disable	UDP	4000 + (serial port number)
Pair Connection Server mode	Enable/ Disable	Disable	TCP	4000 + (serial port number)
Reverse Terminal – Telnet	Enable/ Disable	Disable	TCP	4000 + (serial port number)
Reverse Terminal – SSH	Enable/ Disable	Disable	TCP	4000 + (serial port number)
Disable mode	Enable/ Disable	Disable	N/A	N/A

Turn On Services That Are Necessary

Some services are recommended to be enabled because they are the key functions of the NPort 6000-G2, and they face cybersecurity threats. The communication of these services are encrypted on the Ethernet network.

- Web console (HTTPS): This is the major management console of the NPort 6000-G2 for configuring all the settings, and it also provides some diagnostic tools for an engineer to troubleshoot a problem.
- SNMPv3: The Simple Network Management Protocol is a popular tool for remote device monitoring and management. Enable SNMPv3 to encrypt communication data if needed.
- Moxa services (HTTPS): The Device Search Utility v3.0 is a good tool for first-time installation on the NPort 6000-G2 Series, and the Moxa MXview can easily monitor all the NPorts in a network. All these tools work with the Moxa services.
- Remote Syslog service: The system log is an important message for an engineer to analyze a problem. If the system has a central Log server, the NPort 6000-G2 supports syslog-ng to send the logs to the server securely.

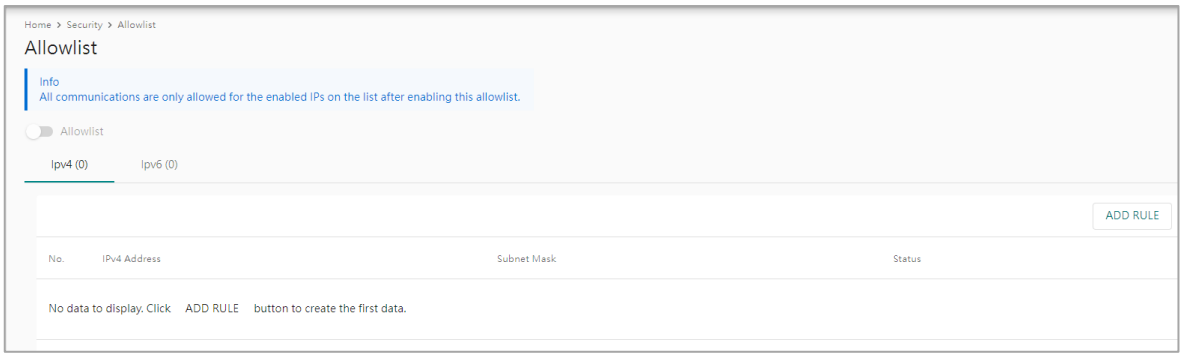
NOTE

If all HTTP/HTTPS/Serial consoles are turned off, then there is no other route to access the product. The only way to recover it is to reset the device and start from the beginning. For guidance on resetting the device, refer to the user manual.

Limited IP Access

Limiting the number of IP addresses that can access the product is one of the most effective ways of blocking unwanted intruders. If the product is accessed by a limited number of desktop/notebook/mobile devices, provide access to those IPs.

The NPort 6000-G2 has the Allowlist function to grant an IP address or a range of devices to access the device server. You can **ADD RULE** for those granted IP addresses and then enable the Allowlist function to limit access to the specific NPort 6000-G2 only to those IP addresses.



Account and Password

- There is no default username and password for NPort 6000-G2 devices. You may need to follow up the first-time login process to set the username and password for the first user (who will also be the admin user) of this device to enhance the device's security.
- Use strong passwords. The devices support a function called **Password Policy** to check if passwords are strong enough. Enable the function to help you check whether the passwords are strong enough.
- Use the account login failure lockout feature to prevent unwelcome access (**Security > Login Settings > Login Lockout**).
- For central management purposes, set up an authentication server in the network. The NPort 6000-G2 Series supports RADIUS and TACACS+ servers. Using an authentication server for account management can ease administrators' loads of repeatedly inputting the same account/password on multiple devices. Refer to **Account Management > Authentication Server** for more information.

System Log

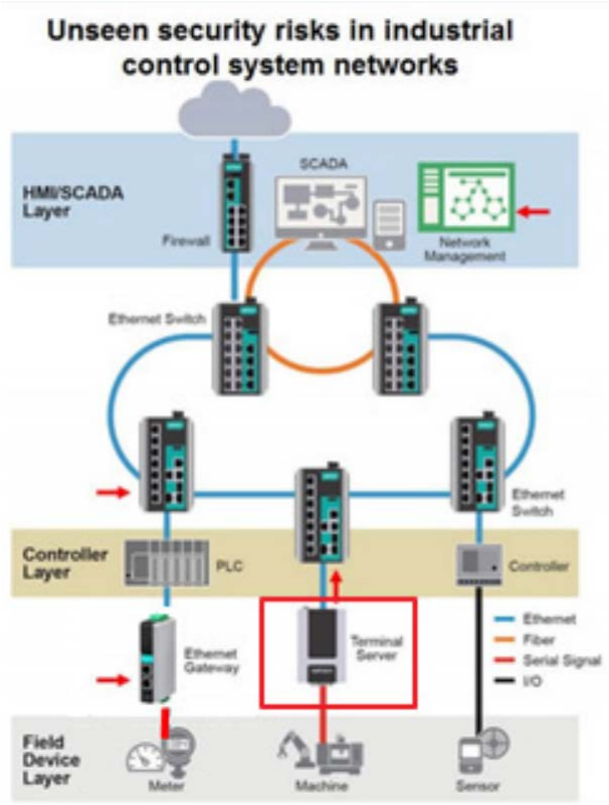
The system log usually records all kinds of activities that are happening on your NPort, such as Login Fail, IP Changed, Password Changed, Config Changed, etc. Check the log regularly to examine any abnormal behavior.

For central management purposes, set up a log server in the network to collect all the logs from different devices. The NPort 6000-G2 Series supports syslog-ng protocol to deliver the logs securely to the log server. The events will be sent with the format defined by RFC3164 for the analyzer to read/analyze. Refer to **System Settings > Notifications > Channels Settings** for more information.

Deployment of the Device

Deploy the NPort 6000-G2 Series behind a secure firewall network that has sufficient security features in place to ensure that networks are safe from internal and external threats.

Make sure that the physical protection of the NPort devices and/or the system meets the security needs of your application. Depending on the environment and the threat situation, the form of protection can vary significantly.



Testing the Security Environment

Besides these devices that support these protective functions, network managers can follow several recommendations to protect their network and devices.

To prevent unauthorized access to a device, follow these recommendations:

- Testing tools for cybersecurity environment checks are available. Some may provide limited free use, for example, Nessus. These tools help identify probable security leaks in the environment.
- The device should be operated inside a secure network, protected by a firewall or router that blocks attacks via the Internet.
- Control access to the serial console as with any physical access to the device.
- Avoid using insecure services such as SNMPv1 or v2; the best way is to disable them completely.
- Limit the number of simultaneous web server sessions allowed. Periodically, change the passwords.
- Back up the configuration files periodically and check the CRC value of the run time settings to make sure the devices work properly.
- Audit the devices periodically to make sure they comply with these recommendations and/or any internal security policies.
- If there is a need to return the unit to Moxa, make sure encryption is disabled, and that you had already backed up the current configuration before returning it.

NOTE

DISCLAIMER: Please note that the above information and guide (the "information") are for your reference only. We do not guarantee a cyberthreat-free environment. These guidelines are to increase the security level to defend against cyberintrusions and do not guarantee that the above information will meet your specific requirements. The above information is provided "as-is", and we make no warranties, express, implied or otherwise, regarding its accuracy, completeness, or performance.

6. Management Consoles

If you' are looking to open COM port applications, you can follow the steps in the **First-time Setup** and **Mapping COM Port** chapters to complete the basic settings. The NPort 6000-G2 will work properly at the actual site. If you want to configure more advanced settings, like **Security** or **Account Management**, access the device with the different management consoles introduced in this chapter.

If you use other applications, finish the account and IP settings by **First-time Setup** process. There are more settings waiting for you. Access the device with different management consoles introduced in this chapter to complete the configuration.

Configuration Options

Device Search Utility

Configure your NPort 6000-G2 with the bundled Device Search Utility (DSU) v3.0 and above for Windows. When you find the NPort 6000-G2 with the default IP address 192.168.127.254 on DSU, set the username and password for the first user (it will also be the admin user) of this device to enhance the device security. Then **right-click** on the device to change the IP address for your network. Or, you can **double-click** on the device to directly open the Web console of the device for configuration.

Web Console

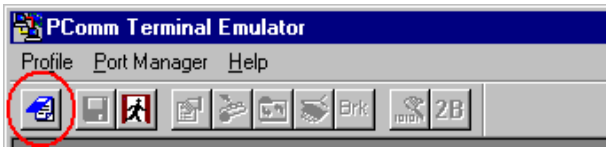
Configure your NPort 6000-G2 using a standard web browser. The web console is the default management console of the device we recommend. Besides special reasons, we suggest keeping it enabled—not only for the first-time installation but also for maintenance and troubleshooting.

Serial Console

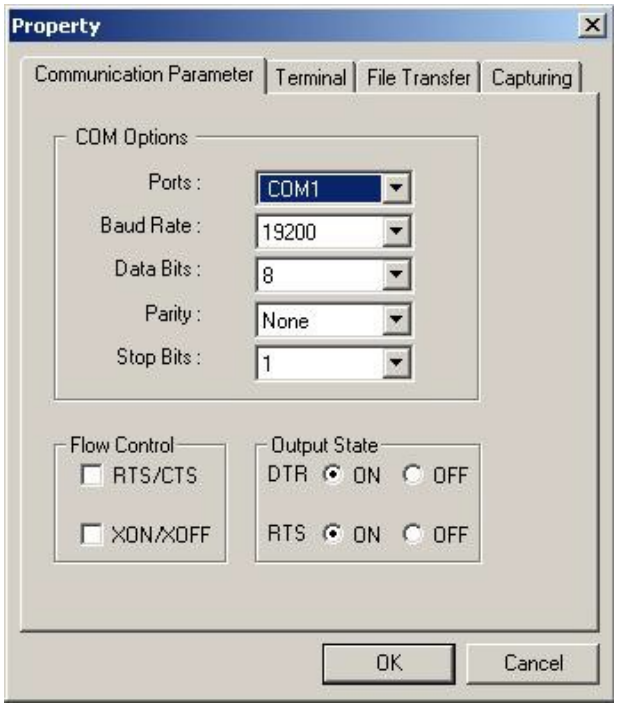
The NPort 6000-G2 supports the serial console as the local access point through serial port 1 if there is no dedicated serial console port. The serial console port only supports basic settings like network settings to change the IP address or when the Ethernet LAN port cannot be logged in.

The following instructions and screenshots show how to enter the serial console using PComm Terminal Emulator, which is available free as part of the PComm Lite suite. You may use a different terminal emulator utility, although your actual screens and procedures may vary slightly from the following instructions.

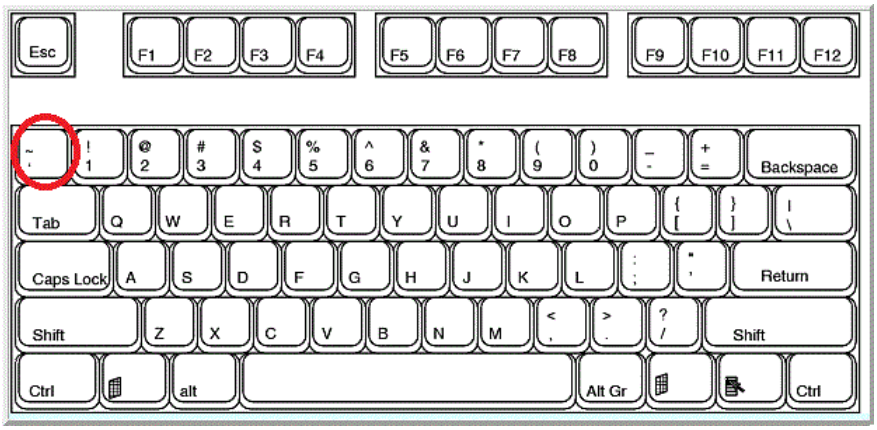
1. Turn off the power to the NPort 6000-G2. Use a serial cable to connect the NPort 6000-G2's serial console port to your computer's male RS-232 serial port.
2. From the Windows desktop, select **Start > All Programs > PComm Lite > Terminal Emulator**.
3. The PComm Terminal Emulator window will appear. From the Port Manager menu, select **Open**, or simply click the **Open** icon as shown below:



4. The Property window opens automatically. Select the **Communication Parameter** tab; then, select the appropriate COM port for the connection (COM1 in this example). Configure the parameters for **19200**, **8**, **None**, **1** (**19200** for Baud Rate, **8** for Data Bits, **None** for Parity, and **1** for Stop Bits).



5. From the Property window's Terminal page, select **ANSI** or **VT100** for **Terminal Type** and click **OK**.
6. If you are using the NPort 6150-G2 or 6250-G2, hold down the grave accent key (`) while powering it up, as shown below. Note the grave accent key (sometimes called backwards apostrophe) is NOT the apostrophe key—it is the key usually found next to the number **1** key.



The NPort 6000-G2 will then automatically switch from data mode to console mode.

7. When you see the "Login:" message, enter the username and password. You will be prompted to the command line mode.

8. The serial console is a Command-line Interface. You may need to input commands to view or change the settings. Please find the Appendix F Command List of the Serial Console section for more details.

7. Configuration with the Web Console

To configure the NPort 6000-G2, the web console is the easiest method to use. With a standard web browser, you can effortlessly navigate through all settings and options. Once you've completed the **First-time Setup** or used DSU-G2 to configure a new IP address for an NPort 6000-G2, enter the new IP address to access the web console. This chapter covers the introduction of the web console and explores its configuration options.

Factory Default IP Address

The NPort 6000-G2 is configured with the following default private IP address:

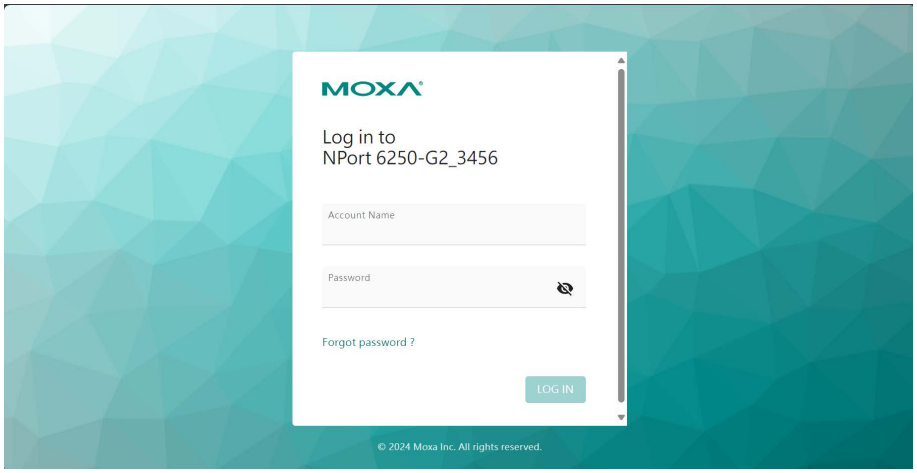
192.168.127.254

Note that IP addresses that begin with "192.168" are referred to as private IP addresses. Devices configured with a private IP address are not directly accessible from a public network. For example, you cannot ping a device with a private IP address from an outside Internet connection.

Using Your Web Browser

Opening the Web Console

Open your web browser and enter the IP address you've changed in the website address line. Press **ENTER** to load the page.



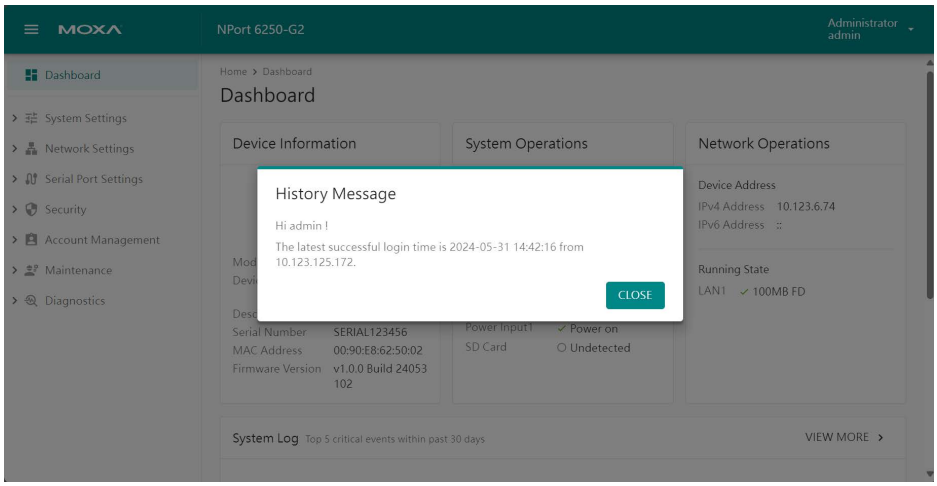
You may find the "Not secure" icon on the website address line. Click it to add the NPort as a trusted device to remove the icon. For more information, refer to the **Security Hardening Guide**. Enter the account name and password you've set to access the device.

ATTENTION

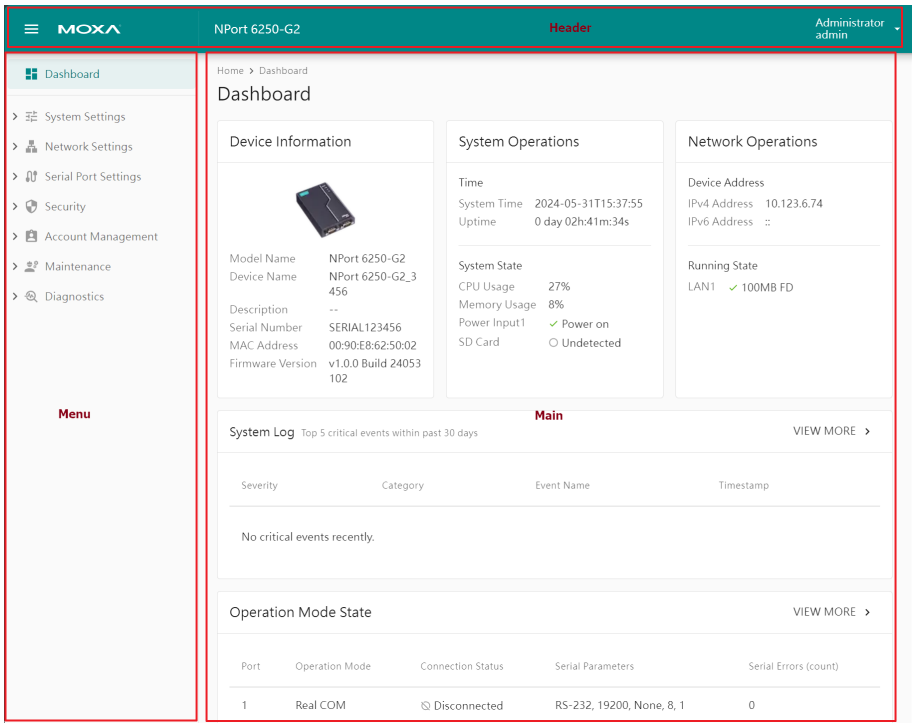
In case of a forgotten password, the reset button must be used to configure the NPort 6000-G2 by resetting all settings and loading the factory defaults. Even if you disabled the reset button in your NPort 6000-G2 configuration, you can still use it to restore factory defaults within the first minute of powering on the NPort 6000-G2.

Remember to back up your configuration by exporting it to a file. Importing the file to the NPort 6000-G2 will quickly restore your configuration. This will save time if you have forgotten the password and need to reload the factory defaults.

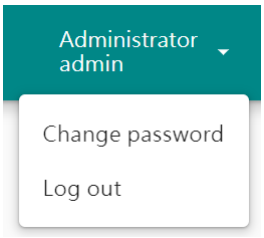
The NPort 6000-G2's web console will appear after logging in and you may receive the history messages including the **Login Message** (can be configured at **Security > Login Settings > Login Message**) and account login history.



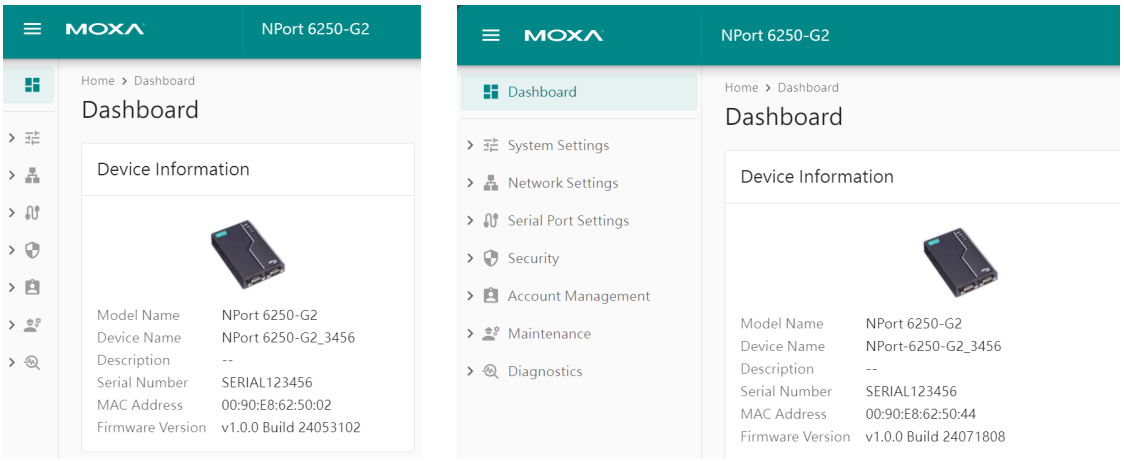
Click the **CLOSE** button and the Dashboard page will be displayed.



The Header shows who is logged in to the device. Click the account to change your password or log out the web console.



Click the icon to hide or show the Navigation Panel.



How many categories you may see on the Navigation Panel depends on the privilege of the user group you belong to. The administrators will see all of them as in snapshot above.

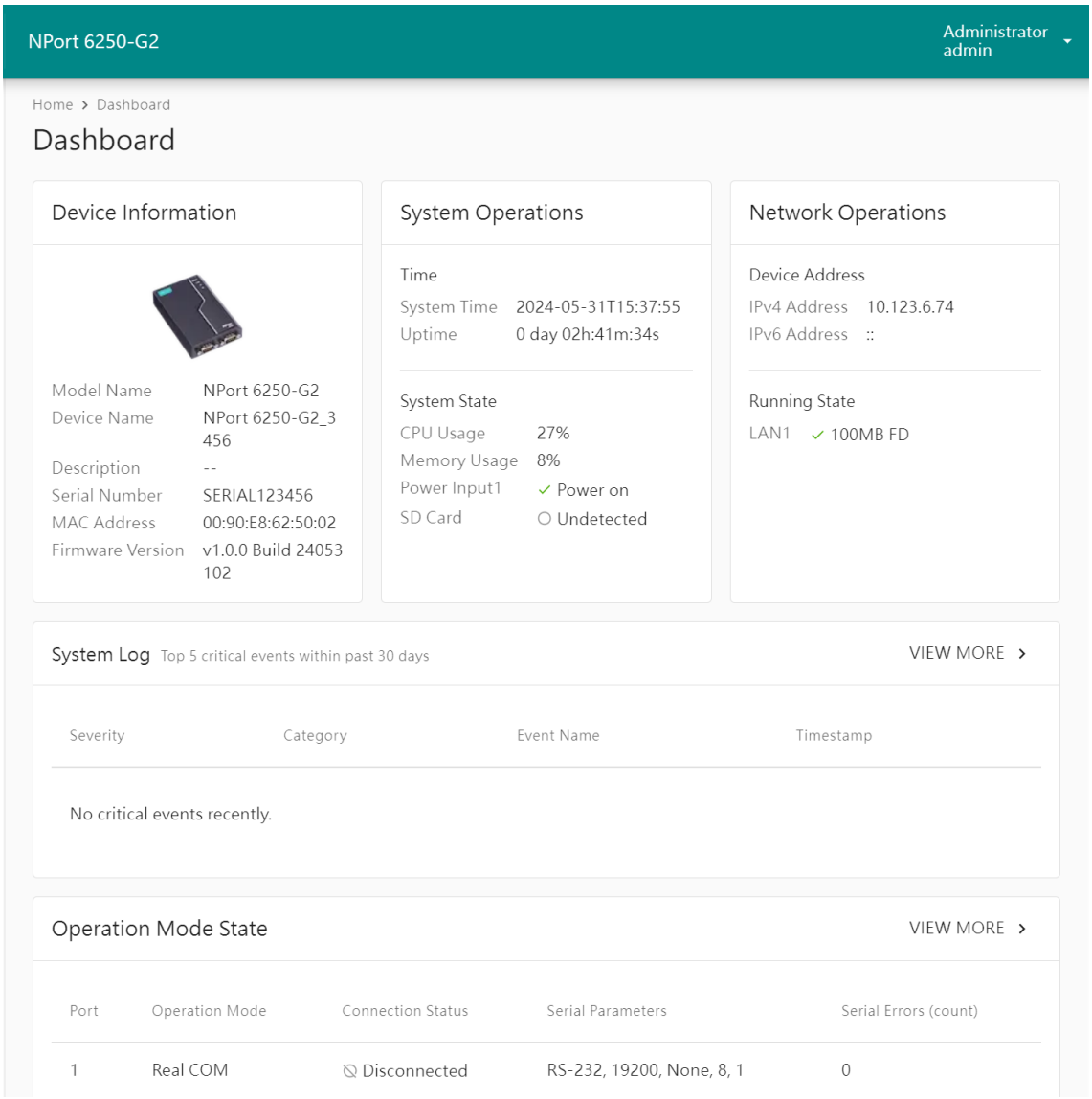
Web Console Navigation

On the NPort 6000-G2 web console, the left panel is the navigation panel and contains an expandable menu tree for navigating among the various settings and categories. When you click on a menu item in the navigation panel, the main window will display the corresponding options for that item. Configuration changes can then be made in the main window.

Changes will take effect immediately except for the network-related settings. If users add or remove devices after the NPort is online, they would want the new settings to immediately take effect without needing to reboot the device. Support for this function is provided by the NPort 6000-G2 Series.

The IP address change for the NPort 6000-G2 is a separate issue. It may require notifying all network devices and updating their tables. To make the NPort 6000-G2 work after changing its IP address, a reboot is necessary.

Dashboard Introduction



When you access the web console of an NPort 6000-G2 device, it will take you to the Dashboard page to have an overview of the status of the unit. There are five sections:

Device Information: The section displays the basic/general information of the unit, including the Model Name, Serial Number, MAC address, and firmware version.

System Operations: This section displays some unique information about the unit, like when the device is powered up, the CPU, and memory usage.

Network Operations: In this section, it shows the network status of the unit. For example, the IP address and the Ethernet LAN speed.

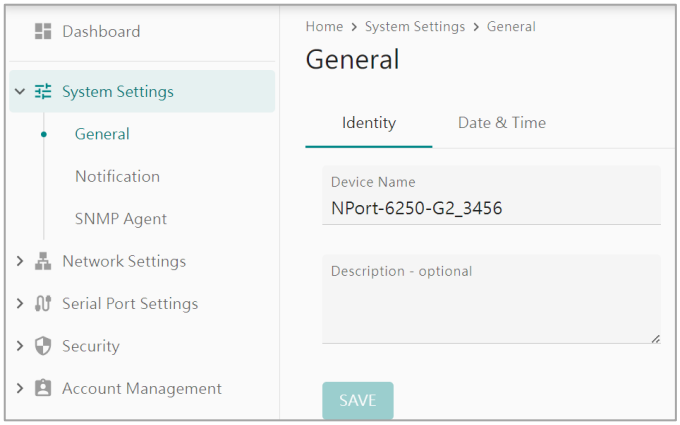
System Log: You can check whether any critical events have happened since you last login to the device. It will remind if any abnormal events happened.

Operation Mode State: The key function of an NPort 6000-G2 device is to provide communication between serial port(s) and the Ethernet LAN port(s). You will find the Operation Modes of each serial port in this section, and you can check the status here to see if it works properly.

System Settings

The first category of the navigation panel is System Settings, which includes three parts. The General page has the Identity and Date & Time settings of the device. The Notification page has the system events, emails, and SNMP Trap/Inform settings. The SNMP Agent has the SNMP Agent settings, which will be needed if you want to get information or settings from the NPort 6000-G2 device via SNMP protocol.

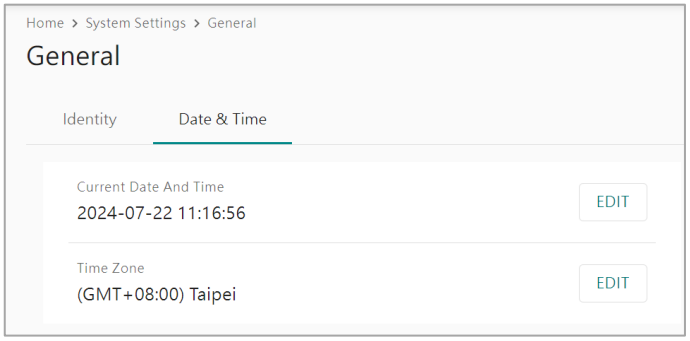
General



Under the General page, the Identity tab provides the Device Name and Description column for you to identify which unit the NPort 6000-G2 is using.

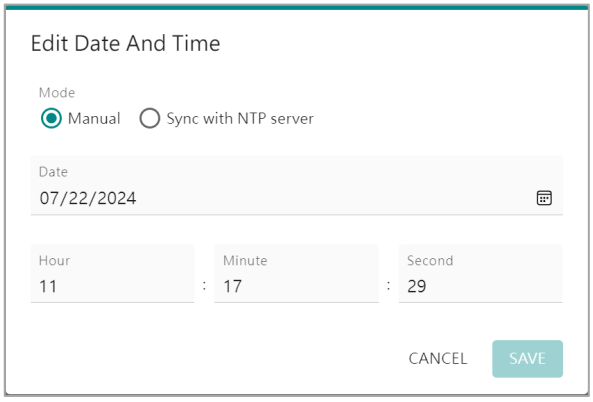
Device Name: This is an optional free text field for your own use. It does not affect the operation of the NPort 6000-G2. It will be set as the Model Name of the device and the last 4 digits of the serial number. It helps differentiate one NPort 6000-G2 server from another.

Description: This is an optional free text field for your own use. It does not affect the operation of the NPort 6000-G2. It is useful for assigning or describing the location of an NPort 6000-G2. In a network environment of multiple servers, this can be a valuable aid when performing maintenance.

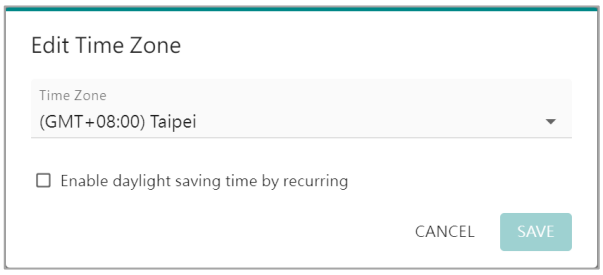


The NPort 6000-G2 has a built-in Real-Time Clock for time calibration functions. To change the time, please switch to the Date & Time tab. Click the **EDIT** button to change the current date and time and the time zone.

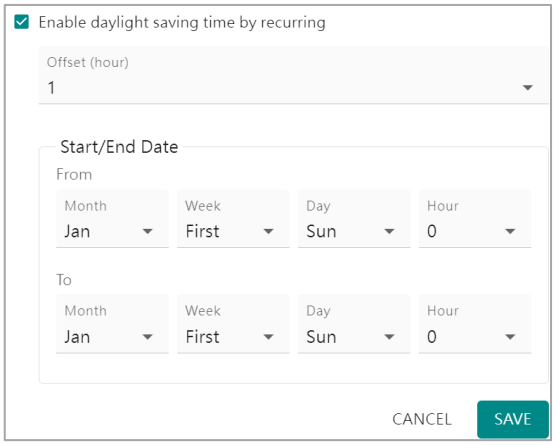
The NPort 6000-G2 uses SNTP (RFC-1769) for auto time calibration. Enter a time server IP address or domain name in this optional field. Once the correct time server address is set, the NPort 6000-G2 will regularly request time information from the time server every 10 minutes.



To change the time zone, please click the **EDIT** button and select the location of the device. It will adjust the time zone automatically.



If daylight saving time applies in the summer, enable the checkbox **Enable daylight saving time by recurring**.



Daylight saving time (also known as **DST** or **summertime** involves advancing clocks (usually one hour) during the summer to provide an extra hour of daylight in the afternoon.

Offset

Setting	Description	Factory Default
User adjustable hour	The clock should be set forward by the number of hours specified in the offset parameter.	1

Start Date

Setting	Description	Factory Default
User adjustable date	The Start Date parameter allows users to enter the date that daylight saving time begins.	The Sunday of the First week of January

End Date

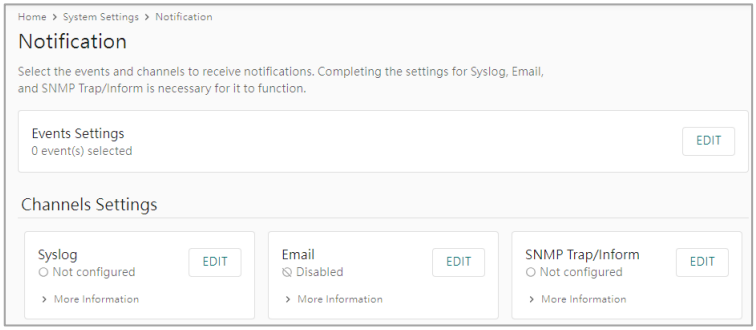
Setting	Description	Factory Default
User adjustable date	The End Date parameter allows users to enter the date that daylight saving time ends.	The Sunday of the First week of January

ATTENTION

A risk of an explosion exists if the real-time clock battery is replaced with the wrong type!

The NPort 6000-G2's real-time clock is powered by a lithium battery. We strongly recommend that you do not attempt replacement of the lithium battery without help from a qualified Moxa support engineer. If you need to change the battery, please contact the Moxa RMA service team.

Notification



Notification sSettings allow you to customize events that are logged by the NPort 6000-G2. Events are grouped into five categories, known as event groups. Select which groups or events you want to log on on the **Remote Log** server. An email or SNMP Trap/Inform can also notify the administrator immediately of some of the events.

By default, the NPort will enable the event severity as Notice, Warning, and Error under the Security category and save them on the local flash memory. For the local log settings, find the diagnostics section. If you have a central management log server, configure the relative settings under **System Settings > Notification**.

Local Log	Keep the log in the flash of NPort 6000-G2 up to 10,000 items.
Remote Log	Keep the log in the remote defined Log Server. You will need to assign a remote Log Server in the System Management/Misc. Network Settings/Remote Log Settings if a remote log is checked.

The Categories of Notifications

Category	Description
System	The events related to the NPort itself, like firmware ready.
Network	The events related to the Ethernet interface, for example, the Ethernet link up.
Security	The events which may be considered security related; the administrator may need to figure out why it happened. For example, a Login fail event.
Maintenance	The events which usually happen at maintenance process, for example, firmware upgrade.
Serial	The events related to the serial interface(s), for example, Port connect.

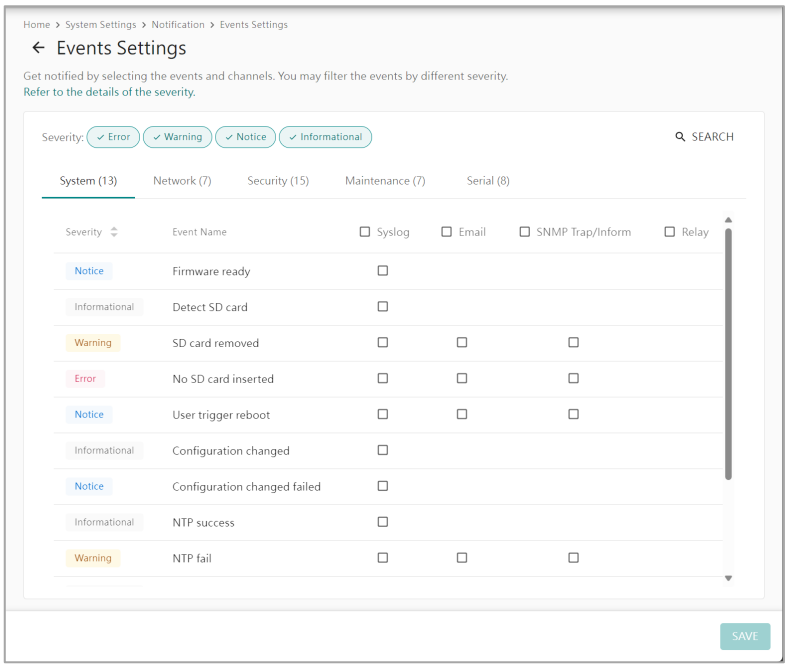
The Severity of Events

Based on RFC5424, the severity of different events is categorized according to the following priority and description.

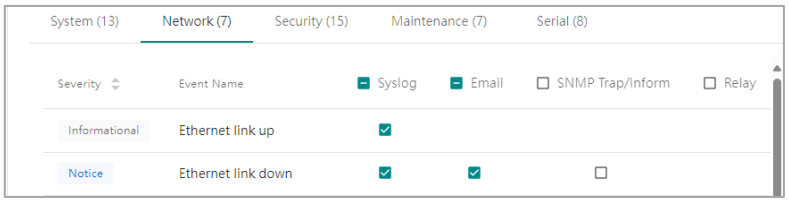
Priority	Severity	Description
1	Error	Events that indicate problems, but in a category that does not require immediate attention.
2	Warning	Events that provide forewarning of potential problems and indicate that some further actions could result in a critical error.
3	Notice	Events that are not error conditions, but that may require special handling.
4	Informational	Confirmation that the program works as expected.

The logs are essential for troubleshooting in case of errors. Refer to Appendix E for a detailed event list.

Event Settings

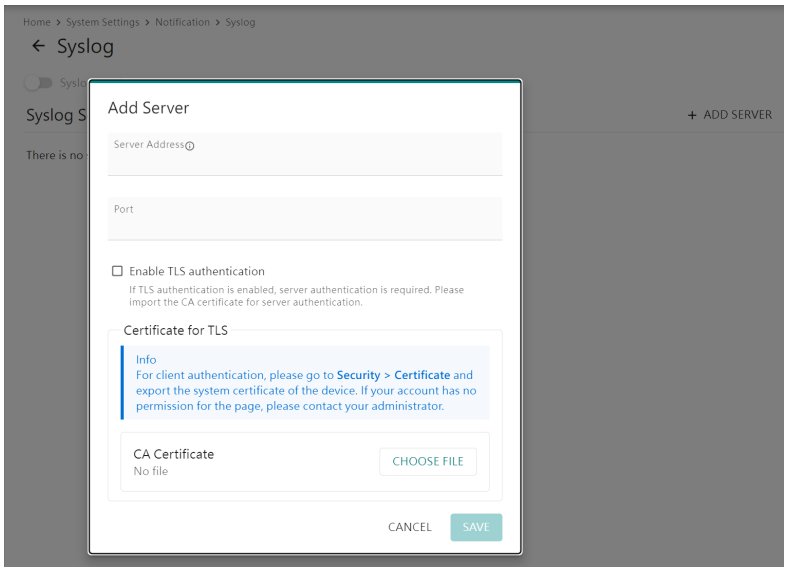


When clicking the **EDIT** button of the **Events Settings** column, you will see the event list, separated into different categories. Click the checkbox to enable the event for Syslog, Email, SNMP Trap/Inform, or the Relay function. Only the enabled events will be recorded on the Syslog or trigger an email, SNMP Trap/Inform, or Relay output.



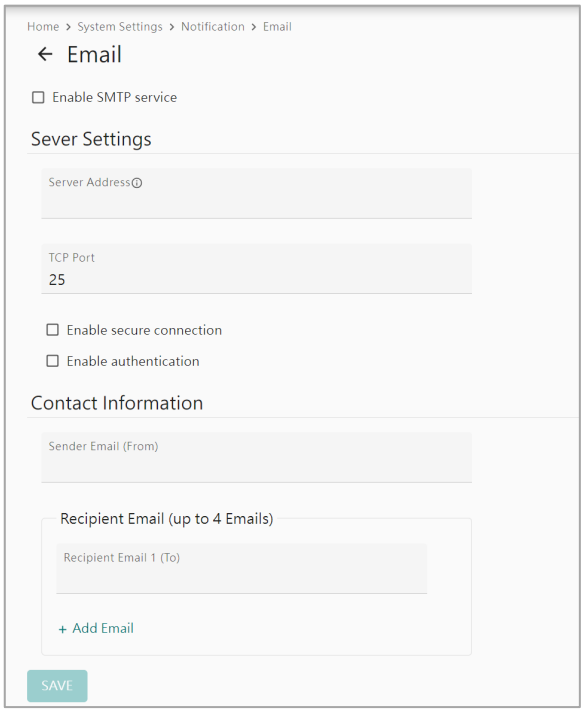
Channels Settings

Once you choose which events to record, set up the recording location and decide on email, SNMP Trap/Inform, or Relay for immediate notification.



Click the **EDIT** button at Syslog column. Input the remote log server's IP address and port to receive the events from the NPort. You can also enable the TLS authentication and import a CA certificate to secure the communication for the log recording.

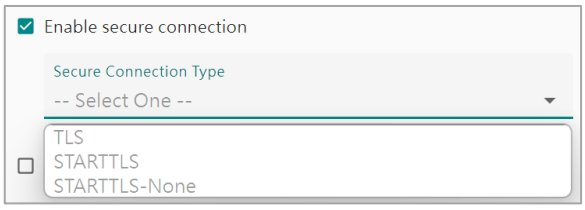
Email



Click the **EDIT** button in the Email column. You can enable the SMTP service so that the NPort will send an email if the selected events happen.

Server Settings

Setting	Description	Factory Default
Server Address	The IP address or domain name of the SMTP server.	N/A
TCP port	The TCP port to which the SMTP server receives SMTP messages.	25



If the SMTP server requires a secure connection (encrypt the email), click **Enable secure connection**. There are three options.

Setting	Description	Factory Default
TLS	Encrypts the entire communication channel between the client and the server from the beginning, ensuring that all data transmitted is secure.	N/A
STARTTLS	It is possible to start the connection in plain text and then switch to encrypted mode through STARTTLS. If the upgrade fails, the communication remains in plain text.	N/A
STARTTLS-None	No encryption. STARTTLS-None as an option helps system administrators clearly specify which connections should remain unencrypted.	N/A

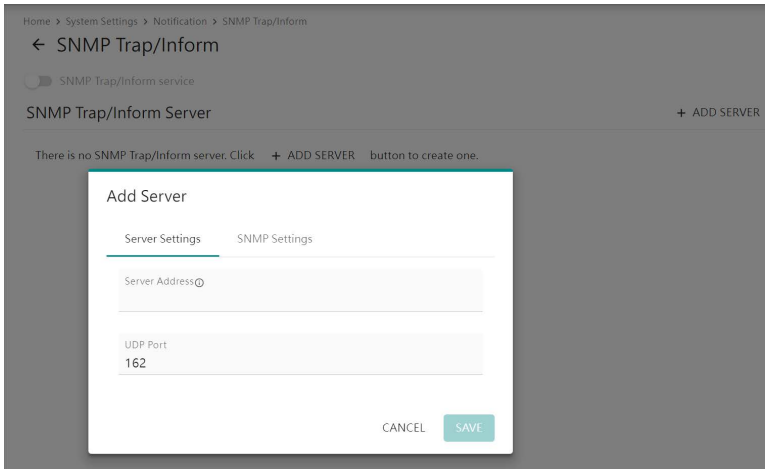
If the SMTP server requires authentication verification, click **Enable authentication**, and input the username and password used to log into the SMTP server.

Setting	Description	Factory Default
Username	The name used to log into the SMTP server.	N/A
Password	The password used to log into the SMTP server.	N/A

Contact Information

Setting	Description	Factory Default
Sender Email (From)	The email address that the NPort will use to send the message. The user can easily figure out which NPort sends the message by this account.	N/A
Recipient Email 1 (To)	The email address that the NPort will send the message to. It shall be the administrator/manager of the NPort who manages/monitors the status of the NPort or the serial device connected to the NPort. There are 4 recipient emails at most.	N/A

SNMP Trap/Inform

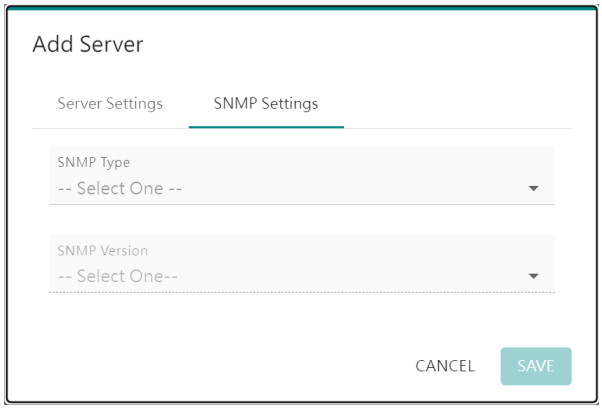


Click the **EDIT** button at SNMP Trap/Inform column and click **ADD SERVER**. Set the Server Setting and the SNMP Settings.

Server Settings

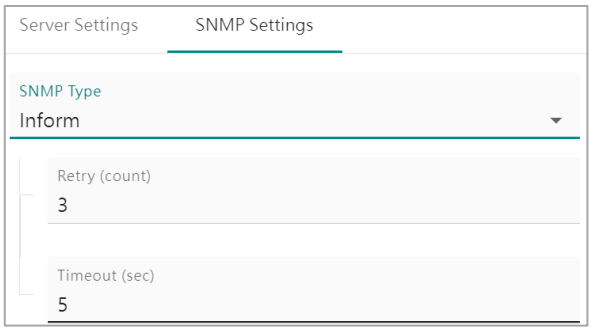
Setting	Description	Factory Default
Server Address	The IP address or domain name of the SNMP server.	N/A
UDP port	The UDP port to which the SNMP server receives SMTP messages.	162

SNMP Settings



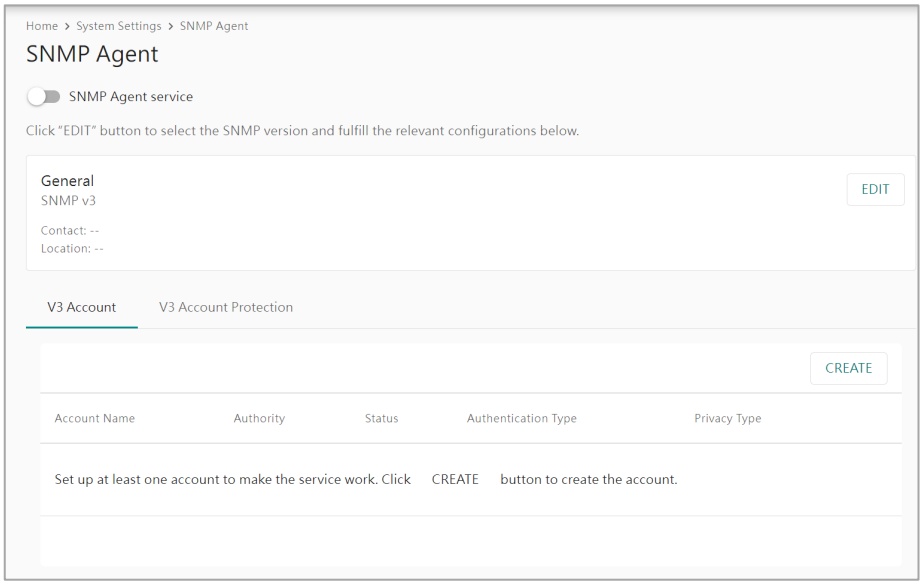
SNMP Type	Description	Retry (Count)	Timeout (sec)	SNMP version
Trap	The NPort will send SNMP Trap and will not wait for acknowledgment	N/A	N/A	v1/v2c/v3
Inform	After sending an SNMP Inform, the NPort waits for the acknowledgment. The NPort will resend the Inform message until it gets a confirmation or times out.	Number of retries Default=3	The duration before a timeout occurs Default=5	v2c/v3

SNMP Inform messages requires acknowledgement of notifications. If you choose SNMP Inform as the SNMP type, you might have to specify the number of retries the NPort should attempt if it doesn't receive acknowledgments. Also, determine the time interval for the NPort to wait before sending the SNMP Inform message.



SNMP Agent

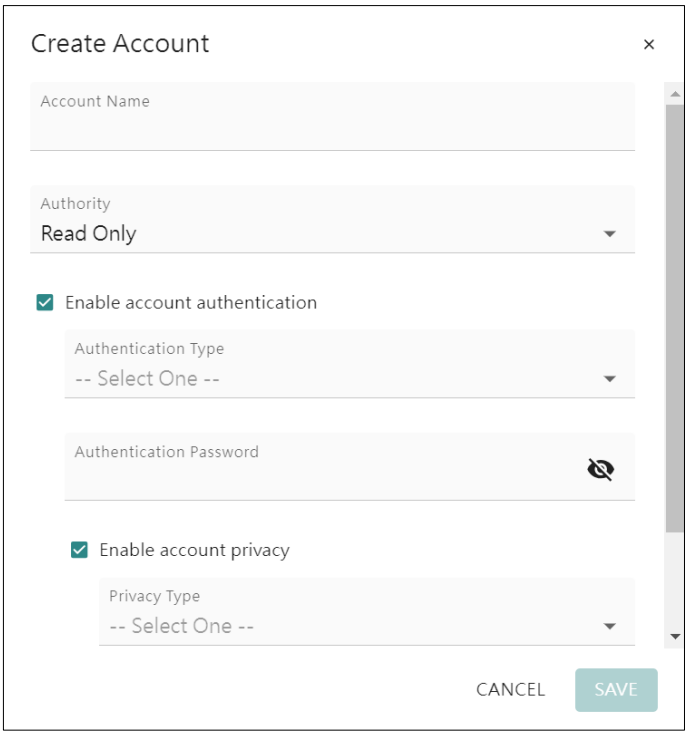
Simple Network Management Protocol (SNMP) is a widely used protocol/tool for network administrators to manage and monitor network devices. To meet this requirement, the NPort 6000-G2 Series supports SNMPv1/v2c/v3 and includes a private MIB for device management and status monitoring of Ethernet or serial communication. For such purposes, enable the SNMP Agent service here (**System Settings > SNMP Agent**) and configure the proper settings introduced in the following sections.



Click the **EDIT** button under the General column. Select the SNMP Version and set the Device Details.

Setting	Description	Factory Default
SNMP Version	Select the SNMP Version. Use only SNMP v3/Use only v1, v2c/Use v1, v2c, and v3.	v3
Contact - Optional	This field usually includes an emergency contact name and telephone or pager number.	N/A
Location - Optional	Use this field to specify the location string for SNMP agents such as the NPort 6000-G2. This string is usually set to the street address where the NPort 6000-G2 is physically located.	N/A

When using SNMP v3, you need to create a V3 Account first. Click the **CREATE** button at V3 Account column.



Account Name: Use this field to identify the username for the specified level of access.

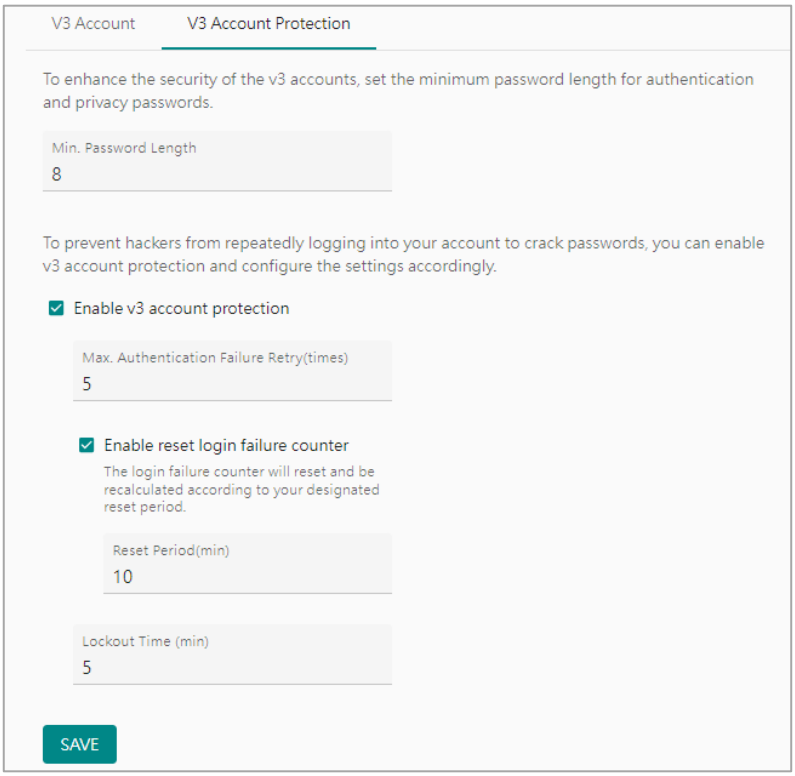
Authority: Select authentication parameters for two levels of access: Read Only(default) and Read/Write.

When enabling account authentication, select the Authentication Type and input the Authentication Password.

Authentication Type: Use this field to select MD5 or SHA as the method of password encryption.

Authentication Password: Use this field to set the password.

Privacy Type: Use this field to enable DES_CBC or AES_128 data encryption when you enable account privacy.



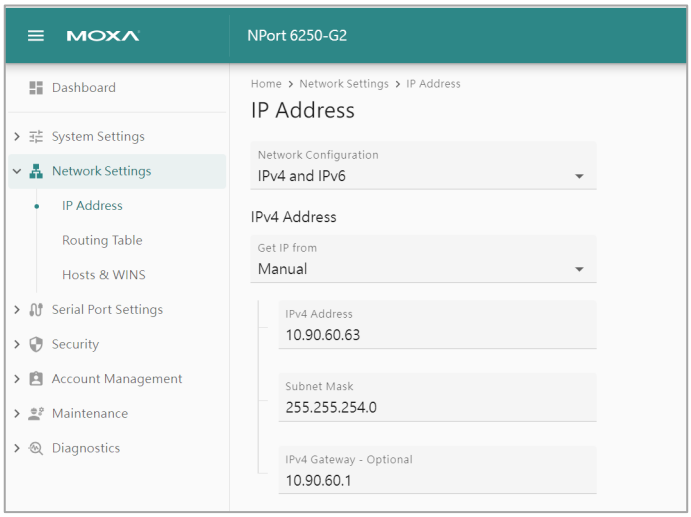
Click the V3 Account Protection to set the minimum password length for authentication and privacy passwords. Enable v3 account protection can set the maximum authentication failure times and lockout time. Additionally, you can enable the reset login failure counter to automatically reset and recalculate it within your designated reset period.

Network Settings

The second category of the Navigation Panel is Network Settings, which also includes three parts. The IP Address page is where you assign the NPort 6000-G2 IP address, netmask, gateway, and other IP parameters. The Routing Table page allows you to configure the NPort 6000-G2's connection to an external network. The Hosts & WINS page can make entering IP addresses on the NPort 6000-G2 console easier by assigning a Host Name to an IP Address.

IP Address

A network device will need an IP address to communicate with other network devices. The IP address should have already been set up during the first-time login process. When accessing the Network Settings category, you may want to configure the advanced settings or change the existing IP address.



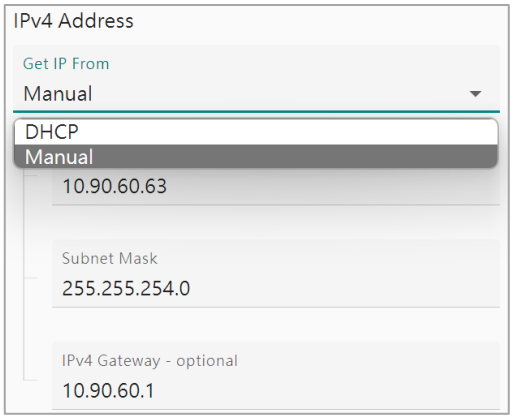
Network Configuration

IPv6 Address

The abbreviation IPv6 stands for Internet Protocol version 6. IPv6 is the second version of the Internet Protocol, introduced after IPv4. What distinguishes the two versions is the varying length of the IP address. IPv4 uses 32-bit IP addresses; IPv6 uses 128-bit IP addresses. IPv4 is still the most widely used protocol on the Internet. If your devices and network infrastructure are limited to IPv4 compatibility, opt for IPv4 only. However, if you have already deployed IPv6 and need a large number of IP addresses, then select IPv4 and IPv6.

IPv4 Address

Get IP From: DHCP or Manual. If there is a DHCP server in the network assigns the IP address automatically, then select **DHCP**. If not, select **Manual** and input the IPv4 address, subnet mask, and IPv4 gateway.

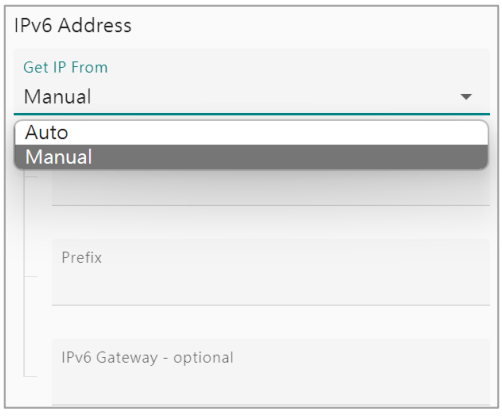


IPv4 Address (default=192.168.127.254): Enter the IP address that will be assigned to your NPort 6000-G2. All ports on the NPort 6000-G2 will share this IP address. An IP address is a number assigned to a network device (such as a computer) as a permanent address on the network. Computers use the IP address to identify and talk to each other over the network. Choose a proper IP address that is unique and valid in your network environment.

Subnet Mask (default=255.255.255.0): Enter the subnet mask. A subnet mask represents all the network hosts at one geographic location, in one building, or on the same local area network. When a packet is sent out over the network, the NPort 6000-G2 will use the subnet mask to check if the desired TCP/IP host specified in the packet is on the local network segment. If the address is on the same network segment as the NPort 6000-G2, the NPort 6000 establishes a connection directly. Otherwise, the connection is established through the default gateway.

IPv4 Gateway: Enter the IP address of the gateway if applicable. A gateway is a network computer or device that acts as an entrance to another network. Usually, the devices that control traffic within the network or at the local Internet service provider are gateway nodes. The NPort 6000-G2 needs to know the IP address of the default gateway device to communicate with the hosts outside the local network environment. For correct gateway IP address information, consult the network administrator.

