NPort S9650I Series

8/16-port rugged device server with managed Ethernet switch

Features and Benefits

- Supports up to 4 managed Ethernet switch ports (fiber available with some optional network modules)
- 8/16-port RS-232/422/485 serial interface
- Supports DNP3 and Modbus protocols
- Ethernet redundancy with Turbo Ring/Chain and RSTP/STP supported
- Real COM/TTY drivers for Windows and Linux
- IEC 61850-3, IEEE 1613 (power substations) compliant
- IEEE 1588v2 and IRIG-B time synchronization functions
- Supports IEC 61850 MMS protocol
- Security features based on IEC 62443/NERC CIP
- -40 to 85°C wide operating temperature

Certifications

Introduction

The NPort S9650I Series 8/16-port RS-232/422/485 device servers, which come with a built-in full-function managed Ethernet switch, are designed specifically for the harsh environmental conditions found in electrical substations. With both fiber and wired Ethernet ports supported, the combination of a device server and Ethernet switch gives users the ability to easily install, manage, and maintain the NPort S9650I itself, as well as attached serial devices.

Electromagnetic Compatibility for Harsh Substation Environments

The NPort S9650I Series supports a high level of surge protection to prevent damage from the types of power surges and EMI one finds in electrical substations and industrial automation applications. Combined with a -40 to 85°C operating temperature range and galvanized steel housing, the NPort S9650I is suitable for a wide range of industrial environments.

Another plus is the NPort S9650I's dual power supplies, which provide both redundancy, as well as a wide range of voltage inputs. The WV models accept a 24/48 VDC power input (ranging from 18 to 72 VDC), and the HV models accept a power input of 88 to 300 VDC and 85 to 264 VAC.

Power SCADA With IEC 61850 MMS for Easy Maintenance

The current trend in power SCADA applications is to control and monitor both IT devices (switches, routers, etc.) and IEDs (sensors, actuators, etc.) with the MMS protocol. Contrast this with the more traditional management approach of using SNMP for IT devices and MMS for IEDs. In fact, SIs may even need to manage a variety of legacy devices that use proprietary communications protocols.

The NPort S9650I device servers are the world's first device servers to integrate MMS into an IT-type device designed specifically for power SCADA applications. The NPort S9650I even supports using MMS to monitor serial communications between the S9650I and legacy devices.

Supports Modbus/DNP3 Protocol Gateway

The NPort S9650I Series provides maximum flexibility for integrating industrial Modbus/DNP3 networks of all types and sizes. The NPort S9650I is designed to integrate Modbus TCP, ASCII, and RTU devices in almost any master/slave combination, including simultaneous serial and Ethernet masters.

The NPort S9650I device servers also support protocol conversion between DNP3 serial and DNP3 IP, and all models are ruggedly constructed to ensure reliable operation.

Cybersecurity Features Based on IEC 62443/NERC CIP

The NPort S9650I Series has security features based on IEC 62443/NERC CIP to provide a high level of cybersecurity. Protecting mission-critical networks from cyberattacks is a high priority for industrial automation applications, which can suffer large losses due to extended network downtime.

Supports IEEE 1588v2 and IRIG-B Time Synchronization Functions

The NPort S9650I Series, which has a modular design that supports IEEE 1588v2 and IRIG-B time synchronization, is able to interconnect and synchronize multiple types of intelligent electronic devices (IEDs) that use different communication protocols. The time source is provided via IEEE 1588v2 and converted to IRIG-B for distribution to the IEDs via the serial ports or via a dedicated IRIG-B BNC connector.

Ring Redundancy at the Device Level

Device-level communication networks for industrial automation are very critical since they are used to control and monitor device processes. The reliability of these communications depends on ring redundancy at the device level, which is designed to provide fast network fault detection and reconfiguration to support the most demanding control applications. The NPort S9650I Series integrates a full-function NPort device server with an industrial switch to carry serial and Ethernet devices at the same time. In addition, the NPort S9650I Series can achieve ring redundancy with standard STP/RSTP and Moxa's proprietary Turbo Ring or Turbo Chain 2 redundancy protocols. This all-in-one design can be used to optimize and simplify your device network and enhance reliability.

