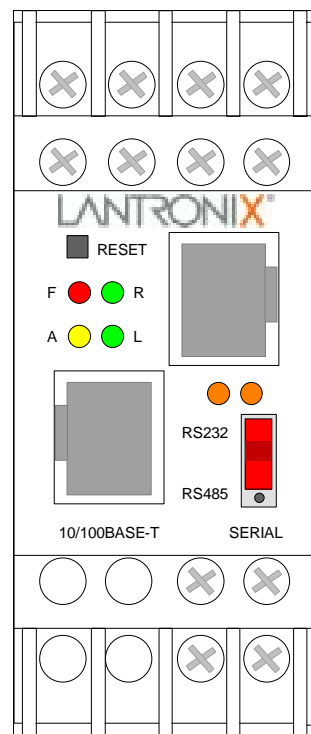




# DSTni-XPress DR User Guide



Revision B 8/03  
Part Number 900-288



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Date	Rev.	Comments
12//02	A	Initial release
8/03	B	Updated warranty information

## **Declaration of Conformity**

(according to ISO/IEC Guide 22 and BS 7514)

### **Manufacturer's Name & Address:**

Lantronix, 15353 Barranca Parkway, Irvine, CA 92618 USA

*Declares that the following product:*

**Product Name Model:** DSTni-XPress DR, DSTni-XPress DR-IAP Device Servers

*Conforms to the following standards or other normative documents:*

**Safety:** EN60950:1988+A1, A2, A3, A4

### **Electromagnetic Emissions:**

EN55022: 1998 (CISPR 22, Class A: 1993, A1: 1995, A2: 1996)

IEC 1000-3-2/A14: 2000

IEC 1000-3-3: 1994

### **Electromagnetic Immunity:**

EN55024: 1998 Information Technology Equipment-Immunity Characteristics

IEC61000-4-2: 1995 Electro-Static Discharge Test

IEC61000-4-3: 1996 Radiated Immunity Field Test

IEC61000-4-4: 1995 Electrical Fast Transient Test

IEC61000-4-5: 1995 Power Supply Surge Test

IEC61000-4-6: 1996 Conducted Immunity Test

IEC61000-4-8: 1993 Magnetic Field Test

IEC61000-4-11: 1994 Voltage Dips & Interrupts Test

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## 1. Introduction

This manual describes the family of DSTni-XPress DR Device Servers, including the DSTni-XPress DR Device Server and the DSTni-XPress DR-IAP Device Server with Industrial Automation Protocols.

Most of the material in this manual applies to all of the DSTni-XPress DR products. However, in some cases there will be some features that apply to only one product. In those cases, a note will explain the variation.

*Note: In most cases DSTni-XPress DR refers to DSTni-XPress DR and DSTni-XPress DR-IAP.*

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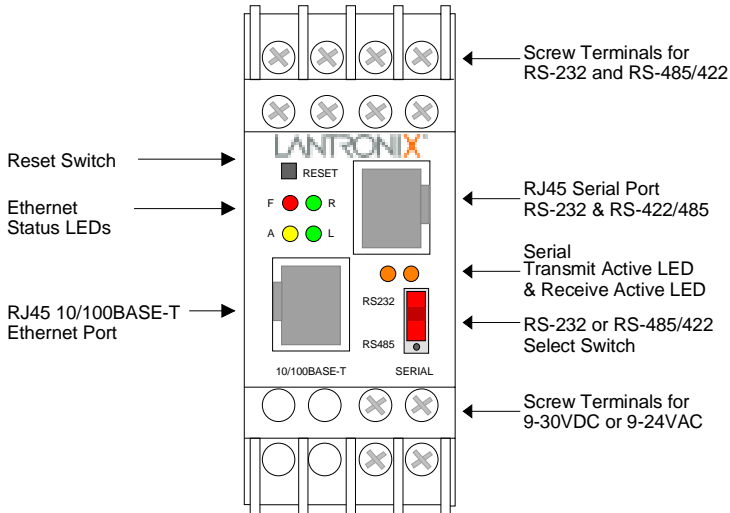
### 1.1 DSTni-XPress DR

The DSTni-XPress DR Device Server connects serial devices to Ethernet networks using the IP protocol family (TCP for connection-oriented stream applications and UDP for datagram applications). A few of the different types of serial devices supported are listed below:

- Time/Attendance Clocks and Terminals
- ATM Machines
- CNC Controllers
- Data Collection Devices
- Universal Power Supply (UPS) Management Units
- Telecommunications Equipment
- Data Display Devices
- Security Alarms and Access Control Devices
- Handheld Instruments
- Modems

The DSTni-XPress DR connects these devices through a TCP data channel or through a Telnet connection to computers or another Device Server. Datagrams can be sent by UDP.

## Introduction



**Figure 1 - DSTni-XPress DR**

The DSTni-XPress DR supports RS-232, RS-422/485 via its screw terminals and RJ45 serial port. It supports 10/100Mb/s Ethernet through the RJ-45 connector. It can be configured via HTTP, SNMP, DHCP or Telnet. It contains a Flash ROM for easy software upgrades.

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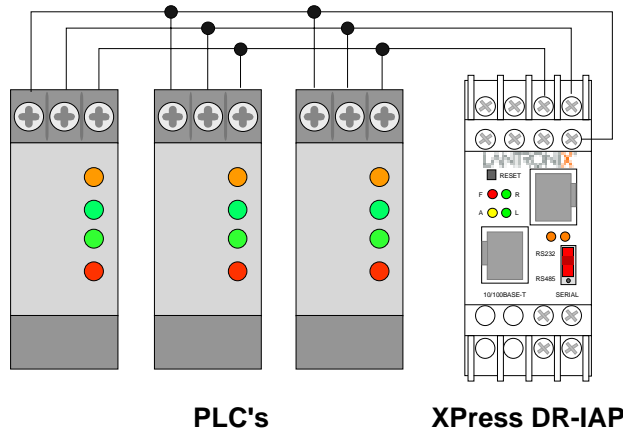
## 1.2 DSTni-XPress DR-IAP Device Server

*Note: This section is for the DSTni-XPress DR-IAP only.*

The Lantronix Industrial Automation Platform (IAP) family of Device Servers allows a single network and protocol to connect multiple serial devices from many vendors. IAP provides the automation industry with a network-enabling solution using TCP/IP and standard Ethernet networks that is vendor-independent.

By encapsulating serial data and transporting it over Ethernet, the Device Server allows virtual serial links to be established over Ethernet and IP (TCP/IP, UDP/IP) networks. As a result, limited distance, point-to-point, direct serial connections can be extended within the plant, throughout the facility, or across the global enterprise. The following picture is one of the Device Servers in the IAP family.





**Figure 2 - RS-485 Multidrop with DSTni-XPress DR-IAP**

Lantronix provides IAP Device Servers specifically designed for different industrial environments.

- DSTni-XPress DR-IAP, with a DIN rail interface for harsh environments or alongside controls instruments in electrical panels.
- CoBox-FL-IAP, with fiber connectivity for long cable runs or electrically hazardous environments.
- UDS-10-IAP, a compact Device Server for use in less demanding environments.

A few examples of attached devices are:

- PLCs
- AC/DC drives
- CNC systems
- Operator panels and message displays
- Process Controls
- Instrumentation
- Power monitoring equipment
- Scales and weighing systems
- Barcode scanners
- Label printers
- Most factory floor serial devices

## 1.2.1 Industrial Automation Protocols

IAP Device Servers, adapted to multiple factory environments, can unite any mixture of equipment from industrial automation vendors into a single reliable pipeline. This new and open infrastructure opens the way for data to flow in real time from all your plant devices up to your IT layer.

IAP Device Servers are delivered with IAP Standard Tunneling protocol and can be loaded with industrial communication protocols. The suite of protocols include DF1 (Rockwell Automation) and Modbus (Schneider Electric). Where the IAP Standard Tunneling protocol is limited to exclusive, standard ASCII device-to-device connections, the industrial protocols offer connections to other devices that require special formatting or features simultaneously.

For information about using any of the industrial communication protocols, see the user manuals on the software CD or our web site. Protocol firmware files are also contained on the CD and new versions are available from the Lantronix web site.

You can set up the unit using the serial port, or remotely over Ethernet using Telnet or a web browser. The CD that comes with your Device Server includes DeviceInstaller, a Windows based configuration software that simplifies the process of installing protocols and configuring them for use with attached devices. IAP Device Servers use Flash memory for maintenance-free, non-volatile storage which allows for fast system upgrades.

---

## 1.3 Network Protocols (Standard Tunneling)

The DSTni-XPress DR uses TCP/IP protocols for network communication. The supported standards are: ARP, UDP, TCP, ICMP, Telnet, TFTP, DHCP, AutoIP, and SNMP. For transparent connections, TCP/IP (binary stream) or Telnet protocols are used. Firmware upgrades can be made with the TFTP protocol.

The IP (Internet Protocol) protocol defines addressing, routing, and data-block handling over the network. The TCP (transmission control protocol) assures that no data is lost or duplicated, and that everything sent into the connection on one side arrives at the target exactly as it was sent.

For typical datagram applications where devices interact with others without maintaining a point-to-point connection, UDP datagram is used.

### 1.3.1 Packing Algorithm

The two available packet algorithms (which define how and when packets are sent to the network) are software selectable. The standard algorithm is optimized for applications where DSTni-XPress DR is used in a local environment, allowing for very small delays for single characters while trying to keep the packet count low. The alternate packing algorithm minimizes the packet count on the network and is especially useful for applications in routed Wide Area Networks. Various parameters can be set in this mode to economize the serial data stream.

### 1.3.2 IP Address

Every active device connected to the TCP/IP network must have a unique IP address. This IP address is used to reference a specific device, for example, to build a connection to DSTni-XPress DR's serial port. See *IP Addresses* on page *10-1* for a complete description of IP Addressing.

### 1.3.3 Port Number

A destination IP address and a port number define every TCP connection and every UDP datagram. A port number is necessary to address an application or a channel on a network host. The port number can be compared to an extension on a PBX system.

A Telnet application (login to a host with an ASCII terminal) is commonly assigned TCP port number 23. More than one Telnet connection can be established to one host using the Telnet port; however, the other peer IP address/port number combinations must be different.

In the DSTni-XPress DR, a port number can be configured on the channel (port). The DSTni-XPress DR uses this port number for outgoing messages and incoming connections, or UDP datagrams, which are addressed to its port number. Port 9999 (decimal) is used for remote configuration.

---

## 1.4 Serial Interface

DSTni-XPress DR has a single serial port that can be accessed by an RJ-45 connector or screw block terminals. Both connectors support RS232 and RS485/422. By setting the switch located on the face of the DSTni-XPress DR, RS232 or RS485/422 can be selected.

*Note: DSTni-XPress DR is a single serial port device, meaning that only the RJ-45 or the screw terminals can be used at a time. In the configuration menu, Channel 1 refers to either one of the ports being used.*

## 1.5 RJ-45 Serial Connector

The serial RJ-45 serial connector supports up to 115200 bits per second and has the following signals.

*Table 1 - Serial RJ45 Pinouts*

Pin	Direction	Name	Function
1	Not Connected		None
2	<b>Hard-wired output</b>	DTR	DTR Data Terminal Ready
3	To XPress DR	RXD or RXA	RS-232: RXD (Received Data) RS-422/485:RXA (Received Data -)
4	From XPress DR	TXD or TXA	RS-232: TXD (Transmit Data) RS-422/485: TXA (Transmit Data -)
5		GND	Ground
6	To XPress DR	CTS or RXB	RS-232: CTS (Clear to Send) RS-422/485: RXB (Received Data +)
7	From XPress DR	RTS or TXB	RS-232: RTS (Request to Send) RS-422/485: TXB (Transmit Data +)
8	Not Connected		None

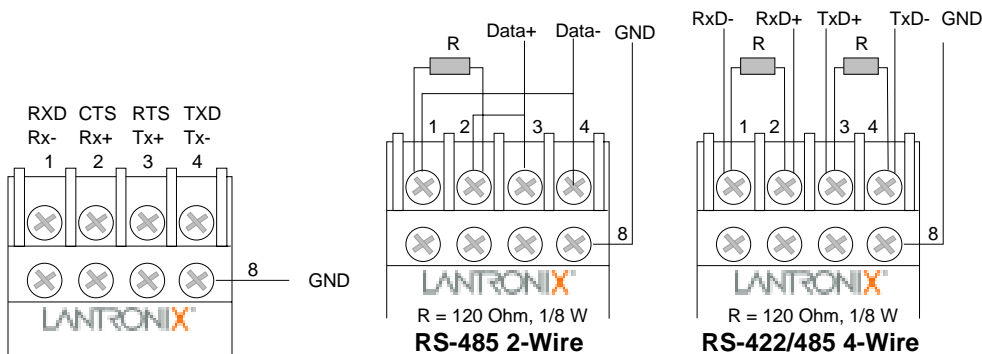
*Note: Pin 2 (DTR) is hard wired (+12V) and cannot be affected by software control.*

*Note: For RS-485 2-wire functionality, pins 3 & 4 and 6 & 7 must be connected together.*

## 1.6 Screw-Terminal Serial Connectors

**Table 2 - Serial Screw-Terminal Pinouts**

Pin	Direction	Name	Function
1	To XPress DR	RXD or RXA	RS-232: RXD (Received Data) RS-422/485:RXA (Received Data -)
4	From XPress DR	TXD or TXA	RS-232: TXD (Transmit Data) RS-422/485: TXA (Transmit Data -)
2	To XPress DR	CTS or RXB	RS-232: CTS (Clear to Send) RS-422/485: RXB (Received Data +)
3	From XPress DR	RTS or TXB	RS-232: RTS (Request to Send) RS-422/485: TXB (Transmit Data +)
8	Ground	GND	Ground



*Note: For RS-485 2-wire functionality, pins 1 & 4 and 2 & 3 of the screw terminals must be connected together.*

*Note: Termination resistors ( $R = 120 \text{ Ohm}$ ) are used to match impedance of a node to the impedance of the transmission (TX) line. Termination resistors should be placed only at the extreme ends of the data line, and no more than two terminations should be placed in any single segment of a RS-485 network. The terminator resistors may not be needed for your application.*

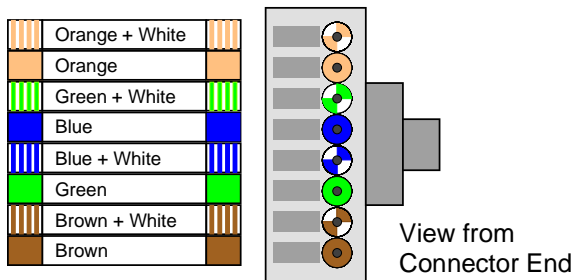
## 1.7 RJ-45 Ethernet Interface

DSTni-XPress DR supports 10/100Mbit Ethernet through its RJ-45 (10BaseT/100BaseTX) connector.

**Table 3 - Ethernet Interface Signals**

Signal Name	DIR	PIN	Primary Function
TX+	Out	1	Transmit Data +
TX-	Out	2	Transmit Data -
RX+	In	3	Differential Ethernet Receive Data +
RX-	In	6	Differential Ethernet Receive Data -

The next drawing shows a typical RJ-45 connector. The color is not standard but very typical of an Ethernet Patch cable. Pin 1 is located at the top of the connector (Orange + White). The view is from the end of the connector.



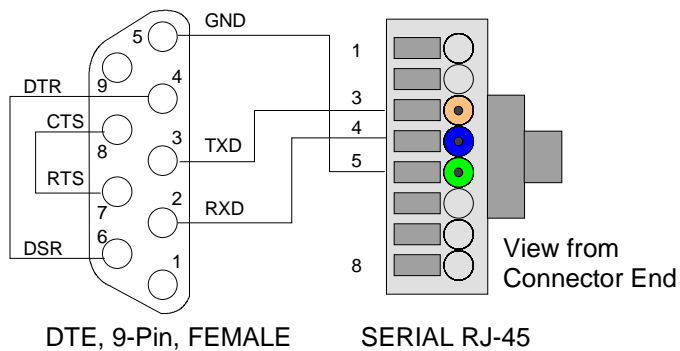
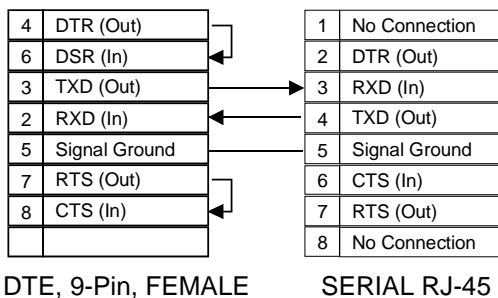
**Figure 3 - RJ-45 Connector**

## 1.8 Serial Interface Connections

The serial device can be RS-232 or RS-485/422 and the connections can be screw terminals or RJ-45 connector. This section shows several practical methods for making the hardware connections. The following diagrams show typical interface cables for the RS-232 Serial interface and the Ethernet interface.

### 1.8.1 9-Pin RS-232 to Serial RJ-45

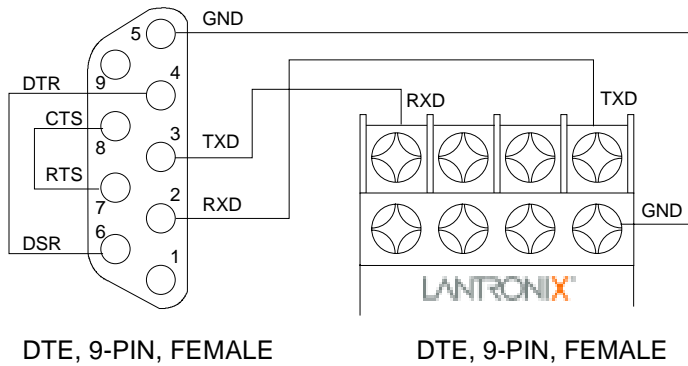
This connection assumes you are connecting a typical PC (COM1) to the DSTni-XPress DR through the serial RJ-45 connector. A pinout table and cable diagram are included.



## Introduction

### 1.8.2 9-Pin RS-232 to Serial Screw Terminals

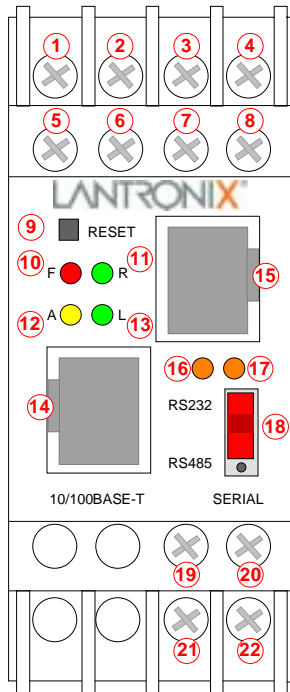
This connection assumes you are connecting a typical PC (COM1) to the DSTni-XPress DR through the serial screw terminals.





## 1.9 Front Panel Description

The following figure illustrates the screw block connector pinouts and other components of the DSTni-XPress DR. See [Table 4 - Front Panel Components](#) for explanations corresponding to the circled numbers.



**Figure 4 - Front Panel Layout**

**Table 4 - Front Panel Components**

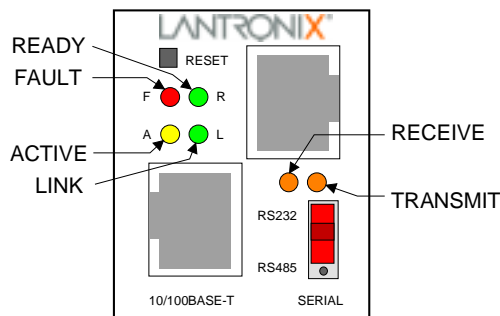
Item	Component	Name	Purpose
1	Screw terminal	RXD or RXA	RS-232: RXD (Received Data) RS-422/485:RXA (Received Data -)
2	Screw terminal	CTS or RXB	RS-232: CTS (Clear to Send) RS-422/485: RXB (Received Data +)
3	Screw terminal	RTS or TXB	RS-232: RTS (Request to Send) RS-422/485: TXB (Transmit Data +)
4	Screw terminal	TXD or TXA	RS-232: TXD (Transmit Data) RS-422/485: TXA (Transmit Data -)
5,6,7	Screw terminal	NC	No connection
8	Screw terminal	GND	Signal ground
9	Reset switch	RESET	Push to power reset and initialize
10	LED (Red)	Fault or Configuration	SOLID: Fault in XPress DR communication (read error) or XPress DR is in Configuration Mode
11	LED (Green)	Ready	SOLID: Ready, Flashing: Error Message
12	LED (Yellow)	Activity	FLASHING: Network traffic
13	LED (Green)	Link	SOLID: XPress DR has good Ethernet link
14	Connector (RJ45)	Ethernet port	RJ45 connector for Ethernet 10BaseT
15	Connector (RJ45)	Serial port	RJ45 connector for RS-232,RS-422/485
16	LED (Yellow)	Serial TXD	FLASHING: Indicates transmission from the serial port
17	LED (Yellow)	Serial RXD	FLASHING: Indicates reception to the serial port
18	Switch	Switch for screw block	UP: Serial RS-232 DOWN: Serial RS-422/485
19	Screw terminal	DC + (or AC)	Operating power, DC positive or AC
20	Screw terminal	Ground	Earth ground
21	Screw terminal	DC – (or AC)	Operating power, DC negative or AC
22	Screw terminal	Ground	Earth ground

*Note: For RS-485 2-wire functionality, pins 1 & 4 and 2 & 3 of the screw terminals must be connected together.*

## 1.10 LEDs

The device contains the following LEDs:

- Two Green (R for ready, L for link)
- Three Yellow (A for active, serial transmit, and serial receive)
- One Red (F for fault)



**Table 5 - DSTni-XPress DR LED Functions**

LED	Meaning
R (Green)	Ready (Solid=ready, blinking = error message, port busy)
L (Green)	Link (socket connection made) = Solid
A (Yellow)	Activity (network) = Random Flashing
TXD (Yellow)	Transmitting serially = Flashes during transmit
RXD (Yellow)	Receiving serially = Flashes during receive
F (Red)	Fault in XPress DR communication (read error) or XPress DR is in Configuration Mode

Simultaneously lit F (Red) and R (Green) LEDs mean something is wrong. If the F (Red) LED is lit or blinking, count the number of times the R (Green) LED blinks between its pauses. Six possible blink patterns, detailed in the following table, indicate which fault condition exists.