IPv6 Address



Get IP From: You can choose from two possible IP configuration modes, Auto or Manual.

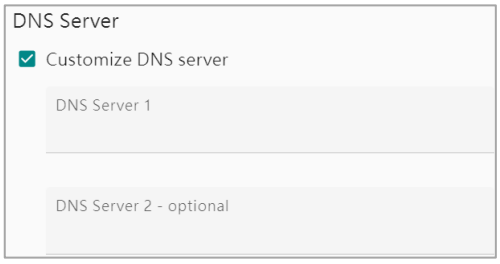
Option	Description
Auto	IPv6 router assigned prefix Step 1: The NPort generates the Link local address automatically Step 2: The NPort sends the "Router solicitation" to the router to apply for an IP address. 2.1 Router assigns an IP address to NPort ->Step 4 2.2 Router assigns the DHCPv6 Server to offer an IP address → Step3 2.3 Router has no response (e.g., router does not exist) → Step 3

Option	Description
	Step 3. The NPort applies for an IP address from the DHCPv6 Server Step 4. Process closed
Manual	User-defined IPv6 address, Prefix, IPv6 Gateway.

IPv6 Address: Enter the IPv6 address that will be assigned to your NPort 6000-G2. All ports on the NPort 6000-G2 will share this IPv6 address. An IPv6 address is a number assigned to a network device (such as a computer) as a permanent address on the network. Computers use the IPv6 address to identify and talk to each other over the network. Choose a proper IPv6 address that is unique and valid in your network environment.

Prefix: The prefix is the part of the address that shows the bits that have fixed values or are the bits of the subnet prefix. Prefixes for IPv6 subnets, routes, and address ranges are expressed in the same way as Classless Inter-Domain Routing (CIDR) notation for IPv4. An IPv6 prefix is written in address/prefix-length notation. For example, 21DA:D3::/48 and 21DA:D3:0:2F3B::/64 are IPv6 address prefixes.

DNS Server



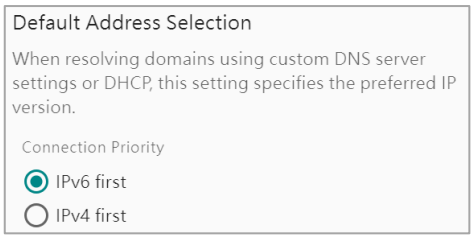
Domain Name System (DNS) is responsible for translating internet domain names into IP addresses. A domain name is an alphanumeric name, such as www.moxa.com, which is easier to remember than the numerical IP address. A DNS server is a host that translates this kind of text-based domain name into the actual IP address used to establish a TCP/IP connection. When a user wishes to access a specific website, their computer sends the domain name (e.g., moxa.com) to a DNS server to obtain the website's IP address. The user's computer connects to the website's web server using the IP address obtained from the DNS server.

The NPort 6000-G2 acts as a DNS client, actively querying the DNS server for domain name IP addresses. The following functions on the NPort 6000-G2 web console support the use of domain names in place of IP addresses: Time Server, Destination IP Address (in TCP Client mode), Mail Server, SNMP Trap Server, Destination Address (in Pair Connection mode), Primary/Secondary Host Address (in Terminal mode), RADIUS Server, TACACS+ Server and SMTP Server.

DNS server 1: Choose Customize DNS server to enter the DNS server's IP address in this field. This allows the NPort 6000-G2 to use domain names instead of IP addresses to access hosts.

DNS server 2: This is an optional field. The IP address of another DNS server can be entered in this field if DNS server 1 is unavailable.

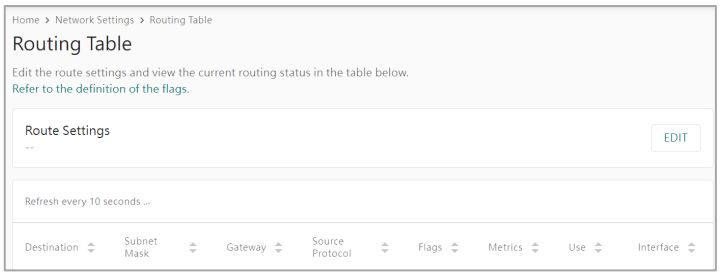
Default Address Selection



Connection Priority: This function should work with the NPort 6000-G2 functions that use the domain name to get the IP address of the remote host/server. For this kind of application, the NPort 6000-G2 will ask for the IP address of the remote host/server through the DNS. The DNS will reply with both the IPv4 and IPv6 IP addresses if both exist simultaneously in the remote host/server. For this reason, you need to define which one has a higher priority, IPv6 first (RFC 3484) or IPv4 first.

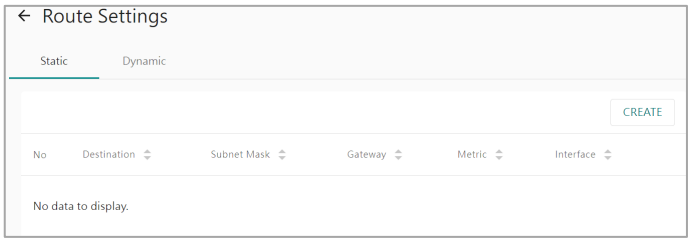
Routing Table

If the NPort encounters an unknown IP address, it will check the routing table to determine the network interface for sending the Ethernet package. This is how network devices collaborate to ensure all Ethernet packets reach the target devices. The routing table in the NPort contains information about network routes and their associated metrics, for example, distances. The **routing table** also provides information about immediate network topology. You can configure the network connection for the NPort 6000-G2 to an outside network. Edit the route settings and view the current routing status on this page.



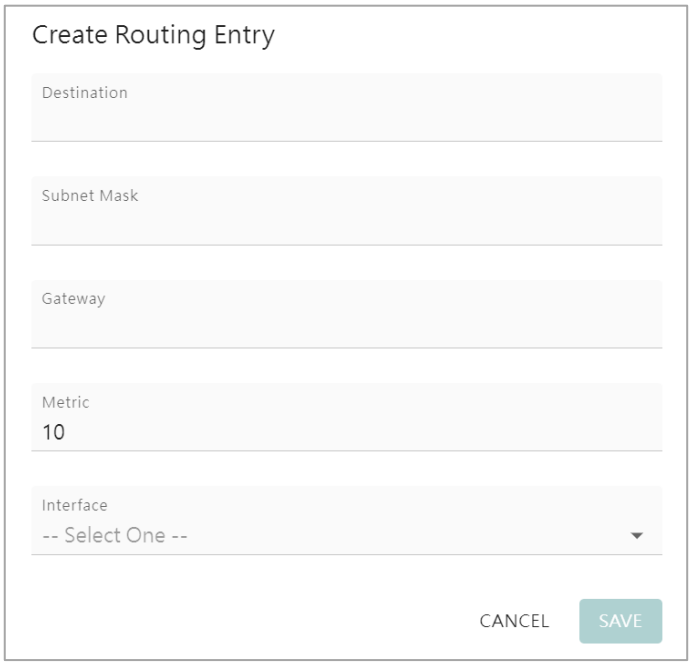
To edit route settings, click the **EDIT** button.

Route Settings-Static



In the static page, click the **CREAT** button to create a routing entry. You must provide information on the Destination, Subnet Mask, Gateway, Metric, and Interface.

Create Routing Entry



Destination: This is the target device's IP address of the route's destination.

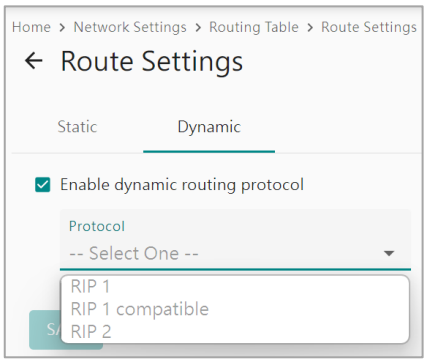
Subnet Mask: This is the destination network's netmask.

Gateway: This is the IP address of the next-hop router.

Metric: You may use this optional field to enter the number of hops from the source to the destination. This allows the NPort 6000-G2 to prioritize the routing of data packets if more than one router is available.

Interface: This is the network interface to which the packet must be sent. Select the Ethernet or serial port (Only for dial-in/out mode).

Route Settings-Dynamic



On the Dynamic page, you can configure the routing protocol. Select **Enable dynamic routing protocol** to choose the protocol.

What is RIP?

Routing Information Protocol (RI) is a protocol used to manage routing information within a self-contained network, such as a corporate LAN (Local Area Network) or an interconnected group of such LANs. By using RIP, a gateway host with a router can send its entire routing table, which lists all the other hosts it knows about, to its closest host every 30 seconds. The closest host will pass this information on to its neighbor, and so on, until all the hosts within the network have the same routing path information. We call this state network convergence. RIP uses a hop count as a way of determining network distance. (Other protocols use more sophisticated algorithms that also include timing.) After receiving a packet headed for a specific destination, a network host with a router uses the routing table information to determine the next host to route the packet to.

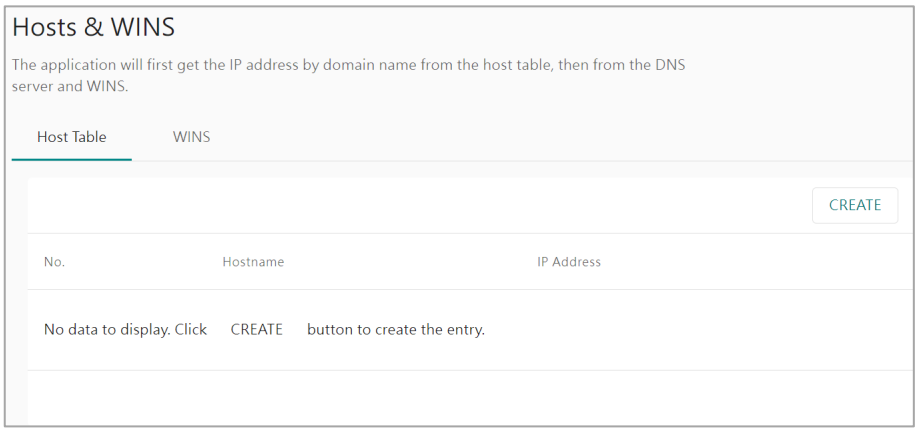
RIP 1 is an effective solution for small homogeneous networks. For larger, more complicated networks, transmitting the entire routing table every 30 seconds can bog down the network with a lot of extra traffic.

RIP 2 is an extension of RIP. Its purpose is to expand the amount of useful information in RIP packets and to add security elements. RIP 2 has become the standard version of RIP, and the original RIP is no longer used.

RIP 1 compatible refers to RIP 2 running in a mode that is compatible with RIP 1, but with the limited functionality of RIP 1.

Hosts & WINS

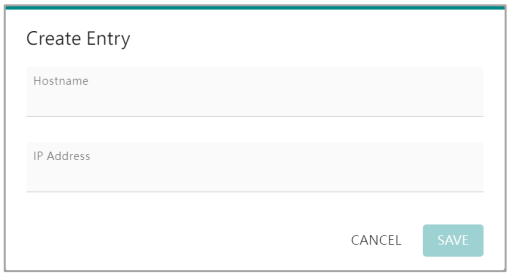
It's hard for people to remember a lot of IP addresses to access different devices for different services. So, people tried to remember the popular devices with domain names, like www.google.com. A DNS server is a well-known service/device to translate the domain name and the IP address. In a small network, to build up a private DNS server may be too expensive. Another option is to configure the Host Table on all network devices, allowing users to access them by simply entering the domain name. The NPort 6000-G2 provides a Host Table to fulfill this need in a small network.



Host Table

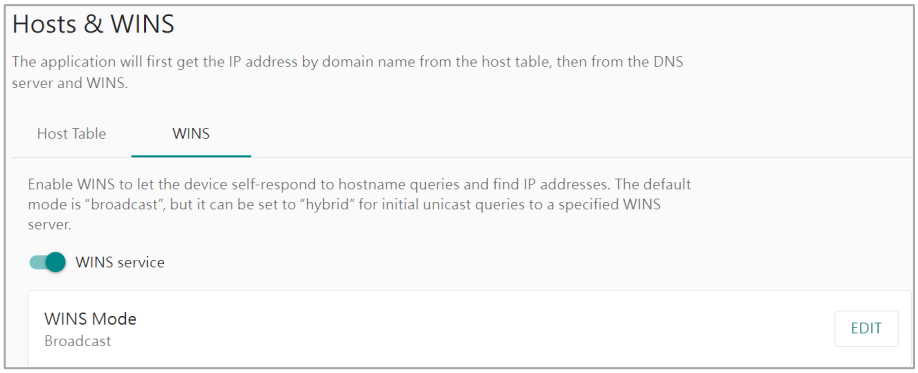
The Host Table simplifies IP address entry on the NPort 6000-G2 console by assigning a host name to a host IP address. When you assign a host name to a host IP address, you use the host name for some fields on the console rather than entering the IP address.

Click the **CREATE**. Then fill in Hostname and IP Address to assign a host name to a host IP address.

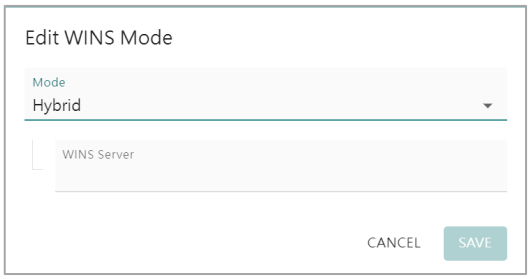


WINS

Basically, Windows Internet Name Service (WINS) is a legacy computer name registration and resolution service that maps computer NetBIOS names to IP addresses.



WINS service: Activate WINS service to allow the device to respond to host name queries and find IP addresses. The initial mode is "broadcast" by default, but it can be edited to "hybrid" for unicast queries to a specified WINS server.



WINS server: If a WINS Server is connected to the network, enter the WINS Server's IP address in this field. TCP/IP uses IP addresses to identify hosts, but users often use symbolic names, such as computer names. The WINS Server, which uses NetBIOS over TCP/IP, contains a dynamic database to map computer names to IP addresses.

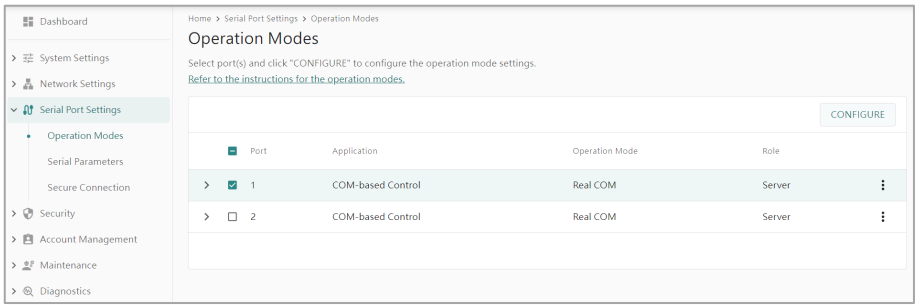
Serial Port Settings

The third section of the Navigation Panel is Serial Port Settings which is grouped into three categories: Operation Modes, Serial Parameters, and Secure Connection. To configure the operation mode and settings for a port, expand Serial Port Configurations in the navigation panel; then, expand the category that you would like to configure.

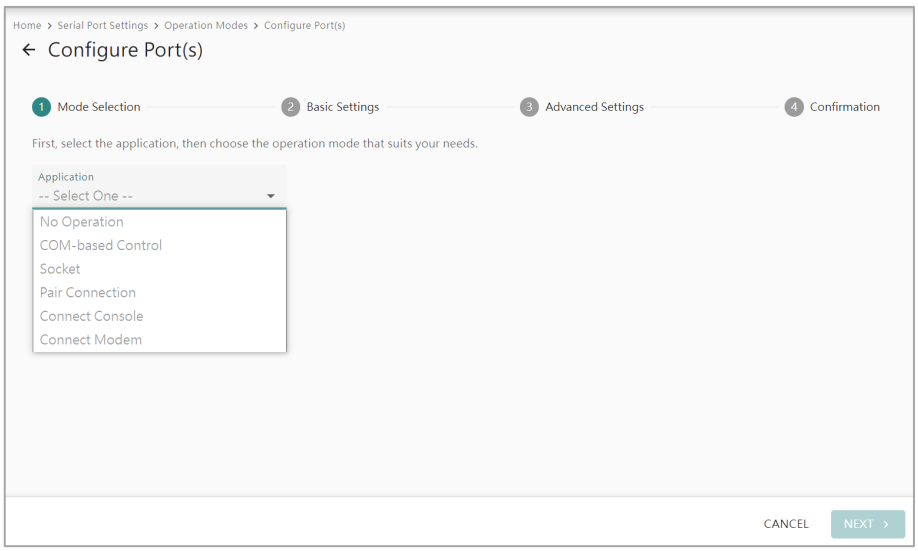
Operation Modes

NPort 6000-G2 Series provides the capability to transfer the data from serial-to-Ethernet and vice versa. The setting of the Operation Modes sets the way how the data was packaged or how it is delivered on the Ethernet network. There are five popular applications: COM-based Control, Socket, Pair Connection, Connect Console and Connect Modem Application, They will be introduced one-by-one in the following sections.

- COM-based Control: For software using a COM port (Windows) or TTY port (Linux) to communicate with the serial device.
- Socket: For socket programs which communicate with NPort with IP address and TCP/UDP port.
- Pair Connection: To extend communication distance without changes to the host PC/HMI and serial device. This requires two NPort devices.
- Connect Console: For accessing a serial console via Telnet or SSH.
- Connect Modem: For accessing a serial modem.



Select **Operation Modes** in the navigation panel to configure the mode for each serial port. For NPort 6000-G2 models with two or more serial ports, use the checkboxes of the Port to apply the settings to one or more ports. Then, click the **CONFIGURE** button.



There is an Operation Mode Wizard to help you complete the settings. Select the application and operation mode as the first step. The next step involves configuring the basic settings for various scenarios. Set the advanced settings for a few scenarios during the third step. During the final step, go over all the settings mentioned earlier. If they're okay, confirm them and these settings will be activated immediately.

Application: Select an application for the serial port from among the choices. Your application will determine the modes that are available.

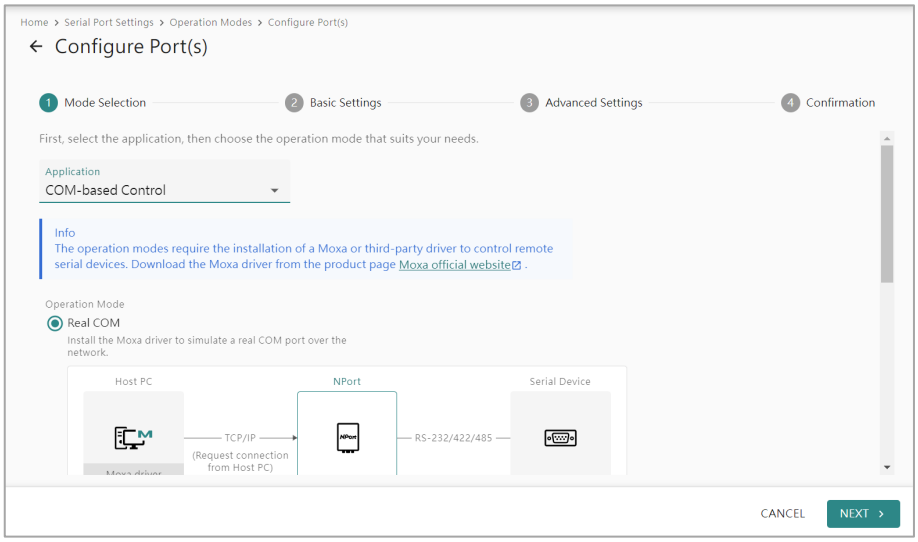
Operation Mode: Once you have chosen an application, select the operation mode. The configuration settings will vary depending on the mode that you have selected.

Application	Operation Mode	Description
No Operation	N/A	To decrease the risk of cyberattacks, select "No Operation" to disable the relative service if there are no serial devices connected to a specific port.
COM-based Control	Real COM mode	Installs the Moxa driver to simulate a real COM port over the network.
	RFC2217 mode	Installs a third-party driver to simulate a real COM port over the network.
	Reverse Real COM mode	Installs the Moxa driver to simulate a real COM port over the private/dynamic network of the NPort.
Socket	TCP Server mode	Your application establishes a TCP connection to the NPort, providing access to connected serial devices.
	TCP Client mode	Your application listens to TCP connections from the NPort, providing access to connected serial devices.
	UDP mode	Your application sends and receives UDP packets for establishing communication with connected serial devices.
Pair Connection	Pair Connection Client mode	Connects to another NPort to enable two serial devices to communicate with each other.
	Pair Connection Server mode	Accepts connected NPort to enable two serial devices to communicate with each other.
Connect Console	Terminal mode	Connects to remote Telnet/SSH server by connecting the NPort via serial port.
	Reverse Terminal mode	Connects to a serial console server by connecting the NPort via Telnet/SSH.
Connect Modem	PPP	Enables network data exchange by establishing a PPP connection over PSTN using a modem.
	SLIP	Enables network data exchange by establishing a SLIP connection over PSTN using a modem.

COM-based Control Applications

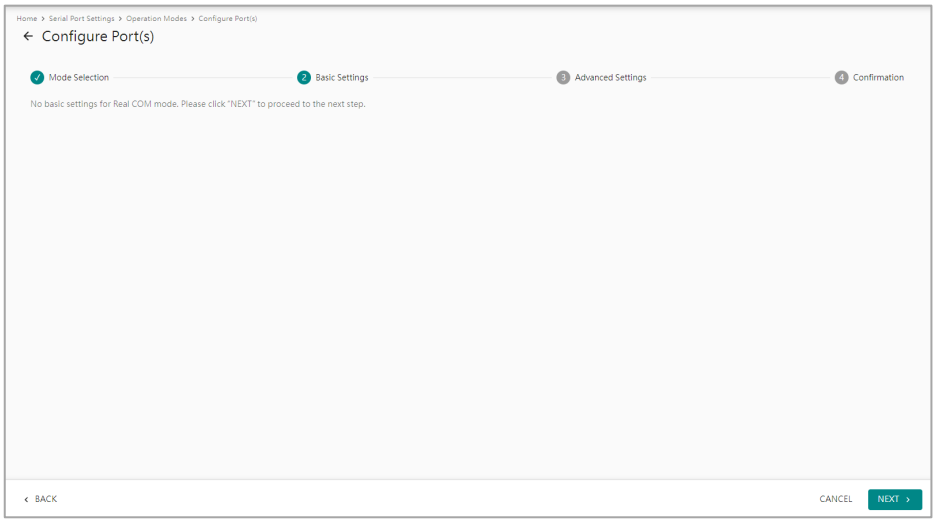
The COM-based control application requires the installation of a Moxa or third-party driver to open a COM port (on Windows platform) or a TTY port (on Linux/UNIX-like platform) to start the communication with the remote serial devices. To keep the legacy software on the Windows or Linux/UNIX-like platform the same, Moxa provides the drivers on different operating systems. Please download them from Moxa website and refer to Chapter 4 Mapping COM Ports, on how to use them.

Real COM Mode



Step 1. Mode Selection

Based on the scenario, selectthe application COM-based Control and Operation Mode Real COM. Then, click **NEXT** button to proceed to the next step.

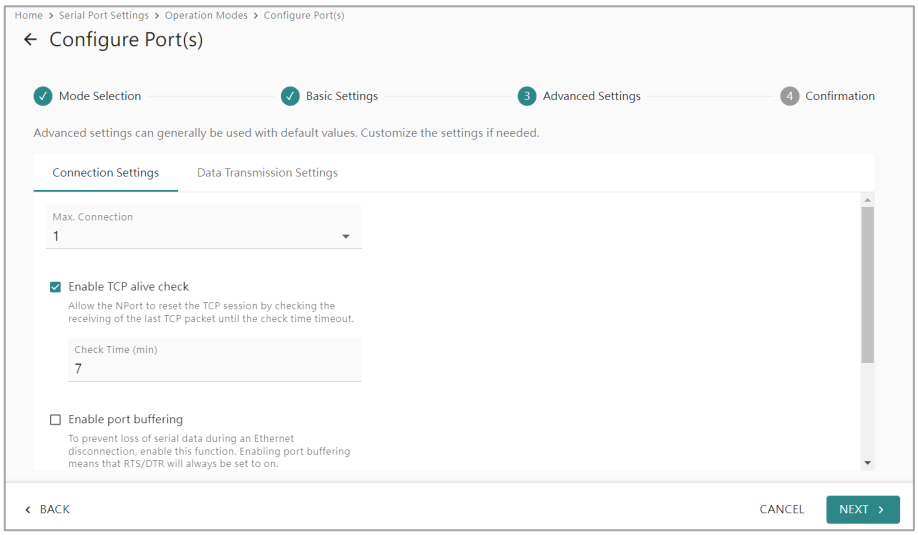


Step 2. Basic Settings

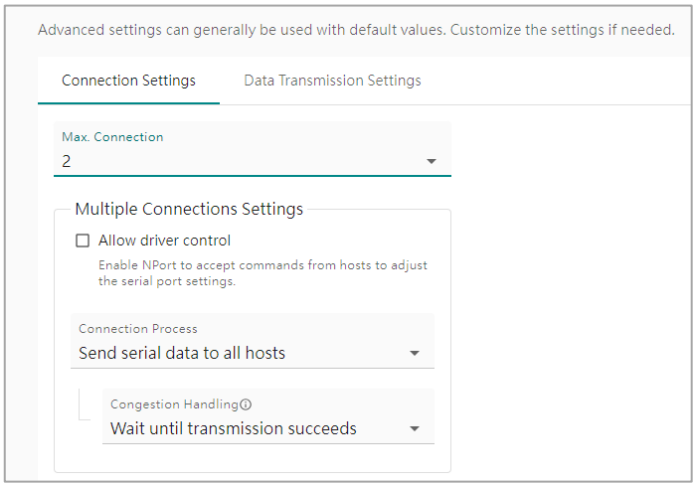
In most scenarios, when configuring the Operation Mode to the Real COM mode, you have already completed the setup. Real COM mode does not have any basic settings. Click the **NEXT** button to go to Step 3.

Step 3. Advanced Settings—Connection Settings

In some scenarios, you may need to change the advanced settings to fulfill these special cases.



To communicate with multiple hosts on the NPort, enable **Max. Connection** and set the number to match the number of hosts. The NPort will now allow multiple hosts to connect at the same time. For example, let's suppose Host 1 is the primary computer, responsible for sending requests and receiving responses, while Host 2 is the backup computer, designated solely for receiving responses. Then, you should set the number to 2.



Max. connection (default=1): This field is used if you need to receive data from different hosts simultaneously. When set to 1, only one specific host can access this port of the NPort 6000-G2, and the Real COM driver on that host will have full control over the port.

When the value is set to 2 or higher, multiple hosts' Real COM drivers can simultaneously open this port, up to the specified number. When several hosts' Real COM drivers open the port simultaneously, the COM driver only acts as a pure data tunnel and lacks control functionality. The serial port parameters will use firmware settings instead of depending on your application program (AP).

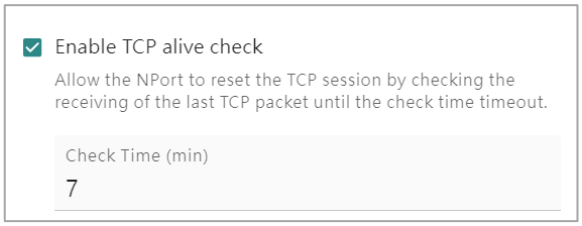
The firmware will only send data back to the driver on the host. When the data is received on the serial port and passed to the Ethernet side of the NPort, all the hosts will receive the same data. When the data is received on the Ethernet port and passed to the serial side of the NPort, the data will be sent first-in first-out.

If the situation described above doesn't match your site, there are several advanced functions at **Multiple Connection Settings** to do some modifications.

Allow driver control: As mentioned above, when **Max. connection** is set to 2 or higher, the serial port parameters will use firmware settings. If you want the serial parameters to still use the settings of your application program, enable the **Allow driver control** function. When you enable it, the serial port settings of your AP will overwrite the firmware settings while opening the COM port. Usually, you should only enable this function on one of the hosts. If you enable it on two or more hosts, then the serial parameters will be overwritten every time these hosts open the COM port.

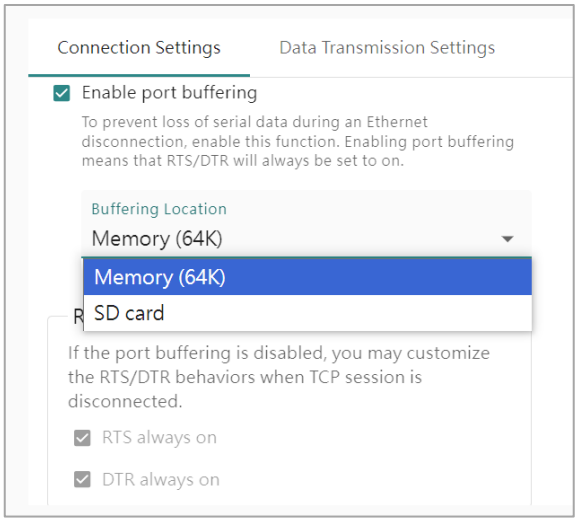
To handle the unexpected data communication of multiple connections, there are different combinations for different scenarios.

Connection Control	Congestion Handling	Description
Send serial data to all hosts	-	This is the default data communication behavior for multiple connections. The serial data will be transmitted to the hosts. What happens if one host cannot receive the data?
	Wait until transmission succeeds	Wait until the host can receive data again. If the host cannot return, this option will store the serial data in the NPort's serial buffer as a side-effect. Once the serial data reaches 1,024 bytes, the buffer becomes full and can no longer receive data. Any new incoming data will be discarded.
	Keep sending data to other hosts	Ignore the abnormal host, keep sending data to other online hosts. The downside of this option is the communication seems OK when the user only checks the status on the succeed host(s). A mechanism might be necessary to alert the user when a host is unable to receive data.
Send serial data to the requested host	-	At times, the other hosts are unable to handle unrequested responses. In this scenario, choose to **Send serial data to the requested host**, ensuring that each host only receives the response specific to their request. What happens if the serial device fails to respond or responds too slowly in this situation?
	Discard	If the serial response times out, then the NPort will discard all the new incoming serial data before the NPort receives an Ethernet request.
	Send to the last request	If the serial response times out and new serial data arrives, the NPort will forward the data to the host that made the most recent request.
	Send to all open connections	If the serial response times out and new serial data is received, the NPort will distribute the data to all hosts that are still connected.
	Enable response timeout	To ensure smooth operation in this one-request-one-response application, you should specify the waiting time for the NPort to receive the serial response. **The default timeout time is 10,000 ms.** This value shall be less than the timeout time on user's AP. Make sure this value is smaller than the AP's timeout time. If not, this unusual situation could occur where AP identifies it as a timeout error, but the NPort is still waiting for a response.



Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the **Enable TCP alive check time** function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

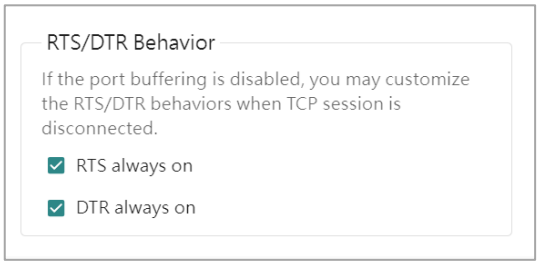
Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.



Poor cable contact or a damaged switch/router could cause it to be disconnected or broken. When this happens, the serial data cannot transmit over Ethernet because the receiver does not exist. As time passes, the serial data could be discarded and lost. If the serial data is important, u enable the Enable port buffering function. The NPort can store serial data either in its internal memory, which is 64 Kbytes, or in an external SD card (if supported).

Enable port buffering (default=No): To prevent serial data loss when the Ethernet connection is down, check the checkbox to enable port buffering. If you enable port buffering, RTS/DTR will remain in the on position.

Buffering Location: Select the location of buffering. Memory (64K) or SD card.



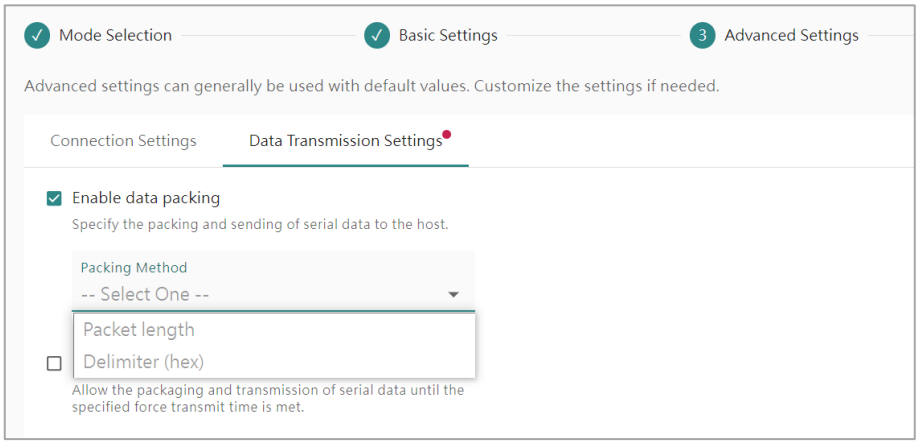
In a serial bus, the host and the serial device can use RTS/DTR signals to indicate their status to each other. Using the RTS/DTR Behavior function, the NPort can simulate the RTS/DTR behavior on Ethernet connections. When using legacy software, enable the RTS/DTR signal and keep it constantly on to prevent the host from entering sleep mode or shutting down. This will ensure the host is always ready for communication.

RTS/DTR Behavior (default=always on): Configures what happens to the RTS and DTR signals when the TCP session is disconnected. For some applications, serial devices need to know the Ethernet link status through RTS or DTR signals sent via the serial port. If the serial devices detect the RTS or DTR is off, it may jump into sleeping mode or low-power mode. Then, it may take a while to come back from the sleeping/low-power mode, which will cause issues because the host PC will come back quicker. In this case, set the signal to always on.

When the Enable port buffering function is enabled, the RTS and DTS signals will be always be set to ON to keep the serial device sending data. This function may be disabled at the same time.

Step 3. Advanced Settings—Data Transmission Settings

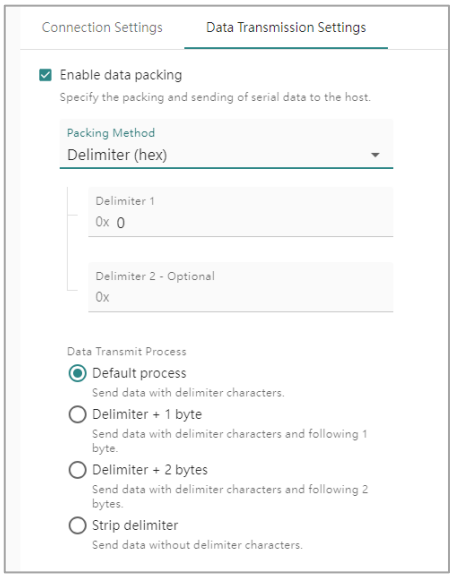
When the serial data is transmitted on the serial bus, it's continuous data. A "Read" command allows the software to receive all of the data. When everything switches to Ethernet, it's a different story. Ethernet data can be divided into packets, which are then assembled by the receiver into a complete frame to interpret the transmission request from the other device. However, a legacy serial software might lack support for the fundamental "assemble" function found in socket programs. Here, the NPort enables the Data Transmission function to deliver the correct frame at the beginning, requiring no changes to the legacy serial software for reading accurate data.



Like a bar code reader, serial data has a fixed length, and the fixed length data is read at once. A second common application is a serial protocol with specific ending character(s), which makes it easier for the engineer to read the data. In these two scenarios, please enable the **Enable data packing** function.

Enable data packing: With the drop-down menu Packing Method, select **Packet length** or **Delimiter (hex)**.

Packet length (Byte): The packet length setting refers to the maximum amount of data that is allowed to accumulate in the serial port buffer before sending. When you specify a packet length between 1 and 1024 bytes, the data in the buffer will be sent as soon as it reaches the specified length.



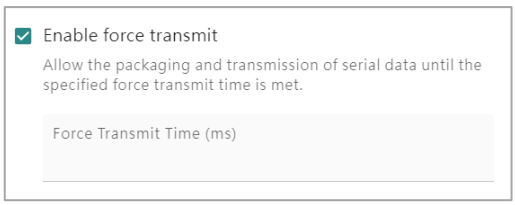
Delimiter (hex): The delimiter refers to the ending character(s) of data. When the specific character(s) is received, the NPort will execute the Data Transmit Process to handle the serial data. Then, send it out on the Ethernet side.

Delimiter 1 and Delimiter 2: If Delimiter 1 is configured in hex format, the NPort will treat the designated character as the end character. If there are two ending characters, use Delimiter 2 and ensure they are received in the correct order (Delimiter 1 first, then Delimiter 2). The NPort will package all the data in the serial buffer and follow the Data Transmit Process to handle the delimiter(s) before transmitting the data to the Ethernet port.

Data Transmit Process: This field determines how to handle the serial data and the delimiter(s) when receiving the delimiter(s). If both Delimiters 1 and 2 are set up, the process will only occur when both characters are received in the correct order.

- **Default process:** Data in the buffer and the delimiter(s) will be transmitted.
- **Delimiter+1 byte:** Data in the buffer and the delimiter(s) plus one byte will be transmitted after one additional byte is received following the delimiter(s).
- **Delimiter+2 bytes:** Data in the buffer and the delimiter(s) plus two bytes will be transmitted after two additional bytes are received following the delimiter.
- **Strip delimiter:** Data in the buffer will be transmitted and the delimiter(s) will be dropped.

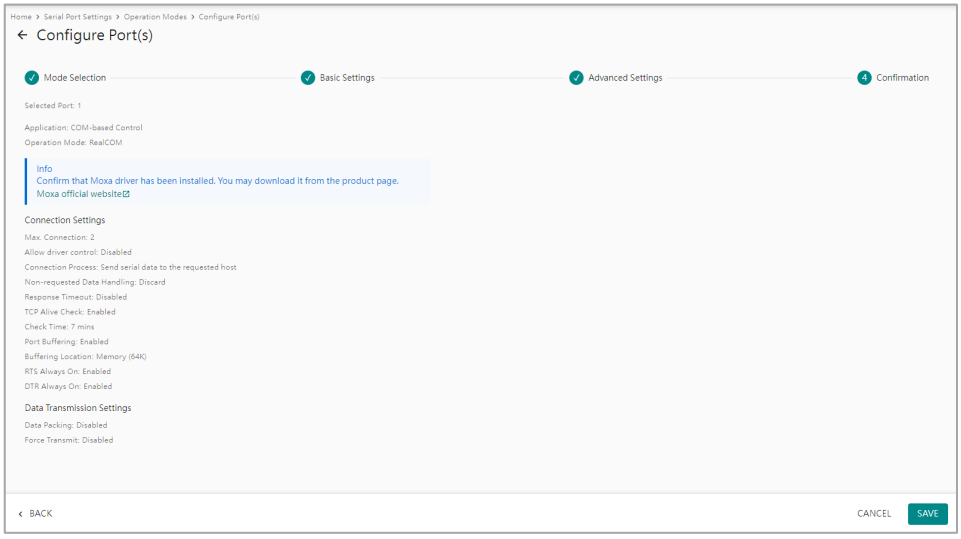
Some protocols, like Modbus, may separate different messages from the idle time between two messages. For this case, please enable the **Enable force transmit** function and input the idle time at the **Force Transmit Time (ms)** field.



Enable force transmit: The NPort will monitor the idle time between two characters. If the time is reached and there are no new characters being received, the NPort will package all the data in the serial buffer and then send it on the Ethernet side. The number of this field is between 1 and 65535.

Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.

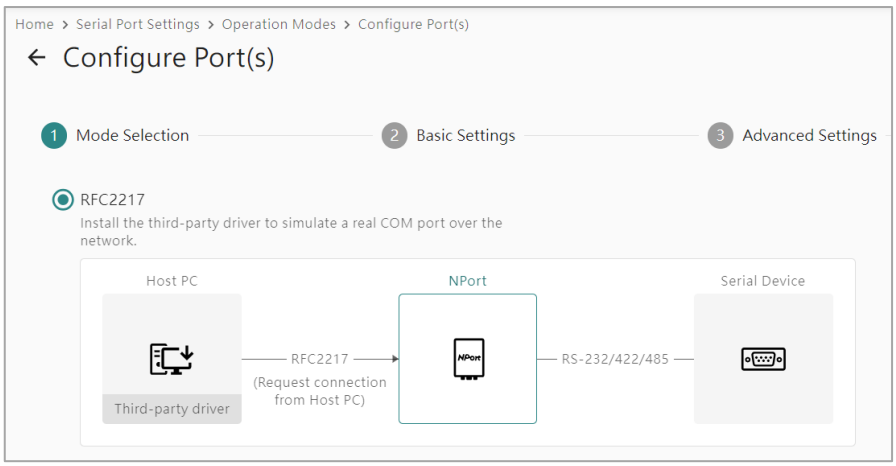


RFC2217 Mode

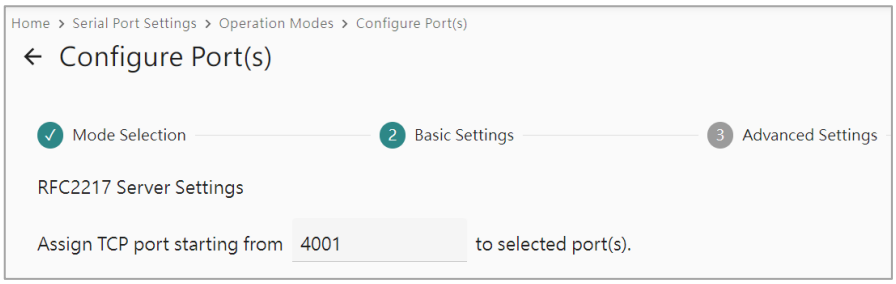
If you prefer a virtual COM driver or have different brands of serial device servers, install a third-party driver to communicate with the NPort and with all the other brands of device servers. In this case, please select the RFC2217 mode.

Step 1. Mode Selection

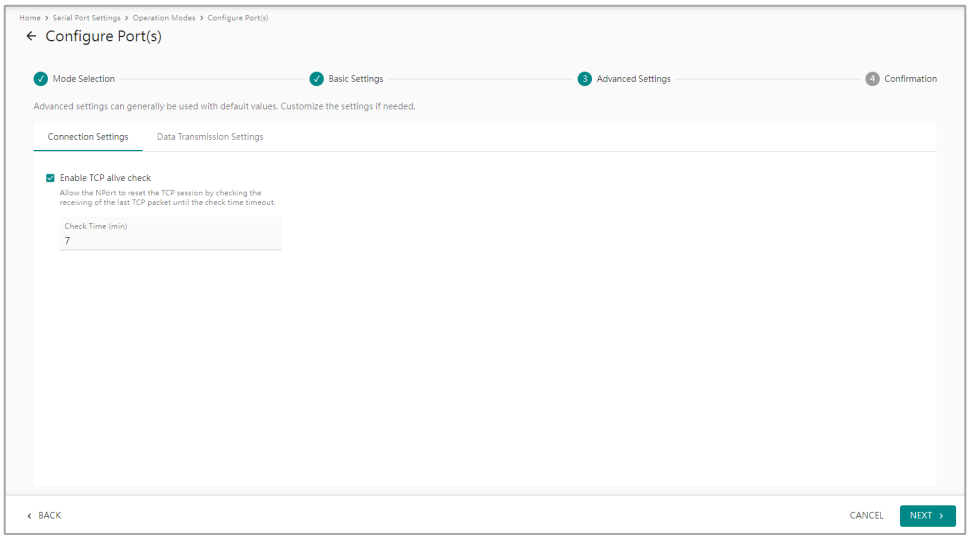
Select the COM-based control and select RFC2217 mode.



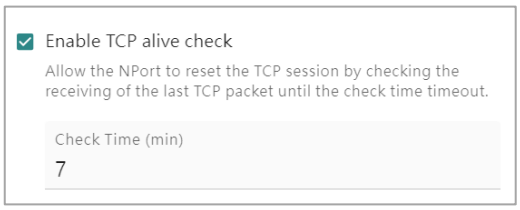
Step 2. Basic Settings



Assign TCP port starting from: This is the TCP port number assignment for the serial port on the NPort 6000-G2. It is the port number that the serial port uses to listen. If more than two serial ports are configured as RFC2217 mode, the listen port will start from this assigned number (the first port will listen on TCP port 4001 and the second port will listen on TCP port 4002). For the host (or other network devices) this TCP port number is also the target TCP port for them to establish the TCP connection. To avoid conflicts with well-known TCP ports, set the default to 4001.



Step 3. Advanced Settings—Connection Settings

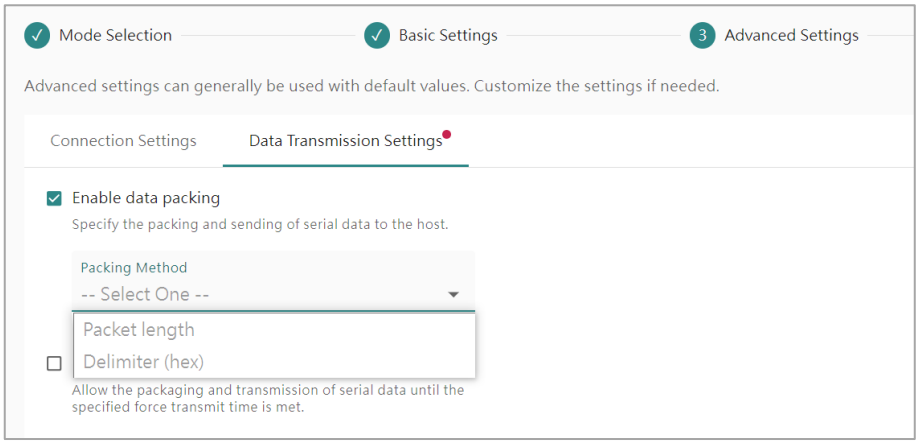


Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the Enable TCP alive check time function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.

Step 3. Advanced Settings—Data Transmission Settings

When the serial data is transmitted on the serial bus, it's continuous data. A "Read" command allows the software to receive all of the data. When everything switches to Ethernet, it's a different story. Ethernet data can be divided into packets, which are then assembled by the receiver into a complete frame to interpret the transmission request from the other device. However, a legacy serial software might lack support for the fundamental "assemble" function found in socket programs. Here, the NPort enables the Data Transmission function to deliver the correct frame at the beginning, requiring no changes to the legacy serial software for reading accurate data.



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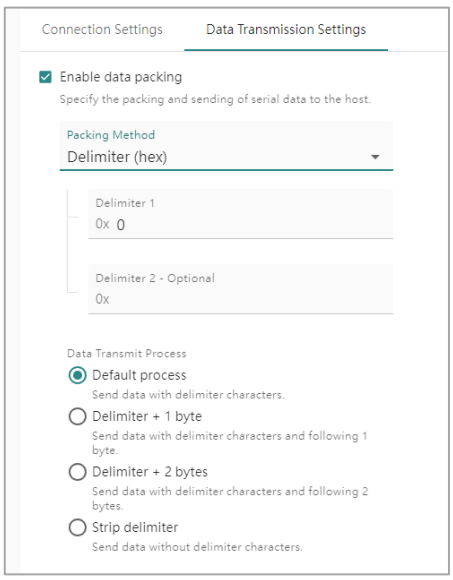
Enable data packing: With the drop-down menu Packing Method, select **Packet length** or **Delimiter (hex)**.

Packet length (Byte): The packet length setting refers to the maximum amount of data that is allowed to accumulate in the serial port buffer before sending. When you specify a packet length between 1 and 1024 bytes, the data in the buffer will be sent as soon as it reaches the specified length.



Delimiter (hex): The delimiter refers to the ending character(s) of data. When the specific character(s) is received, the NPort will execute the Data Transmit Process to handle the serial data. Then, send it out on the Ethernet side.

Delimiter 1 and Delimiter 2: This field determines how to handle the serial data and the delimiter(s) when receiving the delimiter(s). If both Delimiters 1 and 2 are set up, the process will only occur when both characters are received in the correct order.

Data Transmit Process: This field determines how to handle the serial data and the delimiter(s) when receiving the delimiter(s). If both Delimiters 1 and 2 are set up, the process will only occur when both characters are received in the correct order.

Default process: Data in the buffer and the delimiter(s) will be transmitted.

- **Delimiter+1 byte:** Data in the buffer and the delimiter(s) plus one byte will be transmitted after one additional byte is received following the delimiter(s).
- **Delimiter+2 bytes:** Data in the buffer and the delimiter(s) plus two bytes will be transmitted after two additional bytes are received following the delimiter.
- **Strip delimiter:** Data in the buffer will be transmitted and the delimiter(s) will be dropped.

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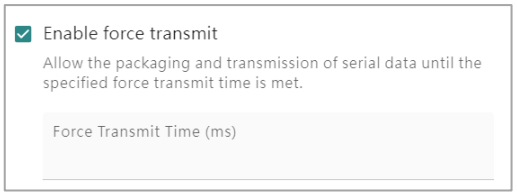
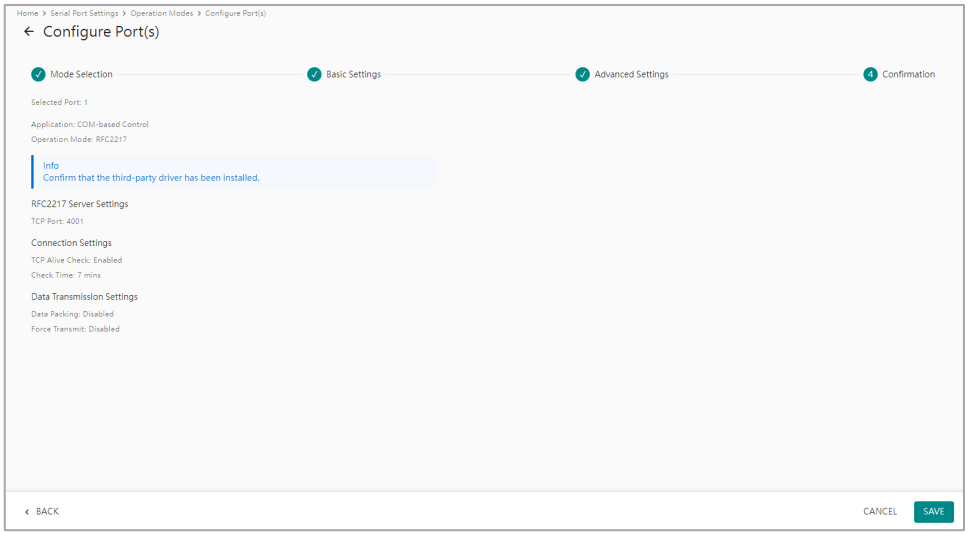


Enable force transmit: The NPort will monitor the idle time between two characters. If the time is reached and there are no new characters being received, the NPort will package all the data in the serial buffer and then send it on the Ethernet side. The number of this field is between 1 and 65535.

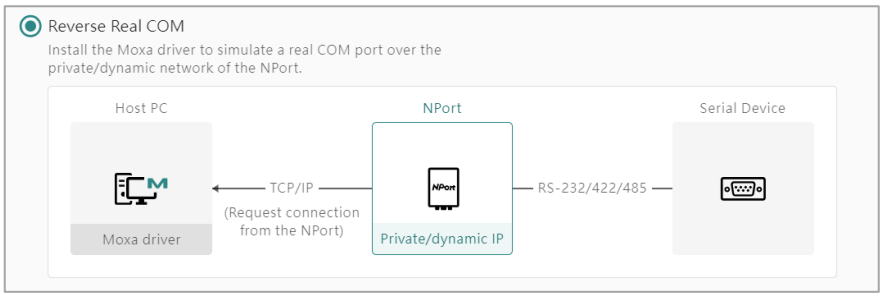
Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



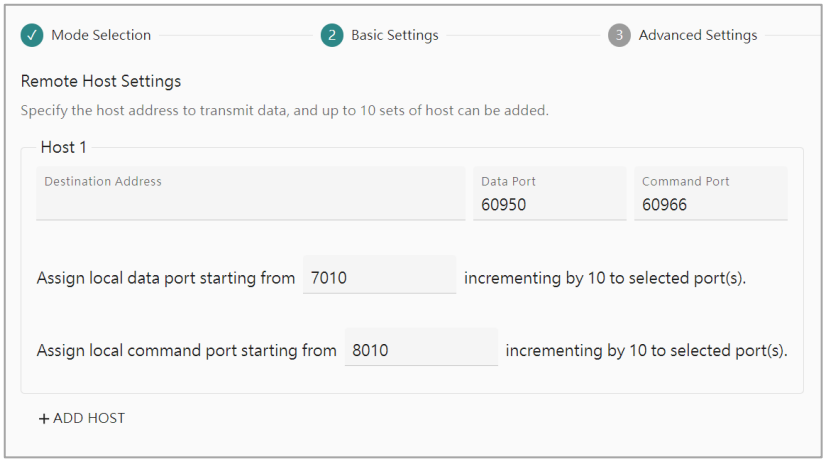
Reverse Real COM Mode

If the host PC and NPort are on separate networks, with potentially untrusted networks in between, a firewall/router might be present before the NPort to regulate which connections can access the internal/local network. The host PC might encounter difficulty connecting to the NPort in this scenario. By selecting Reverse Real COM mode, you can trigger the connection direction from NPort, which may bypass the firewall/router.



Step 1. Mode Selection

Select the COM-based Control and select Reverse Real COM mode.



Step 2. Basic Settings

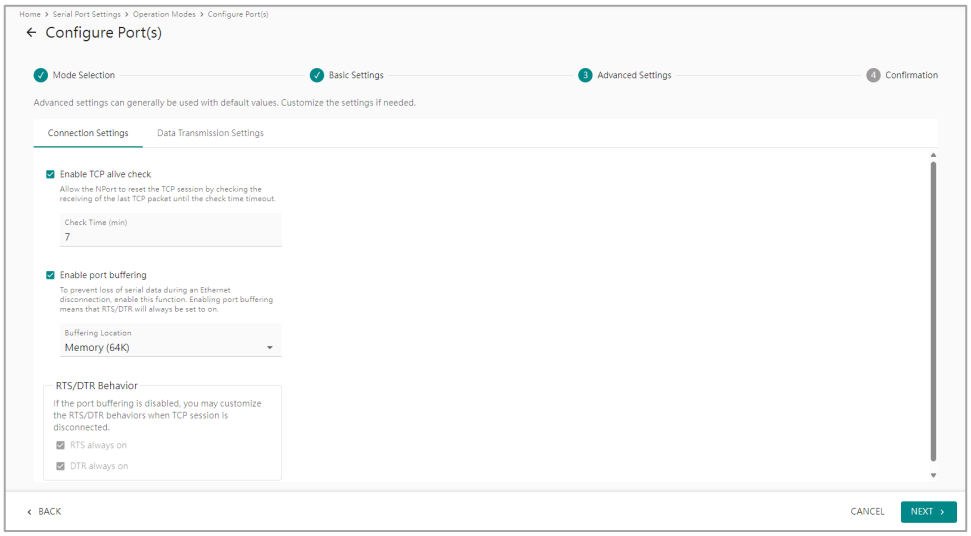
Destination address: Specifying an IP address, domain name, or the name defined in the host table that the NPort 6000-G2 connects to.

Data Port: This is the target TCP port number that is assigned by the NPort Windows Driver Manager on the Remote Host/Server (refers to Chapter 4 Mapping COM Ports). To avoid conflicts with well-known TCP ports, set the default to 60950.

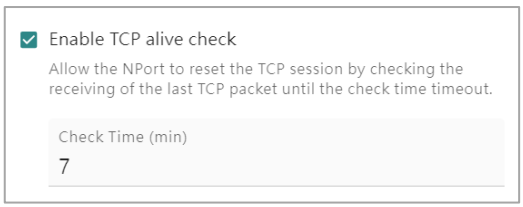
Command Port: This is the target TCP port number that is assigned by the NPort Windows Driver Manager on the Remote Host/Server (refers to Chapter 4 Mapping COM Ports). This port will be used for the communication commands, for example changing the RTS signal. To avoid conflicts with well-known TCP ports, set the default set 60966.

Assign local data port starting from: Use this field to specify the designated local data port on the NPort.

Assign local command port starting from: Use this field to specify the designated local command port on the NPort.



Step 3. Advanced Settings—Connection Settings



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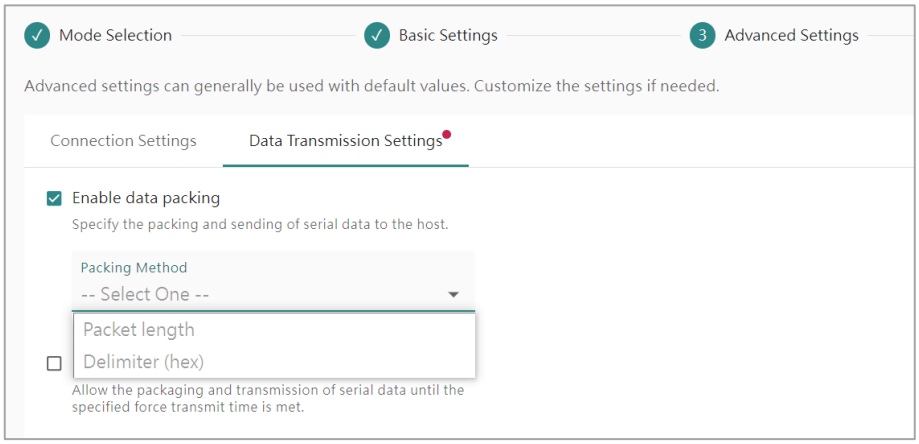
Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-zalive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.

Step 3. Advanced Settings—Data Transmission Settings

When the serial data is transmitted on the serial bus, it's continuous data. A "Read" command allows the software to receive all of the data. When everything switches to Ethernet, it's a different story. Ethernet data can be divided into packets, which are then assembled by the receiver into a complete frame to interpret the transmission request from the other device. However, a legacy serial software might lack support for the fundamental "assemble" function found in socket programs. Here, the NPort enables the Data Transmission function to deliver the correct frame at the beginning, requiring no changes to the legacy serial software for reading accurate data.



