Advantage-Devices

NET485
RS422/485 Serial to Ethernet Adapter

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Date	Rev.	Author	Comments
05/17/05	A	GR	Preliminary Release
06/23/05	B	GR	Add notes about Product Info Base, Java RE, .NET
03/24/06	C	GR	Firmware to 6.1.0.2 and Web Manager update

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1. NET485 Overview

1.1 Overview

The NET485 product allows you to connect to an RS422 / RS485 transceiver to enable remote serial communications over long distances (up to 4,000 ft.). Using RS485 two-wire mode, you can also connect the NET485's serial interface to multiple devices in a multi-drop network. The NET485 is designed around the XPort-03 Serial to Ethernet device server.

1.2 Overview of RS422 / RS485

RS232 is an EIA standard transmission system and has been around since 1962. RS232 provides single-ended data communications between a transmitter and a receiver. It allows for data transmission from one transmitter to one receiver at relatively slow data rates (115k bits / second) and short distances (up to 50 ft. at the maximum data rate).

While RS232 is well-known for connecting PC's to external devices, RS422 and RS485 are not as well known. When communicating at high data rates, or over long distances in real world environments, single-ended methods are often inadequate. RS422 and RS485 were designed to provide data communications over longer distances, higher Baud rates and provide better immunity to external electro-magnetic noise.

RS422 and RS485 use differential data transmission (balanced differential signal). This offers superior performance by canceling the effects of ground shifts and induced noise signals that can appear as common mode voltages on a network. This also allows for data transmission at much higher data rates (up to 460K bits / second) and longer distances (up to 4000 ft).

What is the difference between RS422 and RS485? Like RS232, RS422 is intended for point-to-point communications. In a typical application, RS422 uses four wires (two separate Twisted Pairs of wires) to transfer data in both directions simultaneously (Full Duplex) or independently (Half Duplex). EIA/TIA-422 specifies the use of one, unidirectional driver (transmitter) with a maximum of 10 receivers. RS422 is often used in noisy industrial environments or to extend a RS232 line.

RS485 is used in applications where multiple devices want to share data communications on a single serial network. RS485 can support up to 32 drivers and 32 receivers on a single two wire (one twisted pair) bus. Most RS485 systems use a Master/Slave architecture, where each slave unit has its unique address and responds only to packets addressed to it. However, peer to peer networks are also possible.

Specification	RS-422	RS-485
Transmission Type	Differential	Differential
Maximum Data Rate	10 MB/s	10 MB/s
Maximum Cable Length	4000 ft.	4000 ft.
Minimum driver Output Voltage	+/- 2V	+/- 1.5V
Driver Load Impedance	100 Ohm	54 Ohm
Receiver Input Resistance	4 KOhm min	12 KOhm min
Receiver Input Sensitivity	+/- 200mV	+/- 200mV
Receiver Input Voltage Range	-7V to +7V	-7V to +12V
No of Drivers Per Line	1	32
No of Receivers Per Line	10	32

1.2.1 The RS485 Enable Signal

In a balanced differential system the data signals are produced by a line driver. The line driver generates a voltage across a pair of signal wires that transmits the data signals. A balanced line driver can have an optional input signal called an "Enable" signal. The purpose of the enable signal is to connect the driver to its output terminals. If the enable signal is off, the driver is disconnected from the transmission line. When a driver is disconnected from the network it is referred to as being in the "tri-state" condition. Because there are multiple drivers (transmitters) on a RS485 network and only one transmitter can be enabled at a time, the use of this enable control signal is required on all RS485 networks.

The XPort provides this enable signal for RS485 two-wire applications. When configured for RS485 two-wire applications, the XPort automatically asserts the enable when it is ready to transmit data from its serial port. Once the data has been transmitted, the XPort automatically de-asserts the enable signal to allow other nodes to transmit their data.

1.2.2 NET485 Wiring

NOTE: You cannot configure the NET485 through the serial port. The boot program has no control over the Configurable Pins, so the NET485 will never be able to send data during the boot period (initial 5 seconds).

The XPort can be configured to use any one of the three configurable PIO pins as the RS485_TXEN enable. The NET485 uses CP1 for the transmit enable. You must enable CP1 for RS485_TXEN during the configuration process. (See the Quick Start Guide for details)

Note: CP1 is the hardware designation for the XPort physical pin #6. In the web configuration menus, this pin is called CP0.

You can set the active state of the control pins to LOW or HIGH. The NET485 uses CP1 in the Active High condition. You must set CP1 to Active High during the configuration process. (See the Quick Start Guide for details)

Note: CP1 is the hardware designation for the XPort physical pin #6. In the web configuration menus, this pin is called CP0.

The NET485 can handle both RS485 and RS422 communications. This is done by connecting the XPort to a pair of RS485 transceivers. The following schematic demonstrates how the circuit is wired for RS422 and RS485.
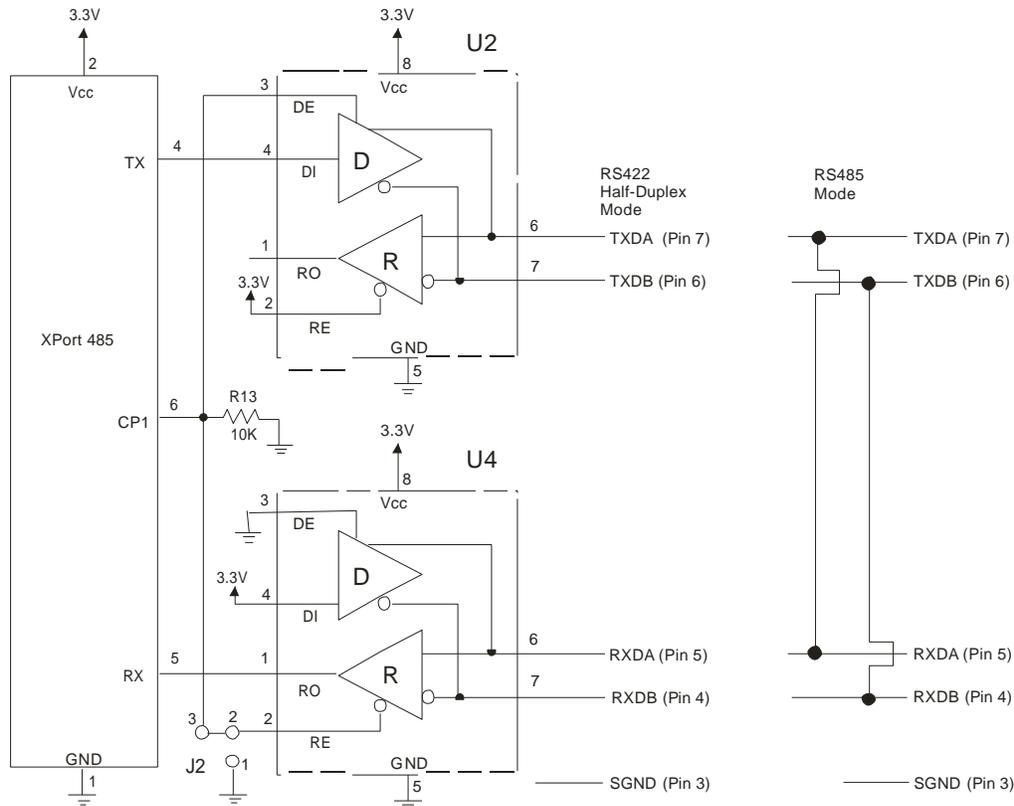
Figure 1 - RS485 Transceiver

The transmit section of the XPort is labeled TX on pin 4. The receive section of the XPort is labeled RX on pin 5. Note that the CP1 pin on the XPort pin 6, which is configured to control the level of RS485_TXEN, is connected to both transceivers. The transmit section is enabled with a High signal on pin 3, U2 and the receive section is enabled with a Low signal on pin 2, U4.

There is a jumper option J2 that permits RS485/RS422 Half Duplex or RS422 Full Duplex. With the jumper in the factory set position between pins 2 and 3, the unit is set for RS485/RS422 Half Duplex.

For RS422 mode, use the four signals produced by the two transceivers plus a signal ground.

For RS485 mode, the TXDA signal is jumpered to the RXDA terminal, and the TXDB signal is jumpered to the RXDB terminal. The three signals are TXDA, RXDB, and signal ground.

1.3 RS422 / RS485 Network connections

1.3.1 RS422 Networks

A typical RS422 application uses a four-wire interface (two twisted pairs) and a shield. RS422 networks are often used in a half-duplex mode, where a single master in a system sends a command to a slave device and the slave responds with data. Typically one device (node) is addressed by the host computer and a response is received from that device. Systems of this type (4-wire, half-duplex) are often constructed to avoid "data collision" (bus contention) problems on a network. Figure 2 shows a typical RS422 four wire interface.
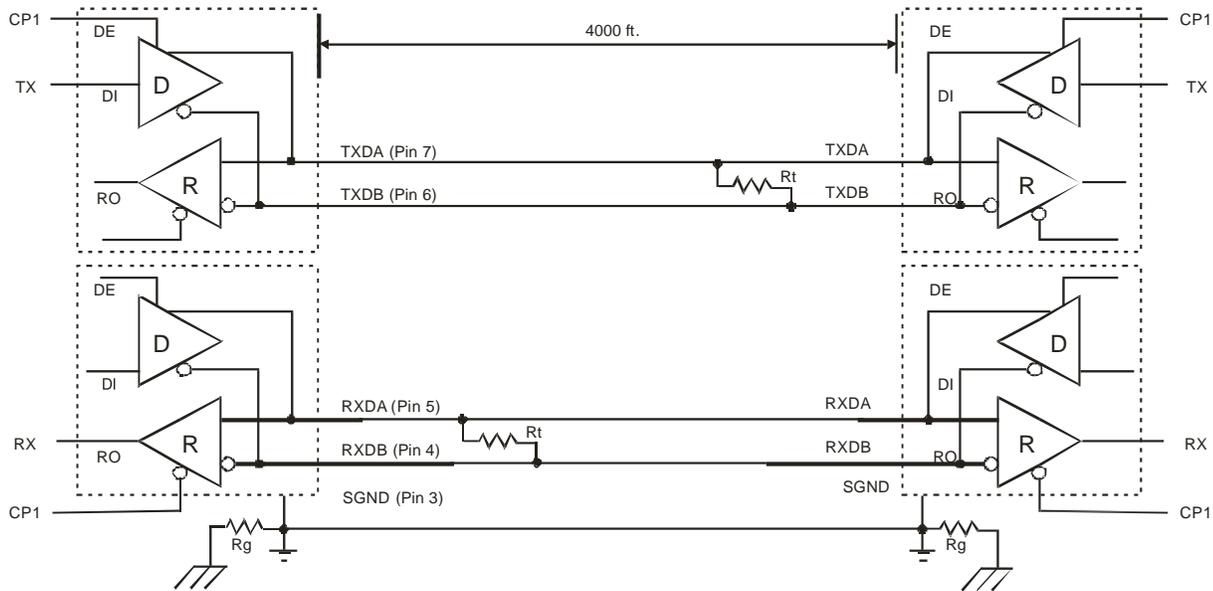
Figure 2 - RS422 Four Wire Interface

Notice that 5 conductors are used (two twisted pairs and a ground wire). Also, when the cable lengths are long and/or the data rates are high, the network must be terminated. To terminate the network, a resistor Rt is added in parallel with the receiver's A and B lines. Rg is an optional resistor between ground and the shield. Rt termination resistors are available as option jumpers on the NET485.

Note: Do NOT install termination resistors on short wire networks. See the Application Notes on the product CD for more information about networks and termination procedures.

