

NDS/5000 and NDS/6000

Hardware

Manual



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Revision B

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Hardware

Manual

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Revision History

Date	Revision	Description
7/15/03	A	Initial release
1/31/08	B	Added 8 and 16 port versions

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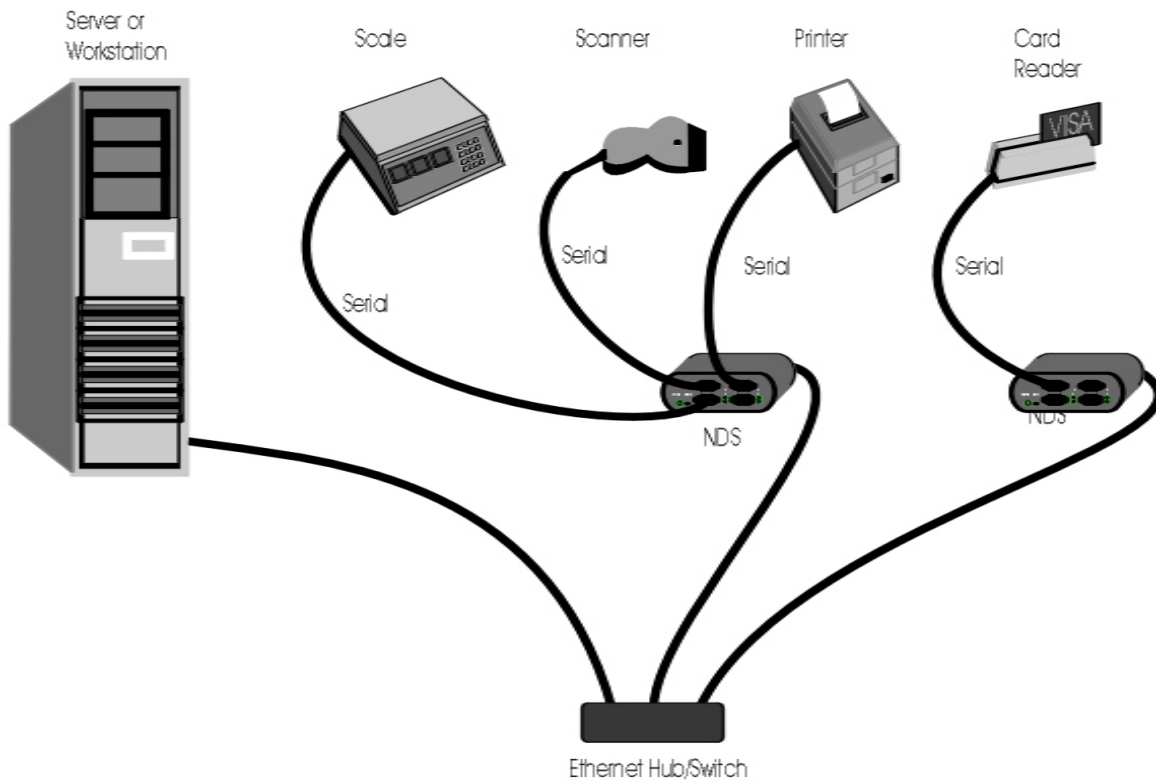
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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Chapter 1: Overview

The NDS port server provides communication between peripheral devices and computers connected to a network. When the NDS is connected to your LAN and to one or more peripherals, it manages network traffic, routing it to the correct device. For example, the network diagram below shows how the NDS might be used to allow one or more PCs to share expensive peripherals or to access peripherals that are located elsewhere on the local or remote network.



NDS Features

The NDS offers the following features and benefits:

- Easy web-based set up and configuration
- Open systems communications for multi-site data networks
- Can be used in a variety of data communications applications
- NDS-6000: 2, 4 or 8 DB-9 (with screw-down connectors)
- NDS-5000: 2, 4, 8 or 16 RJ-45 serial ports
- RS-232 and RS-422/RS-485 software configurable on all ports
- Standard single RJ-45, 10/100 Base-TX Ethernet port
- Optional four-port RJ-45, 10/100 Base-TX Ethernet switch (standard on 8 and 16 port units)
- Optional 100 Base-FX Fiber Ethernet port on one of the switch ports (not available on 8 and 16 port units)
- High-speed serial connections (up to 230.4K baud)
- IP packet routing
- Operating system independent
- Complete remote diagnostics
- LEDs for each port, signaling port status and error conditions
- Industry standard interoperability
- Supports NativeCOM, allowing serial ports to appear as local Windows COM ports
- Supports generic TCP/IP access to serial ports without requiring special protocols or processing
- Standard support for LPR/LPD network printing under Windows and UNIX
- Telnet and reverse-telnet support for a variety of UNIX operating systems

Description of NDS Models

The NDS is available in the 5000 and 6000 series of models. These products are functionally equivalent except for the serial port connectors. The NDS/5000 series of products have RJ-45 serial connectors. The NDS/6000 series of products have DB-9 serial connectors.

Standard units have a plastic enclosure. Rackmount units have a metal enclosure.

The model number describes the number of ports and types of Ethernet connections.

Model	Number of Serial Ports	Type of Serial Connector	Ethernet Connectors
NDS/5102	2	RJ-45	One 10/100TX
NDS/5202	2	RJ-45	Four 10/100TX
NDS/5302	2	RJ-45	Three 10/100TX One 100FX (Fiber)
NDS/6102	2	DB-9	One 10/100TX
NDS/6202	2	DB-9	Four 10/100TX
NDS/6302	2	DB-9	Three 10/100TX One 100FX (Fiber)
NDS/5104	4	RJ-45	One 10/100TX
NDS/5204	4	RJ-45	Four 10/100TX
NDS/5304	4	RJ-45	Three 10/100TX One 100FX (Fiber)
NDS/6104	4	DB-9	One 10/100TX
NDS/6204	4	DB-9	Four 10/100TX
NDS/6304	4	DB-9	Three 10/100TX One 100FX (Fiber)
NDS/5008	8	RJ-45	Four 10/100TX
NDS/5008-RM Rackmount	8	RJ-45	Four 10/100TX
NDS/6008	8	DB-9	Four 10/100TX
NDS/6008-RM Rackmount	8	DB-9	Four 10/100TX
NDS/5016	16	RJ-45	Four 10/100TX
NDS/5016-RM Rackmount	16	RJ-45	Four 10/100TX

Using the NDS

Using the NDS requires three steps:

1. Hardware installation
2. Configuration
3. Operation

Hardware installation is documented in this manual.

Refer to the **NDS Administrator's Guide** for configuration and operation.

Chapter 2: Installing the Hardware

This chapter describes installing the NDS hardware, including:

- Planning the installation
- Checking cables and connectors
- Sample configurations

Overview

Installing the NDS hardware includes the following steps:

1. Plan the installation

2. Connect the NDS port server to your network

The most common connection method is through the 10/100 Base-TX RJ-45 connector (which is labeled LAN) to your Ethernet LAN, using a standard straight-through Ethernet cable to a hub/switch.