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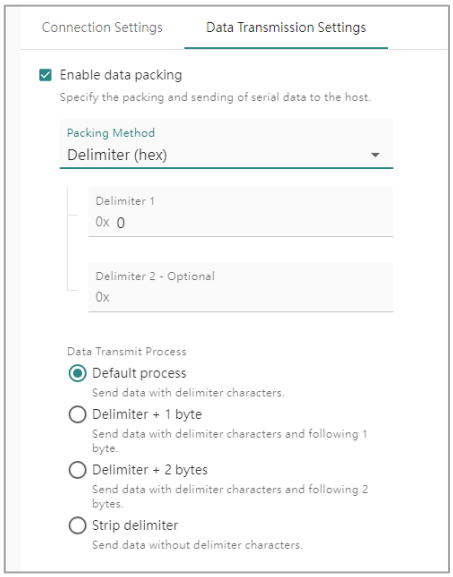

Delimiter (hex): The delimiter refers to the ending character(s) of data. When the specific character(s) is received, the NPort will execute the Data Transmit Process to handle the serial data. Then send it out on the Ethernet side.

Delimiter 1 and Delimiter 2: When Delimiter 1 is set up in hex format, the NPort will looking to the specific character and consider it as the ending character. If there are two ending characters, please set the Delimiter 2, these two delimiters will need to be received by the correct order (delimiter 1 first and then delimiter 2), then NPort will package all the data in the serial buffer and follow the Data Transmit Process to handle the delimiter(s) then transmit the data to the Ethernet port.

Data Transmit Process: This field determines how the serial data and the delimiter(s) is handled when the delimiter(s) is received. If Delimiters 1 and 2 are both set up, both characters must be received with the correct order then the process will take place.

- **Default process:** Data in the buffer and the delimiter(s) will be transmitted.
- **Delimiter+1 byte:** Data in the buffer and the delimiter(s) plus one byte will be transmitted after one additional byte is received following the delimiter(s).
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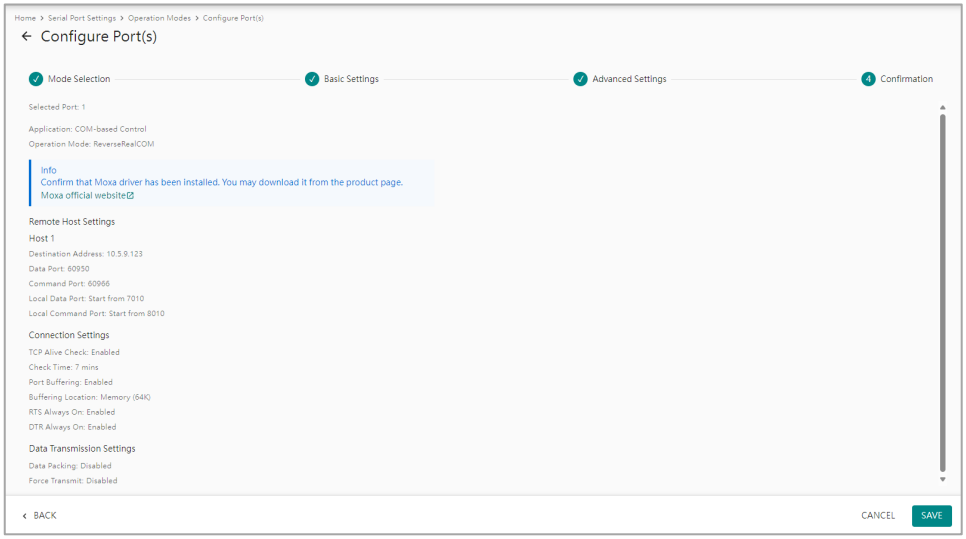
Enable force transmit: The NPort will monitor the idle time between two characters. If the time is reached and there are no new characters being received, the NPort will package all the data in the serial buffer and then send it on the Ethernet side. The number of this field is between 1 and 65535.Step 4 Confirmation

Please review and **SAVE** above settings to make them affective.

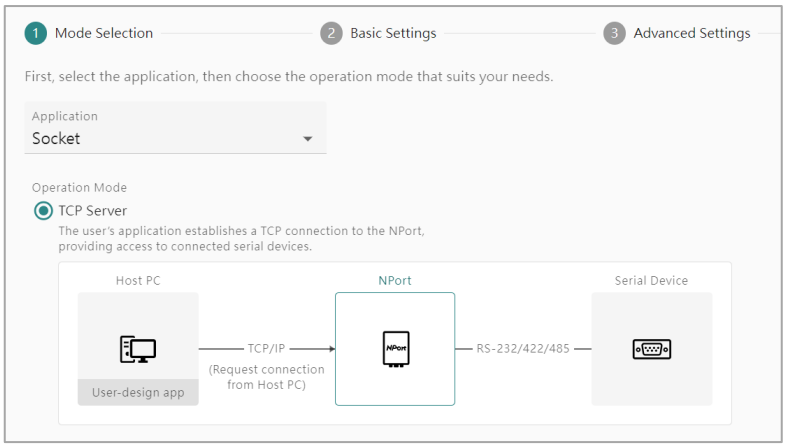


Socket Applications

The Socket application requires the user to have or create a socket program to establish the TCP session or send UDP packets to the destination NPort. Usually when the user wants to manage multiple brands of the network devices, he may have the resources to create or integrate a socket program to fulfill this need.

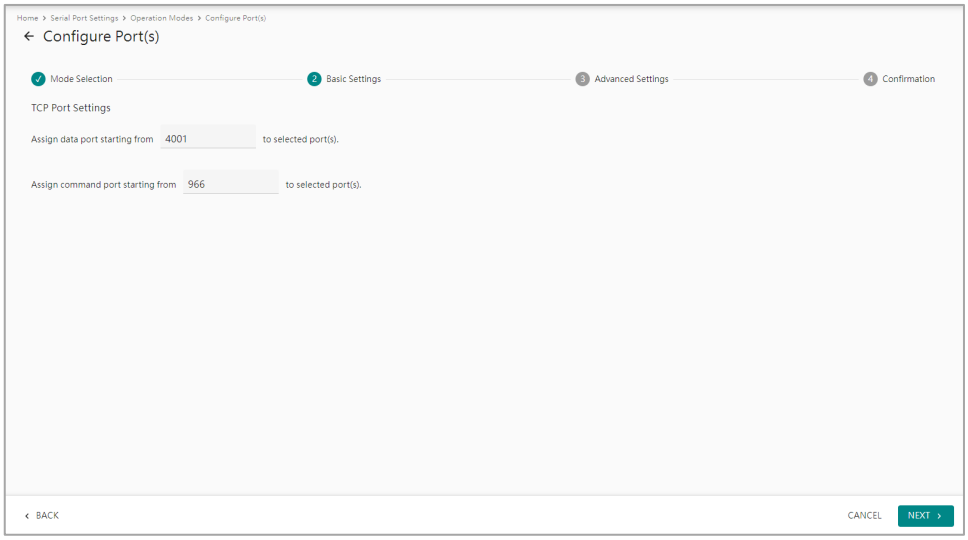
TCP Server Mode

If the user's program will initiate the TCP session actively, the NPort shall be a TCP Server to listen to a specific TCP port and wait for user's program to establish the TCP session. Please select **TCP Server** mode on NPort.



Step 1. Mode Selection

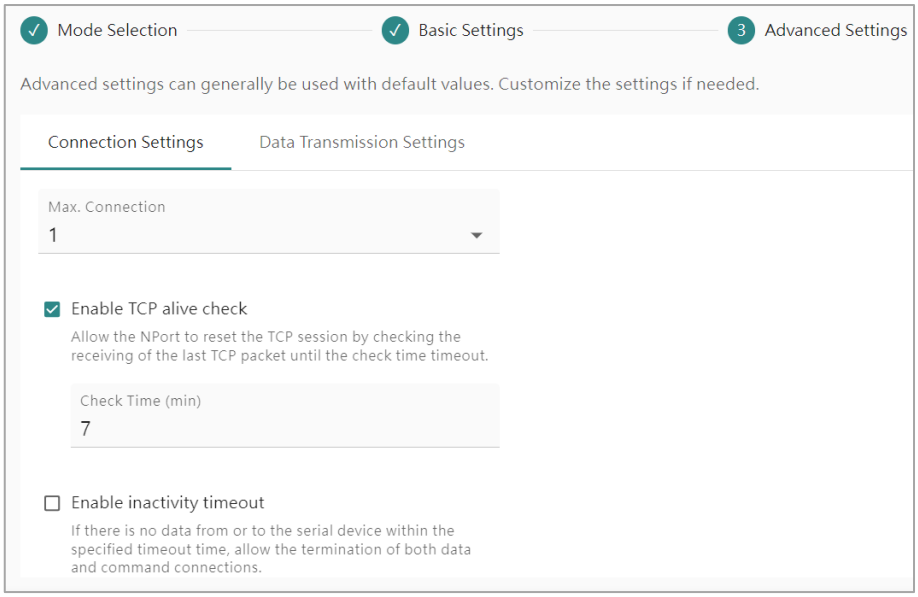
Select the **Socket** and select **TCP Server** mode.



Step 2. Basic Settings

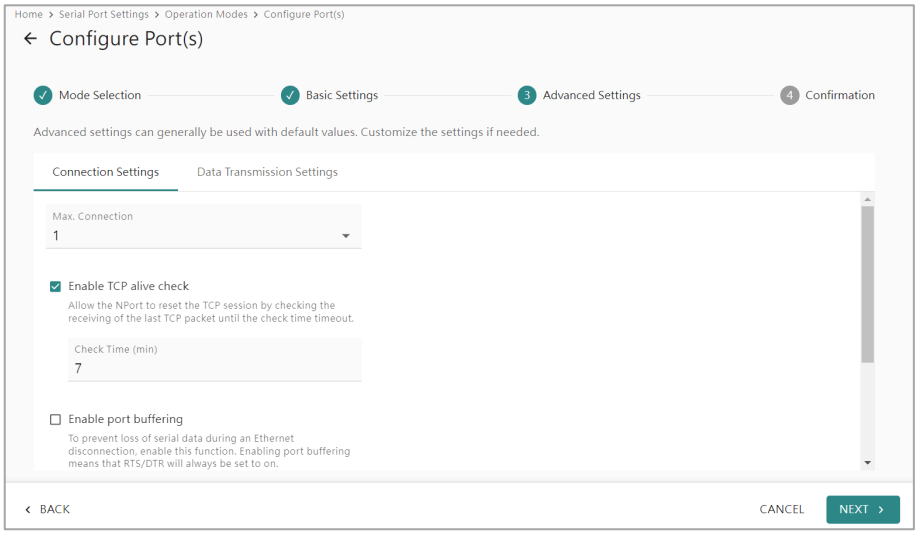
Assign data port: This is the TCP port number assignment for the serial port on the NPort 6000-G2. It is the port number that the serial port uses to listen to connections, and that other devices must use to contact the serial port. To avoid conflicts with well-known TCP ports, the default is set to 4001.

Assign command port: The Command port is the TCP port for listening to Moxa commands from the host. To prevent a TCP port conflict with other applications, the user can set the Command port to another port if needed.

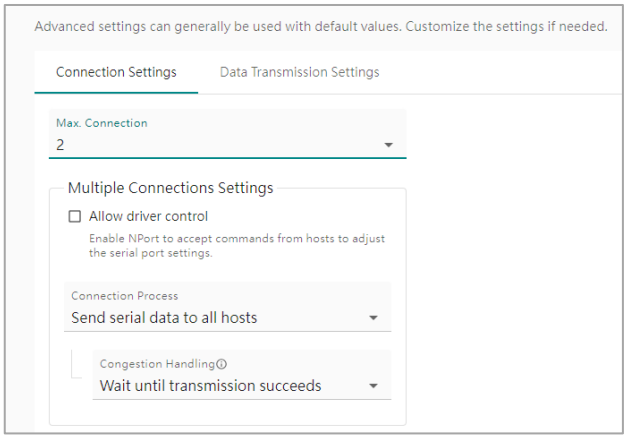


Step 3. Advanced Settings—Connection Settings

In some scenarios, the user may need to modify the advanced settings to fulfill his special cases.



For those users who have more than one Hosts to communicate with the NPort, he will need to enable the Max. Connection by changing the number to the number of the Hosts. With this, the NPort will accept all these Hosts to connect simultaneously. For example, if Host 1 is the primary computer who will send requests and receive the responses and Host 2 is the backup computer to receive all the responses. The user shall set the number to 2.



Max. connection (default=1): This field is used if you need to receive data from different hosts simultaneously. When set to 1, only one specific host can access this port of the NPort 6000-G2, and the Real COM driver on that host will have full control over the port.

When set to 2 or greater, up to the specified number of hosts' Real COM drivers may open this port at the same time. When multiple hosts' Real COM drivers open the port at the same time, the COM driver only provides a pure data tunnel—no control ability. The serial port parameters will use firmware settings instead of depending on your application program (AP).

The firmware will only send data back to the driver on the host. When the data is received on the serial port and passing to the Ethernet side of the NPort, all the Hosts will receive the same data. When the data is received on the Ethernet port and passing to the serial side of the NPort, the data will be sent first-in first-out.

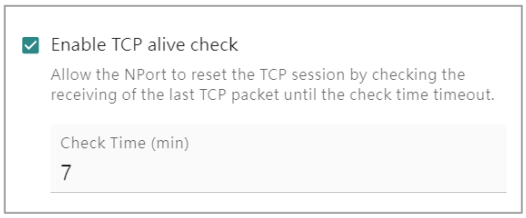
If above scenario is not the case on your site, there are several advanced functions at **Multiple Connection Settings** to do some modifications.

Allow driver control: as mentioned above, when set **Max. connection** to 2 or greater, the serial port parameters will use firmware settings. If you want the serial parameters still use the settings of your application program, please enable the **Allow driver control** function. When you enable it, the serial port settings of your AP will overwrite the firmware settings while opening the COM port. Usually, you should only enable this function on one of the hosts. If you enable it on 2 or more hosts, then the serial parameters will be overwritten every time these hosts open the COM port.

To handle the unexpected data communication of multiple connections, there are different combinations for different scenarios.

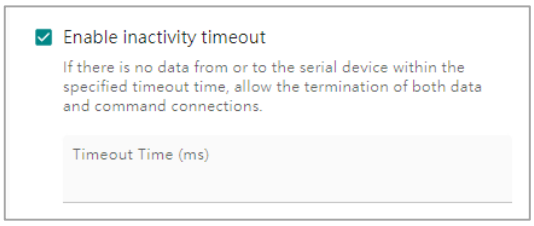
Connection Control	Congestion Handling	Description
Send serial data to all hosts	-	This is the default data communication behavior for multiple connections, the serial data will be transmitted to all the hosts. What if there is one host cannot receive the data successfully?
	Wait until transmission succeeds	Just wait, until the host can receive data again. There is a side-effect on this option, if the host just cannot be back, the serial data will be stored on the serial buffer of the NPort. When the serial data is accumulated to 1,024 bytes, the serial buffer will full and cannot receive any data anymore. If there are new coming data, all of them will be dropped.
	Keep sending data to other hosts	Just ignored the abnormal host, keep sending data to other online hosts. The side-effect of this option is the communication seems OK when the user only checks the status on the succeed host(s). There may need a mechanism to notify the user there is an abnormal host cannot receive any data.

Connection Control	Congestion Handling	Description
Send serial data to the requested host	-	Sometimes, the other hosts cannot handle the responses they don't request. For this case, please select **Send serial data to the requested host** then all the hosts will only receive the response based on their own request. For this scenario, what if the serial device doesn't respond the request or respond too late?
	Discard	If the serial response is timeout, then the NPort will discard all the new coming serial data before NPort receives an Ethernet request.
	Send to the last request	If the serial response is timeout and the NPort receives new coming serial data, it will send the data to the host who send the most recent request to NPort.
	Send to all open connections	If the serial response is timeout and the NPort receives new coming serial data, it will send the data to all the hosts who still connected to NPort.
	Enable response timeout	For this kind of one-request-one-response application, user may need to define how long time the NPort shall wait for the serial response? **The default timeout time is 10,000 ms.** This value shall be less than the timeout time on user's AP. Otherwise this abnormal scenario might happen, the AP consider it's a timeout error but NPort still waiting for a response.



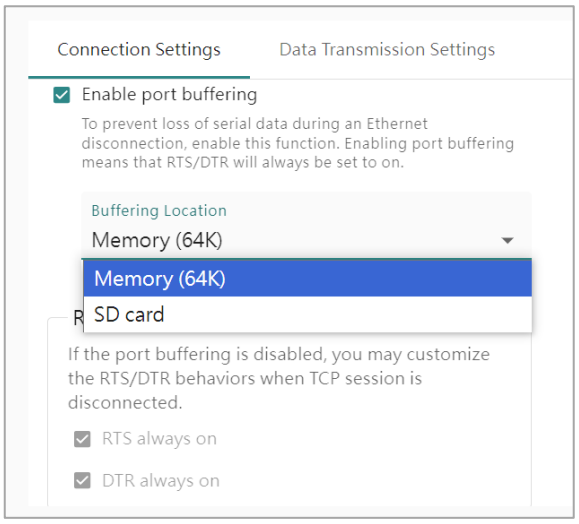
Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the **Enable TCP alive check time** function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.



This setting is used for applications that may incur high costs for the connection between the remote host and the NPort, such as when it is connected with a cellular/satellite line. .

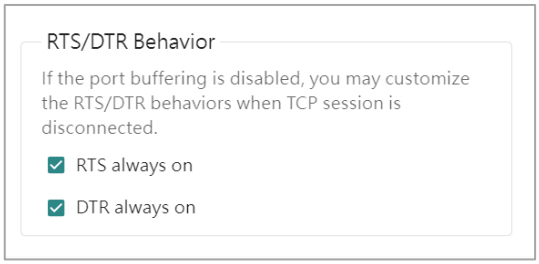
When the TCP session is established, the NPort will terminate the session actively if there is no new data for a while on the serial port. For the timing to terminate the TCP session, the user will need to set the Timeout time (ms) for this option.



Compared to the serial bus, the Ethernet network is not stable. Poor cable contact or a damaged switch/router could cause it to be disconnected or broken. When this happens, the serial data cannot transmit over Ethernet because the receiver does not exist. As time passes, the serial data could be discarded and lost. If the serial data is important, u enable the **Enable port buffering** function. The NPort can store serial data either in its internal memory, which is 64 Kbytes, or in an external SD card (if supported).

Enable port buffering (default=No): To prevent serial data loss when the Ethernet connection is down, check the checkbox to enable port buffering. If you enable port buffering, RTS/DTR will remain in the on position.

Buffering Location: Select the location of buffering. Memory (64K) or SD card.

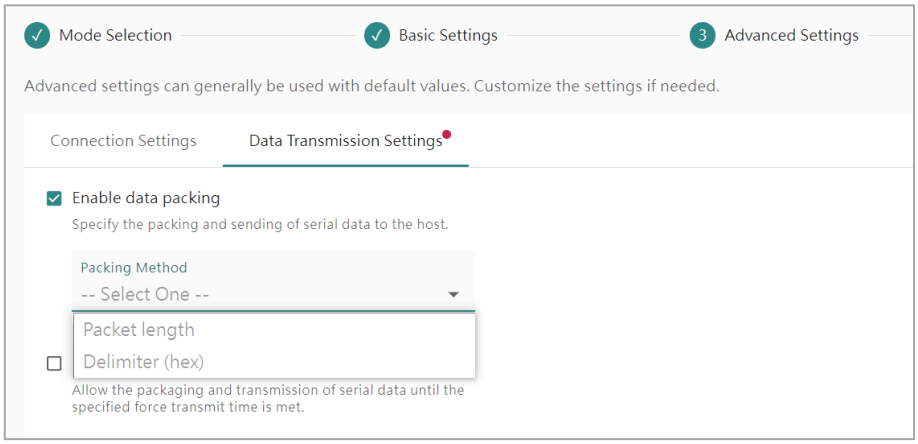


In a serial bus, the host and the serial device can use RTS/DTR signals to indicate their status to each other. Using the RTS/DTR Behavior function, the NPort can simulate the RTS/DTR behavior on Ethernet connections. When using legacy software, enable the RTS/DTR signal and keep it constantly on to prevent the host from entering sleep mode or shutting down. This will ensure the host is always ready for communication.

RTS/DTR Behavior (default=always on): Configures what happens to the RTS and DTR signals when the TCP session is disconnected. For some applications, serial devices need to know the Ethernet link status through RTS or DTR signals sent via the serial port. This function may be disabled by enabling the Enable port buffering function.

Step 3. Advanced Settings—Data Transmission Settings

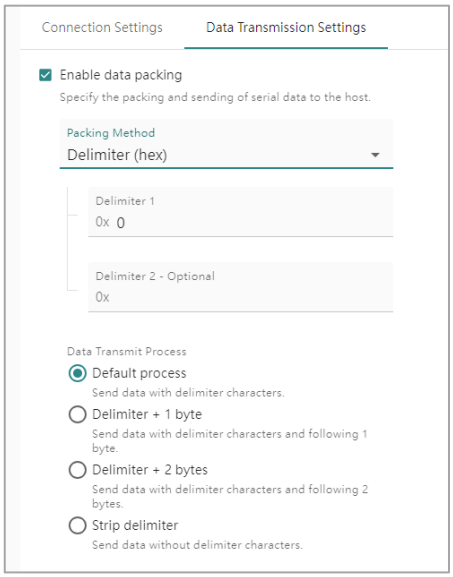
When the serial data is transmitted on the serial bus, it's continuous data. The software can receive the whole data by a simple "Read" command. When everything move to Ethernet based, it's another story. The Ethernet data might be separated to packets, and the receiver will assemble these packets to one complete frame to understand what the other device wants to transmit. But if it's a legacy serial software, it may not support the "assemble" function which is a basic function of a socket program. In this case, NPort provides Data Transmission function to deliver the correct frame at the beginning, then the legacy serial software doesn't need anything changed to read the correct data.



Like a bar code reader, serial data has a fixed length, and the fixed length data is read at once. A second common application is a serial protocol with specific ending character(s), which makes it easier for the engineer to read the data. In these two scenarios, please enable the **Enable data packing** function.

Enable data packing: With the dropdown menu Packing Method, select **Packet length** or **Delimiter (hex)**.

Packet length (Byte): The packet length setting refers to the maximum amount of data that is allowed to accumulate in the serial port buffer before sending. When a packet length between 1 and 1024 bytes is specified, data in the buffer will be sent as soon as it reaches the specified length.



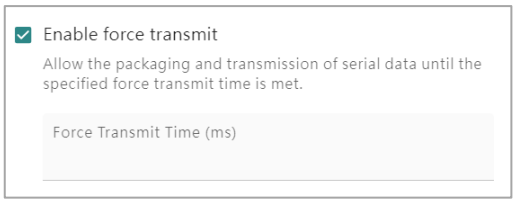
Delimiter (hex): The delimiter refers to the ending character(s) of data. When the specific character(s) is received, the NPort will execute the Data Transmit Process to handle the serial data then send it out on the Ethernet side.

Delimiter 1 and Delimiter 2: If Delimiter 1 is configured in hex format, the NPort will treat the designated character as the end character. If there are two ending characters, use Delimiter 2 and ensure they are received in the correct order (Delimiter 1 first, then Delimiter 2). The NPort will package all the data in the serial buffer and follow the Data Transmit Process to handle the delimiter(s) before transmitting the data to the Ethernet port.

Data Transmit Process: This field determines how to handle the serial data and the delimiter(s) when receiving the delimiter(s). If both Delimiters 1 and 2 are set up, the process will only occur when both characters are received in the correct order.

- **Default process:** Data in the buffer and the delimiter(s) will be transmitted.
- **Delimiter+1 byte:** Data in the buffer and the delimiter(s) plus one byte will be transmitted after one additional byte is received following the delimiter(s).
- **Delimiter+2 bytes:** Data in the buffer and the delimiter(s) plus two bytes will be transmitted after two additional bytes are received following the delimiter.
- **Strip delimiter:** Data in the buffer will be transmitted and the delimiter(s) will be dropped.

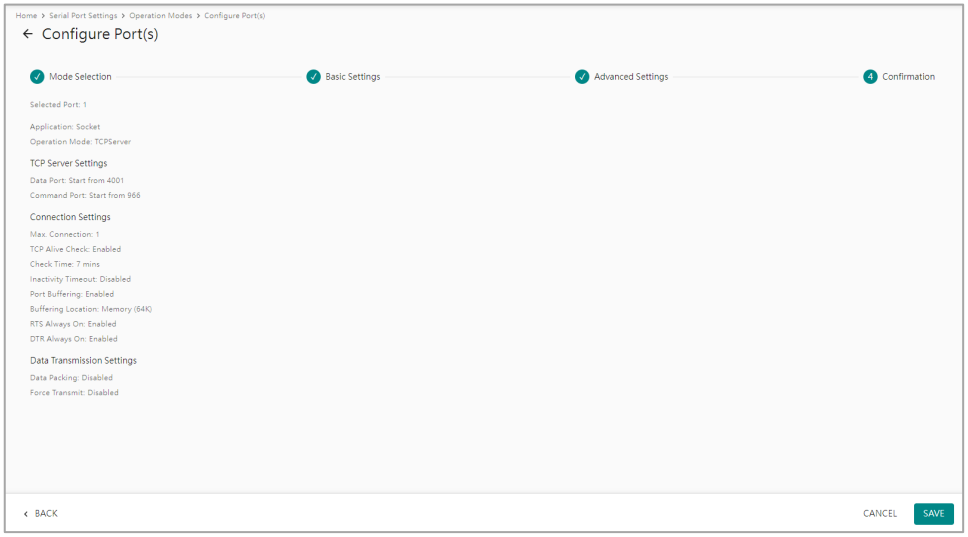
Some protocols, like Modbus, may separate different messages from the idle time between two messages. For this case, please enable the **Enable force transmit** function and input the idle time at the **Force Transmit Time (ms)** field.



Enable force transmit: The NPort will monitor the idle time between two characters. If the time is reached and there are no new characters being received, the NPort will package all the data in the serial buffer and then send it on the Ethernet side. The number of this field is between 1 and 65535.

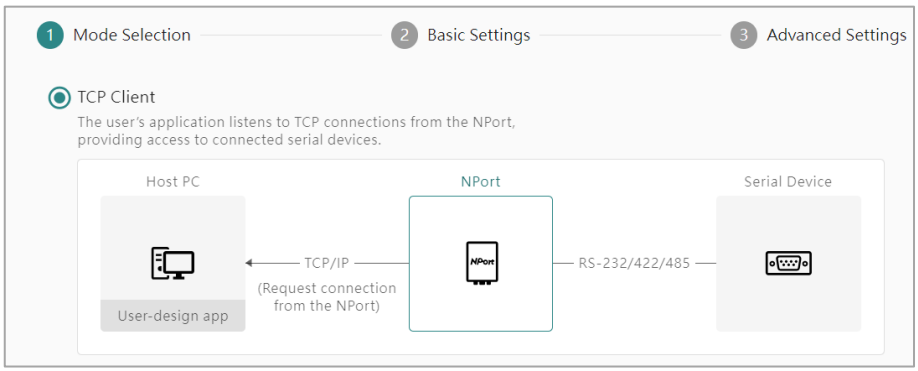
Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



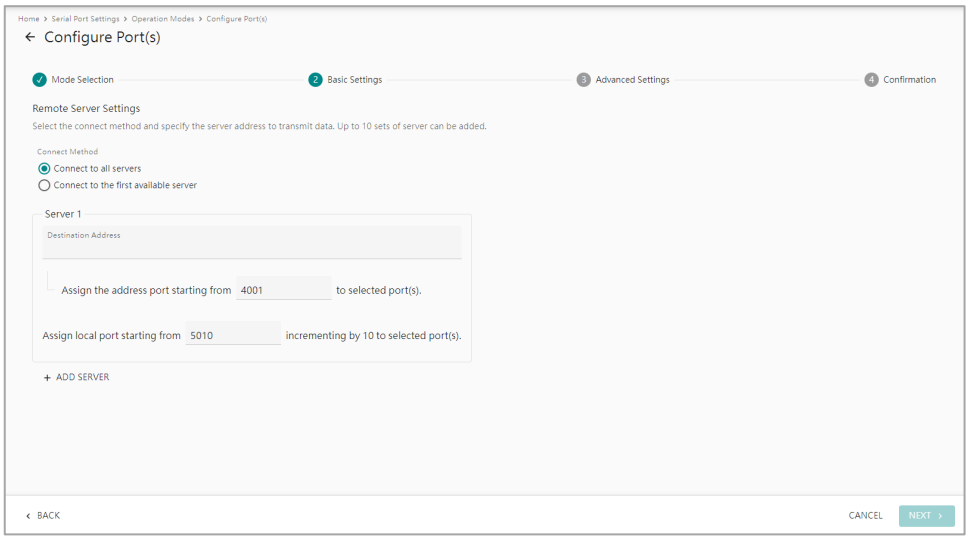
TCP Client Mode

When your program listens to a specific TCP port and wait for NPort to establish the TCP session. Please select **TCP Client** mode on the NPort.



Step 1. Mode Selection

Select the **Socket** and then **TCP Client** mode.



Step 2. Basic Settings

There are two types of the TCP Client application. If the serial device needs to connect to all the hosts (the TCP Servers) simultaneously, select **Connect to all servers**. Or, if the serial device will try to connect to all hosts but only needs to establish a connection with the first one, select **Connect to first available server**. With this setting, the NPort will connect the servers in the order they were entered.

Connect Method: Choose whether you want to **Connect to all servers** or **Connect to the first available server**.

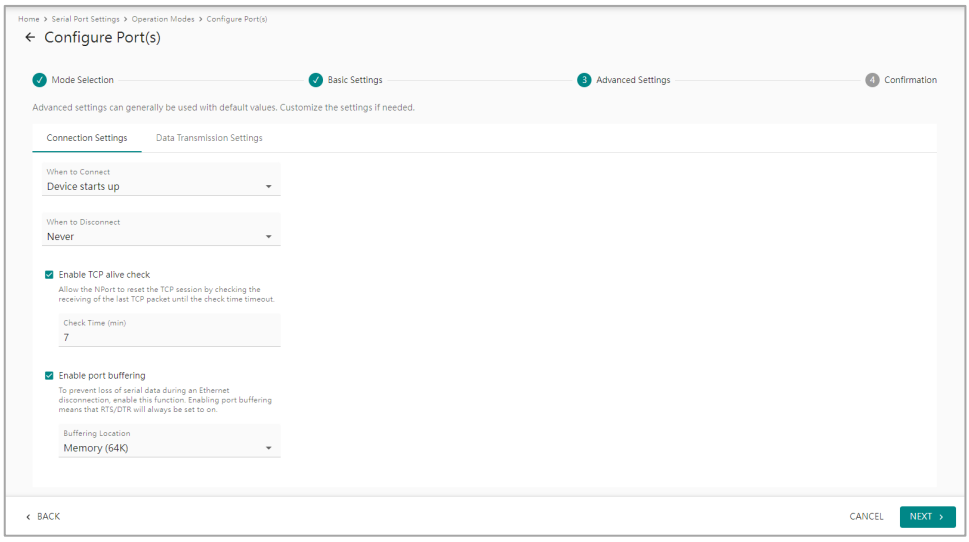
Several parameters need to be set for each server:

Destination Address: Specifying an IP address allows the NPort 6000-G2 to connect actively to the remote host. Provide the destination address for each server.

Assign the address port starting from: This is the TCP port number assignment on the remote host to listen to NPort's request. Please confirm that the port on the remote host matches the AP setting. The default port is set to 4001 to avoid conflicts with well-known TCP ports.

Assign local port starting from: Use these fields to specify the designated local port on the NPort.

ADD Server: Click **ADD Server** to add more remote servers for NPort to connect.



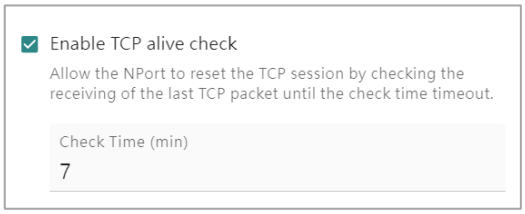
Step 3. Advanced Settings—Connection Settings

For TCP Client mode, the NPort will start the TCP session. It's important to determine when the NPort shall start or end the session. Based on different scenarios, set the behavior on **When to Connect/ When to Disconnect** function.

When to Connect/Disconnect: This setting determines the parameters under which a TCP connection is established or disconnected. The following table provides the different options. In general, we provide both the Connect conditions and Disconnect conditions.

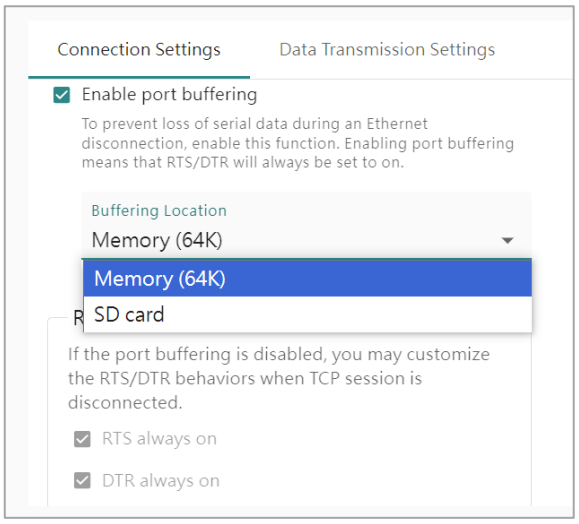
When to Connect	When to Disconnect	Description
Device starts up	Never	This setting is used for those serial devices that may proactively update data and remain powered on at all times, so the NPort needs to start updating data as quickly as possible. The NPort will try to establish the TCP session when the firmware is ready. The NPort will not actively terminate the session once the TCP session is established. If the TCP session is disconnected by the remote host or by an accident, the NPort will try to reestablish it automatically.
Receive any characters from serial	Never	This setting is used for serial devices that may proactively update data, but they may not be powered at all the time or they may update data very frequently. Therefore, the NPort can wait until it receives new serial data, and then it starts to establish the TCP session. The NPort will try to establish the TCP session when it receives data on the serial port. The NPort will not actively terminate the session once it has established the TCP session. If the TCP session is disconnected by the remote host or by accident, the NPort will try to reestablish it automatically.
	T	This setting is for applications that may incur high costs for the connection between the remote host and the NPort, such as when it is connected with a cellular/satellite line. The NPort will try to establish the TCP session when it receives data on the serial port. When the TCP session is established, the NPort will end the session actively if there is no new data for a while on the serial port. Set the Timeout time to determine when to end the TCP session.

When to Connect	When to Disconnect	Description
DSR on	Never	This setting is used for serial devices that can notify the host of their readiness to update data by turning on the DTR signal. Once the NPort detects the DSR signal is on, it will establish the connection and be ready for serial data update. The NPort will try to establish the TCP session when it detects the DCD signal is on. When the TCP session is established, the NPort will not terminate the session actively. If the TCP session is disconnected by the remote host or by accident, the NPort will try to reestablish it automatically.
	DSR off	This setting is used for those serial devices that can notify the host by changing the DTR signal to on when they are ready to update data. When the serial device finishes data update, it will also notify the host by changing the DTR signal to off. The NPort will try to establish the TCP session when it detects the DSR signal is on. When the TCP session is established, the NPort will only terminate the session actively when detecting the DSR signal is off.
DCD on	Never	This setting is used for serial devices that can notify the host of their readiness to update data by turning on the DCD signal. So, when the NPort detects the DCD signal is on, it shall establish the connection and be ready for serial date update. The NPort will try to establish the TCP session when it detects the DCD signal is on. When the TCP session is established, the NPort will not terminate the session actively. If the TCP session is disconnected by the remote host or by accident, the NPort will try to reestablish it automatically.
	DCD off	This setting is used for those serial devices that can notify the host by changing the DCD signal to on when they are ready to update data. When the serial device finishes the data update, it will also notify the host by changing the DCD signal to off. The NPort will try to establish the TCP session when it detects the DCD signal is on. When the TCP session is established, the NPort will only terminate the session actively when detecting the DCD signal is off.



Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the **Enable TCP alive check time** function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

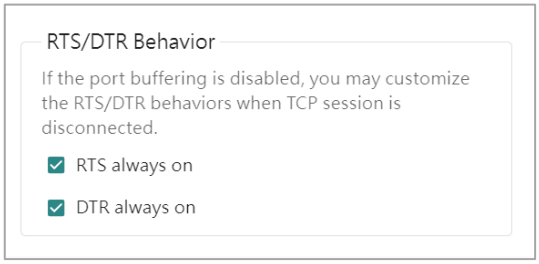
Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.



Compared to the serial bus, the Ethernet network is not stable. It could be disconnected/broken by a cable poor contact or switch/router damaged. When this happened, the serial data cannot be transmitted on the Ethernet because the receiver does not exist. As time goes by, the serial data may be dropped and gone. If the serial data is important, user can enable the **Enable port buffering** function. The NPort will save the serial data to the internal memory, 64 Kbytes, or the external SD card (for the supported models).

Enable port buffering (default=No): You may enable port buffering by checking the checkbox to prevent the loss of serial data when the Ethernet connection is down. Enabling port buffering means that RTS/DTR will always be set to on.

Buffering Location: Select the location of buffering. Memory (64K) or SD card.

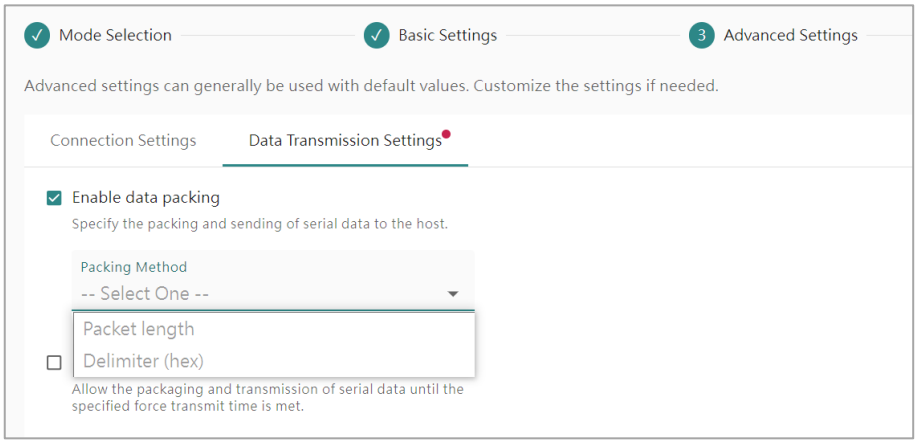


On a serial bus, the Host and the serial device may based on turning on/off the RTS/DTR signals to notify the serial device that the Host is alive or not, and vice versa. The NPort supports RTS/DTR Behavior function to simulate above behavior on the Ethernet connections. Some legacy software on the Host may switch to sleep mode or shutdown itself based on the RTS/DTR signal, when enable this function and keep these two signal always on, it can prevent this to happen and keep the Host is ready for communication.

RTS/DTR Behavior (default=always on): You can configure what happens to the RTS and DTR signals when TCP session is disconnected. For some applications, serial devices need to know the Ethernet link status through RTS or DTR signals sent via the serial port. This function may be disabled by enabling the Enable port buffering function.

Step 3. Advanced Settings—Data Transmission Settings

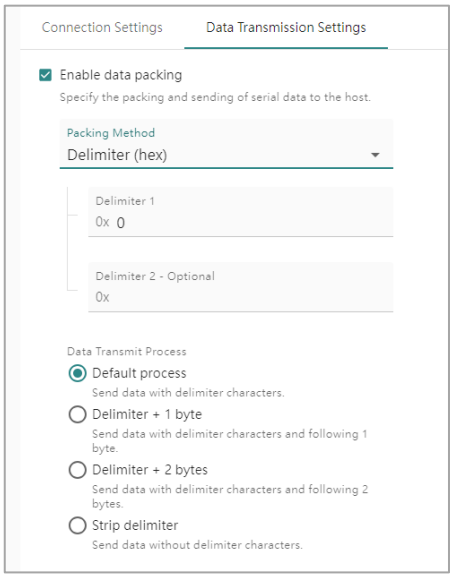
When the serial data is transmitted on the serial bus, it's continuous data. A "Read" command allows the software to receive all of the data. When everything switches to Ethernet, it's a different story. Ethernet data can be divided into packets, which are then assembled by the receiver into a complete frame to interpret the transmission request from the other device. However, a legacy serial software might lack support for the fundamental "assemble" function found in socket programs. Here, the NPort enables the Data Transmission function to deliver the correct frame at the beginning, requiring no changes to the legacy serial software for reading accurate data.



Like a bar code reader, serial data has a fixed length, and the fixed length data is read at once. A second common application is a serial protocol with specific ending character(s), which makes it easier for the engineer to read the data. In these two scenarios, please enable the Enable data packing function..

Enable data packing: With the drop-down menu Packing Method, select **Packet length** or **Delimiter (hex)**.

Packet length (Byte): The packet length setting refers to the maximum amount of data that is allowed to accumulate in the serial port buffer before sending. When you specify a packet length between 1 and 1024 bytes, the data in the buffer will be sent as soon as it reaches the specified length.



Delimiter (hex): The delimiter refers to the ending character(s) of data. When the specific character(s) is received, the NPort will execute the Data Transmit Process to handle the serial data. Then, send it out on the Ethernet side.

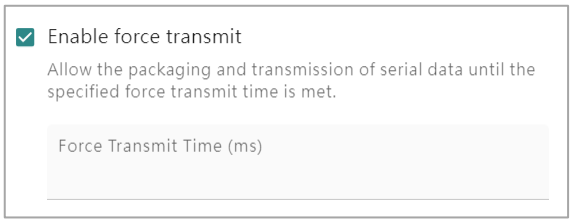
Delimiter 1 and Delimiter 2: If Delimiter 1 is configured in hex format, the NPort will treat the designated character as the end character. If there are two ending characters, use Delimiter 2 and ensure they are received in the correct order (Delimiter 1 first, then Delimiter 2). The NPort will package all the data in the serial buffer and follow the Data Transmit Process to handle the delimiter(s) before transmitting the data to the Ethernet port.

Data Transmit Process: This field determines how to handle the serial data and the delimiter(s) when receiving the delimiter(s). If both Delimiters 1 and 2 are set up, the process will only occur when both characters are received in the correct order.

Default process: Data in the buffer and the delimiter(s) will be transmitted.

- **Delimiter+1 byte:** Data in the buffer and the delimiter(s) plus one byte will be transmitted after one additional byte is received following the delimiter(s).
- **Delimiter+2 bytes:** Data in the buffer and the delimiter(s) plus two bytes will be transmitted after two additional bytes are received following the delimiter.
- **Strip delimiter:** Data in the buffer will be transmitted and the delimiter(s) will be dropped.

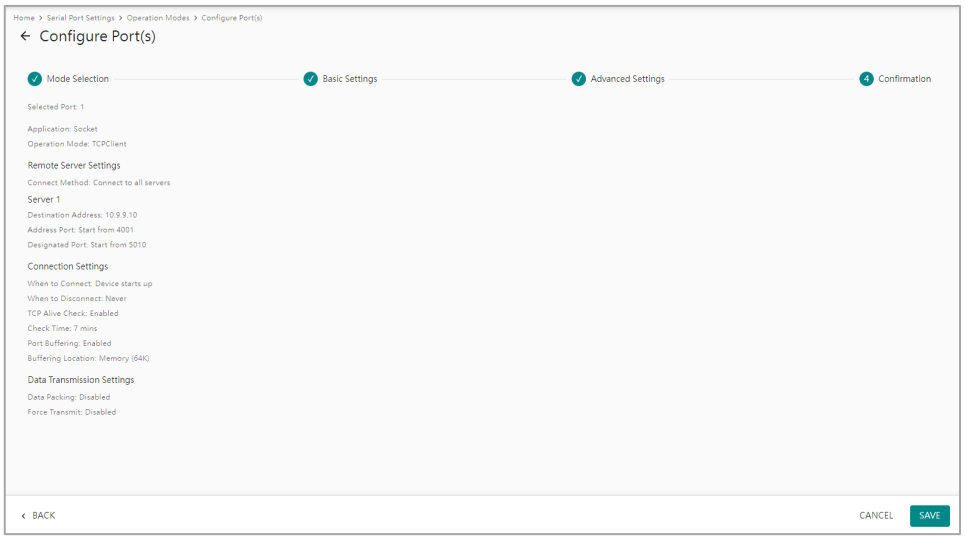
Some protocols, like Modbus, may separate different messages from the idle time between two messages. For this case, please enable the **Enable force transmit** function and input the idle time at the **Force Transmit Time** (ms) field.



Enable force transmit: The NPort will monitor the idle time between two characters. If the time is reached and there are no new characters being received, the NPort will package all the data in the serial buffer and then send it on the Ethernet side. The number of this field is between 1 and 65535.

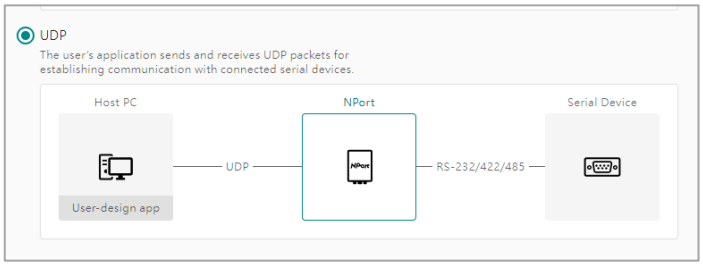
Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



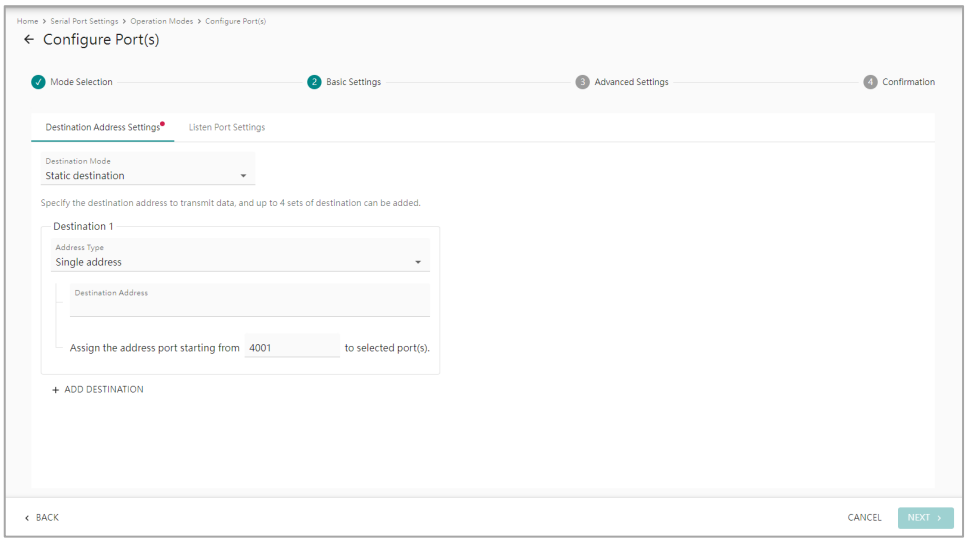
UDP Mode

If your application requires faster data arrival at the device without the need for guaranteed data reception, then he may choose to use UDP packets for the application. For example, at the train station, the message displayed on the LCM could be missed because there are so many displays. If the passenger misses the message on one display, they can find it on the others. The train arrival message may be useless if it arrives on the display one minute after the train has already arrived. This is the typical application of the UDP mode.



Step 1. Mode Selection

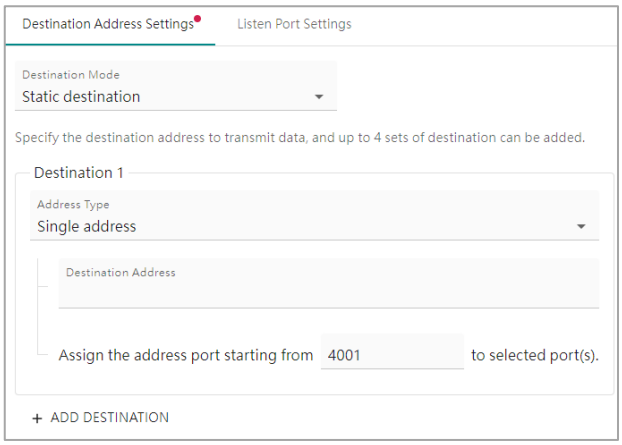
Select the **Socket** and then **UDP** mode.



Step 2. Basic Settings

There are two types of UDP applications. The data may be sent to static destinations, or it may depend on different serial data going to different destinations.

Destination Mode	Address Type	Description
Static destination	Single address	This setting allows serial devices to proactively update data to specific remote hosts. You can input the target IP address and listen UDP port with this option.
	Address range (up to 16 addresses)	This setting allows users to proactively update data from serial devices to specific remote hosts. You can input a range of the IP addresses and listen UDP port with this option.
Dynamic learning	Learning by packet	This setting is used for the one- request, one-response scenario. The NPort will record the source IP address and UDP port as the destination IP address and UDP port when the NPort receives serial data. Every time the NPort receives an Ethernet request, it will update the destination IP address and UDP port.
	Learning when reaching the timeout	Until the timeout time is reached, the NPort will remove the old destination IP address and UDP port and update the information of the next UDP request to the table.



Destination Mode: Specify the way the determines the destination address to transmit data. There are two options, the **Static destination** or **Dynamic learning**. This snapshot shows the parameters for the Static destination.

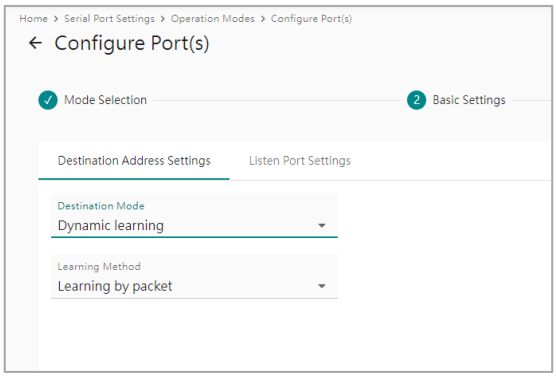
The parameters for Destination 1 are:

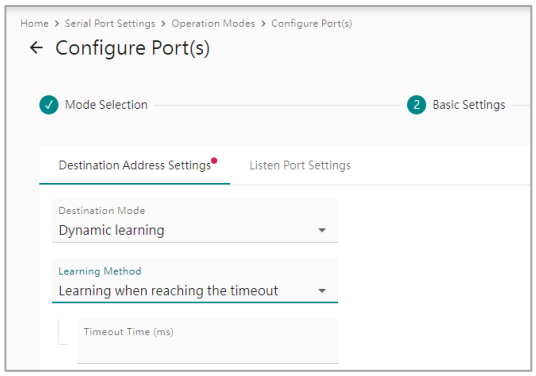
Address Type: Specify **Single address** or **Address range (up to 16 addresses)** as the destination for communication.

Destination Address: Input unicast, multicast IP addresses or domain names as the destination address. At least one destination range must be provided.

Assign the address port starting from: This is the UDP port number assignment for the serial port on the NPort.

ADD DESTINATION: Click the button to add more destinations.



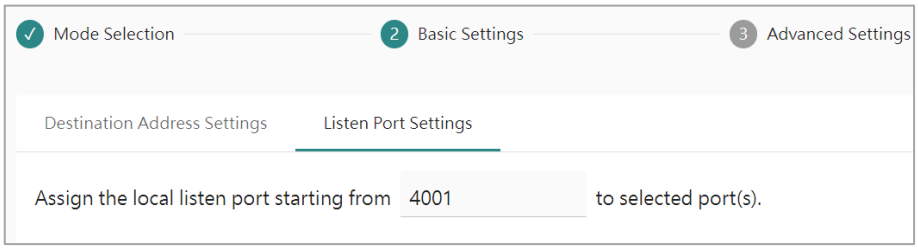


Destination Mode: Specify the way the determines the destination address to transmit data. There are two options, the **Static destination** or **Dynamic learning**. This snapshot shows the parameters for the Dynamic learning.

Learning Method: Under **Dynamic learning** mode, the NPort will record the source IP address and UDP port from the UDP packet. Depends on different user scenarios:

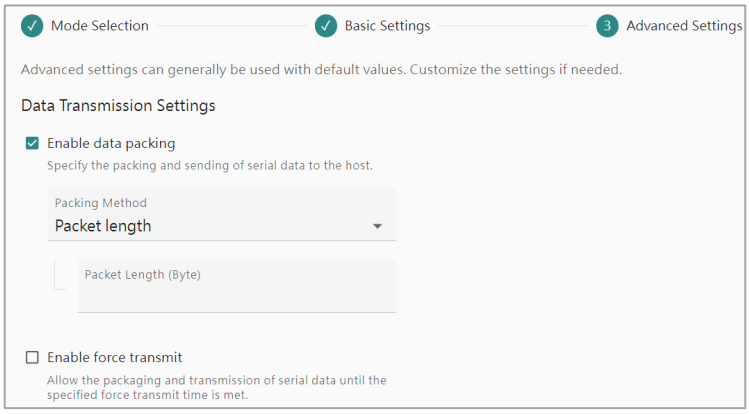
- The different UDP hosts may send the requests frequently, and the NPort (also the serial device) needs to reply to every request. Select **Learning by packet**. With this setting, the NPort will update the Destination IP address and UDP port for each UDP packet, so all the UDP hosts can receive the expected results.
- The different UDP hosts may take turns to send requests and get responses. Only when one host has finished its turn for updating, the token will pass to the second host to start another turn for requesting/responding. Here, set **Learning when reaching the timeout** and a specific timeout time (ms) for the hosts to exchanging the token. The NPort can learn the new host's IP address and UDP port.

No matter which Destination Mode was selected, assign the local listen port at Listen Port Settings tab:



Assign the local listen port from (default=4001): This is the UDP port that the NPort 6000-G2 listens to and that other devices must use. To avoid conflicts with well-known UDP ports, the default is set to 4001.

Step 3. Advanced Settings

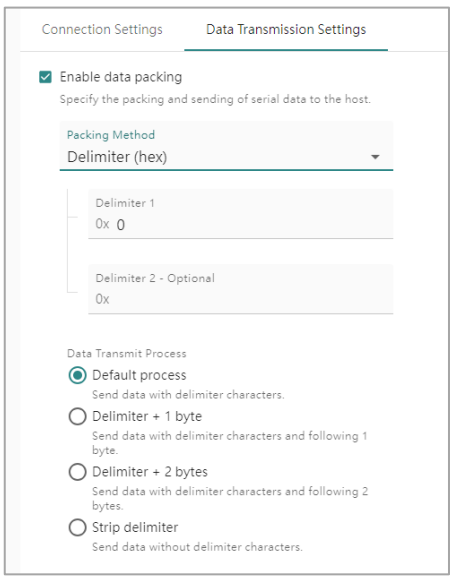


When the serial data is transmitted on the serial bus, it's continuous data. A "Read" command allows the software to receive all of the data. When everything switches to Ethernet, it's a different story. Ethernet data can be divided into packets, which are then assembled by the receiver into a complete frame to interpret the transmission request from the other device. However, a legacy serial software might lack support for the fundamental "assemble" function found in socket programs. Here, the NPort enables the Data Transmission function to deliver the correct frame at the beginning, requiring no changes to the legacy serial software for reading accurate data.

Like a bar code reader, serial data has a fixed length, and the fixed length data is read at once. A second common application is a serial protocol with specific ending character(s), which makes it easier for the engineer to read the data. In these two scenarios, please enable the **Enable data packing** function.

Enable data packing: With the drop-down menu Packing Method, select **Packet length** or **Delimiter (hex)**.

Packet length (Byte): The packet length setting refers to the maximum amount of data that is allowed to accumulate in the serial port buffer before sending. When a packet length between 1 and 1024 bytes is specified, data in the buffer will be sent as soon as it reaches the specified length.



Delimiter (hex): The delimiter refers to the ending character(s) of data. When the specific character(s) is received, the NPort will execute the Data Transmit Process to handle the serial data then send it out on the Ethernet side.

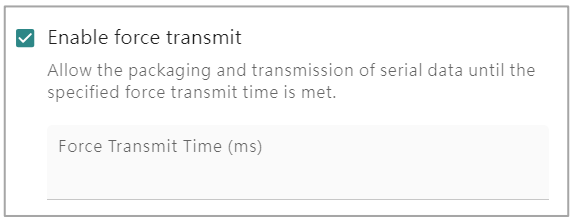
Delimiter 1 and Delimiter 2: If Delimiter 1 is configured in hex format, the NPort will treat the designated character as the end character. If there are two ending characters, use Delimiter 2 and ensure they are received in the correct order (Delimiter 1 first, then Delimiter 2). The NPort will package all the data in the serial buffer and follow the Data Transmit Process to handle the delimiter(s) before transmitting the data to the Ethernet port.

Data Transmit Process: This field determines how to handle the serial data and the delimiter(s) when receiving the delimiter(s). If both Delimiters 1 and 2 are set up, the process will only occur when both characters are received in the correct order.

Default process: Data in the buffer and the delimiter(s) will be transmitted.

- **Delimiter+1 byte:** Data in the buffer and the delimiter(s) plus one byte will be transmitted after one additional byte is received following the delimiter(s).
- **Delimiter+2 bytes:** Data in the buffer and the delimiter(s) plus two byte will be transmitted after two additional bytes are received following the delimiter.
- **Strip delimiter:** Data in the buffer will be transmitted and the delimiter(s) will be dropped.

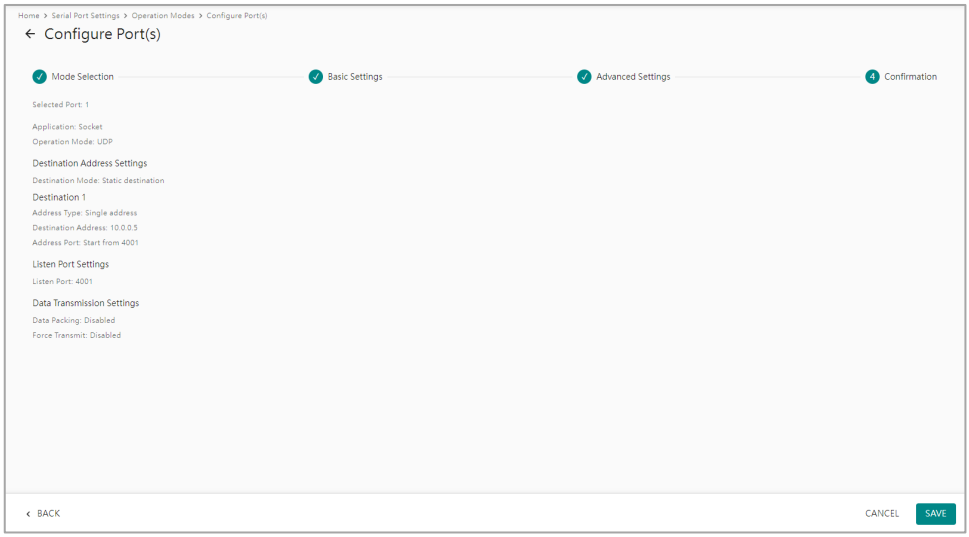
Some protocols, like Modbus, may separate different messages from the idle time between two messages. For this case, please enable the **Enable force transmit** function and input the idle time at the **Force Transmit Time** (ms) field.



