NPort Server Lite
Hardware Installation Guide

for DE-301/331 & DE-302/304/332/334

Third Edition, November 2006

NPort Server Lite
Hardware Installation Guide for
DE-301/331&DE-302/304/332/334

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Introduction

Welcome to Moxa's NPort Server Lite, an industrial serial device server that greatly enhances the ability of a Windows host (i.e., PC) to control multiple serial devices over a TCP/IP-based Ethernet network.

This chapter is an introduction to the NPort Server Lite and includes the following:

- **Features**
- **Specifications**
- **Package Checklist**
- **Parts of the Server**

The NPort Server Lite connects a Windows host to an asynchronous RS-232 or RS-422/485 serial port through a 10/100Mbps TCP/IP Ethernet network. Any device that supports the asynchronous communications protocol can be connected to the network. The NPort Server Lite works like an add-on multiport serial board but with one major advantage—the TCP/IP network. By networking the serial ports, the NPort Server Lite allows you to control asynchronous serial devices from virtually anywhere in the world.

The following table illustrates the number of ports and type of serial interface for each NPort Server Lite model:

	1 port	**2 ports**	**4 ports**
RS-232	NPort DE-301	NPort DE-302	NPort DE-304
RS-422, RS-485	NPort DE-331	NPort DE-332	NPort DE-334

Real COM drivers are included that allow the Windows operating system to recognize the networked serial ports as if they were physically attached to the host, simplifying application development. The NPort Server Lite provides basic

transmit/receive data functions as well as RTS, CTS, DTR, DSR, and DCD control signals.

The NPort Server Lite can be used with your existing applications that support serial communication. A utility program is included that provides simple step-by-step installation instructions and a maintenance wizard that gives you easy access to your asynchronous devices.

Features

- Auto-detecting 10/100 Mbps Ethernet
- RS-232 or RS-422/485 serial interface
- 1, 2, or 4 port models
- LCD control panel with IP address display and configuration
- Built-in Ethernet and TCP/IP protocol
- Each port configurable for Driver, TCP Server, TCP Client, or UDP Server/Client operation mode
- Pair Connection operation available for DE-301 and DE-331
- Windows Real COM drivers and Linux real tty drivers
- Automatic network connection recovery
- Desktop and DIN-rail installation

Specifications

Hardware

Processor	16 bit CPU
I/O Controller:	
DE-301/331	16C550C or compatible × 1
DE-302/332	16C550C or compatible × 2
DE-304/334	16C550C or compatible × 4
Memory	512 KB
Connector Type	DB9 Male

Interface

LAN	Auto-detecting 100Base-TX (10/100 Mbps)
Serial	RS-232 or RS-422/485
No. of Ports	1/2/4
Signals:	
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	TxD+/-, RxD+/-, RTS+/-, CTS+/-, GND
RS-485	Data+/-, GND

Serial Parameters

Speed	50 bps to 230.4 Kbps
Parity	None, even, odd, space, mark
Data bits	5, 6, 7, 8
Stop bits	1, 1.5, 2

Power and Environment

Power Requirements	9 to 30 VDC, 1.05A/9V
Operating Temp.	0 to 55
Operating Humidity	5 to 95% RH
Storage Temp.	-20 to 85
Dimensions	$155 \times 105 \times 33$ mm (W $\times$ D $\times$ H)
Surge Protection	15 KV ESD for serial ports
Magnetic Isolation	1.5 KV for Ethernet
Regulatory Approvals	FCC, CE, UL, CUL, TÜV

Note: If you need a product with optical isolation, the MOXA's Transio A53 is a smart, bi-directional converter that can be used with the NPort Server Lite to provide up to 2 KV of optical isolation.

Package Checklist

- NPort Server Lite
- NPort Server Lite Hardware Installation Guide
- NPort Family Software Installation Guide
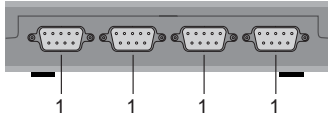- Crossover 10/100 Mbps Ethernet cable

- Power adaptor (110V or 230V)
- Drivers for Windows, Linux, and Unix (on CD)
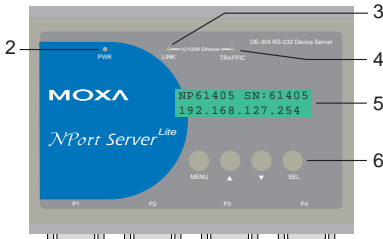
Optional Accessories