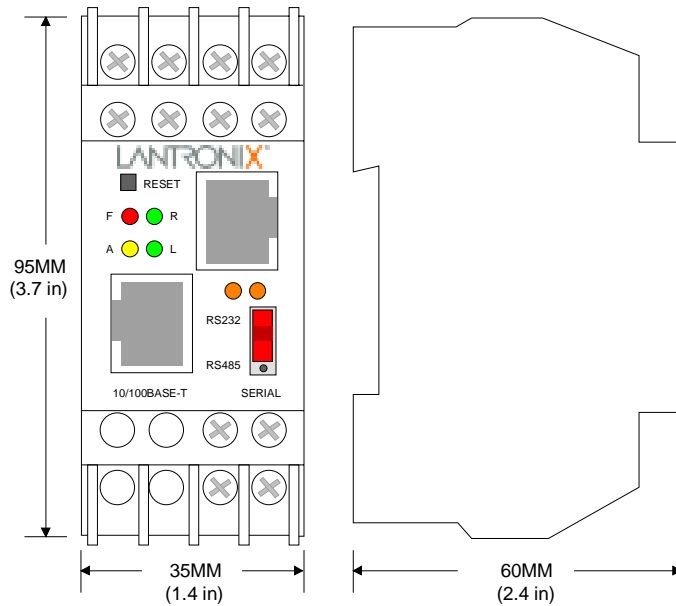
**Table 6 - LED Error Indications**

LED	Error
Steady F (Red) and Blinking R (Green)	1 blink = EPROM checksum error
	2 blinks = RAM error
	3 blinks = Token Ring error
	4 blinks = EEPROM checksum error
Blinking F (Red) and blinking R (Green)	1 blink = Faulty network connection
	2 blinks = No DHCP response
	4 blinks = Setup Mode

---

## 1.11 Dimensions

The DSTni-XPress DR dimensions are shown in the following drawing.



---

## 1.12 Product Information Label

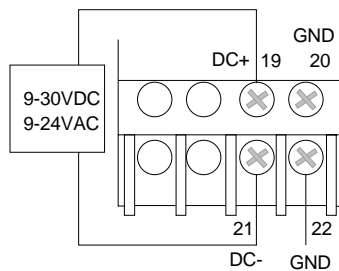
The product information label contains important information about your specific unit. Your unit will have one *similar* to the one below.



*Note: Before mounting the device on a DIN rail, copy the information from the label.*

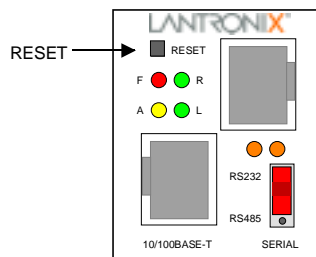
## 1.13 Power Requirements

The DSTni-XPress DR is normally powered by the same 12V or 24VDC supply that powers other devices in your panel. Many AC-powered industrial controllers also supply 24VDC for use by field devices. The DSTni-XPress DR is not shipped with a separate power supply, but any power supply between 9-30VDC or 9-24VAC can be used. The unit requires a maximum of 3 Watts.



## 1.14 Reset Switch

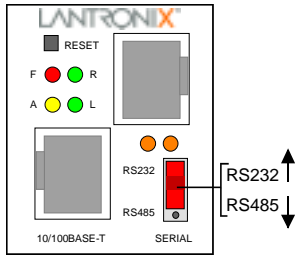
The unit has a reset switch located on the front panel, above the red LED.



---

## 1.15 RS-232/RS-485 Switch

Set this switch for RS-232 (Up) or RS-485 (Down).



*Note: The serial port RS232/RS485 switch is a hardware function. Do not change the switch while the device is operating.*

## 1.16 Technical Specifications

*Table 7 - Technical Specs*

Category	Description
CPU, Memory	DSTni-LX 48MHz clock, 256KB RAM
Flash, EEPROM	512kByte Flash, 1024Byte EEPROM
Serial Interface	RJ45 connector for RS-232 or RS-422/485 interface Screw Terminals for RS-232 or RS-422/485 interface Baud Rate selectable from 300 to 115Kbps Switch selectable RS-232C or RS-422/485 (screw terminals only)
Reset	Front panel recessed push button.
Power Supply	Screw terminals for 9-30VDC, 9-24VAC
Power Input	3 Watts Max, Screw Terminals
Dimensions	90 x 60 x 36mm, (3.54 x 2.36 x 1.41 in)
Weight	120g (4.3oz)
Temperature	Operating range: 0° to +60° C (32-140 degrees F)
Humidity	20% to 90% RH, non-condensing
Case	High-Impact Plastic case designed for DIN Rail (35mm)
Protocols Supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, and HTTP
Network Interface	10Base-T/100Base-TX Ethernet, RJ45 connector
Serial Line Formats	Characters: 7 or 8 data bits Stop bits: 1 or 2 Parity: odd, even, none
Modem Control	DTR, DCD, CTS, RTS
Flow Control	CTS/RTS (hardware), XON/XOFF (software) None
Management	Internal web server (Standard Tunneling only) SNMP (read only) Serial login Telnet login
System Software	DeviceInstaller, Windows® 95/98/ME/NT/2000/XP based configuration software
LEDs	Ready, Fault/Configuration, Activity, Link, Serial Transmit, Serial Receive
Compatibility	Ethernet: Version 2.0/IEEE 802.3
Isolation	Ethernet: 1500 Vrms, Serial: 2000 Vrms Galvanic
Agency Approvals	UL, CSA, TUV, FCC, CE, FM Class 1, Div. 2 (pending)





## 2. Getting Started

This section describes all the procedures for configuring your unit. For a short version, see the Quick Start Guide. Go to the Lantronix web site for the latest firmware and release notes.

DSTni-XPress DR comes with Standard Tunnel Protocol and the DSTni-XPress DR-IAP comes with the IAP Standard Tunnel Protocol. Both versions are similar but cannot be interchanged. Standard Tunneling is a serial communications protocol used by most Lantronix Device Servers. It can be configured to Ethernet-enable most serial devices such as barcode scanners, weigh scales, operator panels, data access devices, alpha numeric displays, and thousands of intelligent serial devices. For DSTni-XPress DR-IAP users, see [Industrial Automation Protocols](#) on page 1-4.

Loading industrial protocols to a DSTni-XPress DR-IAP, such as IAP Modbus Bridge, may remove the web pages and change the configure dialogs. See the user manuals on individual protocols for protocol specific settings and configuration dialogs. Protocol manuals are found on the software CD. This section describes the setup and configuration dialogs for the Standard Tunnel Protocol.

*Note: The following information is based on the condition that a DSTni-XPress DR is loaded with Standard Tunnel Protocol. The DSTni-XPress DR-IAP with IAP Standard Tunnel Protocol may have different options available.*

---

## 2.1 Addresses and Port Number

### 2.1.1 Ethernet (MAC) Address

The Ethernet address is also referred to as the hardware address or the MAC address. The first three bytes of the Ethernet Address are fixed and read 00-20-4A, identifying the unit as a Lantronix product. The fourth, fifth, and sixth bytes are unique numbers assigned to each unit.

00-20-4A-21-18-17 or 00:20:4A:21:18:17

### 2.1.2 Internet Protocol (IP) Address

Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit.

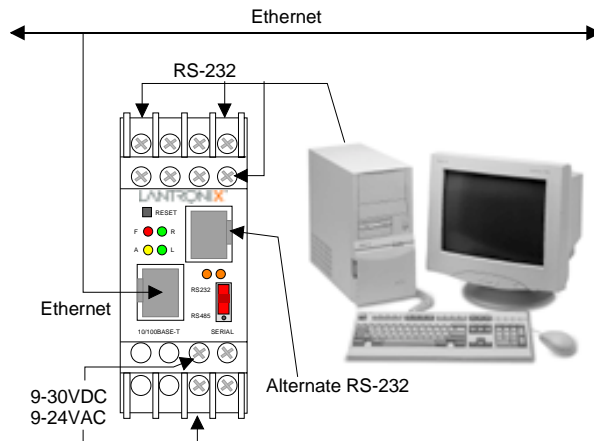
### 2.1.3 Port Number

Every TCP connection and every UDP datagram is defined by a destination IP address and a port number. For example, a Telnet application commonly uses port number 23. A port number is similar to an extension on a PBX system.

The unit's serial channel (port) can be associated with a specific TCP/UDP port number. Port number 9999 is reserved for access to the unit's Setup (configuration) Mode window.

## 2.2 Physically Connecting the Unit

The following diagram shows a typical hardware configuration for the DSTni-XPress DR. Use one of the cables described in [Serial Interface Connections](#) on page 1-9 to connect a PC COM port to the DSTni-XPress DR.



**Figure 5 - DSTni-XPress DR Connected to Serial Device and Network**

1. Connect a serial device to your XPress DR. See [Serial Interface Connections](#) on page 1-9 for more information about cable and connector specifications.
2. Connect an Ethernet cable to the Ethernet port.
3. Supply power to your XPress DR using a 9-30VDC or 9-24VAC source.

*Note: The required input voltage is 9-30VDC, 9-24VAC (3 W maximum).*

4. Supply power to the serial device.

*Note: Connecting a device to an active Ethernet network can disrupt communications on the network. Make sure the device is configured for your application before connecting to an active network.*

## 2.3 Methods of Assigning the IP Address

The unit's IP address must be configured before a network connection is available. You have the following options for assigning an IP to your unit:

Method	Description
DHCP	A DHCP server automatically assigns the IP address and network settings. See <a href="#">DHCP</a> on page 2-5.
DeviceInstaller <b>(Recommended)</b>	You manually assign the IP address using a graphical user interface (GUI) on a PC attached to a network. See <a href="#">DeviceInstaller</a> on page 2-6.
ARP and Telnet	You manually assign the IP address and other network settings at a command prompt using a UNIX or Windows-based system. Only one person at a time can be logged into the configuration port (port 9999). This eliminates the possibility of several people simultaneously attempting to configure the unit. See <a href="#">ARP and Telnet</a> on page 2-12.
AutoIP	This automatic method is appropriate when you have a small group of hosts rather than a large network. This method allows the hosts to negotiate with each other and assign addresses, in effect creating a small network. See <a href="#">AutoIP</a> on page 2-5.
Serial Port Login	You initially configure the unit through a serial connection. See <a href="#">Serial Port Login</a> on page 2-13.

These methods are described in the remaining sections of this chapter.

*Note: In most installations, a fixed IP address is desirable. The systems administrator generally provides the IP address. Obtain the following information before starting to set up your unit:*

*IP Address:*        \_\_\_\_\_

*Subnet Mask:*    \_\_\_\_\_

*Gateway:*        \_\_\_\_\_

### 2.3.1 DHCP

The unit ships with a default IP address of 0.0.0.0, which automatically enables DHCP.

Provided a DHCP server exists on the network, it will assign the unit an IP address, gateway address, and subnet mask when the unit boots up. The XPress DR has acquired an IP address if the red LED stops flashing and the green Status LED is on continuously. (If no DHCP server exists, the unit responds with a diagnostic error: the red Diagnostic LED blinks continuously, and the green Status LED blinks five times. This blinking only continues for about 15 seconds.)

You can use the DeviceInstaller software to search the network for the IP your unit has been assigned by the DHCP server and add it to the managed list. See *Add the Unit to the Manage List* later in this chapter.

*Note: This DHCP address will **not** appear in the unit's standard configuration screens. You can determine your unit's DHCP-assigned IP address from the DHCP server, or in Monitor Mode. When you enter Monitor Mode from the serial port with network connection enabled and issue the NC (Network Communication) command, you will see the unit's IP configuration.*

### 2.3.2 AutoIP

The unit ships with a default IP address of 0.0.0.0, which automatically enables Auto IP within the unit. AutoIP is an alternative to DHCP that allows hosts to automatically obtain an IP address in smaller networks that may not have a DHCP server. A range of IP addresses (from 169.254.0.1 to 169.254.255.254) has been explicitly reserved for AutoIP-enabled devices. The range of Auto IP addresses is not to be used over the Internet.

If your unit cannot find a DHCP server, and you have not manually assigned an IP address to it, the unit automatically selects an address from the AutoIP reserved range. Then, your unit sends out a (ARP) request to other nodes on the same network to see whether the selected address is being used.

- If the selected address is not in use, then the unit uses it for local subnet communication,
- If another device is using the selected IP address, the unit selects another address from the AutoIP range and reboots itself. After reboot, the unit sends out another ARP request to see if the selected address is in use, and so on.

AutoIP is not intended to replace DHCP. The unit will continue to look for a DHCP server on the network. If a DHCP server is found, the unit will switch to the DHCP server-provided address and reboot.

*Note: If a DHCP server is found, but it denies the request for an IP address, the unit does not attach to the network, but waits and retries.*

AutoIP can be disabled by setting the unit's IP address to 0.0.1.0. This setting enables DHCP but disables AutoIP.

---

## 2.4 DeviceInstaller

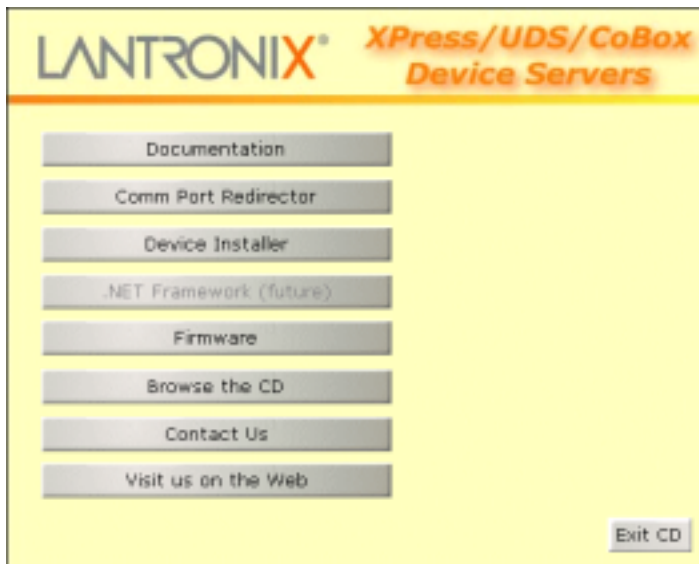
You can manually assign the IP address using DeviceInstaller software, which is found on the product CD. If you want to use a serial connection instead of an Ethernet connection to configure the device, go to [Serial Port Login](#) on page 2-13.

### 2.4.1 Install DeviceInstaller Software

1. Insert the product CD into your CD-ROM drive. The CD will automatically start and display the main window.

If the CD does not launch automatically:

- a) Click the Start button on the Task Bar and select Run.
- b) Enter your CD drive letter, colon, backslash, Launch.exe (e.g., D:\Launch.exe).

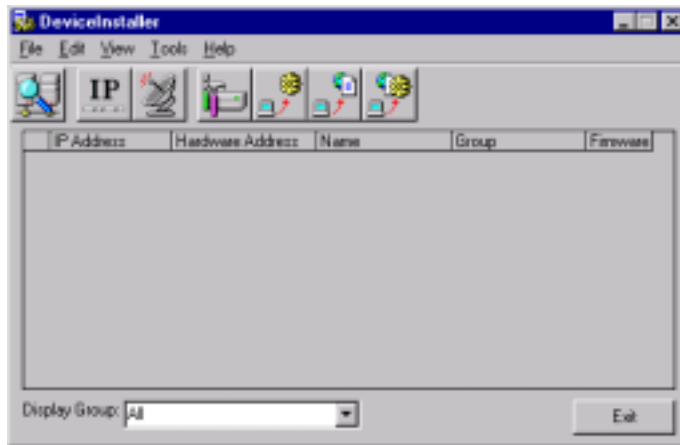


**Figure 6 - CD Main Window**

2. Click the **Device Installer** button. The installation wizard window displays.
3. Respond to the installation wizard prompts. (When prompted to select an installation type, select Typical.)

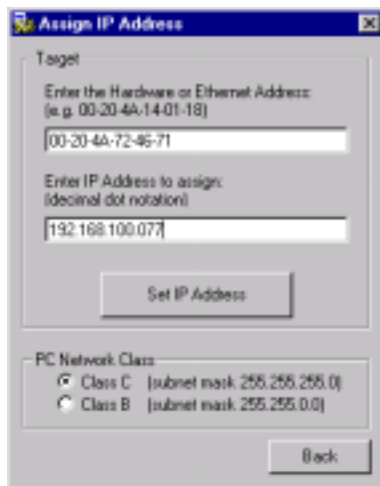
## 2.4.2 Assign IP Address and Network Class

Click the Start button on the Task Bar and select **Programs \Device Installer \Device Installer**. The Device Installer window displays.



**Figure 7 - DeviceInstaller Window**

1. Click the IP icon . The Assign IP Address window displays.



**Figure 8 - Assign IP Address Window**

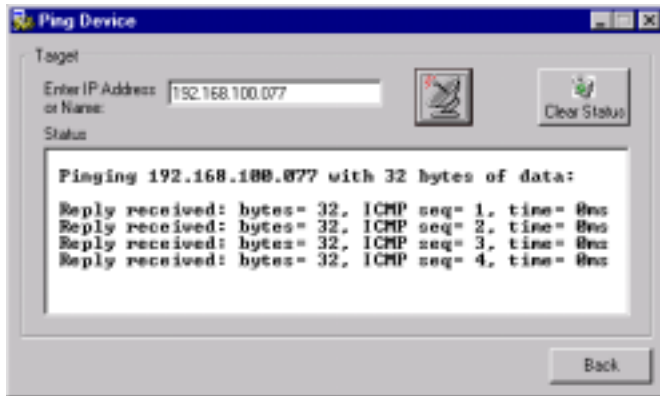
2. In the **Enter the Hardware or Ethernet Address** field, enter the Ethernet address (MAC address), which is listed on the label on the side of the unit.

## Getting Started

3. In the **Enter IP Address to assign** field, enter the unit's IP address in XXX.XXX.XXX.XXX format.
4. In the PC Network Class section, select the class (subnet mask). (Most users select Class C).
5. Click the **Set IP Address** button. (IP is assigned, pinged, and tested)
6. Confirm that the "Assign IP successful" message displays and click OK.
7. Click the **Back** button to return to the DeviceInstaller window.

### 2.4.3 Test the IP Address

1. Click the **Ping** icon . The Ping Device window displays.



**Figure 9 - Ping Device Window**

2. Confirm that "Reply received" messages display in the window, indicating that the IP address has been entered successfully.

*Note: If you do not receive "Reply received" messages, make sure the unit is properly attached to the network and that the IP address assigned is valid for the particular network segment you are working with. If you are not sure, check with your systems administrator.*

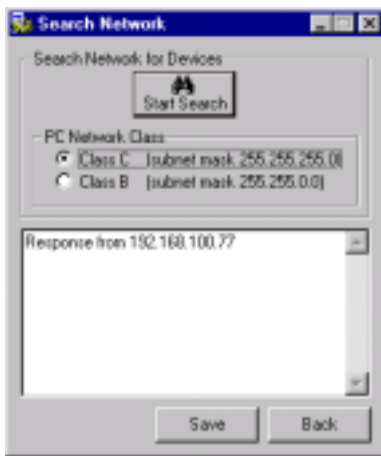
3. Click the Back button to return to the Device Installer window.



## 2.4.4 Add the Unit to the Manage List

Now add the unit to the list of similar Lantronix devices on the network so that you can manage and configure it.

1. Click the **Search the network for devices**  icon. The Search Network window displays.

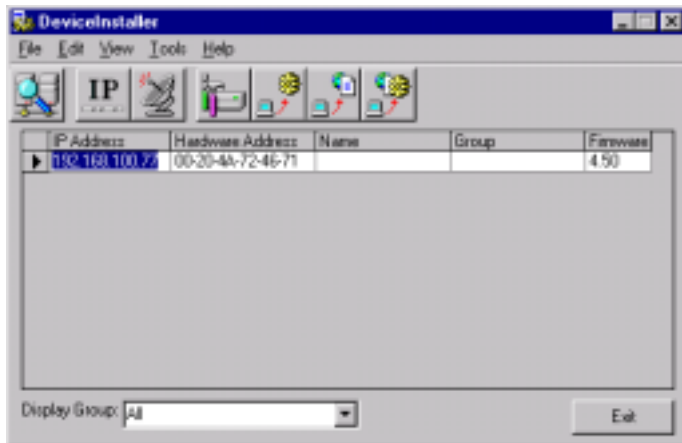


*Figure 10 - Search Network Window*

2. Select the PC Network Class. Class C is the default.
3. Click the **Start Search** button. A list of all active units displays.
4. Click the **Save** button. A confirmation message displays.
5. Click **OK**.

## Getting Started

6. Click the **Back** button to return to the DeviceInstaller window. The DeviceInstaller window now lists all of the devices in the group, including the unit you are setting up. The hardware address and firmware release number for the unit display.



*Figure 11 - Devices in a Group*

Now you can manage (configure) the unit so that it works with the serial device over the network.

## 2.4.5 Opening a Configuration Window



1. Click the **Manage** icon . The Device Management window displays.



**Figure 12 - Device Management Window**

2. Do *one* of the following:

*Note: To assign Expert settings and Security settings, you must use the Setup Mode window in a Telnet session. (only for Standard Tunneling firmware)*

- To configure the unit via a Web browser, click the **Web Configuration** icon . The Lantronix Web-Manager window displays in your browser. For Web Configuration, see [Web Manager Page](#) on page 3-4. (Standard Tunneling only)
- To configure the unit via a Telnet session, click the **Telnet to Device** icon . The Setup Mode window displays. For Telnet Configuration, see [Using a Telnet Connection](#) on page 3-10

3. Continue with the appropriate configuration procedure described in the next chapter.

*Note: The **Get Configuration** icon on the Device Management window allows you to save a configuration locally on your computer as a file. The **Set Configuration** icon sends a saved file to the unit.*

To **Get Configuration** information see [Get Configuration](#) on page 3-27. To **Set Configuration** of a specific device see [Set Configuration](#) on page 3-28.

