NPort 4511

1-Port RS-232/422/485 Programmable Communication Gateway

Features

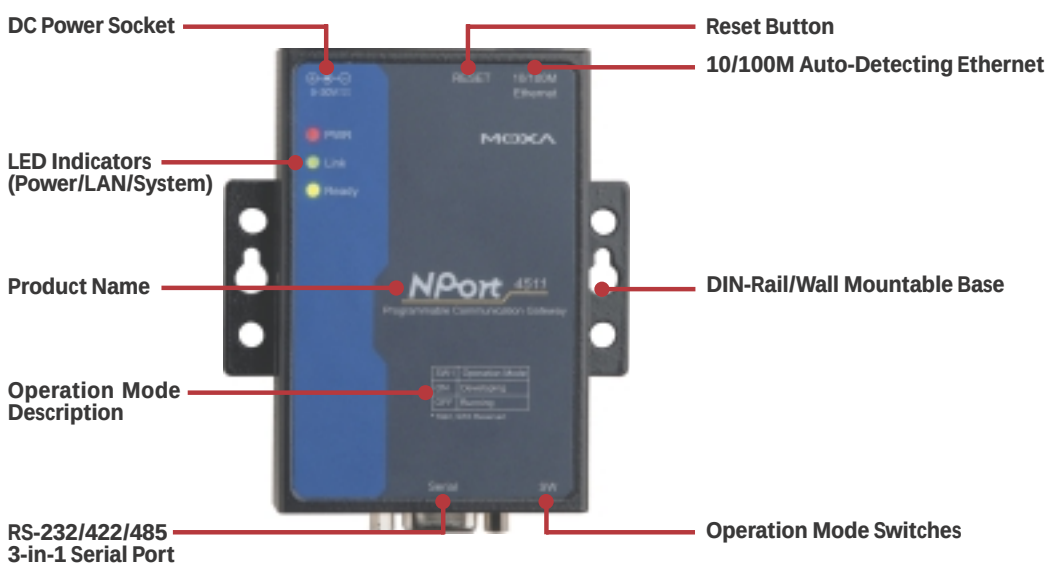
- *NPort 4511's programmable nature makes it suitable for all industrial automation applications*
- *Real-time I/O Control for replacing front-end PCs*
- *Reliable system kernel suitable for secure and long-running SCADA-type applications*
- *High speed RS-232/422/485 and Ethernet interfaces for serial device networking*
- *Customizable programming for IA communication protocol conversion*
- *Can be controlled and managed from a remote location*

Overview

NPort 4511 is a professional Programmable Communication Gateway that makes your RS-232/422/485 devices network-ready, and its programmable nature makes it a value-added developing platform suitable for real-time I/O control and protocol conversion applications. NPort 4511 is a flexible, reliable, cost-effective, and customizable solution that gives System Integrators greater design flexibility.

Target Markets

- Industrial Automation
- Factory Automation
- Building Automation
- Transportation
- Security
- SCADA Systems
- Research Institutes
- Medical Automation
- Military

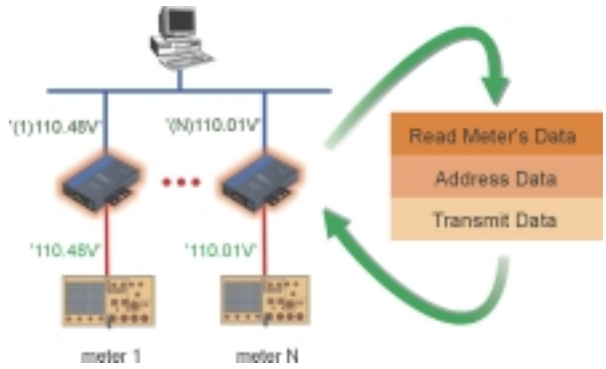


Typical Applications

Front-End Data Processing

Since NPort 4511 is programmable, data processing subroutines can be easily ported to NPort 4511 from a host to increase system performance, and to simplify host programming. Use NPort 4511 for Front-End Processing tasks such as:

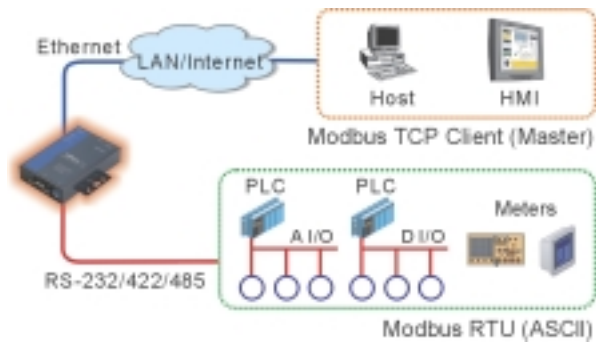
- Serial device addressing
- Data trimming
- Data tagging
- Data encryption
- Character case conversion



Protocol Conversion Communication

NPort 4511 not only makes your RS-232/422/485 devices network-ready, but also provides protocol conversion capability. This makes upgrading legacy serial devices to the network level quicker and easier, and helps bring your device network up-to-date with current network communication trends, such as:

- PLC communication (Modbus, DF1, etc.)
- Proprietary Protocol Conversion (Power, Military, etc.)



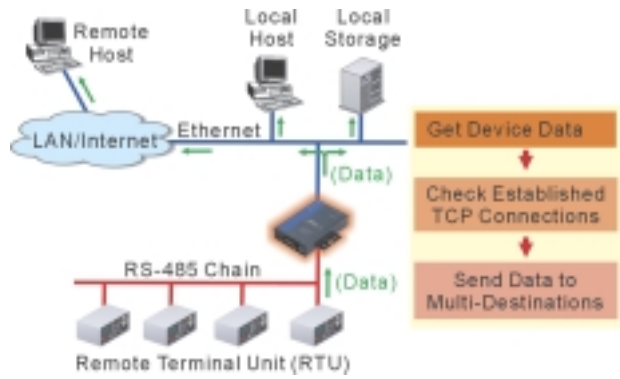
Programmable I/O Controller

Front-End Control and Real-Time Processing are the application models used most frequently in the IA (Industrial Automation) arena. Due to its 186 CPU and Moxa OS, NPort 4511 is suitable for most applications of this type, allowing you to replace your high-cost, low-reliability front-end PCs, and enact real-time monitoring and reporting applications.

NPort 4511, 1-Port RS-232/422/485 Programmable Communication Gateway

Multicasting/Multi-Destination Communication

This type of application involves transmitting data simultaneously from a serial device to multiple networked hosts. Since more than one host can access or control an NPort 4511 via an Ethernet LAN or the Internet at the same time, this makes it easy to implement data backup and system redundancy. Increase your system's reliability by using NPort 4511 to do what ordinary device servers can't do.

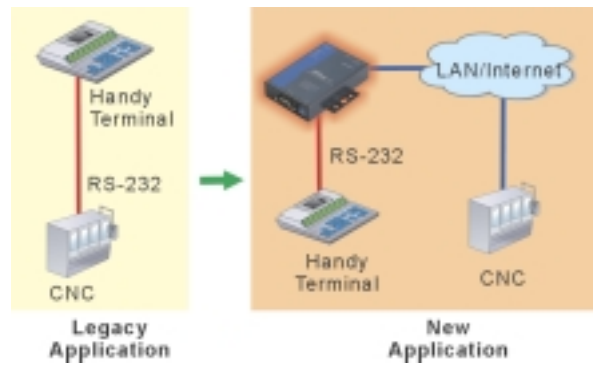


Data Buffering

This function is designed for systems that do not transmit data continuously, but require high reliability. For example, security systems transmit data intermittently and use a random connection method to conserve resources. This type of system usually takes more time to establish or recover an Ethernet connection, and NPort 4511's data buffering capability keeps data safe while waiting for a connection to be established, ensuring communication reliability and topnotch network performance.

Peer-to-Peer Communication

Should you add a high-cost data forwarding PC for upgrading device-to-device communication from serial to Ethernet, or use an NPort 4511 instead? Take advantage of NPort 4511's programmability. Reduce system cost and increase system reliability by changing from legacy serial to Ethernet communication.



Software Intellectual Property Protection (IPP)

System integrators' valuable knowledge often helps customers solve all kinds of problems. NPort 4511 provides built-in software protection that can protect your intellectual property from unauthorized copying. NPort 4511's SDK allows you to set up a secret key on the hardware and in the User Application. When both keys match, the User Application can be downloaded into the coded NPort 4511 hardware.

License Control for Your Projects

Once the software design is finished, you can make sure that you are the sole supplier of the solution. Customers must acquire the product from you. Unauthorized copying and license control is no longer a problem.