- A52: smart RS-232 to RS-422/485 bi-directional converter
- A53: smart RS-232 to RS-422/485 bi-directional converter; supports optical isolation protection (2 KV)
- Mounting plates, brackets and screws

Parts of the Server

Front Panel View

1   1   1   1

Top Panel View

Rear Panel View

7   8   9
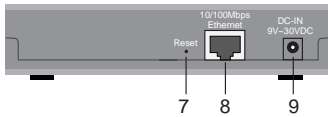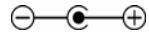
Bottom Panel View
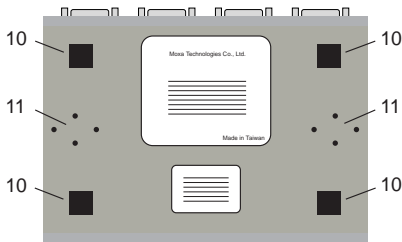
Right Panel View
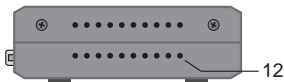
NOTE: 4-port model shown on left

1. DB9 male serial ports

2. PWR LED

3. LINK LED

4. TRAFFIC LED

5. *LCD control panel screen*
   Note: Before IP address is received from DHCP/BOOTP server, unit displays "DHCP/BOOTP fail" message every second.

6. LCD control panel buttons

7. Reset button
   Note: *Hold down for 3 sec to erase password.*

8. 100BaseTx Ethernet port

9. Power input ⊖——⦿——⊕

10. Rubber base pads

11. Mounting bracket area

12. Heat vent

2

Connecting the Hardware

Now that you have been introduced to the NPort Server Lite's features and specifications, it's time to set up the hardware. The following topics are covered in this chapter:

- Choosing a Location
    - Desktop
    - Wall or Cabinet
    - DIN Rail
- Network Connection
- Power Connection
- Serial Connection

Choosing a Location

There are three placement options available:

- place on a desktop
- fix to a wall or inside a cabinet
- fix to a 35-mm DIN rail

Desktop

The NPort Server Lite may be placed on a clean, flat, well-ventilated desktop. There are four rubber pads attached to the bottom of the server, and we recommend leaving sufficient room between the unit and neighboring equipment to create enough clearance for air to circulate.

Do not put anything on top of the unit, since this could damage the internal components and obscure the server's LCD screen.

Wall or Cabinet

The two mounting plates included with the NPort Server Lite can be used to attach the server to a wall or to the inside of a cabinet. First attach the mounting plates to the bottom of the server (Fig. 2-1a). With the mounting plates installed, you may then attach the server to a wall or cabinet (Fig. 2-1b).
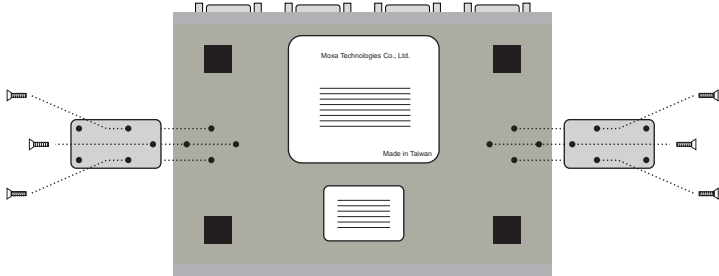
Figure 2-1a. Mounting Plates (bottom view)
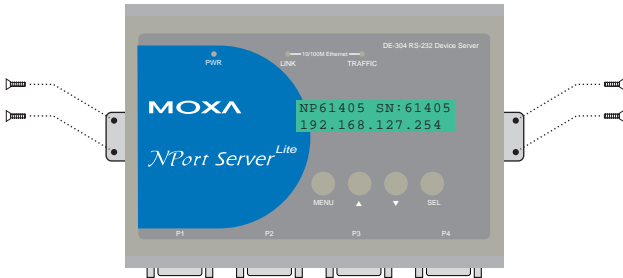
Figure 2-1b. Mounting Plates (top view)