Enable force transmit: The NPort will monitor the idle time between two characters. If the time is reached and there are no new characters being received, the NPort will package all the data in the serial buffer and then send it on the Ethernet side. The number of this field is between 1 and 65535.

Step 4. Confirmation

Please review and **SAVE** above settings to make them affective.

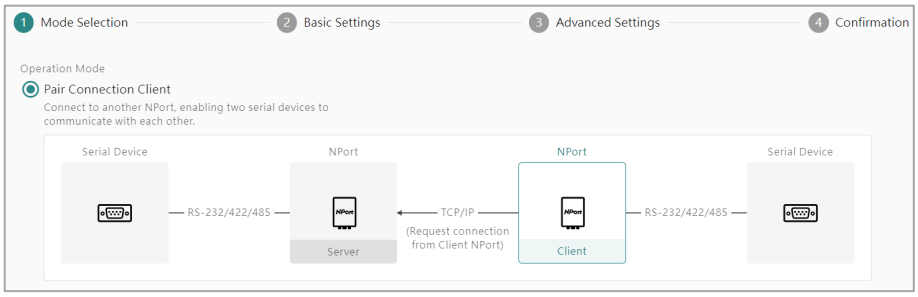


Pair Connection Applications

The Pair Connection application is designed for serial applications that keep the serial host and serial device. Here, the serial host cannot install any driver or socket program since it might not have Ethernet ports. But let's say the factory refurbishes, and the distance between the serial host and serial device increases significantly or maybe the network transitions to an Ethernet-based network. In this scenario, buying two NPorts with the Pair Connection application is a good fit.

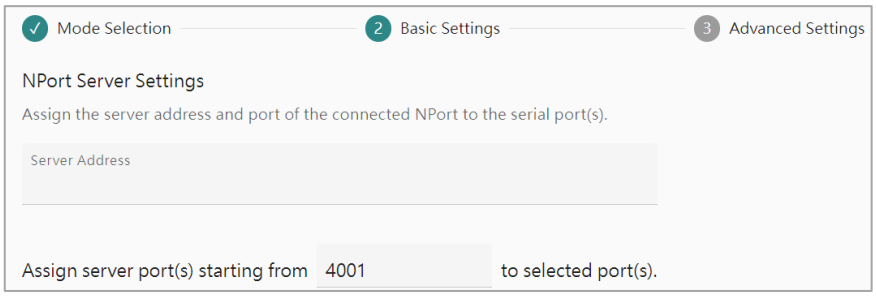
Pair Connection Client Mode

With Pair Connection Application, set one NPort to Pair Connection Client mode to establish the connection and set the other NPort to Pair Connection Server mode to receive the request.



Step 1. Mode Selection

Select **Pair Connection** and **Pair Connection Client** mode.

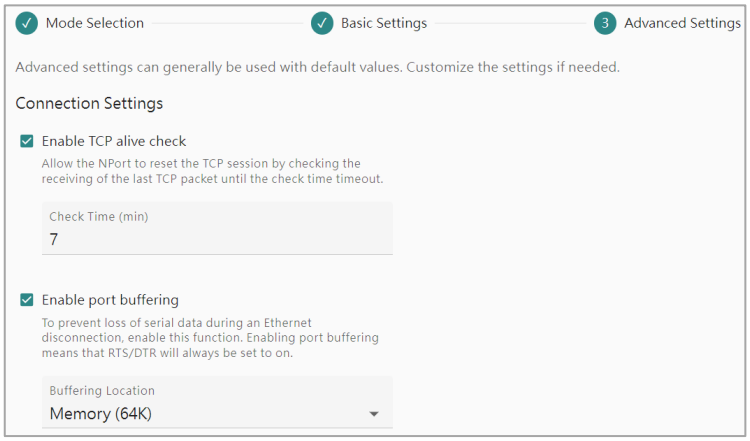


Step 2. Basic Settings

Server Address: The Pair Connection Client will try to establish the TCP session with this IP address. Input an IP address or a domain name.

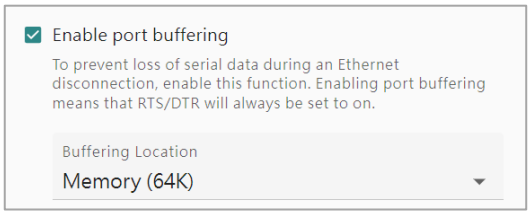
Assign server port(s) starting from: This is the TCP port number assignment for the serial port on the NPort. It is the TCP port number on the remote NPort to listen to the request from the Pair Connection Client. To avoid conflicts with well-known TCP ports, set the default to 4001.

Step 3. Advanced Settings



Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the **Enable TCP alive check time** function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.



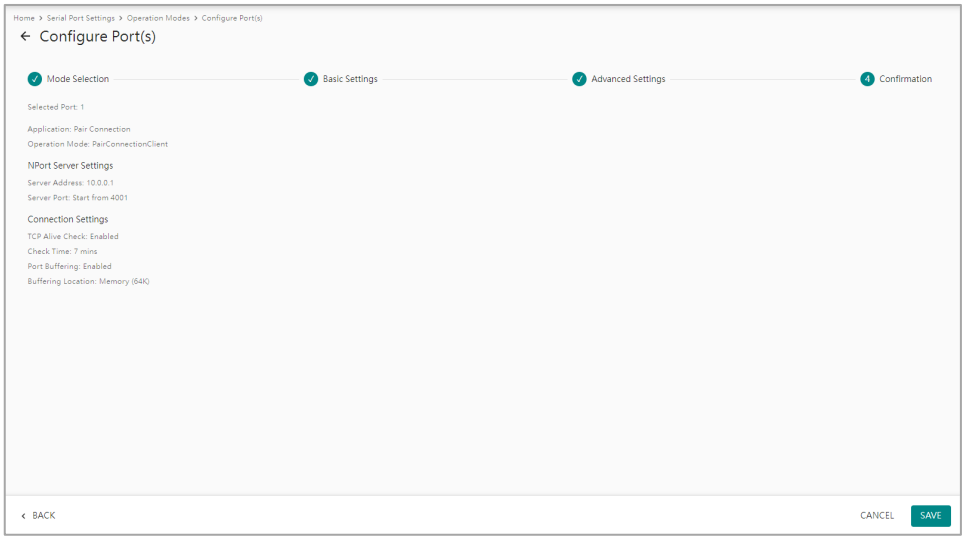
Compared to the serial bus, the Ethernet network is not stable. Poor cable contact or a damaged switch/router could cause it to be disconnected or broken. When this happens, the serial data cannot transmit over Ethernet because the receiver does not exist. As time passes, the serial data could be discarded and lost. If the serial data is important, u enable the **Enable port buffering** function. The NPort can store serial data either in its internal memory, which is 64 Kbytes, or in an external SD card (if supported).

Enable port buffering (default=No): To prevent serial data loss when the Ethernet connection is down, check the checkbox to enable port buffering. If you enable port buffering, RTS/DTR will remain in the on position.

Buffering Location: Select the location of buffering. Memory (64K) or SD card.

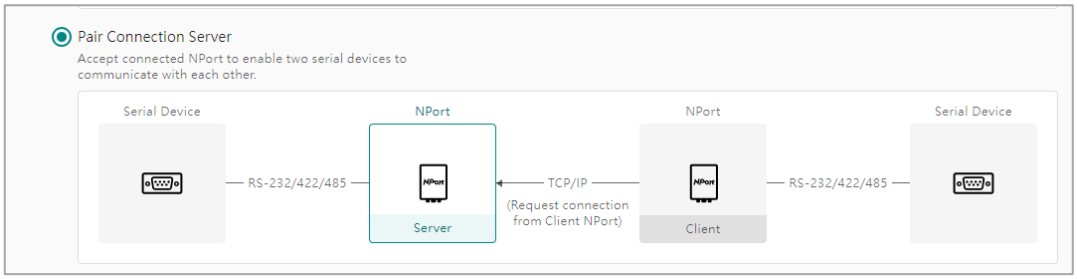
Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



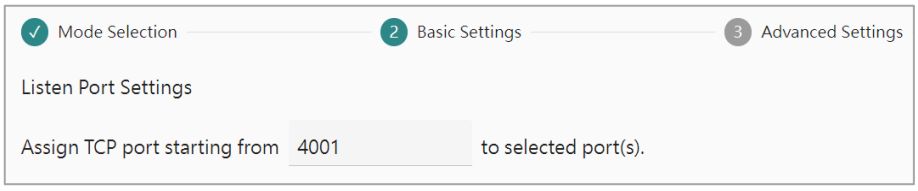
Pair Connection Server Mode

With Pair Connection Application, set one NPort to Pair Connection Client mode to establish the connection and set the other NPort to Pair Connection Server mode to receive the request.



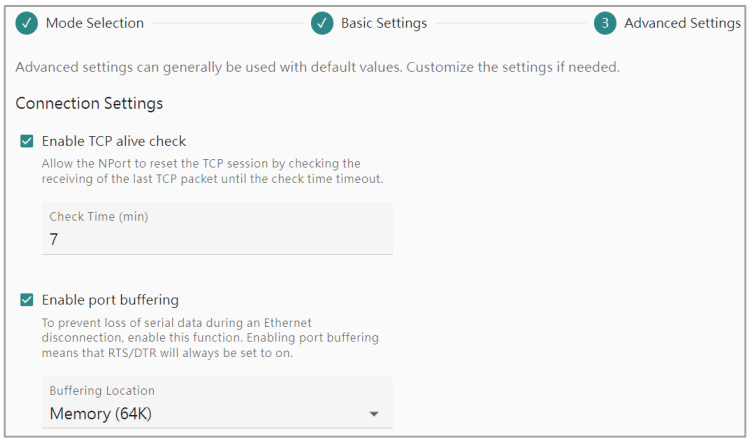
Step 1. Mode Selection

Select the **Pair Connection** and **Pair Connection Server** mode.



Step 2. Basic Settings

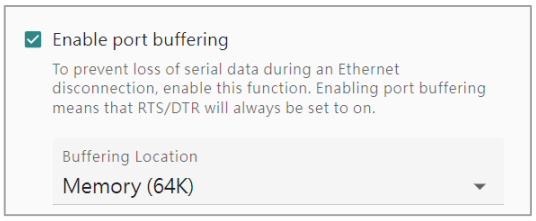
Assign TCP listen port starting from (default=4001): This is the TCP port that the NPort listens to, which shall match with the Pair Connection Client's setting. To avoid conflicts with well-known UDP ports, set the default to 4001.



Step 3. Advanced Settings

Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the **Enable TCP alive check** time function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.



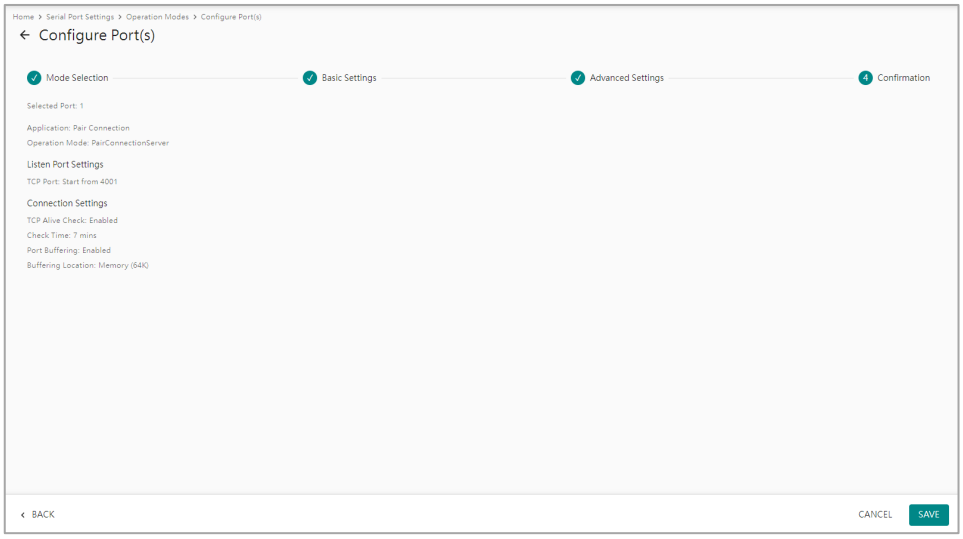
Compared to the serial bus, the Ethernet network is not stable. Poor cable contact or a damaged switch/router could cause it to be disconnected or broken. When this happens, the serial data cannot transmit over Ethernet because the receiver does not exist. As time passes, the serial data could be discarded and lost. If the serial data is important, u enable the Enable port buffering function. The NPort can store serial data either in its internal memory, which is 64 Kbytes, or in an external SD card (if supported).

Enable port buffering (default=No): To prevent serial data loss when the Ethernet connection is down, check the checkbox to enable port buffering. If you enable port buffering, RTS/DTR will remain in the on position.

Buffering Location: Select the location of buffering. Memory (64K) or SD card.

Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



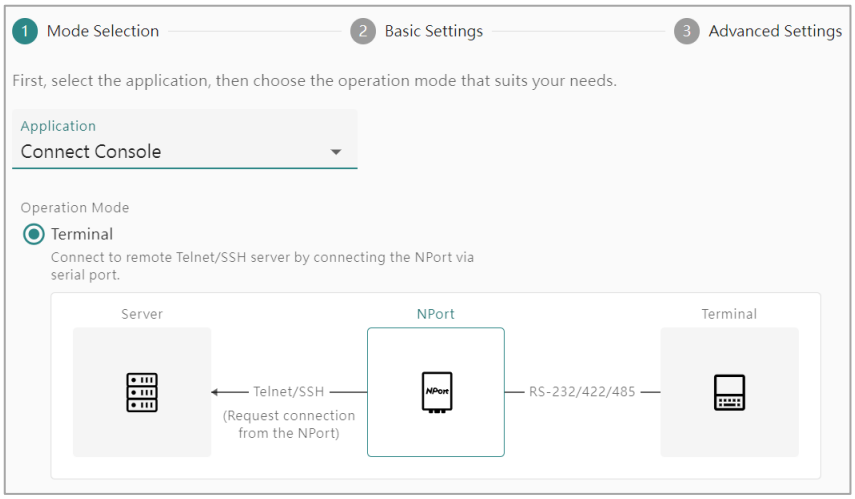
Connect Console Applications

Use the Connect Console application to connect to the console port of a server or a router/switch. There are two types of Connect Console Application:

- If the console port is Ethernetbased, the serial terminal connects to the NPort' s serial port, and the NPort will establish a connection with the remote server using Telnet or SSH. Select the Terminal mode.
- If the console port is a serial based, the Ethernet-based terminal connects to the NPort with Telnet or the SSH protocol, and the NPort connects to the serial console of the server. Select the Reverse Terminal mode.

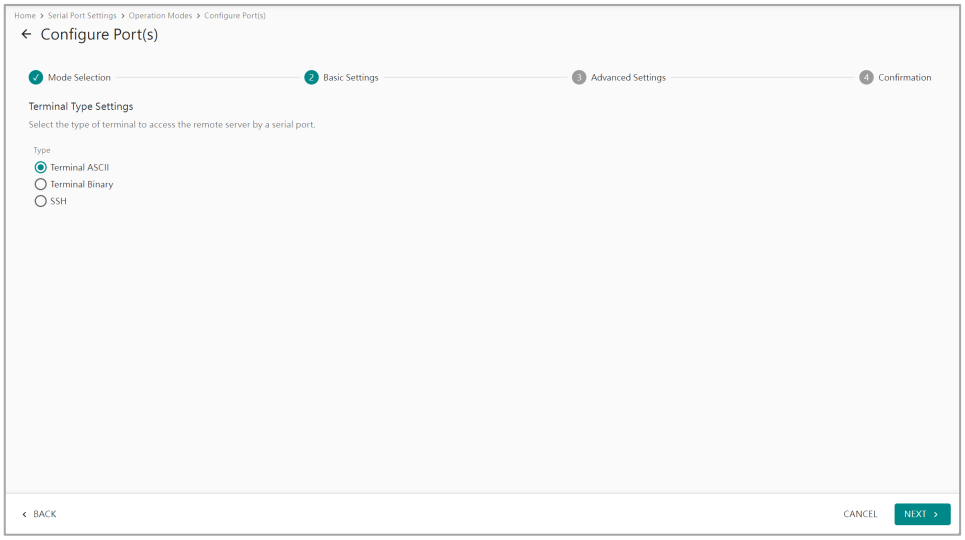
Terminal Mode

The remote server is listening on TCP port 22 for SSH or TCP port 23 for Telnet for a terminal to connect and provide the service. If you only have a serial-based terminal, it cannot establish a Telnet/SSH session to have the service. In this scenario, adding an NPort with Terminal mode can help. There's no need to eliminate the serial-based terminal equipment.



Step 1. Mode Selection

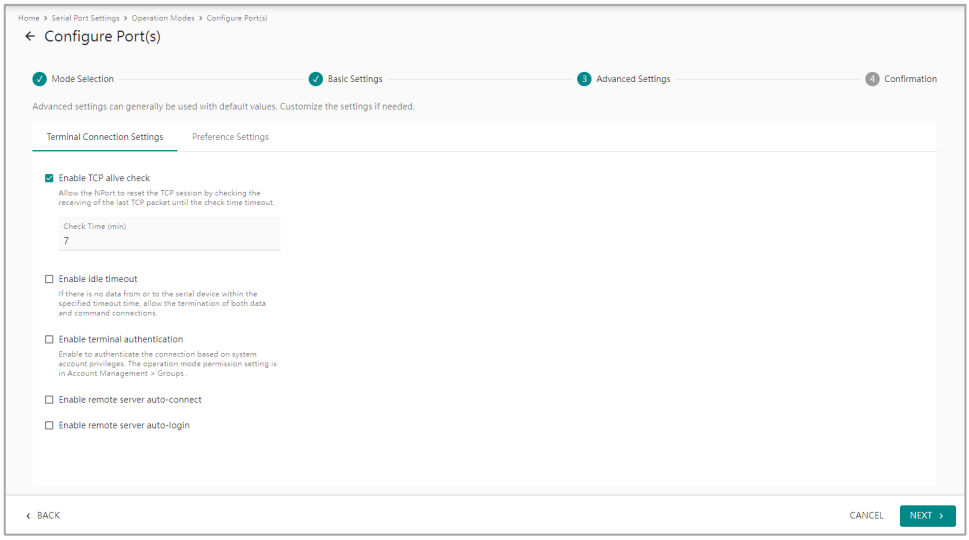
Select the **Connect Console** and **Terminal** mode.



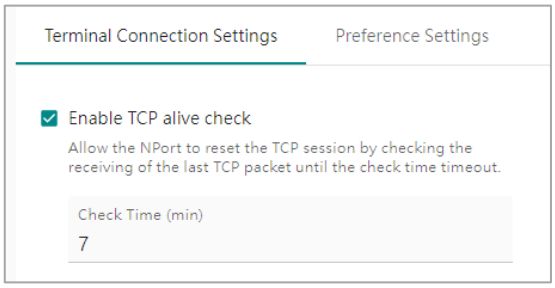
Step 2. Basic Settings

The Terminal Type selection depends on the supported protocols of the remote server or your preferred protocol for the NPort connection.

Terminal Type	Description
Terminal ASCII	If the remote server supports Telnet protocol and there is no need to receive a file from the serial terminal, you may select Terminal ASCII mode on the NPort. Terminal ASCII mode can handle up to 8 sessions per port with the ability to switch between sessions on the same terminal. This mode is used for text-based terminals with no file-transfer capability or encryption
Terminal Binary	If the remote server supports Telnet protocol and the is no need to receive files from the serial terminal, you may select Terminal Binary mode on the NPort. Terminal Binary mode allows one session per port and is used for terminal applications that include file-transfer features.
SSH	If the remote server supports SSH protocol, you may select SSH mode on the NPort. SSH mode allows one session per port and is used for secure terminal applications that abide by the SSH protocol.

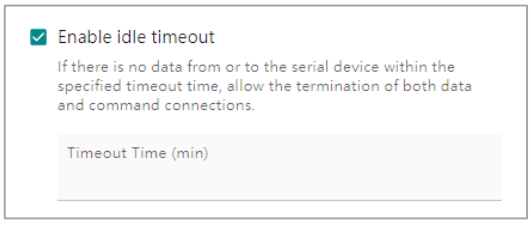


Step 3. Advanced Settings—Terminal Connection Settings



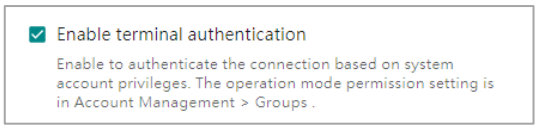
Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the **Enable TCP alive check time** function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.

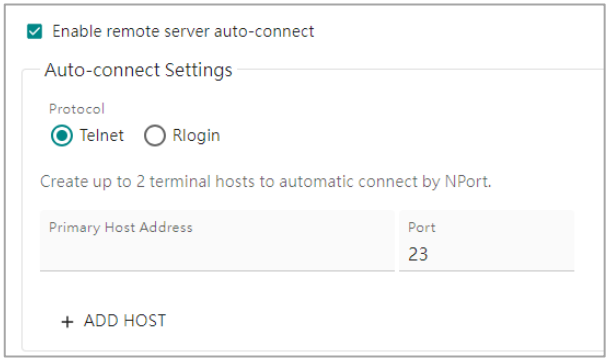


Since the resource of the remote server is limited, the NPort as the session initiator can end the session actively. The duration of no data transmission or reception on the serial port determines it.

Enable idle timeout: User can specify how many minutes without any data been sent or received from the serial port, then NPort will terminate the Telnet session actively to release the remote server's resource to other terminals.



The administrator can use the **Enable the terminal authentication** function to verify if the user has the privilege to connect to the serial port of NPort and access the server. The NPort authenticates users for serial port access based on either the local username/password database or the remote RADIUS/TACACS+ server. Only users in the read/write privilege user group can access it in operation mode.

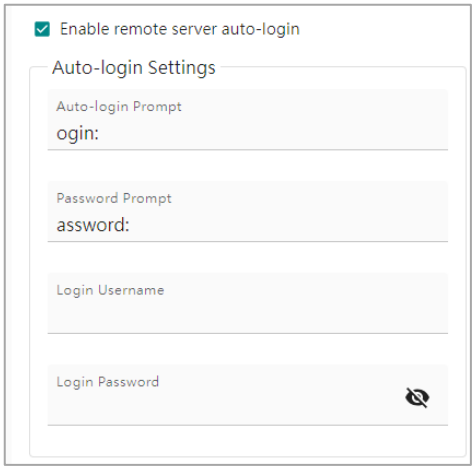


In general, the NPort will attempt to connect with the remote server when the serial port requires it. To avoid waiting, you can configure the NPort to automatically connect to the remote server when it's ready. Check the Enable remote server auto-connect function. The NPort will establish the connection when the firmware is ready.

For each remote server, specify the protocol the NPort shall use to establish the connection. There are two options: Telnet or Rlogin.

Primary Host Address: The NPort will try to establish the TCP session with this IP address. Input an IP address or a domain name.

Port: This is the TCP port number assignment on the remote server to listen to the request from the NPort. The default value is 23, which is the default TCP port of Telnet protocol. If you select Rlogin protocol, the default TCP port is 513.



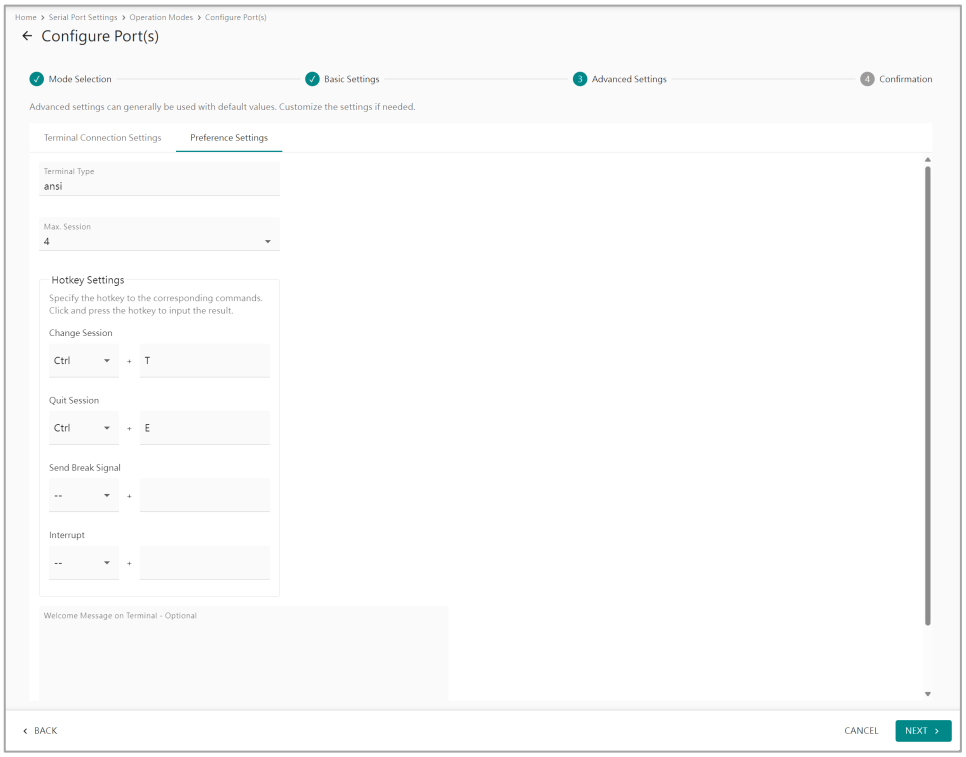
The serial terminal user needs to input the username/password to get authorized on the remote server to use the service. For a convenient purpose, the user can pre-configure the value he will need to input to skip the process. If the values are correct, the NPort will input them.

Auto-login Prompt: The NPort will read the messages delivered by the remote server at the login process. When it reads this string, it will help to input the string in the field of Login Username.

Password Prompt: The NPort will read the messages delivered by the remote server at the login process. When it reads this string, it will help to input the string in the field of Login Password.

Login Username: Input the user account that has the privilege of using the necessary services on the remote server.

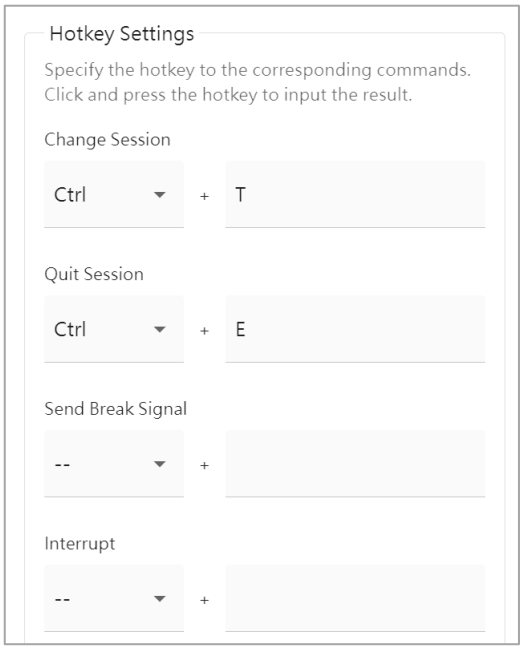
Login Password: User shall input the correct password to get the authority on the remote server.



Step 3. Advanced Settings—Preference Settings

The Preference Settings may be different on different Terminal Types, Terminal ASCII, Terminal Binary and SSH. The snapshot above shows the Preference Settings of the Terminal ASCII mode. **Terminal type** (default=ansi): Some older terminal applications may require that the terminal type be transmitted before the connection can be established. You may need to refer to the server's documentation to determine the appropriate terminal type. For most applications, this setting will be unnecessary and will have no effect. The most popular terminal types may be ansi or vt100.

Max. Sessions (default=4): The Terminal ASCII mode can support up to eight sessions on each serial port. This setting allows you to configure/limit the maximum number of sessions allowed for the specific serial port.



The Hotkey Settings section defines the hotkeys that a serial terminal user can use while logging in to the remote server. These hotkeys are supported by the NPort, and they will be executed by the NPort and not be transmitted to the remote server. For example, when you input Ctrl+T, it will switch to another session, and the string Ctrl+T will not be sent to the remote server.

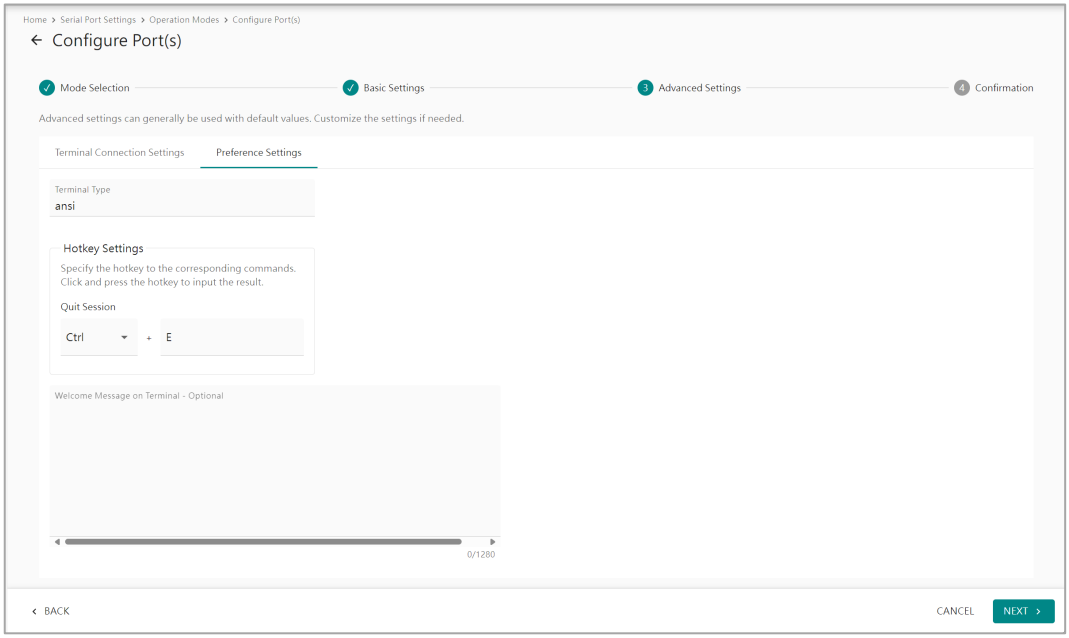
Change Session (default=Ctrl+T): This field defines the quick key to change a session. As mentioned above, there are up to eight sessions of a serial port connection. You can switch to another session by entering this quick key.

Quit Session (default=Ctrl+E): This field defines the quick key to quit a session.

Send Break Signal: This field defines the quick key to send a break signal to the remote server.

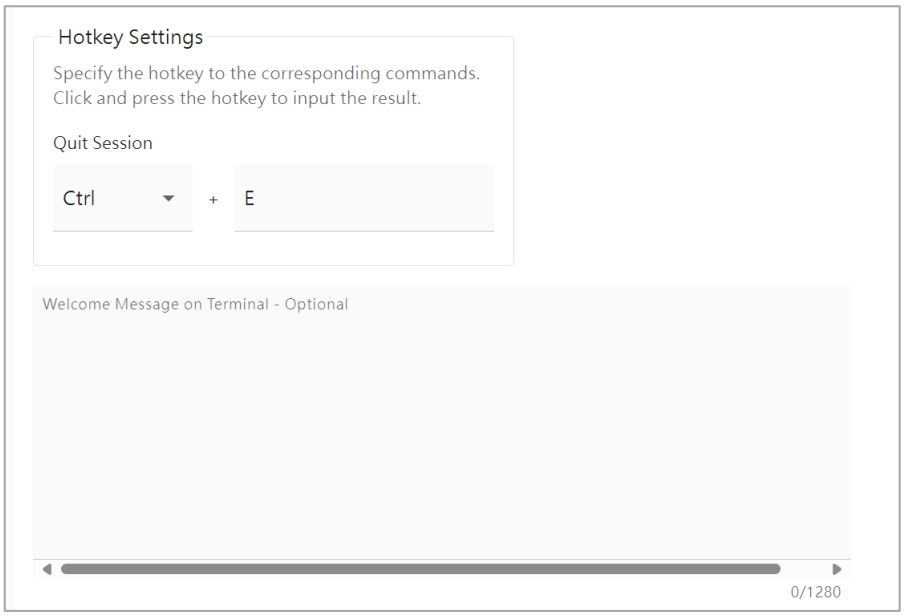
Interrupt: This field defines the quick key for sending an interrupt signal to the remote server.

Welcome Message on Terminal – Optional: When the serial terminal user logs in to the NPort, the messages defined in this field will show to the user.



The Preference Settings may be different on different Terminal Types, Terminal ASCII, Terminal Binary and SSH. The snapshot above shows the Preference Settings of the Terminal Binary mode.

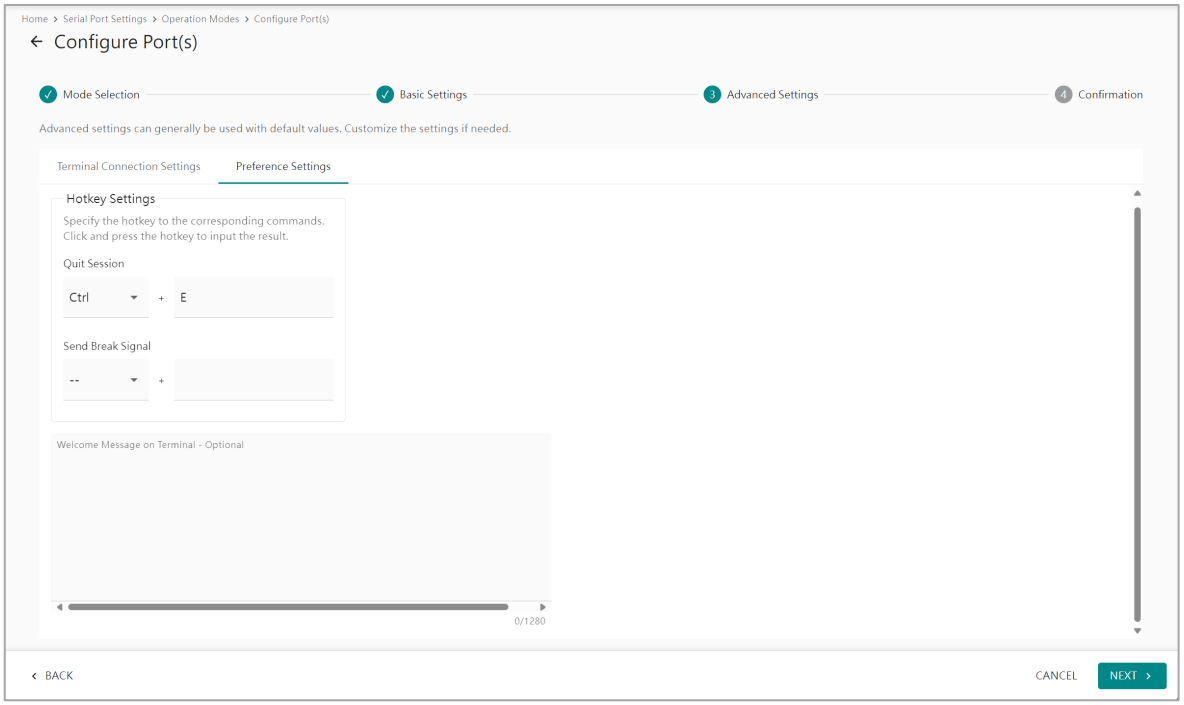
Terminal type (default=ansi): Some older terminal applications may require that the terminal type be transmitted before the connection can be established. You may need to refer to the server's documentation to determine the appropriate terminal type. For most applications, this setting will be unnecessary and will have no effect. The most popular terminal types may be ansi or vt100.



The Hotkey Settings section defines the hotkeys that a serial terminal user can use while logging in to the remote server. These hotkeys are supported by the NPort, and they will be executed by the NPort and not be transmitted to the remote server. For example, when you input Ctrl+T, it will switch to another session, and the string Ctrl+T will not be sent to the remote server.

Quit Session (default=Ctrl+E): This field defines the quick key to quit a session.

Welcome Message on Terminal – Optional: When the serial terminal user logs in to the NPort, the messages defined in this field will be displayed to the user.



The Preference Settings may be different on different Terminal Types, Terminal ASCII, Terminal Binary and SSH. The snapshot above shows the Preference Settings of the SSH mode. The Hotkey Settings section defines the hotkeys that a serial terminal user can use while logging in to the remote server. These hotkeys are supported by the NPort, and they will be executed by the NPort and will not be transmitted to the remote server. For example, when the user input Ctrl+E, the session will be terminated, and the string Ctrl+E will not be sent to the remote server.

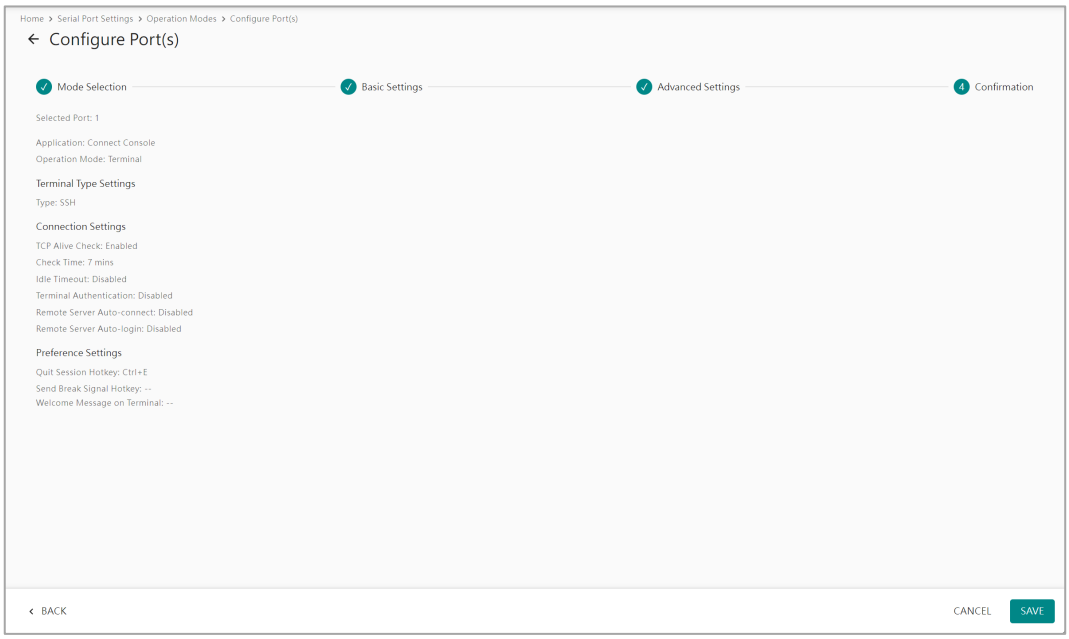
Quit Session (default=Ctrl+E): This field defines the quick key to quit a session.

Send Break Signal: This field defines the quick key to send a break signal to the remote server.

Welcome Message on Terminal – Optional: When the serial terminal user logs in to the NPort, the messages defined in this field will be displayed to the user.

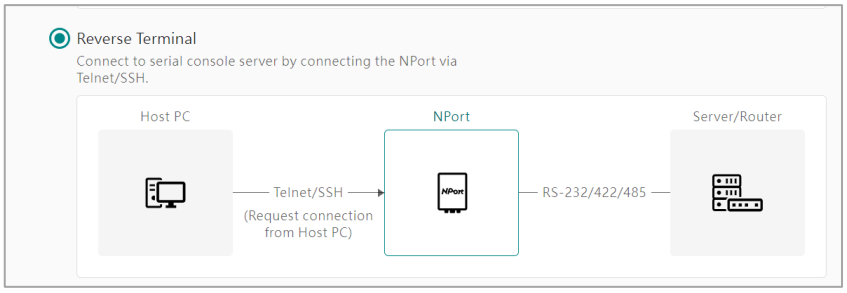
Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



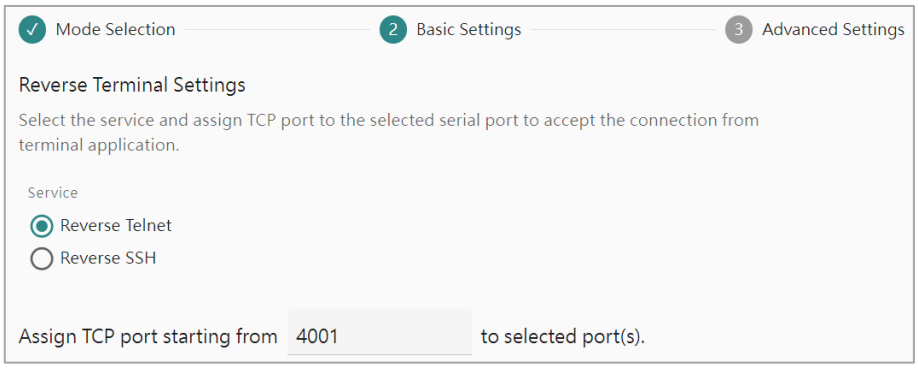
Reverse Terminal Mode

When a PC needs to establish a connection with the serial console of a server, router, or network device, but lacks a serial port (or doesn't have enough). The user might want to connect the serial console to an NPort's serial port. The NPort can then listen on TCP port 22 or 23 for SSH or Telnet connections respectively, allowing a terminal software on the PC to connect and provide the service. The PC can still use the Ethernet based software (supports Telnet or SSH) to connect the serial console of a network device. It's not necessary to increase the number of serial ports on the PC.



Step 1. Mode Selection

Select the **Connect Console** and **Reverse Terminal** mode.

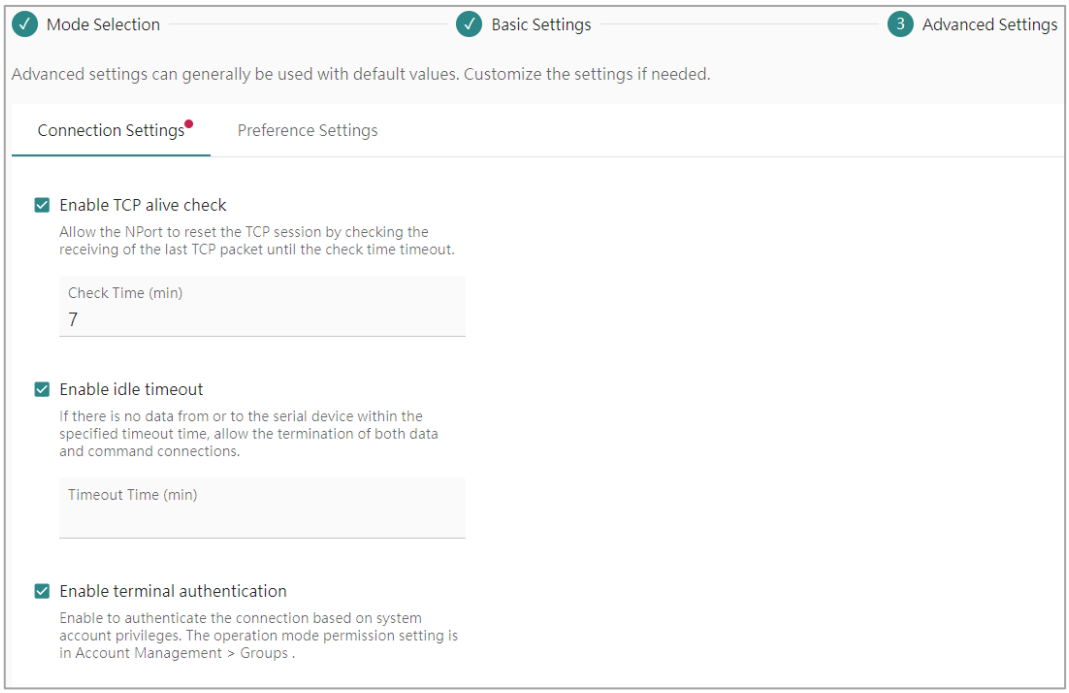


Step 2. Basic Settings

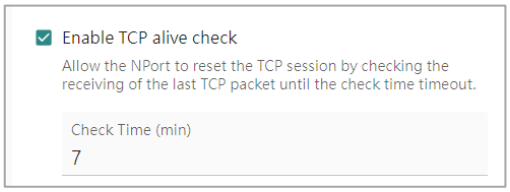
It depends on which protocol the terminal software on the PC supports (or which protocol you prefer to use to connect to the NPort) for choosing the Service

Service	Description
Reverse Telnet	If the PC supports Telnet protocol, then select Reverse Terminal mode on the NPort. The Telnet protocol or the Reverse Telnet mode of NPort is widely used for device management in control rooms. The system waits for a host on the network to start a connection. Since TCP Server mode does not assist with conversion of CR/LF commands, if the management of the serial console of the device requires these CR/LF commands, the user shall use Reverse Telnet mode.
Reverse SSH	Since the Telnet is a plaintext protocol, you may have cybersecurity concerns. In this case, select the Reverse SSH mode to encode the communication between the PC and the NPort.

Assign TCP port starting from (default=4001): This is the TCP port that the NPort listens to, which shall match with the TCP port of the terminal software such as PuTTY on the PC. To avoid conflicts with well-known UDP ports, set the default to 4001.

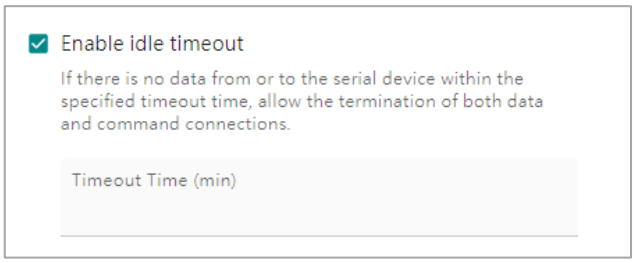


Step 3. Advanced Settings—Connection Settings



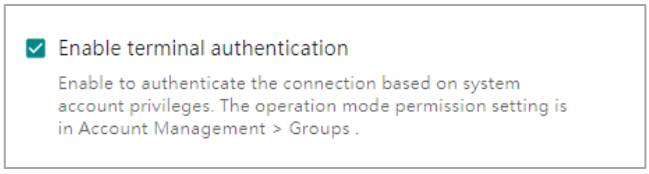
Service providers always have limited resources. By enabling Real COM mode, the NPort allows access to connected serial devices. In the event of an accidental TCP connection failure, the resource could be indefinitely occupied until the you restart the NPort. To prevent this from happening, the NPort will enable the **Enable TCP alive check time** function by default to verify if the existing connection is alive or not. If the session is not active and the timeout period (default value of 7 minutes) is reached, the NPort will end the session and make it available for other users/devices.

Enable TCP alive check time (default=7 min): The duration for which the NPort 6000-G2 waits for a response to keep-alive packets before closing the TCP connection can be specified in this field. To verify connection status, the NPort 6000-G2 sends keep-alive packets at regular intervals. If the packet goes unanswered by the remote host within the specified time, the NPort 6000-G2 will terminate the TCP connection.

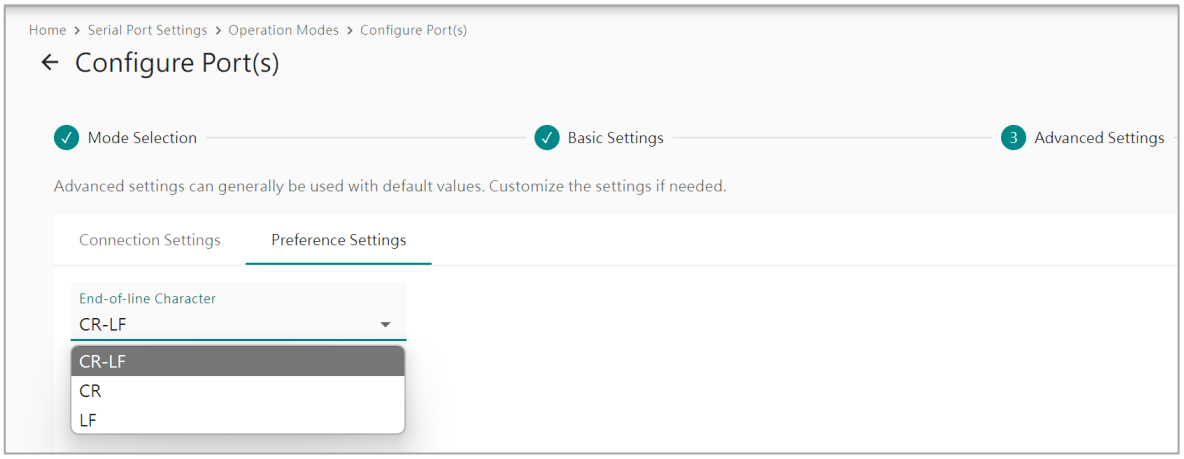


Since the resources of the remote server is limited, the NPort as the session initiator can terminate the session. The duration of no data transmission or reception on the serial port determines it.

Enable idle timeout: You can specify the number of minutes with no data being sent or received from the serial port, and then the NPort will actively terminate the Telnet session to release the remote server's resources to other terminals.



The administrator can use the **Enable the terminal authentication** function to verify if the user has the privilege to connect to the serial port of NPort and access the server. The NPort authenticates users for serial port access based on either the local username/password database or the remote RADIUS/TACACS+ server. Only users in the read/write privilege user group can access it in operation mode.



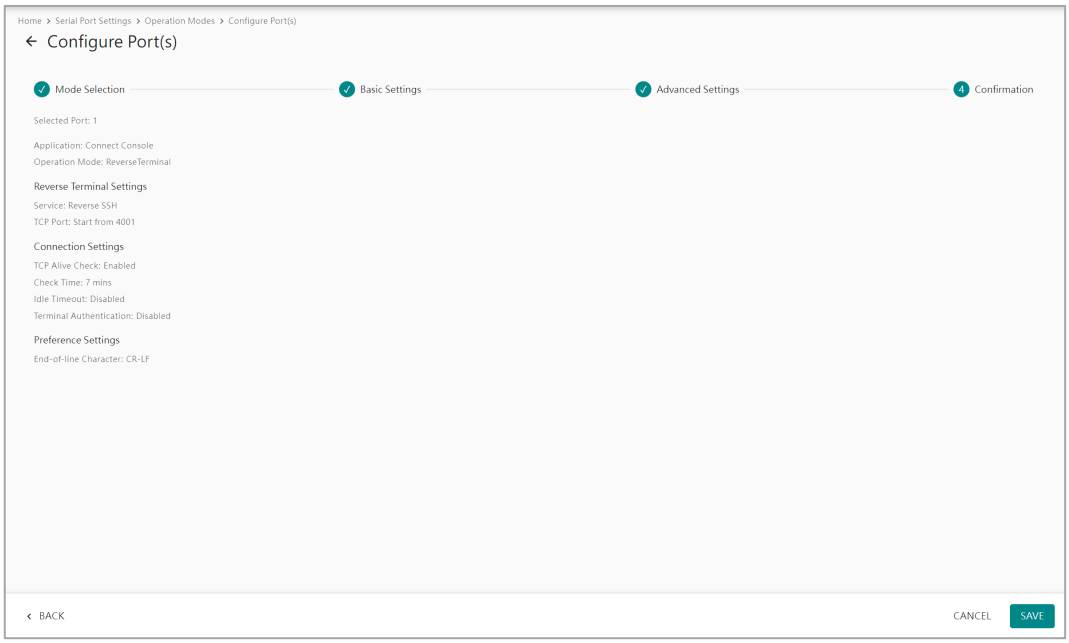
Step 3. Advanced Settings—Preference Settings

End-of-line Character (default=CR-LF): This specifies how the ENTER key is mapped at the serial console of the network device. If the terminal software on the PC has the limitation of sending the ENTER key, for example, it will always send <CR> to represent the ENTER key. But the serial console of the network device can only accept <LF> as the ENTER key. This mismatch may cause problems while using the terminal software to manage the network device. To solve this issue, set the end-of-line character as LF, then every time NPort receives the <CR> from the terminal software that will automatically change it to <LF> and then pass it to the network device. Everything will then work smoothly.

End-of-line Character	Description
<CR-LF>	Officially <CR-LF> represents carriage return + line feed (i.e., the cursor will jump to the next line and return to the first character of the line). This is the formal definition of the ENTER key.
<CR>	Officially <CR> represents carriage return (i.e., the cursor will return to the first character of the line). For some operation systems, this also represents the ENTER key.
<LF>	Officially <LF> represents line feed (i.e., the cursor will jump to the next line, but not move horizontally). For some operation systems, this also represents the ENTER key.

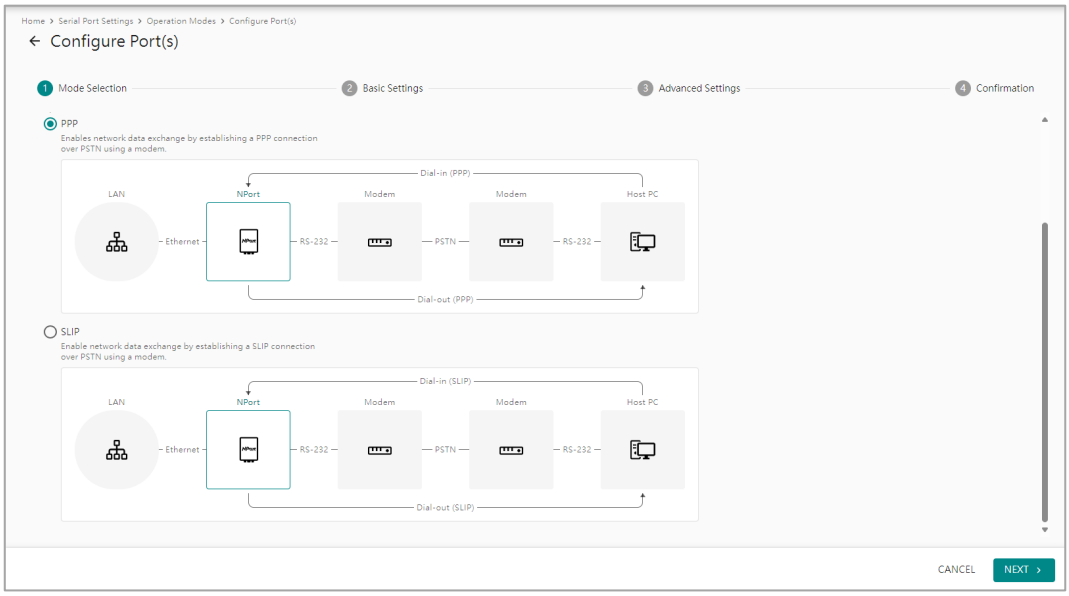
Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



Connect Modem Application

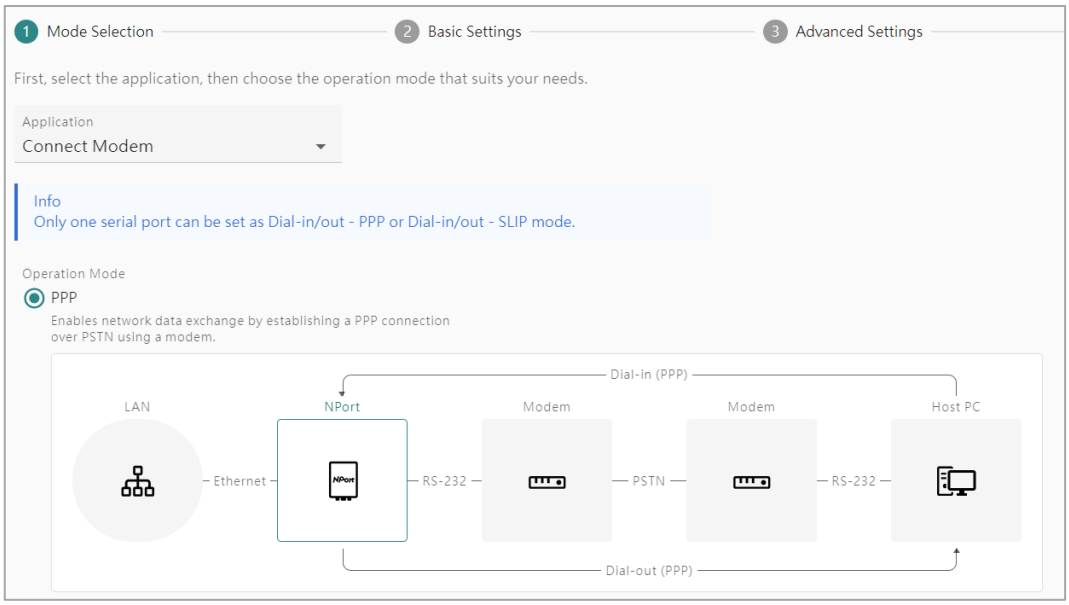
A modem is a computer hardware device that converts data from a digital format into a format suitable for an analog transmission medium, such as telephone or radio. Usually, the computer may need a serial port to connect to a modem. Nowadays, most computers do not have serial ports. To fulfill this need, the NPort can help to connect to a modem on its serial port and bring it as an accessory to the computer. Due to the specific modem signals and behavior required for communication, the Connect Modem Application is designed for this application.



The Connect Modem Application has two operation modes, depending on the communication protocol used by the host PC. If the PPP protocol is used on the host PC, switch the NPort to **Connect Modem Application > PPP mode**. The support for multiple PPP/SLIP sessions on multiple serial ports is unnecessary if the Connect Modem Application can establish a network session via PSTN to access the NPort and the local network behind the NPort. There's a possibility that this will escalate the cybersecurity risk. Hence, only a single serial port can be set up as the Connect Modem Application on an NPort.