3. Connect your peripheral device(s) to the NDS port server

Attach each peripheral device (e.g., cash register, card reader, modem) to a serial port (one of the DB-9 or RJ-45 connectors).

4. Plug the AC power supply adapter into the NDS

Planning the installation

Before installing the NDS remote communications server, consider the following:

- How will you configure your network—what types of devices will you connect and where will they be located? Identify the distances at which each device will be located from the NDS server.
- Verify that the locations selected for devices do not exceed cable specifications.
- Is there an acceptable source of AC power available near each device's proposed location?

NDS Panel Connectors

The following figures show the connectors and LED locations for the NDS models. There are:

- 2-8 DB-9 or 2-16 RJ-45 serial ports
- 1-4 RJ-45 Ethernet ports and
- an optional Fiber (100FX) port (2-4 port models only)

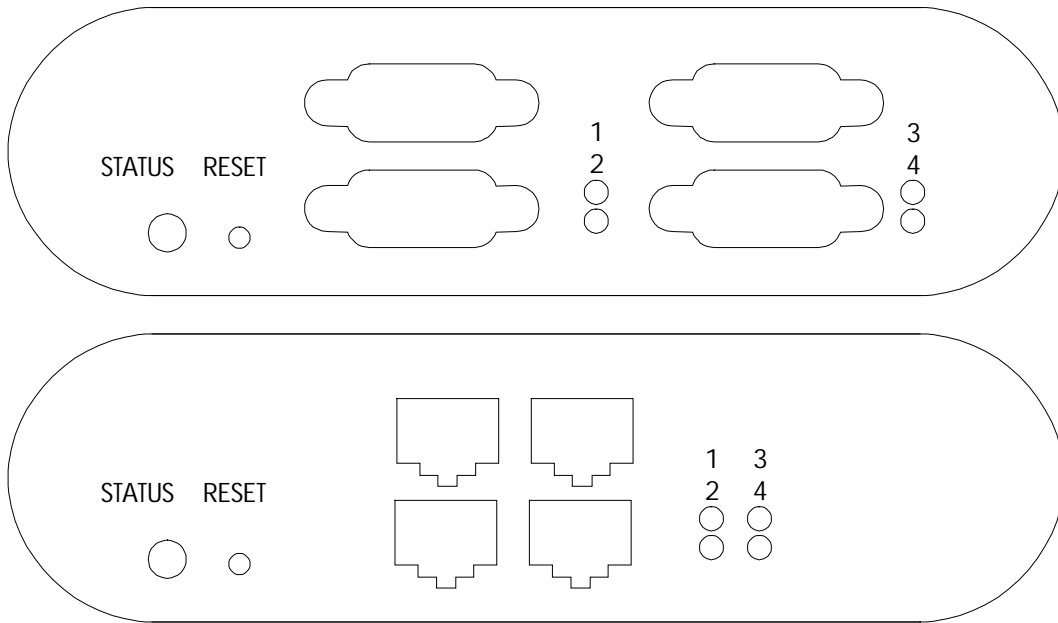


Figure 2-1: NDS 2-4 Port Front Panel Connectors

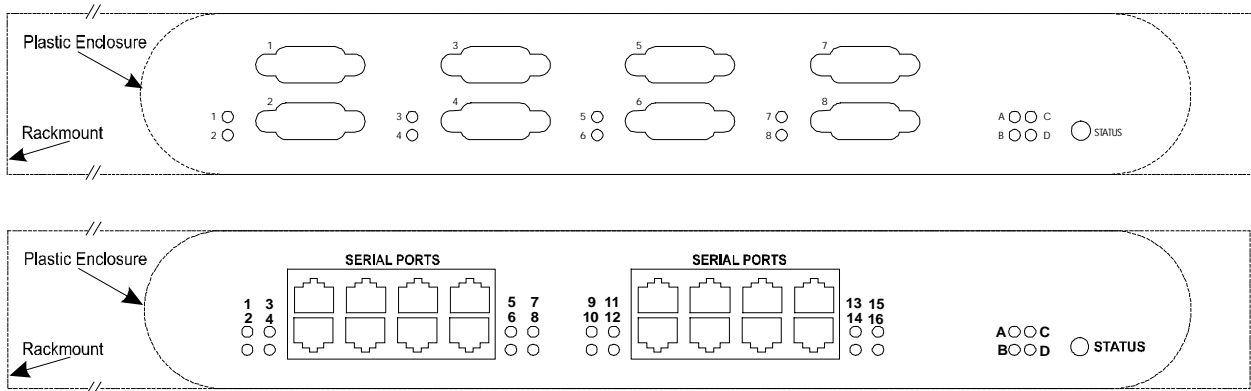


Figure 2-2: NDS 8-16 Port Front Panel Connectors

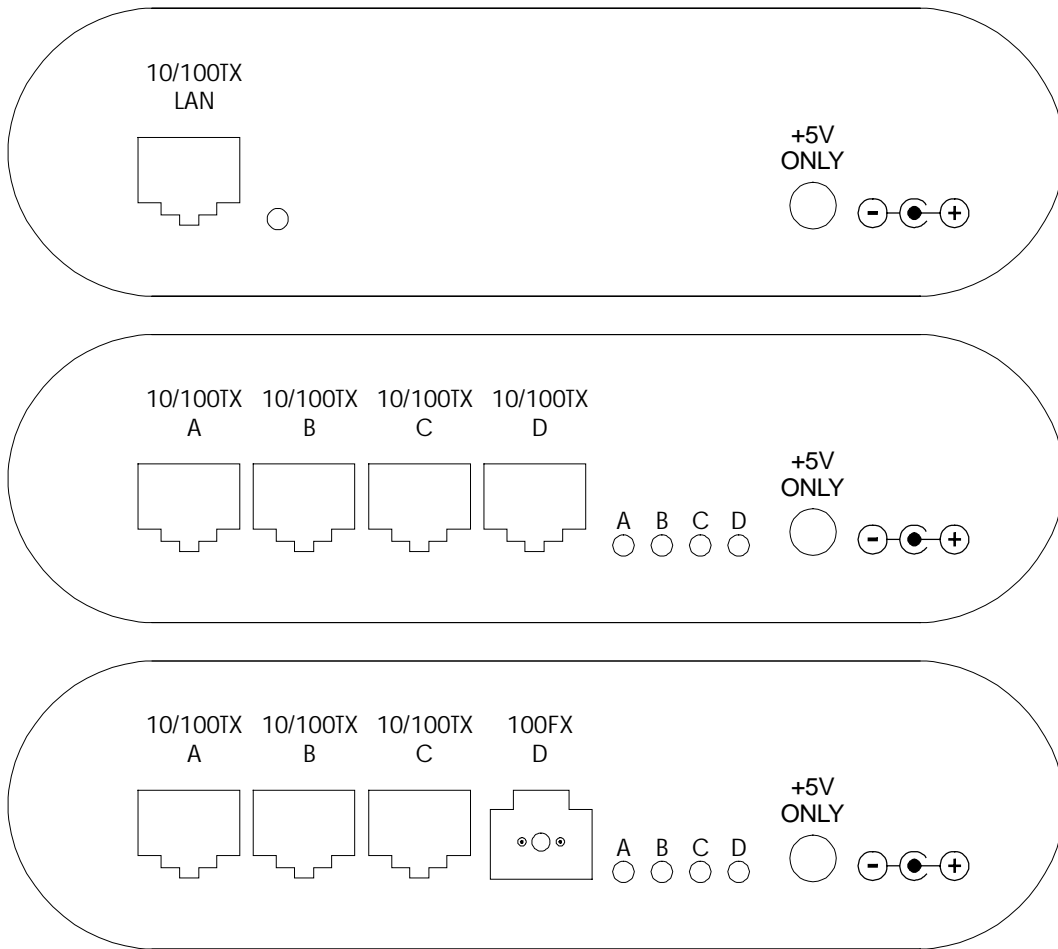


Figure 2-3: NDS 2-4 Port Rear Panel Connectors

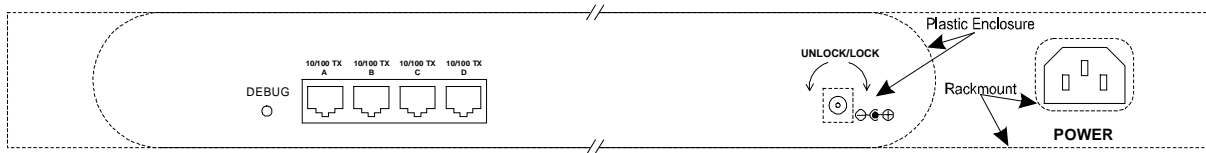


Figure 2-4: NDS 8-16 Port Rear Panel Connectors

The Unit Status LED indicates the overall status of the device. The Port Status LEDs indicate the status of each serial port. The LAN LED(s) indicate the status of the Ethernet connection(s). For information on interpreting the LED color and pattern displays, see **Troubleshooting**.

The reset button can be used to reboot the unit or to restore the factory default configuration on the unit. Depressing and releasing the button will reboot the unit.

Depressing and holding the "Reset" button in for about 5 seconds will restore the default (factory) configuration to the unit and then reboot the unit.

Connecting Devices to the NDS

The NDS serial ports may each be independently configured via software, to operate in RS-232, RS-422 or RS-485 mode. The following sections describe the pinouts and cabling options associated with these different modes.