Specifications

Input/Output Interface

Alarm Contact Channels	Resistive load: 1 A @ 24 VDC

Ethernet Interface

10/100BaseT(X) Ports (RJ45 connector)	NPort S9650I-E Series: 4 RJ45 ports NPort S9650I-MSC Series: 2 RJ45 ports NPort S9650I-SSC Series: 2 RJ45 ports NPort S9650I-IRIG Series: 2 RJ45 ports
100BaseFX Ports (multi-mode SC connector)	NPort S9650I-MSC Series: 2 multi-mode SC ports
100BaseFX Ports (single-mode SC connector)	NPort S9650I-SSC Series: 2 single-mode SC ports
Magnetic Isolation Protection	1.5 kV (built-in)

Optical Fiber

		100BaseFX		
		Multi-Mode		Single-Mode
Fiber Cable Type		OM1	50/125 µm 800 MHz x km	G.652
Typical Distance		4 km	5 km	40 km
Wavelength	Typical (nm)	1300		1310
	TX Range (nm)	1260 to 1360		1280 to 1340
	RX Range (nm)	1100 to 1600		1100 to 1600
Optical Power	TX Range (dBm)	-10 to -20		0 to -5
	RX Range (dBm)	-3 to -32		-3 to -34
	Link Budget (dB)	12		29
	Dispersion Penalty (dB)	3		1

Note: When connecting a single-mode fiber transceiver, we recommend using an attenuator to prevent damage caused by excessive optical power.
Note: Compute the "typical distance" of a specific fiber transceiver as follows: Link budget (dB) > dispersion penalty (dB) + total link loss (dB).

Standards	IEEE 802.1D-2004 for Spanning Tree Protocol IEEE 802.1p for Class of Service IEEE 802.1Q for VLAN Tagging IEEE 802.1w for Rapid Spanning Tree Protocol IEEE 802.1X for authentication IEEE 802.3 for 10BaseT IEEE 802.3ad for Port Trunk with LACP IEEE 802.3u for 100BaseT(X) and 100BaseFX

Switch Properties

IGMP Groups	256
Max. No. of VLANs	64
Priority Queues	4
VLAN ID Range	VID 1 to 4094

Ethernet Software Features

Configuration Options	Command Line Interface (CLI) through Serial/Telnet/SSH, Web Console (HTTP/HTTPS), Windows Utility
Management	DHCP Client, DHCP Option 82, HTTP, IEC 61850 MMS, IPv4, LLDP, Port Mirror, RARP, RMON, SMTP, SNMPv1/v2c/v3, Syslog, Telnet, TFTP, Web Console
Filter	GMRP, GVRP, IGMP v1/v2
Windows Real COM Drivers	Windows 95/98/ME/NT/2000, Windows XP/2003/Vista/2008/7/8/8.1/10 (x86/x64), Windows 2008 R2/2012/2012 R2 (x64), Windows Embedded CE 5.0/6.0, Windows XP Embedded
Linux Real TTY Drivers	Kernel versions: 2.4.x, 2.6.x, 3.x, 4.x, and 5.x
Fixed TTY Drivers	SCO UNIX, SCO OpenServer, UnixWare 7, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x, HP-UX 11i, Mac OS X
Android API	Android 3.1.x and later
Industrial Protocols	Modbus TCP Server (Slave), DNP3 TCP Outstation
Time Management	NTP Server/Client, SNTP, IEEE 1588v2 PTP (hardware-based), IRIG-B
MIB	Bridge MIB, Device Settings MIB, Ethernet-like MIB, MIB-II, P-BRIDGE MIB, Q-BRIDGE MIB, RFC1213, RFC1317, RMON MIB Groups 1, 2, 3, 9, RSTP MIB
Redundancy Protocols	RSTP, Turbo Chain, Turbo Ring v1, Turbo Ring v2
Security	HTTPS/SSL, Local Account Accessibility, TACACS+, RADIUS, SSH