---

## 2.5 ARP and Telnet

The unit's IP address must be configured before a network connection is available. You are able to ARP an address into a CoBox/UDS device even if there is already an address in the unit. If the unit has no IP address, you can use Address Resolution Protocol (ARP) method from UNIX and Windows-based systems to assign a temporary IP address. If you want to initially configure the unit through the network, follow these steps:

1. On a UNIX or Windows-based host, create an entry in the host's ARP table using the intended IP address and the hardware address of the unit, which is found on the product label on the bottom of the unit. Some UNIX hosts use colons ":" between hardware octets, and some use dashes "-". All Windows hosts use dashes.

```
arp -s 191.12.3.77 00:20:4a:xx:xx:xx
```

*Note: For the ARP command to work on Windows 95, the ARP table on the PC must have at least one IP address defined other than its own.*

2. If you are using Windows 95, type ARP -A at the DOS command prompt to verify that there is at least one entry in the ARP table. If the local machine is the only entry, ping another IP address on your network to build a new entry in the ARP table; the IP address must be a host other than the machine on which you are working. Once there is at least one additional entry in the ARP table, use the following command to ARP an IP address to the unit:

```
arp -s 191.12.3.77 00-20-4a-xx-xx-xx
```

3. Open a Telnet connection to port 1. The connection will fail quickly, but the unit will temporarily change its IP address to the one designated in this step.

```
telnet 191.12.3.77 1
```

4. Finally, open a Telnet connection to port 9999, and press Enter within three seconds to go into Setup Mode. If you wait longer than three seconds, the unit will reboot and you will need to perform step 3 again.

```
telnet 191.12.3.77 9999
```

5. Set all required parameters

*Note: The IP address you just set is temporary and will revert to the default value when the unit's power is reset unless you log into the unit and store the changes permanently. Refer to the chapter on configuration for instructions on permanently configuring the IP address.*

---

## 2.6 Serial Port Login

If you want to initially configure the unit through a serial connection, follow these steps:

1. Connect a console terminal or PC running a terminal emulation program to your unit's serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.
2. To enter Setup Mode, cycle the unit's power (power off and back on). After power-up, the self-test begins and the red Diagnostic LED starts blinking. **You have one second** to enter three lowercase x characters.

*Note: The easiest way to enter Setup Mode is to hold down the **x** key at the terminal (or emulation) while powering up the unit.*

3. At this point, the screen display is the same as when you use a Telnet connection. To continue with a serial port login, go to [Using a Telnet Connection](#) on page 3-10.



## 3. Configuring the Unit

You must configure the unit so that it can communicate on a network with your serial device. For example, you must set the way the unit will respond to serial and network traffic, how it will handle serial packets, and when to start or close a connection. You can configure your unit locally or remotely using the following procedures:

- Use a standard Web browser to access the unit's internal Web pages and configure the unit over the network. This is the easiest and preferred method.
- Use a Telnet connection to configure the unit over the network.
- Use a terminal or terminal emulation program to access the serial port locally.

The unit's configuration is stored in nonvolatile memory (NVRam) and is retained without power. You can change the configuration at any time. The unit performs a reset after the configuration has been changed and stored.

*Note: The menus in this section show a typical device. Your device may have different configuration options.*

---

### 3.1 Configuring via Web Browser



Open your JAVA enabled web browser and enter the IP address. The Lantronix Web Manager page will display. Go to [Web Manager Page](#) on page 3-4 for a summary of the menu selections.

*Note: The DSTni-Xpress DR-IAP may not have a web page or may use a different format web page.*

---

## 3.2 Using DeviceInstaller

DeviceInstaller is a powerful software utility for configuring device servers from a network connection. This section uses the utility to demonstrate the various methods of configuring a device. The Device Management window is a common page for gaining access to different menus.

1. Start DeviceInstaller. Click the **Search for network for devices** icon . The Search Network window displays.
2. Click the **Start Search** button. A list of all active units displays.
3. Click the **Save** button. Click **OK** for the confirmation message. Click the **Back** button.
4. Click the **Manage device configuration** icon  to open the Device Management window.



5. For Web configuration, click the **Web Configuration** icon to start your browser. (A small Web Configuration window appears, showing the IP address.)

Go to [Web Manager Page](#) on page 3-4 for a summary of the menu selections.

*Note: If your unit already has an IP address (see [Methods of Assigning the IP Address](#)), you can log into it using a standard Web browser that is Java enabled. Type the unit's IP address into the Web browser's URL (Address/Location) field.*

6. For Telnet configuration, click the **Telnet to Device** icon. A small Telnet to Device window appears, showing the IP Address and the Port address. The main Lantronix Universal Device Server window opens.



Go to [Using a Telnet Connection](#) on page 3-10 for a summary of the menu selections.

7. To Get device configuration information see [Get Configuration](#) on page 3-27.

Configuration information can be read from a device and saved in a file.

8. To Set the configuration of a specific device see [Set Configuration](#) on page 3-28

A device can be configured by reading a configuration file and sending the information to the device.

Configure

### 3.3 Web Manager Page

*Note: The DSTni-XPress DR-IAP may not have a web page or may use a different format web page.*

You can start a web browser for configuration by opening your JAVA enabled web browser and entering the IP address or by clicking the Web Configuration button on the Device Management window. The Lantronix Web Manager page will display.



**Figure 13 - Lantronix Web-Manager**

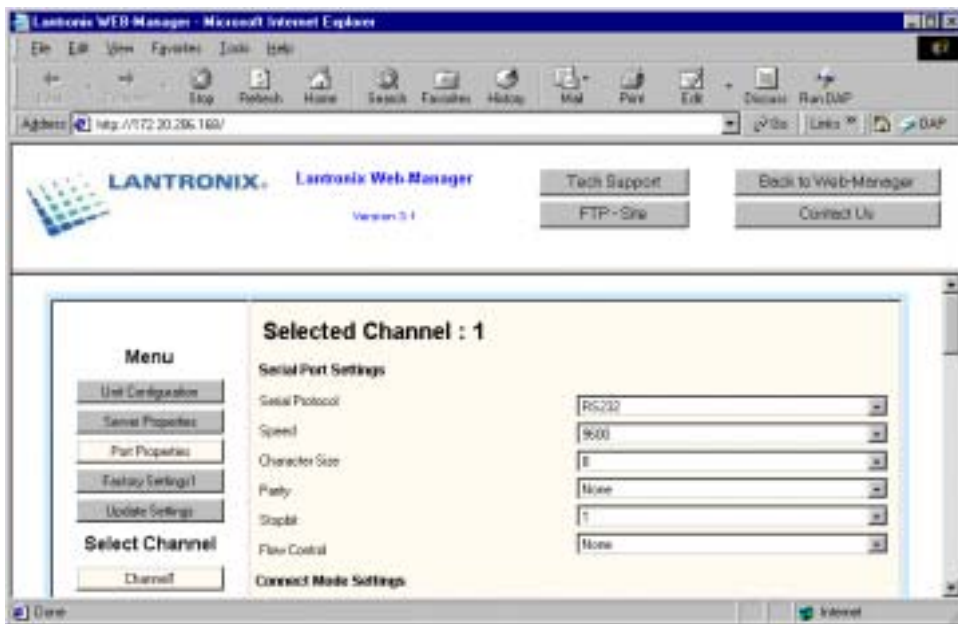
Web Manager 3.1 has the following buttons:

- Unit Configuration
  - Server Properties
  - Port Properties
  - Factory Settings1 (also Factory Settings2 for devices with two serial channels)
  - Update Settings
  - Channel 1 (also Channel 2 for devices with two serial channels)
  - Tech Support
  - FTP – Site
  - Back to Web-Manager
  - Contact Us
1. Use the menu (pushbuttons) to navigate to sub pages where you can configure server settings. See explanations of the configuration parameters later in this chapter.
  2. When you are finished, click the **Update Settings** button to save your settings.

### 3.3.1 Unit Configuration

Click the **Unit Configuration** button to display the following dialog box. This page contains the Server Configuration and the Port Configuration settings. These are static settings read from the device.

*Note: The following screen shots represent the web page shown when the device is loaded with cbxw31.cob firmware.*



**Selected Channel : 1**

**Server Configuration**

Product	Lantronix Universal Device Server
Model	Ethernet 2 Channel
Firmware Version	V4.50
Serial Number	7218033
Hardware Address	00-20-4A-72-45-71
IP Address	192.168.100.77
Subnet Mask	255.255.255.0
Gateway Address	0.0.0.0

## Configure

Port Configuration	
Local Port Number	10001
Remote Port Number	
Serial Port Speed	9600
Flow Control	00
Interface Mode	4C
Connect Mode	C0
Disconnect Mode	00
Flush Mode	00
Pack Control	00
UDP Datagram Type	Not Supported By These Settings

### 3.3.2 Server Properties

You can change the server properties by editing any of the fields. Linger over one of the fields will display operator messages. Changing the IP address will require you to enter the new IP address in the browser to reload the page.

Server Properties	
IP Address	192.168.100.77
Subnet Mask	255.255.255.0
Gateway Address	0.0.0.0
Telnet Password	password

**Figure 14 - Server Properties Configuration on the Web Browser**

#### Telnet Password

In the Telnet Password field, enter a password to prevent unauthorized access to the Setup Mode via a Telnet connection to port 9999. The password is limited to 4 characters. (An enhanced password setting of 16 characters is available under Security Settings on the Telnet Setup Mode window.)

*Note: No password is required to access the Setup Mode window via a serial connection. Remember that the 4 and 16 character passwords are alphanumeric and case sensitive.*

### 3.3.3 Port Properties

Serial Port Settings	
Serial Protocol	RS232
Speed	9600
Character Size	8
Parity	None
Stopbit	1
Flow Control	None

Serial Protocol: RS232, RS422/485 4-wire, RS485 2-wire  
 Speed: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Character Size: 8, 7

Parity: None, Even, Odd

Stop Bit: 1,2

Flow Control: None, XON/XOFF, XON/XOFF Pass Characters to Host, CTS/RTS (Hardware)

Connect Mode Settings	
UDP Datagram Mode	Disable
UDP Datagram Type	<input type="text"/>
<a href="#">Change Address Table</a>	
Incoming Connection	Accept unconditional
Response	Nothing (quiet)
Startup	No Active Connection Startup

UDP Datagram Mode: Enable, Disable

UDP Datagram Type: (User selectable)

Incoming Connection: Accept unconditional, Accept Incoming/DTR (Inactive), Never accept incoming

Response: Nothing (quiet), Character response

Startup: No active startup, with any character, with active DTR (Inactive), with CR (0x0D) only, Manual Connection, Autostart, Modem Mode

## Configure

Dedicated Connection	
Remote IP Address	<input type="text"/>
Remote Port	<input type="text"/>
Local Port	10001

Remote IP Address: (user selectable)  
Remote Port: (user selectable)  
Local Port: 10001 (default 10001, user selectable)

Flush Mode Input Buffer (Line to Network)	
On Active Connection	Disable
On Passive Connection	Disable
At Time To Disconnect	Disable

Flush Mode Input Buffer (Network to Line)	
On Active Connection	Disable
On Passive Connection	Disable
At Time To Disconnect	Disable

On Active Connection: Enable, Disable  
On Passive Connection: Enable, Disable  
At Time of Disconnect: Enable, Disable

Packing Algorithm	
Packing Algorithm	Disable
Idle Time	Force Transmit 12ms
Trailing Characters	None
Send Immediate After Sendchars	Disable
Sendchar Define 2-Byte Sequence	Disable
Send Character 01	00
Send Character 02	00

Packing Algorithm: Enable, Disable  
Idle Time: Force transmit 12 ms, Force transmit 52 ms, Force Transmit 250 ms, Force Transmit 5000 ms  
Trailing Characters: None, One, Two  
Send Immediate After Sendchars: Enable, Disable  
Send Define2-Byte Sequence: Enable, Disable  
Send Character 01: (User Selectable)  
Send Character 02: (User Selectable)

Additional Settings	
Disconnect Mode	Ignore DTR
Check for CTRL-D To Disconnect	Disable
Port Password	Disable
Telnet Mode	Disable
Inactivity Timeout	Enable
Inactivity Timer	0:0
Port Password	

Disconnect Mode: with DTR Drop, Ignore DTR  
 Check for CTRL-D to Disconnect: Enable, Disable  
 Port Password: Enable, Disable  
 Telnet Mode: Enable, Disable  
 Inactivity Timeout: Enable, Disable  
 Inactivity Timer: (User Selectable)  
 Port Password: (User Selectable. Port Password must be enabled)

### 3.3.4 Update Settings

Click the **Update Settings** button to send all changed settings to the device.

### 3.3.5 Technical Support

Several buttons provide direct links to Technical Support functions. You can use the **Tech Support** button to link directly to the Lantronix Tech Support web page, the **FTP-Site** button will link you to the web page for downloading new firmware, manuals, and other files. The **Contact Us** button will link you to the Contact Information page.

---

## 3.4 Configuring via the Setup Mode Window

### 3.4.1 Using a Telnet Connection

To configure the unit over the network, establish a Telnet connection to port 9999.

*Note: If you use the **Telnet to Device** icon on the Device Installer Device Management window **OR** a serial port login to establish the connection, skip steps 1 and 2.*

1. From the Windows Start menu, click **Run** and type the following command, where x.x.x.x is the IP address and 9999 is the unit's fixed network configuration port number.

```
telnet x.x.x.x 9999
```

*Note: Be sure to include a space between the IP address and 9999.*

2. Click **OK**.
3. The **Lantronix Universal Device Server** window displays.

```
*** Lantronix Universal Device Server ***
Serial Number 2D000054 MAC address 00204A2D0036
Software version 05.1b6 (020919) DLX
```

```
Press Enter to go into Setup Mode
```

4. To enter the Setup Mode, **you must press Enter within 5 seconds**. The configuration settings will appear. See [Figure 15 - Setup Mode Window](#) on page 3-11.

*Note: The following line appears only with a Telnet connection.*

```
Model: Device Server Plus+! (Firmware Code: AQ) (see note below)
```

5. Select an option on the menu by entering the number of the option in the **Your choice ?** field and pressing **Enter**.
6. To enter a value for a parameter, type the value and press **Enter**, or to confirm a current value, just press **Enter**.
7. When you are finished, save the new configurations (option **9**). The unit will reboot.

*Note: The Firmware Code AQ represents Standard Tunneling firmware.*



## Configure

```
*** basic parameters
Hardware: Ethernet TPI
IP addr - 0.0.0.0/DHCP/BOOTP/AutoIP, no gateway set
DHCP device name : not set

***** Security *****
SNMP is          enabled
SNMP Community Name:
Telnet Setup is  enabled
TFPT Download is enabled
Port 77Feh is   enabled
Web Server is   enabled
ECHO is         disabled
Enhanced password is disabled

***** Channel 1 *****
Baudrate 9600, I/F Mode 4C, Flow 00
Port 10001
Remote IP Adr: --- none ---, Port 00000
Connect Mode : C0 Disconn Mode: 00
Flush Mode : 00

***** Expert *****
TCP Keepalive      : 45s
ARP cache timeout : 600s
Change Setup      : 0 Server configuration
                   1 Channel 1 configuration
                   5 Expert settings
                   6 Security
                   7 Factory defaults
                   8 Exit without save
                   9 Save and exit

Your choice ?
```

**Figure 15 - Setup Mode Window (Standard Tunneling)**

Configure

### 3.4.2 Using the Serial Port

If you want to initially configure the unit through a serial connection, follow these steps:

1. Connect a console terminal or PC running a terminal emulation program to your unit's serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.
2. To enter Setup Mode, cycle the unit's power (power off and back on). After power-up, the self-test begins and the red Diagnostic LED starts blinking. **You have one second** to enter three lowercase **x** characters (**xxx**).

*Note: The easiest way to enter Setup Mode is to hold down the **x** key at the terminal (or emulation) while powering up the unit.*

3. At this point, the screen display is the same as when you use a Telnet connection. To continue with a serial port login, go to [Using a Telnet Connection](#) on page 3-10.

---

## 3.5 Server Configuration (Network Configuration)

These are the unit's basic network parameters. The following parameters are displayed when you select **Server configuration**.

```
IP Address : (000) .(000) .(000) .(000)
Set Gateway IP Address (N)
Netmask: Number of Bits for Host Part (0=default) (00)
Change telnet config password (N)
```

### 3.5.1 IP Address

The IP address must be set to a unique value in your network. See [Methods of Assigning the IP Address](#) on page 2-3 for more information about IP addressing.

### 3.5.2 Set Gateway IP Address

The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network.

### 3.5.3 Netmask: Number of Bits for Host Part

A netmask defines the number of bits taken from the IP address that are assigned for the host section.

*Note: Class A: 24 bits; Class B: 16 bits; Class C: 8 bits.*

The unit prompts for the number of host bits to be entered, then calculates the netmask, which is displayed in standard decimal-dot notation when the saved parameters are displayed (for example, 255.255.255.0).

**Table 8 - Standard IP Network Netmasks**

Network Class	Host Bits	Netmask
A	24	255.0.0.0
B	16	255.255.0.0
C	8	255.255.255.0

**Table 9 - Netmask Examples**

Netmask	Host Bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
...	...
255.128.0.0	23
255.0.0.0	24

### 3.5.4 Change Telnet configuration password

Setting the Telnet configuration password prevents unauthorized access of the setup menu via a Telnet connection to port 9999 or via Web pages. The password is limited to 4 characters. An enhanced password setting of 16 characters is available under Security Settings for Telnet access only. Passwords are alphanumeric and case sensitive.

*Note: No password is required to access the Setup Mode window via a serial connection.*

Configure

### 3.5.5 DHCP Naming

There are 3 methods for assigning DHCP names to these products.

1) Default DHCP name. If you do not change the DHCP name, and you are using an IP of 0.0.0.0, then the DHCP name will default to CXXXXXXX (XXXXXXX is the last 6 digits of the MAC address shown on the label on the bottom/side of the unit). For example, if the MAC address is 00-20-4A-12-34-56, then the default DHCP name is C123456.

2) Custom DHCP name. You can create your own DHCP name on these products. If you are using an IP address of 0.0.0.0, then the last option in "Server configuration" will be "Change DHCP device name". The "Change DHCP device name" option will allow you to change the DHCP name to an alpha numeric name.

```
Change DHCP device name (not set) ? (N) Y
Enter new DHCP device name : LTX
```

3) Numeric DHCP name. You are able to change the DHCP name by specifying the last octet of the IP address. When you use this method, the DHCP name will be LTXYY where YY is what you chose for the last octet of the IP address. If the IP address you specify is 0.0.0.12, then the DHCP name will be LTX12. This method will only work with 2 digit numbers (0-99).

## 3.6 Channel 1 Configuration (Serial Port Parameters)

Using this option, define how the serial port will respond to network and serial communications.

```

Baudrate (9600)
I/F Mode (4C)
Flow (00)
Port No (10001)
ConnectMode (C0)
Remote IP Address : (000).(000).(000).(000)
Remote Port (00000)
DisConnMode (00)
FlushMode (00)
DisConnTime (00:00) :
SendChar 1 (00)
SendChar 2 (00)

```

### 3.6.1 Baudrate

The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, and 115200 bits per second.

### 3.6.2 I/F (Interface) Mode

The Interface (I/F) Mode is a bit-coded byte that you enter in hexadecimal notation.

*Note: See Table 39 - Binary to Hexadecimal Conversion Table on page 9-1.*

**Table 10 - Interface Mode Options**

I/F Mode Option	7	6	5	4	3	2	1	0
RS-232C <sup>(1)</sup>							0	0
RS-422/485 <sup>(1)</sup>							0	1
RS-485 2-wire <sup>(1)</sup>							1	1
7 Bit					1	0		
8 Bit					1	1		
No Parity			0	0				
Even Parity			1	1				
Odd Parity			0	1				
1 Stop bit	0	1						
2 Stop bit	1	1						

(1) The XPress DR requires you to choose the correct setting in the IF mode, and to also set the front-panel switch for selection of RS-232/RS-485.

## Configure

The following table demonstrates how to build some common Interface Mode settings:

**Table 11 - Common Interface Mode Settings**

<b>Common I/F Mode Setting</b>	<b>Binary</b>	<b>Hex</b>
RS-232C, 8-bit, No Parity, 1 stop bit <sup>(1)</sup>	0100 1100	4C
RS-232C, 7-bit, Even Parity, 1 stop bit <sup>(1)</sup>	0111 1000	78
RS-485 2-Wire, 8-bit, No Parity, 1 stop bit <sup>(1)</sup>	0100 1111	4F
RS-422, 8-bit, Odd Parity, 1 stop bit <sup>(1)</sup>	0101 1101	5D

(1) The XPress DR requires you to choose the correct setting in the IF mode, and to also set the front-panel switch for selection of RS-232/RS-485.

### 3.6.3 Flow

Flow control sets the local handshake method for stopping serial input/output.

**Table 12 - Flow Control Options**

<b>Flow Control Option</b>	<b>Hex</b>
No flow control	00
XON/XOFF flow control	01
Hardware handshake with RTS/CTS lines	02
XON/XOFF pass characters to host	05

### 3.6.4 Port Number

The setting represents the source port number in TCP connections, and is the number used to identify the channel for remote initiating connections. Default setting for Port 1 is 10001.

Range: 0-65535 except for the following reserved port numbers:

Port Numbers	Reserved for
1 – 1024	Reserved (well known ports)
9999	Telnet setup
14000-14009	Reserved
30718	Reserved (77FEh)
10000-10999	Recommended ports, should be used for DeviceComm Manager (COM1-COM256) or direct socket connections

The port number functions as the TCP/UDP source port number for outgoing packets. Packets sent to the unit with this port number are received to this channel. The port number selected is the Incoming TCP/UDP port and Outgoing TCP/UDP source port. Port 0 is used when you want the outgoing source port to change with each connection.

Configure

### 3.6.5 Connect Mode

Connect Mode defines how the unit makes a connection, and how it reacts to incoming connections over the network. Enter Connect Mode options in hexadecimal notation.

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

**Table 13 - Connect Mode Options**

Connect Mode Option	7	6	5	4	3	2	1	0
<b>Incoming Connection</b>								
Never accept incoming	0	0	0					
Accept incoming with DTR <sup>(1)</sup>	0	1	0					
Accept unconditional	1	1	0					
<b>Response</b>								
Nothing (quiet)				0				
Character response (C=conn, D=disconn, N=unreachable)				1				
<b>Startup</b>								
No active startup					0	0	0	0
With any character					0	0	0	1
With active DTR <sup>(1)</sup>					0	0	1	0
With CR (0x0D) only					0	0	1	1
Manual connection					0	1	0	0
Autostart					0	1	0	1
<b>Datagram Type</b>								
Directed UDP					1	1	0	0
<b>Modem Mode</b>								
Full Verbose				1	0	1	1	0
Without Echo				0	0	1	1	0
1-character Response				1	0	1	1	1

(1) Inactive. DTR is hardwired to +12VDC.

**Manual Connection:** When you use manual connection, you are not required to enter the entire IP address if the IP is already configured as the remote IP address in the unit. For example, if the remote IP address already configured in the unit is 129.1.2.3, then an example command string would be C3/7. (This would connect to 129.1.2.3 and port 7.) You may also use a different ending for the connection string. For example, C50.1/23 would connect you to 129.1.50.1 and port 23.