NDS/5000 RS-232 Operation

The NDS/5000 server family uses a symmetrical EIA-232/RS-232 data terminal equipment (DTE) pinout on the RJ-45 serial ports. Table 2-1 lists the pinouts of the RJ-45 ports used for EIA-232 serial communications.

RJ-45 Pin Number	RS-232 Name	Direction	Signal Function
1	DCD	I	Signals module that remote device is attached and powered on
2	RTS	O	Flow control, to enable remote device to send data
3	SG		Signal return (NOT chassis ground)
4	TXD	O	Serial data out, from NDS to remote device
5	RXD	I	Serial data in, from remote device to NDS
6	SG		Signal return (NOT chassis ground)
7	CTS	I	Flow control, to enable NDS to send data on TXD
8	DTR	O	Signals remote device that NDS is attached and powered on

Table 2-1: EIA-232 RJ-45 Pinouts

To connect your EIA-232 device to the serial port of an NDS/5000, you need to determine whether the device connector wiring follows the standard for data terminal equipment (DTE) or for data communication equipment (DCE). In general, modems are wired as DCE devices and all other devices are wired as DTE; however, some equipment manufacturers may deviate from the standard. The manual for your device will contain information on the pinouts for the device. Figure 2-2 through Figure 2-5 show cable diagrams for the most common configurations. Figure 2-6 shows a minimal cable using 3 wires.

The cable shown in Figure 2-2 or Figure 2-3 may be used to connect most ASCII terminals or serial printers to NDS/5000 serial ports. The cable shown in Figure 2-4 or Figure 2-5 may be used to connect modems to the NDS/5000. Modems should be configured to switch their

carrier detect signal (CD) on and off in response to making and breaking telephone connections. This insures that the NDS/5000 terminates users' sessions when they disconnect. Figure 2-6 shows a 3-wire cable.



RJ-45 Plug Pin Number		DB-25 Plug Pin Number/Signal
1 DCD	←	20 DTR
2 RTS	→	5 CTS
3 SG	→	7 SG
6 SG	→	
4 TXD	→	3 RXD
5 RXD	←	2 TXD
7 CTS	←	4 RTS
8 DTR	→	8 DCD
	→	6 DSR