NPort 4511 System Block Diagram

<table>
<tr><td>Application</td><td colspan="5">User Application</td></tr>
<tr><td>SDK</td><td colspan="5">Turbo C and Moxa SDK API</td></tr>
<tr><td>OS</td><td colspan="5">MOXA OS TCP, UDP, IP</td></tr>
<tr><td rowspan="2">Hardware</td><td rowspan="2">CPU</td><td>512 KB DRAM</td><td rowspan="2">Watchdog Timer</td><td rowspan="2">Serial Port</td><td rowspan="2">10/100M Ethernet</td></tr>
<tr><td>512 KB Flash</td></tr>
</table>

*User program space: 64 KB, Data storage: 32 KB

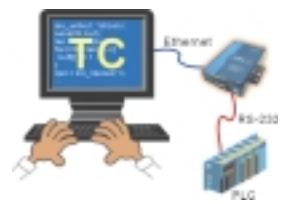
How to Develop an Application on NPort 4511

Step 1: Set up the development environment

(1) Connect NPort 4511 to a host via an Ethernet network.
(2) Connect NPort 4511 to a target device via serial port.
(3) Install SDK utility, library, and Turbo C compiler on the host computer.
(4) Use SDK utility to configure the IP address of the NPort 4511.

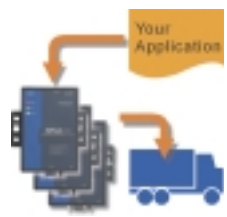
Step 2: Coding & Debugging

(1) Develop User Application with SDK's C library within Turbo C.
(2) Compile & link an executable binary file by Turbo C.
(3) Download program and debug by SDK manager.



Step 3: Deployment

(1) Use SDK utility to set up a software key on NPort 4511 and in the User Application for protection.
(2) Download the finished program to NPort 4511.
(3) NPort 4511, with your own program installed, is ready to ship.



Professional Software Development Kit (SDK)

NPort 4511 provides developers with a complete and easy-to-use Software Development Kit (SDK). SDK is divided into 3 major parts:

- **Library:** More than 100 intuitive C funtion calls.
- **Utilities:** Windows interface for complete NPort 4511 configuration and debugging.
- **Examples:** Several comprehensive programming examples–from basic operation to advanced applications–to get your NPort 4511 up and running in no time.

Our detailed manuals and on-line documentation take you step-by-step from program development to debugging.

SDK Library – Easy to Understand, Easy to Use

The SDK Library functions used to operate NPort 4511's hardware are divided by attribute into 5 groups.

- **Serial Port Control**
  Serial port operation, such as data I/O or changing modem signals.
- **Ethernet Control**
  In addition to standard BSD Sockets, Moxa provides an easy-to-use simplified socket library, making both senior and junior developers expert at NPort 4511 Ethernet programming.
- **System Control**
  Helps developers design in-depth system control functions, such as restarting NPort 4511.
- **Flash Access**
  Lets developers easily access the 32 KB flash memory.
- **Debugging Messages**
  Lets developers and users use SDK Debugger to monitor NPort 4511's operation status.

All data processing can be done with standard C libraries, before data is sent out from NPort 4511, so that programmers can use the most familiar programming interface to take care of development tasks.