DIN Rail

The NPort Server Lite can be mounted on a standard 35-mm DIN rail. First, attach the DIN rail brackets to the mounting plates (Figs. 2-2a, b).
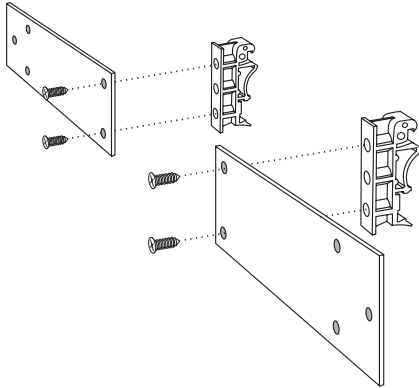
Figure 2-2a. DIN Rail Brackets: Inner Placement
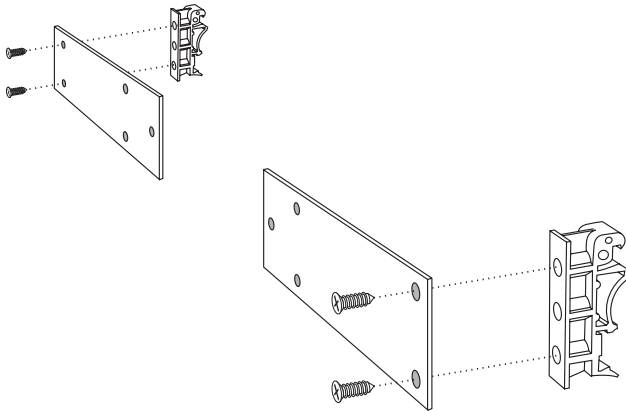
Figure 2-2b. DIN Rail Brackets: Outer Placement

After attaching the brackets, the screw heads should be flush with the mounting plate. The mounting plate can then be attached to the bottom of the unit, with the orientation as shown in Fig. 2-3a or Fig. 2-3b.
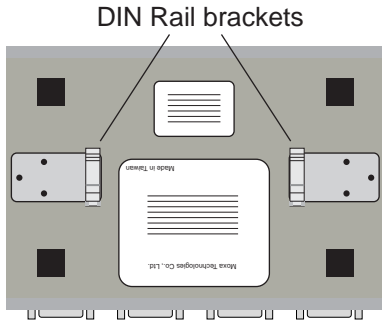
DIN Rail brackets

Figure 2-3a. DIN Rail Brackets: Inner Placement
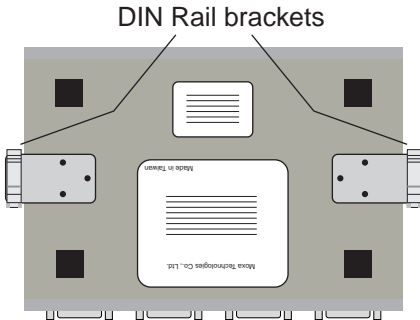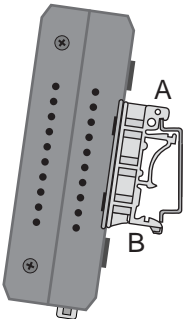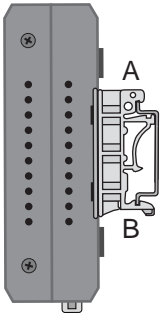
DIN Rail brackets

Figure 2-3b. DIN Rail Brackets: Outer Placement

The next step is to attach the unit to the rail.

STEP 1: The two ends of the bracket are named A and B. Hook the A end over the top edge of the rail.	STEP 2: Push the unit against the rail. You should hear the B end clicking into place over the bottom edge of the rail.

To remove the unit from the rail, simply reverse Steps 1 and 2 above. Use your fingers to pull down on the B end, which should release the bracket from the rail.

Network Connection

There are two ways to use the 10/100BaseT Ethernet jack located on the unit's rear panel.

1. For most applications, simply plug one end of your Ethernet cable into the 10/100BaseT jack, and the other end into the hub connected to your network. In this case, use a standard *straight-through* Ethernet cable.

2. Use a *crossover* Ethernet cable when connecting the NPort Server Lite directly to your computer's Ethernet port, such as when configuring drivers and software. A crossover Ethernet cable is included with the NPort Server Lite.

Power Connection

Instructions for connecting the power adaptor are as follows:

1. Plug the adaptor's DC plug into the NPort Server Lite's "DC-IN" jack.
2. Plug the adaptor into an electrical outlet.

Note that there is no on/off switch. The NPort Server Lite automatically turns on when plugged into the outlet.

When working properly, the LCD screen's back light will glow for a few seconds and the green PWR LED will also light up, indicating that the NPort Server Lite is receiving power. The LCD screen should look similar to the figure shown in Chapter 1.