Figure 2-2: RJ-45 to DB-25 Terminal Cable

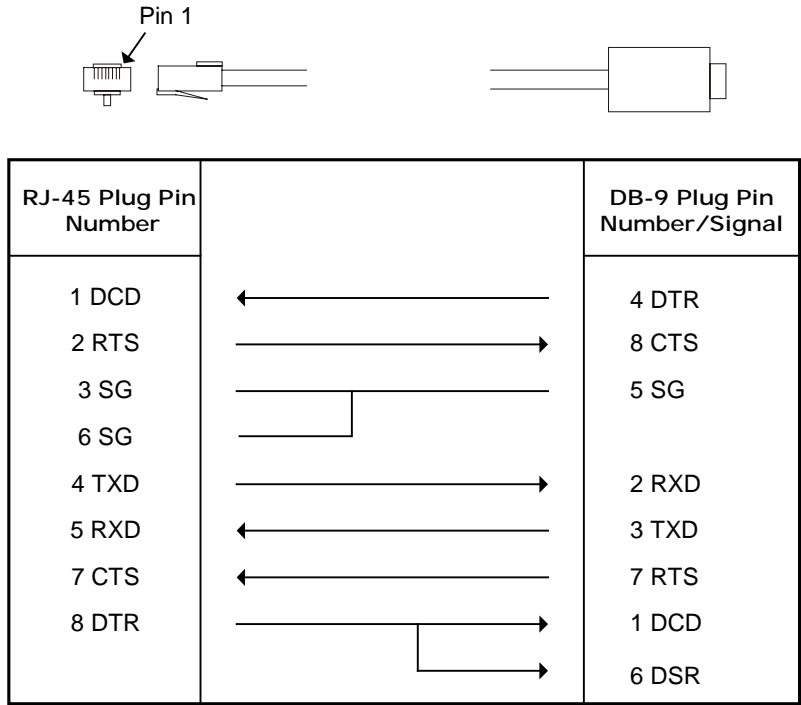


Figure 2-3: RJ-45 to DB-9 Terminal Cable

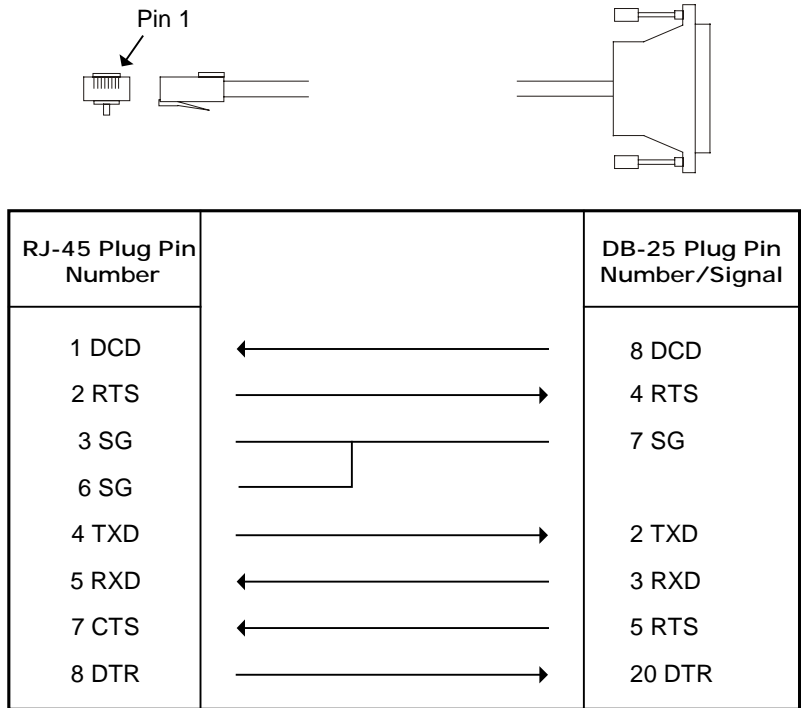


Figure 2-4: RJ-45 to DB-25 Modem Cable

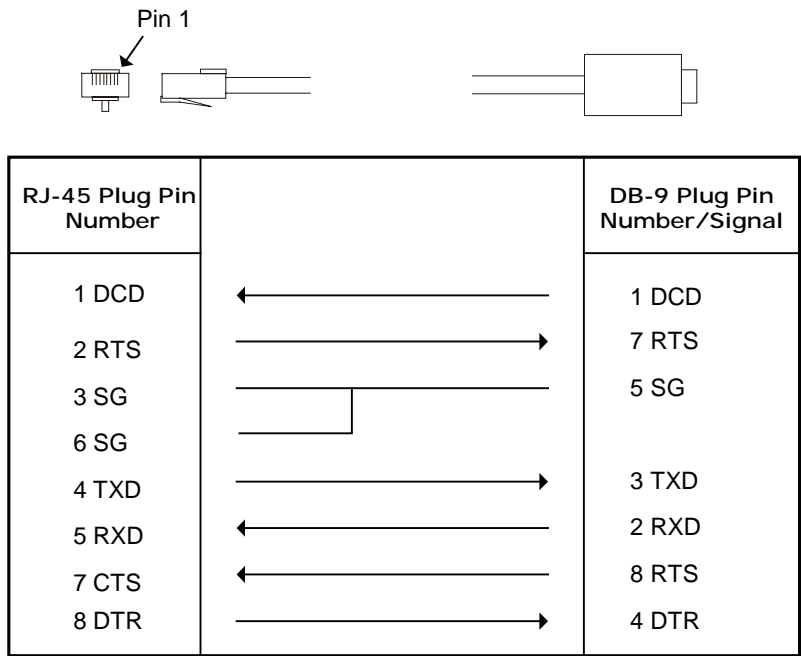


Figure 2-5: RJ-45 to DB-9 Modem Cable

The NDS/5000 does not require the use of all 8 wires. Only the RX, TX, and GND signals are essential. DTR/DSR and RTS/CTS are only necessary for flow control. DCD (pin 1) is normally not required. Figure 2-6 shows a minimal 3-wire cable using only RX (pin 5, data in), TX (pin 4, data out), and GND (pin 3, ground).

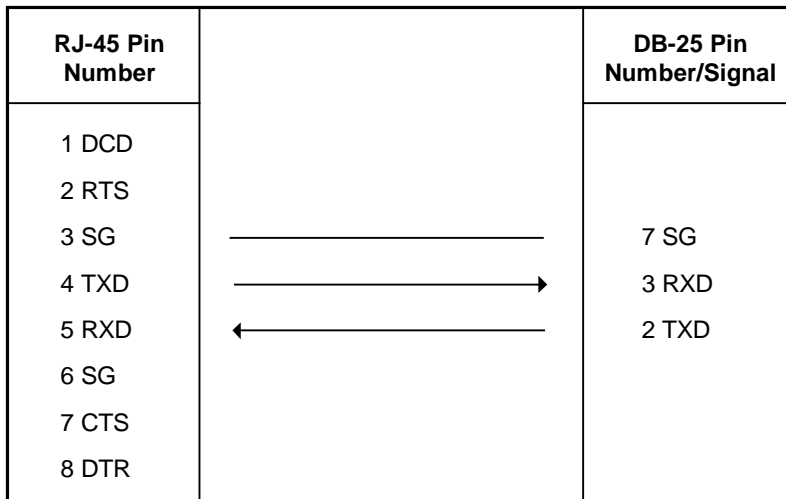


Figure 2-6: RJ-45 to DB-25 3-Wire Terminal Cable

RJ-45 to DB-25 or DB-9 adapters may be used with RJ-45 cables to create the cable configurations shown in Figure 2-2 through Figure 2-6. In most cases, you use “straight through” RJ-45 cables. If you use “crossover” RJ-45 cables, the RJ-45 pins will be reversed. Figure 2-7 and Figure 2-8 illustrate the difference between the two types, when constructed with flat 8-conductor wire.

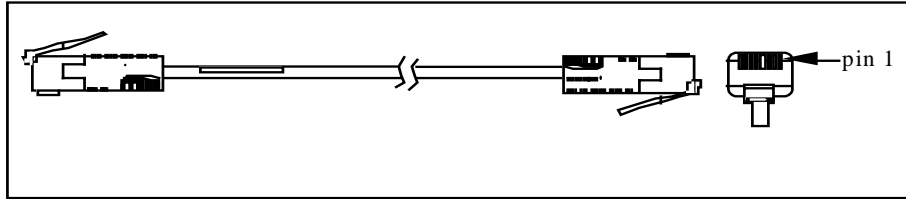


Figure 2-7: RJ-45 to RJ-45 Straight-through Cable

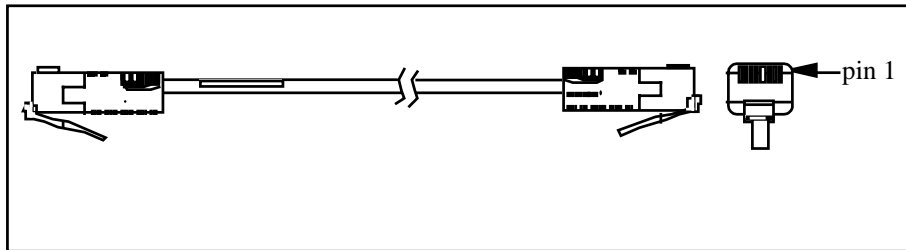


Figure 2-8: RJ-45 to RJ-45 Crossover Cable

NDS/6000 RS-232 Operation

The NDS/6000 port server family uses an EIA-232 data terminal equipment (DTE) pinout on the DB-9 serial ports. Table 2-9 lists the pinouts of the DB-9 ports used for EIA-232 serial communications.