1.3.2 RS485 Networks

RS485 permits a balanced transmission line to be shared in a party line or multi-drop configuration. As many as 32 driver / receiver pairs can share a multi-drop network on a single two wire bus. The length of the network is limited to 4,000 ft. between the first node and the last node. RS485 can be used in two-wire or four-wire multi-drop network applications.

Figure 3 shows a typical RS485 two-wire multi-drop network. The tri-state capabilities of 485 allow a single pair of wires to share transmit and receive signals for half-duplex communications. In this configuration, it is important to prevent more than one device from transmitting at the same time. This is controlled by software and the communications protocol. Note that the transmission line is terminated on both ends of the line but not at drop points in the middle of the line. Termination is only required with high data rates and / or long wire runs.

Note: Do NOT install termination resistors on short wire networks. See the Application Notes on the product CD for more information about networks and termination procedures.
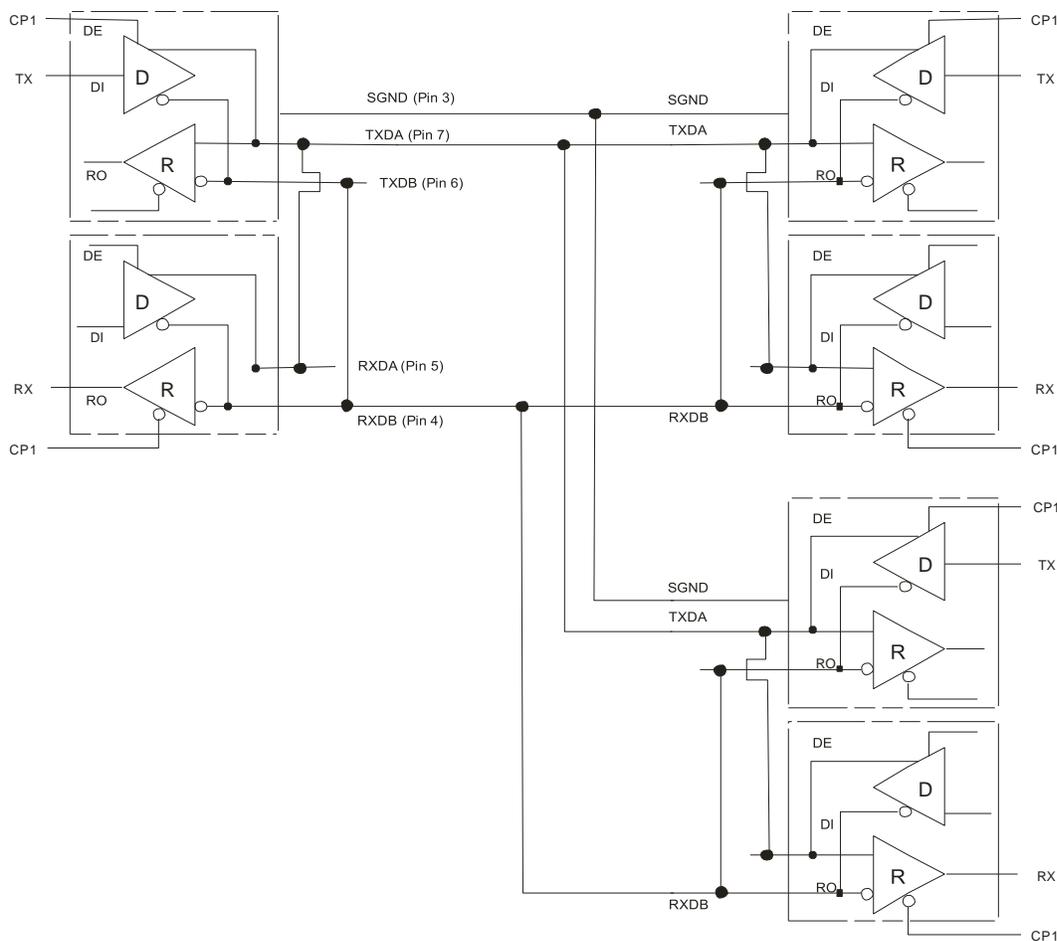
Figure 3 - RS485 Network

2. Introduction

The NET485 product allows you to connect an RS422 / RS485 transceiver to the Ethernet. Using RS485 two-wire mode, you can connect the NET485's serial interface to multiple devices in a multi-drop network.

To quickly setup the NET485, please refer to the Quick Start Guide. This section discusses the general details of the NET485.

Figure 4 - Main Features

2.1 Protocol Support

The NET485 uses the Internet Protocol (IP) for network communications and the Transmission Control Protocol (TCP) to assure that no data is lost or duplicated and that everything sent to the connection arrives correctly at the target.

Other supported protocols include:
- ARP, UDP, TCP, ICMP, Telnet, TFTP, AutoIP, DHCP, HTTP, and SNMP for network communications and management.
- TCP, UDP, and Telnet for connections to the serial port.
- TFTP for firmware and web page updates.
- IP for addressing, routing, and data block handling over the network.
- User Datagram Protocol (UDP) for typical datagram applications in which devices interact with other devices without maintaining a point-to-point connection.

2.2 Serial RS422/485 Interface

The table below lists the RS422/485 signals for the NET485. The RS422/485 and power interface is a 7-pin removable Phoenix connector, with two of the pins used for power.

Table 1 - RS422/485 Signals

NET485 Signal	7-Pin Phoenix
TXDA	7
TXDB	6
RXDA	5
RXDB	4
SGND	3
GND	2
8-24VDC	1

Figure 5 - Phoenix Connector

The NET485 uses protective clamping structures on its inputs and outputs that clamp the voltage to a safe level and dissipate the energy present in ESD (electrostatic) and EFT (electrical fast transients) discharges. This protection structure achieves ESD protection up to 8 kV according to IEC1000-4-2, and EFT protection up to 2 kV on all input/output (I/O) lines.

The NET485 has jumper terminals for adding termination resistors to the RX and TX lines. Add these jumpers ONLY if you have long transmission lines and termination resistors are needed.

Note: Do NOT use RX Term and TX Term jumpers on short transmission lines. Remove these jumpers to remove the 120 Ohm resistors from the transmit and receive lines.

Note: See the Application Notes on the product CD for more information about networks and termination procedures.

2.3 Power Supply

The NET485 can use any DC power source from 8VDC to 24VDC. The current draw is determined by network activity and serial port communications. In general, a 500ma supply will handle the load.

Most modular power supplies use the same style of designating which lead is positive and which one is negative. Generally, the lead with a white stripe, or white markings, is the positive lead. Verify the lead markings with a meter before connecting a power source to the NET485.

Connect the positive lead to the terminal marked 8-24VDC. Connect the negative lead to the terminal marked GND. See Figure 5 for lead identification. The power LED will come on when power is supplied. See Figure 4 and Figure 6 for the location of the Power LED.

The unit will go through a self-test and will attempt to connect to a server. The LEDs on the Ethernet connector will indicate the connection status. See *Ethernet Interface*.

2.4 Ethernet Interface

The NET485 device contains the following LEDs:
- 10BaseT/100BaseTX (Bi-color, Left LED)
- Full/Half Duplex (Bi-color, Right LED)
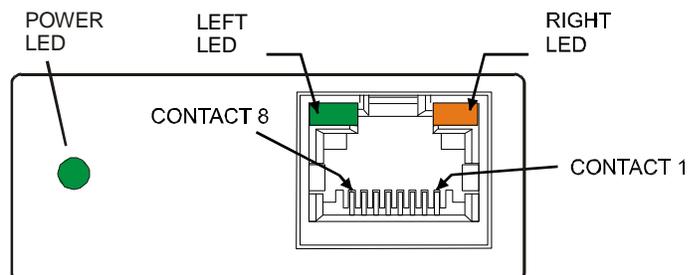
Figure 6 - Ethernet Jack

Table 2 - NET485 LED Functions

Left LED	Right LED	Meaning
Solid Amber		10BASE-T
Solid Green		100BASE-Tx
	Blinking Amber	Half Duplex Activity
	Blinking Green	Full Duplex Activity

2.5 Product CD

The CD sent with the NET485 contains Device Installer software and technical manuals to support the NET485. Device Installer allows for fast and easy configuration of the NET485.

1. Insert the 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).

To view the Quick Start Guide, click on **Quick Start Guide** button.

To view the technical documents, click on **NET485 Documentation**. The technical manuals are in PDF format. If you do not have Acrobat Reader installed, you can install it from the CD.

To install Device Installer, Java RE, Microsoft .NET Framework, or other software products, click the **NET485 Software** button. For more information about Device Installer, see *Device Installer* on page 3-1.

2.6 Additional Documentation

The following guides are available on the product CD. There are several other manuals on the CD, however, they do not apply to the NET485 product.

Title	Description	File Name
NET485 User Guide	This manual in PDF format.	NET485_UM_800240_a.pdf
Device Installer User Guide	Information about installing and using Device Installer Utility.	Dev_Inst_UG_800233_a.pdf
Comm Port Redirector Guide	Provides information on using the Windows based utility to create a virtual com port.	Redirector_UG_800235_a.pdf
Web Enable User Guide	Explains the steps to get your device Web enabled.	Web_Enabling_UG_800236_a.pdf
GPIO Interface Guide	Introduction to the GPIO interface and a demo program.	GPIO_800237_a.pdf
UDP Configuration Guide	How to use UDP to configure the unit. How to acquire and use setup records to configure a unit.	UDPconfig_800238_a.pdf
Tech Notes	Additional information to aid in using the NET485.	485_Notes_800239_a.pdf

2.7 Technical Specifications

Table 3 - Technical Specs

The transceiver used in the NET485 is intended for balanced data transmission and complies with both EIA Standards RS-485 and RS-422. It contains a differential line driver and a differential line receiver, and is suitable for half-duplex transfer. The input impedance is 19KOhm allowing up to 50 transceivers to be connected on the bus.

Category	Description
CPU	DSTni-EX 186 CPU, 256 KB zero wait state SRAM 2048KB Flash, 16KB Boot ROM, 1024KB SRAM
Firmware	Upgradeable via TFTP
Reset Circuit	Reset In is low active. (Software reset only)
Serial Interface	RS422/485. Baudrate software selectable (300 to 921600)
Serial Line Formats	7 or 8 data bits, 1-2 Stop bits, Parity: odd, even, none
Network Interface	RJ45 Ethernet 10Base-T or 100Base-TX (Auto-sensing)
Compatibility	Ethernet: Version 2.0/IEEE 802.3
Protocols Supported	ARP, UDP, TCP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, and HTTP
Power Input	8VDC to 24VDC, approximately 200ma.
LEDs	10Base-T & 100Base-TX Activity, Full/half duplex.
Management	Internal web server, SNMP (read only) Serial login, Telnet login
Security	Password protection, Locking features, optional Rijndael 128-bit encryption
Internal Web Server	Serves static web pages and Java applets
Weight	1.7oz
Material	Case: Flame Retardant
Temperature	Operating range: -40°C to +85°C (-40°F to 185°F) High performance mode has an upper temperature limit of 75°C.
Relative Humidity	Operating: 5% to 95% non-condensing
Warranty	1-year limited warranty
Included Software	Windows™ 98/NT/2000/XP based Device Installer configuration software, Windows™ based Comm Port Redirector.
EMI Compliance	Radiated & conducted emissions - complies with Class B limits of EN 55022:1998 Direct & Indirect ESD - complies with EN55024:1998 RF Electromagnetic Field Immunity - complies with EN55024:1998 Electrical Fast Transient/Burst Immunity - complies with EN55024:1998 Power Frequency Magnetic Field Immunity - complies with EN55024:1998 RF Common Mode Conducted Susceptibility - complies with EN55024:1998

3. Device Installer

3.1.1 Microsoft NET Framework

Microsoft .NET is the Microsoft strategy for connecting systems, information, and devices through Web services so people can collaborate and communicate more effectively. .NET technology is integrated throughout Microsoft products, providing the capability to quickly build, deploy, manage, and use connected, security-enhanced solutions through the use of Web services.