**Table 14 - Manual Connection Address Example**

Command String	Result if remote IP is 129.1.2.3 and remote port is 1234
C121.2.4.5/1	Complete override; connection is started with host 121.2.4.5, port 1
C5	Connect to 129.1.2.5, port 1234
C28.10/12	Connect to 129.1.28.10, port 12

**Autostart (Automatic Connection):** If autostart is enabled, the unit automatically connects to the remote IP address and remote port specified.

**Datagram Type:** When selecting this option, you will be prompted for the Datagram type. Enter **01** for directed or broadcast UDP.

**Modem (Emulation) Mode:** In Modem Mode, the unit presents a modem interface to the attached serial device. It accepts AT-style modem commands, and handles the modem signals correctly.

Normally there is a modem connected to a local PC and a modem connected to a remote machine. A user must dial from the local PC to the remote machine, accumulating phone charges for each connection. Modem Mode allows you to replace modems with device servers, and to use an Ethernet connection instead of a phone call, without having to change communications applications and make potentially expensive phone calls.

To select Modem Mode, set the Connect Mode to **C6** (no echo), **D6** (echo with full verbose), or **D7** (echo with 1-character response).

*Note: If the unit is in Modem Mode and the serial port is idle, the unit can still accept network TCP connections to the serial port if Connect Mode is set to C6 (no echo), D6 (echo with full verbose), or D7 (echo with 1-character response).*

In Modem Mode, echo refers to the echo of all of the characters entered in command mode; it does not mean to echo data that is transferred. Quiet Mode (no echo) refers to the modem not sending an answer to the commands received (or displaying what was typed).

To disconnect a connection using Modem Mode commands:

- There must be 1-second guardtime (no data traffic) before sending +++.
- There must not be a break longer than 1 second between +s.
- There must be another 1-second guardtime after the last + is sent.
- The unit acknowledges with an **OK** to indicate that it is in command mode.
- Enter **ATH** and press **Enter**. It is echoed if echo is enabled. ATH is acknowledged by another **OK**.

Configure

*Table 15 - Modem Mode Commands*

<b>Modem Mode Command</b>	<b>Function</b>
ATDTx.x.x.x,pppp or ATDTx.x.x.x/pppp	Makes a connection to an IP address (x.x.x.x) and a remote port number (pppp).
ATDTx.x.x.x	Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.
ATD0.0.0.0	Forces the unit into monitor mode if a remote IP address and port number are defined within the unit.
ATD	Forces the unit into monitor mode if a remote IP address and port number are not defined within the unit.
ATDx.x.x.x	Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.
ATH	Hangs up the connection (Entered as +++ATH ).
ATS0=n	Enables or disables connections from the network going to the serial port. n=0 disables the ability to make a connection from the network to the serial port. n=1-9 enables the ability to make a connection from the network to the serial port. n>1-9 is invalid.
ATEn	Enables or disables character echo and responses. n=0 disables character echo and responses. n=1 enables character echo and responses.
ATVn	Enables 1-character response or full verbose. n=0 enables 1-character response. n=1 enables full verbose.

*Note: These AT commands are only recognized as single commands like ATE0 or ATV1; compound commands such as ATE0V1 are not recognized. All other AT commands with Modem Mode set to full verbose acknowledge with an OK, but no action is taken.*

### 3.6.6 Remote IP Address

This is the destination IP address used with an outgoing connection.

### 3.6.7 Remote Port

The remote TCP port number must be set for the unit to make outgoing connections. This parameter defines the port number on the target host to which a connection is attempted.

*Note: To connect an ASCII terminal to a host using the unit for login purposes, use the remote port number 23 (Internet standard port number for Telnet services).*

### 3.6.8 DisConnMode

*DTR is hardwired to +12VDC. The Disconnect with DTR drop option is inactive.*

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

**Table 16 - Disconnect Mode Options**

Disconnect Mode Option	7	6	5	4	3	2	1	0
Disconnect with DTR drop <sup>(6)</sup>	1							
Ignore DTR	0							
Telnet mode and terminal type setup <sup>(1)</sup>		1						
Channel (port) password <sup>(2)</sup>				1				
Hard disconnect <sup>(3)</sup>					0			
Disable hard disconnect					1			
State LED off with connection <sup>(4)</sup>								1
Disconnect with EOT (^D) <sup>(5)</sup>			1					

1. The XPress DR will send the "Terminal Type" upon an outgoing connection.

2. A password is required for a connection to the serial port from the network.

3. The TCP connection will close even if the remote site does not acknowledge the disconnection.

4. When there is a network connection to or from the serial port, the state LED will turn off instead of blink.

5. When Ctrl D or Hex 04 are detected, the connection is dropped. Both Telnet mode and Disconnect with EOT must be enabled for Disconnect with EOT to function properly. Ctrl D will only be detected going from the serial port to the network.

6. DTR hardwired to +12VDC. This option is disabled in the DSTni-XPress DR.

Configure

### 3.6.9 Flush Mode (Buffer Flushing)

Using this parameter, you can control line handling and network buffers with connection startup and disconnect. You can also select between two different packing algorithms.

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

**Table 17 - Flush Mode Options**

Function	7	6	5	4	3	2	1	0
<b>Input Buffer (Serial to Network)</b>								
Clear with a connection that is initiated from the UDS to the network				1				
Clear with a connection initiated from the network to the UDS			1					
Clear when the network connection to or from the UDS is disconnected		1						
<b>Output Buffer (Network to Serial)</b>								
Clear with a connection that is initiated from the UDS to the network								1
Clear with a connection initiated from the network to the UDS							1	
Clear when the network connection to or from the UDS is disconnected						1		
<b>Alternate Packing Algorithm (Pack Control)</b>								
Enable	1							

### 3.6.10 Pack Control

Two firmware-selectable packing algorithms define how and when packets are sent to the network. The standard algorithm is optimized for applications in which the unit is used in a local environment, allowing for very small delays for single characters while keeping the packet count low. The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream.

Pack control settings are enabled in Flush Mode. Set this value to 00 if specific functions are not needed.

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

**Table 18 - Pack Control Options**

Option	7	6	5	4	3	2	1	0
<b>Idle Time</b>								
Force transmit: 12ms							0	0
Force transmit: 52ms							0	1
Force transmit: 250ms							1	0
Force transmit: 5sec							1	1
<b>Trailing Characters</b>								
None					0	0		
One					0	1		
Two					1	0		
<b>Send Characters</b>								
2-Byte Send Character Sequence				1				
Send Immediately After Send chars			1					

**Idle Time:** Idle time to "Force transmit" defines how long the unit should wait before sending accumulated characters. This wait period is between characters. If there is an idle period between characters equal to the force transmit set, then the unit will package up the serial data currently in the buffer and send it to the network.

**Trailing Characters:** In some applications, CRC, Checksum, or other trailing characters follow the end-of-sequence character; this option helps to adapt frame transmission to the frame boundary.

## Configure

**Send Characters:** If 2-Byte Send Character Sequence is enabled, the unit interprets the sendchars as a 2-byte sequence; if not set, they are interpreted independently.

If **Send Immediately After Characters** is not set, any characters already in the serial buffer are included in the transmission after a "transmit" condition is found. If set, the unit sends immediately after recognizing the transmit condition (sendchar or timeout).

*Note: A transmission might occur if status information needs to be exchanged or an acknowledgment needs to be sent.*

### 3.6.11 DisConnTime (Inactivity Timeout)

Use this parameter to set an inactivity timeout. The connection is dropped if there is no activity on the serial line before the set time expires. Enter time in the following format: **mm:ss**, where **m** is the number of minutes and **s** is the number of seconds. To disable the inactivity timeout, enter **00:00**.

### 3.6.12 Send Characters

You can enter up to two characters in hexadecimal representation in the parameters "sendchar." If a character received on the serial line matches one of these characters, it is sent immediately, along with any awaiting characters, to the TCP connection. This minimizes the response time for specific protocol characters on the serial line (for example, ETX, EOT, etc.). Setting the first sendchar to **00** disables the recognition of the characters. Alternatively, the two characters can be interpreted as a sequence (see [Pack Control](#) on page 3-23).

### 3.6.13 Telnet Terminal Type

This parameter appears only if the terminal type option is enabled in Disconnect Mode (see [DisConnMode](#) on page 3-21 above). If this option is enabled, you can use the terminal name for the Telnet terminal type. Enter only one name.

If the terminal type option is enabled, the unit also reacts to the EOR (end of record) and binary options, which can be used for applications like terminal emulation to IBM hosts.

### 3.6.14 Channel (Port) Password

This parameter appears only if the channel (port) password option is enabled in Disconnect Mode (see [DisConnMode](#) on page 3-21). If set, you can set a password on the serial port.

---

## 3.7 Expert Settings

These parameters should only be changed if you are an expert and definitely know the consequences the changes might have.

```
TCP Keepalive time in s (1s - 65s; 0s=disable): (45)
ARP Cache timeout in s (1s - 600s) : (600) ?
```

### 3.7.1 TCP Keepalive time in s

This option allows you to change how many seconds the unit will wait during a silent connection before attempting to see if the currently connected network device is still on the network. If the unit then gets no response, it will drop that connection.

### 3.7.2 ARP Cache timeout in s

Whenever the unit communicates with another device on the network, it will add an entry into its ARP table. The ARP Cache timeout option allows you to define how many seconds (1-600) the unit will wait before timing out this table.

---

## 3.8 Security Settings

*Note: You can change these settings via Telnet or serial connections only, not on the Web-Manager. We recommend that you set security over the dedicated network or over the serial setup. If you set parameters over the network (Telnet 9999), someone else could capture these settings.*

```
Disable SNMP (N)
SNMP Community Name <>:
Disable Telnet Setup (N)
Disable TFTP Firmware Update (N)
Disable Port 77FEh (N)
Disable Web Server (N)
Disable ECHO ports (N)
Enable Enhanced Password (N)
```

### 3.8.1 Disable SNMP

This setting allows you to disable the SNMP protocol on the unit for security reasons.

### 3.8.2 SNMP Community Name

This option allows you to change the SNMP Community Name on the unit. This allows for ease of management, and possibly some security. If someone tries to violate security but doesn't know what community to connect to, that person will be unable to get the SNMP

## Configure

community information from the unit. The name is a string of 1 to 13 characters plus a null-terminator (14 bytes total). The default setting is **public**.

### 3.8.3 Disable Telnet Setup

This setting defaults to the N (No) option. The Y (Yes) option disables access to this Configuration Menu by Telnet (port 9999). It only allows access via the Web pages and the serial port of the unit.

### 3.8.4 Disable TFTP Firmware Upgrade

This setting defaults to the N (No) option. The Y (Yes) option disables the use of TFTP to perform network firmware upgrades. With this option, firmware upgrades can be performed only by using a \*.hex file over the serial port of the unit. See *Via the Serial Port* on page 4-6.

### 3.8.5 Disable Port 77FE (Hex)

Port 77FE is a setting that allows DeviceInstaller, Web Pages, and custom programs to configure the unit remotely. You may wish to disable this capability for security purposes. For more information about remote configuration, see the Lantronix Embedded Integration Kit user guide on the Lantronix Web site [www.lantronix.com](http://www.lantronix.com).

The default setting is the N (No) option, which enables remote configuration. You can configure the unit by using DeviceInstaller, Web pages, Telnet, or serial configuration. The Y (Yes) option disables remote configuration and Web pages.

*Note: The Yes option disables many of the GUI tools for configuring the Device Server, including the embedded Web Page Configuration tool.*

### 3.8.6 Disable Web Server

This setting defaults to the N (option). The Y (Yes) option disables the use of the Web Page Configuration tool that is built into the unit.

### 3.8.7 Disable ECHO Ports

Controls whether the serial port will echo characters it receives.

### 3.8.8 Enable Enhanced Password

This setting defaults to the N (option), which allows you to set a 4-character password that protects the Configuration Menu via Telnet and Web pages. The Y (Yes) option allows you to set an extended security password of 16-characters for protecting Telnet access. Passwords are alphanumeric and case sensitive.



---

### 3.9 Factory Defaults

Select **7** to reset the unit's Channel 1 and Enhanced Security to the factory default settings. The server configurations (IP address information) remain unchanged.

---

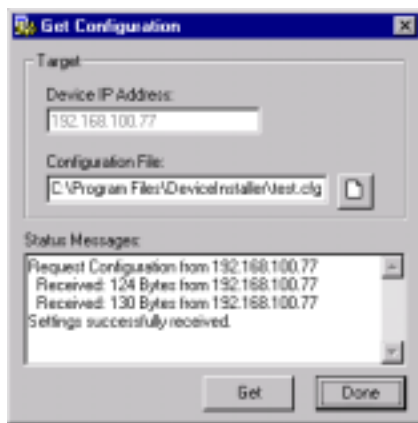
### 3.10 Exit Configuration Mode

Select **8** to exit the configuration mode without saving any changes or rebooting. Select **9** to save all changes and reboot the device. All values are stored in nonvolatile memory.

---

### 3.11 Get Configuration

The device configuration information is stored in flash memory and can be read and saved in a configuration file (filename.cfg). To get the configuration information, click the Get Configuration icon button on the Device Management window. The following dialog appears.



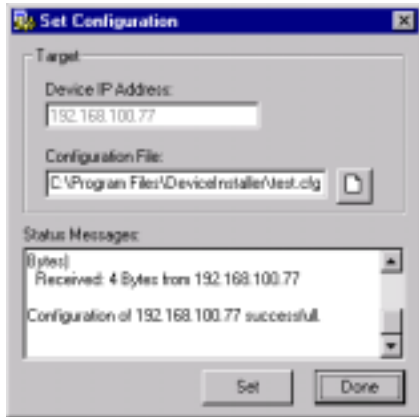
The Device IP Address is shown in the first field. This is the device selected in the DeviceInstaller main window. In the Configuration File field, click the Open File button to select a filename for the configuration file. Click the Get button and the file information is read from the device and saved in the selected file.

Configure

---

### 3.12 Set Configuration

Device configuration information can be saved in a file and later used to set the configuration of one or several devices. To set the configuration of a device from a saved file, click the Set Configuration button on the Device Management window. The following dialog appears.



The Device IP Address is shown in the first field. This is the device selected in the DeviceInstaller main window. In the Configuration File field, click the Open File button to select a configuration file. Click the Set button and the file information is read and stored in the device.

## 4. Updating Protocol (Firmware)

### 4.1 Protocol Firmware

The DSTni-XPress DR-IAP was designed to allow loading of vendor specific protocol firmware. This firmware takes the place of the Standard Tunnel Protocol. Vendor specific protocols and the software tools needed to load them can be found on the software CD.

You can obtain the most up-to-date protocol firmware and release notes for the unit from the Lantronix Web site ([www.lantronix.com](http://www.lantronix.com)) or by using anonymous FTP ([ftp.lantronix.com](ftp://ftp.lantronix.com)).

Once you load a vendor specific protocol, you must reference the user manual associated with that protocol, since many of the setup and configuration dialogs will be changed. Some features, such as web pages, may not be available with certain vendor protocols.

*Note: If you change the protocol to a vendor specific protocol, you MUST reference the associated protocol manual for setup and configuration information. The menu options shown in this manual are for Standard Tunnel Protocol.*

### 4.2 Reloading Protocol Firmware

There are several ways to update the unit's internal operational code (\*.ROM): via DeviceInstaller (the preferred way), via TFTP, via another unit, or via the serial port. You can also update the unit's internal Web interface (\*.COB) via TFTP or DeviceInstaller.

The firmware files are located on the software CD in the **firmware** folder and they are installed in the Program Files\DeviceInstaller\Firmware folder. Here is a list of typical names for those files. Check the Lantronix web site for the latest versions and release notes.

**Table 19 - Protocol Firmware**

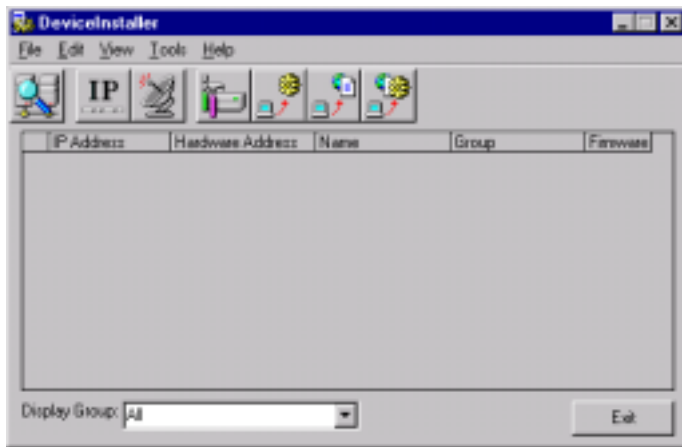
Folder Name	ROM File	COB
DA -XPress \Standard Tunnel	AQDX0510.ROM	cbxw324.cob
DA -XPress \DF1 MultiMaster	DFMD0150.ROM	NA
DA -XPress \Modbus Bridge	AMDx0200.ROM	NA

Firmware

### 4.2.1 Via DeviceInstaller

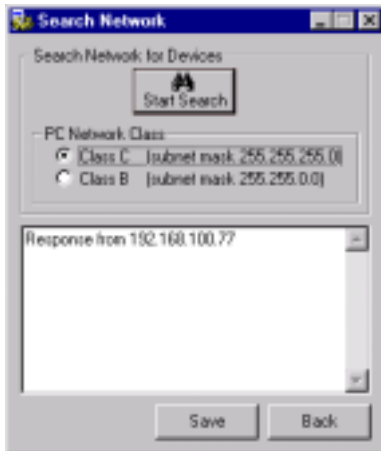
After downloading the firmware to your computer, or locating the file on your software CD, you can use DeviceInstaller to install it.

1. Download the updated firmware files from [www.lantronix.com](http://www.lantronix.com) or [ftp.lantronix.com](ftp://ftp.lantronix.com) and store them in a subfolder on your computer.
2. Click the **Start** button on the Task Bar and select **Programs\DeviceInstaller\Device Installer**. The Device Installer window displays.



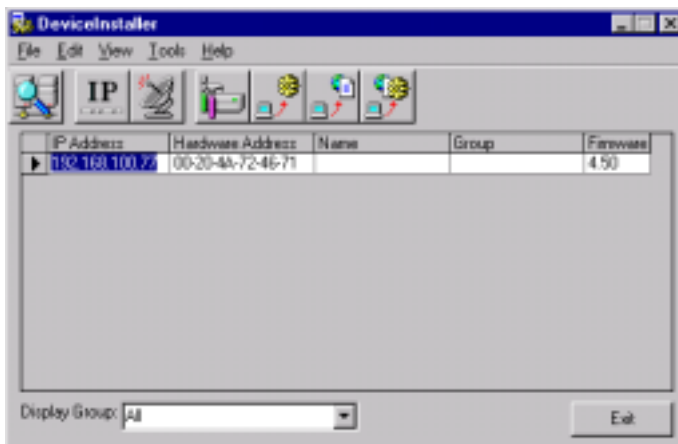
*Figure 16 - Device Installer*

- Click the **Search the network for devices** icon . The Search Network window displays.



**Figure 17 - Search Network Window**

- Select a **PC Network Class**.
- Click the **Start Search** button. A list of all active units on the local network displays.
- Click the **Save** button. A confirmation message displays.
- Click **OK**.
- Click the **Back** button to return to the Device Installer window. The Device Installer window now lists all of the devices in the group, including the unit you are updating.

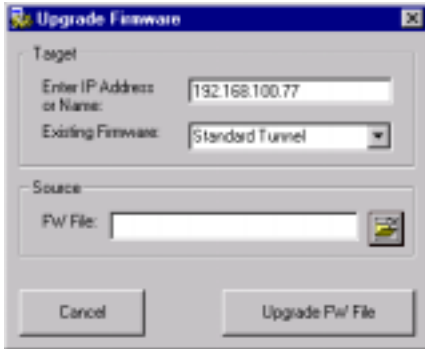


**Figure 18 - Devices in a Group**

## Firmware

9. Select the desired unit and click the **Upgrade Firmware file (.ROM)** icon  The Upgrade Firmware window displays.

*Note: For Device Installer v2.0, the ProductInfobase.txt file must have the following line added: “DA”, IAP-Dlx”. The file is located in Program Files\DeviceInstaller\Firmware.*



**Figure 19 - Upgrade Firmware**

10. In the **Existing Firmware** list box, select the firmware currently installed. (Example: XPress Family IAP) This selection must match the installed Firmware file type or an error message will be displayed.
11. In the **Source FW File** field, locate the firmware file from the software CD or the file you downloaded from the Lantronix web site. (Example: AQDX0510.ROM)
12. Click the **Update FW File** button. Upgrade status process messages display in the lower part of the window. When the process is complete, the “File upgrade successful” message displays.
13. Click **OK**.

*Note: You can update the unit’s Web pages by clicking the **Upgrade Web files (.COB)** icon. Though it would be rare to need to update both the firmware and Web pages at the same time, you can do so by clicking the **Update the firmware files and Webpages in one step** icon.*

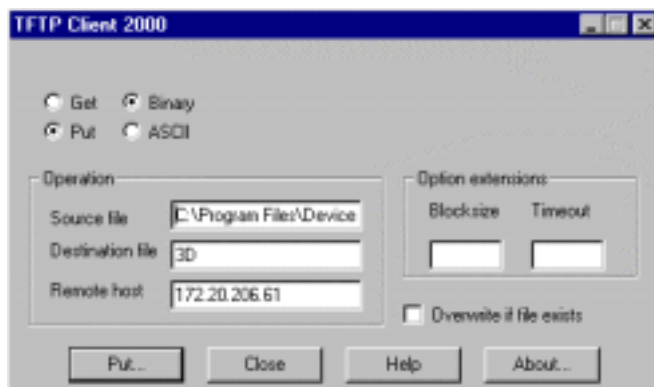
## 4.2.2 Via TFTP

To download new firmware from a computer:

1. Use a TFTP client to send a binary file to the unit (\*.ROM to upgrade the unit's internal operational code and \*.COB to upgrade its internal Web interface).

*Note: TFTP requires the **.ROM** (binary) version of the unit's internal operational code.*

2. Make sure the **Put** and **Binary** options at the top of the window are selected.
3. Enter the full path of the firmware file in the **Source File** field.
4. In the **Destination File** field, enter the **current** internal operational code or **WEB5** for the internal Web interface. (DA=XPress Family IAP)
5. In the **Remote Host** field, enter the IP address of the unit being upgraded.
6. Click the **Put** button to transfer the file to the unit.