IRIG-B Interface

PWM/PPS Output, BNC Connector	NPort S9650I-IRIG Series: 1
PWM/PPS Output, DB9 Female	NPort S9650I-8B-2HV-IRIG-T: 8 NPort S9650I-16B-2HV-IRIG-T: 16
PWM Input, BNC Connector	NPort S9650I-IRIG Series: 1

Serial Interface

Connector	NPort S9650I-8/-16 Series: DB9 male NPort S9650I-8B/-16B Series: DB9 female NPort S9650I-8F/-16F Series: Multi-mode fiber ST connector
No. of Ports	8 or 16
Serial Standards	RS-232, RS-422, RS-485
Operation Modes	Real COM mode, RFC2217 mode, TCP Client mode, TCP Server mode, UDP mode, Modbus mode, DNP3 mode, DNP3 Raw Socket mode, Disabled
Baudrate	50 bps to 921.6 kbps (supports non-standard baudrates)
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2

Parity	None, Even, Odd, Space, Mark
Flow Control	None, RTS/CTS, XON/XOFF
Isolation	2 kV
Surge	4 kV
RS-485 Data Direction Control	ADDC® (automatic data direction control)
Pull High/Low Resistor for RS-485	1 kilo-ohm, 150 kilo-ohms
Terminator for RS-485	120 ohms
Console Port	RS-232 (TxD, RxD, GND), 10-pin RJ45 (19200, n, 8, 1)

Serial Signals

RS-232	NPort S9650I-IRIG Series: TxD, RxD, RTS, CTS, DTR/+IRIG-B, DSR, DCD, GND NPort S9650I Series: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	NPort S9650I-IRIG Series: TxD+, TxD-, RxD+, RxD-, GND, +IRIG-B NPort S9650I Series: Tx+, Tx-, Rx+, Rx-
RS-485-4w	Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w	NPort S9650I-IRIG Series: Data+, Data-, GND, +IRIG-B NPort S9650I Series: Data+, Data-, GND

DIP Switch Configuration

Ethernet Interface	Turbo Ring, Master, Coupler, Reserved

Modbus TCP

Max. No. of Client Connections	32
Max. No. of Server Connections	16

DNP3 (Transparent)

Max. No. of Master Connections	16
Max. No. of Outstation Connections	32

Reliability

Automatic Reboot Trigger	Built-in WDT
Alert Tools	Built-in buzzer and RTC (real-time clock)

Power Parameters

No. of Power Inputs	2
Reverse Polarity Protection	Supported
Input Current	0.65 A @ 100 VAC, 0.47A @ 100 VDC
Input Voltage	110/220 VAC/VDC (100 to 240 VAC, 100 to 250 VDC)

Physical Characteristics

Housing	Metal
Installation	19-inch rack mounting
Dimensions	457 x 32 x 330 mm (18 x 1.25 x 12.99 in)
Weight	Product only: 5.15 kg (11.35 lb)

Environmental Limits

Operating Temperature	-40 to 85°C (-40 to 185°F)
Storage Temperature (package included)	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)

Standards and Certifications

EMC	EN 61000-6-2/-6-4
EMI	CISPR 32, FCC Part 15B Class A
EMS	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV IEC 61000-4-5 Surge: Power: 4 kV; Signal: 4 kV IEC 61000-4-6 CS: 150 kHz to 80 MHz: 10 V/m; Signal: 10 V/m IEC 61000-4-8 PFMF IEC 61000-4-11 DIPs
Environmental Testing	IEC 60068-2-2 IEC 60068-2-14
Power Substation	IEC 61850-3, IEEE 1613
Safety	EN 61010-2-201, UL 61010-2-201
Shock	IEC 60068-2-27
Vibration	IEC 60068-2-6, IEC 60068-2-64