Serial Connection

The NPort Server Lite has one, two, or four serial ports, depending on the model purchased. There are two connection options which depend on your serial device and interface:

- For RS-232 ports, you may use a DB9-to-DB9 cable to connect your serial device to the NPort Server Lite. Simply plug one end of the cable into one of the ports on the front panel of the server, and plug the other end into your serial device's serial port.
- For RS-422 or RS-485 ports, or to build custom cables, please refer to Appendix A for the NPort Server Lite's DB9 pinouts.

3
Using the LCD Control Panel

In this chapter, we explain how to use the NPort Server Lite's LCD control panel.

Basic Operation

If the unit is working properly, the LCD screen will display a yellow color for a few seconds, after which it turns green. The green PWR LED will also light up, indicating that the server is receiving power. The display will appear like the example below:

N	P	6	1	4	0	5		S	N	:	6	1	4	0	5
1	9	2	.	1	6	8	.	1	2	7	.	2	5	4	

In the above example,

- NP61405   is the server's name
- 61405   is the server's serial number
- 192.168.127.254   is the server's IP address

The four buttons on the control panel are used to display or change the settings. The first line indicates the current menu, and second line indicates the current option. The buttons function as follows:

Button	Name	Action
MENU	menu	activates the main menu, or returns to the previous menu
△	up cursor	scrolls to the previous option in the menu
▽	down cursor	scrolls to the next option in the menu
SEL	select	selects the displayed option

Detailed Menu Options

LCD control panel functions are organized into a hierarchy of menus, with a total of three menu levels. Please refer to Fig. 3-1 for the full menu tree.

At the highest level, the MENU button toggles between the *default* screen, and *main menu* screen:

N	P	6	1	4	0	5		S	N	:	6	1	4	0	5
1	9	2	.	1	6	8	.	1	2	7	.	2	5	4	H

(MENU)

M	A	I	N		M	E	N	U							
S	E	R	V	E	R		S	E	T	T	I	N	G		↓

- Use the SEL button to advance one level (i.e., left to right in the menu tree)
- Use the MENU button to go back one level (i.e., right to left in the menu tree)
- Use the cursor keys, △ and ▽, to scroll between the various options within a level (i.e., up and down on the tree graph).

  When you press the SEL button to select the option displayed on the second line of the LCD screen, it will move to the top line of the LCD screen as the current menu.
- Note that Fig. 3-1 shows a C or D for all Level 3 menus:
  - C = configurable (user may change the settings)

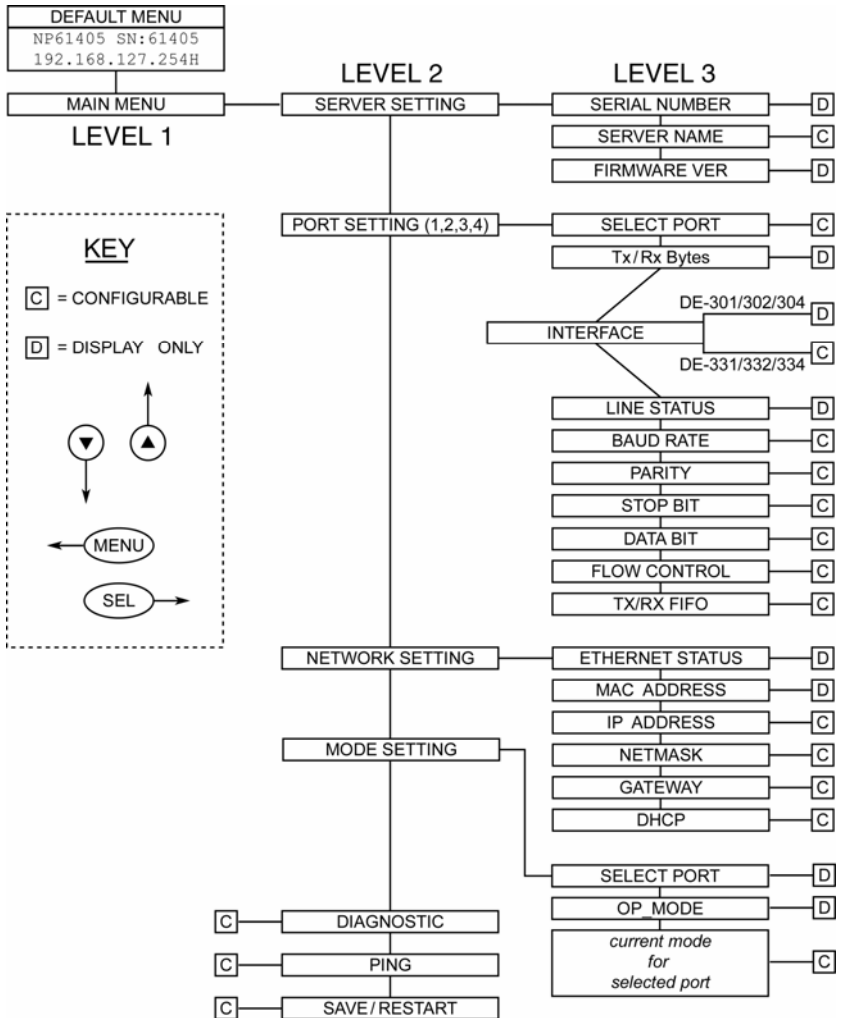 - D = display only (user may not change settings))