Serial (SDK)	sio_open	sio_write	sio_getbaud
	sio_close	sio_AbortRead	sio_getflow
	sio_ioctl	sio_AbortWrite	sio_data_status
	sio_baud	sio_GetReadTimeouts	sio_cnt_irq
	sio_flowctrl	sio_SetReadTimeouts	sio_modem_irq
	sio_flush	sio_GetWriteTimeouts	sio_term_irq
	sio_DTR	sio_SetWriteTimeouts	sio_break_irq
	sio_RTS	sio_lstatus	sio_Tx_empty_irq
	sio_lctrl	sio_iqueue	sio_break
	sio_getch	sio_oqueue	sio_break_ex
	sio_read	sio_Tx_hold	sio_ActXon
	sio_linput	sio_getmode	sio_ActXoff
	sio_putch		
Ethernet (SDK)	Moxa Simplified Socket		
	tcp_open	udp_open	tcp_get_remote
	tcp_close	udp_close	tcp_state
	tcp_connect	tcp_send	udp_ofree
	tcp_listen	tcp_recv	udp_iqueue
	tcp_listento	udp_send	net_get_IP
	tcp_connect_nowait	udp_recv	net_get_netmask
	tcp_listen_nowait	tcp_ofree	net_get_gateway
	tcp_listento_nowait	tcp_iqueue	net_get_MAC_addres
	Std. BSD Socket		
	accept	htonl	recvfrm
	bind	htons	select
	closesocket	inet_addr	send
	conect	inet_ntoa	sendto
	gethostbyname	ioctlsocket	setsockopt
	gethostname	listen	shutdown
	getpeername	ntohl	socket
	getsockname	ntohs	
	getsockopt	recv	
System (SDK)	sys_clock_s	sys_enable_watchdog	sys_set_RegisterID
	sys_clock_ms	sys_disable_watchdog	sys_set_SerialType
	sys_sleep_ms	sys_watchdog_status	sys_get_SetialType
	sys_timeouts	sys_restart_system	sys_exit
	sys_get_info	sys_restart_UserAP	
Flash (SDK)	flash_write	flash_erase	hflash_lengt
	flash_read		
Debugging (SDK)	dbg_putch	dbg_block	dbg_put_word_hex
	dub_put_IP	dbg_put_word	dbg_put_doubleword_hex
	dbg_put_string	dbg_put_doubleword	
Data Processing (Std. C)	sprintf	strlen	itoa
	strcat	atoi	ltoa
	strcpy	atil	.....

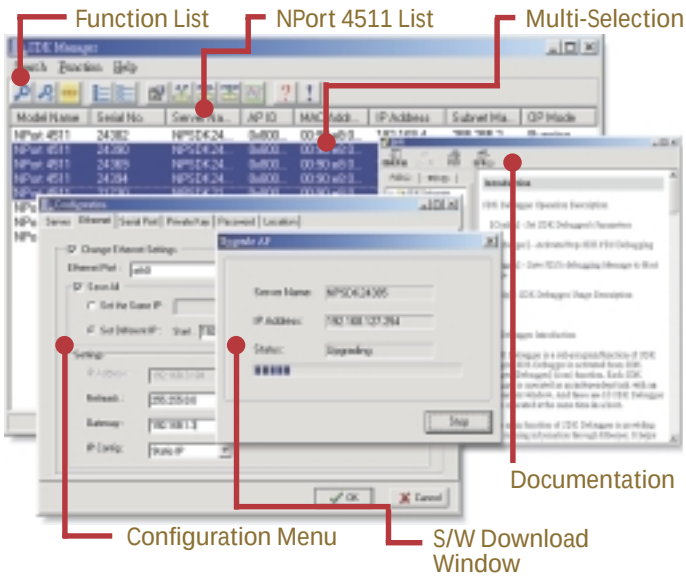
Comprehensive Management Utility

You get a simple but effective way to communicate with or control NPort 4511 during each development stage by using different SDK utilities. The utilities provided are:

- Management Tool: Used for NPort 4511 configuration and software downloading.
- Debugging Tool: Used for debugging and monitoring NPort 4511's operation.
- Packing Tool: Creates a downloadable program and adds NPort 4511 software protection.

Management Tool–SDK Manager

SDK Manager



SDK Manager is important for both NPort 4511 and the developer. Its major functions are:

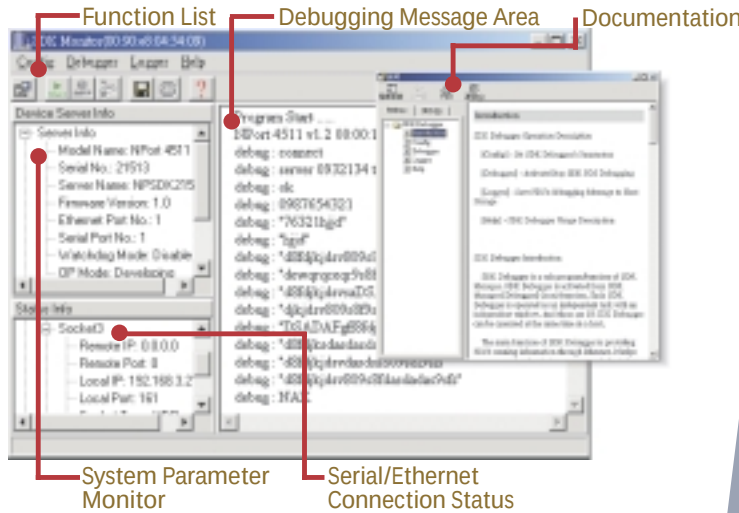
- NPort 4511 configuration: Ethernet, Serial, and System parameters.
- Setting up NPort 4511's Password and Private Key.
- NPort 4511 software download: Application program, kernel, etc.
- Activating debugging utility
- Multi NPort 4511 Management: Simultaneous access of multiple NPort 4511s.