Web services are small, reusable applications that help computers from many different operating system platforms work together by exchanging messages. Web services are based on industry protocols that include XML (Extensible Markup Language), SOAP (Simple Object Access Protocol), and WSDL (Web Services Description Language). These protocols help computers work together across platforms and programming languages.

From a business perspective, Web services are used to reenable information technology so that it can change, move, and adapt like other aspects of a business. They not only connect systems, they can help connect people with the information they need, within the software applications they are used to using, and wherever they happen to be.

Device Installer uses .NET Framework to adapt the NET485 for Web services. Your system must have .NET Framework installed for Device Installer to work properly. Installation options are included on the software CD.

3.1.2 Install Device Installer

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 7 - CD Browser Main Window

2. Click the **NET485 Software** button.

3. Device Installer requires Microsoft .NET Framework be installed on your system. If your system does not have this installed, click the **NET Framework** button to install it.

4. Click the **Device Installer** button. The installation wizard window displays.

5. Respond to the installation wizard prompts.

Note: For more information about Device Installer, see the Device Installer User Guide on the product CD and the online help.

6. Restart your system.

3.1.3 RUN Device Installer

Click the Start button on the Task Bar and select **Programs\Lantronix\DeviceInstaller**. From the list of options, select **DeviceInstaller**. The Device Installer main dialog box appears.
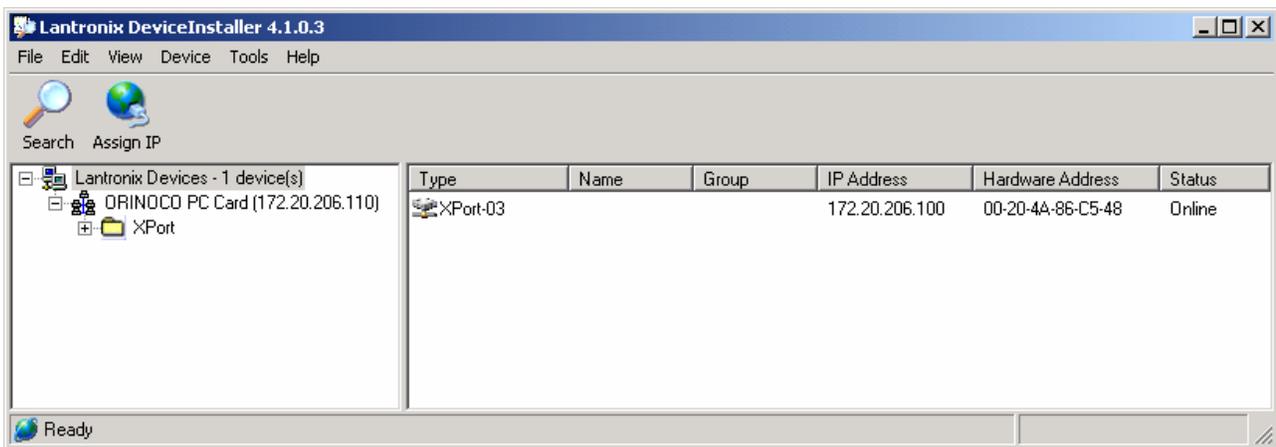
Figure 8 - Device Installer Dialog Box

Device Installer automatically locates and displays devices on the network. To search for devices recently added to the network, click the icon [Search], select **Search** from the **Device** menu or press the **F5** key.

3.1.4 Device Found

Figure 8 shows a device found on the network, with the IP addresses assigned by the DHCP server. The device IP Address is normally set to 0.0.0.0 at the factory. The Hardware Address is an individual permanent address assigned to a particular device on the network. The Hardware Address can be found on the product label.

To change the IP address, first select the device from the list. Notice that the Upgrade icon appears on the toolbar when you select a device.

3.1.5 Assign IP

Click the **Assign IP** icon [Assign IP], select **Assign IP Address** from the Device menu or press the F7 key.

You are then asked to select an assignment method. To assign a specific IP address, select the **Assign a specific IP address** button in the dialog box. Click **Next** to continue.

If you choose to obtain an IP address automatically, select **Obtain an IP address automatically** button. The IP Discovery Settings dialog appears. Choose from DHCP, BOOTP and Auto-IP protocols to obtain the IP address. Skip to Assignment on page 3-4.

Enter the **IP address**, the **Subnet mask** and the **Default gateway** in the IP Settings dialog box. In the following example, the new IP address is 172.20.206.150. Press the TAB key to advance to the next field. The Subnet mask will be filled in automatically. On a local network, you can leave the Default gateway blank (all zeros). Click the Next button to continue.

3.1.6 Assignment

Click the **Assign** button and wait until the progress bar shows the task is complete.
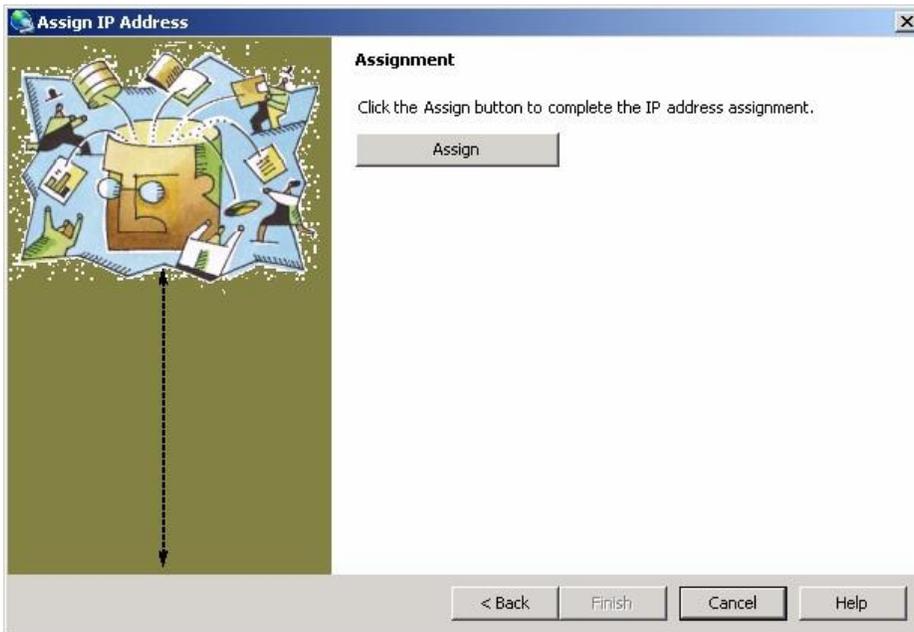
Click the **Finish** button to return to the main Device Installer dialog.

Select the device from the main window list and select **Ping** from the **Tools** menu. The Ping Device dialog box shows the IP address of the selected unit.

Click the **Ping** button. The results display in the Status window. Click the **Clear Status** button to clear the window so you can ping the device again.

Note: If you do not receive "Reply" 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.

Click the **Close** button to finish.

3.2 Using Device Installer

Device Installer is used to locate all devices that use a Lantronix device server. The NET485 uses the XPort-03 device server.

To configure the unit via a Web browser, double-click on one of the devices listed in the Device Installer window. This will display the Device Details window.

Expand the list of XPorts by clicking the + symbol next to the XPort folder. Select an XPort unit by clicking on it. Click the + sign to expand the details. Click on the IP address to display option tabs.
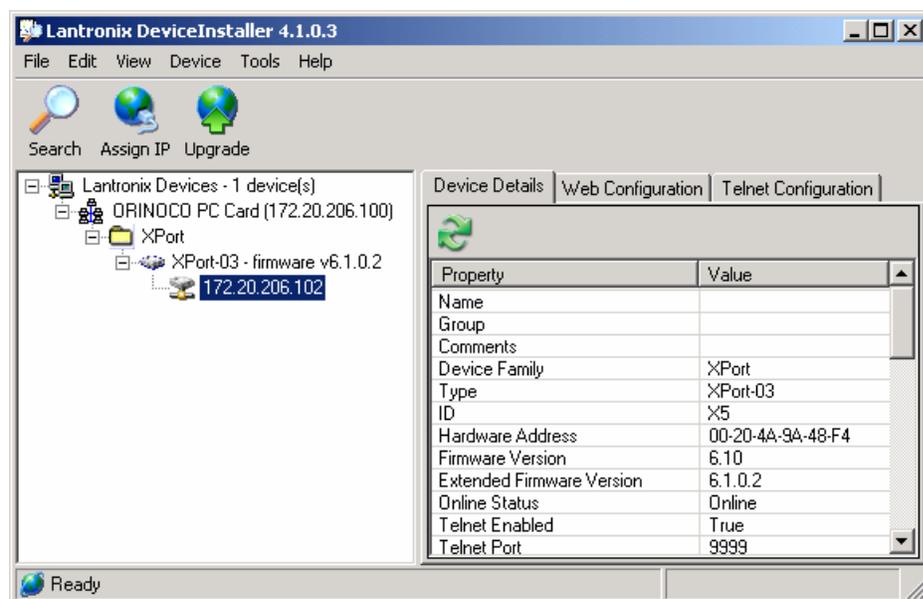
Figure 9 – Device Installer

3.2.1 Viewing the Current Configuration

Device Installer provides a view of the unit's configuration. To view the unit's current settings:

1. Follow the instructions above to locate the XPort.

2. In the right pane, click the **Device Details** tab. The current XPort configuration displays:

Name	Configurable field. A name that identifies the XPort. Double-click the field, type in the value, and press Enter to complete. This name is not visible on other PCs or laptops using DeviceInstaller.
Group	Configurable field. A group name to categorize the XPort. Double-click the field, type in the value, and press Enter to complete. This group name is not visible on other PCs or laptops using DeviceInstaller.
Comments	Configurable field. Information about the XPort. Double-click the field, type in the value, and press Enter to complete. This description or comment is not visible on other PCs or laptops using DeviceInstaller.
Device Family	Non-configurable field. Displays the XPort's device family type as XPort.
Type	Non-configurable field. Displays the device type as XPort.
ID	Non-configurable field. Displays the XPort's ID embedded within the box.
Hardware Address	Non-configurable field. Displays the XPort's hardware (or MAC) address.
Firmware Version	Non-configurable field. Displays the firmware currently installed on the XPort.
Extended Firmware Version	Non-configurable field. Displays the full version nomenclature of the firmware.