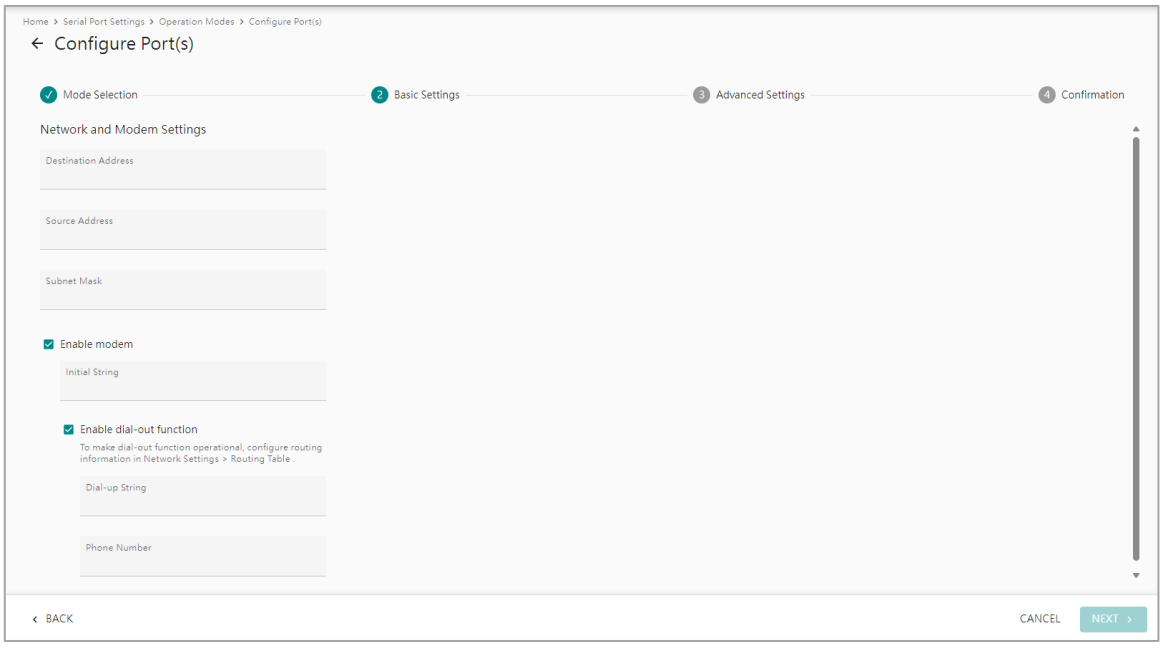
PPP Mode

Depending on the protocol used on the host PC, set the operation mode on the NPort. This setting will enable network data exchange by establishing a PPP connection over PSTN using a modem.



Step 1. Mode Selection

Select the **Connect Modem** and **PPP** mode.



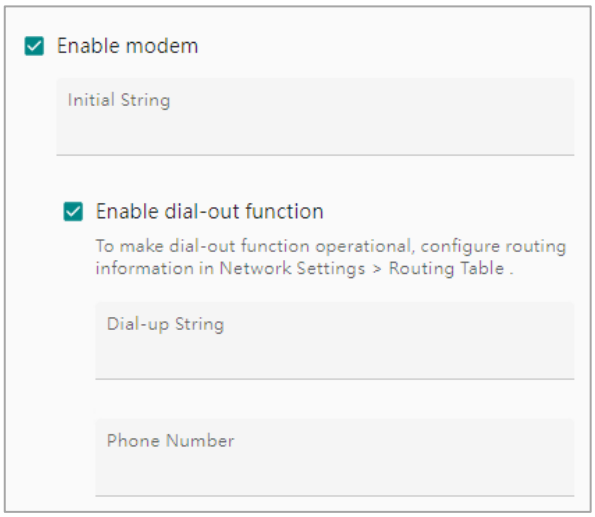
Step 2. Basic Settings

To establish a PSTN connection to a remote network, the NPort will need to know the serial port, the remote site's IP addresses and the subnet mask. Then, it can help to route the packets to local and remote networks.

Destination Address: This is the IP address of the remote Host PC's serial port.

Source Address: The Source IP address is the IP address assigned to the NPort's serial port.

Subnet Mask: The subnet mask defines the netmask for the PPP connection, which includes the NPort and remote PC's serial ports.

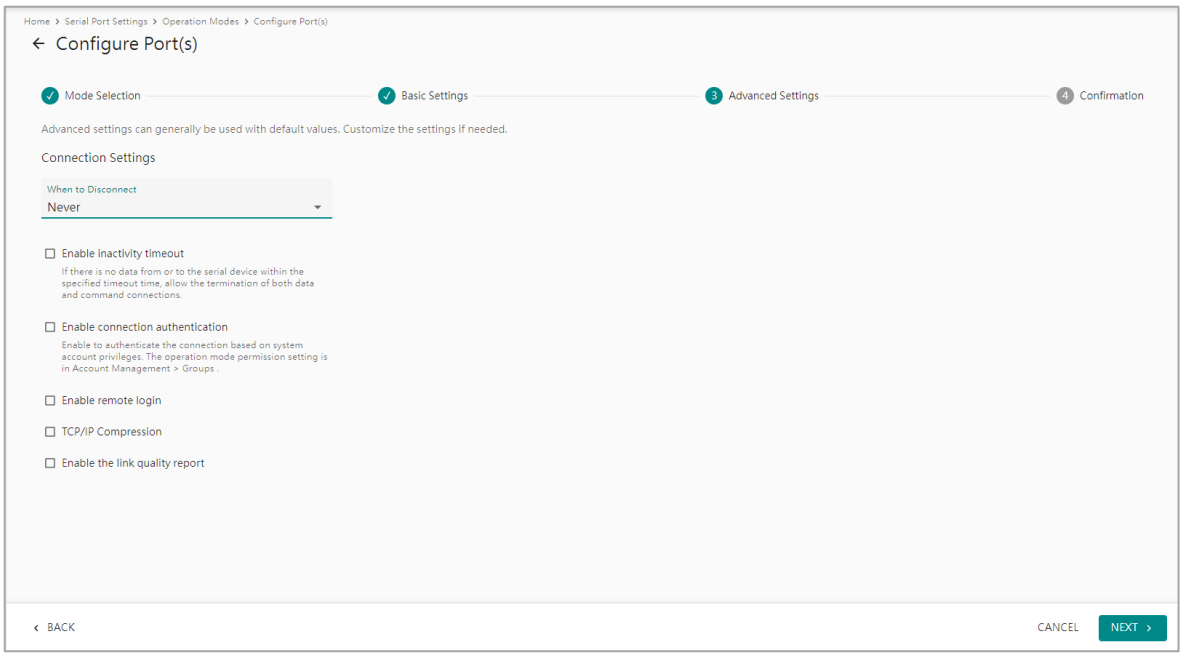


The local PC connected to the NPort might have a PPP program that can establish a PSTN connection using built-in commands. To ensure compatibility with the PPP program and NPort, configure the following settings.

Initial string: Input the command used by the PPP program to trigger the modem to establish the connection with the remote site. In general, the initial string may be AT.

Dial-up String: Input the command used by the PPP program to start the dialing to the remote site. In general, the dial-up string may be ATD.

Phone Number: Use this field to configure the phone number to be dialed out.

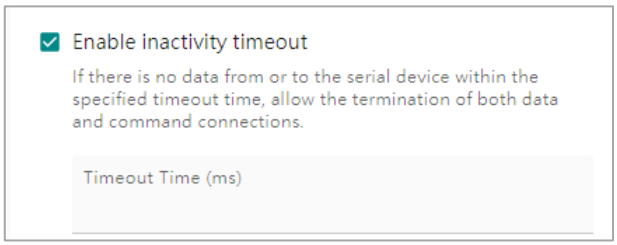


Step 3. Advanced Settings

Since the PSTN or Radio connection may be expensive, you may want to manage the time it stays connected.

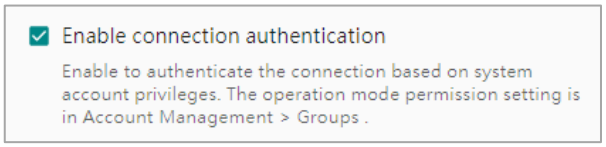
When to Disconnection (default=Never): To manage when the NPort will end the connection actively, there are three mechanisms: Never, DCD-Off or DSR Off.

- Never means the NPort will not end the connection actively.
- DCD-Off means the NPort will end the connection when it detects the DCD signal is turned off.
- DSR-Off means the NPort will end the connection when it detects the DSR signal is turned off.

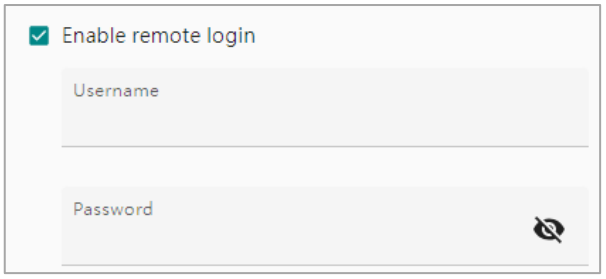


This setting is used for applications that may incur high costs for the connection between the remote host and the NPort, such as when it is connected with a cellular/satellite line.

When the TCP session is established, the NPort will actively end the session if there is no new data for a while on the serial port. For the time interval to end the TCP session, the user will need to set the Timeout time (ms) for this option.



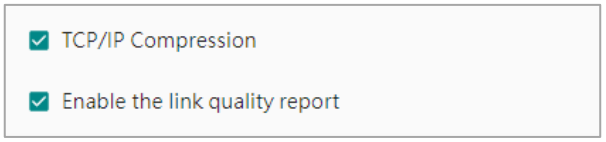
The administrator can use the **Enable the terminal authentication** function to verify if the user has the privilege to connect to the serial port of NPort and access the server. The NPort authenticates users for serial port access based on either the local username/password database or the remote RADIUS/TACACS+ server. Only users in the read/write privilege user group can access it in operation mode.



When the remote side enables user authentication, the NPort user must enter their authorized username and password for each connection attempt. By enabling the remote login function and entering the username/password, NPort can automatically input the information.

Username: This is the dial-out user ID account.

Password: This is the dial-out user password.

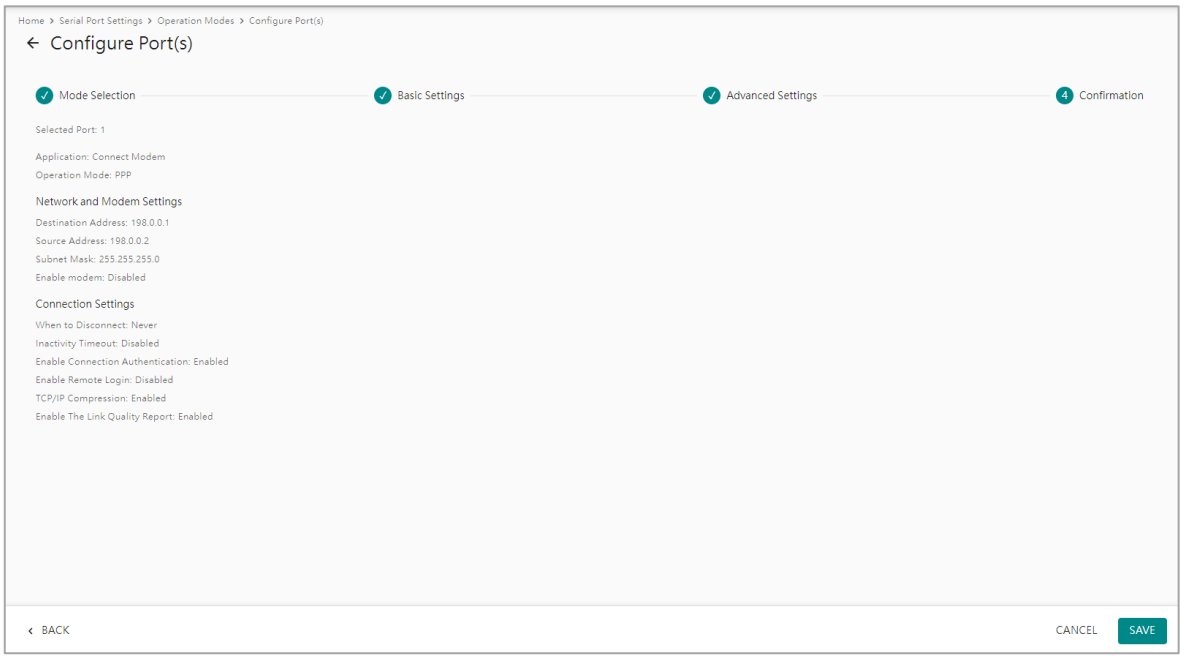


TCP/IP compression (default=Disable): The setting of this field depends on whether the remote user's application requests compression.

Enable the link quality report (default=Disable): Setting this field to enable allows the NPort to disconnect a connection if the link noise exceeds a certain threshold.

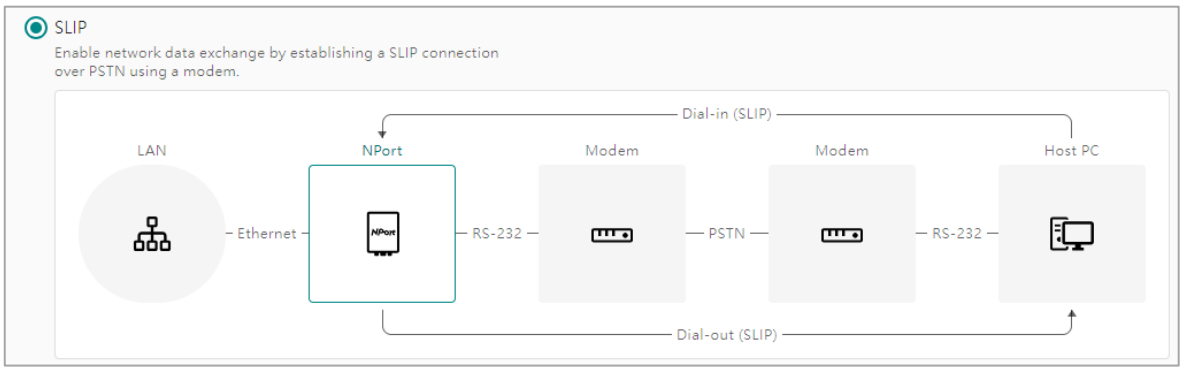
Step 4. Confirmation

Please review and **SAVE** above settings to make them affective.



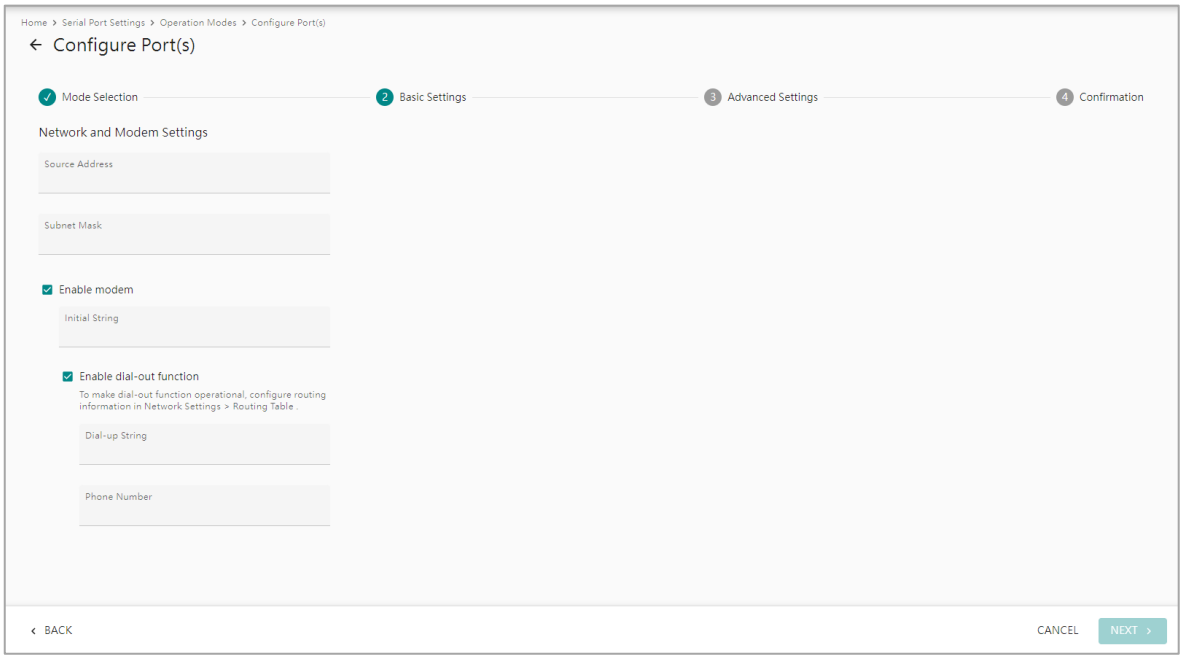
SLIP Mode

The operation mode on the NPort can be set based on the protocol used on the host PC, as determined by you. This setting will enable network data exchange by establishing a SLIP connection over PSTN using a modem.



Step 1. Mode Selection

Select the **Connect Modem** and select **SLIP** mode.

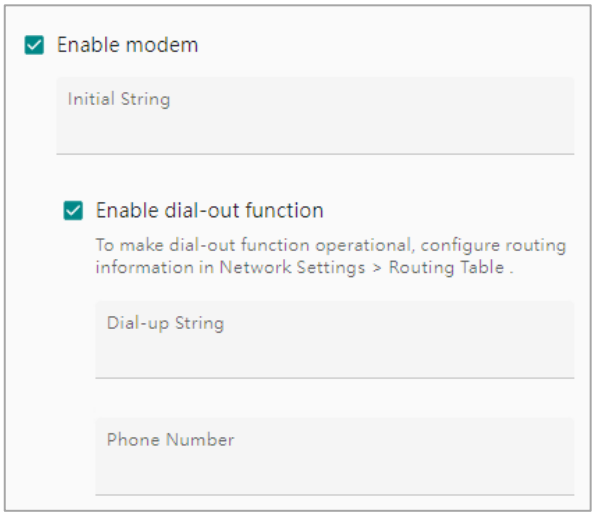


Step 2. Basic Settings

To establish a PSTN connection to a remote network, the NPort will need to know the serial port's IP addresses and the subnet mask. Then, it can help to route the packets to local and remote networks.

Source Address: The Source IP address is the IP address assigned to the NPort's serial port.

Subnet Mask: The subnet mask defines the netmask for the SLIP connection.

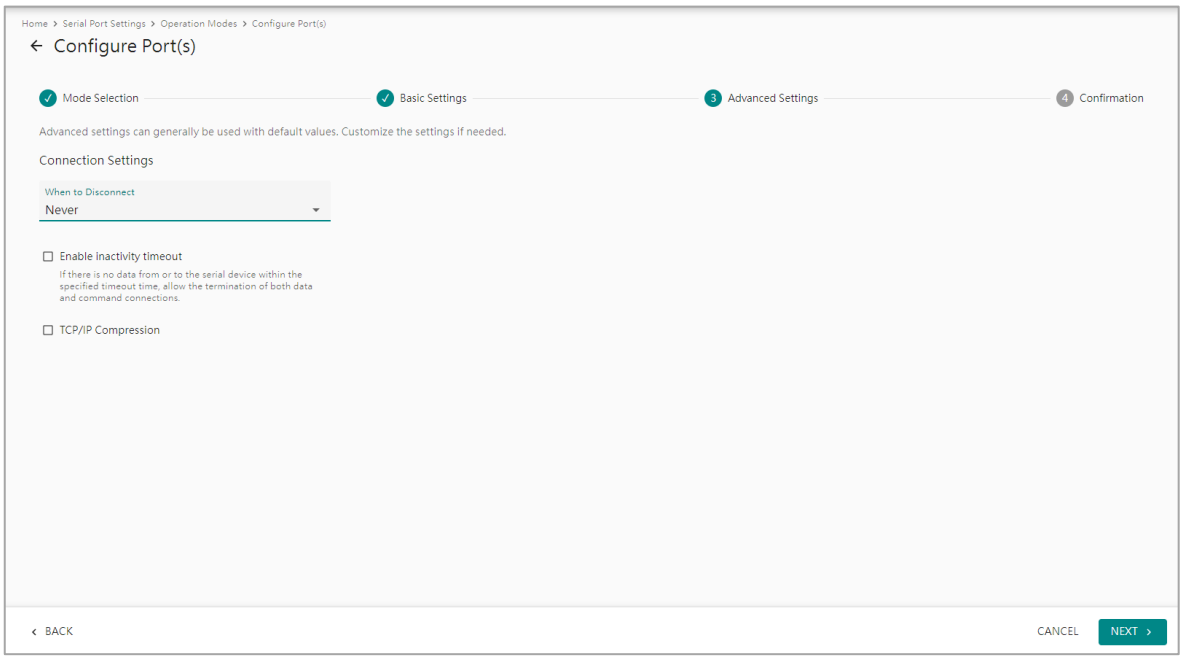


The local PC connected to the NPort might have a PPP program that can establish a PSTN connection using built-in commands. To ensure compatibility with the PPP program and NPort, configure the following settings.

Initial string: Input the command used by the PPP program to trigger the modem to establish the connection with the remote site. In general, the initial string may be AT.

Dial-up String: Input the command used by the PPP program to start the dialing to the remote site. In general, the dial-up string may be ATD.

Phone Number: Use this field to configure the phone number to be dialed.

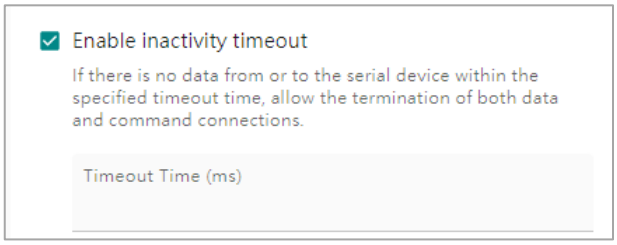


Step 3. Advanced Settings

Since the PSTN or Radio connection may be expensive, you may want to manage the time it stays connected.

When to Disconnection (default=Never): There are three mechanisms to actively manage when the NPort will terminate the connection: Never, DCD-Off, or DSR Off..

- Never means the NPort will not end the connection actively.
- DCD-Off means the NPort will end the connection when it detects the DCD signal is turned off.
- DSR-Off means the NPort will end the connection when it detects the DSR signal is turned off.



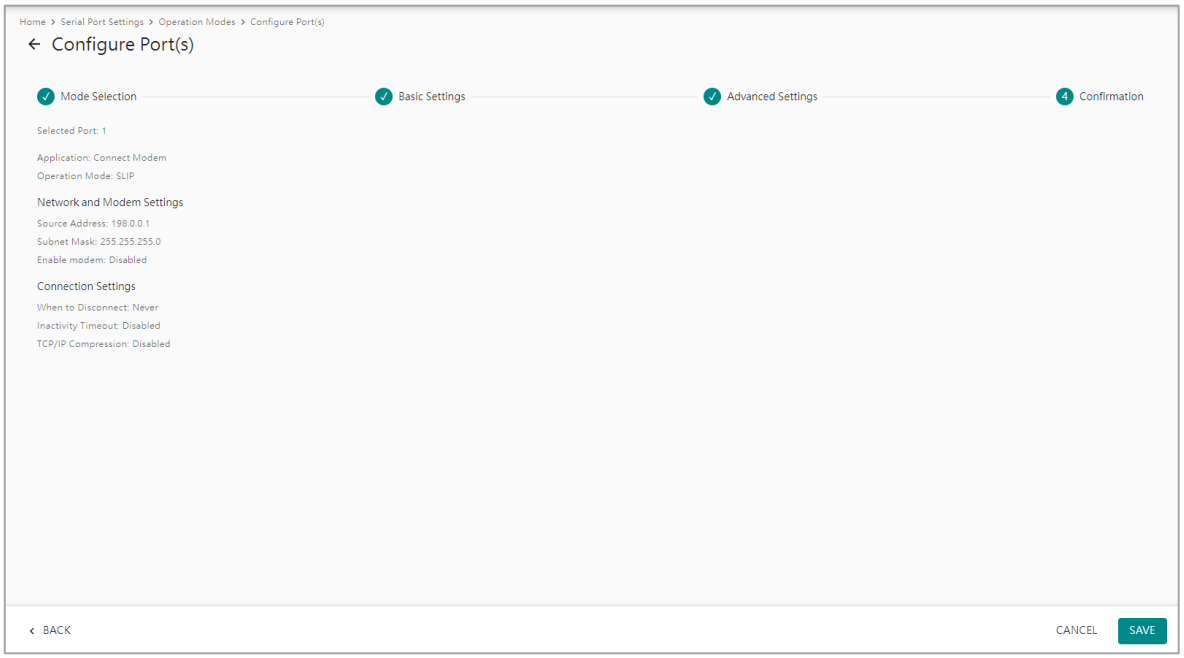
This setting is used for applications that may incur high costs for the connection between the remote host and the NPort, such as when it is connected with a cellular/satellite line.

When the TCP session is established, the NPort will terminate the session actively if there is no new data for a while on the serial port. For the timing to terminate the TCP session, the user will need to set the Timeout time (ms) for this option.

TCP/IP compression (default=Disable): The setting of this field depends on whether the remote user's application requests compression.

Step 4. Confirmation

Please review and **SAVE** the above settings to make them affective.



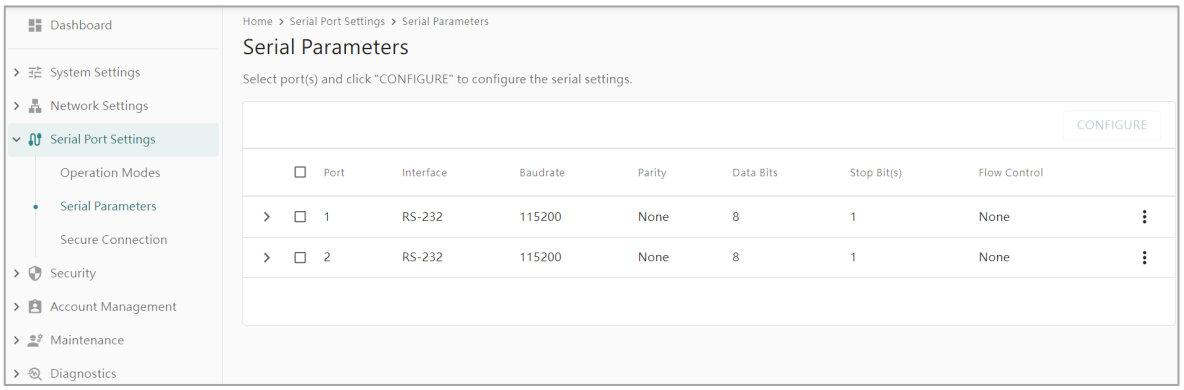
No Operation

To address cybersecurity concerns, users can set a serial port to No Operation if it is not connected to any serial devices. Disabling unused services can decrease cybersecurity risks.

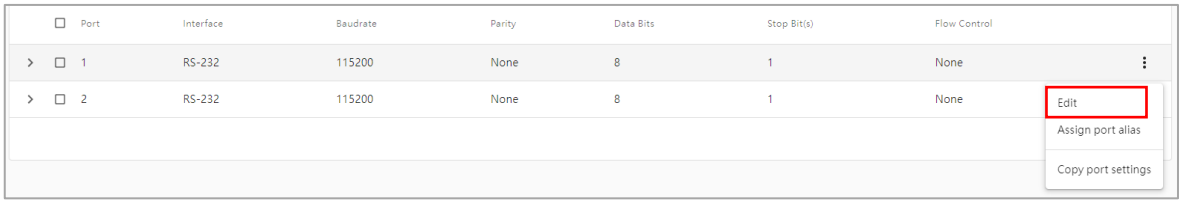
Serial Parameters

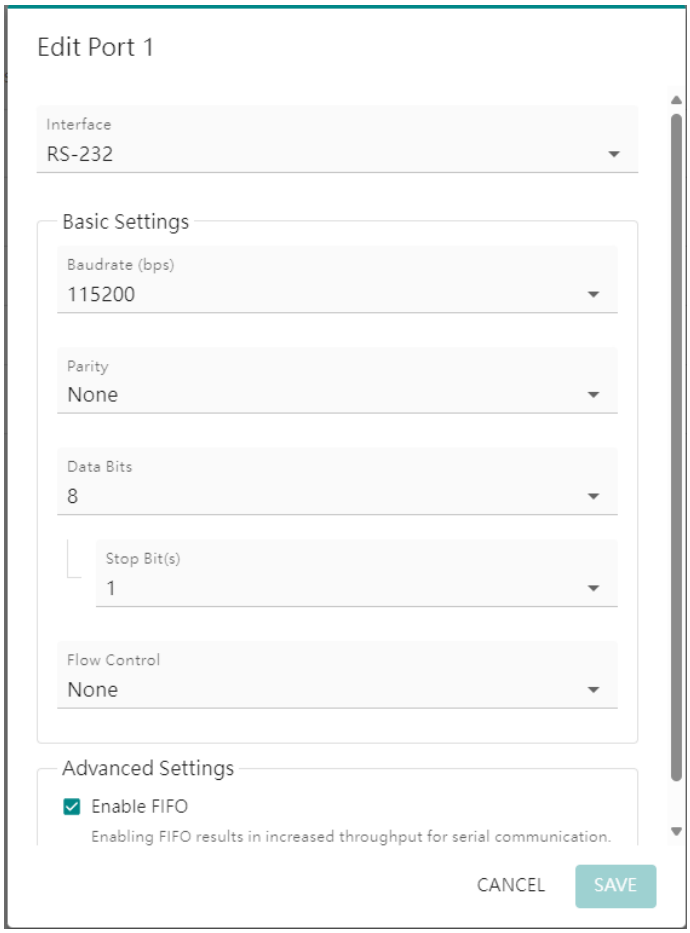
Matching serial parameters between the serial device and the NPort device server is an essential factor for communication. Refer to the device manual to obtain its serial parameters. Then, navigate to **Serial Port Settings > Serial Parameters** to modify the serial parameters.

Only if the NPort is configured as a **COM-based Control** application, can you skip this step/section. The COM port software or TTY software will overwrite the serial parameters while it opens a COM port/TTY port.

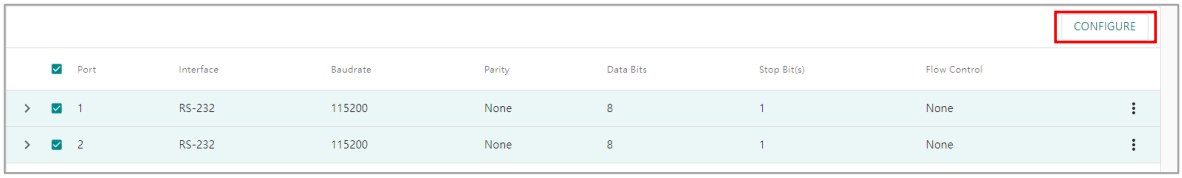


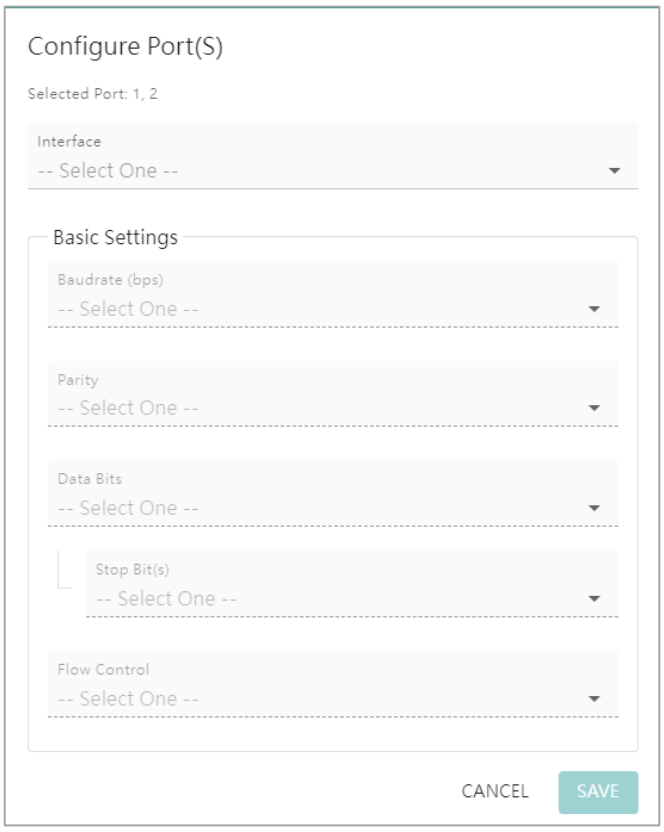
Select Serial Port Settings > Serial Parameters in the navigation panel to configure the parameters for each serial port. You may click on the button and select **EDIT** to change the serial parameters on a specific serial port. The Edit Port window will open to change the existing parameters.





If you want to change multiple serial ports simultaneously, select the checkboxes of the target ports and click the **CONFIGURE** button. The Configure Port window allows you to set new values for all selected ports by displaying empty parameter fields.





Basic Settings

Interface (default=RS-232): You may configure the serial interface to RS-232, RS-422, RS-485 2-wire, or RS-485 4-wire

Baudrate (bps) (default=115200): This field configures the port's baudrate. Select one of the standard baudrates from the drop-down box or select Other and input the specific baudrate of the serial device in the Value box.

Parity (default=None): This field configures the parity parameter.

Data Bits (default=8): This field configures the data bits parameter; 5, 6, 7, or 8 are supported.

Stop Bits (default=1): This field configures the stop bits parameter;1 or 2 are supported.

Flow control (default=None): This field configures the flow control type, including RTS/CTS, DTR/DSR, Xon/Xoff, RTS Toggle and None. When set interface as RS-232, it supports all above flow control mechanisms. When set interface as RS-422, RS-485 2-wire or RS-485 4-wire, it only supports None and Xon/Xoff.

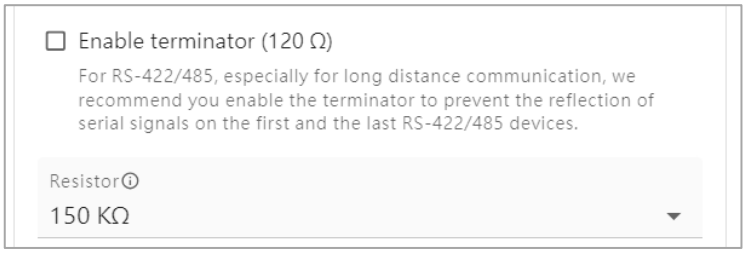
Advanced Settings

Enable FIFO:

The Enable FIFO function is enabled by default for improved data throughput. There are two situations where the user may choose to disable the Enable FIFO function by unchecking the checkbox.

- If the serial device does not have FIFO/buffer or does not support the flow control function. In this case, the serial device may not receive the serial data from the NPort on time, which means that some data might be dropped.
- If the data latency is more important than data throughput. To achieve higher data throughput, data can be temporarily stored in the buffer, allowing for larger amounts of data to be sent at once. The downside is that the latency of a single data may be slower. If the latency is important for the serial device to read data correctly, then you should consider disabling the Enable FIFO function.

This field enables or disables the 512-byte FIFO buffer. The NPort 6000-G2 provides FIFO buffers for each serial port, for both the Tx and Rx signals.



When configuring the interface as RS-422, RS-485 2-wire, or RS-485 4-wire, you can choose to enable the terminator (120 Ω) and set the resistor. Because these interfaces can handle communication distances of over 1 km and accommodate more than 10 serial devices on the same bus, there are more factors that need to be taken into account.

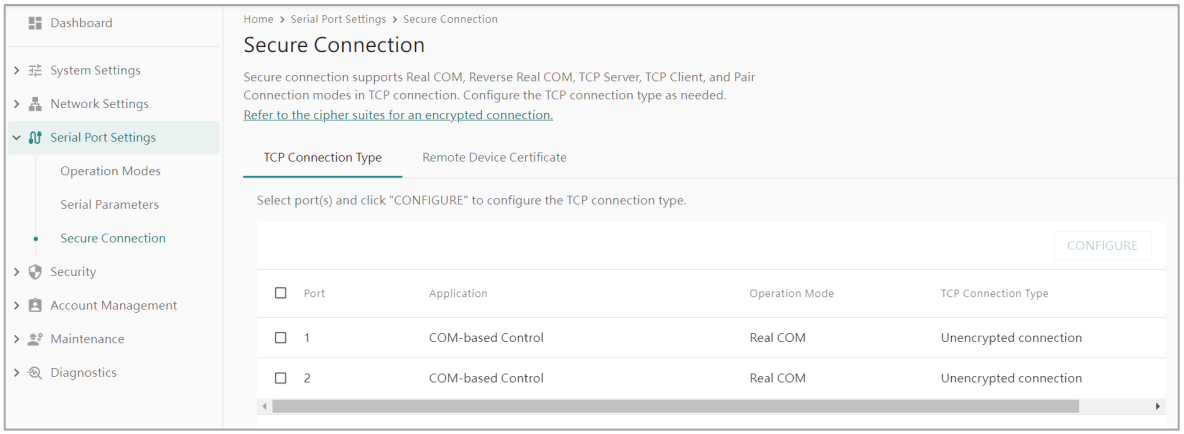
Enable terminator (120 Ω): For RS-422/485, especially for long-distance communication, we recommend you enable the terminator to prevent the reflection of serial signals on the first and the last RS-422/485 devices.

Resistor: If the remote devices are unable to receive data correctly for RS-422/485, try adjusting the pull high/low resistors which can strengthen the serial signal, and it might help on this. Two values are selectable, 1 KΩ or 150 KΩ.

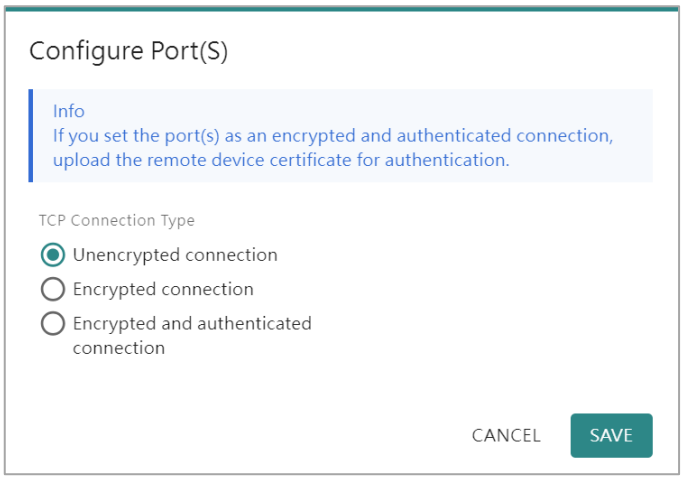
Secure Connection

To face the increasing cybersecurity threats, user may want to consider how you can protect important data on the serial device. The communication distance on the serial bus is short and hard to steal (usually in a factory with a security guard). When using a device server to pass the serial data to an Ethernet network, it is another story. An Ethernet network is more vulnerable than a serial bus. The NPort device server provides the ability to communications on the Ethernet network.

Select **Serial Port Settings > Secure Connection** in the navigation panel to configure the **TCP Connection Type** for each serial port. You can also select multiple serial ports and click the **CONFIGURE** button to change them simultaneously.

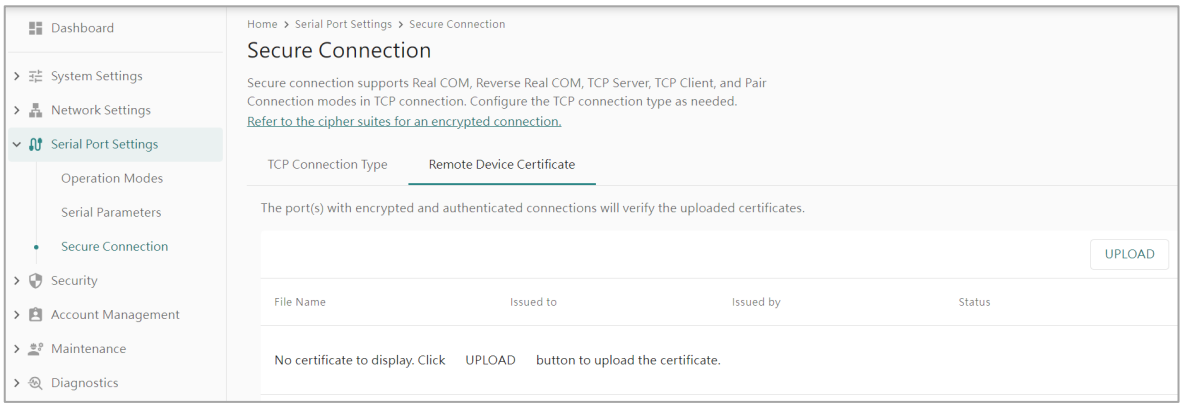


TCP Connection Type



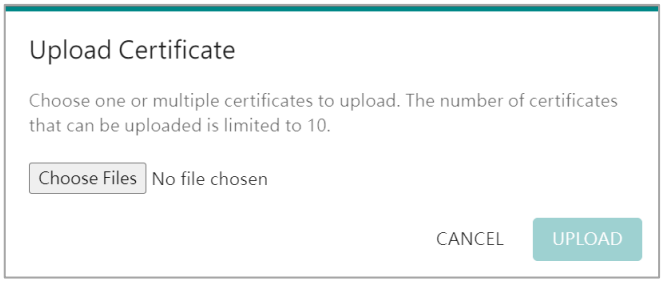
Option	Description
Unencrypted connection	Data sent through the Ethernet will not be encrypted. This is the default value.
Encrypted connection	Data sent through the Ethernet will be encrypted with TLS v1.2.
Encrypted and authenticated connection	Data sent through the Ethernet will be encrypted with TLS v1.2, and the connection will be authenticated by certificate before the connection is established. Please upload the certificate at Remote Device Certificate tab for authentication if you choose this type.

Remote Device Certificate



Encrypting the TCP session safeguards the confidentiality of the serial data, but how can we ensure the authenticity of the network device being communicated with? It's possible that the server is fake and attempting to extract valuable data from the serial device. To avoid this, it is recommended to enable certificate-based authentication. The NPort will verify the user-uploaded certificate and request verification of the remote server's certificate before establishing a secure connection. Once both devices are confirmed as correct, they will establish an encrypted TCP session to safeguard the crucial serial data. To enable it, remember to select **TCP Connection Type** to **Encrypted and authenticated connection** and upload the certificate at **Remote Device Certificate** tab.

When switching to the **Remote Device Certificate** tab, click the **UPLOAD** button to upload your certificate for authentication.

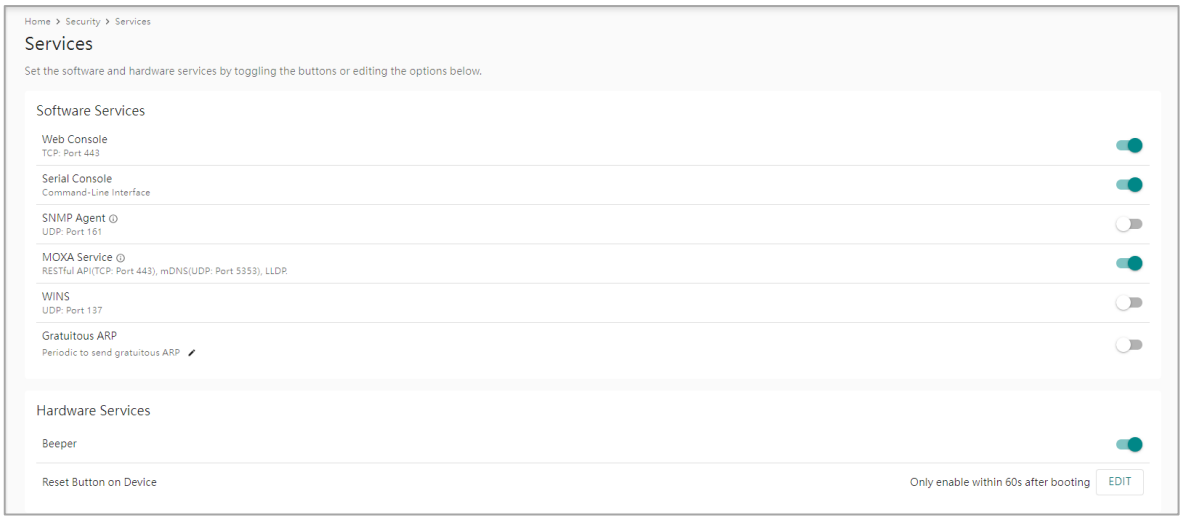


Security

With cyberattacks growing in number and sophistication, device server vendors are adding functions geared towards protecting sensitive business and personal information. All the relative functions are listed under the **Security** category.

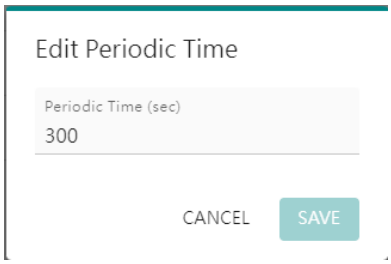
Services

Based on different user scenarios, you may need different services to meet these requirements. Click **Security > Services** to enable/disable the services he needs or no need.



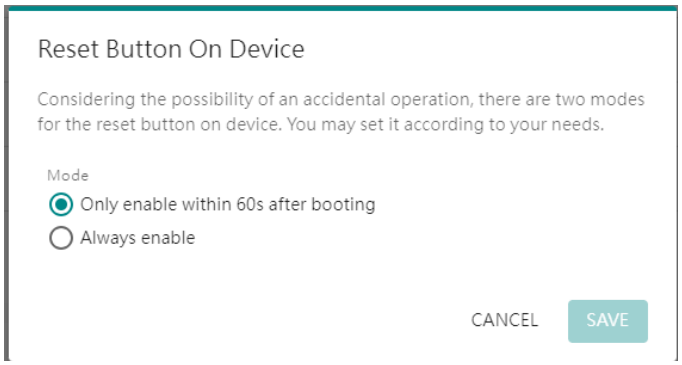
Software Services	Value	Default Value	Description
Web Console	Enable/ Disable	Enable	This setting is to enable/disable the web console. To ensure security, the NPort 6000-G2 device server only supports HTTPS console using TLS v1.2 or newer. The web console provides all the settings that the NPort 6000-G2 supports. We don't recommend a user to disable it.
Serial Console	Enable/ Disable	Enable	This setting is to enable/disable the serial console on the serial port 1 of the NPort 6150-G2/6250-G2. Log in the serial console while the device server is booting up to configure the network settings like the IP address. After setting the network settings, it is advisable to disable the serial console. This prevents accidental triggering of the console by the serial device during simultaneous boot-up.
SNMP Agent	Enable/ Disable	Disable	This setting is to enable/disable the SNMP Agent service. If you want to use the SNMP protocol to monitor the status or change some configuration settings of the NPort 6000-G2, enable the service. If your site doesn't match this scenario, please disable it.
Moxa Service	Enable/ Disable	Enable	This setting is to enable/disable Moxa proprietary service. NPort Windows Driver Manager, DSU-G2, and MXStudio are based on this service to work. This software cannot be used when Moxa Service is disabled.
WINS	Enable/ Disable	Disable	This setting is to enable/disable the WINS service. Windows Internet Name Service (WINS) is the Microsoft implementation of NetBIOS Name Service (NBNS), a name server and service for NetBIOS computer names. If the service is not enabled in your network, keep it as disabled.
Gratuitous ARP	Enable Disable	Disable	This setting is to enable/disable the Gratuitous ARP service. In some applications, you may need the NPort 6000-G2 to send broadcast packets to update the ARP table on the server. If you enable this function and set the send period, the NPort 6000-G2 will periodically send broadcast ARP packets at the specified time interval.

When click the edit button  of Gratuitous ARP service, set the time for the ARP packets. The default value is 300 seconds.



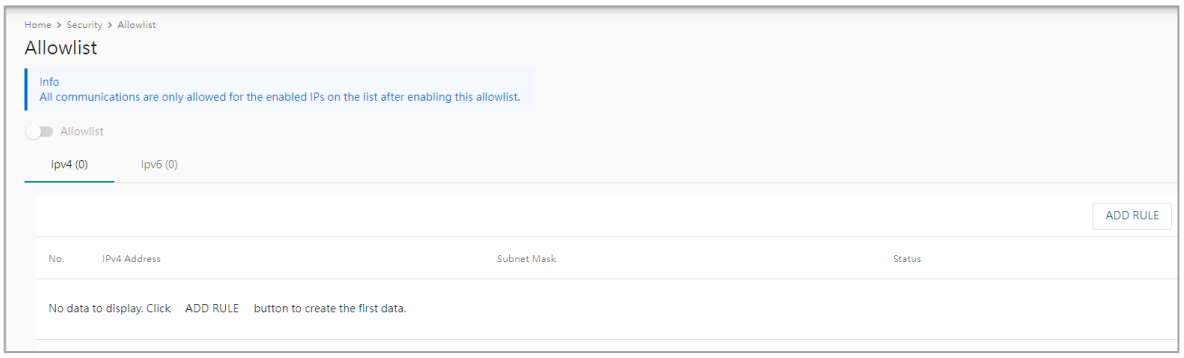
Hardware Services	Value	Default Value	Description
Beeper	Enable/Disable	Enable	This setting is to enable/disable the beeper of the device. You will hear the beeper when the device is ready after a power cycle. If you don't want to hear the sound, you may disable the service.
Reset Button on Device	Only enable within 60s after booting up/Always enable	Only enable within 60s after booting up	By default, the device disables the reset button after booting up for 60 seconds to prevent someone from accidentally pushing the button and resetting the device to its default settings.

The EDIT button in the Reset Button On Device service allows you to specify when the reset button should be enabled. Either the button is enabled for just one minute after the device boots up, or it stays enabled indefinitely.

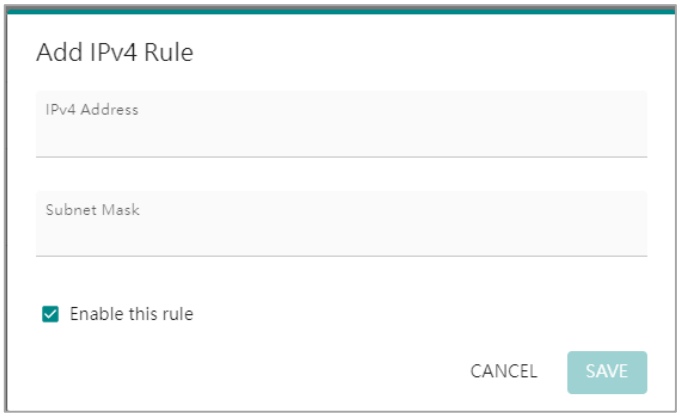


Allowlist

An allowlist is a list of IP addresses or domains that are provided privileged access. Enabling this function limits the number of the IP addresses that can access the device server, which can prevent unauthorized access from an untrusted network.



Before you enable Allowlist, add at least one rule on the table. And remember to make sure the host PC's IP address is on the list, or you may not access the web console of the device server.



Click the ADD RULE button to add a new rule. You may fill an IP Address or a domain name in the IP Address column, and then input the subnet mask to allocate a range of IP addresses. We recommend you enable this function, so the new rules will be enabled while adding a new rule. If you don't want to enable it, remember to uncheck the checkbox **Enable this rule**.

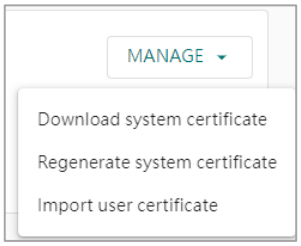
Certificate

The NPort 6000-G2 will automatically generate a self-certification for all the TLS sessions, including web console (HTTPS), secure operation modes, and syslog-ng service.

If you have company generated or a third-party verified certification, click the MANAGE button to import the certification to mitigate the cybersecurity risks to the network.

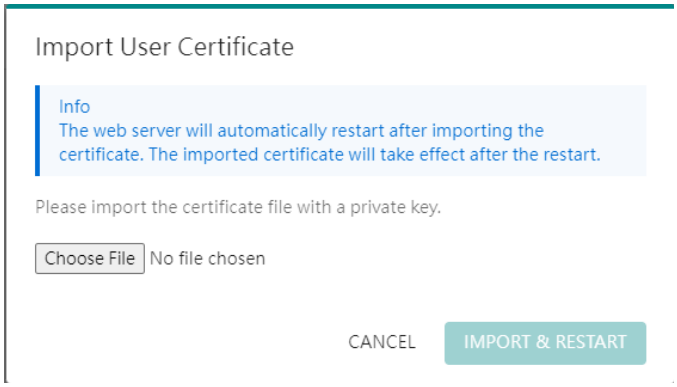
When access the **Security > Certificate** page, it shows the status of the system certificate:

- Is the system certificate still valid? Or has it expired?
- Who requested the system certificate?
- Who issued the system certificate? If it is a self-certification, the IP address will be NPort' s IP address.
- When was the system certificate issued?
- When will the system certificate expire?



When you click the MANAGE button, there are three actions:

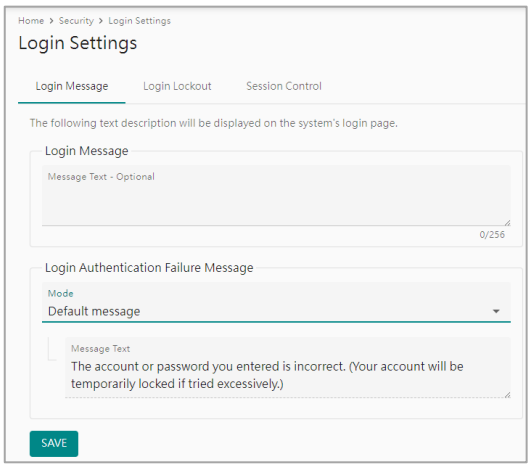
- Download system certificate: The browser or the software on a PC may request the target device to provide a valid certificate before establishing a secure connection. In this case, download the system certificate from the NPort. and then upload it to the browser or the software. Then the secure connection will be established.
- Regenerate system certificate: If the system certificate has expired or no longer sucure, regenerate the system certificate for new secure connections.
- Import user certificate: If you have company generated or a third-party verified certification, import that certificate to the NPort to establish new secure connections.

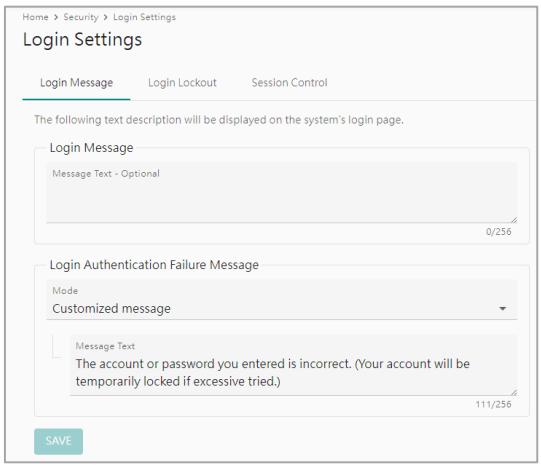


When clicking the **MANAGE > Import user certificate**, click **Choose File** button to find the certification on the PC. Click the **IMPORT & RESTART** button to ensure the NPort will restart itself to use the imported certificate.

Login Settings

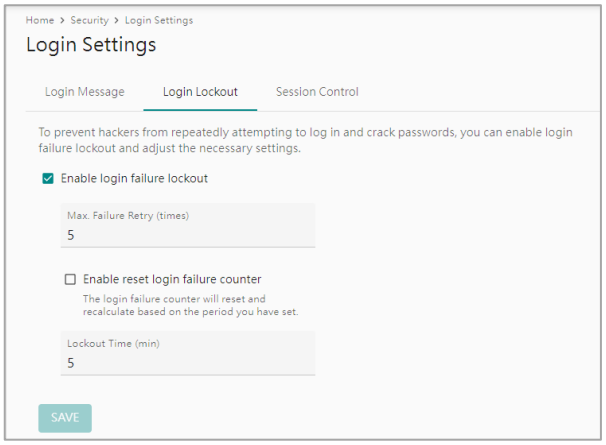
The NPort device server administrator may need to send messages to a user upon successful or failed login attempts. The administrator can edit related messages or functions here.





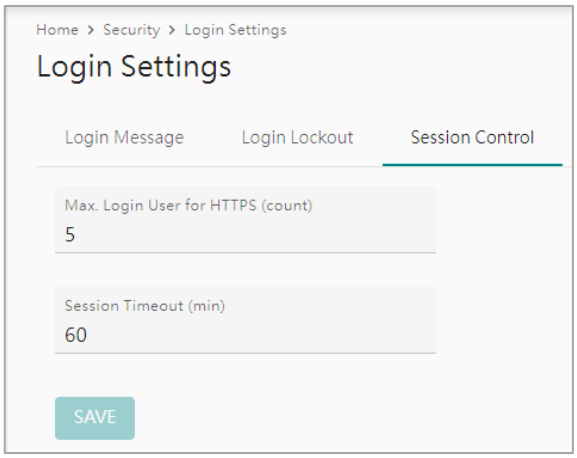
When you successfully log in to an NPort 6000-G2 device server, the Login Message column will be shown. The message input by the administrator can be up to 256 characters long.

To communicate with users who couldn't login, the administrator can opt for Customized message mode and enter the message in the Message Text column. When the mode is set to Default message, the NPort 6000-G2 also offers a recommended message for the administrator to refer to.



To prevent hackers from repeatedly attempting to log in and crack passwords, we recommend you enable the Login Lockout function. It will be enabled on default.

Name	Value	Default Value	Description
Enable login failure lockout	Cheked / uncheck	Checked	When checked, the Login Lockout function will be enabled.
Max. Failure Retry (times)	1 - 10	5	If the Login Lockout function is enabled, it sets the number of attempts a user has before being locked out. Let's say the value is 5, then five password attempts are allowed. Regardless of whether the password is right or wrong on the sixth attempt, access to the device will be denied.
Enable reset login failure counter	Checked / uncheck	Unchecked	If this function is enabled, the user can wait a bit and then retry logging in. If this feature is turned off, the only option is to contact the administrator and request an account unlock.
Lockout Time (min)	1 – 60	5	If the option to reset the login failure counter is turned on, it sets the waiting time for the user before another login attempt.



For security and resource arrangement reasons, the NPort will limit the usage of the HTTPS sessions.

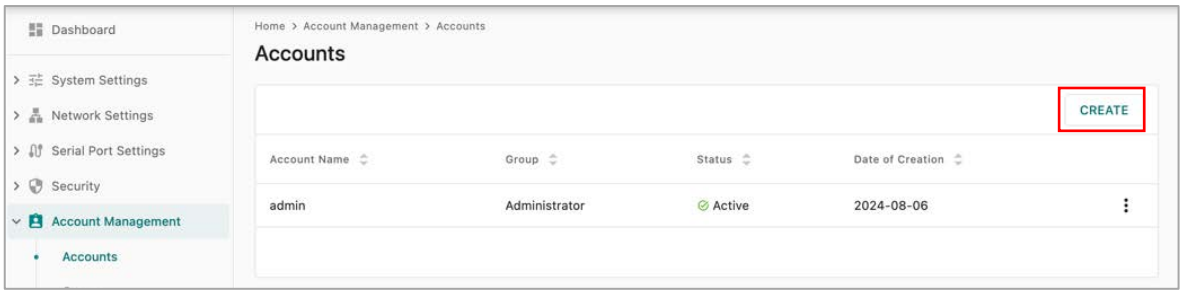
Name	Value	Default Value	Description
Max. Login User for HTTPS (count)	1 – 10	5	The number of users with different user accounts that can establish a HTTPS connection to the NPort.
Session Timeout (min)	1 - 1440	60	The time the NPort allows for inactivity when a user logs in before ending the HTTPS session

Account Management

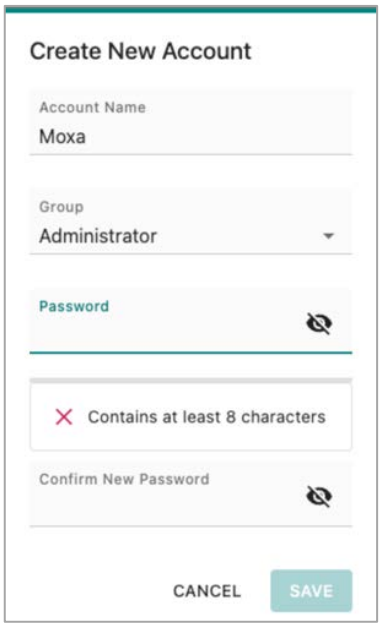
For security concerns, different users need different accounts and privileges on one device. With the Account Management function of the NPort 6000-G2 Series, administrators can easily add, delete, or change user account names. They can also assign access to specific function categories based on different user groups. Furthermore, administrators can effectively manage passwords and login policies to ensure that only authorized users can use the device.