**Figure 20 - TFTP Dialog Box**

The unit performs a power reset after the firmware has been loaded and stored.

## 4.2.3 Via Another Unit

To distribute firmware to another unit over the network:

1. Enter the host unit's Monitor Mode (see [Monitor Mode](#) on page 7-1).
2. Send the firmware to the receiving unit using the **SF** command, where x.x.x.x is the receiving unit's IP address.

SF x.x.x.x

The receiving unit performs a power reset after the firmware has been loaded and stored.

*Note: You can only update your unit's internal Web interface using TFTP or Device Installer.*

## Firmware

### 4.2.4 Via the Serial Port

The following procedure is for using the HyperTerminal software application. In some cases, the HEX format file is available on the software CD and on the Web site.

Before you can load firmware through the serial port you need to convert the ROM code to HEX format. There is a DOS application, R2H.EXE that can be used to convert the ROM file to HEX format. The R2H.EXE application is available at <ftp://ftp.lantronix.com/pub>.

Put R2H.EXE and the \*.ROM file into the same directory on a PC then open a DOS Window to that directory and type:

```
C:\ R2H filename
```

This will create a filename.hex file that you can load via the serial port.

*Note: **Do not switch off the power supply during the update.** A loss of power while reprogramming will result in a corrupt program image and a nonfunctional unit.*

To download firmware from a computer via the unit's serial port:

1. Enter Monitor Mode via the serial port. (see [Monitor Mode](#) on page 7-1).
2. Download the firmware to the unit using the **DL** command.
3. Select **Send Text File** and select the \*.HEX file to be downloaded. The downloaded file must be the **.HEX** (ASCII) version.
4. After the final record is received, the unit checks the integrity of the firmware image before programming the new firmware in the flash ROM. The following message displays when the firmware upgrade is complete.

```
*** NodeSet 2.0 ***  
0>DL  
02049 lines loaded.
```

*Note: You can only update your unit 's internal Web interface using TFTP or Device Installer.*

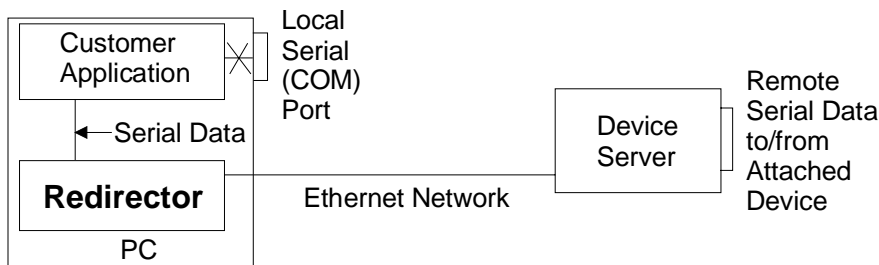


## 5. Comm Port Redirector

### 5.1 Overview

The Com Port Redirector allows any PC running Windows to use ports on a network server as if they were connected directly to the PC. The Redirector creates a virtual COM port within Windows, which for most purposes acts just like the selected serial port on the server. Whenever this virtual port is accessed, the redirector forms a network connection to the server, and routes all data between the physical serial port on the server and the virtual port within windows. This allows a modem on a server to be shared by many PC users, thus the name of "modem sharing" which is commonly used to describe this.

The Redirector support both IP and IPX. For IP, you must have IP installed and bound to your network card, and a server which supports TCP socket connections to its serial ports. For IPX, you must have IPX/SPX installed and bound to your network card, and the server must support IPX/SPX connections to its serial ports.



### 5.2 Installing Comm Port Redirector

The Comm Port Redirector software is included on the product CD or it can be downloaded from the Lantronix web site.

*Note: Comm Port Redirector is not suitable for use with Modbus Bridge firmware.*

*Comm Port Redirector (CPR) will not work with RSLinx v2.31. You must use DeviceComm Manager which can be downloaded from the Lantronix website.*

*When using Device Comm Manager (DCM) in conjunction with Rockwell's RSLinx v2.31, it is important to put 14001 in the "Port:" field of DCM. The Setup Menu of the DF1 firmware says the "Redirector Socket" number is 3001. This is because it is assumed you will be using CPR, and in the setup of CPR the port number would be 3001 as specified. But, when using DCM the port number must be 14001.*

### 5.2.1 Install Comm Port Redirector

1. Insert the product CD into your CD-ROM drive. The CD will automatically start and display the main window.

If the CD does not launch automatically:

- a) Click the Start button on the Task Bar and select Run.
- b) Enter your CD drive letter, colon, backslash, Launch.exe (e.g., D:\Launch.exe).



*Figure 21 - Main Window*

2. Click the **Comm Port Redirector** button. The installation wizard window appears.

---

### 5.3 Using Redirector

When the redirector is properly configured, starting your communications application will cause the redirector to open a connection to the server. As soon as the application accesses the virtual com port, a connection will be formed.

While the connection is being established, a message window will indicate what is happening. If any problems occur, they will be displayed in these message windows.

A similar message window will appear when the connection is terminated. Usually the connection terminates when the communications application is finished using it. Sometimes, the connection will fail while the application is trying to use it. This could happen because of a network failure or if a privileged user logs out the port being used. In this case, a message window will appear indicating that the connection was terminated, and the application will no longer be able to communicate with the modem.

To view the Com Redirector release notes, go to **Programs\Com Redirector** and select **Release Notes**.

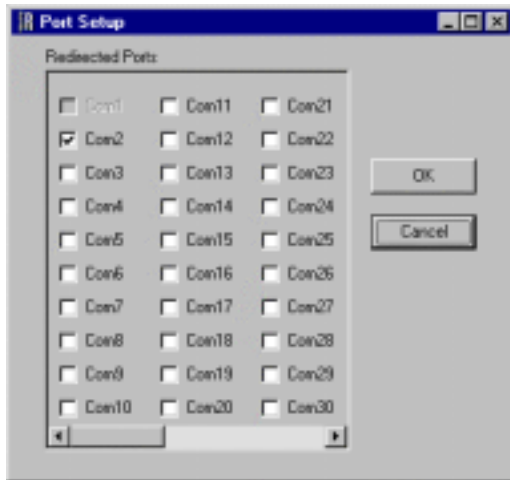
Start Redirector by going to **Programs\Com Redirector** and selecting **Configuration**. The following dialog box appears.



## Comm Port Redirector

### 5.3.1 Port Setup

Click on "**Com Setup**" from the main window to set up which ports will be redirected.



The Redirector can support up to 4 ports. These ports can all be active simultaneously. For instance you can set up COM3-COM6 to be redirected, each to a separate (or identical) list of services, and have 4 different comm apps each talking to a different port at once.

### 5.3.2 Comm App Setup

Redirected ports behave in much the same way as local serial ports.

A typical configuration would be to add a modem under Control Panel->Modems with its port set to the Com Port Redirector port and then to reference that modem in the communications application. If the services that are being referenced use different types of modems then the modem type should be setup to be the "common denominator," like "Standard 14400" or "Standard 28800."

Certain applications which are not fully compatible with Windows 95/NT will not reference the installed modems so it's necessary to reference the redirected port directly. In this case configure the application to reference the Com port that is being redirected (COM3 or COM4 for example).

### 5.3.3 IP Service Configuration

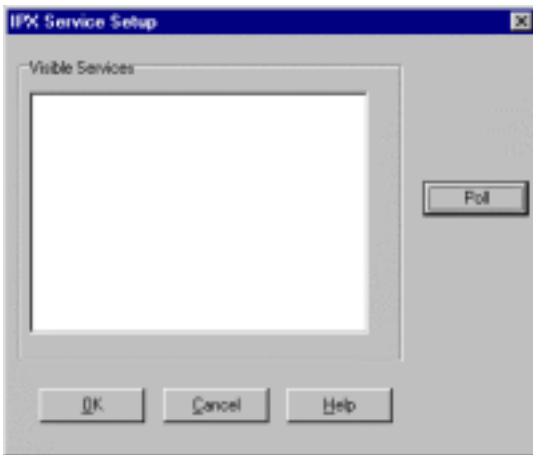
To redirect over IP, select **Add IP** from the main window. The IP Service dialog box appears.



In the "Host Name" field enter the IP hostname or IP address of the server you are connecting to. In the "TCP Port" field enter the TCP socket on the server you are connecting to.

### 5.3.4 IPX Service Configuration

To redirect over IPX, select "Add IPX" from the main window. This will bring up a dialog with a list of all visible IPX services on the network. If your service doesn't appear in this list then click "Poll" to rescan for services. Select a service from this list and click "OK" to accept it.



### 5.3.5 Port Settings

If auto reconnect is enabled, the redirector will try to reestablish the network connection if the connection goes down. (Cant find this option) If **Timeout Reconnect** is enabled, the connection will be reestablished if the connection times out (see TCP Keepalive). If **Server Reconnect** is enabled, the connection will be reestablished if the server purposely closes the connection.

When auto reconnecting, the redirector will keep trying to reconnect until the connections succeeds or the user hits Cancel in the popup connection dialog.

If the port was closed by the comm app or by clicking **Disconnect**, then the redirector does not try to auto reconnect.

The **Connection Timeout** is the number of seconds to attempt a connection before failing. If auto reconnect is enabled then each connection attempt will last this long. If auto reconnect is disabled then the connection attempt will fail out after this interval.

### 5.3.6 Listen Mode

The redirector can be set up to listen for an incoming connection over TCP/IP. In this mode, when the comm app opens the COM port the redirector tells the comm app that the port is open, but goes into a listening state. When the server initiates a connection into the PC, data transfer between the PC and the server proceeds normally. The redirector can be configured in one of two listen modes:

#### 1. Listen once

In this mode the redirector will accept an incoming connection and if the remote side closes the connection, the redirector will notify the comm app that the port is closed. The comm app has to re-open the port in order to go back into listen mode.

To configure this mode set the IP host name field in the IP Service Setup screen to "listen" (without the quotes) and set the port number field to the port that the PC will be listening on. For instance, if you wanted the PC to listen on port 3200, set the host name to "listen" and the port to 3200.

#### 2. Listen auto

In this mode the redirector will accept an incoming connection and if the remote side closes the connection, the redirector will automatically go back into listen mode without notifying the comm app that anything has happened.

To configure this mode set the IP host name field in the IP Service Setup screen to "listen\_auto" (without the quotes) and set the port number field to the port that the PC will be listening on. For instance, if you wanted the PC to listen on port 3200, set the host name to "listen\_auto" and the port to 3200.

On the server, configure the connection for a raw TCP connection to the port that is specified in the Service Setup screen. See the documentation or tech tip for your server to find out how to set up an outbound raw TCP connect.

### **5.3.7 Silent Mode**

Check the "Silent" checkbox to suppress the popup window messages from the Redirector. This option will not take effect until you click "Save."

### **5.3.8 TCP Keepalive**

Click the Advanced button to display the Advanced Settings dialog box.

The TCP keepalive time specifies how long to wait on an idle connection before the PC starts sending keepalive packets. A keepalive packet is a packet sent to the server to see if it is still alive. If the server responds then the keepalive timer is reset. If it does not respond then the PC resends the packet several times at short intervals. After a certain number of non-responses, the connection is timed out. At this point the connection is either closed or auto reconnected.

There are two important things to note:

1. This setting is global to the PC, so anything which enables TCP keepalives will use this setting.
2. The timeout is specified in milliseconds. 1 second = 1000 milliseconds, so if you want a timeout of 1 minute, the value needs to be 60000. The default Windows timeout value is 7,200,000 (2 hours).





## 6. Troubleshooting

---

### 6.1 Technical Support

This chapter discusses how you can diagnose and fix errors quickly without having to contact a dealer or Lantronix.

It helps to connect a terminal to the serial port while diagnosing an error to view summary messages that may be displayed. When troubleshooting, always ensure that the physical connections (power cable, network cable, and serial cable) are secure.

*Note: Some unexplained errors might be caused by duplicate IP addresses on the network. Make sure that your unit's IP address is unique.*

#### 6.1.1 Technical Support

If you are experiencing an error that is not described in this chapter, or if you are unable to fix the error, you may:

- Check our online knowledge base at [www.lantronix.com/support](http://www.lantronix.com/support)
- E-mail us at [E-mail: support@lantronix.com](mailto:support@lantronix.com)
- Call us at:
  - (800) 422-7044 Domestic
  - (949) 453-7198 International
  - (949) 450-7231 Fax

Our phone lines are open from 6:00AM - 5:30 PM Pacific Time Monday through Friday excluding holidays.

Firmware downloads, FAQs, and the most up-to-date documentation are available at: [www.lantronix.com/support](http://www.lantronix.com/support)

#### **Technical Support Europe, Middle East, and Africa**

+49 (0) 7720 3016 20/57

[eu\\_techsupp@lantronix.com](mailto:eu_techsupp@lantronix.com)

## Troubleshooting

When you report a problem, please provide the following information:

- Your name, and your company name, address, and phone number
- Lantronix model number
- Lantronix serial number
- Software version (on the first screen shown when you Telnet to port 9999)
- Description of the problem
- Debug report (stack dump), if applicable
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem)

When troubleshooting the following problems, make sure that the XPress DR is powered up and the Link (L) LED is lit solid green. If the Link LED is not lit, then the physical network connection is bad. Confirm that you are using a good network connection.

**Table 20 - Problems and Error Messages**

<b>Problem/Message</b>	<b>Reason</b>	<b>Solution</b>
When you issue the <b>ARP -S</b> command in Windows, "The ARP entry addition failed: 5" message displays.	Your currently logged-in user does not have the correct rights to use this command on this PC.	Have someone from your IT department log you in with sufficient rights.
When you attempted to assign an IP address to the device server via the ARP method, "Press Enter to go into Setup Mode" is displayed. Now when you Telnet to the device server, the connection fails.	When you Telnet into port 1 on the device server, you are only assigning a temporary IP address. When you Telnet into port 9999 and do not press Enter quickly, the device server will reboot, causing it to lose the IP address.	Telnet back into Port 1. Wait for it to fail, then Telnet to port 9999 again. Make sure you press Enter quickly.
When you Telnet to port 9999, the message "Press Enter to go into Setup Mode" displays. However, nothing happens when you press Enter, or your connection is closed.	You did not press Enter quickly enough. You only have 5 seconds to press Enter before the connection is closed.	Telnet to port 9999 again, but press Enter as soon as you see the message "Press Enter to go into Setup Mode."
When you Telnet to port 1 to assign an IP address to the device server, the Telnet window does not respond for a long time.	You may have entered the Ethernet address incorrectly with the ARP command.	Confirm that the Ethernet address that you entered with the ARP command is correct. The Ethernet address may only include numbers 0-9 and letters A-F. In Windows and usually in Unix, the segments of the Ethernet address are separated by dashes. In some forms of Unix, the Ethernet address is segmented with colons.
	The IP address you are trying to assign is not on your logical subnet.	Confirm that your PC has an IP address and that it is in the same logical subnet that you are trying to assign to the device server.
	The device server may not be plugged into the network properly.	Make sure that the Link LED is lit. If the Link LED is not lit, then the device server is not properly plugged into the network.
When you try to assign an IP with Device Installer, you get the following message:  "No response from device! Verify the IP, Hardware address and Network Class. Please try again."	The cause is most likely one of the following: The Hardware address you specified is incorrect. The IP address you are trying to assign is not a valid IP for your logical subnet. You did not choose the correct subnet mask.	Double-check the parameters that you specified. Tip: You cannot assign an IP address to a device server through a router.

## Troubleshooting

<b>Problem/Message</b>	<b>Reason</b>	<b>Solution</b>
No LEDs are lit.	The unit or its power supply is damaged.	Change power supplies.
The device server will not power up properly, and the LEDs are flashing.	Various	Consult the LEDs section in the Introduction chapter or the Quick Start for the LED flashing sequence patterns. Call Lantronix Technical Support if the blinking pattern indicates a critical error.
The device server is not communicating with the serial device it is attached to.	The most likely reason is the wrong serial settings were chosen.	The serial settings for the serial device and the device server must match. The default serial settings for the device server are RS232, 9600 Baud, 8 Character Bits, No Parity, 1 Stop Bit, No Flow Control.
When you try to enter the setup mode on the device server via the serial port, you get no response.	The issue will most likely be something covered in the previous problem, or possibly you have Caps Lock on.	Double-check everything in the problem above. Confirm that Caps Lock is not on.
You can ping the device server, but not Telnet to the device server on port 9999.	There may be an IP address conflict on your network  You are not Telnetting to port 9999.  The Telnet configuration port (9999) is disabled within the device server security settings.  A network device, such as a router, is blocking port 9999.	Turn the device server off and then issue the following commands at the DOS prompt of your computer: ARP -D X.X.X.X (X.X.X.X is the IP of the device server) PING X.X.X.X (X.X.X.X is the IP of the device server).  If you get a response, then there is a duplicate IP address on the network (the LEDs on the device server should flash a sequence that tells you this). If you do not get a response, use the serial port to verify that Telnet is not disabled.
With Device Installer you get the "Wrong Password" error when you try to upgrade the firmware.	You have chosen the incorrect setting for the <b>Existing Firmware</b> field.	Try upgrading the firmware again, but make sure to use the correct setting in the field of <b>Existing Firmware</b> field.

<b>Problem/Message</b>	<b>Reason</b>	<b>Solution</b>
<p>The device server appears to be set up correctly, but you are not communicating with your device attached to the device server across the network.</p>	<p>If you are sure that the serial port setting is correct, then you may not be connecting to the correct socket of the device server.</p> <p>Check the cables and wiring.</p>	<p>You can check to see whether there is a socket connection to or from the device server by looking at the Ready LED.</p> <p>If the Ready LED is blinking consistently then there is a good socket connection.</p> <p>If the Ready LED is solid green, then the socket connection does not exist. Use the Connect Mode option C0 for making a connection to the device server from the network. Use Connect Mode option C1 or C5 for a connection to the network from the device server. See the full list of Connect Mode Options in the Binary to Hexadecimal chapter.</p>
<p>When connecting to the Web-Manager within the device server, the message "No Connection With CoBox" displays.</p>	<p>Your computer is not able to connect to port 30718 (77FEh) on the device server.</p>	<p>Make sure that port 30718 (77FEh) is not blocked with any router that you are using on the network. Also make sure that port 77FEh is not disabled within the Security settings of the device server.</p>



## 7. Monitor Mode

---

### 7.1 Monitor Mode

Monitor Mode is a command-line interface used for diagnostic purposes (see [Table 21 - Monitor Mode Commands](#)). There are two ways to enter Monitor Mode: locally via the serial port or remotely via the network.

#### 7.1.1 Entering Monitor Mode Via the Serial Port

To enter Monitor Mode locally:

1. Follow the same principles used in setting the serial configuration parameters (see [Configuring via the Setup Mode Window](#) on page 3-10).
2. Instead of typing three “x” keys, however, type zzz (or xxl) to enter Monitor Mode with network connections.

Type yyy to enter Monitor Mode without network connections.

3. A 0> prompt indicates that you have successfully entered Monitor Mode.

#### 7.1.2 Entering Monitor Mode Via the Network Port

To enter Monitor Mode using a Telnet connection:

4. First establish a Telnet session to the configuration port (9999). The following message appears:

```
Serial Number 1400280  MAC address 00:20:4A:14:01:18
Software Version 4.3 (xxxxxxx)
Press Enter to go into Setup Mode
```

5. Type M (upper case).

A 0> prompt indicates that you have successfully entered Monitor Mode.

#### 7.1.3 Monitor Mode Commands

The following commands are available in Monitor Mode. Many commands have an IP address as an optional parameter (xxx.xxx.xxx.xxx). If the IP address is given, the command is applied to another network device with that IP address. If no IP address is given, the command is executed locally.

*Note: All commands must be given in capital letters.*

Monitor Mode

**Table 21 - Monitor Mode Commands**

Command		Function
DL	Download	Download firmware to the Device Server via the serial port in hex format
SF x.x.x.x	Send Firmware	Send firmware to Device Server with IP address x.x.x.x
VS x.x.x.x	Version	Query software header record (16 bytes) of Device Server with IP address x.x.x.x
GC x.x.x.x	Get Configuration	Get configuration of Device Server with IP address x.x.x.x as hex records (120 bytes)
SC x.x.x.x	Send Configuration	Set configuration of Device Server with IP address x.x.x.x from hex records
PI x.x.x.x	Ping	Ping Device Server with IP address x.x.x.x to check device status
AT	ARP Table	Show the Device Server's ARP table entries
TT	TCP Connection Table	Shows all incoming and outgoing TCP connections
NC	Network Connection	Shows the Device Server's IP configuration
RS	Reset	Resets the Device Server's power
SI xxx.xxx.xxx.xxx: yyy.yyy.yyy.yyy	Send/Set IP Address	Remotely assign an IP address to a Device Server, where xxx.xxx.xxx.xxx is the IP address, and yyy.yyy.yyy.yyy is the two-part identification number at the bottom of the label, converted to decimal, and written twice.
QU	Quit	Exit diagnostics mode
G0, G1, ..., Ge, Gf	Get configuration from memory page	Gets a memory page of configuration information from the device.
S0, S1, ..., Se, Sf	Set configuration to memory page	Sets a memory page of configuration information on the device.

Responses to some of the commands are given in Intel Hex format (see [The Intel Hex Format](#) on page 8-5).

*Note: You may be required to enter QU twice to exit monitor mode.*

Entering any of the commands listed above will generate one of the following command response codes:

**Table 22 -Command Response Codes**

Response	Meaning
0>	OK; no error
1>	No answer from remote device
2>	Cannot reach remote device or no answer
8>	Wrong parameter(s)
9>	Invalid command



## 8. Network Configuration using UDP

### 8.1 UDP Datagrams

The Device Server can also be configured or queried over the network using UDP datagrams. The Device Server has a UDP listener set for port 30718 (77FE Hex). Responses from the Device Server are returned to the source port of the UDP packet.