Figure 3-1: LCD Menu Tree

You will encounter two types of configurable fields:

The first type involves entering numbers, such as IP addresses, netmasks, etc. For these fields, each digit is modified one at a time. The up button ($\triangle$) and down button ($\triangledown$) are used to modify the current digit, and the SEL button is used to move to the next digit. When you get to the last digit, press SEL to enter the number into the unit's memory.

The second type of field involves selecting from a set of options. For these fields, changes are made the same way that a menu option is chosen—by using the up button ($\triangle$) and down button ($\triangledown$) to scroll through the available options.

Consider the PARITY attribute under PORT SETTING as an example. Follow the menu tree to arrive at the PARITY menu. The first option, None, is displayed, along with a down arrow at the right. The down arrow indicates that you may press the down button to see additional options..

P	A	R	I	T	Y										
N	o	n	e												↓

Press the down button once to see EVEN as the second option.

P	A	R	I	T	Y										↑
E	v	e	n												↓

Press the down button again to see ODD as the third option.

P	A	R	I	T	Y										↑
O	d	d													↓

Press the down button again to see MARK as the fourth option.

P	A	R	I	T	Y										↑
M	a	r	k												↓

Press the down button yet again to see the last option, SPACE.

P	A	R	I	T	Y										↑
S	p	a	c	e											

To select an option, press the select button when desired option is displayed.

NOTE: The configuration must be saved and the NPort Server Lite restarted in order for any changes to take effect. Remember to navigate to the SAVE/RESTART menu after you are finished making configuration changes.

4
Troubleshooting

This chapter explains how to solve problems that you may encounter while using the NPort Server Lite. If you still have problems after reading this chapter, contact your dealer or e-mail Moxa for assistance. You may also use the "Problem Report Form" at the end of this manual to notify your dealer that you require prompt technical support.

The following topics are covered.

- Installation and Configuration Troubleshooting
- Programming Problems

Installation and Configuration Troubleshooting

▶ *Why am I unable to change the NPort Server Lite's IP address and other properties?*

This problem occurs when the server is password-protected. If you enter the wrong password while running Configurator in the NPort Management Suite, the program will not allow you to change the unit's IP address and other properties. Only the administrator (i.e., anyone who knows the password) has the right to modify the server's configuration.

Keep in mind that even when multiple hosts have access to the unit, you may still protect access to the unit's administrative functions by setting up a password.

If you need to change the unit's configuration but do not know the password, you will have to ask the administrator for help. If you **are** the administrator but have forgotten the password, you can erase the current password by holding the RESET button down for three seconds.

▶ *How do I allow multiple hosts to access the NPort Server Lite?*

By default, the NPort Server Lite allows access from multiple hosts. This can be controlled using Configurator in the NPort Management Suite.

