

# 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
- 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
- Reliable system kernel suitable for secure and long-running SCADA-type applications



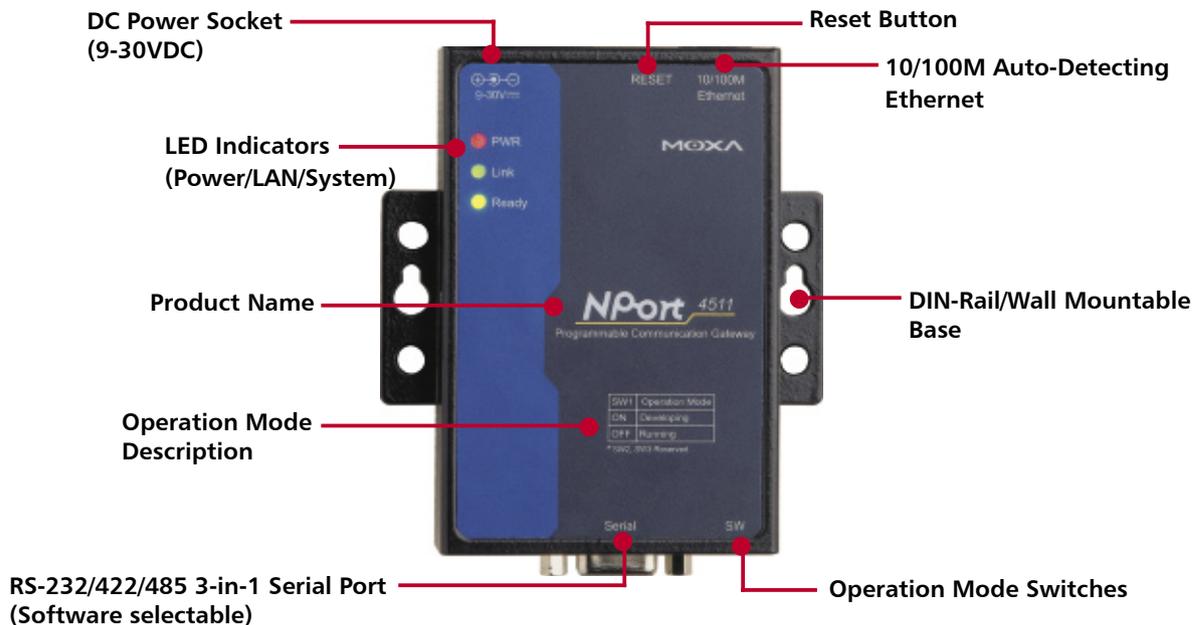
### Overview

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 protocol conversion

applications. NPort 4511 is a flexible, reliable, cost-effective, and customizable solution that gives System Integrators greater design flexibility.