Declaration

Green Product	RoHS, CRoHS, WEEE

MTBF

Time	NPort S9650I-8-2HV-E-T: 224,670 hrs NPort S9650I-8-2HV-MSC-T: 220,944 hrs NPort S9650I-8-2HV-SSC-T: 220,944 hrs NPort S9650I-8B-2HV-IRIG-T: 213,025 hrs NPort S9650I-8F-2HV-E-T: 311,734 hrs NPort S9650I-8F-2HV-MSC-T: 304,587 hrs NPort S9650I-8F-2HV-SSC-T: 304,587 hrs NPort S9650I-16-2HV-E-T: 158,816 hrs NPort S9650I-16-2HV-MSC-T: 156,949 hrs NPort S9650I-16-2HV-SSC-T: 156,949 hrs NPort S9650I-16B-2HV-IRIG-T: 157,770 hrs NPort S9650I-16F-2HV-E-T: 261,817 hrs NPort S9650I-16F-2HV-MSC-T: 256,761 hrs NPort S9650I-16F-2HV-SSC-T: 256,761 hrs
Standards	Telcordia SR332

Warranty

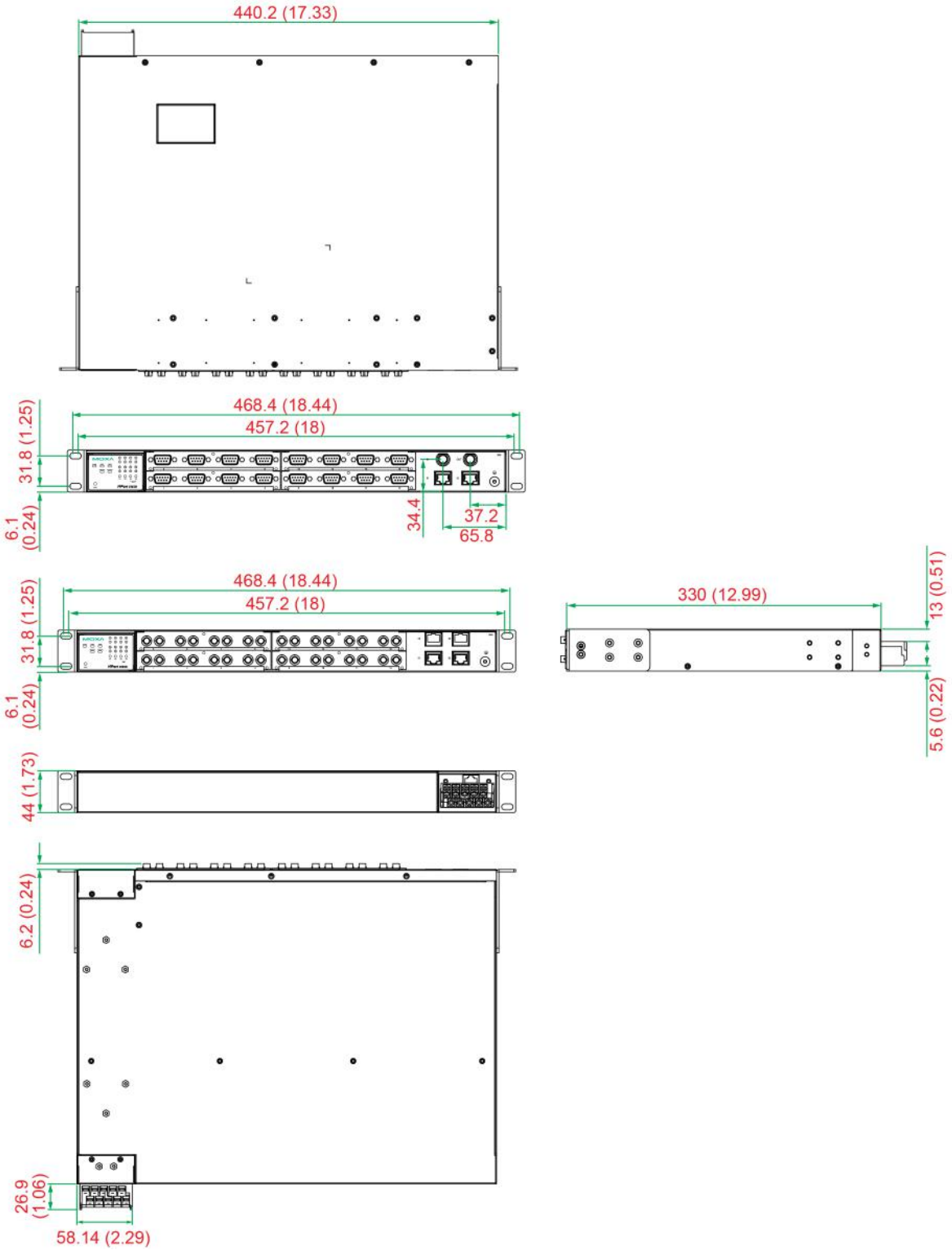
Warranty Period	5 years
Details	See www.moxa.com/warranty