Online Status	Non-configurable field. Displays the XPort's status as online, offline, unreachable (the XPort is on a different subnet), or busy (the XPort is currently performing a task).
Telnet Enabled	Non-configurable field. Permits Telnet sessions.
Telnet Port	Non-configurable field. Displays the XPort's port for telnet sessions.
Web Enabled	Non-configurable field. Permits configuration through Web Manager.
Web Port	Non-configurable field. Displays the XPort's port for Web Manager configuration.
Maximum Baud Rate Supported	Non-configurable field. Displays the XPort's maximum baud rate. Note: the XPort may not currently be running at this rate.
Firmware Upgradeable	Non-configurable field. Displays True, indicating the XPort's firmware is upgradeable as newer version become available.
IP Address	Non-configurable field. Displays the XPort's current IP address.
Number of COB partitions supported	Non-configurable field. Displays the number of COB partitions supported.
Supports Dynamic IP	Non-configurable field. Indicates whether the current IP address on the XPort was set manually or assigned by DHCP.
DHCP	Permits the Dynamic Host Configuration Protocol (DHCP) to assign a leased IP address to the XPort unit automatically. Default True.
BOOTP	Permits the Bootstrap Protocol (BOOTP) server to assign the IP address from a pool of addresses automatically. Default True
RARP	Default False
Auto IP	Permits the XPort to generate an IP in the 169.254.x.x address range with a Class B subnet. Default True
Subnet Mask	Non-configurable field. Displays the XPort's current subnet mask.
Gateway	Non-configurable field. Displays the XPort's current gateway.
Number of Ports	Non-configurable field. Displays the number of ports on the XPort.
TC P Keepalive	Non-configurable field. Displays 1-65s, the XPort's TCP keepalive value. The default setting is 45.
Supports Configurable Pins	Non-configurable field. Displays True, indicating configurable pins are available on the XPort.
Supports Email Triggers	Non-configurable field. Displays True, indicating email triggers are available on the XPort.
Supports AES Data Stream	Non-configurable field. Displays True if the XPort unit supports AES encryption.
Supports 485	Non-configurable field. Displays True if the XPort supports the RS-485 protocol.
Supports 920K Baudrate	Non-configurable field. XPort supports baud rates up to 920 Kbps.
Supports HTTP Server	True
Supports HTTP Setup	Non-configurable field. XPort supports HTTP setup.
Supports 230K Baud Rate	Non-configurable field. XPort supports a baud rate of 230 Kbps.
Supports GPIO	True

3.3 Configuration Using Web Manager

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.

The unit's configuration is stored in nonvolatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after you change and store the configuration.

In this chapter, we describe how to configure the XPort in the NET485 using Web-Manager, Lantronix's browser-based configuration tool. (For information on using Setup Mode, our command line configuration interface, see *Configuration Using Telnet* on page 3-21.

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

3.3.1 Accessing XPort Using Device Installer

Note: Make note of the hardware (MAC) address. You will need it to locate the XPort using DeviceInstaller.

Follow the instructions on the product CD to install and run DeviceInstaller.

1. Click **Start/Programs/Lantronix/DeviceInstaller/DeviceInstaller.** If the PC has more than one network adapter, a message displays requesting the selection of a network adapter. Select an adapter and click **OK.**

2. Click the **Search** icon. The list of Lantronix device servers displays in the left pane.

3. Click on the **XPort** folder. The list of available XPorts displays.

4. Expand the list of XPorts by clicking the + symbol next to the XPort icon.

5. Select the XPort unit by clicking its hardware address.

6. In the right pane, click the **Web Configuration** tab.

7. To view the XPort's Web-Manager in the current DeviceInstaller window, click the **Go** button. To open the Web-Manager in a web browser, click the **External Browser** button. The Web-Manager displays.

Note: Alternatively, to open Web-Manager, open your web browser and enter the IP address of the device.
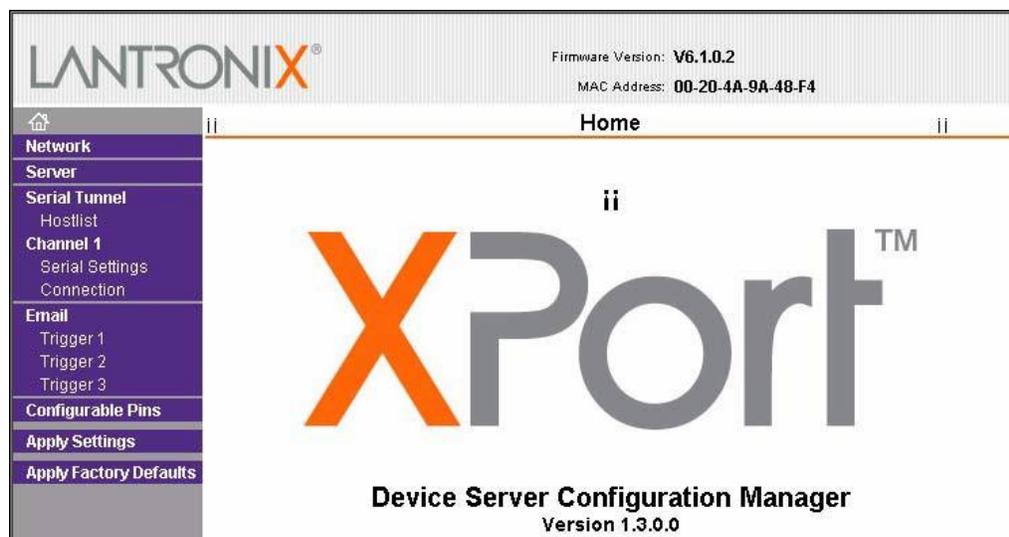
The main menu is in the left pane of the Web-Manager window.

3.4 Network Configuration

The unit's network values display when you select **Network** from the main menu. The following sections describe the configurable parameters on the Network Settings page.

3.4.1 Automatic IP Address Configuration

An IP address can be assigned automatically. You then enter related network settings.

To assign an IP address automatically:

1. On the main menu, click **Network**.

2. Select **Obtain IP address automatically**.

3. Enter the following (as necessary):

BOOTP	Select Enable to permit the Bootstrap Protocol (BOOTP). server to assign the IP address from a pool of addresses automatically. Enable is the default.
DHCP	Select Enable to permit the Dynamic Host Configuration Protocol (DHCP) to assign a leased IP address to the XPort unit automatically. Enable is the default.
AutoIP	Select Enable to permit the XPort to generate an IP in the 169.254.x.x address range with a Class B subnet. Enable is the default.
DHCP Host Name	Enter the name of the host on the network providing the IP address.

Note: Disabling BOOTP, DHCP, and AutoIP (all three checkboxes) is not advised as the only available IP assignment method will then be ARP or serial port.

4. When you are finished, click the **OK** button.

5. On the main menu, click **Apply Settings.**

3.4.2 Static IP Address Configuration

You manually assign an IP address to the unit and enter related network settings.

To assign an IP address manually:

1. On the main menu, click **Network.**

2. Select **Use the following IP configuration.**

3. Enter the following (as necessary):

IP Address	If DHCP is not used to assign IP addresses, enter it manually in decimal-dot notation. The IP address must be set to a unique value in the network.
Subnet Mask	A subnet mask defines the number of bits taken from the IP address that are assigned for the host part.
Default Gateway	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.

4. When you are finished, click the **OK** button.

5. On the main menu, click **Apply Settings.**

3.4.3 Ethernet Configuration

You must specify the speed and direction of data transmission.

To specify how data will be transmitted:

1. On the main menu, click **Network**.

2. Enter the following (as necessary):

Auto Negotiate	With this option, the Ehernet port auto-negotiates the speed and duplex with the hardware endpoint to which it is connected. This is the default. If this option is not selected, the complete the fields that become available: **Speed:** The speed of data transmission. The default is **100 Mbps.** **Duplex:** The direction of data transmission. The default is **Full.**

3. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings**.

3.5 Server Configuration

The unit's server values display when you select **Server** from the main menu. The following sections describe the configurable parameters on the Server Settings page.
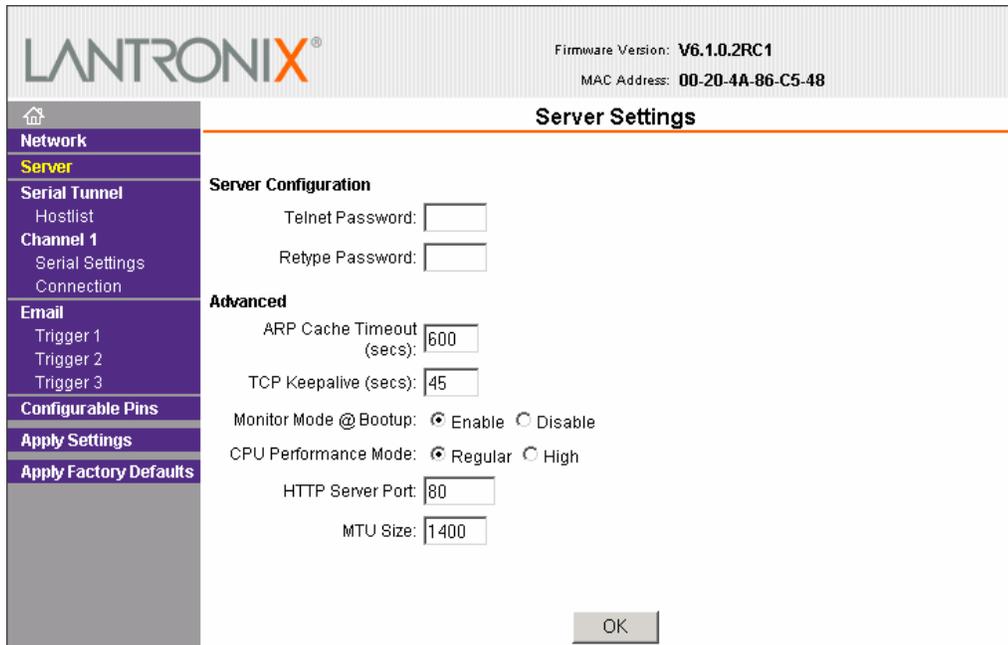
To configure the XPort's device server settings:

1. On the main menu, click **Server**.

2. Configure or modify the following fields:

Server Configuration

Telnet Password	Enter the password required for Telnet access
Retype Password	Re-enter the password required for Telnet access.

Advanced

ARP Cache Timeout	When the unit communicates with another device on the network, it adds an entry into its ARP table. ARP Cache timeout defines the number of seconds (1-600) before it refreshes this table.
TCP Keepalive	TCP Keepalive time defines how many seconds the unit waits during an inactive connection before checking its status. If the unit does not receive a response, it drops that connection. Enter a value between 0 and 60 seconds. 0 disables keepalive.
Monitor Mode @ Bootup	Select **Disable** to disable entry into the monitor mode using the 'yyy' or 'xx1' key sequence at startup. This field prevents the unit from entering monitor mode by interpreting the stream of characters that are received during the device server's initialization at startup.
CPU Performance Mode	Select the XPort's performance mode. Higher performance settings require more energy. **Regular** is 48 Mhz, **High** is 88 Mhz. The default is **Regular**.
HTTP Server Port	This option allows the configuration of the web server port number. The valid range is 1-65535. The default is **80**.
MTU Size	The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between **512** and **1400** bytes. The default is **1400** bytes.

3. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings.**

3.6 Host List Configuration

The XPort scrolls through the host list until it connects to a device listed in the host list table. After a successful connection, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until the next successful connection.

The host list supports a minimum of 1 and a maximum of 12 entries. Each entry contains an IP address and a port number.

Note: The host list is disabled for Manual and Modem Mode. The unit does not accept a data connection from a remote device when the hostlist option is enabled.