Accounts

In the NPort 6000-G2 Series, the categories that you can access have a strong correlation with the user groups defined by the administrator(s) (for managing the groups, please refer to the next section, Groups). Administrators are allowed to add user accounts to the NPort 6000-G2 device by clicking the Create button on the **Accounts** page.



The **Create New Account** window will pop up for you to input account information and assign a password to the user. Also, the Administrator(s) shall assign a proper **Group** to users to limit their privileges of using the NPort 6000-G2. To add/delete/edit the **Group**, please go to the **Groups** section in the menu. The **Password** rules can be set up in **Password Policy** section.



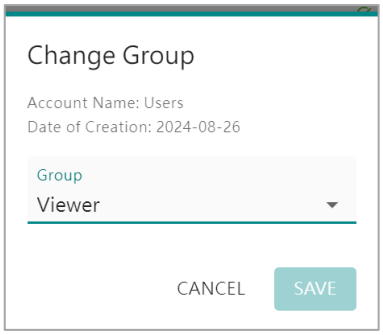
You may also click more menu button on an exited user to edit the account's above information/settings.)

Change password

As an administrator, you can change every user's password. The Change Password window will appear. Input the new password twice and **SAVE** the new password. The password will be changed.

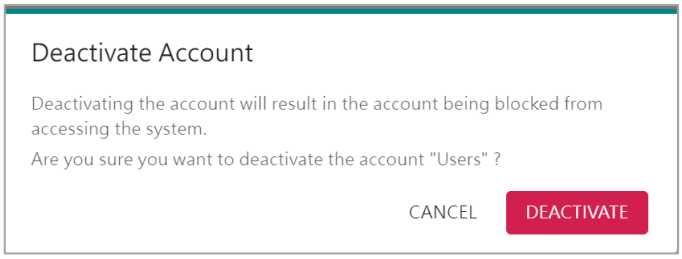
As a general user, you can only change your password. Click the More menu button in your account name and select **Change password** so that the Change password window opens. Input the new password twice and **SAVE** the new password. The password will be changed.

Change group



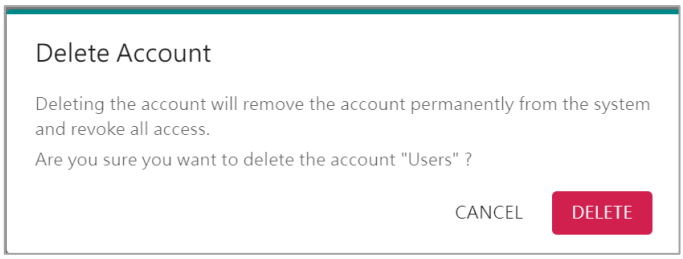
Only the administrator can change the group of a user account. Click the More menu button in the target account name and select **Change group** to open the Change Group window. On te drop-down menu, select the group you want to move click the **SAVE** button. The user account will move to the new group.

Deactivate



Only the administrator deactivate a user account. When deactivating an user, the user account still exists on the NPort, but the user cannot log in to the device. Only when the administrator activates the user account can the user lock in. Click the More menu button on the target account name and select **Deactivate** to open the Deactivate Account window. Click the **DEACTIVATE** button and the user account will be deactivated.

Delete



Only the administrator can delete a user account. When deleting a user account, it will be removed from the NPort. Click the More menu button on the target account name and select **Delete** to open the Delete Account window. Click the **DELETE** button to delete the user account.

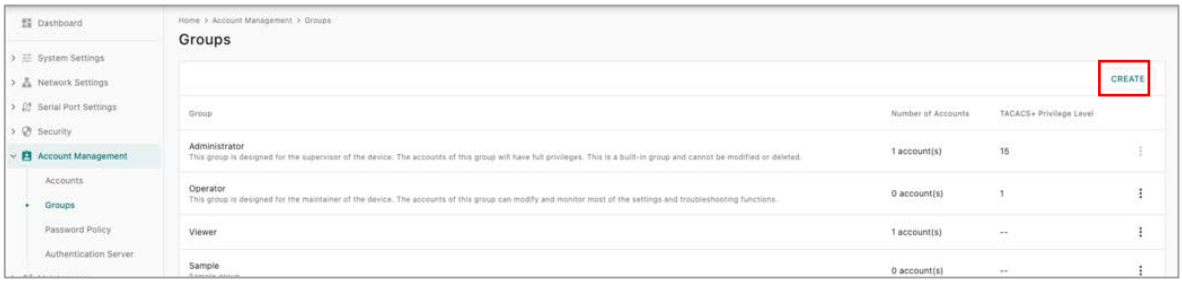
Groups

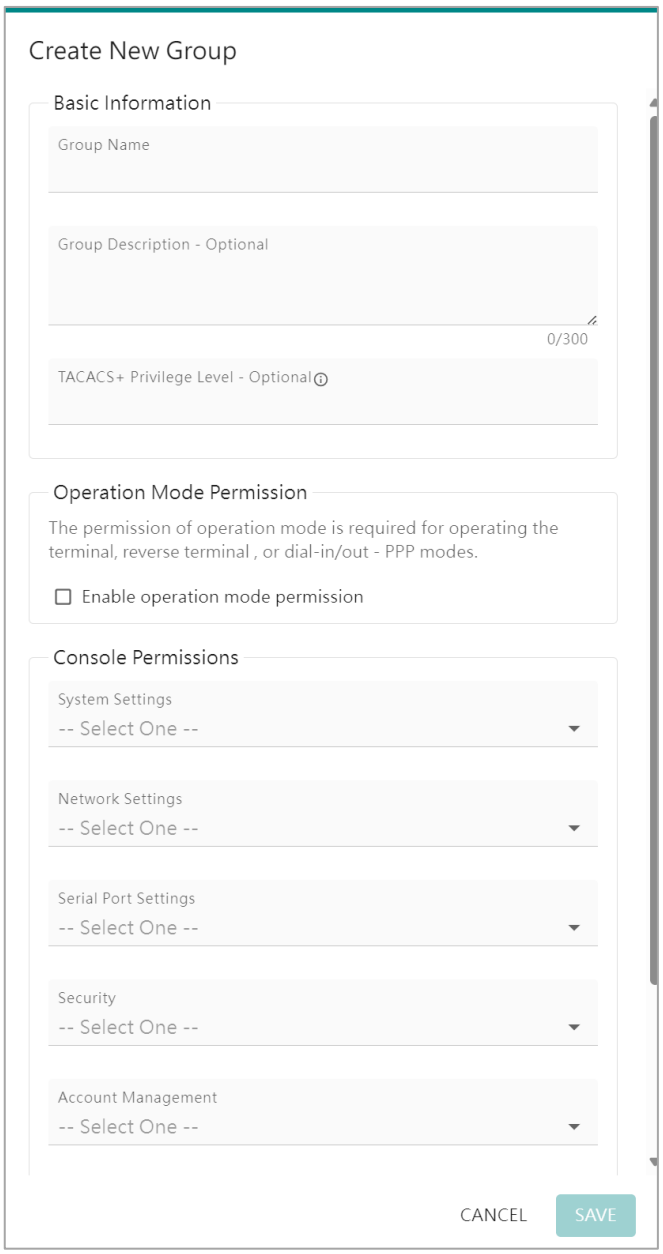
Users can access different function categories with the NPort 6000-G2 based on their group affiliation. Customizing access permissions for different groups is restricted to the group administrator by default, or any group which is granted with Read/Write permission on Account Management category.

A maximum of four user groups can be created, with up to four user accounts per group. By default, the NPort 6000-G2 has the Administrator, Operator, and Viewer user groups built in.

- The Administrator group cannot be removed, and the name cannot be changed.
- The Operator group can be removed, and the name can be changed.
- The Viewer group cannot be removed , but the name can be changed.

Clicking the Create button on the Groups page to create a new group.





Group Name: The name of the group user is going to create. You need to give the group name. When the NPort enables a central account management mechanism with RADIUS, the group name shall match the Filter-ID parameter on the RADIUS server.

Group Description – Optional: Decribe the group to understand the purpose for creating this group. For example, creating a group named "Operator" with the description: "This group is designed for the maintainenance of the device. The accounts of this group can change and monitor most of the settings and troubleshooting functions." This is an optional column.

TACACS+ Privilege Level – Optional: When the NPort enables the central account management mechanism with TACACS+, this column will need to be filled with a number between 0 and 15. This value must match the Privilege Level parameter on the TACACS+ server. This value is crucial for coworking with a TACACS+ server.

Operation Mode Permission: When the serial port(s) is configured with these operation modes—Terminal, Reverse Terminal or Dial-in/out PPP mode—can check if the remote user has the necessary privilege to access the serial port. For these users, add them to a group that enabled this function.

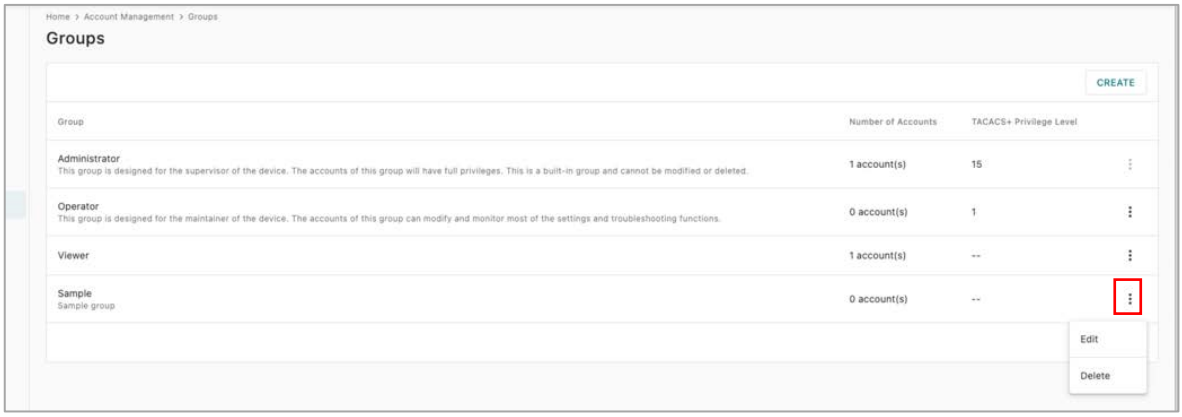
Console Permissions: Assign the privileges for different categories using the drop-down menu. There are three types of the permissions:

- **No Display:** The user in this user group will not see this function group when accessing the NPort 6000-G2.
- **Read Only:** The user in this user group can only view the function/setting in this function group but cannot make modifications.
- **Read Write:** The user in this user group can view the function/setting in this function group and make modifications.

There are totally seven categories:

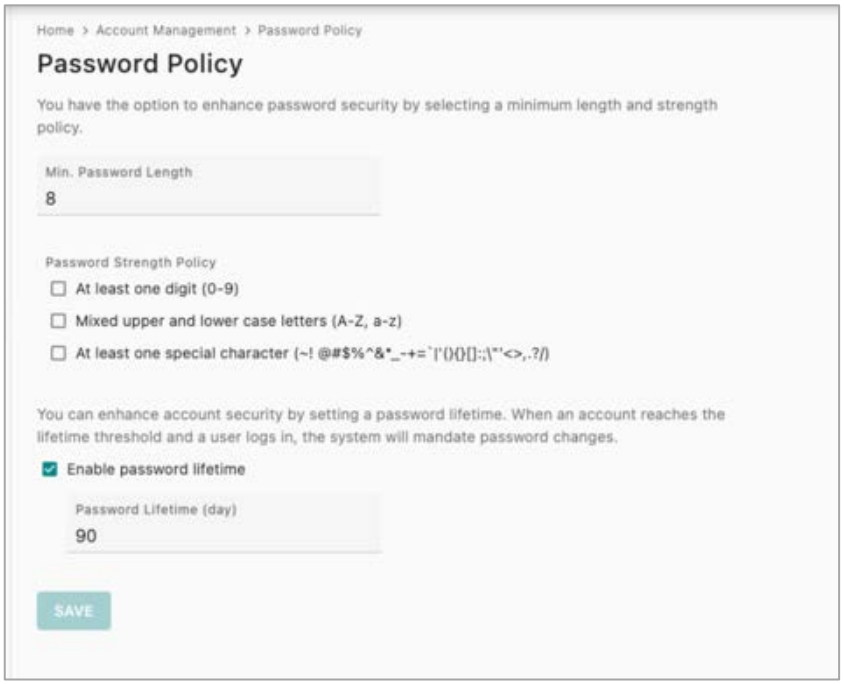
- System Settings: Includes all the settings for the NPort itself, like the server's name and notification.
- Network Settings: Includes all the settings related to the Ethernet port, like the IP address and subnet mask.
- Serial Port Settings: Includes all the settings related to the serial port, like the operation mode and serial parameters.
- Security: Includes all the settings related to cybersecurity, like the allowlist and login settings.
- Account Management: Includes all the settings related to account and group, like create/modify/delete an account or group.
- Maintenance: Includes all the settings related to routine maintenance jobs, like firmware upgrade and configuration import/export.
- Diagnostics: Includes all the functions which help the user troubleshoot, like device status and traffic monitoring.

Click the More menu button on an existing group to edit its access privilege or delete the group.



Password Policy

With the PC platform becoming increasingly powerful, users worry about the risk of password brute-force attacks. The administrator can mitigate cybersecurity risk by enabling the Password Policy function to boost password complexity.



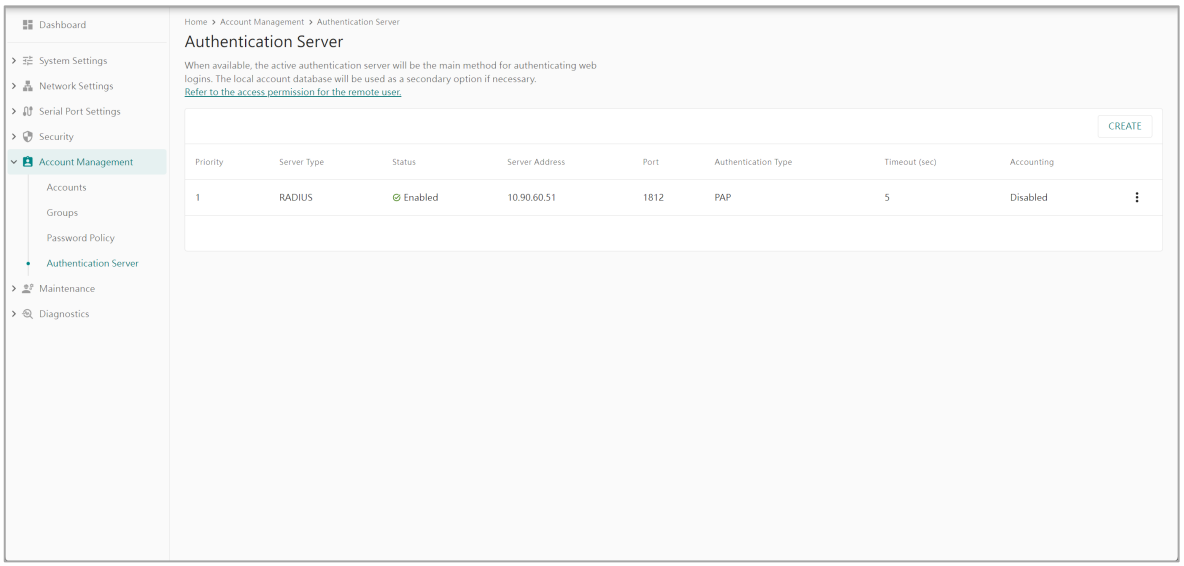
Parameter	Setting	Default	Description
Password minimum length	8 to 256 characters	8	Define the minimum length of the login password for NPort 6000-G2
At least one digit (0-9)	Enable/Disable	Disable	The password must contain at least one number (0 to 9) when enabling this parameter
Mixed upper- and lowercase letters (A~Z, a~z)	Enable/Disable	Disable	The password must contain an upper- and a lowercase letter when enabling this parameter
At least one special character (~!@#$%^&*-_|;:,.<>[]{}())	Enable/Disable	Disable	The password must contain at least one special character when enabling this parameter
Enable password lifetime	Enable/Disable	Enable	Enhancing account security by setting a password lifetime.
Password Lifetime (day)	1 to 180 days	90 days	Users can set a specific lifetime for their passwords, and receive system notifications to change them if the option is enabled.

On completion of the settings, click the **SAVE** button to save the changes and make them effective.

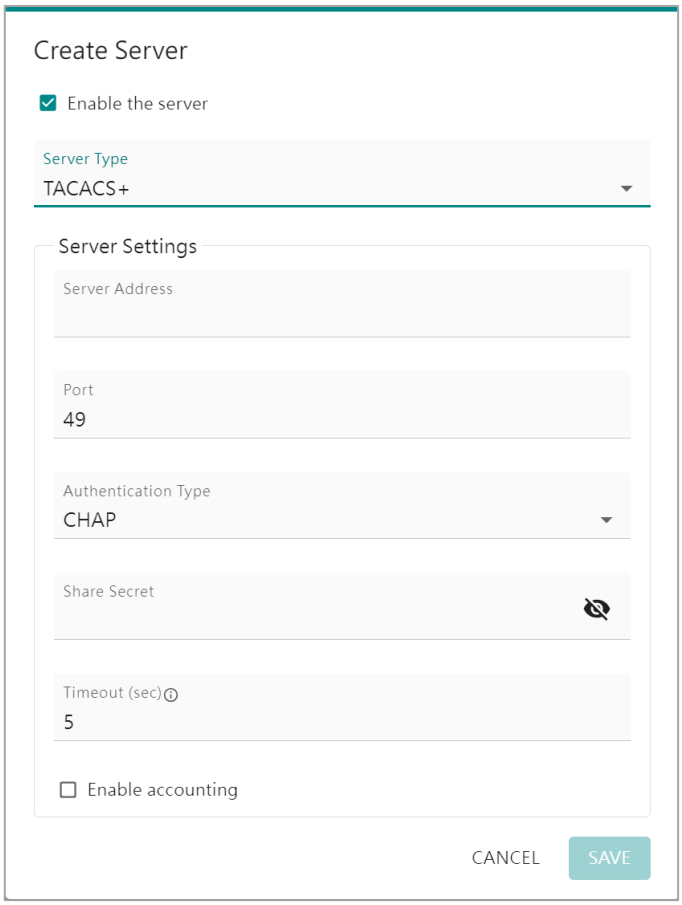
For setting related to failure logins, for example, to lock out an IP address after five failure password inputs, find the **Security > Login Settings > Login Lockout** section.

Authentication Server

For a medium or big network topology (maybe more than 50 network devices), setting up the username/password database on each network device is tedious work, especially when you need to update the passwords quarterly. Setting up a centralized account management system is a solution. Select the **Account Management > Authentication Server** of the Navigation Panel to configure the relative settings.



Click the CREATE button to create an authentication server in the network.



Enable the server: Click the CREATE button to open the Create Server window and enable the **Enable** the server function. If you want to add a server without enabling server authentication, make sure to disable it.

Server Type: The NPort 6000-G2 Series supports TACACS+ or RADIUS server of a central account management system.

Server Address: Input the IP address or the domain name of the TACACS+ or RADIUS server.

Port: Enter the TCP port for the TACACS+ or RADIUS server to listen for authentication.

Authentication Type: The NPort 6000-G2 Series supports two authentication types, PAP or CHAP. PAP uses a two-way handshake and sends the secret in clear-text form, whereas CHAP uses a three-way handshake and never sends the secret between the parties. Therefore, CHAP is a stronger authentication method than PAP, because the secret is not transmitted over the network, and it provides protection against repeated attacks during the life of the link.

Share Secret: The shared secret key is a text string used to encrypt/decrypt data in TACACS+/RADIUS packets transmitted between the two parties during authentication sessions. It must match the setting on the RADIUS/TACACS+ server.

Timeout: The time NPort will wait for the server response before trying another server or local account database.

Enable Accounting: The TACACS+/RADIUS may support an accounting function to calculate the time each user uses a specific service. To enable support for this, the administrator needs to activate it for the NPort.

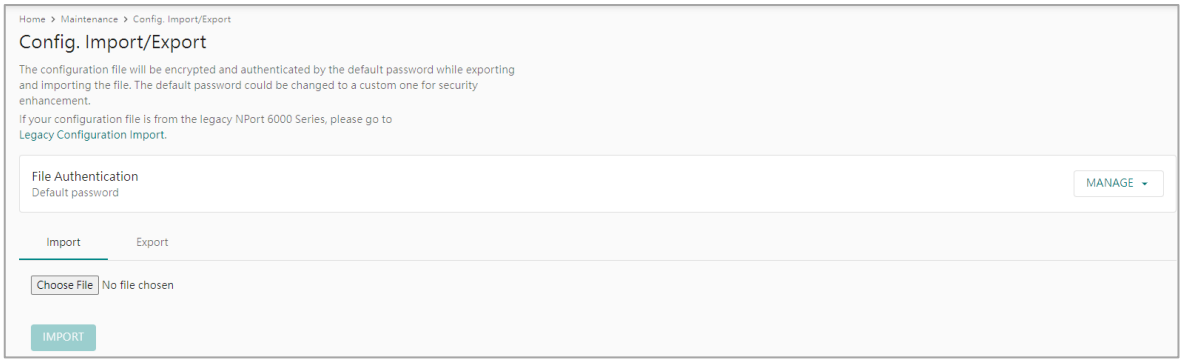
On completion of the settings, click the **SAVE** button to save the changes and make them effective.

Maintenance

Operators may have to perform routine tasks every month or quarter to maintain the system when it is online. NPort categorizes these actions as Maintenance to simplify their completion for the user.

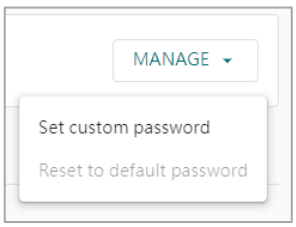
Config. Import/Export

You may want to back up the configuration settings of the NPort to access the **Maintenance > Config. Import/Export** to accomplish it.



File Authentication

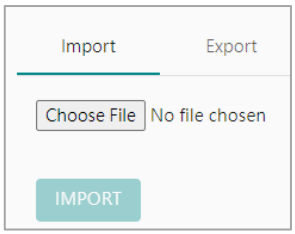
Because of security concerns, the NPort 6000-G2 can no longer export a configuration file without a password. Click the MANAGE button to set a password for the exported configuration file.



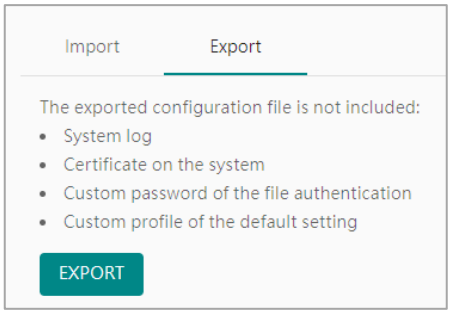
When clicking the **Set custom password**, give a customized password for the exported configuration file. The NPort 6000-G2 will use this password to decode the imported configuration file. The password policy for the configuration file allows for 8 to 64 characters and does not have any complex requirements.

When clicking the **Reset to default password**, the NPort 6000-G2 will use the default password to encode or decode a configuration file.

Import/Export the Configuration File



At the **Import** tab, click the **Choose File** button to select the configuration file you want to import.

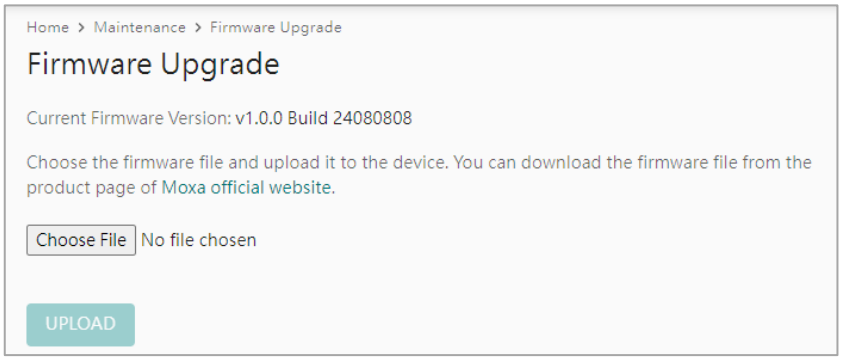


At the **Export** tab, click the **EXPORT** button to select where you want to save the configuration file to.

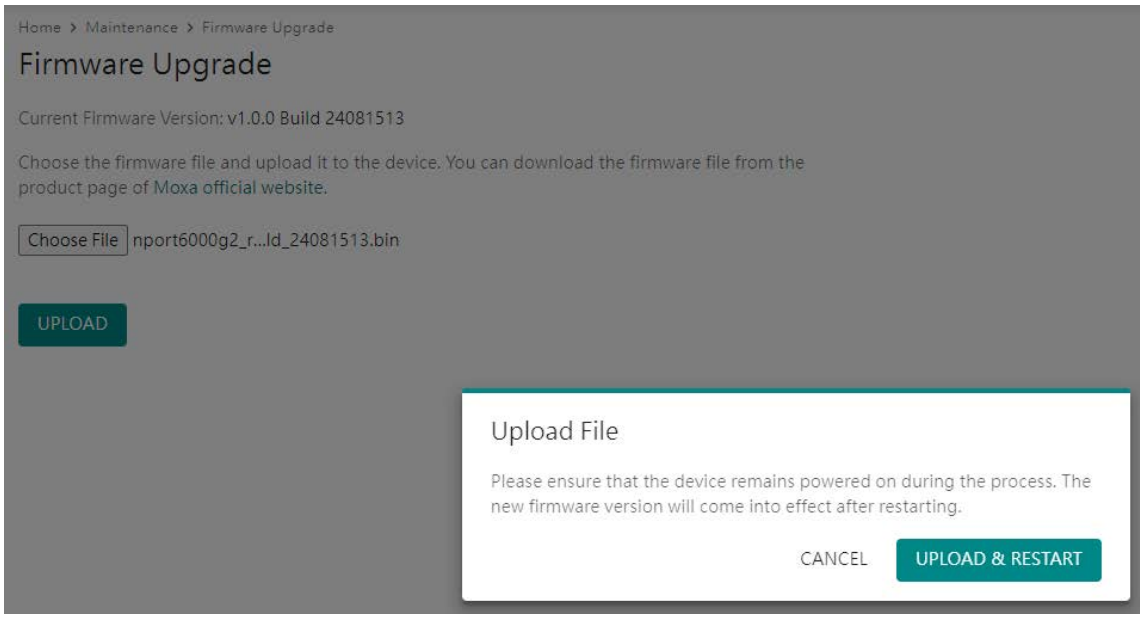
Firmware Upgrade

It's highly advised to always upgrade to the latest firmware version due to the increasing number of cybersecurity threats. Consistently using the latest firmware helps reduce cybersecurity risks.

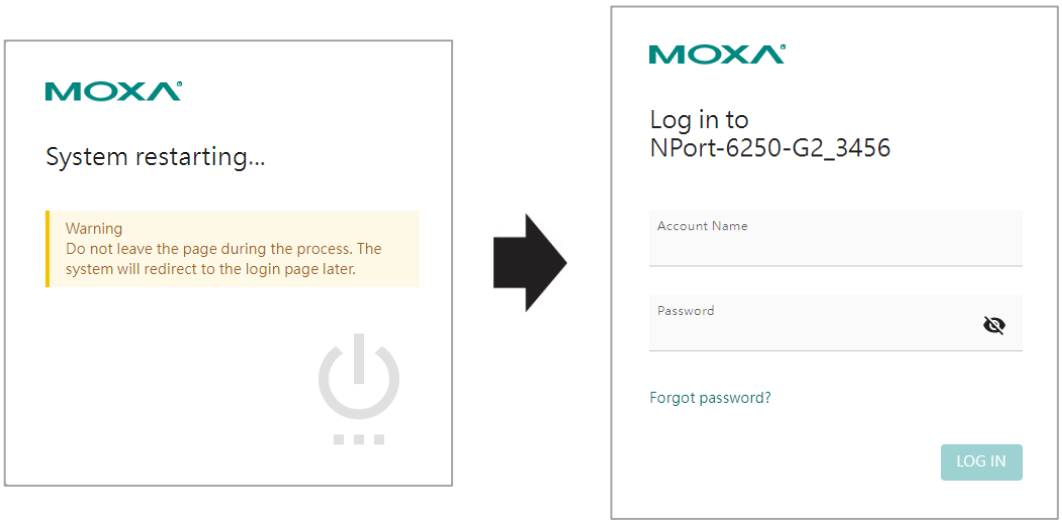
When you want to upgrade the firmware, click **Maintenance > Firmware Upgrade**, and click the **Choose File** button to find the firmware file. Click the UPLOAD button to proceed.



Ensure the device remains powered on and click the UPLOAD & RESTART button. The device will upgrade to the new firmware version and restart itself.

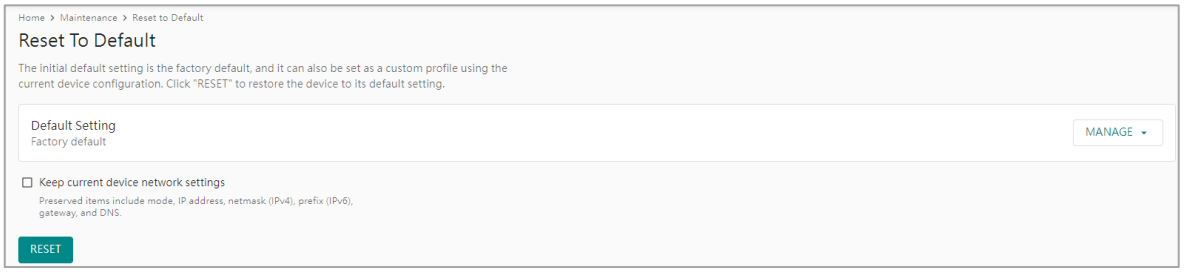


When the login page appears, it means that the firmware upgrade process has been completed.

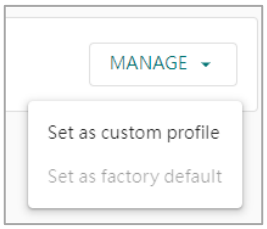


Reset to Default

This function will reset all the NPort 6000-G2's settings to the factory default values. All previous settings, including the console password, will be lost. If you wish to keep the NPort 6000-G2 IP address, netmask, and other network settings, make sure **Keep current device network settings** is checked before loading the factory defaults.

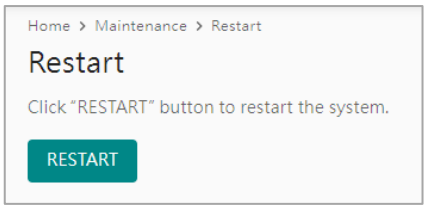


Machine builders or system integrators may have their preferred default values on the NPort. The NPort 6000-G2 provides **Set as custom profile** function to allow users to set the settings as the default setting. In this case, when the customer triggers the Reset to Default function, the device will restore the custom default settings. The hardware reset button is the only way to reset it to the Moxa factory default. Clicking the **MANAGE** button and selecting the **Set as custom profile** will enable this function. The configuration file will be saved as default when the customer initiates a reset using the web console, DSU-G2, or MCC Tool.



Restart

If you want to restart the device, access **Maintenance > Restart** and click the **RESTART** button. The device will restart itself.



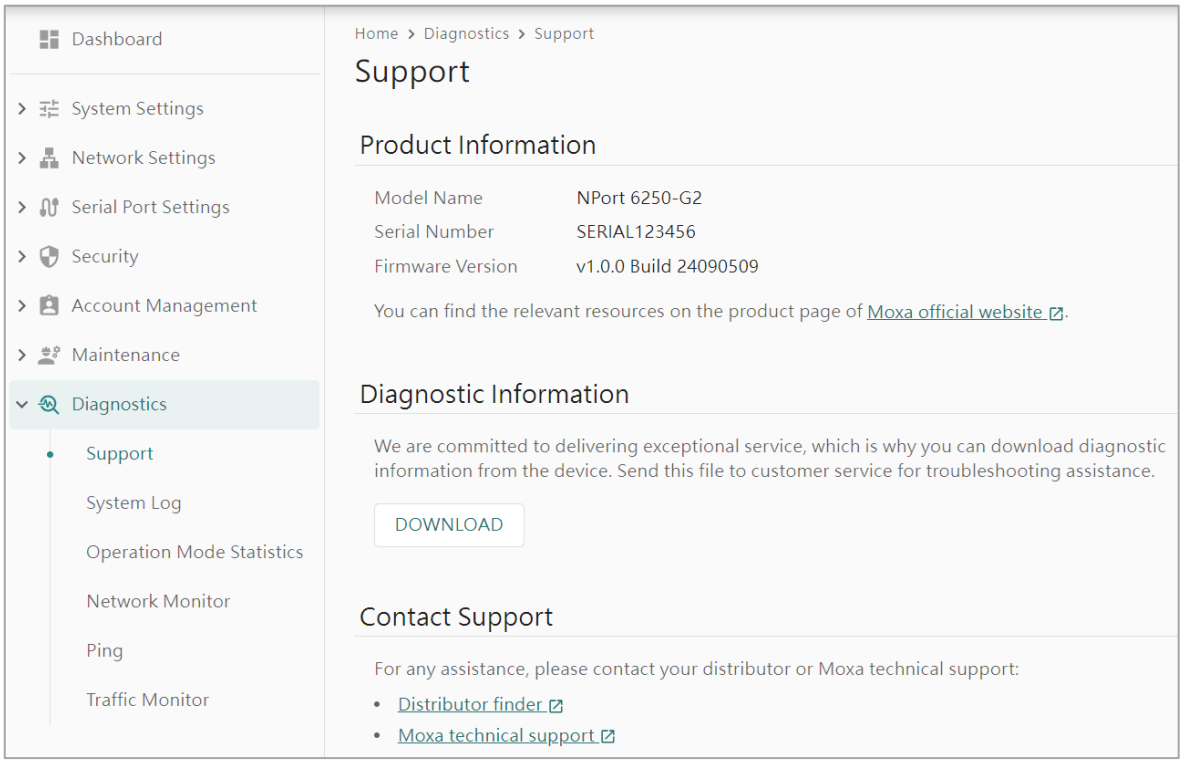
Diagnostics

System integrators and technical engineers may encounter issues when configuring a new application or receiving error reports during system operation. When that happens, you might find it helpful to have some diagnostic tools for troubleshooting.

In the Navigation Panel, the Diagnostics section brings together all the necessary functions for quick troubleshooting..

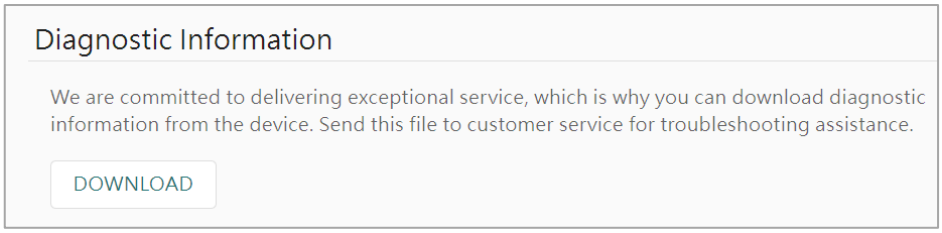
Support

If users need direct support from Moxa, they can find it on the Diagnostics à Support page. There, we provide a list of recommended information to collect before contacting Moxa, as well as contact information for seeking assistance.



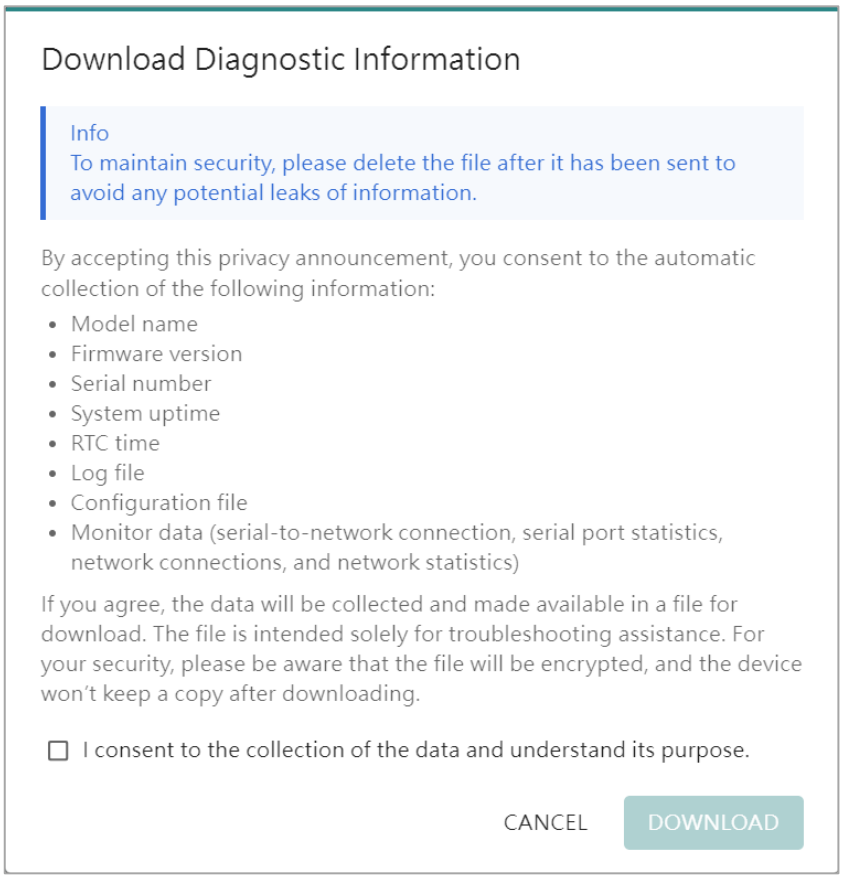
Product Information

Find here the basic information of the NPort device server, including the Model Name, Serial Number, Firmware Version of the NPort 6000-G2 device.



Diagnostic Information

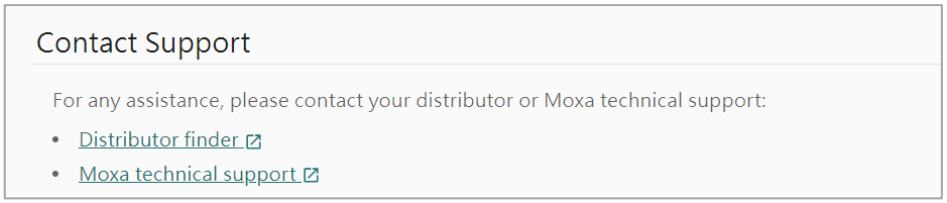
Previously, users would typically reach out to Moxa customer service initially, and the engineer would then request additional information for problem analysis. For the NPort 6000-G2 Series, we advise users to gather Diagnostic Information and send it along with their inquiry to Moxa customer service. This can make it simpler for the customer service engineer to pinpoint the root cause of the problem.



The Download Diagnostic Information window will open and list what information on the NPort device server will be collected/downloaded. Click **DOWNLOAD** to save the data after providing your consent for collection. The diagnostic information is encrypted to ensure it is secure when delivered on the Internet and can only be unzipped by Moxa engineers for troubleshooting purposes. Access will not be granted with the password.

To verify this information, please use the NPort device server's web console.

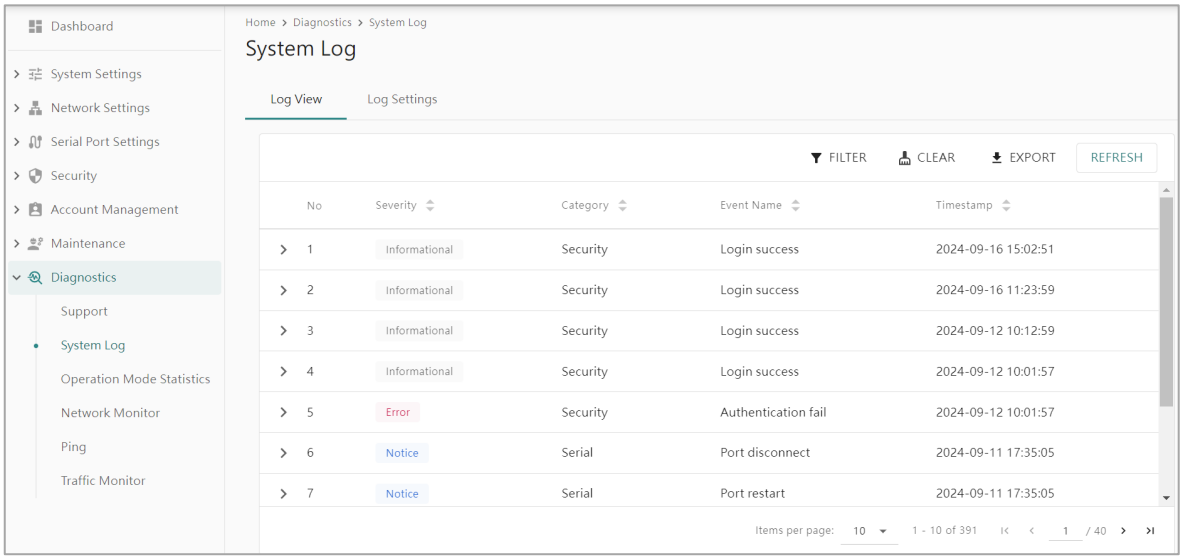
Contact Support



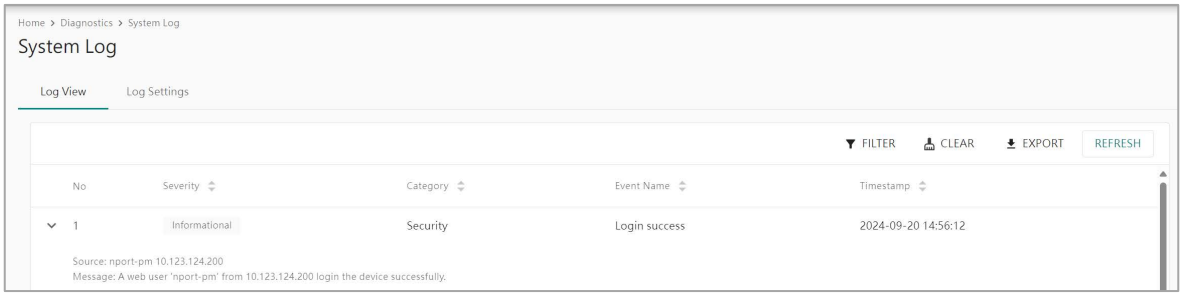
After downloading the Diagnostic Information, you can find the contact window by clicking the **Distributor finder** or **Moxa technical support**, which will guide you to the corresponding resources on the official website.

System Log

It is very important to record the activities of a device. At the System Settings > Notification page, configure which events will be recorded. Under the **Diagnostics > System Log > Log View** tab, find the recorded events on the NPort device server. Under the **Log Settings** tab, set the advanced settings for the local system log.

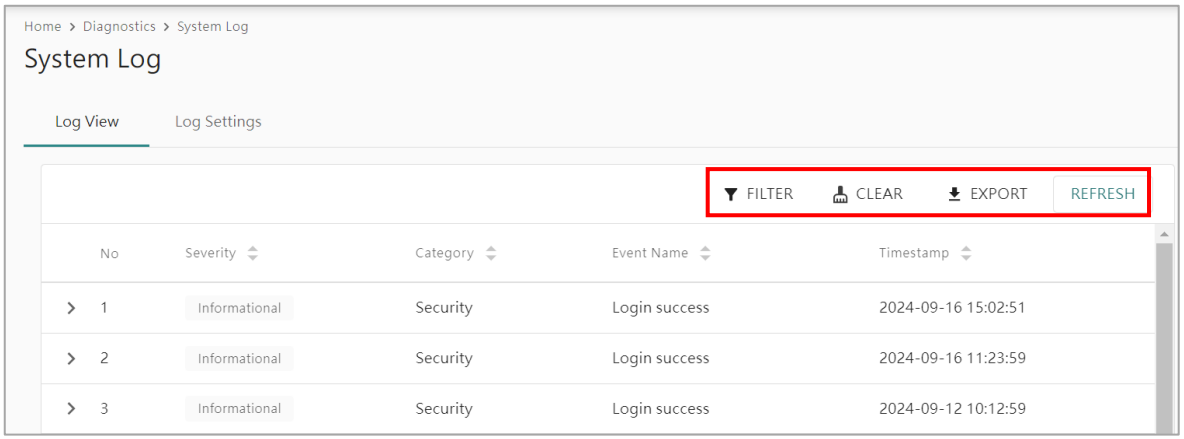


An event will be recorded under these columns: Severity, Category, Event Name, and Timestamp. You may find more information at **System Settings > Notification** section. also, there is the event list in the appendix.

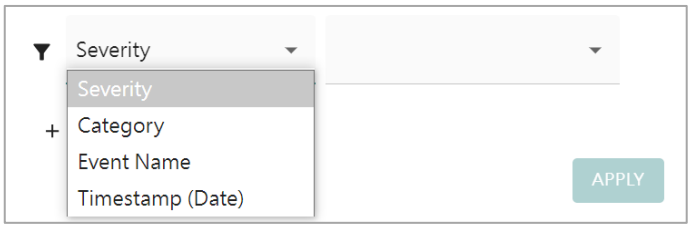


Click the arrow icon  to read more details about the event.

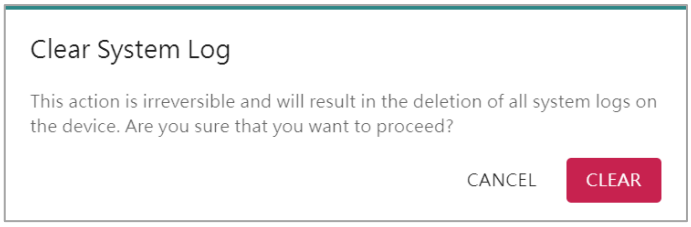
The NPort device server provides some management functions for you to easily read the events.



FILTER: Filter the event by Severity, Category, Event Name, or Timestamp.



CLEAR: Delete all system logs on the device.



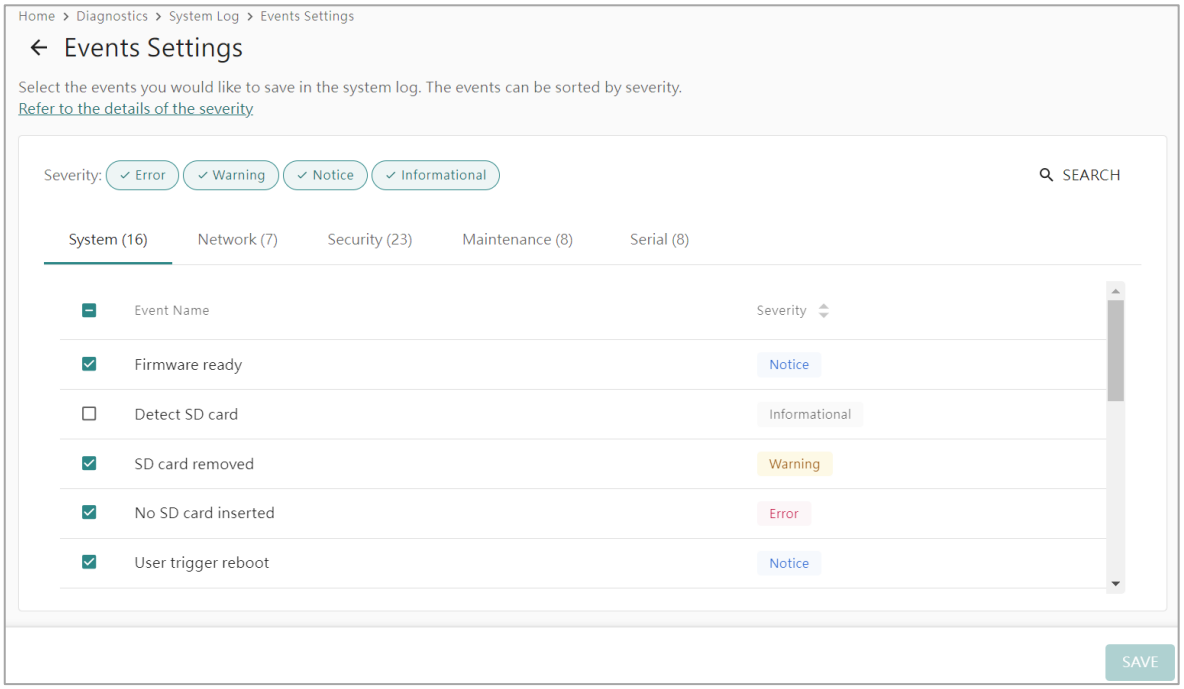
EXPORT: Export the system log for troubleshooting.

REFRESH: Refresh the logs on the panel.

Under the Log Settings tab, you will see the Current Log Capacity displayed as a percentage for reference. Since the events are stored on the local flash memory, there is a limitation on the number of events that can be saved. Click the **EDIT** button to manage the settings.

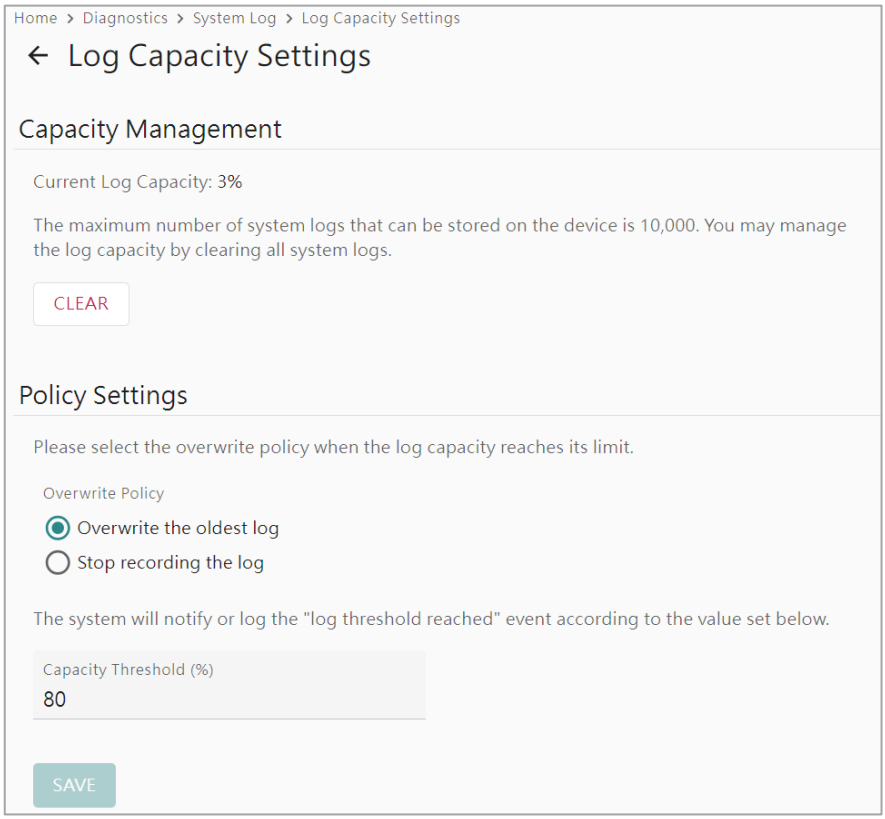
Events Settings

Select the events you will like to save in the local system log.



Find more information in the **System Settings > Notification** section. Also, there is the event list in the appendix.

Log Capacity Settings



Capacity Management: The NPort 6000-G2 provides 10,000 audit records. Click the CLEAR button to clear the local system log when it's getting full.

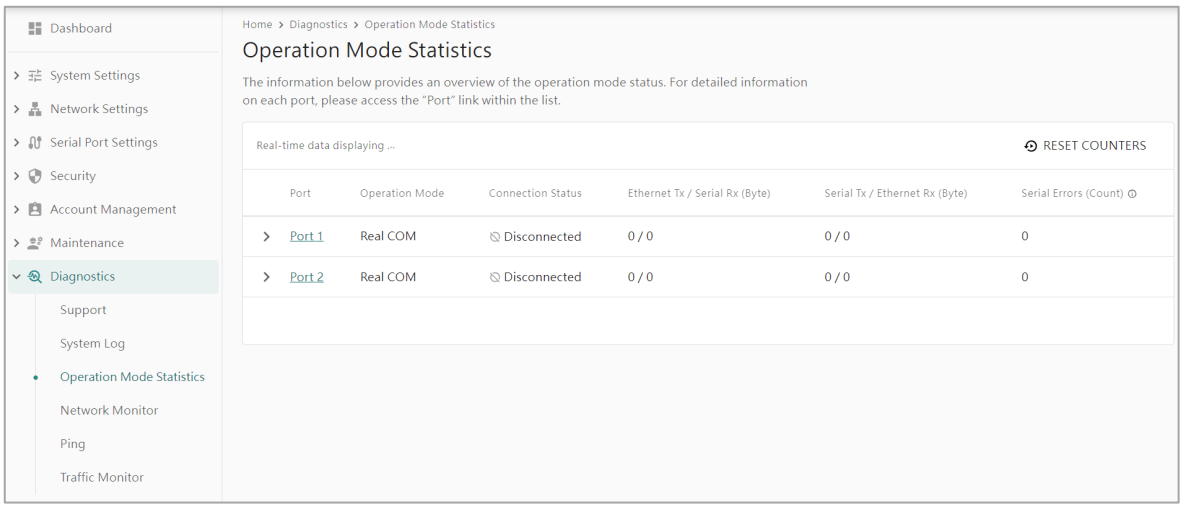
Policy Settings: When the log capacity reaches its limit, decide what action the NPort should take due to limited recording system log capacity.

- Overwrite the oldest event log
- Stop recording events

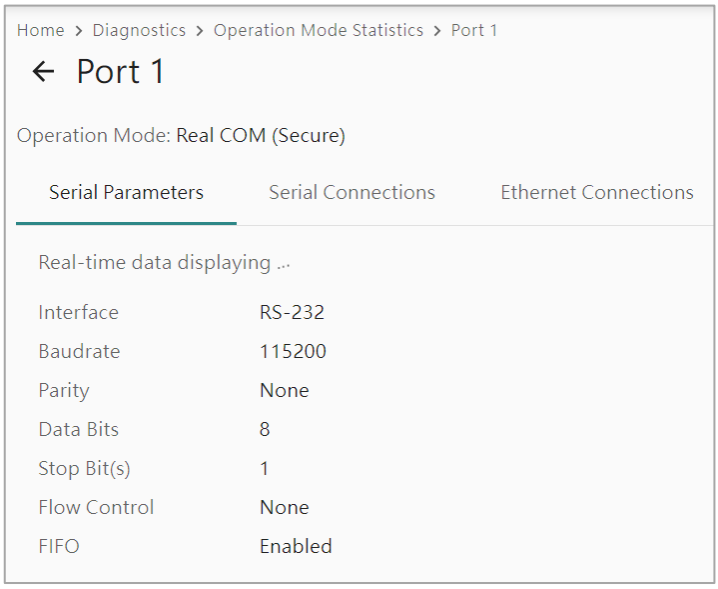
Capacity Threshold (%): The system will notify you or record an event "log threshold reached" when the log capacity reaches the value set here. The default value is 80.

Operation Mode Statistics

The key feature of an NPort device server is to transmit serial data to the Ethernet network and vice versa. Everything that happens on the serial interface will be recorded here, **Diagnostics > Operation Mode Statistics**, to help the user understand the serial data transmitted/received or the modem status changes.



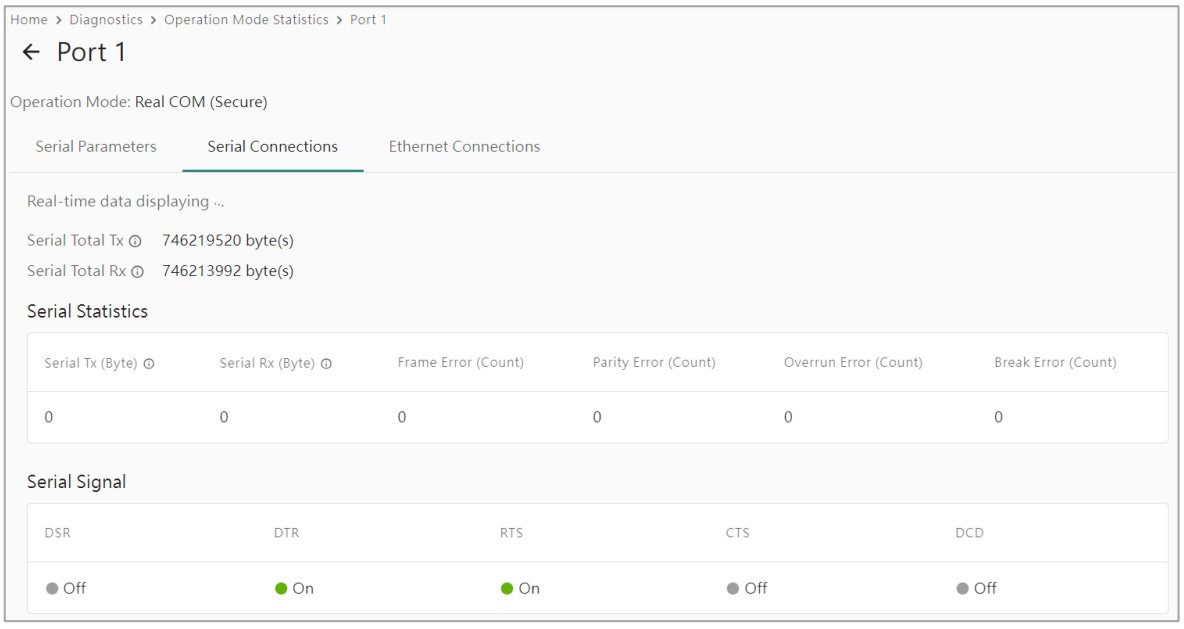
- The Operation Mode Statistics contains the operation mode, connection status, the transmitted/received packets on Ethernet and serial connections, and the serial errors. The status or numbers for each port and column are shown here.
- Port: The serial port number of this NPort. When clicking the Port, there are more details.
- Operation Mode: The operation mode which is set a the specific serial port.
- Connection Status: Whether or not the Ethernet session is connected
- Ethernet Tx / Serial Rx (Byte): The Ethernet port and the serial port recorded a total of transmitted bytes and received bytes, respectively. Normally, these two numbers ought to match. If the Ethernet session disconnects, the number will reset.
- Serial Tx / Ethernet Rx (Byte): The serial port and the Ethernet port recorded a total of transmitted bytes and received bytes, respectively. Normally, these two numbers ought to match. If the Ethernet session disconnects, the number will reset.
- Serial Errors (Count): If the NPort detects an error in the received serial data (1 byte), for example, a frame error or parity error, it increments this column by 1.