Debugging Tool–SDK Debugger

SDK Debugger is designed for program debugging and end-user monitoring. Its major functions are:

- Display debugging messages.
- Monitor connection status.
- Display system status.
- Store operation status and messages.

SDK Debugger



Specifications

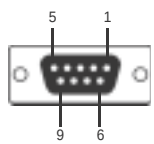
Hardware
CPU: 16-bit, 25 MHz
DRAM: 512 KB
Flash: 512 KB
Watchdog timer: 1
LAN
Ethernet: 10/100 Mbps, RJ45 x1
Protection: Built-in 1.5 KV magnetic isolation
Serial
Interface: RS-232/422/485 software selectable , DB9 Female x1
RS-232 signals: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422 signals: TxD+, TxD-, RxD+, RxD-, RTS+, RTS-, CTS+, CTS-, GND
RS-485 signals: Data+, Data-, GND
Protection: 15 KV ESD for all signals
Serial Communication Parameters
Parity: None, Even, Odd, Space, Mark
Data bits: 5, 6, 7, 8
Start bits: 1, 1.5, 2
Flow control: RTS/CTS, XON/XOFF
Speed: 50 bps to 230.4 Kbps
LED Indicators
Power, Link, Ready
Mechanical Specifications
Aluminum sheet metal (0.8 mm)
Power Requirements
Power input: 9-30 VDC
Power consumption: 300 mA @ 9 VDC (max.)
Environment
Operating Temperature: 0 to 55 °C (32 to 131 °F), 5 to 95% RH
Storage Temperature: -20 to 80 °C (-4 to 185 °F), 5 to 95% RH
Mechanical Specifications

Agency Approvals
EMC: FCC Class B, CE Class B
Safety: CUL, TÜV
Warranty
5-Year Manufacturer's Warranty

Software
Embedded Operating System:
MOXA OS with real-time kernel
Internet Protocols:
TCP, UDP, IP, DHCP, ICMP
Development Environment
Development Platform: Windows95/98/NT/2000/XP
Compiler/Linker: Borland Turbo C 2.01 included with license card (SDK is compatible with Borland Turbo C 2.x, Borland C 3.x)
Development console: Ethernet
Software Download Tool: SDK Manager
Debug Tool: SDK Manager
Library:
Serial port, Simplified Socket, BSD Socket, System, Flash Access, Debugging, STD C libraries.
User Program Space:
Total of 64 KB for code and data.
Data Storage:
32 KB Read/Write on Flash ROM.
Max. TCP Sessions: 10 sessions
Max. Thread: Single task
Intellectual Property Protection: Software key protection for user program
Documentation
Hardware Installation Guide
Programmer's Guide
Programmer's Reference

NPort 4511 Serial Port Pin Assignment

DB9 Female



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

NPort 4511 Dimensions

Ordering Information

NPort 4511-ST

Software CD: NPort 4511 SDK utilities and libraries, Turbo C 2.01

Manuals: NPort 4511 Hardware Installation Guide, SDK Programmer's Guide, SDK API Reference

Accessories: Switching Power Adapter, Ethernet Cross-Over Cable, Serial Extension Cable, Mini Adapter, RS-232 Loopback Tester, Terminal Block Connector, DIN-Rail Mounting Kit

Miscellaneous: Borland License Card, Moxa 5-Year Warranty Booklet

NPort 4511-ST

NPort 4511

NPort 4511 single unit with universal power adapter (100-240 VAC, US plug, Euro plug included)

NPort 4511-B

NPort 4511 Board

Optional Accessories

TB-M9
DB9 Male
DIN-Rail Wiring
Terminal

DB9 Male-to-Male
Mini adapter

RS-232 Loopback
Tester

DK-35A
DIN-Rail
Mounting Kit

Switching Power Adaptor
100-240 VAC, 12 VDC,
400 mA, US plug