To configure the XPort's host list:

1. On the main menu, click **Hostlist.**
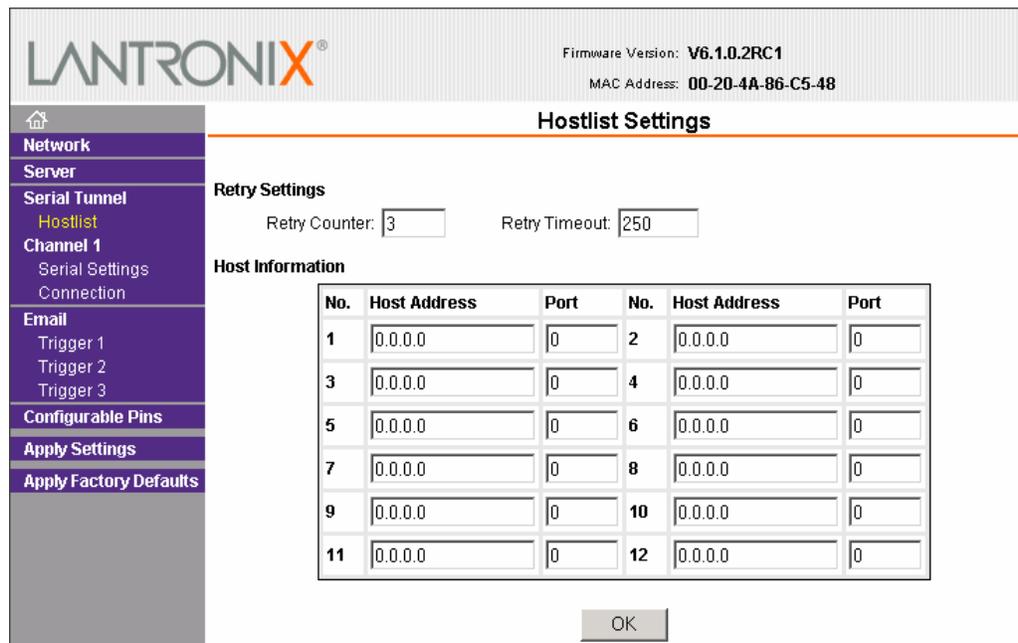
2. Enter or modify the following fields:

Retry Settings

Retry Counter	Enter the value for the number of times the XPort should attempt to retry connecting to the host list.
Retry Timeout	Enter the duration (in seconds) the XPort should abandon attempting a connection to the host list.

Host Information

Host Address	Enter or modify the host's IP address.
Port	Enter the target port number.

3. When you are finished, click the **OK button.**

4. On the main menu, click **Apply Settings.**

3.7 Channel 1 Configuration

The Channel 1 configuration defines how the serial port responds to network and serial communication.

Serial Settings

To configure the channel's serial settings:

1. On the main menu, click **Serial Settings** (under **Channel 1**) to display the Serial Settings window.
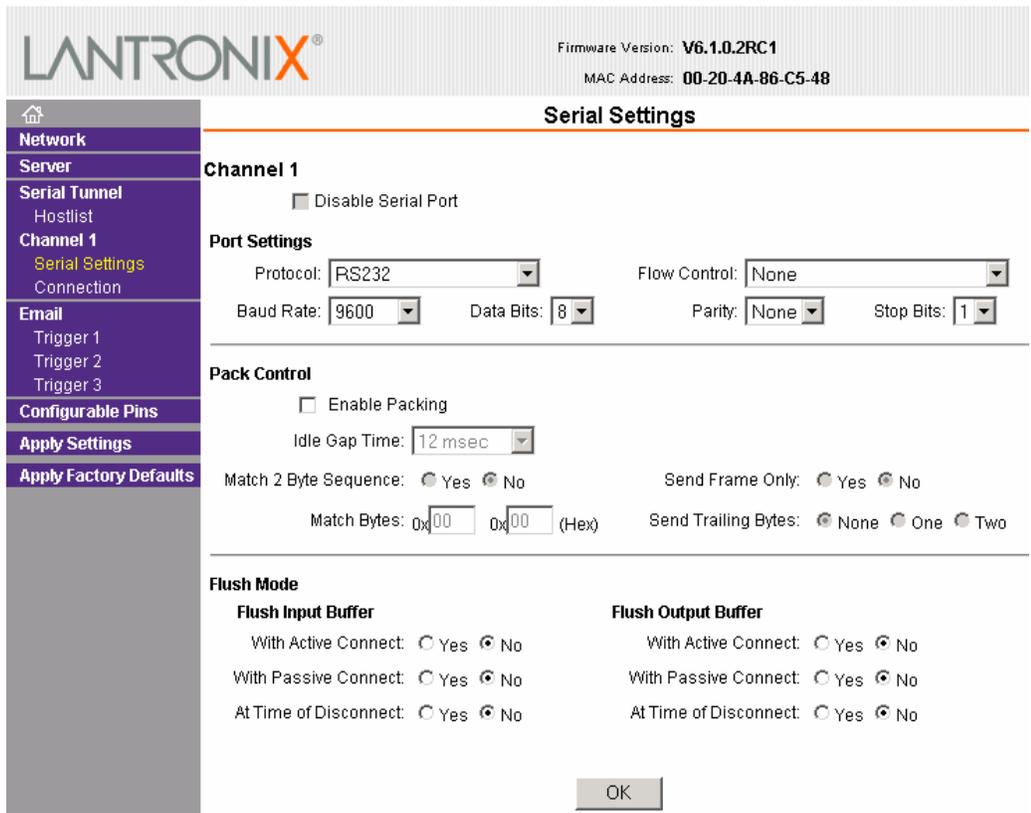
2. In the available fields, enter the following information:

Channel 1

Disable Serial Port	When selected, disables communication through the serial port. The serial port is enabled by default.

Port Settings

Protocol	From the drop-down menu, select the protocol type for the selected channel. For the NET485, this MUST be RS485 2-wire or RS422/RS485 4-wire.
Flow Control	Flow control manages data flow between devices in a network to ensure it is processed efficiently. Too much data arriving before a device is prepared to manage it causes lost or retransmitted data. **None** is the default.
Baud Rate	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, 115200, 230400, 460800, or 921600.
Data Bits	Indicates the number of bits in a transmitted data package. The default is **8.**
Parity	Checks for the parity bit. The default is **None.**
Stop Bits	The stop bit follows the data and parity bits in serial communication. It indicates the end of transmission. The default is **1.**

Pack Control

Enable Packing	Select to enable packing on the XPort. 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. Disabled by default.
Idle Gap Time	Select the maximum time for inactivity. The default time is **12** milliseconds.
Match 2 Byte Sequence	Use to indicate the end of a series of data to be sent as one group. The sequence must occur sequentially to indicate end of the data collection to the XPort. The default is **No**.
Match Bytes	Use to indicate the end of a series of data to be sent as one group. Set this value to **00** if specific functions are not needed.
Send Frame Only	After the detection of the byte sequence, indicates whether to send the data frame or the entire buffer. Select Yes to send only the data frame. The default is **No**.
Send Trailing Bytes	Select the number of bytes to send after the end-of-sequence characters. The default is **None**.

Flush Input Buffer (Serial to Network)

With Active Connect	Select **Yes** to clear the input buffer with a connection that is initiated from the device to the network. The default is **No**.
With Passive Connect	Select **Yes** to clear the input buffer with a connection initiated from the network to the device. The default is **No**.
At Time of Disconnect	Select **Yes** to clear the input buffer when the network connection to or from the device is disconnected. The default is **No**.

Flush Output Buffer (Network to Serial)

With Active Connect	Select **Yes** to clear the output buffer with a connection that is initiated from the device to the network. The default is **No**.
With Passive Connec	Select **Yes** to clear the output buffer with a connection initiated from the network to the device. The default is **No**.
At Time of Disconnect	Select **Yes** to clear the output buffer when the network connection to or from the device is disconnected. The default is **No.**

3. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings**.

3.7.1 Connection Settings - TCP

To configure a channel's TCP settings:

1. On the main menu, click **Connection**. The Connection Settings window for the channel displays.

2. In the available fields, enter or modify the following information:

Connect Protocol

Protocol	From the drop-down menu, select TCP.

Connect Mode: Passive Connection

Accept Incoming	Select **Yes** to accept incoming connections. The default is **Yes**.
Password Required	Determines whether a password is required for an incoming passive connection. This field is not available when a password is set for Telnet mode.
Password	If **Password Required** was set to **Yes**, enter the password for passive connections.

Connect Mode: Active Connection

Active Connect	Select **None** to disable **Active Connect**. Otherwise, indicate the connection type from the drop-down list: - **With Any Character**: Attempts to connect when any character is received from the serial port. - **With Active Mdm Ctrl In**: Accepts external connection requests only when the modem_control_in input is asserted. - **With Start Character**: Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return. - **Manual Connection**: Attempts to connect when directed by a command string received from the serial port. - **Auto Start**: Automatically connects to the remote IP address and port after booting up.
Start Character	If Active Connect is set to **With Start Character,** enter the start character in this field.
Modem Mode	Indicates the on-screen response type when in Modem Mode (if **Modem Mode** is enabled).

Endpoint Configuration

Local Port	Enter the local port number. (This is the one used by Comm Port Redirector)
Auto increment for active connect	Select to auto-increment the local port number for new outgoing connections. The range of auto-incremented port numbers is **50,000** to **59,999** and loops back to the beginning when the maximum range is reached.
Remote Port	Enter the remote port number.
Remote Host	Enter the IP address of the remote device.

Common Options

Telnet Mode	This field is available for configuration only when Active Connect is set to None. Select Enable to permit Telnet communication to the XPort unit.
Terminal Name	This field is available for configuration only when Telnet Mode is set to **Enable**. Use the terminal name for the Telnet terminal type. Enter only one name. When this option is enabled, the unit also reacts to the end of record (EOR) and binary options, which can be used for application such as terminal emulation to IBM hosts.
Connect Response	A single character is transmitted to the serial port when there is a change in connection state. Default setting is **None**.

| **Use Hostlist** | If this option is set to **True**, the device server scrolls through the host list until it connects to a device listed in the host list table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it connects to another IP in the host list.

The host list is disabled for Manual Mode and for Modem Mode. The unit will not accept a data connection from a remote device when the host list option is enabled. |
|---|---|
| **LED** | Select **Blink** for the status LEDs to blink upon connection or **None** for no LED output. |

Disconnect Mode

On Mdm_Ctrl_In Drop	Set to **Yes** for the network connection to or from the serial port to drop when **modem_control_in** transitions from a high state to a low state.
Hard Disconnect	When set to **Yes**, the TCP connection closes even if the remote site does not acknowledge the disconnect request.
With EOT	Select **Yes** to drop the connection when **Ctrl-D** or **Hex 04** is detected. Both **Telnet Mode** and **Disconnect with EOT** must be enabled for **Disconnect with EOT** to function properly. **Ctrl+D** is only detected going from the serial port to the network.
Inactivity Timeout	Use this parameter to set an inactivity timeout. The unit drops the connection if there is no activity on the serial line before the set time expires. Enter time in the 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. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings**.