1. In the Configurator utility, locate the NPort Server Lite on the network and double-click it to view the server's settings.
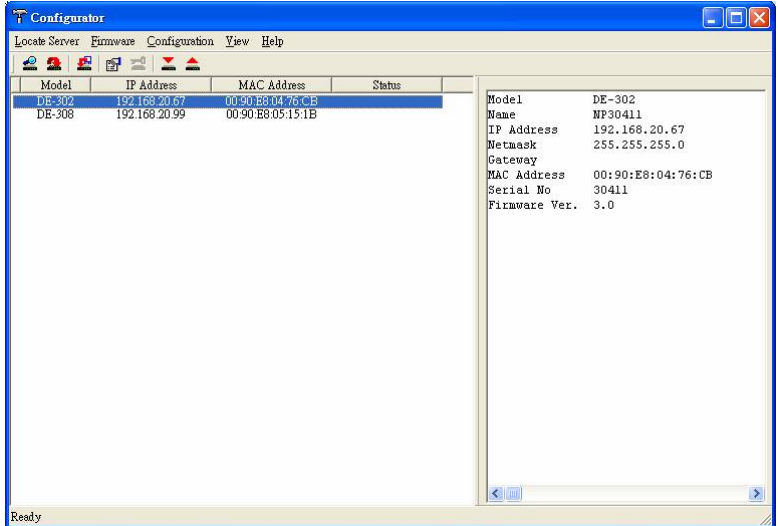
2. The Access Control tab is where you can restrict or enable access to the NPort Server Lite. To allow access to all hosts, click "Remove All". To allow access to only specific IP addresses, click "Add IP" to add authorized IP addresses.
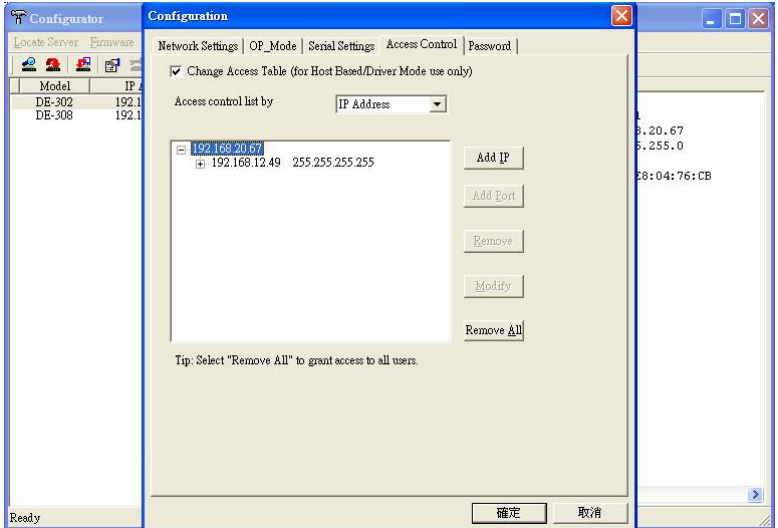
▶ *Why does Real COM Installer show a question mark (?) above the server icon? This makes it impossible to view the server properties.*
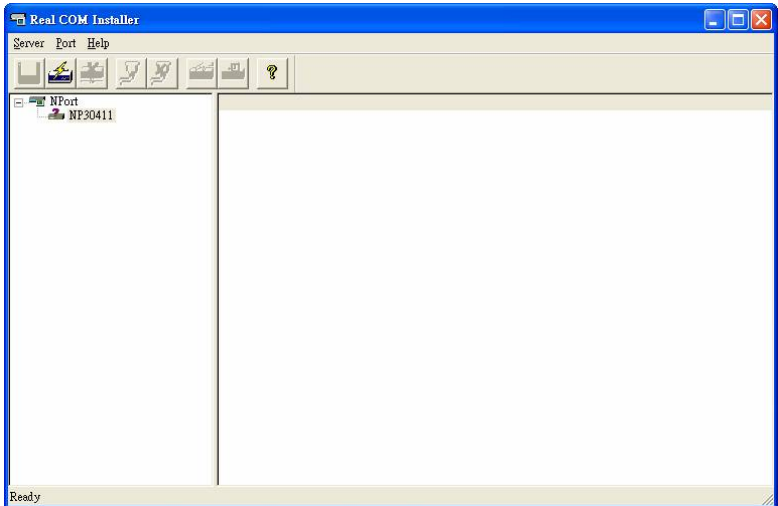
The question mark means that your host cannot find the NPort Server Lite. Try the following procedure to resolve this problem:

If the host and the NPort Server Lite are in the same location:

1. Verify that the NPort Server Lite's power adaptor is plugged in and that the unit is receiving power.

2. Verify that the NPort Server Lite's network cable is plugged in properly.

3. Verify that your computer is properly connected to the network.

4. Double-click the server icon with the question mark. This will cause Real COM Installer to reconnect with the NPort Server Lite.

If the NPort Server Lite is at a remote site:

1. Make sure the network connection to the remote site is okay. If no route can be established to the remote device server and you are connecting through the Internet, you may need to wait until the route is reestablished.

2. If the route is okay, try using the ping command by typing

    ```
    ping [server-IP-address]
    ```

    from your Windows host, where [server-IP-address] is the NPort Server Lite's IP address. If the unit cannot be pinged, you will need to ask someone at the remote site to verify that the power is on and that the connection is okay. When power and network connection have been verified, double-click the icon with the question mark. This will cause Real COM Installer to reconnect with the NPort Server Lite.