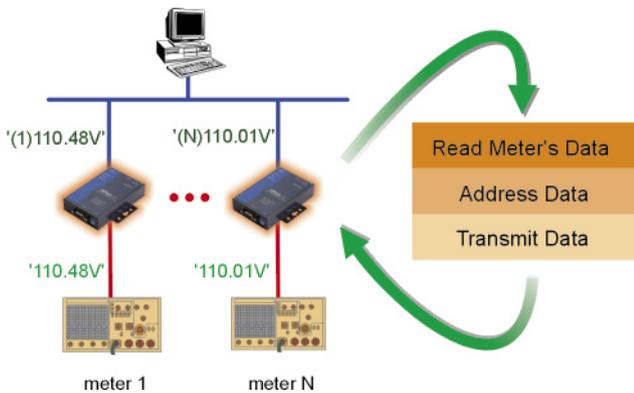
### Target Markets

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



## Typical Applications

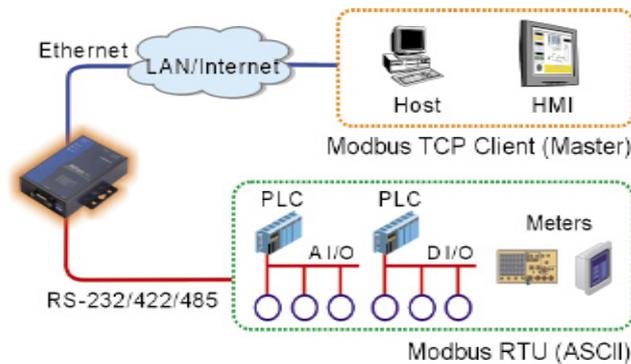
### Front-End Data Processing



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

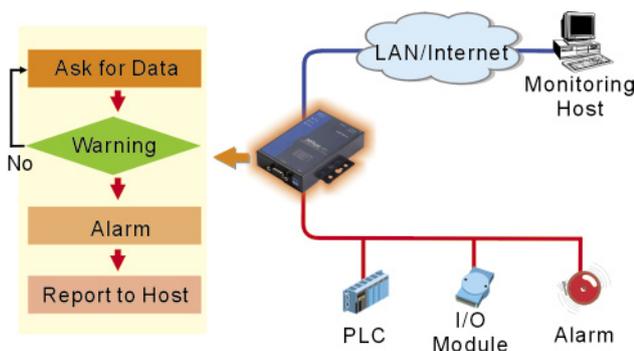
### Protocol Conversion Communication



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

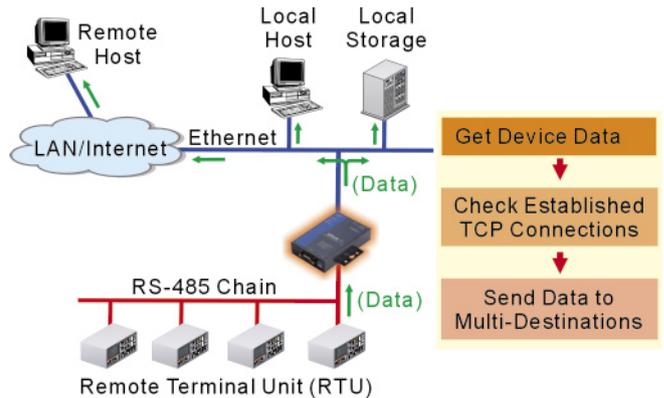


Front-End Control and Real-Time Processing are the application models used most frequently in the IA (Industrial Automation) arena. Due to its 186 CPU and Moxa OS, NPort 4511 is suitable for most applications of this type, allowing you to replace your high-cost, low-reliability front-end PCs, and enact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

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

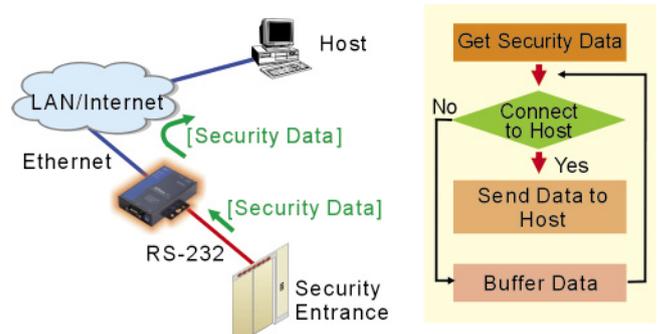
## Multicasting/Multi-Destination Communication

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.



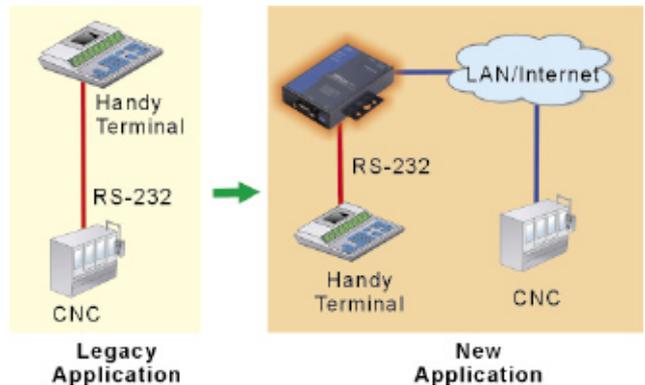
## Data Buffering

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.



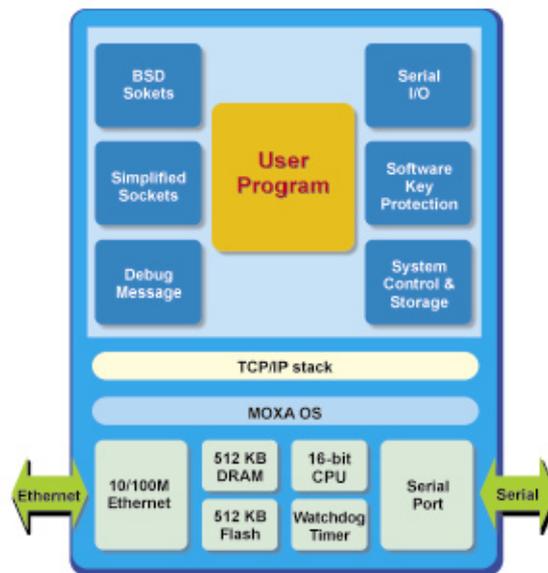
## Software Intellectual Property Protection (IPP)

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, and unauthorized copying and license control is no longer a problem.