The first three bytes of the UDP data block should be set to zero. The fourth byte selects the function as described in the following table:

**Table 23 - UDP Configuration**

Byte	Command	Parameters	Notes
03	Node Reset	2 bytes, software type	These 2 bytes are used to prevent accidental reset of the Device Server. (Value for standard CoBox firmware: 33 51 [Hex], 3Q)
F6	Query for Firmware Version	None	The Device Server responds with the F7 block below.
F7	Firmware Information	First 16 bytes of the firmware image, and 4 bytes device information and serial number.	The first 16 bytes of the firmware image contain the software type (offset 4,5) and checksum (offset 14,15). The last two bytes of the device information contain the serial number.
F8	Query for Setup Record	None	The Device Server responds with the F9 block below.
F9	Configuration Readback	120 byte setup record (see Setup Records on page E-7)	n/a
FA	Set Configuration	120 byte setup record (see Setup Records on page E-7)	The IP address (byte 0-3) will not be overridden using FA. See FD for this functionality.
FB	Configuration Change Acknowledge	None	This block is sent back to the host requesting a configuration change (FB). After sending out this block, the Device Server resets and uses the new configuration sent with the FA command.

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Byte	Command	Parameters	Notes
FC	Set IP Address	<p>First 8 bytes must be set to the string IP-SETUP (Hex 49 50 2D 53 45 54 55 50).</p> <p>Next 2 bytes have to be set to 00.</p> <p>Next 2 bytes must contain the serial number.</p> <p>Next 4 bytes have to be the new IP address.</p>	<p>This block can be sent as a broadcast, because the serial number is unique. It provides one method to set the IP address of the Device Server if is on the local network and the serial number is known. Remember, broadcasts are only 'heard' on the subnet on which they are generated. No reply is sent by the Device Server, which restarts using the new IP address after the block is received.</p> <p>Example (all in Hex):            49 50 2D 63 45 54 55 50 00 00 2A 12 81            00 01 02            IP address of the node with serial number 42-18 set to 129.0.1.2</p>
FD	Set Configuration and IP Address	Same as FA, but changes IP address as well (bytes 0-3).	n/a

## 8.2 Configuring Multiple Devices

When configuring a number of Device Servers identically, it is useful to create a template setup record. The setup record can then be sent to the “target” Device Servers from a “master” Device Server via “cut and paste” or UDP (see [Network Configuration using UDP](#) on page 8-1).

Device Servers use a 120-byte setup record in Intel Hex format. This format facilitates the transfer of binary data using ASCII characters. See [Setup Records](#) on page 8-7 and [The Intel Hex Format](#) on page 8-5 for information about setup records and converting them to Intel Hex format.

```
:20000010AC10C81D0000100000000000AC10010B4C0200001127000000000000C000
000011
:200020100000000000000000000000000000000000000000000000000000000000
0000B0
:200040104C0200001227000000000000C000000000000000000000000000000000
000049
:1800601000000000000000000000000000000000000000000000000000000078
:00000001FF
```

**Figure 22 - Sample Setup Record in Intel Hex Format**

### 8.2.1 Acquiring a Valid Setup Record

There are a number of ways to acquire a valid setup record:

- Copy the setup record of a properly configured Device Server via Monitor Mode (easiest method).
- Request the setup record of a properly configured Device Server via another Device Server on the network.
- Build the setup record in software.
- From a host PC, request the setup record of a properly configured Device Server via UDP.

To copy the setup record of a properly configured Device Server:

1. Configure a “master” Device Server with the desired parameters.
2. Enter Monitor Mode on the master Device Server (see [Monitor Mode](#) on page 7-1).
3. At the prompt, enter GC followed by a carriage return. The Device Server will respond with its setup record in Intel Hex format.
4. Copy the setup record into a text file and save it for future use.

## UDP

To request the setup record of a properly configured Device Server via another Device Server on the network:

1. Make sure that both units are plugged onto the network properly.
2. Enter Monitor Mode (with network support enabled) on the unit that is not properly configured. (see [Monitor Mode](#) on page 7-1)
3. Issue the command GC x.x.x.x followed by a carriage return, where x.x.x.x is the IP address of the properly configured device. The properly configured device will respond by sending its setup record to the unit you are currently on. This configuration will be displayed in Intel HEX format.
4. Copy that HEX string, and then issue the command SC. Now paste the copied string.

To build the setup record in software:

1. Create a 120-byte setup record.
2. Convert it to an Intel Hex record (see [The Intel Hex Format](#) on page 8-5).
3. Copy the setup record into a text file and save it for future use.

To request the setup record of a properly configured Device Server via UDP:

1. Configure a Device Server with the desired parameters and place it on the network.
2. From a host PC, send the F8 datagram to the Device Server (see [Network Configuration using UDP](#) on page 8-1). The Device Server responds with the F9 datagram, which includes its setup record.
3. Send a previously saved setup record from a host PC via UDP.

### 8.2.2 Sending a Setup Record

There are also a number of ways to send a setup record to a Device Server:

- Send a previously saved setup record via Monitor Mode (easiest method).
- Send the setup record of a properly configured Device Server to another Device Server on the network.
- Send a previously saved setup record from a host PC via UDP.

To send a setup record via Monitor Mode:

1. Configure a “master” Device Server with the desired parameters and place it on the network.
2. Place another Device Server (the “target”) on the network.
3. Enter Monitor Mode (with network support enabled) on the master Device Server (see [Monitor Mode](#) on page 7-1)
4. At the prompt, enter SC, the IP address of the target, and a carriage return.
5. Send the setup record to the target Device Server.

*Note: For example, using Hyperterminal, copy the setup record and select “Paste to Host” to send it to the Device Server. The Device Server reboots with the new configuration.*

To send a previously saved setup record to a Device Server via UDP, from a host PC, send the **FA** (or **FD**) datagram to the “target” Device Server (see [Network Configuration using UDP](#) on page 8-1).

*Note: The Device Server responds with the FB datagram. Refer to the table.*

### 8.2.3 The Intel Hex Format

With this format, 8-bit binary data can be sent and received as ASCII text. The transmission is blocked in records, and every record has its own checksum.

The record begins with a colon (:) and consists of a block length (2-character Hex), a 16-bit address (4-character Hex), and a block type (2-character Hex). It is built by adding all binary 8-bit values and taking the complement, so adding all byte values (including length, address, and type) should yield zero.

Example:

```
00000001FF
```

End record, type 01, length 00, address 00 00, checksum FF.

```
01002000805F
```

Data record consisting of one byte (value 80 Hex) for address 0020 (32 decimal).

For communication with the node, the following block types are defined:

**Table 24 - Block Types**

Option	Hex
Data block program memory (firmware)	00
End record	01
Data block configuration memory	10

## UDP

To get and set the node configuration, 120 bytes should be exchanged at once in 32-Byte records. The IP address in the record (bytes 0 to 3) will be ignored (unless the UDP FD command is being used).

### 8.2.4 Calculating the Checksum

As mentioned in [Table 24 - Block Types](#) above, the last two characters of an Intel Hex setup record represent a checksum of the data in the line. Since the checksum is a two-digit hexadecimal value, it can represent a value from 0 to 255.

The checksum is calculated by summing the value of the data on the line and taking the two's complement of the sum.

*Note: Do not include the leading colon or the checksum byte in the sum.*

Example:

```
0300300002337A1E
```

Record length: 03 (3 bytes of data)

Address: 0030 (the 3 bytes will be stored at 0030, 0031, and 0032)

Record Type: 00 (normal data)

Data: 02, 33, 7A

Checksum: 1E

$$03 + 00 + 30 + 00 + 02 + 33 + 7A = E2$$

The two's complement of E2 is 1E. See [Calculating the Two's Complement](#) below.

### 8.2.5 Calculating the Two's Complement

The two's complement of a number is the value that must be added to the number to reach a Hexadecimal value of 100 (256 in decimal). In the example above,  $E2 + 1E = 100$ .

You can also calculate the two's complement by subtracting the sum from 100. Using the example above again,  $100 - E2 = 1E$ . It may help to use a scientific calculator.

### 8.3 Setup Records

A setup record consists of 120 bytes. They are transmitted at once from and to the node. Unused bytes should be initialized as 00. *Table 25 - Setup Record Construction* defines the structure of a setup record:

**Table 25 - Setup Record Construction**

Byte(s)	Function
00-03	IP address of the unit (x.x.x.x)
04	Reserved (0)
05	Flag BYTE Bit 7: Reserved (0) Bit 6: Set 1 for AUI, 0 for 10BASE-T (CoBox-Micro only) Bits 5-0: Reserved (0)
06	Number of host bits for subnetting; if 0, matching standard netmask for Class A, B, C is used.
07	Reserved (0)
08-11	Telnet configuration password (0 if not used)
12-15	Gateway IP address (0,0,0,0 if not used)
16-63	48-byte Channel 1 parameters; parameter setup Channel 1 (see Table E-4: Channel Parameters)
64-111	48-byte Channel 2 parameters; parameter setup Channel 2 (see Table E-4: Channel Parameters)
112-119	Reserved (0)

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### 8.3.1 Channel Parameters

Use the following table to select setup record parameters for Channels 1:

**Table 26 - Channel Parameters**

Byte(s) (Channel 1)	Function
16	Interface Mode (see <a href="#">Table 27 - Interface Mode Options</a> )
17	Line Speed Bits 7-5: Reserved Bits 4-0: Baud Rate (see <a href="#">Table 29 - Baud Rate Settings</a> )
18	Flow Control (see <a href="#">Table 30 - Flow Control Options</a> )
19	Reserved
20-21	Own TCP port low-byte, high-byte (Intel)
22-23	Remote TCP port low byte, high-byte (Intel)
24-27	Remote IP address (low/high low/high)
28	Connect Mode (see <a href="#">Table 31 - Connect Mode Options</a> )
29	Disconnect Mode (see <a href="#">Table 32 - Disconnect Mode Options</a> )
30	Disconnect w/ inactivity time-out, minutes (00 if unused)
31	Disconnect w/ inactivity time-out, seconds (00 if unused)
32-33	Characters to trigger send immediately (sendchar)
34	Flush mode (see <a href="#">Table 33 - Flush Mode Options</a> )
35	Pack Control (see <a href="#">Table 34 - Pack Control Options</a> )
36-47	Reserved (0)
48-63	a) Terminal name for Telnet terminal type option (15 characters max), 0-terminated. If set and Bit 6 in Disconnect Mode is set, Telnet connection will be assumed. b) Password for Passworded Socket Connection (Bit 4 in Disconnect Mode Set).



### 8.3.2 Interface Mode

The Interface (I/F) Mode is a bit-coded byte entered in hexadecimal notation. Use the following table to select Interface Mode settings:

**Table 27 - Interface Mode Options**

I/F Mode Option	7	6	5	4	3	2	1	0
RS-232C <sup>(1)</sup>							0	0
RS-422/485 <sup>(1)</sup>							0	1
RS-485 2-wire <sup>(1)</sup>							1	1
7 Bit					1	0		
8 Bit					1	1		
No Parity			0	0				
Even Parity			1	1				
Odd Parity			0	1				
1 Stop bit	0	1						
2 Stop bits	1	1						

(1) The DSTni-XPress DR requires you to choose the correct setting in the IF mode, and to also set the front-panel switch for selection of RS-232/RS-485.

The following table demonstrates how to build some common Interface Mode settings:

**Table 28 - Common Interface Mode Settings**

Option	Binary	Hex
RS-232C, 8-bit, No Parity, 1 stop bit <sup>(1)</sup>	0100 1100	4C
RS-232C, 7-bit, Even Parity, 1 stop bit <sup>(1)</sup>	0111 1000	78
RS-485 2-Wire, 8-bit, No Parity, 1 stop bit <sup>(1)</sup>	0100 1111	4F
RS-422, 8-bit, Odd Parity, 2 stop bits <sup>(1)</sup>	1101 1101	DD

(1) The DSTni-XPress DR requires you to choose the correct setting in the IF mode, and to also set the front-panel switch for selection of RS-232/RS-485.

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

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### 8.3.3 Baud Rate

The Device Server and attached serial device must agree on a speed or baud rate to use for the serial connection. Use the following table to select Baud Rate settings:

*Table 29 - Baud Rate Settings*

Speed (bps)	Hex
38400	00
19200	01
9600	02
4800	03
2400	04
1200	05
600	06
300	07
115200	08
57600	09

### 8.3.4 Flow Control

Flow control sets the local handshaking method for stopping serial input/output. Generally, flow control is not required if the connection is used to pass a blocked protocol with block sizes less than 1k (ACK/NAK) and/or speeds of 19200 or less. Use the following table to select Flow Control options:

*Table 30 - Flow Control Options*

Option	Hex
No flow control	00
XON/XOFF flow control	01
Hardware handshake with RTS/CTS lines	02
XON/XOFF pass characters to host	05

### 8.3.5 Connect Mode

Connect Mode defines how the Device Server makes a connection, and how it reacts to incoming connections over the network. Use the following table to select Connect Mode options:

*Table 31 - Connect Mode Options*

Connect Mode Option	7	6	5	4	3	2	1	0
<b>Incoming Connection</b>								
Never accept incoming	0	0	0					
Accept incoming with DTR <sup>(1)</sup>	0	1	0					
Accept unconditional	1	1	0					
<b>Response</b>								
Nothing (quiet)				0				
Character response (C=conn, D=disconn, N=unreachable)				1				
<b>Startup</b>								
No active startup					0	0	0	0
With any character					0	0	0	1
With active DTR <sup>(1)</sup>					0	0	1	0
With CR (0x0D) only					0	0	1	1
Manual connection					0	1	0	0
Autostart					0	1	0	1
<b>Datagram Type</b>								
Directed UDP					1	1	0	0
<b>Modem Mode</b>								
Full Verbose				1	0	1	1	0
Without Echo				0	0	1	1	0
1-character Response				1	0	1	1	1

(1) Inactive. DTR is hardwired to +12VDC.

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

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### 8.3.6 Disconnect Mode

In Disconnect Mode, DTR drop either drops the connection or is ignored. Use the following table to select Disconnect Mode Options:

*Table 32 - Disconnect Mode Options*

Disconnect Mode Option	7	6	5	4	3	2	1	0
Disconnect with DTR drop <sup>(6)</sup>	1							
Ignore DTR	0							
Telnet mode and terminal type setup <sup>(1)</sup>		1						
Channel (port) password <sup>(2)</sup>				1				
Hard disconnect <sup>(3)</sup>					0			
Disable hard disconnect					1			
State LED off with connection <sup>(4)</sup>								1
Disconnect with EOT (^D) <sup>(5)</sup>			1					

1. The DSTni-XPress DR will send the "Terminal Type" upon an outgoing connection.
2. A password is required for a connection to the serial port from the network.
3. The TCP connection will close even if the remote site does not acknowledge the disconnection.
4. When there is a network connection to or from the serial port, the state LED will turn off instead of blink.
5. When Ctrl D or Hex 04 are detected, the connection is dropped. Both Telnet mode and Disconnect with EOT must be enabled for Disconnect with EOT to function properly. Ctrl D will only be detected going from the serial port to the network.
6. DTR hardwired to +12VDC. This option is disabled in the DSTni-XPress DR.

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

### 8.3.7 Flush Mode (Buffer Flushing)

Using this parameter, you can control line handling and network buffers with connection startup and disconnect. You can also select between two different packing algorithms. Use the following table to select Flush Mode options:

*Table 33 - Flush Mode Options*

Function	7	6	5	4	3	2	1	0
<b>Input Buffer (Serial to Network)</b>								
Clear with a connection that is initiated from the UDS to the network				1				
Clear with a connection initiated from the network to the UDS			1					
Clear when the network connection to or from the UDS is disconnected		1						
<b>Output Buffer (Network to Serial)</b>								
Clear with a connection that is initiated from the UDS to the network								1
Clear with a connection initiated from the network to the UDS							1	
Clear when the network connection to or from the UDS is disconnected						1		
<b>Alternate Packing Algorithm (Pack Control)</b>								
Enable	1							

*Note: See Table 39 - Binary to Hexadecimal Conversion Table.*

### 8.3.8 Pack Control

Alternate packing algorithm settings are enabled in Flush Mode. Use the following table to select Pack Control options:

*Table 34 - Pack Control Options*

Option	7	6	5	4	3	2	1	0
Idle Time								
Force transmit: 12ms							0	0
Force transmit: 52ms							0	1
Force transmit: 250ms							1	0
Force transmit: 5sec							1	1
Trailing Characters								
None					0	0		
One					0	1		
Two					1	0		
Send Characters								
Sendchars Define 2-Byte Sequence				1				
Send Immediately After Sendchars			1					

---

## 8.4 IP Addresses

Each TCP/IP node on a network host has a unique IP address. This address provides the information needed to forward packets on the local network and across multiple networks if necessary.

IP addresses are specified as **x.x.x.x**, where each x is a number from 1 to 254; for example, 192.0.1.99. The Device Server must be assigned a unique IP address to use TCP/IP network functionality.

IP addresses contain three pieces of information: the network, the subnet, and the host.

### 8.4.1 Network Portion

The network portion of the IP address is determined by the network type: Class A, B, or C.

*Table 35 - Network Portion of IP Address*

Network Class	Network Portion of Address
Class A	First byte (2nd, 3rd, and 4th bytes are the host)
Class B	First 2 bytes (3rd and 4th bytes are the host)
Class C	First 3 bytes (4th byte is the host)

In most network examples, the host portion of the address is set to zero.

*Table 36 - Available IP Addresses*

Classes	Reserved	Available
A	0.0.0.0 127.0.0.0	1.0.0.0 to 126.0.0.0
B	128.0.0.0 191.255.0.0	128.1.0.0 to 191.254.0.0
C	192.0.0.0 223.255.255.0	192.0.1.0 to 223.255.254.0
D, E	224.0.0.0 to 255.255.255.254 255.255.255.255	None

Consider the IP address 36.1.3.4. This address is a Class A address; therefore, the network portion of the address is 36.0.0.0 and the host portion is 1.3.4.

### 8.4.2 Subnet Portion

The subnet portion of the IP address represents which **sub-network** the address is from. Sub-networks are formed when an IP network is broken down into smaller networks using a **subnet mask**.

A router is required between all networks and all sub-networks. Generally, hosts can send packets directly only to hosts on their own sub-network. All packets destined for other subnets are sent to a router on the local network.

### 8.4.3 Host Portion

The host portion of the IP address is a unique number assigned to identify the host.

### 8.4.4 Network Address

A host address with all host bits set to 0 addresses the network as a whole (for example, in routing entries).

192.168.0.0

### 8.4.5 Broadcast Address

A host address with all host bits set to 1 is the broadcast address, meaning for “for every station.”

192.168.0.255

Network and broadcast addresses must not be used as a host address; for example, 192.168.0.0 identifies the entire network, and 192.168.0.255 identifies the broadcast address.

#### IP Subnet Mask

An IP subnet mask divides IP address differently than the standards defined by the classes A, B, and C. An IP subnet mask defines the number of bits to be taken from the IP address as the network or host sections. The Device Server prompts for the number of host bits to be entered and then calculates the netmask, which is displayed in standard decimal-dot notation (for example, 255.255.255.0) when saved parameters are displayed.

*Table 37 - Standard IP Network Netmasks*

Network Class	Network Bits	Host Bits	Netmask
A	8	24	255.0.0.0
B	16	16	255.255.0.0
C	24	8	255.255.255.0

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*Table 38 - Netmask Examples*

Netmask	Host Bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
...	...
255.128.0.0	23
255.0.0.0	24

#### **8.4.6 Private IP Networks and the Internet**

If your network is not and will not be connected to the Internet, you may use any IP address. If your network is connected or will be connected to the Internet, or if you intend to operate the Device Server on an intranet, you should use one of the reserved sub-networks. Consult your network administrator with questions about IP address assignment.

#### **8.4.7 Network RFCs**

For more information about IP addresses, refer to the following documents, which can be located on the World Wide Web using one of the following directories or indices:

- RFC 950      Internet Standard Subnetting Procedure
- RFC 1700     Assigned Numbers
- RFC 1117     Internet Numbers
- RFC 1597     Address Allocation for Private Networks



## 9. Binary to Hex Conversion

Many of the Device Server's configuration procedures require you to assemble a series of options (represented as bits) into a complete command (represented as a byte). The resulting binary value must be converted to a hexadecimal representation.

Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0010 0011) to a hexadecimal representation, the upper and lower four bits are treated separately, resulting in a two-digit hexadecimal number (in this case, 4C).

Use the following table to convert values from binary to hexadecimal.