If the problem is still not resolved, please contact Moxa technical support for further assistance.

Programming Problems

▶ *Why are the Win32 COMM API functions returning fail codes?*
Why are the PComm Pro library functions returning the fail code
"SIO_WIN32 FAIL"?

The fail code for COMM API functions has a different meaning from the
fail code for standard COM drivers. You may receive the fail code when the
network connected to the NPort Server Lite is unreachable, or if the NPort
Server Lite is offline. If the network connection is through the Internet, the
network could be unreachable during heavy Internet traffic. This does not
mean that the NPort Server Lite has failed. To recover from this type of
error, you can modify your program so that the port is automatically closed
and then re-opened.

Try the following steps to resolve the issue:

1. Re-open the port if the fail code is returned during the open (i.e.,
   sio_open) session.

2. If the fail code returns while writing data, reading data, changing
   settings, etc., close the file handler and then try to reopen the port.

3. If the device server is off-line, turn it on and plug it into the network.

4. Verify that the route to NPort Server Lite is reachable by typing

   ```
   Ping [NPort-Server-Lite-IP-address]
   ```

   If a route to the NPort Server Lite cannot be established, check your
   host's routing table and the NPort Server Lite's routing table.

A
Cable Pinouts

DB9 Male Port Pinouts
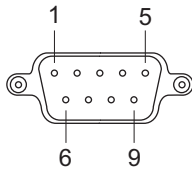
PIN	RS-232	RS-422	2-wire RS-485
1	DCD	TxD-(A)	Data-(A)
2	RxD	TxD+(B)	Data+(B)
3	TxD	RxD+(B)	---
4	DTR	RxD-(A)	---
5	GND	GND	GND
6	DSR	RTS-(A)	---
7	RTS	RTS+(B)	---
8	CTS	CTS+(B)	---
9	---	CTS-(A)	---

RS-232 Wiring

Male DB9	Female DB9	Male DB25	Female DB25

NPort Lite   **DTE Device**
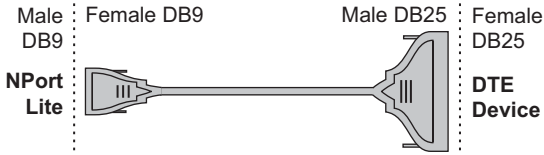
9 pins	**Cable Wiring**	25 pins

DCD	1	←	8	DCD
RxD	2	←	2	TxD
TxD	3	→	3	RxD
DTR	4	→	6	DSR
GND	5	—	7	GND
DSR	6	←	20	DTR
RTS	7	→	5	CTS
CTS	8	←	4	RTS

Male DB9	Female DB9	Male DB9	Female DB9

NPort Lite   **DCE Device**

9 pins	**Cable Wiring**	9 pins

DCD	1	←	1	DCD
RxD	2	←	2	TxD
TxD	3	→	3	RxD
DTR	4	→	4	DSR
GND	5	—	5	GND
DSR	6	←	6	DTR
RTS	7	→	7	CTS
CTS	8	←	8	RTS

RS-422 Wiring

Male DB9 : Female DB9

NPort Lite : RS-422 Device

9 pins : **Cable Wiring**

TxD-(A)	1 ⟶	RxD-(A)
TxD+(B)	2 ⟶	RxD+(B)
RxD+(B)	3 ⟵	TxD+(B)
RxD-(A)	4 ⟵	TxD-(A)
GND	5 ———	GND
RTS-(A)	6 ⟶	CTS-(A)
RTS+(B)	7 ⟶	CTS+(B)
CTS+(B)	8 ⟵	RTS+(B)
CTS-(A)	9 ⟵	RTS-(A)