## NPort 4511 System Block Diagram



## How to Develop an Application on NPort 4511

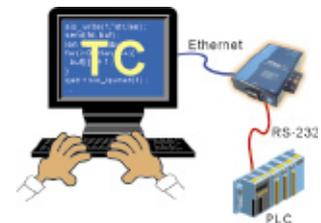
### Step 1: Set up the development environment

- (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 a User Application with Turbo C and SDK's C library.
- (2) Compile & link an executable binary file with Turbo C.
- (3) Download the program and debug with SDK manager.



### Step 3: Deployment

- (1) Use SDK utility to set up a software key on NPort 4511 and in the User Application.
- (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 function 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.

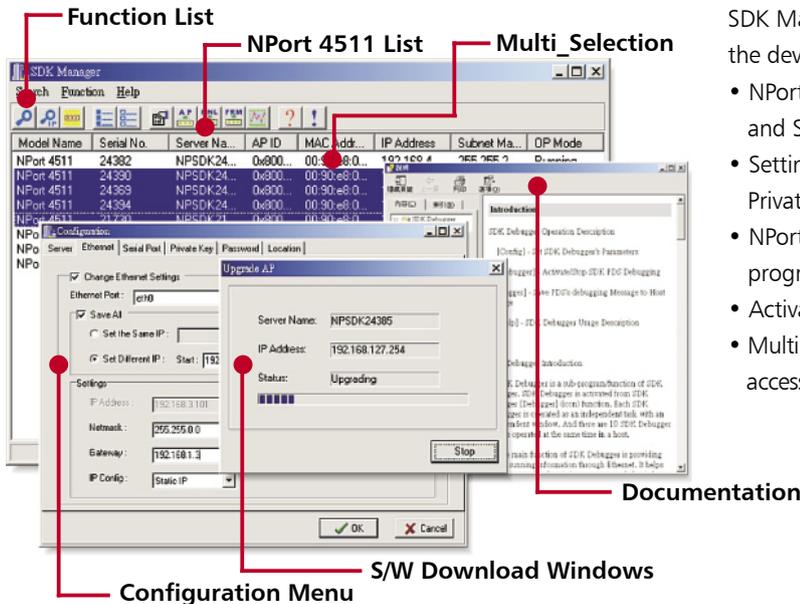
Serial (SDK)	sio_open sio_close sio_ioctl sio_baud sio_flowctrl sio_flush sio_DTR sio_RTS sio_ctrl sio_getch sio_read sio_linput sio_putch	sio_wire sio_AbortRead sio_AbortWrite sio_GetReadTimeouts sio_SetReadTimeouts sio_GetWriteTimeouts sio_SetWriteTimeouts sio_lstatus sio_rstatus sio_oqueue sio_Tx_hold sio_gentmode	sio_getbaud sio_getflow sio_data_status sio_cnt_irq sio_modem_irq sio_term_irq sio_break_irq sio_Tx_empty_irq sio_break sio_breal_ex sio_ActX on sio_ActX off
	Moxa Simplified Socket		
Ethernet (SDK)	tcp_open tcp_close tcp_connect tcp_listen tcp_listento tcp_connect_nowait tcp_listen_nowait tcp_listento_nowait	udp_open udp_close udp_send tcp_recv udp_send udp_recv tcp_ofree tcp_iqueue	tcp_get_remote tcp_state udp_ofree udp_iqueue net_get-IP net_get_netmask net_get_gateway net_get_MAC_address
	Std. BSD Socket		
	accept bind colseocket conect gethostbyname gethostname getpeername getsockname getsockopt	htonl htons inet_addr inet_ntoa ioctlsocket listen ntohl ntohs recv	recvfrm select send sendto setsockopt shutdown socket
System (SDK)	sys_clock_s sys_clock_ms sys_sleep_ms sys_timeouts sys_get_into	sys_enable_watchdog sys_disable_watchdog sys_watchdog_status sys_restart_system sys_restart_UserAP	sys_set_RegisterID sys_set_Serialtype sys_get_SerialType sys_exit
Flash (SDK)	flash_wirte flash_read	flash_erase	Flash_lengt
Debugging (SDK)	dbg_putch dub_put_IP dbg_put_string	dbg_block dbg_put_word dbg_put_doubleword	dbg_put_word_hex dbg_put_doubleword_hex
Data Processing (Std. C)	sprintf strcat strcpy	strlen atoi atil	itoa itoa -----