3.7.2 Connection Settings - UDP

To configure a channel's UDP settings:

1. On the main menu, click **Connection**. The Connection Settings window for the selected channel displays.

2. In the available fields, enter or modify the following information:
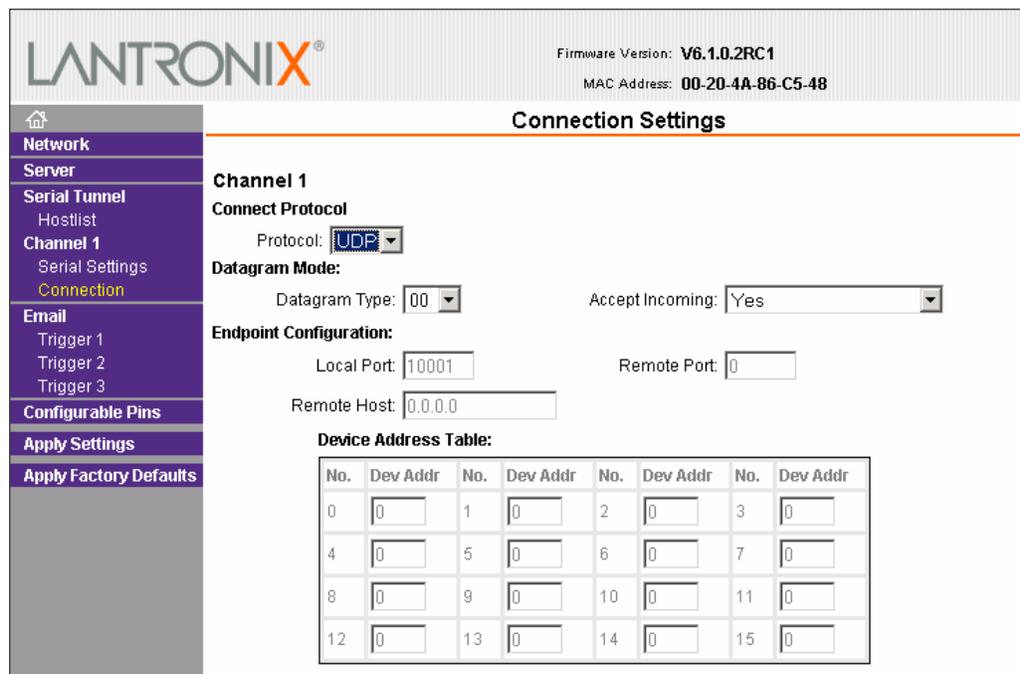
Connect Protocol

Protocol	Select UDP from the drop-down menu.

Datagram Mode

Datagram Type	Configures the remote IP or network broadcast address and the remote port. Enter 01 for directed or broadcast UDP.
Accept Incoming	Select Yes to accept incoming UDP datagrams.

Local Port	Enter the local port number.
Remote Port	Enter the port number of the remote device.
Remote Host	Enter the IP address of the remote device.
Device Address Table	The table is enabled when **Datagram Type** is set to **FD.** Enter values between **1** and **255** to identify units on the local network of device servers. *Note: Lantronix Tech Support supports Datagram type 01. Datagram Type **FD** is for OEM use.*

3. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings**.

3.8 Email Settings

An XPort can send an email to multiple recipients when a specific trigger event occurs. There are three separate triggers, based on any combination of the configurable pins selected as user I/O functions. Optionally, use a two-byte serial string to initiate a trigger. Each trigger is independent of the others. Each condition within an individual trigger must be met before the unit will send the email.

Note: Using configurable pins for Email is not supported on the NET485.

To configure the NET232's email settings:

1. On the main menu, select **Email**. The Email Settings window opens.

2. Configure the following fields:

Server IP Address	Enter the IP address of the mail server.
Server Port	Enter the port number on the email server.
Domain Name	Enter the email server's domain name.
Unit Name	Enter the user name used by the XPort to send email messages.

Recipients

Recipient 1: Email Address	Enter the email address designated to receive email notifications
Recipient 2: Email Address	Enter an additional email address designated to receive email notifications.

3. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings**.

3.8.1 Trigger Configuration

The configurable pins are disabled if they are all set to **None.** If both the serial sequence and the configurable pins are disabled, the trigger is disabled.

To configure the XPort's email trigger settings:

1. On the main menu, click **Trigger 1, Trigger 2,** or **Trigger 3** to configure the desired trigger settings. The **Email Trigger Settings** page opens.

2. Configure or modify the following fields:

Conditions

Configurable Pins	Not supported on the NET485.
Enable Serial Trigger Input	Enabling this option causes specified serial communications to count as a trigger input.
Channel	Select the channel prompting the trigger. For the XPort, there is only one channel.
Data Size	Select the data size prompting the trigger.
Match Data	Enter the data, which, when it appears in the communication stream, prompts a trigger.

Note: All of the conditions must match for the XPort to send an email notification.

Message Properties

Message	The subject line of the trigger event email to the specified recipient(s).
Priority	The priority level for the email.
Notification Interval	The minimum time allowed between individual triggers. If a trigger event occurs within the minimum interval since the last trigger, it is ignored.
Re-notification Interval	Indicates the time interval in which a new email message is sent to the recipient(s) when a single trigger event remains active.

3. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings.**

3.9 Configurable Pin Settings

There are three configurable hardware pins on the XPort device server inside the NET485.

To configure the NET485, select Configurable Pin CP0.

1. On the main menu, click **Configurable Pins**. The Configurable Pins page opens.
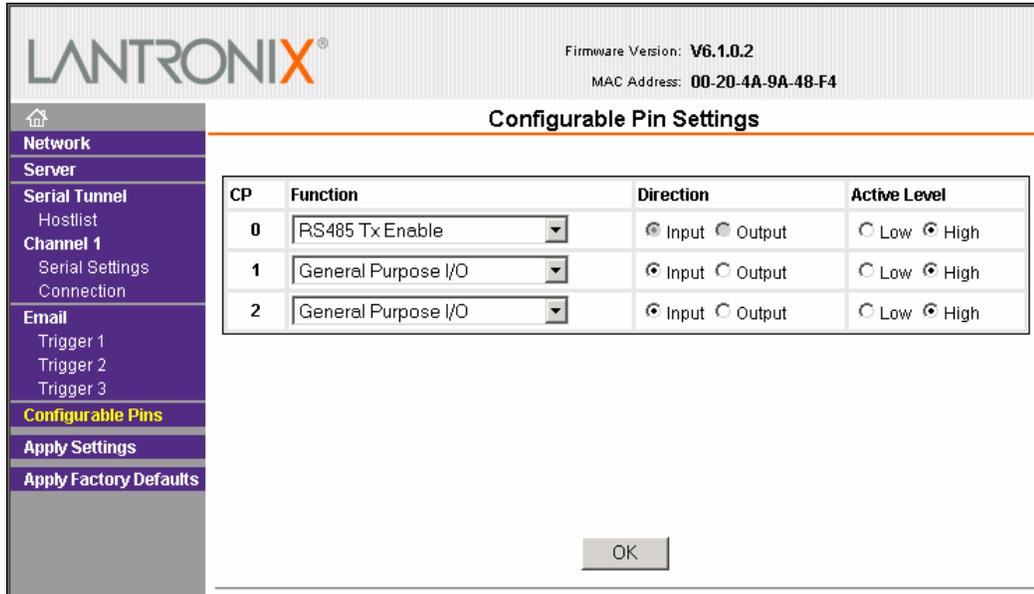
2. Configure or modify the following fields for each pin:

Function	From the drop-down menu, select the purpose of the specified pin. See Configurable Pin Functions for a description of each available function.
Direction	Select whether the pin is an Input or an Output.
Active Level	Select the signal active level (**Low** or **High**) **CP0 MUST be set HIGH for NET485**

Configurable Pin Functions

General Purpose I/O	Monitors input using the 77F0 port or controls output by the 77F0 port.
Status LED 1	Indicates channel 1 status and extended diagnostics when status LED 3 is lit.
Flow Control Out (CTS)	Allows for flow control on the connection with hardware handshaking. You can set Pin 1 for CTS.
RS485 TxEnable	Allows for control of the RS485 Transmit Enable signal. **CP0 MUST be set to RS485 Transmit Enable for NET485.**

3. When you are finished, click the **OK** button.

4. On the main menu, click **Apply Settings.**

3.10 Apply Settings

1. To save and apply the configuration changes to the device server, click the **Apply Settings** button.

*Note: Clicking **OK** on each page does not change the configuration on the device. **OK** tells the XPort what changes to use; **Apply Settings** makes the changes permanent and reboots the XPort.*

2. Click **Yes** to set factory settings or click **No** to cancel.

3.11 Apply Factory Defaults

Click the **Apply Factory Defaults** button to set the device server back to the default settings.

3.12 Configuration Using Telnet

You must configure the unit so that it can communicate on a network with your serial device. The unit's configuration is stored in nonvolatile memory 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.

You can establish a Telnet connection by clicking the Telnet Configuration tab in the Device Installer window or by starting a Telnet session in command mode.

Telnet Configuration using Device Installer

Click the Telnet Configurarion tab. When the window opens, click the Connect button.
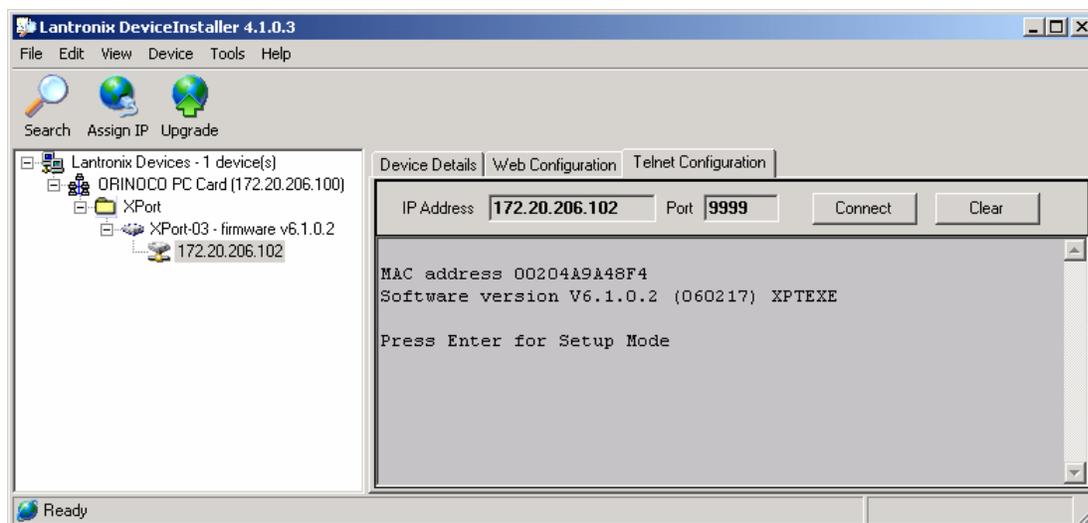
Go to **Telnet Messages** on page 3-22

3.12.1 Telnet Connection

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

Note: If you use the Telnet Configuration tab on Device Installer, skip steps 1and 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**.

3.12.2 Telnet Messages

3. The window displays:

```
MAC address 00204A82CCAA
Software version V6.1.0.2 (060217) XPTEXE

Press Enter for Setup Mode
```

4. To enter the Setup Mode, **you must press Enter within 5 seconds**. The configuration settings will appear.

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.

```
*** 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: public
Telnet Setup is     enabled
TFPT Download is    enabled
Port 77Feh is       enabled
Web Server is       enabled
Web Setup is        enabled
ECHO is             disabled
Encryption    is    disabled
Enhanced Password is disabled
Port 77F0h is       enabled

*** Channel 1
Baudrate 9600, I/F Mode 4C, Flow 00
Port 10001
Connect Mode : C0
Send '+++' in Modem Mode enabled
Auto increment source port  disabled
Remote IP Adr: --- none ---, Port 00000
Disconn Mode : 00
Flush   Mode : 00

*** Expert
TCP Keepalive     : 45s
ARP cache timeout : 600s
CPU performance : Regular
Monitor Mode @ bootup : enabled
RS485 tx enable  : active low
HTTP Port Number : 80
SMTP Port Number : 25
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type:  auto-negotiate
```

```
**************** E-mail ****************
Mail server: 0.0.0.0
Unit       :
Domain     :
Recipient 1:
Recipient 2:

*** Trigger 1
Serial trigger input: disabled
  Channel: 1
  Match: 00,00
Trigger input1: x
Trigger input2: x
Trigger input3: x
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s

*** Trigger 2
Serial trigger input: disabled
  Channel: 1
  Match: 00,00
Trigger input1: x
Trigger input2: x
Trigger input3: x
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s

*** Trigger 3
Serial trigger input: disabled
  Channel: 1
  Match: 00,00
Trigger input1: x
Trigger input2: x
Trigger input3: x
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s

Change Setup:
  0 Server
  1 Channel 1
  3 E-mail
  5 Expert
  6 Security
  7 Defaults
  8 Exit without save
  9 Save and exit            Your choice ?
```

Figure 10 - Setup Mode Window

3.13 Server Configuration (Option 0 Network Configuration)

These are the unit's basic network parameters. The following parameters are displayed when you select **Server**(Option 0).

```
IP Address : (000) .(000) .(000) .(000)
Set Gateway IP Address (N)
Netmask: Number of Bits for Host Part (0=default)  (0)
Change telnet config password (N)
Change DHCP device name (not set) ? (N) ?
```

3.13.1 IP Address

DHCP is not used to assign IP addresses, enter the IP address manually. The IP address must be set to a unique value in the network. Enter each octet and press **Enter** between each section. The current value displays in parentheses.