Package Contents

Device	1 x NPort S9650I Series device server
Documentation	1 x quick installation guide 1 x warranty card

Dimensions

Unit: mm (inch)



Ordering Information

Model Name	No. of Serial Ports	Serial Port Connector	IRIG-B Time Sync	No. of Ethernet Ports	Ethernet Port Connector
NPort S9650I-8-2HV-E-T	8	DB9 male	–	4	4 x RJ45
NPort S9650I-8-2HV-MSC-T	8	DB9 male	–	4	2 x RJ45, 2 x multi-mode SC fiber
NPort S9650I-8-2HV-SSC-T	8	DB9 male	–	4	2 x RJ45, 2 x single-mode SC fiber

Model Name	No. of Serial Ports	Serial Port Connector	IRIG-B Time Sync	No. of Ethernet Ports	Ethernet Port Connector
NPort S9650I-8B-2HV-IRIG-T	8	DB9 female	✓	2	2 x RJ45
NPort S9650I-8F-2HV-E-T	8	Multi-mode ST fiber	–	4	4 x RJ45
NPort S9650I-8F-2HV-MSC-T	8	Multi-mode ST fiber	–	4	2 x RJ45, 2 x multi-mode SC fiber
NPort S9650I-8F-2HV-SSC-T	8	Multi-mode ST fiber	–	4	2 x RJ45, 2 x single-mode SC fiber
NPort S9650I-16-2HV-E-T	16	DB9 male	–	4	4 x RJ45
NPort S9650I-16-2HV-MSC-T	16	DB9 male	–	4	2 x RJ45, 2 x multi-mode SC fiber
NPort S9650I-16-2HV-SSC-T	16	DB9 male	–	4	2 x RJ45, 2 x single-mode SC fiber
NPort S9650I-16B-2HV-IRIG-T	16	DB9 female	✓	2	2 x RJ45
NPort S9650I-16F-2HV-E-T	16	Multi-mode ST fiber	–	4	4 x RJ45
NPort S9650I-16F-2HV-MSC-T	16	Multi-mode ST fiber	–	4	2 x RJ45, 2 x multi-mode SC fiber
NPort S9650I-16F-2HV-SSC-T	16	Multi-mode ST fiber	–	4	2 x RJ45, 2 x single-mode SC fiber

Accessories (sold separately)

Cables

CBL-F9M9-150	DB9 female to DB9 male serial cable, 1.5 m
CBL-F9M9-20	DB9 female to DB9 male serial cable, 20 cm
CBL-RJ458P-100	8-pin RJ45 CAT5 Ethernet cable, 1 m
CN20070	10-pin RJ45 to DB9 female serial cable

Connectors

ADP-RJ458P-DB9F	DB9 female to RJ45 connector
Mini DB9F-to-TB	DB9 female to terminal block connector

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