## 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.

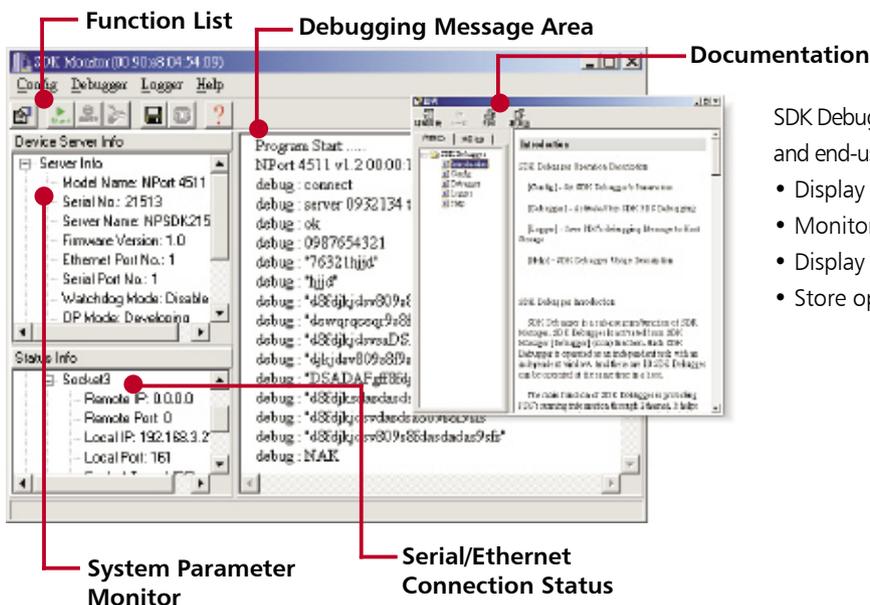
## Management Tool—SDK Manager



SDK Manager 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.

## 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 x 1

**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

### Regulatory 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:** Windows 95/98/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

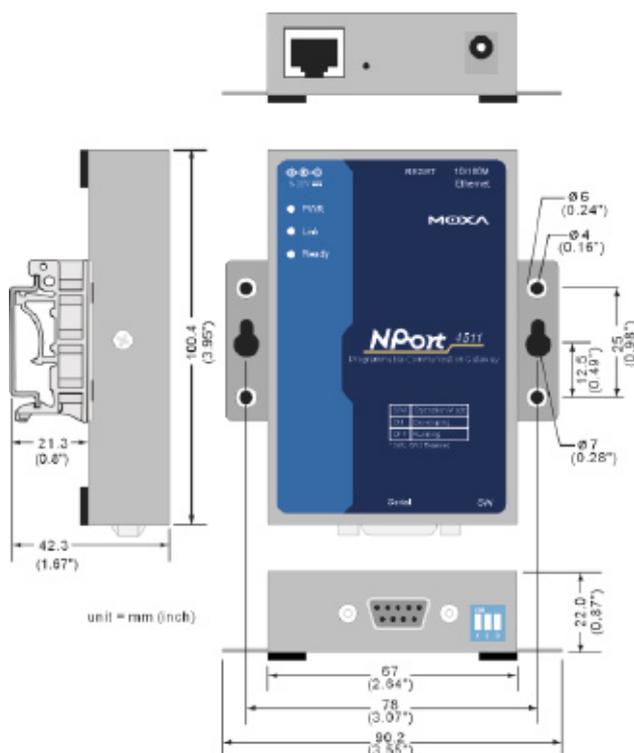
**Max. Thread:** Single task

**Intellectual Property Protection:** Software key protection for user program

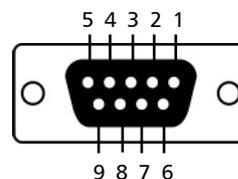
### Documentation

Hardware Installation Guide, Programmer's Guide, Programmer's Reference

## Dimensions



## Pin Assignment



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)	-

## Ordering Information

### NPort 4511-ST

#### NPort 4511 single unit

**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 Adaptor, Ethernet Cross-Over Cable, CBL-F9M9-150, Mini Adaptor, RS-232 Loopback Tester, Wiring Terminal, 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 adaptor (100-240 VAC, US plug, Euro plug included)



### NPort 4511

NPort 4511 Board



## Optional Accessories



TB-M9 DB9 Male  
DIN-Rail Wiring  
Terminal



DB9 Male-to-Male  
Mini adaptor



RS-232 Loopback  
Tester



DK-35A DIN-Rail  
Mounting Kit



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



Ethernet cross-over cable



DB9(M) to DB9(F) RS-232 cable