DB-9 Pin Number	RS-232 Name	Direction	Signal Function
1	DCD	I	Signals module that remote device has a valid connection
2	RX	I	Serial data in, from remote device to NDS
3	TX	O	Serial data out, from NDS to remote device
4	DTR	O	Signals remote device that NDS is attached and

			powered on
5	GND		Signal ground
6	DSR	I	Signals module that remote device is attached and powered on
7	RTS	O	Flow control, to enable remote device to send data
8	CTS	I	Flow control, to enable NDS to send data on TX
9	RI	I	Ring Indicator

Table 2-9: EIA-232 DB-9 Pinouts

Figure 2-10, Figure 2-11, and Figure 2-12 show cable diagrams for three common configurations. The cable shown in Figure 2-11 may be used to connect modems to the NDS/6000. Modems should be configured to switch their carrier detect signal (CD) on and off in response to making and breaking telephone connections. This insures that the NDS/6000 terminates user sessions when they disconnect. The cable shown in Figure 2-10 can be used to connect a DB-9 terminal (or standard PC COM) port directly to the NDS/6000. The DB-9 to DB-9 terminal cable diagrammed in Figure 2-12 is a standard NULL modem connector, readily available in retail outlets. DB-9 to DB-9 modem cables (not diagrammed) require no special pinouts and use a straight-through cable. A 3-wire cable is shown in Figure 2-13.

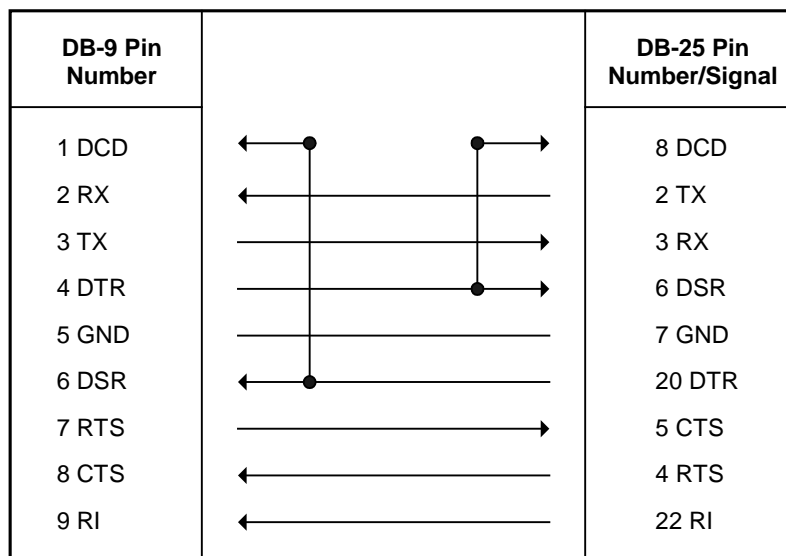


Figure 2-10: DB-9 to DB-25 Terminal Cable

DB-9 Pin Number		DB-25 Pin Number/Signal
1 DCD	←	8 DCD
2 RX	←	3 RX
3 TX	→	2 TX
4 DTR	→	20 DTR
5 GND	—	7 GND
6 DSR	←	6 DSR
7 RTS	→	4 RTS
8 CTS	←	5 CTS
9 RI	←	22 RI

Figure 2-11: DB-9 to DB-25 Modem Cable

DB-9 Pin Number		DB-9 Pin Number
1 DCD	←	4 DTR
2 RX	←	3 TX
3 TX	→	2 RX
4 DTR	→	1 DCD
5 GND	—	5 GND
6 DSR	←	6 DSR
7 RTS	→	8 CTS
8 CTS	←	7 RTS
9 RI	—	9 RI

Figure 2-12: DB-9 to DB-9 Terminal Cable

The NDS/6000 does not require the use of all 9 wires. Only the RX, TX, and GND signals are essential. DTR/DSR and RTS/CTS are only necessary for flow control. DCD (pin 1) is normally not required and RI (pin 9) is only required for modems that need a ring indicator. Figure 2-13 shows a minimal 3-wire cable using only RX (pin 2, data in), TX (pin 3, data out), and GND (pin 5, ground).

DB-9 Pin Number		DB-25 Pin Number/Signal
1 DCD		8 DCD
2 RX	←	2 TX
3 TX	→	3 RX
4 DTR		6 DSR
5 GND		7 GND
6 DSR		20 DTR
7 RTS		5 CTS
8 CTS		4 RTS
9 RI		22 RI

Figure 2-13: DB-9 to DB-25 3-wire Terminal Cable

RS-422/485 Operation

Unlike RS-232, the RS-485 and RS-422 specifications do not have a standard set of pinouts. In general, whenever you use RS-422/485 devices you will need to make custom cables. The NDS DB-9 pinouts for RS-422 /RS-485 mode are shown in Table 2-14. The RJ-45 pinouts are shown in Table 2-15.

Pin #	Name	Direction
1	Not used	
2	RXB/RX+	Input
3	TXB/TX+	Output
4	Not used	
5	GND	
6	Not used	
7	TXA/TX-	Output
8	RXA/RX-	Input
9	Not used	

Table 2-14: DB-9 Pinouts for RS-422 and RS-485

Pin #	Name	Direction
1	Not used	
2	TXA/TX-	Output
3	GND	
4	TXB/TX+	Output
5	RXB/RX+	Input
6	GND	
7	RXA/RX-	Input
8	Not used	

Table 2-15: RJ-45 Pinouts for RS-422 and RS-485

RS-485 2-wire mode uses the same pinouts, but the receive and transmit pairs should be externally shorted together in the connector (TXA shorted to RXA and TXB shorted to RXB).

Note that some RS-422 and RS-485 devices refer to the differential pair of signals that make up the transmit and receive lines as “-” and “+” instead of the standard “A” and “B”. In

most cases, the “-” signal corresponds to the “A” signal and the “+” signal corresponds to the “B” signal, but some devices reverse this. Refer to the chapter on **Using RS-422 and RS-485 Devices** for more information on wiring and using 2-wire and 4-wire RS-422/485 networks with the NDS.

Ethernet LAN

The NDS is connected to your LAN using an Ethernet port. The Ethernet port on the NDS is a standard 10/100 Base-TX RJ-45 jack. It can be connected to an Ethernet hub/switch via a standard, straight-through Ethernet cable.