2-wire RS-485 Wiring

Male DB9 : Female DB9

NPort Lite : 2-wire RS-485 Device

Active Pins : **Cable Wiring**

Data+(B)	1 ⟵⟶	Data+(B)
Data-(A)	2 ⟵⟶	Data-(A)
GND	5 ———	GND
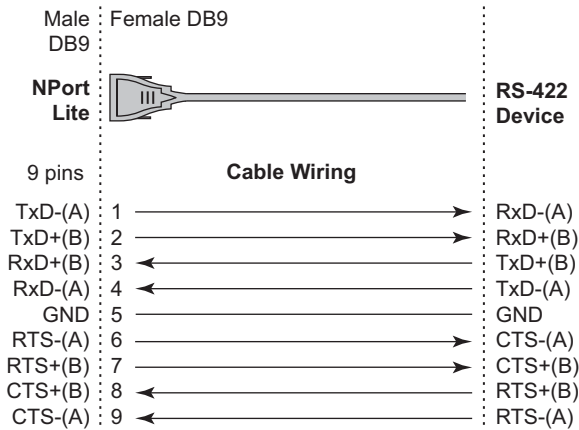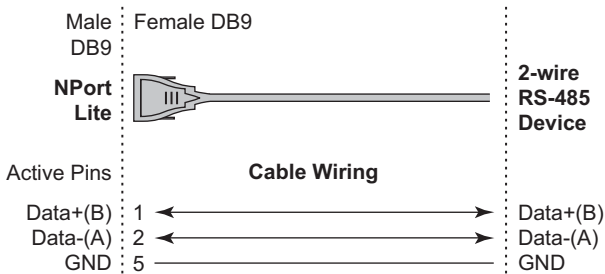
RS-232 Loopback Tester

Pin	Signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS

RS-422 Loopback Tester

Pin	Signal
1	TxD-(A)
2	TxD+(B)
3	RxD+(B)
4	RxD-(A)
5	GND
6	RTS-(A)
7	RTS+(B)
8	CTS+(B)
9	CTS-(A)

B

Declaration of Conformity

Manufacturer's Name: Moxa Technologies Co., Ltd.

Manufacturer's Address: Fl.4, No.135, Lane 235, Pao-Chiao Rd.,
                              Shing Tien City, Taipei, Taiwan, R.O.C.

declares that the product:

Product Name: NPort Server Lite

Model Numbers: DE-301, DE-302,DE-304,
                              DE-331, DE-332, DE-334

conforms to the following standards:

EMC: EN55022:1994 class A
              EN61000-3-2:1995 class A
              EN61000-3-3:1995
              EN55082-1:1997
              EN61000-4-2:1995   Contact Discharge 4kV
                                            Air Discharge 8kV

              EN61000-4-3:1995
              EN61000-4-4:1995   AC/DC Power supply 1kV
                                            Data/Signal lines 5kV
              EN61000-4-5:1995   AC/DC Line to Line 1kV
                                            AC/DC Line to Earth 2kV
              EN61000-4-6:1995
              EN61000-4-8:1993   3A/m at 50Hz
              EN61000-4-11:1994

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Service Information

MOXA Internet Services

Customer satisfaction is our top priority. To ensure that customers receive the full benefit of our products, MOXA Internet Services has been set up to provide technical support, driver updates, product information, and user's manual updates.

The following services are provided:

Technical Support E-mail Address
support@moxa.com

Website for Product Information
http://www.moxa.com

Problem Report Form

NPort Server Lite

Customer name:	
Company:	
Tel:	Fax:
E-mail:	Date:

1. **Model**:
   - ☐ DE-301 (1 RS-232 port)   ☐ DE-331 (1 RS-422/485 port)
   - ☐ DE-302 (2 RS-232 ports)   ☐ DE-332 (2 RS-422/485 ports)
   - ☐ DE-304 (4 RS-232 ports)   ☐ DE-334 (4 RS-422/485 ports)
2. **Interface**:   ☐ RS-232 ☐ RS-422 ☐ RS-485 (ADDC) ☐ RS-485 (by RTS)
3. **Operation Mode**:
   - ☐ Host Based Mode   ☐ TCP Server   ☐ TCP Client
   - ☐ UDP Server/Client   ☐ Pair Connection (DE-301/331)
4. **Serial Number**: _____
5. **NPort Lite Firmware Version**: _____
6. **NPort Lite Management Suite Version**: _____
7. **PC Host**:   Make _____   Model _____
8. **CPU**:   Speed _____ MHz   Make _____   Model ____
9. **Ethernet Card**:   ☐ ISA Card Make: _____
   - ☐ PCI Card Make: _____
10. **Problem Description**: Please describe the symptoms as clearly as possible, including any error messages you see, since we may need to follow your description to reproduce the symptoms.

   _____

   _____

   _____

   _____

   _____

Product Return Procedure

For product repair, exchange, or refund, the customer must:

- Provide evidence of original purchase.
- Obtain a Product Return Agreement (PRA) from the sales representative or dealer.
- Fill out the Problem Report Form (PRF). Include as much detail as possible to help minimize repair time.
- Carefully pack the product in an anti-static package, and send it, pre-paid, to the dealer. The PRA should be visible on the outside of the package, and include a description of the problem, along with the return address and telephone number of a technical contact.