If DHCP is used, the third octet of the IP address sets the BootP/DHCP/AutoIP options. The following table shows the bits you can manually configure to force the XPort to disable AutoIP, DHCP, or BootP. To disable an option, set the appropriate bit.

Options	Bit
AutoIP	0
DHCP	1
BootP	2

For example, if the third octet is 0.0.5.0, the AutoIP and BootP options are disabled; only DHCP is enabled. (The value 5 results from adding the binary equivalents of 0 and 2.) This is the most common setting when using DHCP.

3.13.2 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. The default is **N** (No), meaning the gateway address has not been set. To set the gateway address, type **Y** and enter the address.

3.13.3 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 display (for example, 255.255.255.0).

Table 4 - 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 5 - Netmask Examples

Netmask	Host Bits
255.255.255.252	NOT Recommended
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
255.255.240.0	12
255.255.224.0	13
255.255.192.0	14
255.255.128.0	15
255.255.0.0	16
255.254.0.0	17
255.252.0.0	18
255.248.0.0	19
255.240.0.0	20
255.224.0.0	21
255.192.0.0	22
255.128.0.0	23
255.0.0.0	24

3.13.4 Change Telnet configuration password

Setting the Telnet configuration password prevents unauthorized access of the setup menu via a Telnet connection to port 9999 or through 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.

3.13.5 DHCP Naming

If a DHCP server has automatically assigned the IP address and network settings, you can discover the unit by using the Device Installer network search feature.

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 CXXXXXX (XXXXXX 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).

3.14 Channel 1 Configuration (Serial Port Parameters)

This section describes how to setup the serial port. The following parameters are displayed when you select **Channel 1** (Option 1).

```
Baudrate (9600)
I/F Mode (4C)
Flow (00)
Port No (10001)
ConnectMode (C0)
Send '+++' in Modem Mode  (Y) ?
Auto increment source port (N) ?
Remote IP Address : (000).(000).(000).(000)
Remote Port (00000)
DisConnMode (00)
FlushMode   (00)
DisConnTime (00:00) :
SendChar 1  (00)
SendChar 2  (00)
```

3.14.1 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, 115200, and 230400 bits per second. XPort-03 and greater units also support high-performance baud rates of 460800 and 921600 bps. See *Error! Reference source not found.* on page **Error! Bookmark not defined.**.

3.14.2 I/F (Interface) Mode

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

Table 6 - Interface Mode Options

I/F Mode Option	7	6	5	4	3	2	1	0
RS-232C [1]							0	0
RS-422/485							0	1
RS-485 2-wire							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						

(1) 2 stop bits are implemented by software. This might have influence on performance.

Note: RS-422/485 I/F Modes are supported on XPort-03 with firmware 6.1.0.0 and above.

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

Table 7 - Common Interface Mode Settings

Common I/F Mode Setting	Binary	Hex
RS-232C, 8-bit, No Parity, 1 stop bit	0100 1100	4C
RS-232C, 7-bit, Even Parity, 1 stop bit	0111 1000	78

3.14.3 Flow

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

Table 8 - Flow Control Options

Flow Control Option	Hex
No flow control	00
XON/XOFF flow control	01
Hardware handshake with RTS/CTS lines (see note)	02
XON/XOFF pass characters to host	05

3.14.4 Port Number

The setting represents the source port number in TCP connections. It is the number used to identify the channel for remotely initiating connections.

Note: When using Comm Port Redirector software, use this port number.

Default setting for Port 1 is 10001. Range: 1-65535 except for the following reserved port numbers:

Table 9 - Reserved Ports

Port Numbers	Reserved for
1 – 1024	Reserved (well known ports)
9999	Telnet setup
14000-14009	Reserved for Comm Port Redirector
30704	Reserved (77F0h)
30718	Reserved (77FEh)

Warning: We recommend that you not use the reserved port numbers for this setting as incorrect operation may result.

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.

If the port number is set to 0, the initial value of 50000 will be used to actively establish a connection. Each subsequent connection will increment the number by 1. When the port number reaches 59999, it will wrap back to 50000.

The automatic port increment feature must only be used when this device is the one initiating a connection using TCP. The port must be set to a non-zero value when this is a passive device or when UDP is being used instead of TCP.

3.14.5 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: If you do not want to convert the binary numbers to hexadecimals yourself, look up the values in the Tech Notes guide.

Table 10 - Connect Mode Options

Connect Mode Option	7	6	5	4	3	2	1	0
Incoming Connection								
Never accept incoming	0	0	0					
Accept with DTR Active	0	1	0					
Always Accept	1	1	0					
Response								
Nothing (quiet)				0				
Character response (C=connect, D=disconnect, N=unreachable)				1				
Active Startup								
No active startup					0	0	0	0
With any character					0	0	0	1
With DTR Active					0	0	1	0
With a specific start character					0	0	1	1
Manual connection					0	1	0	0
Autostart					0	1	0	1
Hostlist	0	0	1	0				
Datagram Type								
Directed UDP					1	1	0	0
Modem Mode								
No Echo			0	0		1	1	
Data Echo and Modem Response (Numeric)			0	1		1	1	1
Data Echo and Modem Response (Verbose)			0	1		1	1	0
Modem Response Only (Numeric)			0	0	1	1	1	1
Modem Response Only (Verbose)			0	0	1	1	1	0

INCOMING CONNECTION:

Never Accept Incoming: Rejects all external connection attempts.

Accept with DTR Active: Accept external connection requests only when the DTR input is asserted. Cannot be used with Modem Mode.

Always Accept: Accept any incoming connection when a connection is not already established. This is the default setting.

RESPONSE:

Character Response: A single character is transmitted to the serial port when there is a change in connection state: C = connected, D = disconnected, N = host unreachable. This option is overridden when the Active Start Modem Mode or Active Start Host List is in effect. Default setting is Nothing (quiet).

ACTIVE STARTUP:

No Active Startup: No attempt to initiate a connection under any circumstance. This is the default setting.

With Any Character: Attempts to connect when any character is received from the serial port.

With DTR Active: Attempts to connect when the DTR input changes from not asserted to asserted.

With a Specific Start Char: Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return.

Manual Connection: Attempts to connect when directed by a command string received from the serial port. The first character of the command string must be a C (ASCII 0x43), and the last character must be either a carriage return (ASCII 0x0D) or a line feed (0x0A). No blanks or space characters in the command string. Between the first and last command string characters must be a full or partial destination IP address and may be a destination port number.

The IP address must be presented in standard dot-decimal notation and may be a partial address, representing the least significant 1, 2 or 3 bytes of the remote IP address. The period is required between each pair of IP address numbers.

If present, the port number must follow the IP address, must be presented as a decimal number in the range 1-65535 and must be preceded by a forward slash (ASCII 0x2F). The slash separates the IP address and the port number. If the port number is omitted from a command string, the internally stored remote port number is used to start a connection.

For Active Start options requiring internally stored destination IP address and port number, the unit will not attempt a connection if this information is not configured (all zeros).

If a partial IP address is presented in a command string, it will be interpreted to be the least significant bytes of the IP address and will use the internally stored remote IP address to provide the most significant bytes of the IP address.

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 11 - 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
C0.0.0.0/0	Enter Monitor Mode

Autostart (Automatic Connection):

If **Autostart** is enabled, the unit automatically connects to the remote IP address and remote port specified when the firmware starts.

Hostlist: If you enable this option, the unit scrolls through the hostlist until it connects to a device listed in the hostlist table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it is able to connect to another IP in the hostlist.

Hostlist supports a minimum of 1 and a maximum of 12 entries. Each entry contains the IP address and the port number. The host list will be disabled for Manual Mode and for Modem Mode. The unit will not accept a data connection from a remote device when the host list option is enabled.

```
Baudrate (9600)
I/F Mode (4C)
Flow (00)
Port No (10001)
ConnectMode (21)
Send '+++' in Modem Mode (Y) ?
Auto increment source port (N) ?

Hostlist :
01. IP : 010.010.010.001  Port : 00023
02. IP : 010.010.010.002  Port : 00023
03. IP : 010.010.010.003  Port : 00023

Change Hostlist ? (N)
Hostlist Retrycounter    (3)
Hostlist Retrytimeout    (250)
DisConnMode (00)
FlushMode   (00)
DisConnTime (00:00) :
SendChar 1  (00)
SendChar 2  (00)
```

Figure 11 - Hostlist Option

To use the Hostlist option, follow these steps:

1. Enter a **Connect Mode** of 0x20 (**2X**). The menu shows you a list of current entries already defined in the product.

2. To delete, modify, or add an entry, select **Yes**. If you enter an IP address of 0.0.0.0, that entry and all others after it are deleted.

3. After completing the hostlist, repeat the previous step if necessary to edit the hostlist again.

4. For **Retrycounter**, enter the number of times the unit should try to make a good network connection to a hostlist entry that it has successfully ARPed. The range is 1-15, with the default set to 3.

5. For **Retrytimeout**, enter the number of seconds the unit should wait before failing an attempted connection. The time is stored as units of milliseconds in the range of 1-65535. The default value is 250.

DATAGRAM TYPE:

Directed UDP: When selecting this option, you will be prompted for the Datagram type. Enter **01** for directed or broadcast UDP.
When the UDP option is in effect, the unit will never attempt to initiate a TCP connection because it will use UDP datagrams to send and receive data.

MODEM MODE:

In Modem (Emulation) 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 NET232/USBs, 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 **06** (no echo), **16** (echo with full verbose), or **17** (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 06 (no echo), 16 (echo with full verbose), or 17 (echo with 1-character response).

Without Echo:	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 (without echo) refers to the modem not sending an answer to the commands received (or displaying what was typed).
Data Echo & Modem Response	**Full Verbose**: The unit echoes modem commands and responds to a command with a message string shown in the table below. **Numeric Response**: The unit echoes modem commands and responds to a command with a numeric response.
Modem Responses Only	**Full Verbose:** The unit does not echo modem commands and responds to a command with a message string shown in the table below. **Numeric Response**: The unit does not echo modem commands and responds to a command with a numeric response.

Message	Meaning
OK	Command was executed without error.
CONNECT	A network connection has been established.
DISCONNECT	A network connection has been closed.
RING n.n.n.n.	A remote device, having IP address n.n.n.n, is connecting to this device.

Message	Meaning
OK	Command was executed without error.
CONNECT	A network connection has been established
NO CARRIER	A network connection has been closed.
RING n.n.n.n	A remote device, having IP address n.n.n.n, is connecting to this device.
0	OK
1	Connected
2	Ring
3	No Carrier
4	Error

Received commands must begin with the two-character sequence **AT** and must be terminated with a carriage return character.

Any character sequence received not starting with **AT** will be ignored. The unit will only recognize and process single **AT**-style commands. Compound **AT** commands will be treated as unrecognized commands.