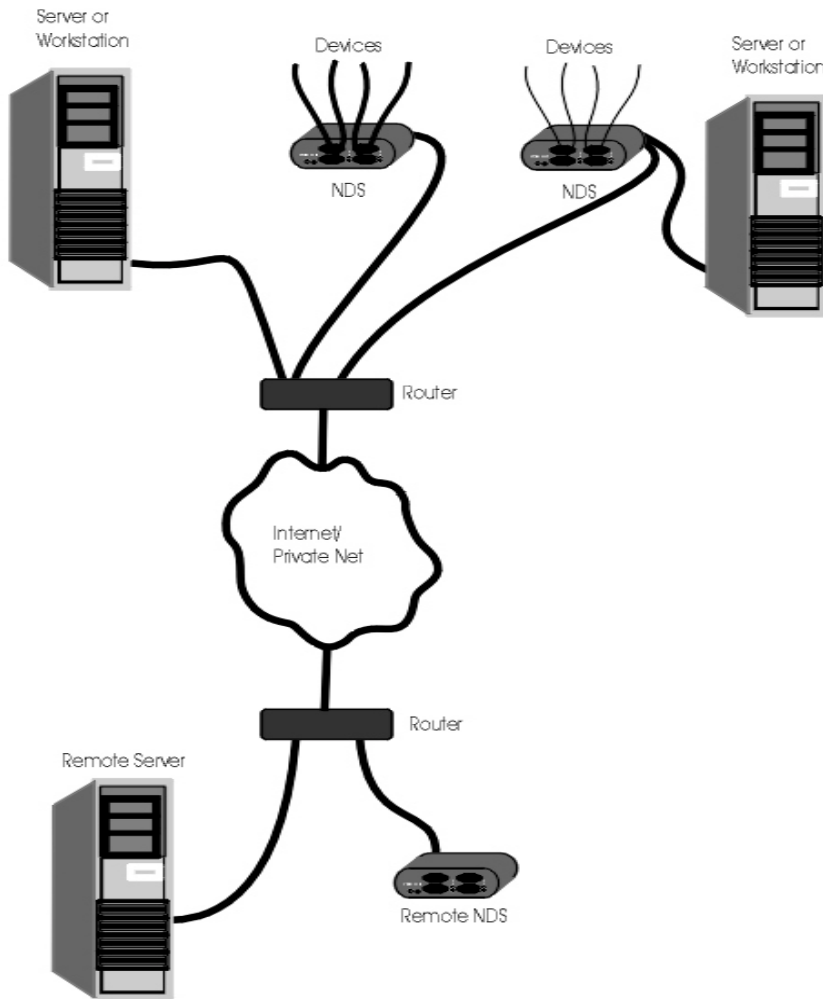


Figure 2-16: Network Topology Example

The switch versions of the NDS have four 10/100 Base-TX Ethernet ports. These ports are all interchangeable. Any port can be used to either connect to a hub/switch or to a network device (auto MDI/MDIX).

The fourth Ethernet port may optionally be a MT-RJ 100 Base-FX Ethernet port (not available on 8 and 16 port models).

Starting the NDS

When the NDS is powered up, the LEDs will flash to indicate normal operation. The following LED colors and patterns will be displayed during normal startup, if no errors are detected.

- **Status LED** – initially this LED will be yellow, but will quickly turn green. If the status LED is solid green, then the NDS doesn't have a permanent IP address and is trying to obtain one from a DHCP server. If the LED is blinking green, it means the NDS has obtained an IP address and is ready to use. Red indicates a fatal error.
- **Ethernet LEDs** – these LEDs will either be off or green. A green LED means that a good Ethernet link has been established and the unit is on the network. The LED will blink green to show network activity.
- **Serial port LEDs** – these LEDs will normally be either off or green. Off indicates a port that is not in use. Green indicates a port that is in use. The green LED will blink when data is transmitted or received. It will blink 2 times per second when data is continuously transmitted or received.

If any of the LEDs turn red, an error condition was detected. For a full description of the LED patterns, see **Troubleshooting**.

Chapter 3: Using RS-422 and RS-485 Devices

The NDS can be used to communicate with RS-422 and RS-485 devices. This chapter describes connecting these devices and configuring the NDS to communicate in this mode.

Connecting RS-422/485 Devices

RS-422 and RS-485 modes are very similar, except that in RS-422 mode the transmitter remains enabled at all times; in RS-485 mode, the transmitter is disabled automatically when no data is being transmitted. Consequently, RS-422 devices must be connected using a four-wire cable (i.e. with separate transmit and receive pairs). RS-485 devices may be connected with either two-wire or four-wire cables.

You can connect two RS-422/485 devices with a point-to-point connection, or more than two RS-485 devices in a bus configuration.

The only legal RS-485 cabling topology is a bus topology (including point-to-point connections)! All other topologies are expressly forbidden by the RS-485 specification. This includes the following illegal configurations:

- Connecting cables in any type of star topology (regardless of whether or not devices are attached to the ends of the cables). This includes using star-based patch panels or any other method that splits the physical cable off into multiple segments.
- Connecting RS-485 devices to the bus using cable stubs of any length

Due to the resilience of the RS-485 signaling specification, some of these illegal topologies may work in certain configurations. However, changing factors such as cable length, baud rate, number of devices, bus loading, etc. may cause such configurations to fail sporadically or to stop communicating entirely. **The only topology guaranteed to work in all cable configurations is a properly terminated bus topology.**

RS-422/485 Point-to-point Configuration

Point-to-point connections can be established between two RS-422 devices, an RS-422 and an RS-485 device, or two RS-485 devices. Figure 3-1 shows a four-wire, point-to-point connection between two devices.

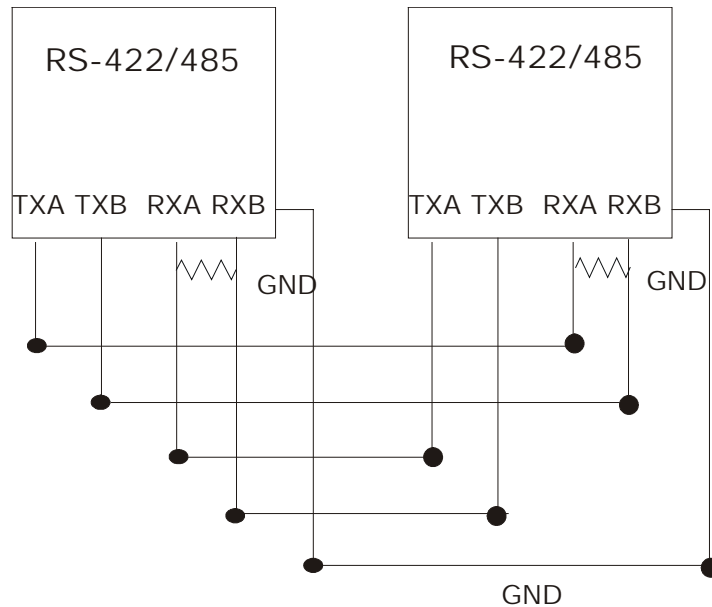


Figure 3-1: RS-422/485 point-to-point connection

Notice the termination on each end of the connection. The receiving end of the wire should be terminated with a resistance equal to the wire's characteristic impedance, generally 100-120 ohms.