**Table 39 - Binary to Hexadecimal Conversion Table**

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

---

## 9.1 Connect Mode Options

*Note: Character response codes are C=connect, D=disconnect, N=unreachable*

**Table 40 - Connect Mode Options**

Accept Incoming Connections	Serial Response Upon Connection	Active Connection Startup	Hostlist	Hex
Never	None (quiet)	No active startup		N/A
Never	None (quiet)	Any character		1
Never	None (quiet)	Active DTR		2
Never	None (quiet)	CR (0x0D)		3
Never	None (quiet)	Manual connection		4
Never	None (quiet)	Autostart		5
Never	None (quiet)	UDP		C
Never	Character	No active startup		10
Never	Character	Any character		11
Never	Character	Active DTR		12
Never	Character	CR (0x0D)		13
Never	Character	Manual connection		14
Never	Character	Autostart		15
Never	Character	UDP		1C
With DTR	None (quiet)	No active startup		40
With DTR	None (quiet)	Any character		41
With DTR	None (quiet)	Active DTR		42
With DTR	None (quiet)	CR (0x0D)		43
With DTR	None (quiet)	Manual connection		44
With DTR	None (quiet)	Autostart		45
With DTR	None (quiet)	UDP		4C
With DTR	Character	No active startup		50
With DTR	Character	Any character		51
With DTR	Character	Active DTR		52
With DTR	Character	CR (0x0D)		53
With DTR	Character	Manual connection		54
With DTR	Character	Autostart		55
With DTR	Character	UDP		N/A

Accept Incoming Connections	Serial Response Upon Connection	Active Connection Startup	Hostlist	Hex
Unconditionally	None (quiet)	No active startup		C0
Unconditionally	None (quiet)	Any character		C1
Unconditionally	None (quiet)	Active DTR		C2
Unconditionally	None (quiet)	CR (0x0D)		C3
Unconditionally	None (quiet)	Manual connection		C4
Unconditionally	None (quiet)	Autostart		C5
Unconditionally	None (quiet)	UDP		CC
Unconditionally	Character	No active startup		D0
Unconditionally	Character	Any character		D1
Unconditionally	Character	Active DTR		D2
Unconditionally	Character	CR (0x0D)		D3
Unconditionally	Character	Manual connection		D4
Unconditionally	Character	Autostart		D5
Unconditionally	Character	UDP		DC
Never	None (quiet)	No active startup	Hostlist	N/A
Never	None (quiet)	Any character	Hostlist	21
Never	None (quiet)	Active DTR	Hostlist	22
Never	None (quiet)	CR (0x0D)	Hostlist	23
Never	None (quiet)	Manual connection	Hostlist	N/A
Never	None (quiet)	Autostart	Hostlist	25
Never	None (quiet)	UDP	Hostlist	
Never	Character	No active startup	Hostlist	N/A
Never	Character	Any character	Hostlist	31
Never	Character	Active DTR	Hostlist	32
Never	Character	CR (0x0D)	Hostlist	33
Never	Character	Manual connection	Hostlist	N/A
Never	Character	Autostart	Hostlist	35
Never	Character	UDP	Hostlist	N/A
With DTR	None (quiet)	No active startup	Hostlist	N/A
With DTR	None (quiet)	Any character	Hostlist	61
With DTR	None (quiet)	Active DTR	Hostlist	62
With DTR	None (quiet)	CR (0x0D)	Hostlist	63
With DTR	None (quiet)	Manual connection	Hostlist	N/A
With DTR	None (quiet)	Autostart	Hostlist	65
With DTR	None (quiet)	UDP	Hostlist	N/A
With DTR	Character	No active startup	Hostlist	N/A
With DTR	Character	Any character	Hostlist	71
With DTR	Character	Active DTR	Hostlist	72
With DTR	Character	CR (0x0D)	Hostlist	73
With DTR	Character	Manual connection	Hostlist	N/A
With DTR	Character	Autostart	Hostlist	75
With DTR	Character	UDP	Hostlist	N/A

## Binary to Hex

Accept Incoming Connections	Serial Response Upon Connection	Active Connection Startup	Hostlist	Hex
Unconditionally	None (quiet)	No active startup	Hostlist	N/A
Unconditionally	None (quiet)	Any character	Hostlist	E1
Unconditionally	None (quiet)	Active DTR	Hostlist	E2
Unconditionally	None (quiet)	CR (0x0D)	Hostlist	E3
Unconditionally	None (quiet)	Manual connection	Hostlist	N/A
Unconditionally	None (quiet)	Autostart	Hostlist	E5
Unconditionally	None (quiet)	UDP	Hostlist	N/A
Unconditionally	Character	No active startup	Hostlist	N/A
Unconditionally	Character	Any character	Hostlist	F1
Unconditionally	Character	Active DTR	Hostlist	F2
Unconditionally	Character	CR (0x0D)	Hostlist	F3
Unconditionally	Character	Manual connection	Hostlist	N/A
Unconditionally	Character	Autostart	Hostlist	F5
Unconditionally	Character	UDP	Hostlist	N/A

*Note: The DSTni-XPress DR DTR signal is hardwired to +12VDC. DTR options are inactive.*

The following connect mode options are for when you use modem emulation:

**Table 41 - Connect Mode Options for Modem Emulation**

Accept Incoming Connections	Response	Hex
Never	Echo	16
Never	Without echo	6
Never	1-character response	7
With DTR	Echo	56
With DTR	Without echo	46
With DTR	1-character response	47
Unconditionally	Echo	D6
Unconditionally	Without echo	C6
Unconditionally	1-character response	C7

## 9.2 Disconnect Mode Options

*Table 42 - Disconnect Mode Options*

Disconnect with DTR Drop (Note)	Telnet Mode and Terminal Type Setup	Channel (port) Password	Hard Disconnect	State LED Off with Connection	Disconnect with EOT (^D)	Hex
			Enable			0
		Enable	Enable			10
			Enable		Enable	20
		Enable	Enable		Enable	30
	Enable		Enable			40
	Enable	Enable	Enable			50
	Enable		Enable		Enable	60
	Enable	Enable	Enable		Enable	70
Enable			Enable			80
Enable		Enable	Enable			90
Enable			Enable		Enable	A0
Enable		Enable	Enable		Enable	B0
Enable	Enable		Enable			C0
Enable	Enable	Enable	Enable			D0
Enable	Enable		Enable		Enable	E0
Enable	Enable	Enable	Enable		Enable	F0
			Enable	Enable		1
		Enable	Enable	Enable		11
			Enable	Enable	Enable	21
		Enable	Enable	Enable	Enable	31
	Enable		Enable	Enable		41
	Enable	Enable	Enable	Enable		51
	Enable		Enable	Enable	Enable	61
	Enable	Enable	Enable	Enable	Enable	71
Enable			Enable	Enable		81
Enable		Enable	Enable	Enable		91
Enable			Enable	Enable	Enable	A1
Enable		Enable	Enable	Enable	Enable	B1
Enable	Enable		Enable	Enable		C1
Enable	Enable	Enable	Enable	Enable		D1
Enable	Enable		Enable	Enable	Enable	E1
Enable	Enable	Enable	Enable	Enable	Enable	F1

## Binary to Hex

Disconnect with DTR Drop (Note)	Telnet Mode and Terminal Type Setup	Channel (port) Password	Hard Disconnect	State LED Off with Connection	Disconnect with EOT (^D)	Hex
			Disable			8
		Enable	Disable			18
			Disable		Enable	28
		Enable	Disable		Enable	38
	Enable		Disable			48
	Enable	Enable	Disable			58
	Enable		Disable		Enable	68
	Enable	Enable	Disable		Enable	78
Enable			Disable			88
Enable		Enable	Disable			98
Enable			Disable		Enable	A8
Enable		Enable	Disable		Enable	B8
Enable	Enable		Disable			C8
Enable	Enable	Enable	Disable			D8
Enable	Enable		Disable		Enable	E8
Enable	Enable	Enable	Disable		Enable	F8
			Disable	Enable		9
		Enable	Disable	Enable		19
			Disable	Enable	Enable	29
		Enable	Disable	Enable	Enable	39
	Enable		Disable	Enable		49
	Enable	Enable	Disable	Enable		59
	Enable		Disable	Enable	Enable	69
	Enable	Enable	Disable	Enable	Enable	79
Enable			Disable	Enable		89
Enable		Enable	Disable	Enable	Enable	99
Enable			Disable	Enable	Enable	A9
Enable		Enable	Disable	Enable	Enable	B9
Enable	Enable		Disable	Enable		C9
Enable	Enable	Enable	Disable	Enable		D9
Enable	Enable		Disable	Enable	Enable	E9
Enable	Enable	Enable	Disable	Enable	Enable	F9

*Note: The **DSTni-XPress DR** DTR signal is hardwired to +12VDC. DTR options are inactive.*

### 9.3 Flush Mode (Buffer Flushing) Options

*Table 43 - Flush Mode Options*

<b>Serial to Network</b>	<b>Network to Serial</b>	<b>Alternate Packing Algorithm</b>	<b>Hex</b>
<b>Clear input buffer upon:</b>	<b>Clear output buffer upon:</b>		
None			0
Active connection			10
Passive connection			20
Active connection Passive connection			30
Disconnect			40
Active connection Disconnect			50
Passive connection Disconnect			60
Active connection Passive connection Disconnect			70
		Enable	80
Active connection		Enable	90
Passive connection		Enable	A0
Active connection Passive connection		Enable	B0
Disconnect		Enable	C0
Active connection Disconnect		Enable	D0
Passive connection Disconnect		Enable	E0
Active connection Passive connection Disconnect		Enable	F0
	Active connection		1
Active connection	Active connection		11
Passive connection	Active connection		21
Active connection Passive connection	Active connection		31
Disconnect	Active connection		41
Active connection Disconnect	Active connection		51
Passive connection Disconnect	Active connection		61
Active connection Passive connection Disconnect	Active connection		71

## Binary to Hex

<b>Serial to Network</b>	<b>Network to Serial</b>	<b>Alternate Packing Algorithm</b>	<b>Hex</b>
<b>Clear input buffer upon:</b>	<b>Clear output buffer upon:</b>		
	Active connection	Enable	81
Active connection	Active connection	Enable	91
Passive connection	Active connection	Enable	A1
Active connection Passive connection	Active connection	Enable	B1
Disconnect	Active connection	Enable	C1
Active connection Disconnect	Active connection	Enable	D1
Passive connection Disconnect	Active connection	Enable	E1
Active connection Passive connection Disconnect	Active connection	Enable	F1
	Passive connection		2
Active connection	Passive connection		12
Passive connection	Passive connection		22
Active connection Passive connection	Passive connection		32
Disconnect	Passive connection		42
Active connection Disconnect	Passive connection		52
Passive connection Disconnect	Passive connection		62
Active connection Passive connection Disconnect	Passive connection		72
	Passive connection	Enable	82
Active connection	Passive connection	Enable	92
Passive connection	Passive connection	Enable	A2
Active connection Passive connection	Passive connection	Enable	B2
Disconnect	Passive connection	Enable	C2
Active connection Disconnect	Passive connection	Enable	D2
Passive connection Disconnect	Passive connection	Enable	E2
Active connection Passive connection Disconnect	Passive connection	Enable	F2



<b>Serial to Network</b>	<b>Network to Serial</b>	<b>Alternate Packing Algorithm</b>	<b>Hex</b>
<b>Clear input buffer upon:</b>	<b>Clear output buffer upon:</b>		
	Active connection Passive connection		3
Active connection	Active connection Passive connection		13
Passive connection	Active connection Passive connection		23
Active connection Passive connection	Active connection Passive connection		33
Disconnect	Active connection Passive connection		43
Active connection Disconnect	Active connection Passive connection		53
Passive connection Disconnect	Active connection Passive connection		63
Active connection Passive connection Disconnect	Active connection Passive connection		73
	Active connection Passive connection	Enable	83
Active connection	Active connection Passive connection	Enable	93
Passive connection	Passive connection Active connection	Enable	A3
Active connection Passive connection	Active connection Passive connection	Enable	B3
Disconnect	Active connection Passive connection	Enable	C3
Active connection Disconnect	Active connection Passive connection	Enable	D3
Passive connection Disconnect	Active connection Passive connection	Enable	E3
Active connection Passive connection Disconnect	Active connection Passive connection	Enable	F3

## Binary to Hex

<b>Serial to Network</b>	<b>Network to Serial</b>	<b>Alternate Packing Algorithm</b>	<b>Hex</b>
<b>Clear input buffer upon:</b>	<b>Clear output buffer upon:</b>		
	Disconnect		4
Active connection	Disconnect		14
Passive connection	Disconnect		24
Active connection Passive connection	Disconnect		34
Disconnect	Disconnect		44
Active connection Disconnect	Disconnect		54
Passive connection Disconnect	Disconnect		64
Active connection Passive connection Disconnect	Disconnect		74
	Disconnect	Enable	84
Active connection	Disconnect	Enable	94
Passive connection	Disconnect	Enable	A4
Active connection Passive connection	Disconnect	Enable	B4
Disconnect	Disconnect	Enable	C4
Active connection Disconnect	Disconnect	Enable	D4
Passive connection Disconnect	Disconnect	Enable	E4
Active connection Passive connection Disconnect	Disconnect	Enable	F4
	Active connection Disconnect		5
Active connection	Active connection Disconnect		15
Passive connection	Active connection Disconnect		25
Active connection Passive connection	Active connection Disconnect		35
Disconnect	Active connection Disconnect		45
Active connection Disconnect	Active connection Disconnect		55
Passive connection Disconnect	Active connection Disconnect		65
Active connection Passive connection Disconnect	Active connection Disconnect		75
	Active connection Disconnect	Enable	85

Binary to Hex

<b>Serial to Network</b>	<b>Network to Serial</b>	<b>Alternate Packing Algorithm</b>	<b>Hex</b>
<b>Clear input buffer upon:</b>	<b>Clear output buffer upon:</b>		
Active connection	Active connection Disconnect	Enable	95
Passive connection	Active connection Disconnect	Enable	A5
Active connection Passive connection	Active connection Disconnect	Enable	B5
Disconnect	Active connection Disconnect	Enable	C5
Active connection Disconnect	Active connection Disconnect	Enable	D5
Passive connection Disconnect	Active connection Disconnect	Enable	E5
Active connection Passive connection Disconnect	Active connection Disconnect	Enable	F5
	Passive connection Disconnect		6
Active connection	Passive connection Disconnect		16
Passive connection	Passive connection Disconnect		26
Active connection Passive connection	Passive connection Disconnect		36
Disconnect	Passive connection Disconnect		46
Active connection Disconnect	Passive connection Disconnect		56
Passive connection Disconnect	Passive connection Disconnect		66
Active connection Passive connection Disconnect	Passive connection Disconnect		76

## Binary to Hex

<b>Serial to Network</b>	<b>Network to Serial</b>	<b>Alternate Packing Algorithm</b>	<b>Hex</b>
<b>Clear input buffer upon:</b>	<b>Clear output buffer upon:</b>		
	Passive connection Disconnect	Enable	86
Active connection	Passive connection Disconnect	Enable	96
Passive connection	Passive connection Disconnect	Enable	A6
Active connection Passive connection	Passive connection Disconnect	Enable	B6
Disconnect	Passive connection Disconnect	Enable	C6
Active connection Disconnect	Passive connection Disconnect	Enable	D6
Passive connection Disconnect	Passive connection Disconnect	Enable	E6
Active connection Passive connection Disconnect	Passive connection Disconnect	Enable	F6
	Active connection Passive connection Disconnect		7
Active connection	Active connection Passive connection Disconnect		17
Passive connection	Active connection Passive connection Disconnect		27
Active connection Passive connection	Active connection Passive connection Disconnect		37
Disconnect	Active connection Passive connection Disconnect		47
Active connection Disconnect	Active connection Passive connection Disconnect		57
Passive connection Disconnect	Active connection Passive connection Disconnect		67
Active connection Passive connection Disconnect	Active connection Passive connection Disconnect		77
	Active connection Passive connection Disconnect	Enable	87
Active connection	Active connection Passive connection Disconnect	Enable	97

<b>Serial to Network</b>	<b>Network to Serial</b>	<b>Alternate Packing Algorithm</b>	<b>Hex</b>
<b>Clear input buffer upon:</b>	<b>Clear output buffer upon:</b>		
Passive connection	Active connection Passive connection Disconnect	Enable	A7
Active connection Passive connection	Active connection Passive connection Disconnect	Enable	B7
Disconnect	Active connection Passive connection Disconnect	Enable	C7
Active connection Disconnect	Active connection Passive connection Disconnect	Enable	D7
Passive connection Disconnect	Active connection Passive connection Disconnect	Enable	E7
Active connection Passive connection Disconnect	Active connection Passive connection Disconnect	Enable	F7

---

## 9.4 Interface Mode Options

*Table 44 - Interface Mode Options*

Interface	Bits	Parity	Stop Bits	Hex
RS-232C	7	No	1	48
RS-232C	7	No	2	C8
RS-232C	7	Even	1	78
RS-232C	7	Even	2	F8
RS-232C	7	Odd	1	58
RS-232C	7	Odd	2	D8
RS-232C	8	No	1	4C
RS-232C	8	No	2	CC
RS-232C	8	Even	1	7C
RS-232C	8	Even	2	FC
RS-232C	8	Odd	1	5C
RS-232C	8	Odd	2	DC
RS-422/485	7	No	1	49
RS-422/485	7	No	2	C9
RS-422/485	7	Even	1	79
RS-422/485	7	Even	2	F9
RS-422/485	7	Odd	1	59
RS-422/485	7	Odd	2	D9
RS-422/485	8	No	1	4D
RS-422/485	8	No	2	CD
RS-422/485	8	Even	1	7D
RS-422/485	8	Even	2	FD
RS-422/485	8	Odd	1	5D
RS-422/485	8	Odd	2	DD
RS-422/485 2-Wire	7	No	1	4B
RS-422/485 2-Wire	7	No	2	CB
RS-422/485 2-Wire	7	Even	1	7B
RS-422/485 2-Wire	7	Even	2	FB
RS-422/485 2-Wire	7	Odd	1	5B
RS-422/485 2-Wire	7	Odd	2	DB
RS-422/485 2-Wire	8	No	1	4F
RS-422/485 2-Wire	8	No	2	CF
RS-422/485 2-Wire	8	Even	1	7F
RS-422/485 2-Wire	8	Even	2	FF
RS-422/485 2-Wire	8	Odd	1	5F
RS-422/485 2-Wire	8	Odd	2	DF

## 9.5 Pack Control Options

*Table 45 - Pack Control Options*

Sendcharacter Defined by a:	Trailing Characters	Idle Time Force Transmit:	Send Immediately after Sendcharacter	Hex
1-Byte Sequence	No	12ms		0
1-Byte Sequence	No	52ms		1
1-Byte Sequence	No	250ms		2
1-Byte Sequence	No	5sec		3
1-Byte Sequence	1	12ms		4
1-Byte Sequence	1	52ms		5
1-Byte Sequence	1	250ms		6
1-Byte Sequence	1	5sec		7
1-Byte Sequence	2	12ms		8
1-Byte Sequence	2	52ms		9
1-Byte Sequence	2	250ms		A
1-Byte Sequence	2	5sec		B
2-Byte Sequence	No	12ms		10
2-Byte Sequence	No	52ms		11
2-Byte Sequence	No	250ms		12
2-Byte Sequence	No	5sec		13
2-Byte Sequence	1	12ms		14
2-Byte Sequence	1	52ms		15
2-Byte Sequence	1	250ms		16
2-Byte Sequence	1	5sec		17
2-Byte Sequence	2	12ms		18
2-Byte Sequence	2	52ms		19
2-Byte Sequence	2	250ms		1A
2-Byte Sequence	2	5sec		1B
1-Byte Sequence	No	12ms	Yes	20
1-Byte Sequence	No	52ms	Yes	21
1-Byte Sequence	No	250ms	Yes	22
1-Byte Sequence	No	5sec	Yes	23
1-Byte Sequence	1	12ms	Yes	24
1-Byte Sequence	1	52ms	Yes	25
1-Byte Sequence	1	250ms	Yes	26
1-Byte Sequence	1	5sec	Yes	27
1-Byte Sequence	2	12ms	Yes	28
1-Byte Sequence	2	52ms	Yes	29
1-Byte Sequence	2	250ms	Yes	2A
1-Byte Sequence	2	5sec	Yes	2B

## Binary to Hex

<b>Sendcharacter Defined by a:</b>	<b>Trailing Characters</b>	<b>Idle Time Force Transmit:</b>	<b>Send Immediately after Sendcharacter</b>	<b>Hex</b>
2-Byte Sequence	No	12ms	Yes	30
2-Byte Sequence	No	52ms	Yes	31
2-Byte Sequence	No	250ms	Yes	32
2-Byte Sequence	No	5sec	Yes	33
2-Byte Sequence	1	12ms	Yes	34
2-Byte Sequence	1	52ms	Yes	35
2-Byte Sequence	1	250ms	Yes	36
2-Byte Sequence	1	5sec	Yes	37
2-Byte Sequence	2	12ms	Yes	38
2-Byte Sequence	2	52ms	Yes	39
2-Byte Sequence	2	250ms	Yes	3A
2-Byte Sequence	2	5sec	Yes	3B



## 10. IP Addresses

An IP address is a 32-bit value, divided into four octets of eight bits each. The standard representation is four decimal numbers (in the range of 0..255) divided by dots.

192.2.1.123

This is called decimal-dot notation.

The IP address is divided in two parts: network and host. To support different needs, three *network classes* have been defined. Depending on the network class, the last one, two or three bytes define the host, while the remaining part defines the network. In the following explanations, *x* stands for the host part of the IP address:

---

### 10.1 Class A Network

IP address 1.x.x.x to 127.x.x.x

Only 127 different networks of this class exist. These have a very large number of potential connected devices (up to 16,777,216).

Example: 10.0.0.1, (network 10, host 0.0.1)

---

### 10.2 Class B Network

IP address 128.0.x.x to 191.255.xxx.xxx

These networks are used for large company networks. Every network can consist of up to 65,534 devices.

Example: 172.1.3.2 (network 172.1, host 3.2)

---

### 10.3 Class C Network

IP address 192.0.0.xxx to 223.255.255.xxx

These network addresses are most common and are often used in small companies. These networks can consist of a maximum number of 254 hosts.

Example: 192.7.1.9 (network 192.7.1, host 9)

The remaining addresses 224.x.x.x - 239.x.x.x are defined as "class D" and are used as multicast addresses.

The addresses 240.x.x.x. - 254.x.x.x are defined as class E and are reserved addresses.

---

## 10.4 Network Address

The host address with all host bits set to 0 is used to address the network as a whole (in routing entries, for example).

---

## 10.5 Broadcast Address

The address with the host part bits set to 1 is the broadcast address, meaning for every station.

Network and broadcast addresses must not be used as a host address (for example, 192.168.0.0 identifies the entire network and 192.168.0.255 identifies the broadcast address).

---

## 10.6 IP Netmask

The netmask is used to divide the IP address differently from the standard defined by classes A, B, C. A netmask defines how many bits from the IP address are to be taken as the network section and how many bits are to be taken as the host section. When the number of host bits is entered, the DSTni-XPress DR calculates the netmask. The netmask is displayed in standard decimal-dot notation.

	Network Bits	Host Bits	Netmask
Class A	8	24	255.0.0.0
Class B	16	16	255.255.0.0
Class C	24	8	255.255.255.0

Netmask	Host bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
.	.
.	.
255.128.0.0	23
255.0.0.0	24

---

## 10.7 Private IP Networks and the Internet

If your network is not connected to the Internet, and there are no plans to make such a connection, you may use any IP address you wish.

If your network is not connected to the Internet and you have plans to connect, or you are connected to the Internet and want to operate your DSTni-XPress DRs on an intranet, use one of the subnetworks below. These network numbers have been reserved for such networks. If you have any questions about IP assignment, consult your Network Administrator.

Class A	10.x.x.x
Class B	172.16.x.x
Class C	192.168.0.x

---

## 10.8 Network RFCs

For more information regarding IP addressing see the following documents. These can be located on the World Wide Web using one of the directories or indices:

RFC 950	Internet Standard Subnetting Procedure
RFC 1700	Assigned Numbers
RFC 1117	Internet Numbers
RFC 1597	Address Allocation for Private Internets



## 11. Glossary

### **Address space:**

A linear array of locations that a thread can access. Simple processors have only one, and these processors are referred to as 'linear' addressing.

### **AutoIP:**

AutoIP is an alternative to DHCP that allows hosts to automatically obtain an IP address in smaller networks that may not have a DHCP server. A range of IP addresses (from 169.254.0.1 to 169.254.255.254) has been explicitly reserved for AutoIP-enabled devices. The range of AutoIP addresses is not to be used over the Internet.

### **Auto-Negotiate:**

Clause 28 of the IEEE 802.3u standard specifies a MAC sublayer for the identification of the speed and duplex mode of connection being supported by a device. Support of this feature is optional for individual vendors.