When clicking a specific port number, the Port window will open with the information below.

Serial Parameters tab:

This tab displays the current settings of the serial parameters like the interface, baudrate, and so on.

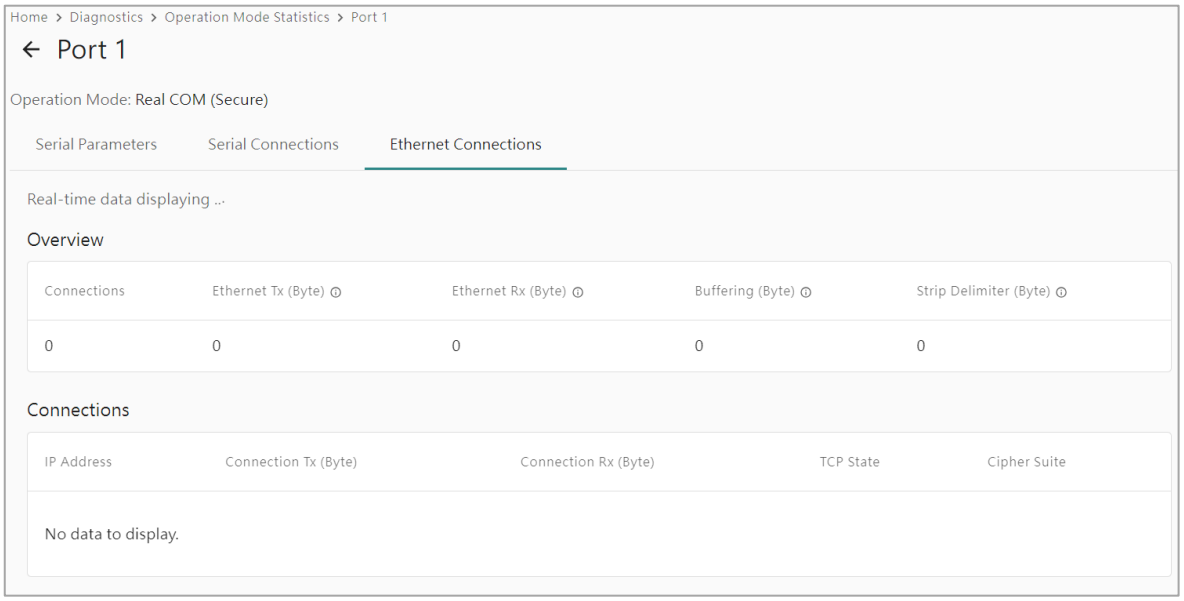


Serial Connections tab:

This tab displays the current statistics of the serial port:

- **Serial Total Tx:** The total amount of data transmitted on the serial port since the device was powered up. The number resets when performing a power cycle.
- **Serial Total Rx:** The total amount of data received on the serial port since the device was powered up.. The number resets when performing a power cycle.
- **Serial Tx (Byte):** The total amount of data transmitted on the serial port since the TCP session is connectied. The number resets when the TCP session disconnects.
- **Serial Rx (Byte):** The total amount of data received on the serial port since the TCP session is connectied.. The number resets when the TCP session disconnects.
- **Frame Error (Count):** When NPort receives a byte of serial data, it will check if the frame format matches the serial parameters. If not, it will count one frame error.

- **Parity Error (Count):** When NPort receives a byte of serial data, it will check if the parity value is correct. If not, it will count one parity error.
- **Overrun Error (Count):** If the serial device sends data too quickly for the NPort to read, resulting in dropped data bytes, it will be considered an overrun error.
- **Break (Count):** When the NPort receives a break signal, it will count it as one break.
- **Serial Signal:** Displays the current status of all modem signals, including DSR, DTR, RTS, CTS and DCD.



Ethernet Connections tab:

This tab displays the current statistics of the Ethernet port, related to serial communications:

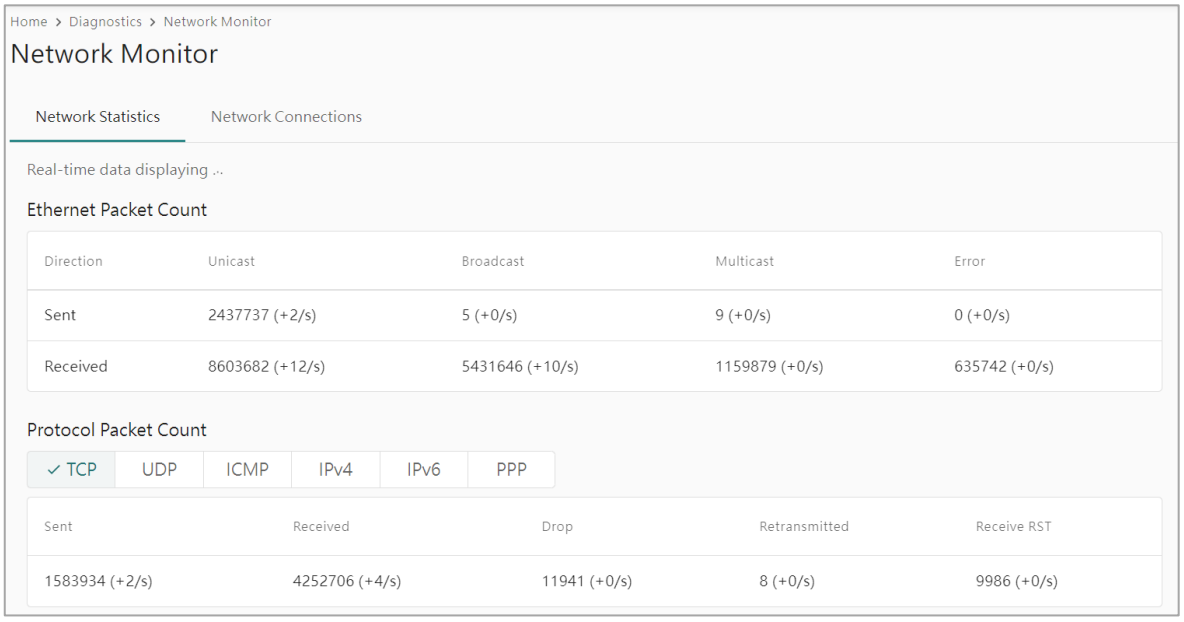
- **Connections:** The number of TCP sessions established on this serial port.
- **Ethernet Tx (Byte):** The amount of data transmitted on the Ethernet port since the TCP session was established. The number will reset when TCP session disconnects. The number needs to match the Serial Rx (Byte). It is easy to check this on the **Diagnostics > Operation Mode Statistics** page.
- **Ethernet Rx (Byte):** The amount of data received on the Ethernet port since the TCP session was established. The number will reset when TCP session disconnects. The number needs to match the Serial Tx (Byte).. It is easy to check this on the **Diagnostics > Operation Mode Statistics** page.
- **Buffering (Byte):** Byte numbers are still stored in the NPort buffer. If the numbers above don' t match (Ethernet Tx & Serial Rx or Ethernet Rx & Serial Tx), it could be because there are still some data bytes in the buffer.
- **Strip Delimiter (Byte):** If you enable the Delimiter function with the Strip delimiter process, the total dropped delimiters will be recorded here.

The Connections sheet displays more detailed information about the TCP sessions:

- **IP Address:** This column displays the IP address connected to the NPort.
- **Connection Tx (Byte):** The amount of data transmitted on the Ethernet port since the TCP session was established. The number resets when the TCP session disconnects. The number needs to match the Serial Rx (Byte). It is easy to check this on the **Diagnostics > Operation Mode Statistics** page.
- **Connection Rx (Byte):** The amount of data received on the Ethernet port since the TCP session was established. The number resets when the TCP session disconnects. The number needs to match the Serial Tx (Byte). It is easy to check this on the **Diagnostics > Operation Mode Statistics** page.
- **TCP State:** Displays the status of this TCP session, which may be CLOSED, LISTEN, ESTABLISHED, CLOSING and TIME-WAIT.
- **Cipher Suite:** If the TCP session has the Encrypted connection feature enabled (Serial Port Settings à Secure Connection), this column will show the cipher suite used for the TCP session.

Network Monitor

The key feature of an NPort device server is to transmit serial data to the Ethernet network and vice versa. Everything that happens on the Ethernet interface will be recorded here, **Diagnostics > Network Monitor**, to help you understand the Ethernet data transmitted/received.



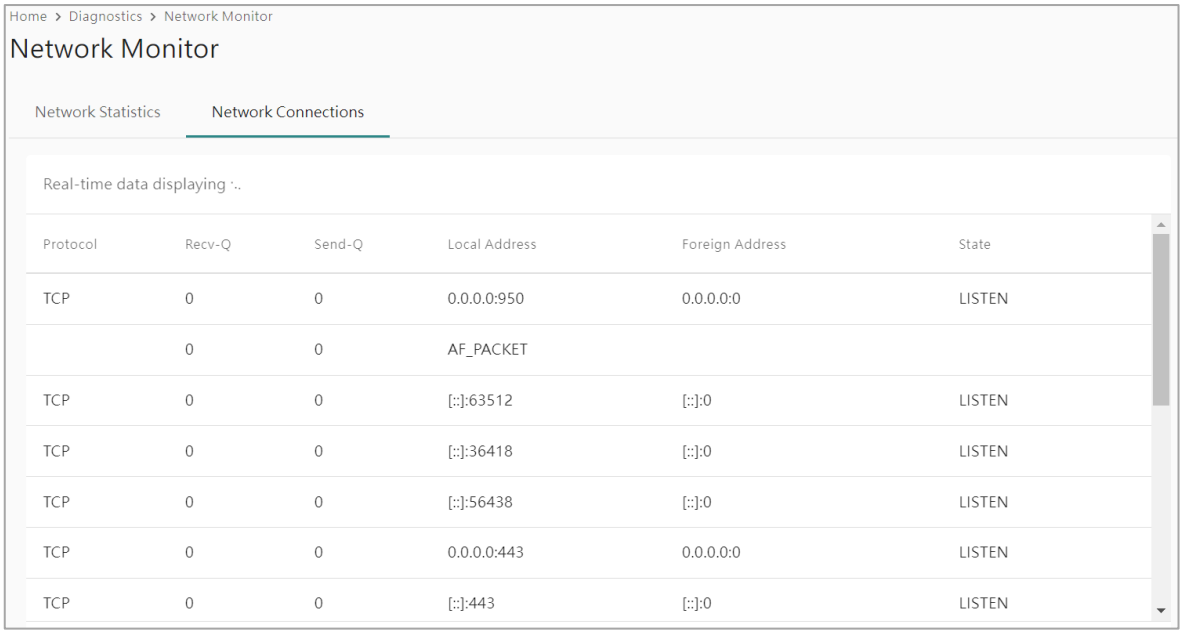
Network Statistics tab:

The Ethernet Packet Count sheet separates the Ethernet data in two directions, Send and Received, to count the number of unicasts, broadcasts, and multicasts. If there are any error bytes, the Error column will count them.

The Protocol Packet Count sheet separates the Ethernet data by different protocols to count the numbers of TCP, UDP, ICMP, IPv4, IPv6 and PPP.

Network Connections tab:

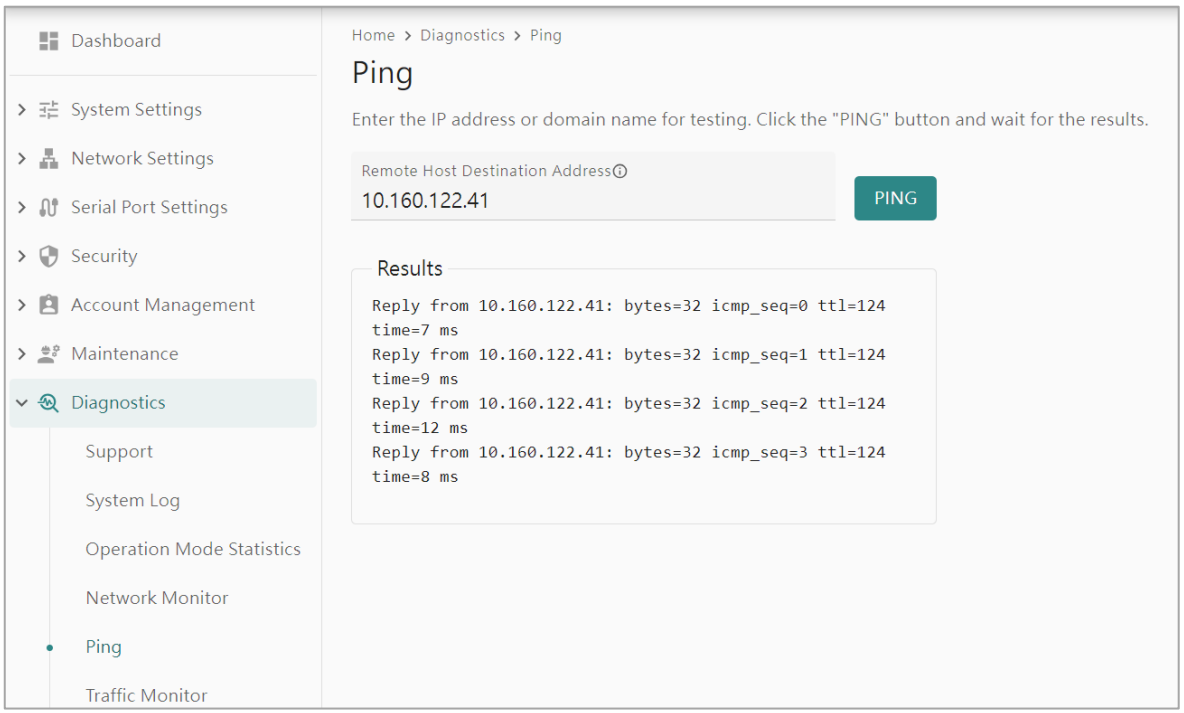
This tab displays the status of all the TCP sessions.



Ping

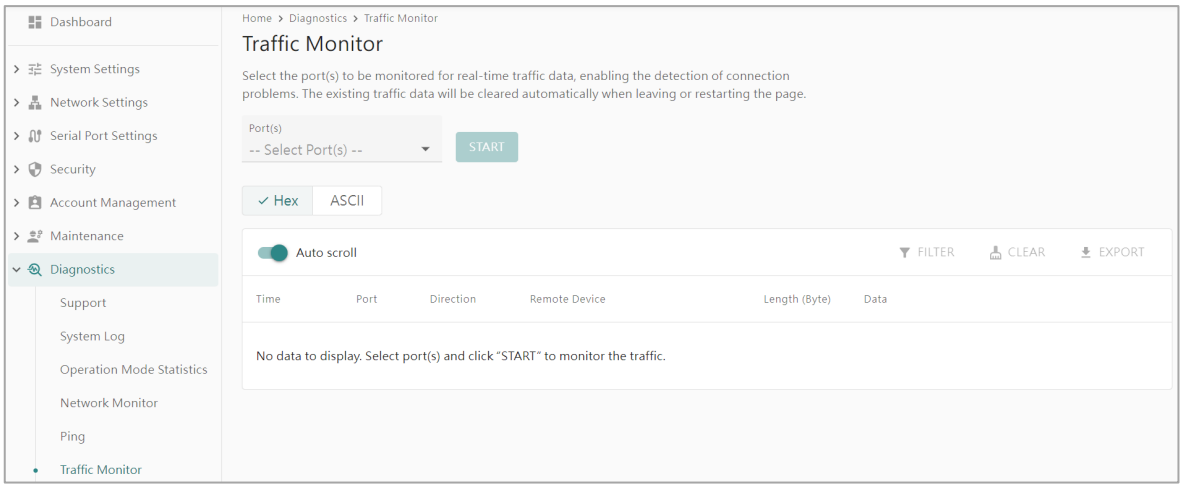
The Ping function is a good tool for troubleshooting. Engineers can use the NPort device server in this tool to verify the status of network nodes.

Directly input the IP address and click the PING button. The NPort will check if the target node can respond to the ping request and display the result.



Traffic Monitor

The key feature of an NPort device server is to transmit serial data to the Ethernet network and vice versa. To troubleshoot, it's crucial to check if the serial data is transferred correctly to the Ethernet side. Previously, the customer service engineer had the option to use a third-party tool to indirectly check the data and provide an answer. Engineers can now use the Traffic Monitor function to compare recorded serial and Ethernet data.



As a troubleshooting tool, it may not be proper to monitor normal communication for a very long time because of the limited local memory size. Moxa recommends that the engineer use this tool to capture both abnormal and normal communication for a few minutes, allowing them to compare and analyze them.

To initiate capturing, choose the target port and click the START button; the transactions captured will be shown below. You can decide whether to view the data as HEX or ASCII.

After finishing the capturing, you have the option to click the FILTER button to narrow down the data for analysis or click the EXPORT button to save the transactions for further analysis by Moxa customer service.

8. Mass Deployment/Maintenance

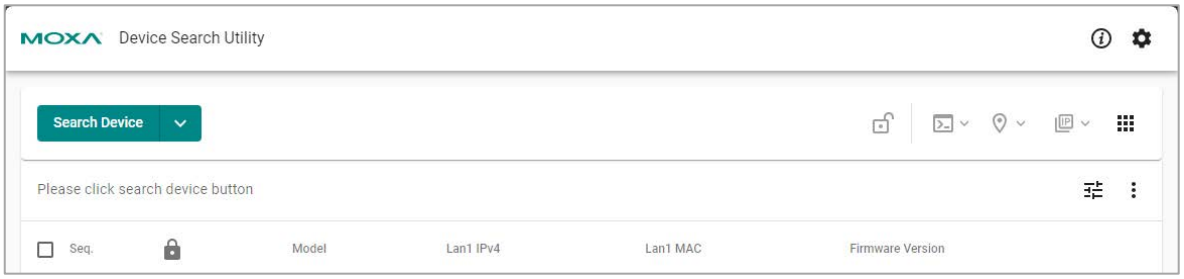
Once a user completes the settings on a device server, they may need to deploy those settings to multiple devices or sites. Moxa provides the GUI tool Device Search Utility v3.0 or the CLI tool Moxa CLI Command Tool, MCC Tool, to meet this requirement.

After the devices were set up at the locations, the maintainer might need to perform routine tasks on a regular basis to run the system. This includes tasks such as firmware upgrades or password updates. The Device Search Utility v3.0 and MCC Tool can assist the maintainer in carrying out these tasks effortlessly.

Mass Configuration With GUI Tool: Device Search Utility v3.0 or Newer

The Device Search Utility v3.0 is a web-based utility. Make sure the operation system and browser version are compliant with the below version before using the tool:

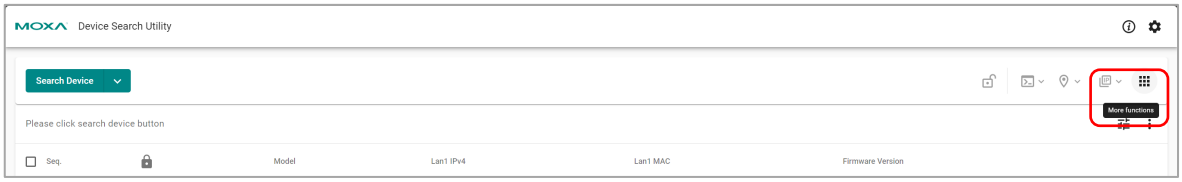
- Chrome:
  - For Windows 7, 8/8.1, Server 2012 and Server 2012 R2: Chrome 109 and newer
  - For Windows 10 and newer, Server 2016 and newer: All Chrome versions
- Firefox:
  - For Windows 7 and newer versions, Server 2012 and newer versions: All Firefox ESR versions
- Edge:
  - For Windows 7 and newer versions, Server 2012 and newer versions: All Firefox ESR versions



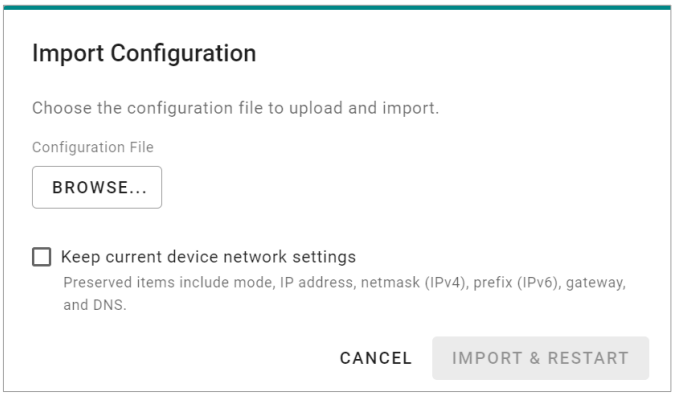
Execute the Device Search Utility and click the Search Device button to find the target NPort(s). Remember to unlock them before any further actions.

Import/Export Configuration

Select the NPort device server(s) to import/export configuration, and then move the mouse to the More functions to choose the Import Configuration function.



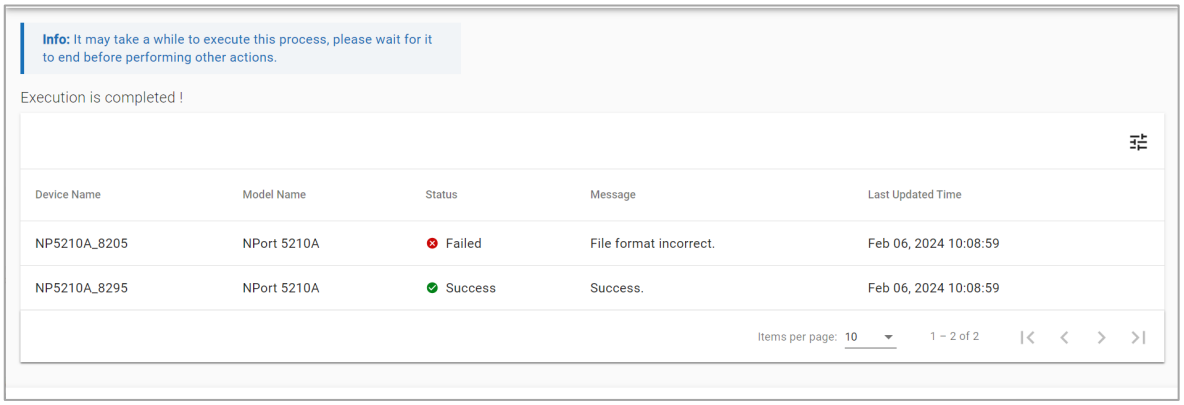
Import Configuration is to import one configuration file to one or more devices with the same model. Click the BROWSER… button to find there the configuration file is saved.



Keep the Current Device Network Settings

If the target NPort device server(s) already has the proper IP address(es) configured, you may choose to retain the existing network settings for the device(s). Select the option.

After importing the configuration, Device Search Utility will display the success or failure in the Status & Message columns for each device.



Your device may restart again to make the configuration effective, and it will stop your work in progress.

NOTE

For the cause of failure, please refer to the **DSU** User Manual Appendix: Error Messages.

For exporting the configuration file(s), you can also find the Export Configuration function under the More functions button.

Export Configuration is to export the configuration file from one or more devices with the same model. When exporting one device only, the file format may be *.ini, *.dat, *.txt, *.cfg, *.dec. The file name will be [ModelName] - [IP] _ [Date] .xxx, e.g., NPort6150-10.123.10.1_220724.ini.

When exporting multiple devices, the system will zip the configuration files.

Import Certificate

To build a more secure or a zero-trust network environment, you may want to set a public key infrastructure (PKI). The certificate needs to be imported into all network devices for this scenario. To simplify the loading process, the Device Search Utility supports importing certificates to multiple NPort device servers.

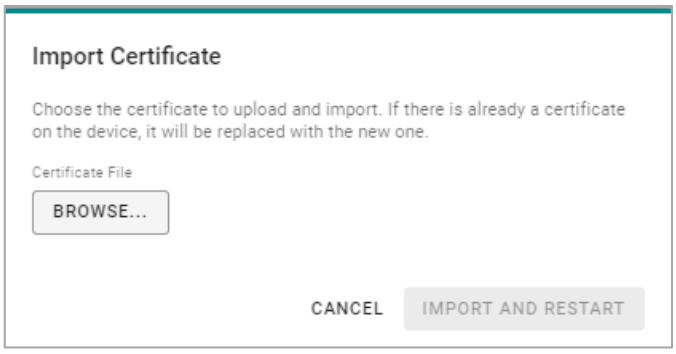
You can find the Import Certificate function under the More functions button.

Import Certificate is to exchange certificate files to one or more devices to establish secured command/data transferring.

Step 1: Select NPort G2 models

Step 2: Import certificate file

Step 3: Import and restart



Firmware Upgrade

The increasing convergence of IT and OT poses a cybersecurity risk as more OT network devices connect to office networks. Upgrading the firmware version to the latest one is crucial for all network devices. In order to meet this requirement, the Device Search Utility supports firmware updates on multiple NPort device servers.

You can find the Firmware Upgrade function under the More functions button. **Firmware Upgrade** is to send one firmware file to one or more devices with the same model. The firmware file extension normally comes with .ROM.

Step 1: Select NPort G2 models

Step 2: Import firmware file

Step 3: Imported and the device will restart.

Mass Configuration with CLI tool: MCC Tool

The MCC Tool is a command line utility based on Windows and Linux platforms. Make sure you have downloaded the correct file for your operating system.

Unzip the file and install the MCC Tool. Execute the MCC Tool under the command line to manage the NPort device servers in the network.

Import/Export Configuration

Import/Export the device configuration for a specific device or a range of devices through the device list file. The password must be specified by the parameter or by the device list file. Device configurations are stored in individual files, using device type, IP address, and file create date as the filename. The result log is directly printed on the screen, or you can specify a result_log file for it.

MCC_Tool –cfg –ex –i [ip_address] –u [user] –p [password] –dk [key] –l [result_log]

MCC_Tool –cfg –ex –d [Device_list] –l [result_log]

MCC_Tool –cfg –ex –d [Device_list] –l [result_log] –t [timeout_value]

MCC_Tool –cfg –im –i [ip_address] –u [user] –p [password] –dk [key] –f [cfg_file] –l [result_log] –n –nr

MCC_Tool –cfg –im –d [Device_list] –l [result_log] –n –nr

MCC_Tool –cfg –im –d [Device_list] –l [result_log] –t [timeout_value]

Parameters Description:

Command	Function	Remark
-cfg	Execute actions for configuration related	
-ex	Export the configuration file	
-im	Import the configuration file	
-i	Device IP address (ex. 192.168.1.1)	
-d	Device list	
-u	Device's user account for login	
-p	Device's password for login	
-dk	**When Exporting configuration:** The command decrypts the exported file with the pre-shared key. • If this parameter is not used, the exported file will be encrypted by the pre-shared key set on the firmware of the device. • If this parameter is used, the exported file will be decrypted to a clear-txt file for editing. **When Importing configuration:** If the configuration file that needs to be imported is encrypted, the command is needed with pre-shared key. • If the import configuration file is without -n, The MCC tool will ignore -dk (won't return -11). • If the import configuration file is with - n, the MCC tool will use pre-shared key to decrypt the encrypted file. Therefore, if the key is wrong for decrypting the file, the MCC tool will return -10. However, if the file is in plain text, and you input the pre-shared key, it will ignore the key (won't return -10).* (by parameter -dk or the key column in the device list file)	
-f	The configuration file to be imported	Only for the import configuration function
-n	Keep original network parameters (includes IP, subnet mask, gateway, and DNS)	Only for the import configuration function
-nr	Do not reboot the device after importing the configuration file	Only for the import configuration function.
-l	Export result log file	
-t	Timeout (1 to 120 seconds) Export function Default value: 30 seconds Import function Default value: 60 seconds	

Example: Export the configuration using a device list and export the results to a result log

MCC_Tool –cfg –ex –d [DeviceList] –l [result_log]

The result_log will include the following items:

Model	ServerName	IP	MAC	FwVer	ExportCfgFile	Key	ErrCode
NPort6650;	NPort6650_123;	192.168.1.1;	00:90:e8:01:02:03;	1.3;	NP6650_192_168_1_1_20170622.ini;	moxa;	0;
NPort6150;	NPort6150_456;	192.168.1.2;	00:90:e8:04:05:06;	1.3;	NP6650_192_168_1_2_20170622.ini;	moxa;	0;

Example: Import the configuration to a device list (with restarting the units) and export the results to a result log.

MCC_Tool –cfg –im –d [DeviceList] –l [result_log]

The result_log will include the items below:

Model	ServerName	IP	MAC	FwVer	CfgFile	Key	ErrCode
NPort6650;	NPort6650_123;	192.168.1.1;	00:90:e8:01:02:03;	1.3;	NP6650_192_168_1_1_20170622.ini	moxa;	0;
NPort6150;	NPort6150_456;	192.168.1.2;	00:90:e8:04:05:06;	1.3;	NP6650_192_168_1_2_20170622.ini	moxa;	0;

Example: Import the configuration to a device list without restarting the units and export the results to a result log.

MCC_Tool –cfg –im –d [DeviceList] –nr –l [result_log]

Firmware Upgrade

With the IT/ OT convergence trend, office networks may see an increase in OT network devices, posing cybersecurity risks. Upgrading the firmware version is crucial for all network devices. The MCC Tool allows users familiar with the command line interface to update the firmware on multiple NPort device servers to fulfill this need.

The NPort 6000-G2 Series supports password protection by default and cannot be disabled. The password(s) must be specified by a command parameter or by the DeviceList file before upgrading the firmware and restarting a specific device (or multiple devices simultaneously).

MCC_Tool –fw –up –i [ip_address] –u [user] –p [password] –f [firmware_file] –l [result_log]

MCC_Tool –fw –up –d [Device_list] –l [result_log]

MCC_Tool –fw –up –d [Device_list] –l [result_log] –t [timeout_value]

Parameters Description:

Command	Function	Remark
-fw	Execute actions for firmware related	
-up	Upgrade firmware version	
-i	Device's IP address (192.168.1.1)	
-u	Device's user account for login	
-p	Device's password for login	
-d	Device list	
-f	Firmware file to be upgraded	
-l	Export result log file	
-t	Timeout (1~1200 seconds) Default value: 800 seconds	
-print	Print upgrade process status message	

Example: Upgrade firmware using a device list and capture the results in an import log.

MCC_Tool –fw –u –d [DeviceList] –l [result_log]

The result_log will include the items below:

Model	ServerName	IP	MAC	FwFile	ErrCode
NPort6650;	NPort6650_123;	192.168.1.1;	00:90:e8:01:02:03;	NP6000_V1.3.rom;	0;
NPort6150;	NPort6150_456;	192.168.1.2;	00:90:e8:04:05:06;	NP6000_V1.3.rom;	0;

Change Password

Due to the IT/OT convergence trend, an increasing number of companies require their employees to regularly update their login password, as do the network devices. The owner/maintainer of the network devices may need to update the password regularly. The MCC Tool helps you to ease this routine job by generating a small script to update the password.

Set the password of the target device specified by an IP address. The current password must be specified by a parameter or by the Device List file.

MCC_Tool –pw –ch –i [ip_address] –u [user] –p [old_password] –npw [new_password]

MCC_Tool –pw –ch –d [Device_list] –nd [device_list_new_password] –l [result_log]

MCC_Tool –pw –ch –d [Device_list] –nd [device_list_new_password] –l [result_log] –t [timeout_value]

Parameters Description:

Command	Function	Remark
-pw	Execute actions for password	
-ch	Change password	
-npw	The new password for the specific user	
-i	Device's IP address (192.168.1.1)	
-u	Device's user account for login	

Command	Function	Remark
-p	Device's password for login (old password)	
-d	Device list	
-nd	The Device list with new password settings	Youwill need to assign a new password in the Device List when using -nd command.
-l	Export result log file	
-nr	Don't reboot the device after changing the password	
-t	Timeout (1to120 seconds) Default value: 60 seconds	

Example: Set the new password as "5678" and restart the device to make it effective. Print the result on the screen.

MCC_Tool –pw 5678 –i 192.168.1.1 –u admin –p moxa

Example: Set the new password from a device list and then restart the device to make it effective. Export the results to a result log

MCC_Tool –pw DeviceList_New –d [DeviceList] –l [result_log]

The result_log will include the items below:

Model	ServerName	IP	MAC	FwVer	User	PWD	ErrCode
NPort6650;	NPort6650_123;	192.168.1.1;	00:90:e8:01:02:03;	1.3;	admin;	5678;	0;
NPort6150;	NPort6150_456;	192.168.1.2;	00:90:e8:04:05:06;	1.3;	admin;	moxa;	0;

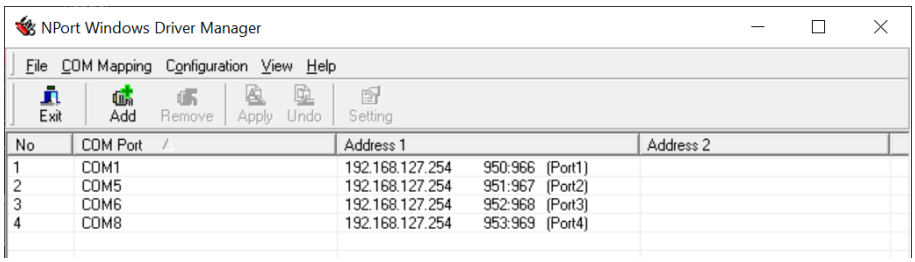
9. Advanced Settings of NPort Windows Driver Manager

The NPort Windows Driver Manager has additional capabilities apart from being a driver for the virtual COM application. There are many advanced settings to help you face different user scenarios. In this chapter, we will explain which functions/settings are useful in different scenarios.

Configure the mapped COM ports

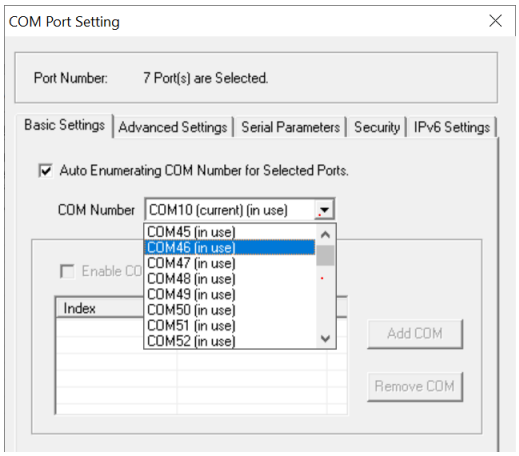
After mapping the COM ports, refer to Chapter 4 for instructions. In many instances, the legacy COM port software can establish communication with the serial devices by opening either the COM port or the TTY port. In specific cases, the user may need to modify the advanced settings of the NPort Windows Driver Manager for certain applications.

To reconfigure settings for a specific serial port on the NPort device server, select the corresponding row and click the **Setting** icon in Real COM Mode/Reverse Real COM Mode.



Change the number of a mapped COM port

Some legacy COM port software is restricted to using specific COM ports like COM1 or COM2. Nevertheless, the NPort Windows Driver Manager has the capability to automatically assign COM ports starting from COM3. To modify the COM port number, click on the **Setting** button and locate the **COM Number** drop-down menu in the Basic Settings. Simply select the COM port requested by the legacy COM port software.



To assign the serial ports of the NPort device server to COM port numbers in sequence, choose **Auto Enumerating COM Number** option for selected ports.

COM Splitting

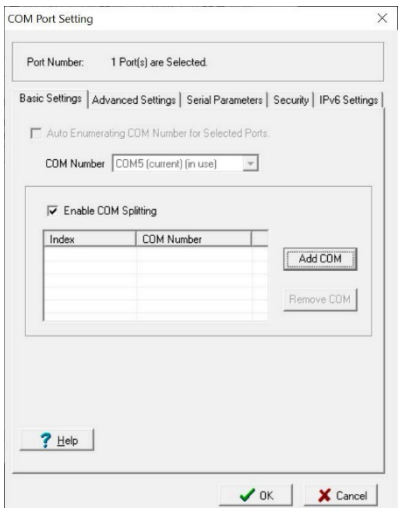
When you activate COM Splitting, you can use multiple COM port software to communicate with the same serial device. Only one software can open/occupy a COM port, causing others to wait until it is closed. The COM Splitting function allows multiple COM port numbers to be assigned to the same serial port on the NPort device server. The first software accesses COM1, while the second software uses COM2, but both communicate with the same serial device.

Since both softwares will be using the same serial port and device, they must coordinate when the first software sends a command and when the second one does. Or there may be a data collision. Using this feature could be a better option for enabling one-way communication from the serial device to multiple host PCs on the Ethernet network. Let's say there's a serial temperature sensor that constantly updates temperature data to the control servers. If the temperature gets too high or too low, one of the servers will send a request to activate the fan or heater. The purpose of the second server might be to serve as the database for recording temperature readings.

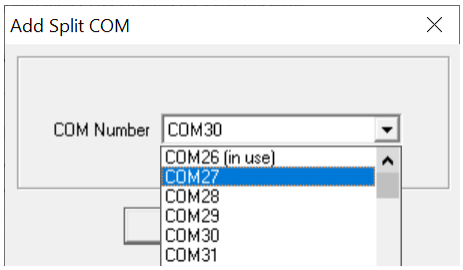
The COM Splitting function will group all the selected COM ports into one COM port. Even if you use varying software to communicate via different COM port numbers, all the software will receive identical data from the serial device.

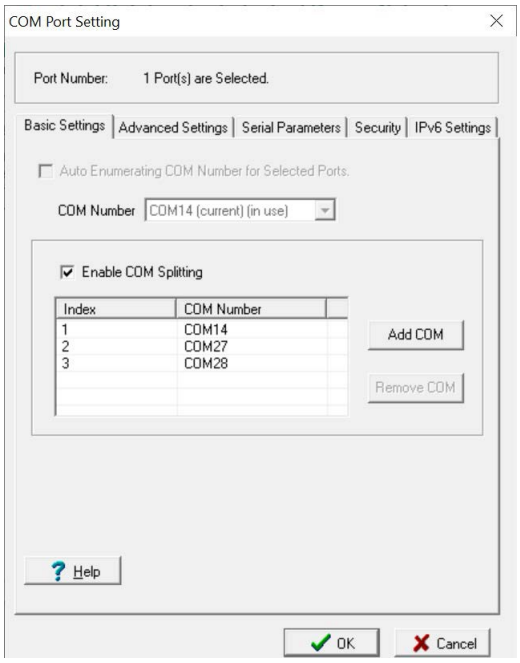
In order to handle various host PCs connecting to the same serial port, it is necessary to modify the **Max. Connection** setting according to the number of ports grouped in your NPort. For example, if you split to two COM ports, **Max. Connection** needs to be adjusted to 2. The grouped serial ports must be directed to the same NPort device server; they cannot be combined from different NPorts.

Enabled COM Splitting

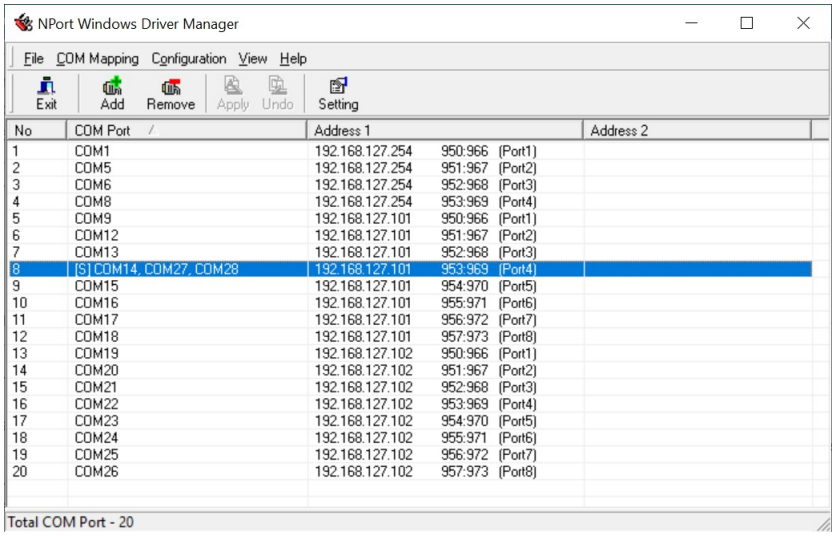


1. Select the target COM port number and click the **Setting** button.
2. Select to enable the Enable COM Splitting function.
3. **Add COM** to select target COM ports for splitting; the COM port must be available.





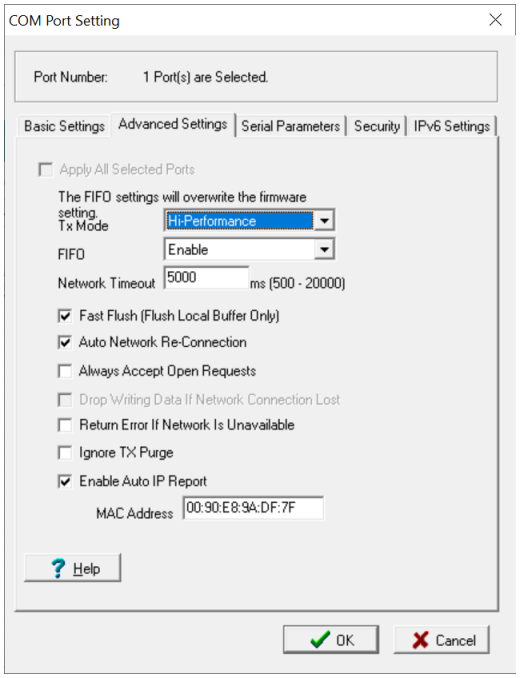
4. After pressing **OK**, check if the COM ports you just selected are grouped together. Click **Apply** to save the change.



5. Once the COM port number changes to black text, the software can open multiple COM Splitting ports to receive serial data.

Advanced Setting

Transferring serial data to an Ethernet network can result in timing differences and variations in behavior compared to TCP socket behavior. The NPort Windows Driver Manager offers various advanced settings to accommodate these differences, ensuring that your original software remains unchanged and communication functions properly.



Tx Mode

Because Ethernet and serial technology have significantly different speeds, the serial line's maximum baudrate is only 921,600bps, while Ethernet's minimum speed is 10Mbps. The Tx Mode offers two options for the driver to mimic either Ethernet or serial bus behavior more closely.

The default setting for the Tx Mode is **Hi-Performance** mode, which sends as much data as possible to the serial side. This behavior will be closer to Ethernet. The driver buffer will temporarily store the data before sending it all at once over Ethernet, resulting in higher data delivery throughput.

This might pose issues for older serial applications or devices that lack sufficient buffer or performance to handle large amounts of data quickly. To handle these situations, switch the Tx Mode to **Classical** mode. In Classical mode, the NPort sends the serial data one byte at a time, eliminating the need for a large buffer size in the serial device. This is designed to work with serial devices like these. Additionally, the **Classical** mode allows for quicker data delivery by minimizing latency. The serial data can bypass the driver buffer's waiting time.

FIFO

This FIFO setting is the same setting on the NPort device server. If they're not the same, the value in the NPort Windows Driver Manager will overwrite the setting on the firmware and apply either Real COM mode or Reverse Real COM mode.

The Enable FIFO function is enabled by default for improved data throughput. There are two scenarios you may consider disabling the Enable FIFO function (uncheck the checkbox).

- The serial device does not have FIFO/buffer or does not support flow control function. In this case, the serial device may not be able to receive the serial data from NPort on time, which means that some data might be dropped.
- The data latency is more important than data throughput. Higher data throughput involves temporarily storing data in the buffer to enable sending larger amounts of data at once. This behavior may result in slower latency for individual data. If maintaining low latency is a priority for reading data correctly on the serial device, it is recommended to disable the Enable FIFO function.

This field enables or disables the 512-byte FIFO buffer. The NPort 6000-G2 provides FIFO buffers for each serial port, for both the Tx and Rx signals.

Network Timeout

This function shares similarities with the **TCP alive check time** function on the NPort device server. The only difference is the source of each function. The source of the **TCP alive check time** is the NPort device server; it will check if the remote host PC is alive or not. The source of the **Network Timeout** function is the host PC (which installed the NPort Windows Driver Manager); it will check if the remote NPort is alive or not. Use this option to prevent blocking when the target NPort is unavailable.

Fast Flush (only flushes the local buffer)

For some applications, the user's program will use the Win32 "PurgeComm()" function before it reads or writes data. Following the execution of the PurgeComm() function, the NPort driver persists in querying the firmware of the NPort multiple times to ensure the absence of queued data in the firmware buffer, instead of solely flushing the local buffer on the host PC. The purpose of this design is to meet specific requirements. The additional time required for Ethernet communication means it may take longer (about several hundred milliseconds) than a native COM1. PurgeComm() is noticeably faster on native COM ports than on mapped COM ports on the NPort 6000-G2. In order to support applications with faster response requirements, the new NPort driver incorporates a Fast Flush option. This function is enabled by default.

If you disable Fast Flush and notice a significant decrease in performance for COM ports mapped to the NPort 6000-G2, check if your application uses "PurgeComm()" functions. If so, try enabling the Fast Flush function and see if there is a significant improvement in performance.

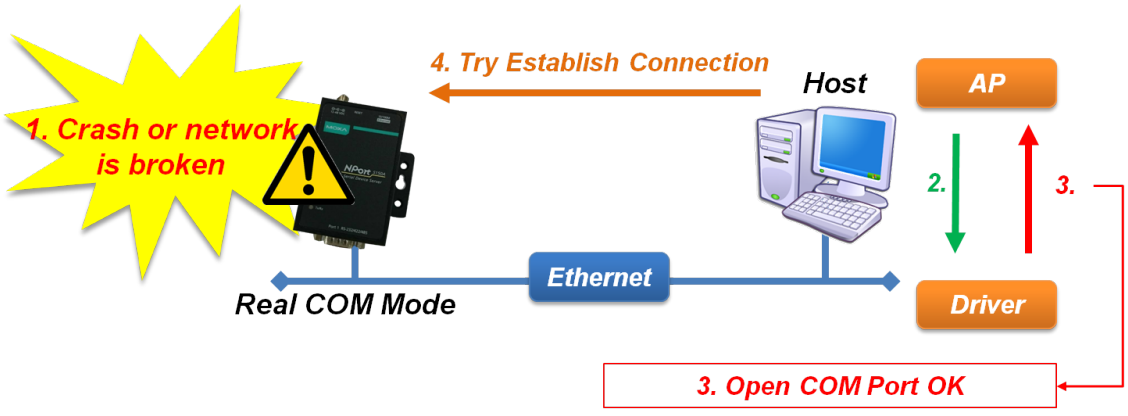
Auto Network Reconnection

While serial communication is always connected, Ethernet communication is not. The NPort Windows Driver Manager offers Auto Network Reconnection for automatic re-establishment of connections, ensuring the serial device is always considered connected and capable of sending data.

If this option is turned on, the driver will keep trying to reconnect the TCP connection if the NPort 6000-G2 doesn't respond to "check-alive" packets, which are sent in the background. The Network Timeout function, which cannot be disabled, determines the timing of these packets..

Always Accept Open Requests

When the driver cannot establish a connection with the NPort, your software can still open the mapped COM port, like an onboard COM port.



Return Error If Network Is Unavailable

We discovered that some legacy COM port software always opens a fixed range of COM ports, from COM1 to COM10, when executed by the user. For the real application, only COM3, COM5 and COM7 are available, so the software will always return failure since it cannot open the COM1 to COM10 successfully. To temporarily resolve this issue with the outdated software, you can deactivate the **Return error if network is unavailable** option..

Disabling this option will prevent the driver from reporting errors for failed connections to the NPort 6000-G2. Enabling this option will result in the Win32 Comm function returning the error code "STATUS_NETWORK_UNREACHABLE" if a connection to the NPort 6000-G2 cannot be established. Typically, this indicates that your host's network connection is offline, possibly due to a disconnected cable. But if you're able to access other network devices, it's likely that the NPort 6000-G2 is either disconnected or not powered on. To use this feature, make sure **Auto Network Re-Connection** is turned on.

Ignore TX Purge

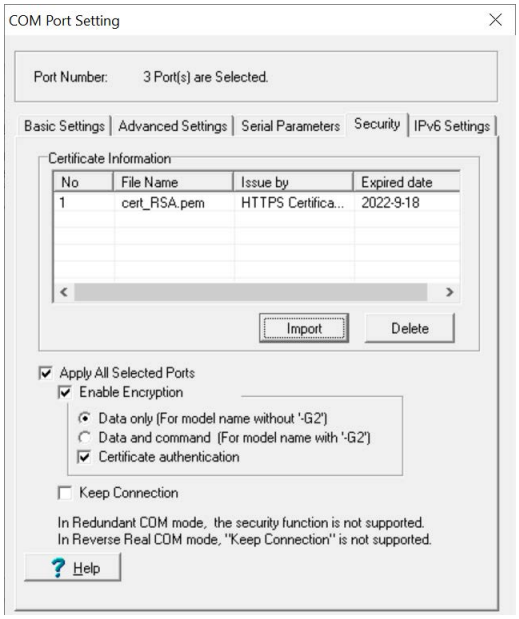
When programming for legacy COM port software, it is common practice to clear the buffer before and after writing data, to prevent any unwanted data from being present. In the past, there were no troubles, making it an effective method to avoid sending incorrect data to the serial device.

Due to advancements in technology, PCs now have significantly improved performance compared to the past. There's a possibility that the clear buffer command might be sent to the NPort device server prematurely, following the write command The NPort may still have correct data in its buffer, but it will be lost when the clear buffer command, which is the Win32 API PurgeComm command, is received. You might notice that the received serial data is missing the last few bytes. Enabling the **Ignore TX Purge** function might be the solution when this occurs.

Security

When addressing the growing cybersecurity threats, it is crucial to devise ways to protect vital data on serial devices. The serial bus has a short communication distance and is difficult to steal, especially in secure manufacturing facilities with guards. However, it's a different situation when it comes to using a device server to transmit serial data over an Ethernet network. The Ethernet network is much more vulnerable than the serial bus. The NPort device server enables encryption of Ethernet network communications. With the NPort Windows Driver Manager, you can encrypt communications on the host PC.

Select target serial port, click the **Setting** button, and switch to **Security** tab:



Enable Encryption

Enable the SSL encryption for data and command transmission of the selected COM port.

Data Only

The NPort 6000 Series supports data encryption only. Select this option if you are using the NPort 6000 Series.

Data and Command

The NPort 6000-G2 Series supports both data and command encryption. Select this option if you are using NPort G2 models.

Certification Authentication

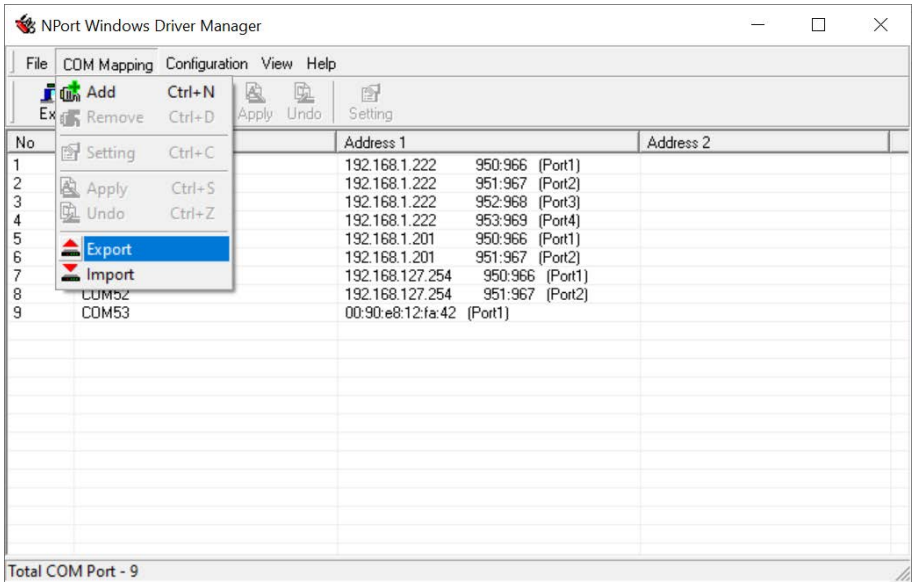
This security enhancement allows you to verify the server and client using an imported certificate from a trusted Certificate Authority (CA). Click the **Import** button above to import the certification of your own.

Keep Connection

For quicker operations, it is recommended to enable this option if the COM port software frequently opens and closes the COM port with data encryption and the NPort is dedicated to one host. The opening time of a COM port with encryption enabled will be brief (300 to 500ms) due to the SSL protocol. By enabling these options, you can ensure a continuous SSL connection for the COM port. The opening and closing of the COM port will be faster here. The Keep Connection feature is not supported in Reverse Real COM mode.

Importing/Exporting COM mapping

To load/save the configuration to a text file, select Import/Export from the **COM Mapping** menu. You will then be able to use this configuration file on another host and use the same COM Mapping settings in the host.

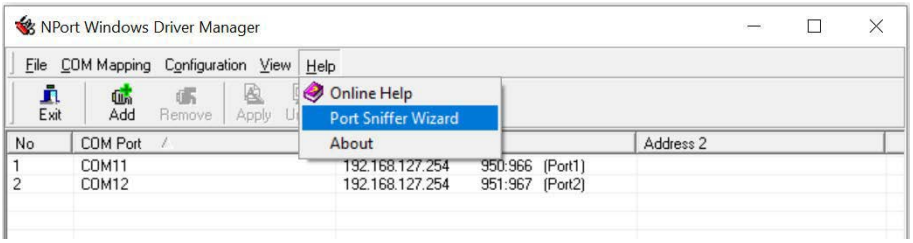


Port Sniffer Wizard

At times, engineers may require an analyzer to track the commands and responses exchanged between the Windows platform and the NPort Windows Driver Manager to diagnose communication issues. The Port Sniffer Wizard is a tool that tracks and records activity on all serial ports of a system. Its advanced filtering and search capabilities make it a powerful tool for exploring Windows functionality, monitoring port usage, and troubleshooting system or application configurations.

How to Use the Port Sniffer

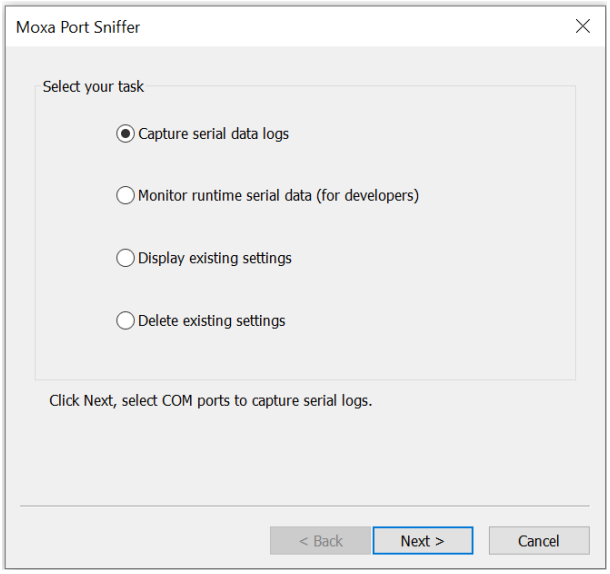
Click **Port Sniffer Wizard** in the drop-down menu under Help.



Task Page

Select the task you need, and click **Next**:

- Capture serial data logs
- Monitor runtime serial data (for developers)
- Display existing settings
- Delete existing settings



Capture Serial Data Logs

If errors occur, you can capture serial data logs from specific ports and send the logs back to Moxa. We can help you check the problems. Select this function to export log files.

NOTE

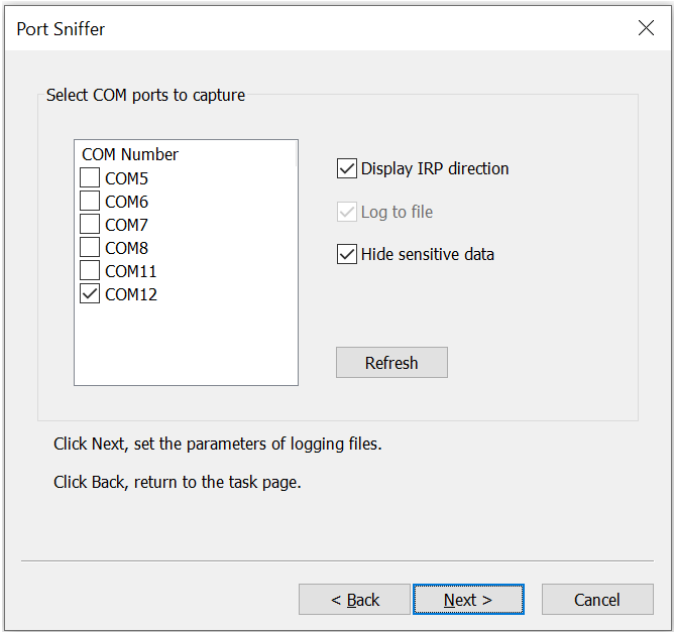
Enabling the capture serial data logs function may cause slight latency.

Step 1: COM port setting

- Select one or more COM ports to capture.
- Turn on the function you need.
  - Display IRP direction

    IRP will inform users whether an error occurs when issuing a command or returning a response.
  - Hide sensitive data

    The system will hide the data, so that you don't need to worry about data leakage. Used specifically for sensitive data.

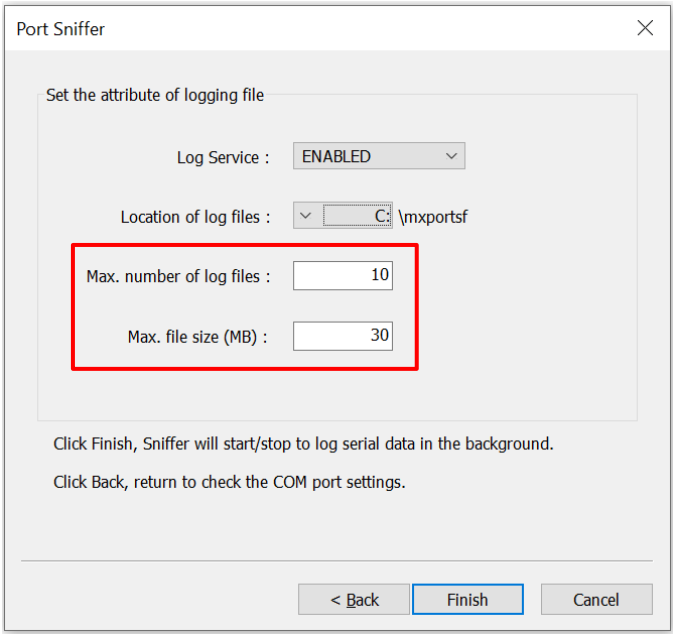


Step 2: Set the parameters of logging files

- Enable log service.