RS-422/485 Bus Configurations

More than two RS-422/485 devices can be connected in a bus configuration. You can connect one RS-422 and several RS-485 devices on a bus or you can connect several RS-485 devices on a bus, but you cannot connect more than one RS-422 device on a single bus. If your configuration includes an RS-422 device, you must use a four-wire connection. Configurations including only RS-485 devices can use either two-wire or a four-wire communication.

When RS-422 and/or RS-485 devices are connected to a bus, they operate as one master and one or more slaves. In all configurations that include an RS-422 device, the RS-422 device is the master and the RS-485 devices are slaves.

Two-Wire System

In two-wire communication, all devices share the same pair of wires to both transmit and receive. All the devices connected to a two-wire system must be RS-485 devices. Figure 3-2 shows a typical two-wire system.

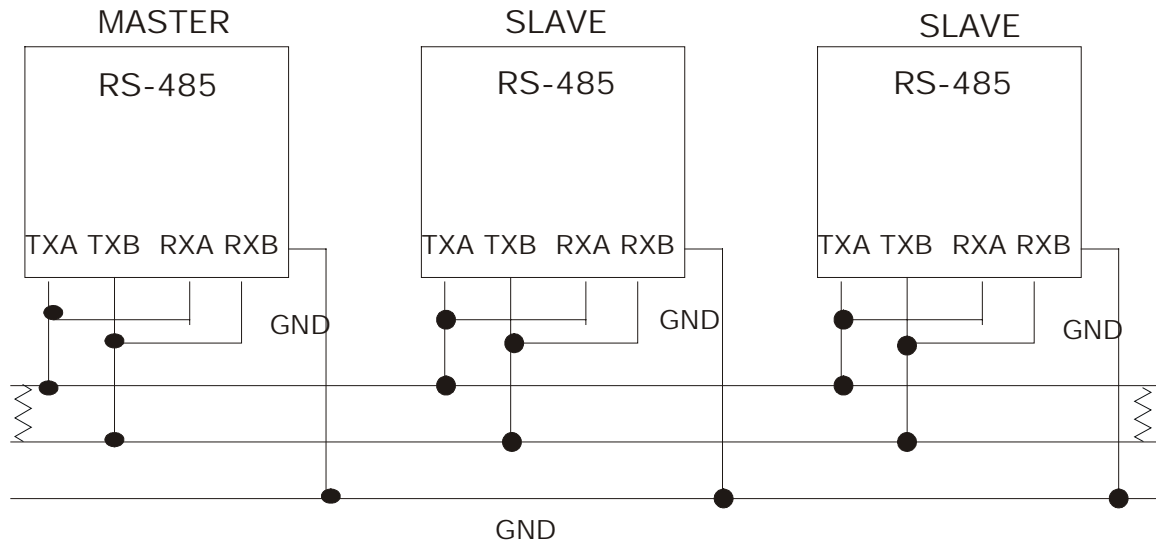


Figure 3-2: Two-wire RS-485 System

In the two-wire system diagrammed in Figure 3-2, one pair of transmit and receive lines (TXA and RXA) are connected to a single wire and the other pair of transmit and receive lines (TXB and RXB) are connected to the second wire. The device that is designated as the master manages the traffic on the lines.

As shown in the above diagram, the pair of transmit/receive lines needs to be terminated with 120 ohms at each end of the bus.

Four-Wire Systems

In four-wire communication, there are two pairs of transmit and receive lines, allowing full duplex communication. In most four-wire systems, an RS-422 device will serve as the master with several RS-485 devices as slaves. However, an RS-422 device is not required; an RS-485 device can serve as the master. Figure 3-3 shows a typical four-wire system.

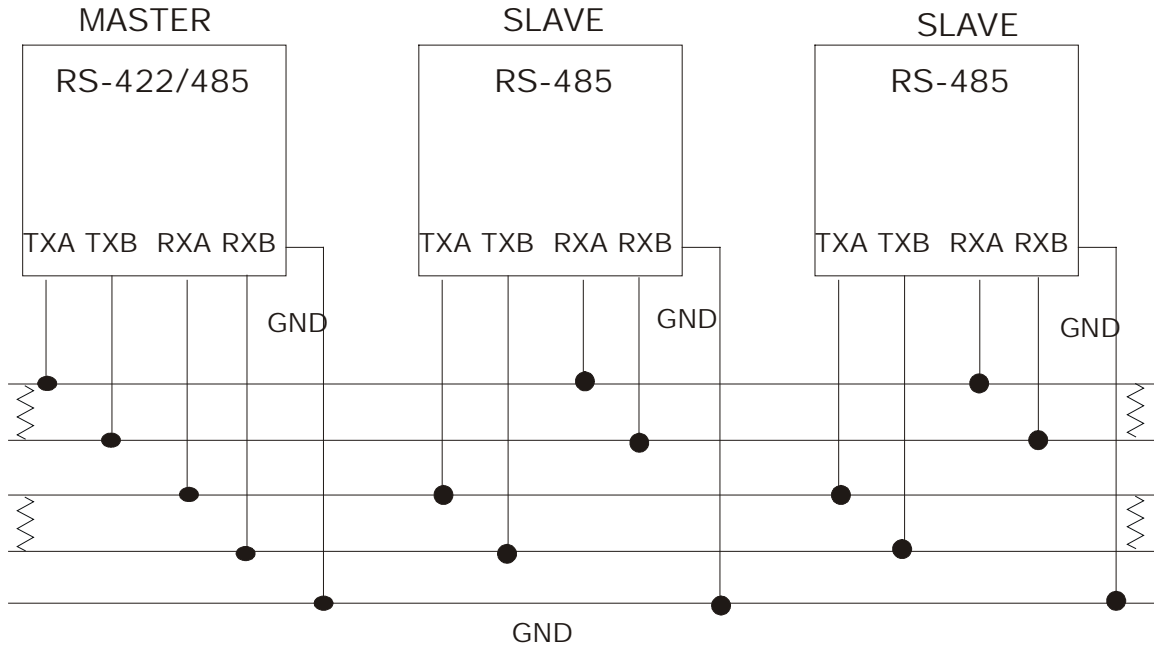


Figure 3-3: Four-wire RS-422/485 System

In most configurations, the device that is designated as the master will be an RS-422 device that constantly drives the transmit lines.

Both pairs of lines on the multi-drop wire must be terminated at each end of the bus with a resistance equal to the wire's characteristic impedance, generally 120 ohms. If the RX data pins are not terminated at all and have nothing attached, they may be susceptible to cross talk. Data from other lines on this serial port, or from other nearby ports, may be coupled back onto the unterminated receive lines. You should attach a simple 100- or 120-ohm termination resistor between the lines to avoid this.