### **Auto-sense:**

Ability of a 10/100 Ethernet device to interpret the speed or duplex mode of the attached device and to adjust to that rate. Official term is Auto-Negotiation in Clause 28 of the IEEE 802.3u standard.

### **AUI:**

Attachment Unit Interface. A 15-pin shielded, twisted pair Ethernet cable used (optionally) to connect between network devices and a MAU.

### **Autobaud:**

Automatic determination and matching of transmission speed.

### **Backbone:**

The main cable in a network.

### **Bandwidth on Demand:**

Feature that allows a remote access device to initiate a second connection to a particular site to increase the amount of data transferred to that site to increase the desired threshold. The network manager configuring the remote access server will specify a number of bits or a percentage of connection bandwidth threshold which will trigger the secondary connection. Multilink PPP is an emerging standard to allow this feature to be interoperable, but right now the only way to ensure correct operation is to use devices on both end from the same vendor.

## Glossary of Terms

### **Baseband LAN:**

A LAN that uses a single carrier frequency over a single channel. Ethernet, Token Ring and Arcnet LANs use baseband transmission.

### **Baud:**

Unit of signal frequency in signals per second. Not synonymous with bits per second since signals can represent more than one bit. Baud equals bits per second only when the signal represents a single bit.

### **Binaries:**

Binary, machine readable forms of programs that have been compiled or assembled. As opposed to Source language forms of programs.

### **Binary:**

Characteristic of having only two states, such as current on and current off. The binary number system uses only ones and zeros.

### **Bit:**

The smallest unit of data processing information. A bit (or binary digit) assumes the value of either 1 or 0.

### **Block**

A block is a variable-size piece of memory that a task can acquire. Blocks are allocated from heaps.  
[Related: Buffer, heap]

### **BNC:**

A standardized connector used with Thinnet and coaxial cable.

### **BOOTP:**

A TCP/IP network protocol that lets network nodes request configuration information from a BOOTP "server" node.

### **bps:**

Bits per second, units of transmission speed.

### **Bridge:**

A networking device that connects two LANs and forwards or filters data packets between them, based on their destination addresses. Bridges operate at the data link level (or MAC-layer) of the OSI reference model, and are transparent to protocols and to higher level devices like routers.

**Broadband:**

A data transmission technique allowing multiple high-speed signals to share the bandwidth of a single cable via frequency division multiplexing.

**Broadband Network:**

A network that uses multiple carrier frequencies to transmit multiplexed signals on a single cable. Several networks may coexist on a single cable without interfering with one another.

**Router:**

A device that routes specific protocols, such as TCP/IP and IPX, and bridges other protocols, thereby combining the functions of both routers and bridges.

**Bus:**

A LAN topology in which all the nodes are connected to a single cable. All nodes are considered equal and receive all transmissions on the medium.

**Byte:**

A data unit of eight bits.

**Channel:**

The data path between two nodes.

**CHAP:**

(Challenge Handshake Authentication Protocol) Authentication scheme for PPP where the password not only is required to begin connection but also is required during the connection - failure to provide correct password during either login or challenge mode will result in disconnect.

**Coaxial Cable:**

An electrical cable with a solid wire conductor at its center surrounded by insulating materials and an outer metal screen conductor with an axis of curvature coinciding with the inner conductor - hence "coaxial." Examples are standard Ethernet cable and Thinwire Ethernet cable.

**Collision:**

The result of two network nodes transmitting on the same channel at the same time. The transmitted data is not usable.

**Collision Detect:**

A signal indicating that one or more stations are contending with the local station's transmission. The signal is sent by the Physical layer to the Data Link layer on an Ethernet/IEEE 802.3 node.

## Glossary of Terms

### **Communication Server:**

A dedicated, standalone system that manages communications activities for other computers.

### **Cut-through:**

Technique for examining incoming packets whereby an Ethernet switch looks only at the first few bytes of a packet before forwarding or filtering it. This process is faster than looking at the whole packet, but it also allows some bad packets to be forwarded.

### **CSMA/CD:**

Carrier Sense Multiple Access with Collision Detection is the Ethernet media access method. All network devices contend equally for access to transmit. If a device detects another device's signal while it is transmitting, it aborts transmission and retries after a brief pause.

### **Data Link:**

A logical connection between two nodes on the same circuit.

### **Data Link Layer:**

Layer 2 of the seven-layer OSI reference model for communication between computers on networks. This layer defines protocols for data packets and how they are transmitted to and from each network device. It is a medium-independent, link-level communications facility on top of the Physical layer, and is divided into two sublayers: medium-access control (MAC) and logical-link control (LLC).

### **DHCP**

Short for Dynamic Host Configuration Protocol, a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses.

Dynamic addressing simplifies network administration because the software keeps track of IP addresses rather than requiring an administrator to manage the task. This means that a new computer can be added to a network without the hassle of manually assigning it a unique IP address. Many ISPs use dynamic IP addressing for dial-up users.

DHCP client support is built into Windows 95 and NT workstation. NT 4 server includes both client and server support.

### **Dial on Demand:**

When a router detects the need to initiate a dial-up connection to a remote network, it does so automatically according to pre-defined parameters set by the network manager.



**Dialback:**

A security feature that ensures people do not log into modems that they shouldn't have access to. When a connection is requested, the system checks the user name for validity, then "dials back" the number associated with that user name.

**Distributed Processing:**

A system in which each computer or node in the network performs its own processing and manages some of its data while the network facilitates communications between the nodes.

**Domain Name:**

A domain name is a text name appended to a host name to form a unique host name across internets.

**Download:**

The transfer of a file or information from one network node to another. Generally refers to transferring a file from a "big" node, such as a computer, to a "small" node, such as a terminal server or printer.

**End Node:**

A node such as a PC that can only send and receive information for its own use. It cannot route and forward information to another node.

**Ethernet:**

The most popular LAN technology in use today. The IEEE standard 802.3 defines the rules for configuring an Ethernet network. It is a 10 Mbps, CSMA/CD baseband network that runs over thin coax, thick coax, twisted pair or fiber optic cable.

**FDDI:**

Fiber optic Data Distribution Interface. A cable interface capable of transmitting data at 100 Mbps. Originally specified for fiber lines, FDDI can also operate over twisted-pair cable for short distances.

**Fiber-Optic Cable:**

A transmission medium composed of a central glass optical fiber cable surrounded by cladding and an outer protective sheath. It transmits digital signals in the form of modulated light from a laser or LED (light-emitting diode).

**File Server:**

A computer that stores data for network users and provides network access to that data.

## Glossary of Terms

### **Filtering:**

Process whereby an Ethernet switch or bridge reads the contents of a packet and then finds that the packet does not need to be forwarded, drops it. A filtering rate is the rate at which a device can receive packets and drop them without any loss of incoming packets or delay in processing.

### **Firmware:**

Alterable programs in semipermanent storage, e.g., some type of read-only or flash reprogrammable memory.

### **Forwarding:**

Process whereby an Ethernet switch or bridge reads the contents of a packet and then passes that packet on to the appropriate attached segment. A forwarding rate is the time that it takes the device to execute all of the steps.

### **Flash ROM:**

See ROM.

### **Framing:**

Dividing data for transmission into groups of bits, and adding a header and a check sequence to form a frame.

### **FTP:**

File Transfer Protocol, a TCP/IP protocol for file transfer.

### **Full-Duplex:**

Independent, simultaneous two-way transmission in both directions, as opposed to half-duplex transmission.

### **Gateway:**

A device for interconnecting two or more dissimilar networks. It can translate all protocol levels from the Physical layer up through the Applications layer of the OSI model, and can therefore interconnect entities that differ in all details.

### **Hardware Address:**

See Network Address.

### **Header:**

The initial part of a data packet or frame containing identifying information such as the source of the data, its destination, and length.

**Heartbeat:**

Ethernet defined SQE signal quality test function.

**Hertz (Hz):**

A frequency unit equal to one cycle per second.

**Host:**

Generally a node on a network that can be used interactively, i.e., logged into, like a computer.

**Host Table:**

A list of TCP/IP hosts on the network along with their IP addresses.

**HTTP**

Short for HyperText Transfer Protocol, the underlying protocol used by the World Wide Web. HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands. For example, when you enter a URL in your browser, this actually sends an HTTP command to the Web server directing it to fetch and transmit the requested Web page.

HTTP is called a stateless protocol because each command is executed independently, without any knowledge of the commands that came before it. This is the main reason that it is difficult to implement Web sites that react intelligently to user input. This shortcoming of HTTP is being addressed in a number of new technologies, including Active X, Java, JavaScript and cookies.

**IEEE 802.3:**

The IEEE (Institute of Electrical and Electronic Engineers) standard that defines the CSMA/CD media-access method and the physical and data link layer specifications of a local area network. Among others, it includes 10BASE2, 10BASE5, 10BASE-FL and 10BASE-T Ethernet implementations.

**Internet:**

A series of interconnected local, regional, national and international networks, linked using TCP/IP. Internet links many government, university and research sites. It provides E-mail, remote login and file transfer services.

**Internetworking:**

General term used to describe the industry composed of products and technologies used to link networks together.

**IP Address:**

See Network Address.

## Glossary of Terms

### **IPX:**

Internetwork Packet eXchange, a NetWare protocol similar to IP (Internet Protocol).

### **ISDN:**

(Integrated Services Digital Network): All digital service provided by telephone companies. Provides 144K bps over a single phone line (divided in two 64K bps "B" channels and one 16K bps "D" channel).

### **ISO Layered Model:**

The International Standards Organization (ISO) sets standards for computers and communications. Its Open Systems Interconnection (OSI) reference model specifies how dissimilar computing devices such as Network Interface Cards (NICs), bridges and routers exchange data over a network. The model consists of seven layers. From lowest to highest, they are: Physical, Data Link, Network, Transport, Session, Presentation and Application. Each layer performs services for the layer above it.

### **Jabber:**

Network error caused by an interface card placing corrupted data on the network. Or, an error condition due to an Ethernet node transmitting longer packets than allowed.

### **KB**

Kilobyte. KBps is Kilobytes per second.

### **Kbps:**

Kilobits per second.

### **kHz**

Kilohertz.

### **Kermit:**

A popular file transfer and terminal emulation program.

### **LAN:**

Local Area Network, a data communications system consisting of a group of interconnected computers, sharing applications, data and peripherals. The geographical area is usually a building or group of buildings.

### **LAT:**

Local Area Transport, a Digital Equipment Corporation proprietary network communication protocol. The protocol is based on the idea of a relatively small, known number of hosts on a local network

sending small network packets at regular intervals. LAT will not work on a wide area network scale, as TCP/IP does.

**Latency:**

The delay incurred by a switching or bridging device between receiving the frame and forwarding the frame.

**Layer:**

In networks, layers refer to software protocol levels comprising the architecture, with each layer performing functions for the layers above it.

**Line Speed:**

Expressed in bps, the maximum rate at which data can reliably be transmitted over a line using given hardware.

**Local Network Interconnect (LNI):**

A Port Multiplier, or concentrator supporting multiple active devices or communications controllers, either used standalone or attached to standard Ethernet cable.

**Logical Link:**

A temporary connection between source and destination nodes, or between two processes on the same node.

**MAU:**

Medium Attachment Unit, a device used to convert signals from one Ethernet medium to another.

**Mbps:**

Megabits per second.

**MIB:**

Management Information Base, a database of network parameters used by SNMP and CMIP (Common Management Information Protocol) to monitor and change network device settings. It provides a logical naming of all information resources on the network that are pertinent to the network's management.

**MII:**

Media Independent Interface, New standard developed for Fast Ethernet in IEEE 802.3u specification. The Fast Ethernet equivalent to the AUI in 10 Mbps Ethernet, allowing different types of Fast Ethernet media to be connected to a Fast Ethernet device via a common interface.

## Glossary of Terms

### **MJ:**

Modular Jack. A jack used for connecting voice cables to a faceplate, as for a telephone.

### **MMJ:**

Modified Modular Jack. These are the 6-pin connectors used to connect serial terminal lines to terminal devices. MMJs can be distinguished from the similar RJ12 jacks by having a side-locking tab, rather than a center-mounted one.

### **Modem:**

A modulator-demodulator device for changing transmission signals from digital to analog for transmission over phone lines. Used in pairs, one is required at each end of the line.

### **MOP:**

Maintenance Operations Protocol, a DEC protocol used for remote communications between hosts and servers.

### **Multicast:**

A multicast is a message that is sent out to multiple devices on the network by a host.

### **Multilink PPP:**

The ability of a dialup device to allocate more than one channel of bandwidth to a particular connection. Generally, this is termed to be the ability of an ISDN device to bond two B-channels together into a single data pipe, but some vendors can perform the same function with asynchronous dial-up connections over modems by having a second connection initiated to support the additional bandwidth requirements.

### **Multiplexer:**

A device that allows several users to share a single circuit. It funnels different data streams into a single stream. At the other end of the communications link, another multiplexer reverses the process by splitting the data stream back into the original streams.

### **Multiplexing:**

Transmitting multiple signals simultaneously on a single channel.

### **Multiport Repeater:**

A repeater, either standalone or connected to standard Ethernet cable, for interconnecting up to eight Thinwire Ethernet segments.

**Name Server:**

Software that runs on network hosts charged with translating (or resolving) text-style names into numeric IP addresses.

**NetWare:**

A Novell developed Network Operating System (NOS). Provides file and printer sharing among networks of Personal Computers (PCs). Each NetWare network must have at least one file server, and access to other resources is dependent on connecting to and logging into the file server. The file server controls user logins and access to other network clients, such as user PCs, print servers, modem/fax servers, disk/file servers, etc.

**NetBIOS/NetBEUI:**

Microsoft's networking protocols for it's LAN Manager and Windows NT products.

**Network:**

An interconnected system of computers that can communicate with each other and share files, data and resources.

**Network Address:**

Every node on a network has one or more addresses associated with it, including at least one fixed hardware address such as "ae-34-2c-1d-69-f1" assigned by the device's manufacturer. Most nodes also have protocol specific addresses assigned by a network manager.

**Network Management:**

Administrative services for managing a network, including configuring and tuning, maintaining network operation, monitoring network performance, and diagnosing network problems.

**NIC:**

Network Interface Card, an adapter card that is inserted into a computer, and contains the necessary software and electronics to enable the station to communicate over the network.

**Node:**

Any intelligent device connected to the network. This includes terminal servers, host computers, and any other devices (such as printers and terminals) that are directly connected to the network. A node can be thought of as any device that has a "hardware address."

**NOS:**

Network Operating System, the software for a network that runs in a file server and controls access to files and other resources from multiple users. It provides security and administrative tools. Novell's NetWare, Banyan's VINES and IBM's LAN Server are NOS examples.

## Glossary of Terms

### **Open System Interconnect (OSI):**

See "ISO."

### **Packet:**

A series of bits containing data and control information, including source and destination node addresses, formatted for transmission from one node to another.

### **PAP:**

(Password Authentication Protocol) Authentication scheme for PPP links. A password can be specified for both devices on a remote link. Failure to authenticate will result in a dropped connection prior to start of data transmission.

### **Physical Address:**

An address identifying a single node.

### **Physical Layer:**

Layer 1, the bottom layer of the OSI model, is implemented by the physical channel. The Physical layer insulates Layer 2, the Data Link layer, from medium-dependent physical characteristics such as baseband, broadband or fiber-optic transmission. Layer 1 defines the protocols that govern transmission media and signals.

### **Point-to-Point:**

A circuit connecting two nodes only, or a configuration requiring a separate physical connection between each pair of nodes.

### **Port:**

The physical connector on a device enabling the connection to be made.

### **Port Multiplier:**

A concentrator providing connection to a network for multiple devices.

### **PostScript:**

A printer/display protocol developed by Adobe Corp. PostScript is an actual printing and programming language to display text and graphics. Unlike line/ASCII printers, which print character input verbatim, PostScript printers accept and interpret an entire PostScript page before printing it.

### **PPP:**

Point-to-Point Protocol. The successor to SLIP, PPP provides router-to-router and host-to-network connections over both synchronous and asynchronous circuits.



**Print Server:**

A dedicated computer that manages printers and print requests from other nodes on the network.

**PROM:**

Programmable ROM, a read-only memory whose data content can be altered.

**Protocol:**

Any standard method of communicating over a network.

**Remote Access:**

Access to network resources not located on the same physical Ethernet. (Physical Ethernet here refers to an entire site network topology.)

**Remote Control:**

Form of remote access where a device dialing in assumes control of another network node - all keystrokes on the remote are translated into keystrokes on the network node. Used primarily with IPX protocol.

**Remote Node:**

Form of remote access where the device dialing in acts as a peer on the target network. Used with both IP and IPX protocols.

**Repeater:**

A repeater is a network device that repeats signals from one cable onto one or more other cables, while restoring signal timing and waveforms.

**Ring:**

A network topology in which the nodes are connected in a closed loop. Data is transmitted from node to node around the loop, always in the same direction.

**RMON:**

SNMP-based standard for reporting various network conditions. RMON has 10 different management groups which provide detailed information about a network.

**Rlogin:**

Rlogin is an application that provides a terminal interface between UNIX hosts using the TCP/IP network protocol. Unlike Telnet, Rlogin assumes the remote host is (or behaves like) a UNIX machine

## Glossary of Terms

### **ROM:**

Read-Only Memory, a memory device that retains its information even when power to it is removed. A ROM version of a network device does not need to download, since the ROM contains the entire executable code and thus never needs to reload it. Frequently the ROM is provided as "flash ROM", which can be reprogrammed by downloading if the user chooses.

### **Router:**

Device capable of filtering/forwarding packets based upon data link layer information. Whereas a bridge or switch may only read MAC layer addresses to filter, routers are able to read data such as IP addresses and route accordingly.

### **RTEL:**

Lantronix' "reverse Telnet" software allows hosts using TCP/IP to establish a session with a device attached to a terminal server port.

### **Server:**

A computer that provides resources to be shared on the network, such as files (file server) or terminals (terminal server).

### **Session:**

A connection to a network service.

### **Shared Ethernet:**

Ethernet configuration in which a number of segments are bound together in a single collision domain. Hubs produce this type of configuration where only one node can transmit at a time.

### **SLIP:**

Serial Line Internet Protocol, a protocol for running TCP/IP over serial lines.

### **SNA:**

Systems Network Architecture. IBM's layered protocols for mainframe communications.

### **SNMP:**

Simple Network Management Protocol, allows a TCP/IP host running an SNMP application to query other nodes for network-related statistics and error conditions. The other hosts, which provide SNMP agents, respond to these queries and allow a single host to gather network statistics from many other network nodes.

### **Source Code:**

Programs in an uncompiled or unassembled form.

**Spanning Tree:**

An algorithm used by bridges to create a logical topology that connects all network segments, and ensures that only one path exists between any two stations.

**Store and Forward:**

Technique for examining incoming packets on an Ethernet switch or bridge whereby the whole packet is read before forwarding or filtering takes place. Store and forward is a slightly slower process than cut-through, but it does ensure that all bad or misaligned packets are eliminated from the network by the switching device.

**SPX:**

Sequential Packet exchange. Novell's implementation of SPP (Sequential Packet Protocol).

**SQE:**

Ethernet-defined signal quality test function, frequently called "heartbeat."

**Switch:**

Multiport Ethernet device designed to increase network performance by allowing only essential traffic on the attached individual Ethernet segments. Packets are filtered or forwarded based upon their source and destination addresses.

**T-Connector:**

A T-shaped device with two female and one male BNC connectors.

**TCP/IP:**

Transmission Control Protocol (TCP) and Internet Protocol (IP) are the standard network protocols in UNIX environments. They are almost always implemented and used together and called TCP/IP.

**Telnet:**

Telnet is an application that provides a terminal interface between hosts using the TCP/IP network protocol. It has been standardized so that "telnetting" to any host should give one an interactive terminal session, regardless of the remote host type or operating system. Note that this is very different from the LAT software, which allows only local network access to LAT hosts only.

**10BASE2:**

Ethernet running on thin coax network cable.

**10BASE5:**

Ethernet running on Thickwire network cable.

## Glossary of Terms

### **10BASE-T:**

Ethernet running on unshielded twisted pair (UTP) cable. Note that 10BASE-T is a point-to-point network media, with one end of the cable typically going to a repeater/hub and the other to the network device.

### **Terminal Server:**

A concentrator that facilitates communication between hosts and terminals.

### **Terminator:**

Used on both ends of a standard Ethernet or Thinwire Ethernet segment, this special connector provides the 50 ohm termination resistance needed for the cable.

### **TFTP:**

Trivial File Transfer Protocol. On computers that run the TCP/IP networking software, TFTP is used to quickly send files across the network with fewer security features than FTP.

### **Thickwire:**

Half-inch diameter coax cable.

### **Thinwire:**

Thin coaxial cable similar to that used for television/video hookups.

### **Throughput:**

The amount of data transmitted between two points in a given amount of time, e.g., 10 Mbps.

### **Token:**

The character sequence or frame, passed in sequence from node to node, to indicate that the node controlling it has the right to transmit for a given amount of time.

### **Token Ring:**

Developed by IBM, this 4 or 16 Mbps network uses a ring topology and a token-passing access method.

### **Topology:**

The arrangement of the nodes and connecting hardware that comprises the network. Types include ring, bus, star and tree.

### **Transceiver:**

The actual device that interfaces between the network and the local node. The term generally refers to any connector, such as a MAU, that actively converts signals between the network and the local node.

**Transceiver Cable:**

Cable that attaches a device either to a standard or thin coax Ethernet segment.

**Twisted-Pair Cable:**

Inexpensive, multiple-conductor cable comprised of one or more pairs of 18 to 24 gauge copper strands. The strands are twisted to improve protection against electromagnetic and radio frequency interference. The cable, which may be either shielded or unshielded, is used in low-speed communications, as telephone cable. It is used only in baseband networks because of its narrow bandwidth.

**Unix:**

A multitasking, multiuser computer operating system developed by AT&T. Several versions exist, e.g., the Berkeley version.

**UTP:**

Unshielded twisted pair, one or more cable pairs surrounded by insulation. UTP is commonly used as telephone wire.

**Wide Area Network (WAN):**

A network using common carrier transmission services for transmission of data over a large geographical area.

**Workgroup Switching:**

Configuration in which a number of users are connected to an Ethernet network via a switch. Switching allows each user to get greater throughput than would be available through a hub.

**X.25 Gateway Access Protocol:**

Allows a node not directly connected to a public data network to access the facilities of that network through an intermediary gateway node. X.25 is the protocol standard governing packet-switched networks.