> **NOTE**
>
> Disabling the log service will not capture the serial data.

- Choose the location of log files.
- Set the max. number of log files and max. file size (MB).



- Click finish and check log files at the locations you set.

Monitor Runtime Serial Data (for developers)

The difference between the "Capture serial data logs" and "Monitor runtime serial data" functions is that the latter presents the status in real time.

Step 1: COM port setting

- Select one or more COM ports to monitor the serial log in the runtime.
- Turn on the function you need.
  - ➢ Display IRP direction

    IRP will inform users whether the error occurs when issuing a command or returning a response.
  - ➢ Log to file

    Export log files simultaneously. (Exporting log files simultaneously will cause latency)

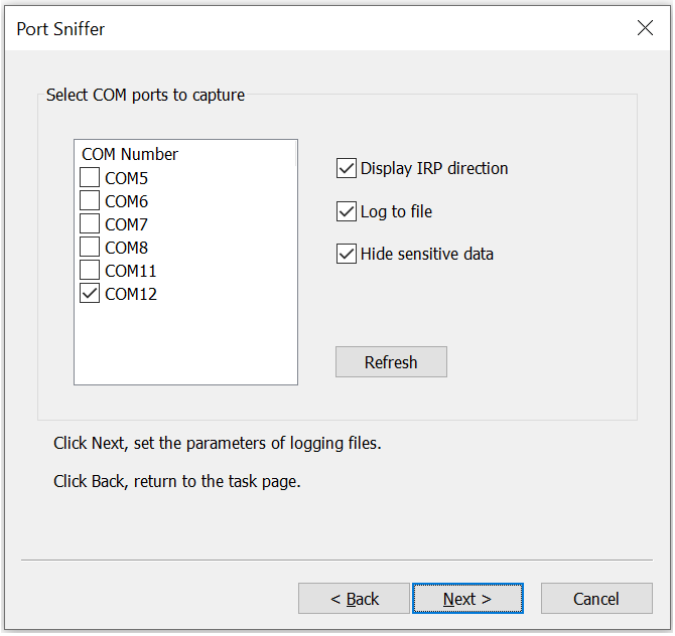
NOTE

Monitor runtime is usually used by developers or serial driver programmers to troubleshoot.

Download debug tools like "DebugView" from a third party to view the real-time status.

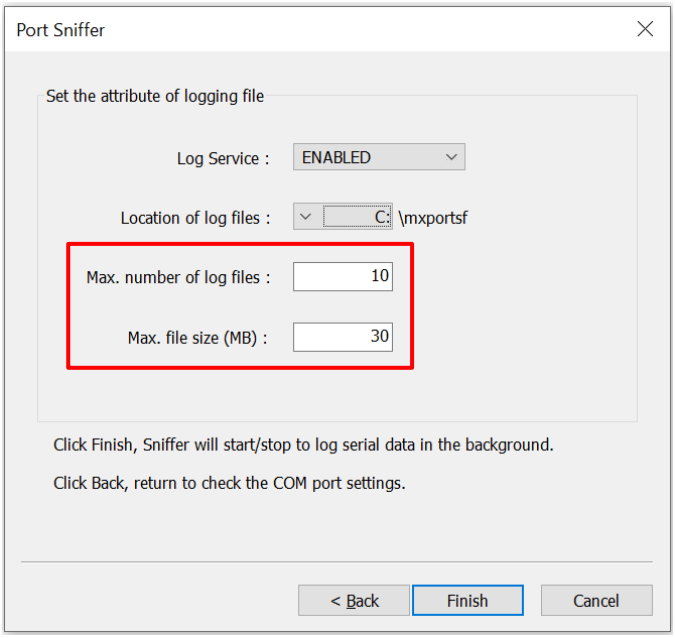
  - ➢ Hide sensitive data

    The system will hide the data. Used specifically used for sensitive data.



Step 2: Set the parameters of logging files. Skip this step if you disabled **Log to file** function

- Enable log service.
- Choose the location of log files.
- Set the max. number of log files and max. file size (MB).

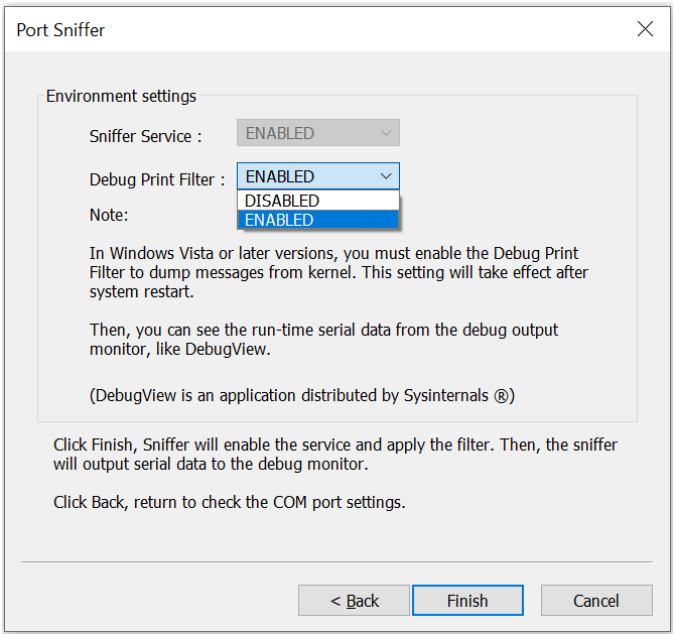


Step 3: Set the environment settings.

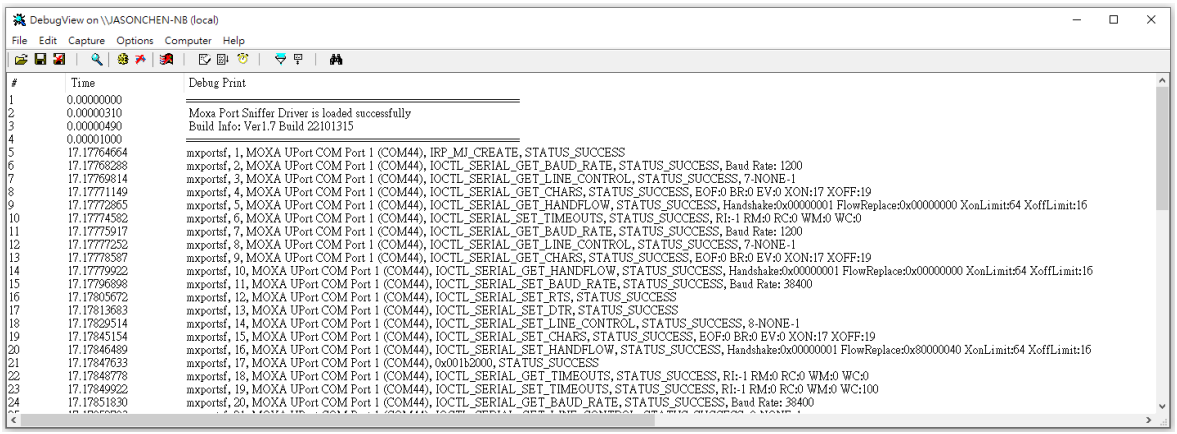
- Enable the Debug Print Filter to dump messages from the kernel. The setting will take effect after the system restarts.

NOTE

1. Disabling the Debug Print Filter will not output the serial data to the monitor.
2. You can see the runtime serial data from the debug output monitor.

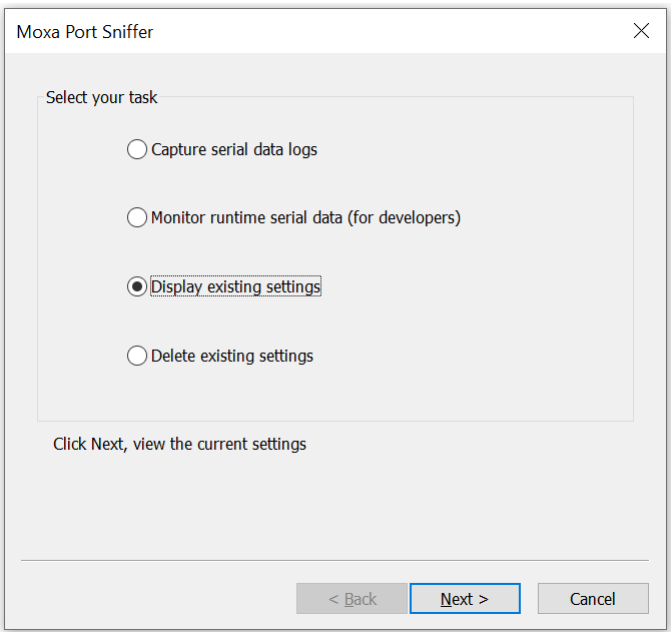


- Click **finish** and open "DebugView" to Monitor runtime serial data.

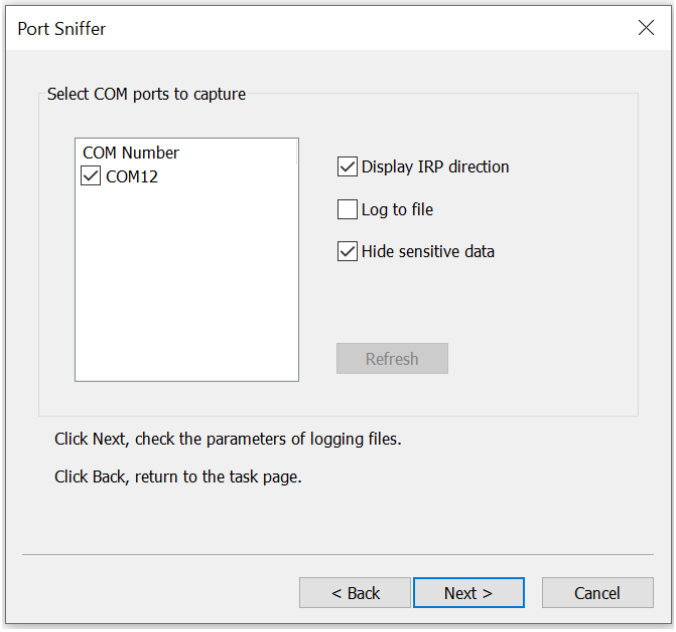


Display existing settings

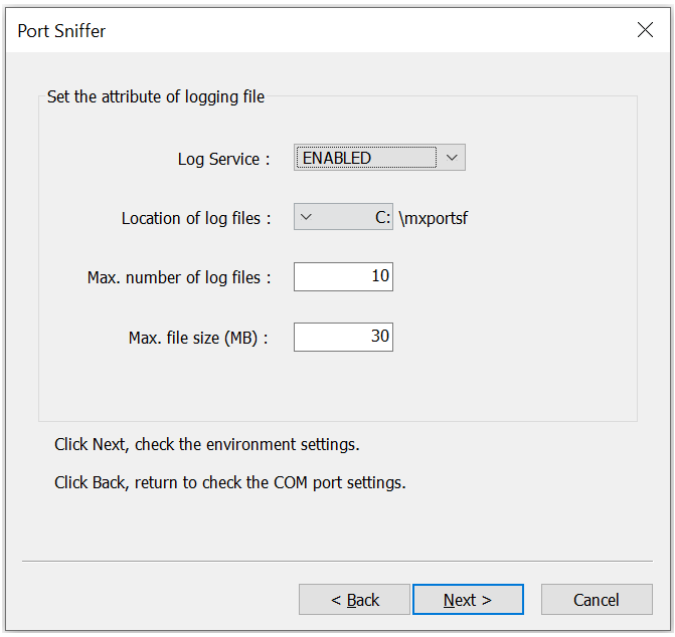
Step 1: Click **Display existing settings** to view the current setting.



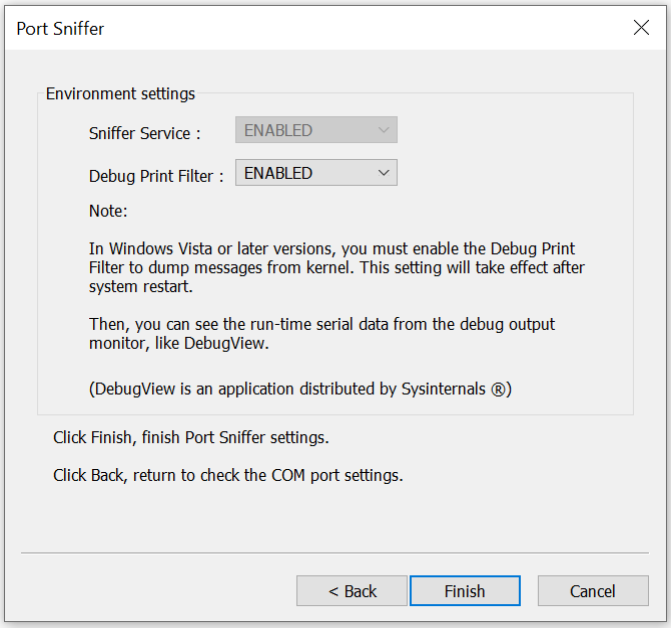
Step 2: Check the COM port settings.



Step 3: Check the parameters for logging files.



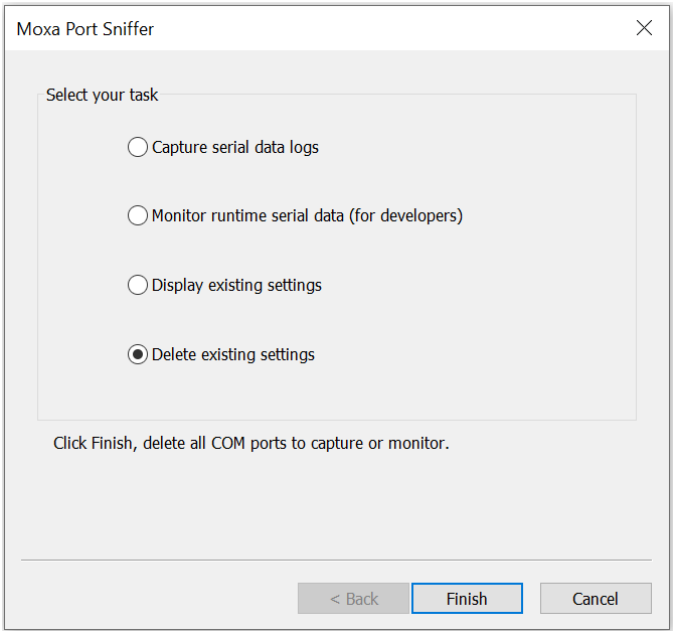
Step 4: Check the environment settings.



Step 5: Click **Finish** to finish Port Sniffer settings.

Delete existing settings

Step 1: Select **Delete existing settings**.



Step 2: Click **Finish** to delete existing settings.

10. Frequently Asked Questions

We have designed this section to list the Frequently Asked Questions so that users can solve their own questions.

Q1. If I disable the Web console, how can I change the settings?

The web console is the major management console of the NPort 6000-G2. It configures all the functions of the NPort 6000-G2 and monitors the status of the device server. We don't recommend you to disable the web console service.

When operating in an extremely high-risk cybersecurity environment, you may opt to disable the web console service after completing the configuration and confirming that no further adjustments are needed. The web console service can be enabled through SNMP private MIB in this scenario.

If the SNMP Agent service is also turned off, the only way to reset the device to factory settings and re-enable the web console service is to use the hardware reset button.

Q2. Can different users use the same account to log in to the device server?

Different connections are not allowed for one user account on the device server because of cybersecurity measures.

For example, the administrator is already logged into the NPort as account "admin". And, now a second user uses "admin" to log in to the same device server:

- If the password is wrong, the device server will record a login failed event on the syslog. The administrator can check the syslog to notice this failure.
- If the password is correct, the user will log in to the device and the former connection will be terminated. The administrator will be notified by this unexpected behavior. By logging in again, the administrator can find the IP address from the syslog to prevent the user to try again.

Q3. Why Device Search Utility v3.0 and later cannot be executed on my Windows 7 or Windows 2008 R2?

Since the Device Search Utility v3.0 is a web-based application, it has the minimum requirements for the browser version and operating system:

- Chrome:
  - For Windows 7, 8/8.1, Server 2012 and Server 2012 R2: Chrome 109 and newer
  - For Windows 10 and newer, Server 2016 and newer: All Chrome versions
- Firefox:
  - For Windows 7 and newer versions, Server 2012 and newer versions: All Firefox ESR versions
- Edge:
  - For Windows 7 and newer versions, Server 2012 and newer versions: All Firefox ESR versions

Q4. How can I check the CRC value of the runtime settings?

The NPort 6000-G2 provides private MIB for the CRC value of the runtime settings, the OID is xxx. Use a MIB browser or send a SNMP command to get the CRC value.

Q5. Is there an easier way to copy the settings of a NPort 6000 device server to a NPort 6000-G2?

If you have NPort 6000 device servers on site, you may wonder how to transfer the same settings to the NPort 6000-G2 device servers. Is it possible to configure each setting individually, one page at a time, even if it takes a lot of time?

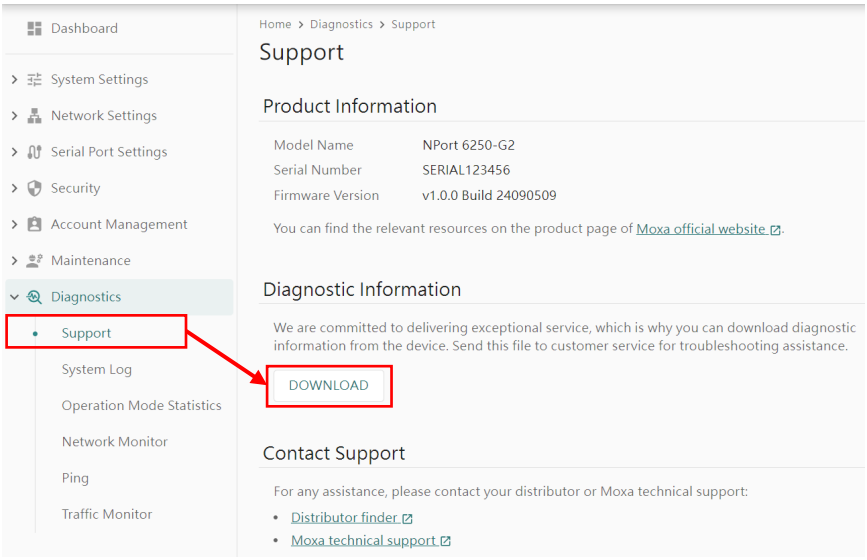
The NPort 6000-G2 device servers have the capability to import the configuration file directly from a NPort 6000. Export the NPort 6000 settings and import them into the NPort 6000-G2. The NPort 6000-G2 can then replace the device server on site.

Q6. If there is a power outage during a firmware upgrade, how can I recover the device?

The NPort 6000-G2 supports a fail-safe mechanism during firmware upgrade. If there is a power outage,just power up the device. The device will be ready with the previous version of firmware. Try again or arrange another proper time to upgrade the firmware.

Q7. Before calling Moxa customer service, is there anything I can prepare to save both of us time?

Please find the **Support > Diagnostic Information** and click the **DOWNLOAD** button to collect all the settings and logs for troubleshoot. This will help Moxa customer service to understand the case background and try to replicate the issue you are experiencing.

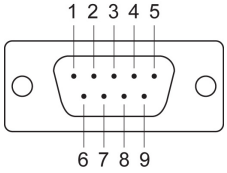


A. Pinouts and Cable Wiring

As mentioned in Chapter 2, the pin assignment of NPort 6000-G2 Series is as below:

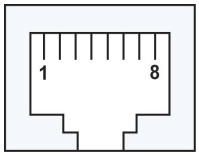
The serial port RS-232/422/485 pin assignment (male DB9):

Pin	RS-232	RS-422 4-wire RS-485	2-wire RS-485
1	DCD	TxD-(A)	–
2	RxD	TxD+(B)	–
3	TxD	RxD+(B)	Data+(B)
4	DTR	RxD-(A)	Data-(A)
5	GND	GND	GND
6	DSR	–	–
7	RTS	–	–
8	CTS	–	–
9	–	–	–



The Ethernet port pin assignment (RJ45):

Pin	RJ45
1	Tx+
2	Tx-
3	Rx+
4	–
5	–
6	Rx-
7	–
8	–

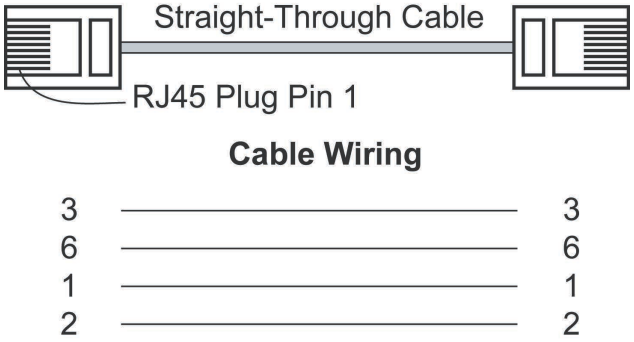


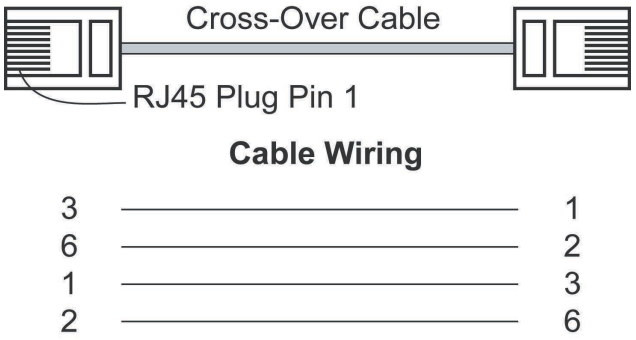
Cable Wiring Diagrams

To connect dserialhe serial devices/Ethernet devices, customize the connecting cable to connect the NPort and the serial/Ethernet devices. Here are some of most popular cable wiring for your reference.

Ethernet Cables

There are two major types of the RJ45 Ethernet cable, straight-through and crossover cables.





Serial Cables

Depending on different connectors on the serial devices, we provide several serial cables to connect easily to the NPort and the device.

CBL-RJ45F9-150

The CBL-RJ45F9-150 is a 150-cm long cable to connect the NPort's DB9 male connector to a serial device with RJ45 serial connector. The pin assignment of this cable is as below:

Pin on DB9 male	RS-232 signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	–

Pin on RJ45	RS-232 signal
6	DCD
4	RxD
5	TxD
1	DTR
3	GND
8	DSR
7	RTS
2	CTS
–	–

CBL-RJ45SF9-150

Industrial applications such as the factory floor are typically electrically noisy environments. The CBL-RJ45SF9-150 is a 150-cm long cable, shielded to protect the signals from the noise and connect the NPort's DB9 male connector to a serial device with a RJ45 serial connector. The pin assignment of this cable is as below:

Pin on DB9 male	RS-232 signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	–

Pin on RJ45	RS-232 signal
6	DCD
4	RxD
5	TxD
1	DTR
3	GND
8	DSR
7	RTS
2	CTS
–	–

CN-20070

The CN-20070 is a 150-cm long cable to connect the NPort's DB9 male connector to a serial device with a 10-pin RJ45 serial connector. The pin assignment of this cable is as below:

Pin on DB9 male	RS-232 signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	–
10	–

Pin on 10-pin RJ45	RS-232 signal
1	DCD
5	RxD
6	TxD
2	DTR
7	GND
9	DSR
8	RTS
3	CTS
–	–
–	–

B. Accessory Introduction

Moxa provides different accessories for different user scenarios. The scenarios will be introduced with the appropriate accessory in this appendix.

Convert the DB9 Connector to Other Connectors

The DB9, RJ45 and terminal block are the most popular interfaces on serial communications. The NPort device server has built-in DB9 connector as the default. Moxa provides a connector to convert the DB9 interface to other connectors.

ADP-RJ458P-DB9F

The ADP-RJ458P-DB9F is a connector that transforms the NPort's DB9 male connector to an 8-pin RJ45 serial connector. The pin assignment of this connector is as below:

Pin on DB9 male	RS-232 signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	–

Pin on RJ45	RS-232 signal
6	DCD
4	RxD
5	TxD
1	DTR
3	GND
8	DSR
7	RTS
2	CTS
–	–

Mini DB9F-to-TB

The Mini DB9F-to-TB is a connector that transforms the NPort's DB9 male connector to a 5-pin terminal block serial connector. This connector usually is used on a RS-422/RS-485 application. The pin assignment of this connector is as below:

Pin on DB9 male	RS-422 signal
1	TxD-(A)
2	TxD+(B)
3	RxD+(B)
4	RxD-(A)
5	GND
6	–
7	–
8	–
9	–

Pin on RJ45	RS-422 signal
2	TxD-(A)
1	TxD+(B)
3	RxD+(B)
4	RxD-(A)
5	GND
–	–
–	–
–	–
–	–

Pin on DB9 male	4w RS-485 signal
1	TxD-(A)
2	TxD+(B)
3	RxD+(B)
4	RxD-(A)
5	GND
6	–
7	–
8	–
9	–

Pin on RJ45	4w RS-485 signal
2	TxD-(A)
1	TxD+(B)
3	RxD+(B)
4	RxD-(A)
5	GND
–	–
–	–
–	–
–	–

Pin on DB9 male	2w RS-485 signal
1	–
2	–
3	Data+(B)
4	Data-(A)
5	GND
6	–
7	–
8	–
9	–

Pin on RJ45	2w RS-485 signal
–	–
–	–
3	Data+(B)
4	Data-(A)
5	GND
–	–
–	–
–	–
–	–

LB-DB9F-G-01

The LB-DB9F-G-01 is a loop-back connector for the NPort's DB9 male connector. It shortens Pin2 and Pin3;;Pin4, Pin6, and Pin7; and Pin8 and Pin1, so the serial port can have a self-test to verify if the serial communication works properly. The pin assignment of this connector is as below:

Pin on DB9 male	RS-232 signal	Notes
1	DCD	Shorted with Pin7, Pin8
2	RxD	Shorted
3	TxD	
4	DTR	Shorted with Pin6
5	GND	–
6	DSR	Shorted with Pin4
7	RTS	Shorted
8	CTS	
9	–	–

Selecting Suitable Power Adapter Depends on the Environment

The standard temperature models (NPort 6150-G2 and NPort 6250-G2) default will be shipped with a power adapter suitable for user's region.

- PWR-12050-AU-S1: with the Australia power plug
- PWR-12050-CN-S1: with the China power plug
- PWR-12050-EU-S1: with the European power plug
- PWR-12050-IN-S1: with the India power plug and certificate
- PWR-12050-KR-S1: with the Korea power plug and certificate
- PWR-12050-UK-S1: with the United Kingdom power plug and certificate
- PWR-12050-USJP-S1: with the United States and Japan power plug

With these power adapters, the operating temperature is from 0 to 40 degrees Celsius. Generally, the NPort device server may be set up in an indoor environment, like a control room. If the NPort device server may be set in an outdoor area or a cabinet without air conditioning, the temperature change may be big. Consider to buying the wide temperature models (NPort 6150-G2-T and NPort 6250-G2-T), and the power adapters may need to be ordered separately (it is not included in the box of NPort 6150-G2-T/6250-G2-T).

- PWR-12150-AU-SA-T: with the Australia power plug
- PWR-12150-CN-SA-T: with the China power plug
- PWR-12150-EU-SA-T: with the European power plug
- PWR-12150-UK-SA-T: with the United Kingdom power plug and certificate
- PWR-12150-USJP-SA-T: with the United States and Japan power plug

With these wide temperature models and power adapters, the operating temperature is from -40 to 75 degrees Celsius. Generally, the NPort device server may be set up in an outdoor environment, like a cabinet at the remote site, where it may be really extremely hot in summer and extremely cold in winter.

For those regions which do not have wide temperature power adapters, there are two options:

1. Try to locate a power adapter that a local UL Listed power supply (LPS) supplies externally, with a power output that meets SELV and LPS requirements and is rated between 12 to 48 VDC, with a minimum current of 0.16 A and a minimum Tma of 75°C.
2. Find a DIN-rail power supply that functions under a wide range of the temperatures and supply higher watts to multiple devices simultaneously. For example, Moxa provides:
   - MDR-40-24: DIN-rail 24 VDC power supply with 40W, -20 to 70°C operating temperature
   - MDR-60-24: DIN-rail 24 VDC power supply with 60W, -20 to 70°C operating temperature
   - HDR-60-24: 60 W/2.5 A DIN-rail 24 VDC power supply, -30 to 70°C operating temperature

For easy connections with these DIN-rail power supplies, Moxa provides a power cable: CBL-PJ21NOPEN-BK-30 w/Nut, which is a power plug at one side and with two cables V+ and V- at the other side to connect to the power supply.

C. Well-known Port Numbers

In this appendix, we provide a list of well-known port numbers that may cause network problems if you set the NPort 6000-G2 to one of these ports. Refer to RFC 1700 for well-known port numbers or to the following introduction from the IANA:

The port numbers are divided into three ranges: the Well-Known Ports, the Registered Ports, and the Dynamic and/or Private Ports.

The Well-known Ports range from 0 through 1023. The Registered Ports range from 1024 through 49151.

The Dynamic and/or Private Ports range from 49152 through 65535.

The Well-known Ports are assigned by the IANA, and on most systems, they can only be used by system processes or by programs executed by privileged users. The following table shows famous port numbers among the listed well-known port numbers. For more details, please visit the IANA website at http://www.iana.org/assignments/port-numbers.

TCP Socket	Application Service
0	Reserved
1	TCP Port Service Multiplexer
2	Management Utility
7	Echo
9	Discard
11	Active Users (systat)
13	Daytime
15	Netstat
20	FTP data port
21	FTP control port
23	Telnet
25	SMTP (Simple Mail Transfer Protocol)
37	Time (Time Server)
42	Host name server (names server)
43	Whois (nickname)
49	Login Host Protocol (login)
53	Domain Name Server (domain)
79	Finger protocol (finger)
80	World Wide Web (HTTP)
119	Network News Transfer Protocol (NNTP)
123	Network Time Protocol
213	IPX
160 to 223	Reserved for future use

UDP Socket	Application Service
0	Reserved
2	Management Utility
7	Echo
9	Discard
11	Active Users (systat)
13	Daytime
35	Any private printer server
39	Resource Location Protocol
42	Host name server (names server)
43	Whois (nickname)
49	Login Host Protocol (login)
53	Domain Name Server (domain)
69	Trivial Transfer Protocol (TETP)
70	Gopher Protocol
79	Finger Protocol
80	World Wide Web (HTTP)
107	Remote Telnet Service
111	Sun Remote Procedure Call (Sunrpc)
119	Network News Transfer Protocol (NNTP)
123	Network Time Protocol (NTP)
161	SNMP (Simple Network Management Protocol)
162	SNMP Traps
213	IPX (used for IP Tunneling)

D. SNMP MIB List

The NPort 6000-G2 has built-in SNMP (Simple Network Management Protocol) agent software that supports SNMP Trap, RFC1317 and RS-232-like groups, and RFC 1213 MIB-II. The following table lists the standard MIB-II groups and the variable implementation for the NPort 6000-G2.

RFC1213 MIB-II Supported SNMP Variables

System MIB	Interfaces MIB	IP MIB	ICMP MIB
sysDescr	ifNumber	ipForwarding	icmpInMsgs
sysObjectID	ifIndex	ipDefaultTTL	icmpInErrors
sysUpTime	ifDescr	ipInReceives	icmpInDestUnreachs
sysContact	ifType	ipInHdrErrors	icmpInTimeExcds
sysName	ifMtu	ipInAddrErrors	icmpInParmProbs
sysLocation	ifSpeed	ipForwDatagrams	icmpInSrcQuenchs
sysServices	ifPhysAddress	ipInUnknownProtos	icmpInRedirects
	ifAdminStatus	ipInDiscards	icmpInEchos
	ifOperStatus	ipInDelivers	icmpInEchoReps
	ifLastChange	ipOutRequests	icmpInTimestamps
	ifInOctets	ipOutDiscards	icmpTimestampReps
	ifInUcastPkts	ipOutNoRoutes	icmpInAddrMasks
	ifInNUcastPkts	ipReasmTimeout	icmpInAddrMaskReps
	ifInDiscards	ipReasmReqds	icmpOutMsgs
	ifInErrors	ipReasmOKs	icmpOutErrors
	ifInUnknownProtos	ipReasmFails	icmpOutDestUnreachs
	ifOutOctets	ipFragOKs	icmpOutTimeExcds
	ifOutUcastPkts	ipFragFails	icmpOutParmProbs
	ifOutNUcastPkts	ipFragCreates	icmpOutSrcQuenchs
	ifOutDiscards	ipAdEntAddr	icmpOutRedirects
	ifOutErrors	ipAdEntIfIndex	icmpOutEchos
	ifOutQLen	ipAdEntNetMask	icmpOutEchoReps
	ifSpecific	ipAdEntBcastAddr	icmpOutTimestamps
		ipAdEntReasmMaxSize	icmpOutTimestampReps
		ipRouteDest	icmpOutAddrMasks
		ipRouteIfIndex	icmpOutAddrMaskReps
		ipRouteMetric1	
		ipRouteMetric2	
		ipRouteMetric3	
		ipRouteMetric4	
		ipRouteNextHop	
		ipRouteType	
		ipRouteProto	
		ipRouteAge	
		ipRouteMask	
		ipRouteMetric5	
		ipRouteInfo	
		ipNetToMediaIfIndex	
		ipNetToMediaPhysAddress	
		ipNetToMediaNetAddress	
		ipNetToMediaType	
		ipRoutingDiscards	

Address Translation MIB	TCP MIB	UDP MIB	SNMP MIB
atIfIndex	tcpRtoAlgorithm	udpInDatagrams	snmpInPkts
atPhysAddress	tcpRtoMin	udpNoPorts	snmpOutPkts
atNetAddress	tcpRtoMax	udpInErrors	snmpInBadVersions
	tcpMaxConn	udpOutDatagrams	snmpInBadCommunityNames
	tcpActiveOpens	udpLocalAddress	snmpInBadCommunityUses
	tcpPassiveOpens	udpLocalPort	snmpInASNParseErrs
	tcpAttemptFails		snmpInTooBigs
	tcpEstabResets		snmpInNoSuchNames
	tcpCurrEstab		snmpInBadValues
	tcpInSegs		snmpInReadOnlys
	tcpOutSegs		snmpInGenErrs
	tcpRetransSegs		snmpInTotalReqVars
	tcpConnState		snmpInTotalSetVars
	tcpConnLocalAddress		snmpInGetRequests
	tcpConnLocalPort		snmpInGetNexts
	tcpConnRemAddress		snmpInSetRequests
	tcpConnRemPort		snmpInGetResponses
	tcpInErrs		snmpInTraps
	tcpOutRsts		snmpOutTooBigs
			snmpOutNoSuchNames
			snmpOutBadValues
			snmpOutGenErrs
			snmpOutGetRequests
			snmpOutGetNexts
			snmpOutSetRequests
			snmpOutGetResponses
			snmpOutTraps
			snmpEnableAuthenTraps
			snmpSilentDrops
			snmpProxyDrops

RFC1317 RS-232 Like Groups

RS-232 MIB	Async Port MIB
rs232Number	rs232AsyncPortIndex
rs232PortIndex	rs232AsyncPortBits
rs232PortType	rs232AsyncPortStopBits
rs232PortInSigNumber	rs232AsyncPortParity
rs232PortOutSigNumber	
rs232PortInSpeed	
rs232PortOutSpeed	

Input Signal MIB	Output Signal MIB
rs232InSigPortIndex	rs232OutSigPortIndex
rs232InSigName	rs232OutSigName
rs232InSigState	rs232OutSigState

Moxa-NP6000-G2-MIB

overview	basicSetting	networkSetting	opModeSetting
modelName	serverName	ipConfiguration	portIndex
serialNumber	serverLocation	sysIpAddress	portApplication
firmwareVersion	timeZone	netMask	portMode
macAddress	localTime	defaultGateway	
viewLanSpeed	timeserver	dnsServer1IpAddr	
viewLanModuleSpeed		dnsServer2IpAddr	
upTime		pppoeUserAccount	
moduleType		pppoePassword	
configCRC32		winsFunction	
		winsServer	
		lan1Speed	
		routingProtocol	
		gratuitousArp	
		gratuitousArpSendPerios	

deviceControl Mode	socket Mode
deviceControlTcpAliveCheck	socketTcpAliveCheck
deviceControlMaxConnection	socketInactivityTime
deviceControlIgnoreJammedIp	socketMaxConnection
deviceControlAllowDriverControl	socketIgnoreJammedIp
deviceControlSecure	socketAllowDriverControl
deviceControlLocalTcpPort	socketSecure
deviceControlConnectionDownRTS	socketLocalTcpPort
deviceControlConnectionDownDTR	socketCmdPort
	socketTcpServerConnectionDownRTS
	socketTcpServerConnectionDownDTR
	socketTcpClientDestinationAddress1
	socketTcpClientDestinationPort1
	socketTcpClientDestinationAddress2
	socketTcpClientDestinationPort2
	socketTcpClientDestinationAddress3
	socketTcpClientDestinationPort3
	socketTcpClientDestinationAddress4
	socketTcpClientDestinationPort4
	socketTcpClientDesignatedLocalPort1
	socketTcpClientDesignatedLocalPort2
	socketTcpClientDesignatedLocalPort3
	socketTcpClientDesignatedLocalPort4
	socketTcpClientConnectionControl
	socketUdpDestinationAddress1Begin
	socketUdpDestinationAddress1End
	socketUdpDestinationPort1
	socketUdpDestinationAddress2Begin
	socketUdpDestinationAddress2End
	socketUdpDestinationPort2
	socketUdpDestinationAddress3Begin
	socketUdpDestinationAddress3End
	socketUdpDestinationPort3
	socketUdpDestinationAddress4Begin
	socketUdpDestinationAddress4End
	socketUdpDestinationPort4
	socketUdpLocalListenPort

pairConnection Mode	ethernetModem Mode
pairConnectionTcpAliveCheck	ethernetModemTcpAliveCheck
pairConnectionSecure	ethernetModemTcpPort
pairConnectionDestinationAddress	
pairConnectionDestinationPort	
pairConnectionTcpPort	

terminal Mode	reverseTerminal Mode
terminalTcpAliveCheck	reverseTerminalTcpAliveCheck
terminalInactivityTime	reverseTerminalInactivityTime
terminalAutoLinkProtocol	reverseTerminalTcpPort
terminalPrimaryHostAddress	reverseTerminalAuthenticationType
terminalSecondHostAddress	reverseTerminalMapKeys
terminalTelnetTcpPort	
terminalSshTcpPort	
terminalType	
terminalMaxSessions	
terminalChangeSession	
terminalQuit	
terminalBreak	
terminalInterrupt	
terminalAuthenticationType	
terminalAutoLoginPrompt	
terminalPasswordPrompt	
terminalLoginUserName	
terminalLoginPassword	

printer Mode	dial Mode	dataPacking
printerTcpAliveCheck	dialTERMBINMode	portPacketLength
printerTcpPort	dialPPPDMode	portDelimiter1Enable
printerGroup	dialSLIPDMode	portDelimiter1
printerQueueNameRaw	dialAuthType	portDelimiter2Enable
printerQueueNameASCII	dialDisconnectBy	portDelimiter2
printerAppendFromFeed	dialDestinationIpAddress	portDelimiterProcess
	dialSourceIpAddress	portForceTransmit
	dialIpNetmask	
	dialTcpIpCompression	
	dialInactivityTime	
	dialLinkQualityReport	
	dialOutgoingPAPID	
	dialPAPPassword	
	dialIncomingPAPCheck	

comParamSetting	dataBuffering	modemSetting
portAlias	portBufferingEnable	portEnableModem
portInterface	portBufferingLocation	portInitialString
portBaudRate	portBufferingSDFileSize	portDialUp
portBaudRateManual	portSerialDataLoggingEnable	portPhoneNumber
portDataBits		
portStopBits		
portParity		
portFlowControl		
portFIFO		
portOnDelay		
portOffDelay		

welcomeMessage	sysManagement
portEnableWelcomeMessage	enableAccessibleIpList
portMessage	accessibleIpListIndex
	activeAccessibleIpList
	accessibleIpListAddress
	accessibleIpListNetmask
	snmpEnable
	snmpContactName
	snmpLocation
	dDNSEnable
	dDNSServerAddress
	dDNSHostName
	dDNSUserName
	dDNSPassword
	hostTableIndex
	hostName
	hostIpAddress
	routeTableIndex
	gatewayRouteTable
	destinationRouteTable
	netmaskRouteTable
	metricRouteTable
	interfaceRouteTable
	userTableIndex
	userNameUserTable
	passwordUserTable
	phoneNumberUserTable
	radiusServerIp
	radiusKey
	udpPortAuthenticationServer
	radiusAccounting
	sysLocalLog
	networkLocalLog
	configLocalLog
	opModeLocalLog
	mailWarningColdStart
	mailWarningWarmStart
	mailWarningAuthFailure
	mailWarningIpChanged
	mailWarningPasswordChanged
	trapServerColdStart
	trapServerWarmStart
	trapServerAuthFailure
	alarmServerEthernet1LinkDown
	alarmServerEthernet2LinkDown
	alarmServerEthernet3LinkDown
	mailDCDchange
	trapDCDchange
	alarmDCDchange
	mailDSRchange
	trapDSRchange
	alarmDSRchange
	emailWarningMailServer
	emailRequiresAuthentication
	emailWarningUserName
	emailWarningPassword
	emailWarningFromEmail
	emailWarningFirstEmailAddr
	emailWarningSecondEmailAddr

welcomeMessage	sysManagement
	emailWarningThirdEmailAddr
	emailWarningFourthEmailAddr
	snmpTrapReceiverIp
	trapVersion
	httpConsole
	httpsConsole
	telnetConsole
	sshConsole
	lcmReadOnlyProtect
	resetButtonFunction
	loadFactoryDefaultSetting
	maxHttpLoginUsers
	autoLogoutSetting
	loginNotificationMessage
	loginFailureMessage
	userAccountIndex
	activeUserAccount
	accountName
	accountGroupName
	groupName
	networkConfig
	serialConfig
	systemConfig
	adminConfig
	monitorLogWarning
	commonSetting
	pwdMinLength
	pwdComplexityCheckEnable
	pwdComplexityCheckDigitEnable
	pwdComplexityCheckAlphabetEnable
	pwdComplexityCheckSpecialCharEnable
	pwdLifetime
	loginFailureLockoutEnable
	loginFailureLockoutRetrys
	loginFailureLockoutTime

sysStatus	saveConfiguration	restart
remoteIpIndex	saveConfig	restartPorts
monitorRemoteIp		restartSystem
monitorTxCount		
monitorRxCount		
monitorTxTotalCount		
monitorRxTotalCount		
monitorDSR		
monitorDTR		
monitorRTS		
monitorCTS		
monitorDCD		
monitorErrorCountFrame		
monitorErrorCountParity		
monitorErrorCountOverrun		
monitorErrorCountBreak		
monitorBaudRate		
monitorDataBits		
monitorParity		
monitorRTSCTSFlowControl		
monitorXONXOFFFlowControl		
monitorFIFO		

sysStatus	saveConfiguration	restart
monitorInterface		
monitorRTSToggleFlowControl		
relayOutputEthernet1LinkDown		
ethernet1LinkDownAcknowledge		
relayOutputEthernet2LinkDown		
ethernet2LinkDownAcknowledge		
relayOutputEthernet3LinkDown		
ethernet3LinkDownAcknowledge		
portDCDChangedStatus		
portDCDChangedAcknowledge		
portDSRChangedStatus		
portDSRChangedAcknowledge		

E. Event List

The NPort 6000-G2 provides event logs to help users to troubleshoot. All the events that may be recorded are listed below.

Item	Category	Severity	Default Setting	Event Name	Description
1	System	Notice	Disable	Firmware ready	The system is ready for operation.
2		Informational	Disable	Detect SD card	Mount SD card successfully.
3		Warning	Disable	SD card removed	Detect SD card is removed.
4		Error	Disable	No SD card inserted	No SD card in the system when Port Buffering is enabled and targeting to save in the SD card.
5		Notice	Disable	User trigger reboot	The device was rebooted by the user.
6		Informational	Disable	Configuration changed	A user changed the configuration setting, and the new settings are activated.
7		Notice	Disable	Configuration changed failed	A user changed the configuration setting, but the new settings activated failed.
8		Warning	Disable	Power input failure	The device detects Power Input doesn't provide the electricity (only happens on multiple power inputs models).
9		Informational	Disable	NTP success	The device synchronizes the time with NTP server successfully.
10		Warning	Disable	NTP fail	The device failed to synchronize the time.
11		Informational	Disable	Manual setting time success	Manual setting time success.
12		Notice	Disable	Email fail	The device failed to deliver the email message.
13		Notice	Disable	SNMP inform fail	The device failed to deliver the SNMP Inform message.
14		Notice	Disable	Syslog fail	The device failed to deliver the Syslog message.
15		Notice	Disable	Email service is back	Email service resumed; the event recorded for successfully sending after a failure.
16		Notice	Disable	SNMP inform service is back	SNMP information service resumed; the event recorded for successfully sending after a failure.
17		Notice	Disable	Syslog service is back	Syslog service resumed; the event recorded for successfully sending after a failure.
18		Informational	Disable	LCM display ready	The system detects the LCM display, and it's ready for use.
19		Notice	Disable	LCM display not work	The system detects the LCM display, but it doesn't work.
20	Network	Informational	Disable	Ethernet link up	The Ethernet port is linked up.
21		Notice	Disable	Ethernet link down	The Ethernet port is linked down.
22		Notice	Disable	IP changed	A user changed the network configuration setting, and the new settings are activated.
23		Error	Disable	IP conflict	The device detects an IP conflict, this may make the device malfunctioned.
24		Warning	Disable	Not get IP from DHCP server	The device shall get an IP address from the DHCP server, but it failed.
25		Warning	Disable	Connect DHCP server fail	The device cannot find a DHCP server in the network.
26		Notice	Disable	Using 169.254.x.x IP	The device is using 169.254.x.x IP address, which is abnormal.
27		Informational	Disable	IP renew	IP of the device is renewed (with DHCP enabled).
28		Notice	Disable	Topology change	When Redundant protocol (RSTP or TurboRing) enabled, the Slave port is blocked to prevent data loop. When the master path is broken and the

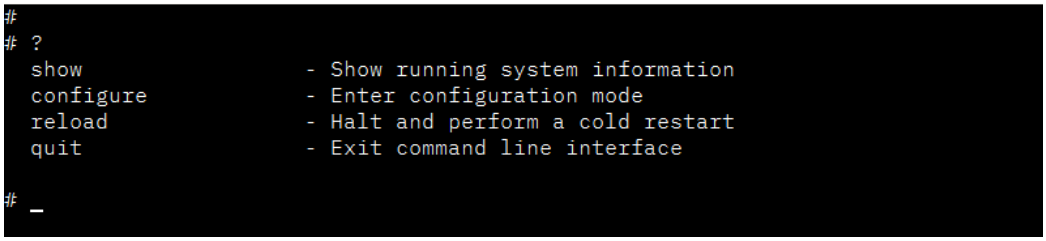
Item	Category	Severity	Default Setting	Event Name	Description
					network communication is working with the Slave path (only for the models which supports Redundant protocols).
29		Informational	Disable	Network module ready	The network module is detected and ready for communication (only for the models which can plug-in a network module).
30		Informational	Disable	No network module	There is no network module detected (only for the models which can plug-in a network module).
31		Notice	Disable	Network module not work	The system detects the network module, but it doesn't work (only for the models which can plug-in a network module).
32	Security	Warning	Enable	Clear log	Clear all the system logs on the device.
33		Informational	Disable	System log export	The system log is exported.
34		Notice	Enable	Log threshold reached	The number of the log events reached the number of the threshold setting.
35		Informational	Disable	Login success	A user from the IP address login the device successfully.
36		Notice	Enable	Login fail	A user from the IP address try to login the device but failed.
37		Informational	Disable	Account/group changed	A user changed the configuration setting of username, password or group privilege.
38		Warning	Enable	Account lockout	An account is locked out because he failed to login too many times.
39		Informational	Disable	Service enabled	The device enables the service successfully.
40		Notice	Enable	Service disabled	The device disables the service successfully.
41		Warning	Enable	Service enabled/disabled failed	The device tries to enable/disable service failed.
42		Informational	Disable	Syslog certificate export	The Syslog certificate was exported.
43		Notice	Enable	Syslog certificate import	The Syslog certificate was imported.
44		Notice	Enable	Syslog certificate deleted	The Syslog certificate was deleted.
45		Notice	Enable	Syslog certificate expired	The Syslog certificate was expired.
46		Informational	Disable	Syslog certificate will expire	The Syslog certificate will expire in one month.
47		Warning	Enable	Connect authentication server fail	The device failed to connect to the RADIUS/TACACS+ server.
48		Error	Enable	Authentication fail	A user failed to pass the authentication process.
49		Informational	Disable	SSL certificate export	The SSL certificate was exported.
50		Notice	Enable	SSL certificate import	The SSL certificate was imported.
51		Notice	Enable	SSL certificate deleted	The SSL certificate was deleted.
52		Notice	Enable	SSL certificate expired	The SSL certificate was expired.
53		Notice	Enable	SSL certificate regenerated	The SSL certificate was regenerated.
54		Warning	Enable	DoS Defense is triggered	The DoS Defense functions were triggered.
55		Informational	Disable	Password reached lifetime	Account's password reached the lifetime.
56	Maintenance	Informational	Disable	Firmware upgrade	The firmware is upgraded.

Item	Category	Severity	Default Setting	Event Name	Description
57		Warning	Disable	Firmware upgrade fail	A user tried to upgrade the firmware, but the device rejects to upgrade it because of the wrong file format/checksum error.
58		Notice	Disable	Configuration import	The config file was imported.
59		Warning	Disable	Configuration import fail	The device failed to import a config file because of the wrong file format or invalid authentication.
60		Informational	Disable	Configuration export	The config file was exported.
61		Notice	Disable	Load factory default	Load factory default.
62		Notice	Disable	Load customized default	Load customized default.
63		Notice	Disable	Log collection	When use click One-click data collection function to collect the event logs and relative information for diagnostics purpose, the device will record this event.
64	Serial	Informational	Disable	Serial port CTS changed	The CTS signal of the serial port is turned ON from OFF or is turned OFF from ON.
65		Informational	Disable	Serial port DSR changed	The DSR signal of the serial port is turned ON from OFF or is turned OFF from ON.
66		Informational	Disable	Serial port DCD changed	The DCD signal of the serial port is turned ON from OFF or is turned OFF from ON.
67		Notice	Disable	Port OP mode disabled	The Operation mode of the port is disabled; the port cannot be connected by any network devices.
68		Informational	Disable	Port connect	The session is connected on the port.
69		Notice	Disable	Port disconnect	The session is disconnected on the port.
70		Error	Disable	Port authentication fail	A user failed to login on the port in terminal, Reverse Terminal. or dial-in/out operation modes.
71		Notice	Disable	Port restart	The serial port is restarted.
72		Notice	Disable	Serial data error	There is an error happened on the received serial data of the Port, for example, a framed error, parity error, or overrun error.

F. Command List of the Serial Console

The NPort 6000-G2 provides a serial console as a command-line interface for the user who prefers to log in with the serial port. The serial console only supports limited configuration settings. View the basic information and configure the network settings.

When you first enter the serial console, input ? to view a list of basic commands and the description of each command.



For the users with READ privilege of the serial console, execute the **show** command to view relative settings. For the users with WRITE privilege, execute the **configure** command to set or modify relative settings.

Input # configure to access the subcategory to show or change the network related settings.

Set statis ip address of the network interface:

Syntax Description	**ip**	Configure IP parameters
	address	Configure IPv4 address parameters
	static	Configure static IPv4 address
	ipv4-address	The IPv4 address
	ipv4-netmask	The IPv4 subnet mask
	dhcp	Assign the IPv4 address by DHCP
Defaults	IPv4 Address: 192.168.127.254 IPv4 Netmask: 255.255.255.0 IPv4 Gateway: 0.0.0.0	
Command Modes	Global Configuration	
Usage Guidelines	N/A	
Examples	# configure (config)# ip address static 192.168.127.254 255.255.255.0	
Related Commands	no ip address	

Set the default gateway:

Syntax Description	**ip**	Configure IP parameters
	default-gateway	Configure IPv4 default gateway address
	ipv4-address	The IPv4 address
Defaults	N/A	
Command Modes	Global Configuration	
Usage Guidelines	N/A	
Examples	# configure (config)# ip default-gateway 192.168.127.1	
Related Commands	no ip address	

Show the network status:

Syntax Description	**show**	Display configuration/status information
	ip	Display IP information
	management	Display IP information
Defaults	N/A	
Command Modes	Privileged EXEC	
Usage Guidelines	N/A	
Examples	# show ip management IPv4 IP configuration : DHCP IP address : 192.168.127.254 Subnet mask : 255.255.255.0 Default gateway : 0.0.0.0 DNS server : 0.0.0.0 #	
Related Commands	N/A	

User can input # reload to access the sub-category to show or modify the network related settings.

Restart the device:

Syntax Description	**reload**	Halt and perform a cold restart.
Defaults	N/A	
Command Modes	Privileged EXEC	
Usage Guidelines	N/A	
Examples	# reload Proceed with reload? [y/n] y Resetting system...	
Related Commands	N/A	

Reset the device to factory default settings:

Syntax Description	**reload**	Halt and perform a cold restart.
	factory-default	Halt and perform a cold restart with factory default.
Defaults	N/A	
Command Modes	Privileged EXEC	
Usage Guidelines	N/A	
Examples	# reload factory-default Proceed with reload to factory default? [y/n] y Reset to factory default...	
Related Commands	N/A	

Logout the serial console:

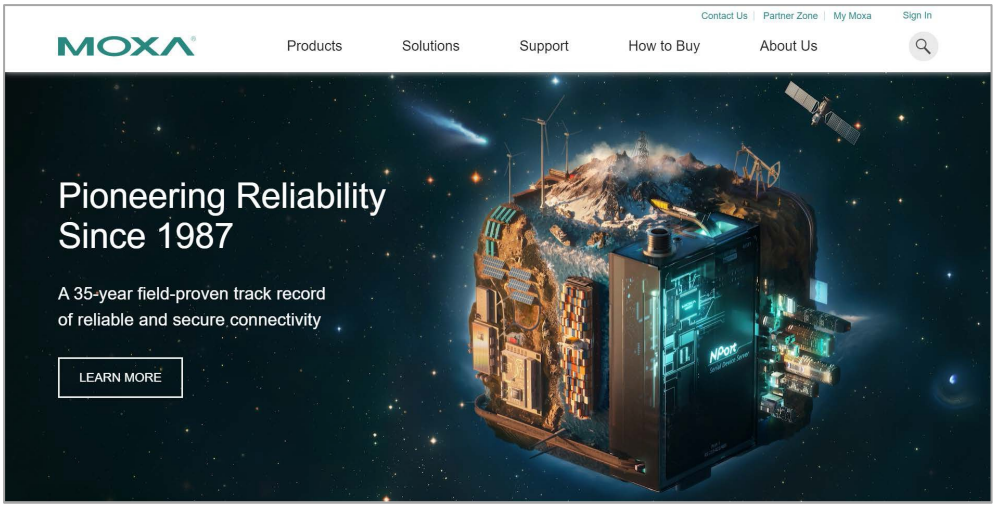
Syntax Description	**quit**	Logout from the command line interface.
Defaults	N/A	
Command Modes	Privileged EXEC	
Usage Guidelines	N/A	
Examples	# quit	
Related Commands	N/A	

G. How to Become a Registered User

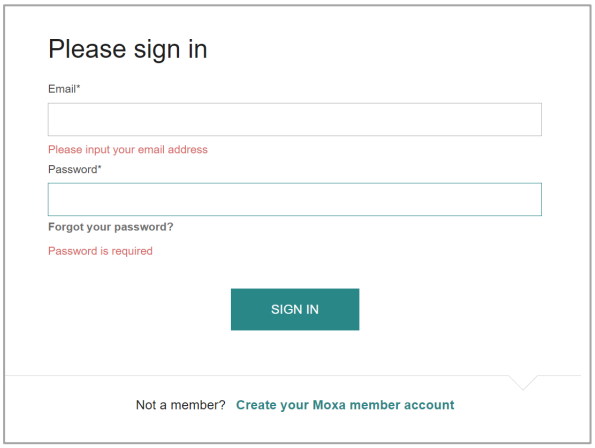
By becoming a registered user on Moxa.com, you gain access to all updates for your purchased or interested products, including software and documentation.To become a registered user and receiving all updates, you need to do following:

Register a Moxa Account

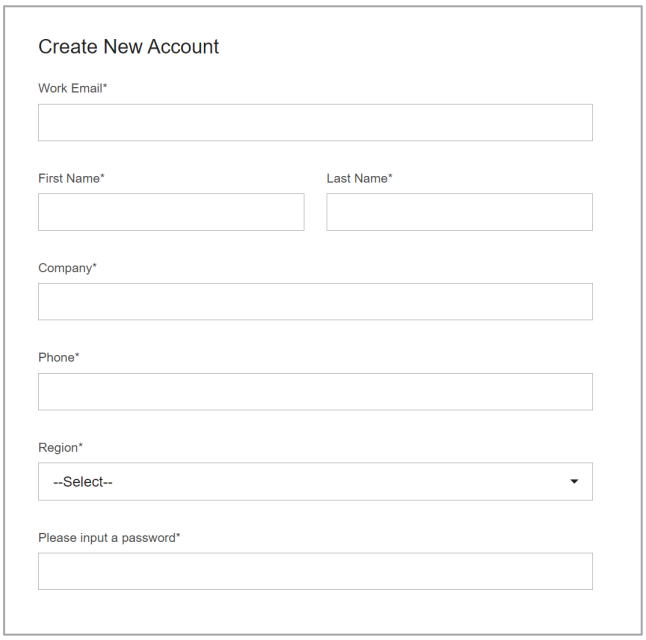
1. Go to Moxa.com and click **'Sign in'** at the top-right corner.



2. In the Sign-n page, click "Create your Moxa member account" as below.'



3. Fill the necessary fields.



Request for Product Updates

1. Go to the specific product page to receive updates. Click **"+FOLLOW UPDATE"**

2. Once completes, see the FOLLOW UPDATES button changes.