Using the NDS in RS-422 or RS-485 Mode

The NDS ports can function as any of the devices in any of the configurations described above. The NDS can be connected to either an RS-422 or an RS-485 device in a point-to-point configuration. Or the NDS can be connected to a two-wire or four-wire bus, as either a master or a slave, and can communicate in either RS-422 or RS-485 mode. Typically, a single NDS is connected to the bus and functions as the master, but this is determined by the application. The ports are configured for RS-232, RS-485 or RS-422 via software. Refer to the NDS Administrator's Guide.

Chapter 4: Troubleshooting

The NDS has several LED indicators: **Unit Status**, **Serial ports**, and **Ethernet**.

The LEDs use red, yellow, and green blinking combinations to indicate the status of each of the NDS's major components.

Status LED

The status LED indicates the overall status of the NDS. See Table 4-1.

Status LED Condition	Meaning
Solid Green	The unit is running, but it needs an IP address. It is trying to obtain one from DHCP/BOOTP.
Blinking Green	The unit has an IP address and is operating normally
Alternating Green/Red	If the "reset" button is being held in, this LED sequence means that the factory default configuration is about to be restored. If you do not want to restore the factory default, release the button before the sequence changes to Green/Yellow. Otherwise this means a serious system error occurred. See the system log for more details.
Alternating Green/Yellow	If the "reset" button is being held in, this LED sequence means that the factory default configuration was restored. You may release the button. Otherwise, this means that the current configuration is corrupt and that the factory default configuration is being used.
Blinking Yellow	The unit is booting.
Solid Red	Fatal error.
Off	No power, or the unit is inoperative

Table 4-1: Status LED Conditions

Serial Port LEDs

Each serial port has a Port LED that describes port activity. Table 4-2 describes the various Port LED states.

Port LED Condition	Meaning
Off	Port is closed or no power.
Solid Green	Port is open, but idle
Blinking Green	Port is open, and data is being transmitted or received. When data is being continuously transferred, this LED will blink approximately 2 times per second.
Red Blinks	Data errors will cause periodic red blinks. Persistent red blinks may imply a configuration problem (incorrect baud rate, parity settings, etc.)
Solid Red	Port hardware has failed

Table 4-2: Port LED Conditions

Ethernet LEDs

Each Ethernet port has one LED that describes the state of the network connection on that port. Table 4-3 describes the various Ethernet LED states.

Ethernet LED Condition	Meaning
Solid Green	Ethernet link is good
Green Blink	Network traffic was detected
Off	The Ethernet cable is bad or not connected

Table 4-3: Ethernet LED Condition

Appendix: Specifications

NDS Hardware Specifications

- ARM7 50MHz CPU (2-4 port units) or ARM9 166MHz CPU (8-16 port units)
- 512K to 8Mbytes in-circuit boot flash and program memory
- 8 to 64 Mbytes SDRAM
- 10/100 Mbps Ethernet connection over 10/100 Base-TX or 100 Base-FX physical lines
- Two to sixteen asynchronous serial ports with modem control and surge suppression
- Asynchronous port data rates of up to 230.4 Kbps
- DB-9 or RJ-45 physical connectors
- Serial ports software configurable for RS-232 or RS-422/RS-485
- External or Internal 110-240 VAC power supply provides +5V DC regulated to NDS
- Status LEDs for each port

Environmental Specifications

- Operating temperature range: 0 to 50°C
- Storage temperature range: -10 to 70°C
- Humidity range: 10% to 90% noncondensing

Product Dimensions

The NDS models measure:

2-4 port models – plastic enclosures

6 inches x 5.65 inches x 2.0 inches (152 mm x 144 mm x 51 mm)

8-16 port models – plastic enclosures

12 inches x 5.6 inches x 1.9 inches (305 mm x 143 mm x 48 mm)

8-16 port models – rack mount enclosures

17.0 inches x 5.8 inches x 1.7 inches (435 mm x 148 mm x 44 mm)

With mounting brackets, total width is 18.9 inches (482 mm)

Model Numbers

NDS/5102	Two Ports, RJ-45, one 10/100 Base-TX port
NDS/5202	Two Ports, RJ-45, four-port 10/100 Base-TX Ethernet switch
NDS/5302	Two Ports, RJ-45, three 10/100 Base-TX Ethernet, one 100 Base-FX Fiber
NDS/5104	Four Ports, RJ-45, one 10/100 Base-TX port
NDS/5204	Four Ports, RJ-45, four-port 10/100 Base-TX Ethernet switch
NDS/5304	Four Ports, RJ-45, three 10/100 Base-TX Ethernet, one 100 Base-FX Fiber
NDS/6102	Two Ports, DB-9, one 10/100 Base-TX port
NDS/6202	Two Ports, DB-9, four-port 10/100 Base-TX Ethernet switch
NDS/6302	Two Ports, DB-9, three 10/100 Base-TX Ethernet, one 100 Base-FX Fiber
NDS/6104	Four Ports, DB-9, one 10/100 Base-TX port
NDS/6204	Four Ports, DB-9, four-port 10/100 Base-TX Ethernet switch
NDS/6304	Four Ports, DB-9, three 10/100 Base-TX Ethernet, one 100 Base-FX Fiber
NDS/5008	Eight Ports, RJ-45, four-port 10/100 Base-TX switch, plastic enclosure
NDS/5008-RM	Eight Ports, RJ-45, four-port 10/100 Base-TX switch, Rackmount
NDS/6008	Eight Ports, DB-9, four-port 10/100 Base-TX switch, plastic enclosure
NDS/6008-RM	Eight Ports, DB-9, four-port 10/100 Base-TX switch, Rackmount
NDS/5016	Sixteen Ports, RJ-45, four-port 10/100 Base-TX switch, plastic enclosure
NDS/5016-RM	Sixteen Ports, RJ-45, four-port 10/100 Base-TX switch, Rackmount

Ethernet cabling specifications

This section describes guidelines for using 10/100 Base-TX twisted-pair cabling:

- Recommended cable is category 5 (CAT5 or CAT5E) unshielded solid copper twisted pair
- Ethernet cable pairs **must** be properly twisted: pins 1 and 2 must be a twisted pair, and pins 3 and 6 must be a twisted pair
- Maximum distance of a segment—from concentrator to node—is 100 meters (328 feet)
- Maximum of 5 segments between any two nodes

Power Requirements

Units in plastic enclosures use an external power supply. The Rackmount units have an internal power supply.

<u>Models</u>	<u>Input Power</u>	<u>Output Power</u>
2-4 port units	100-240VAC, 50-60HZ 0.3A	5V 2.0A
8-16 port units, plastic enclosure	100-240VAC, 50-60HZ 0.7A	5V 4.0A
8-16 port units, rackmount	85-264VAC, 47-63HZ 0.5A (115VAC), 0.25A (240VAC)	N/A

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