If the **Full Verbose** option is in effect, an unrecognized command string that is otherwise formatted correctly (begins with **AT** and ends with carriage return) will be responded to with the **OK** message and no further action is taken.

If the Numeric Response option is in effect, unrecognized command strings that are otherwise formatted correctly will be responded to with **OK** and no further action is taken.

When an active connection is in effect, the unit will be transferring data and will not process commands received from the serial interface.

When a connection is terminated or lost, the unit will revert to command mode.

When an active connection is in effect, the unit will terminate the connection if the following sequence is received from the attached serial device:

1. No serial data is received for one second.
2. The character sequence +++ is received, with no more than one second between each two characters.

3. No serial data is received for one second after the last + character. At this time the unit will respond affirmatively per the selected echo/response mode.

4. The character string **ATH** is received, terminated with a carriage return. The unit will respond affirmatively per the selected echo/response mode and drop the network connection. The serial interface will revert to accepting command strings.

If the above sequence is not followed, the unit will remain in data transfer mode.

Table 12 - Modem Mode Commands

Modem Mode Command	Function
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.

3.14.6 Send the Escape Sequence (+++) in Modem Mode

Disable or enable the ability to send the escape sequence. The default is **Y** (Yes) (send the escape sequence).

3.14.7 Auto Increment Source Port

Y (Yes) auto increment the source port. The NET232 increments the port number used with each new connection

3.14.8 Remote IP Address

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

*Note: This option does not display when Hostlist is enabled from the **ConnectMode** prompt.*

3.14.9 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.

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).

Note: This option does not display when Hostlist is enabled from the ConnectMode prompt.

3.14.10 DisConnMode

This setting determines the conditions under which the unit will cause a network connection to terminate.

Note: In DisConnMode (Disconnect Mode), DTR drop either drops the connection or is ignored.

Note: DTR is not factory enabled.

Note: There is no State LED on the NET485.

Table 13 - Disconnect Mode Options

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

1. The NET485 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 is 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. When DTR transitions from a high state to a low state, then the network connection to or from the serial port will drop.

3.14.11 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.

Table 14 - Flush Mode Options

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

3.14.12 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.

Table 15 - Pack Control Options

Option	7	6	5	4	3	2	1	0
Packing Interval								
Interval: 12ms							0	0
Interval: 52ms							0	1
Interval: 250ms							1	0
Interval: 5sec							1	1
Trailing Characters								
None					0	0		
One					0	1		
Two					1	0		
Send Characters								
2-Byte Send Character Sequence				1				
Send Immediately After Send chars			1					

Packing Interval: Packing Interval defines how long the unit should wait before sending accumulated characters. This wait period is between successive network segments containing data. For alternate packing, the default interval is 12 ms.

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.

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 Send 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.

3.14.13 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**. Range is 0 (disabled) to 5999 seconds (99 minutes, 59 seconds). Default setting is 0.

3.14.14 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 *Error! Reference source not found.* on page *Error! Bookmark not defined.*).

3.14.15 Telnet Terminal Type

This parameter appears only if the terminal type option is enabled in Disconnect Mode (see *Error! Reference source not found.* on page *Error! Bookmark not defined.* 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.

3.14.16 Channel (Port) Password

This parameter appears only if the channel (port) password option is enabled in Disconnect Mode (see *Error! Reference source not found.* on page *Error! Bookmark not defined.*). If the option is enabled, you can set a password on the serial port.

3.15 E-mail Settings

Note: The XPort Device Server allows the circuit designer the option of using three I/O pins for different purposes. These are referred to as Configurable Pins and are designated CP1, CP2 and CP3.

In order to use the E-mail function on the XPort, you will need access to the configurable pins. The NET485 limits the access so you cannot use the configurable pins to trigger an E-mail message. Your only option is to use a two-byte serial string to initiate a trigger.

If your device sends out a lot of character strings, then it might not be a good choice to use with the E-mail trigger option.

Note: You can change these settings via Telnet or serial connections only, not on the Web-Manager. To configure e-mail settings via DeviceInstaller, see E-mail Notification in the DeviceInstaller User Guide.

```
***************** E-mail *****************
Mail server (0.0.0.0) (000) .(000) .(000) .(000)
Unit name ():
Domain name ():
Recipient 1 ():
Recipient 2 ():

- Trigger 1
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message ():
Priority (L):
Min. notification interval (1 s):
Re-notification interval (0 s):
```

```
*** Trigger 2
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message ():
Priority (L):
Min. notification interval (1 s):
Re-notification interval (0 s):

*** Trigger 3
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message ():
Priority (L):
Min. notification interval (1 s):
Re-notification interval (0 s):
```

3.15.1 E-mail Setup

E-mail setup requires you to set up the e-mail server location as follows:

Mail server:	The IP address in decimal-dot notation.
Unit:	The user name used by the NET232/USB to send e-mail messages
Domain:	The Domain name of your e-mail server
Recipient 1:	Full e-mail address of the recipient.
Recipient 2:	Full e-mail address of the second recipient.

3.15.2 Trigger Setup

A trigger event can occur by receiving two bytes of a specified sequence on the serial port. If the serial sequence is set to **00,00** then it is disabled. At the **Serial Sequence** prompt, enter the ASCII Hex value. Example: A two byte sequence of 12 would be 0x31, 0x32.

Set all the configurable pins to **X** (Don't Care) so they are disabled. If both the serial sequence and the configurable pins are disabled, the trigger is disabled.

Message:	Enter the subject line of the e-mail.
Priority:	L is for normal priority, H is for High Priority.
Min. notification interval:	The minimum time allowed between individual triggers. If a trigger event occurs faster than the minimum interval, the trigger will be ignored.
Re-notification interval:	If a single trigger event stays asserted, then an e-mail message will be sent at this time interval.

Each trigger is independent from the others. Each condition within an individual trigger must be met before the e-mail will be sent.

3.16 Expert Settings

Note: You can change these settings via Telnet or serial connections only, not on the Web-Manager.

```
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) ?
CPU Performance (0=Regular, 1=Low, 2=High): (0) ?
Disable Monitor Mode @ bootup  (N) ?
RS485 tx enable active level (0=low; 1=high): (0) ?
HTTP Port Number :  (80) ?
SMTP Port Number :  (25) ?
MTU Size (512 – 1400): (1400) ?
Enable alternate MAC (N) ?
Ethernet connection type: (0) ?
```

3.16.1 TCP Keepalive time in seconds

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.

3.16.2 ARP Cache timeout in seconds

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.

3.16.3 Enable High Performance

This option applies to XPort-03 and greater units only. It allows you to increase the CPU performance and utilize the higher baud rates on the serial interface (i.e. 460Kbps and 920Kbps). Increasing CPU performance requires more power and lowers the unit's operating temperature. The standard CPU performance mode supports up to 230400 baud.

Note: If baud rates of 460Kbps or 920Kbps is set and the high performance mode disabled, the operation of the serial channel would be out of the specified error tolerance thereby leading to inconsistent speed settings on the two ends of the serial channel.

3.16.4 Disable Monitor Mode at Bootup

This option allows you to disable the Monitor Mode only during the startup sequence. This prevents all entries into Monitor Mode except thru 'xxx' followed by 'M'. All other Monitor Mode entry sequences, e.g. 'zzz' and 'yyy', are blocked during startup.

Note: Since the NET485 is not capable of Monitor Mode at Bootup, this option is not used.

3.16.5 RS-485 TX Enable Active Level

This option allows the selection of the active level (either active high or active low) for the RS485_TXEN signal. The default is active low.

This setting only applies if one of the configurable pins for the RS485_TXEN functionality is selected. For the RS-485 interface mode to operate correctly, configure one of the configurable pins to RS485_TXEN. To change the configurable pins' settings, use DeviceInstaller or send setup records to port 77FE. On the NET485, the only valid pin is CP0, which must be set to Active Level High.

Note: The NET485 must be configured for Active Level HIGH.

3.16.6 HTTP Port Number

This option allows changing the HTTP port number. The valid range is from 1 - 65535. The default value is 80.

3.16.7 SMTP Port Number

This option allows you to configure the SMTP (email) port number. Valid range is from 1 - 65535. The default value is 25.

3.16.8 MTU Size

The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between 512 and 1400 bytes. The default is 1400 bytes.

3.16.9 Enable Alternate MAC

If necessary, enable the alternate MAC address (if specified in the OEM setup record).

3.16.10 Ethernet Connection Type

The NET485 allows for the Ethernet speed and duplex to be manually configured. Enter 0 for auto-negotiation (default). To select the speed and duplex, enter one of the following: 2 (10Mbit/half duplex), 3 (10Mbit/full duplex), 4 (100Mbit/half duplex), or 5 (100Mbit/full duplex).

3.17 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.

Caution: Disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network. Disabling Port 77FE also disables the Web from configuring the device.

```
Disable SNMP (N)
SNMP Community Name (public):
Disable Telnet Setup (N)
Disable TFTP Firmware Update (N)
Disable Port 77FEh (N)
Disable Web Server (N)
Disable Web Setup (N)
Disable ECHO ports (Y)
Enable Encryption (N) (Only if Encrypted NET485)
Enable Enhanced Password (N)
Disable Port 77F0h (N)
```

3.17.1 Disable SNMP

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

3.17.2 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 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**.

3.17.3 Disable Telnet Setup

Note: If you choose to disable this option, keep in mind that disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.

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 locally via the Web pages and the serial port of the unit.

3.17.4 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 downloaded over the serial port using Device Installer's Recover Firmware procedure.

3.17.5 Disable Port 77FE (Hex)

Note: If you choose to disable this option, keep in mind that disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.

Port 77FE is a setting that allows Device Installer, Web-manager, and custom programs to configure the unit remotely. You may want to disable this capability for security purposes.

The default setting is the N (No) option, which enables remote configuration. You can configure the unit by using Device Installer, web pages, Telnet, or serial configuration.

The Y (Yes) option disables remote configuration and web sites.

Note: The Y (Yes) option disables many of the GUI tools for configuring the unit, including the embedded Web-Manager tool.

3.17.6 Disable Web Server

This setting defaults to the N (option). The Y (Yes) option disables web server.

3.17.7 Disable Web Setup

The Y (Yes) option disables configuration using the Web-Manager. This setting defaults to the N (option).

3.17.8 Disable ECHO Ports

Controls whether the serial port will echo characters it receives.

3.17.9 Enable Encryption

Rijndael is the block cipher algorithm chosen by the National Institute of Science and Technology (NIST) as the Advanced Encryption Standard (AES) to be used by the US government. The NET485 supports 128-, 192-, and 256-bit encryption key lengths.

Note: Configuring encryption should be done through a local connection to the serial port of the NET485, or via a secured network connection. Initial configuration information, including the encryption key, is sent in clear text over the network.

To configure AES encryption on the NET485:

1. When prompted to enable encryption, select Y.

2. When prompted, enter the encryption key length. The NET485 supports 128-, 192-, and 256-bit encryption key lengths.

3. When prompted to change keys, select Y.

4. At the Enter Keys prompt, enter your encryption key. The encryption keys are entered in hexadecimal. The hexadecimal values are echoed as asterisks to prevent onlookers from seeing the key. Hexadecimal values are 0-9 and A-F.
   For a 128-bit key length, enter 32 hexadecimal characters.
   For a 192-bit key length, enter 48 hexadecimal characters.
   For a 256-bit key length, enter 64 hexadecimal characters

5. Continue pressing Enter until you return to the Change Setup menu.

6. From the Change Setup menu, select option 9 to save and exit.

Encryption only applies to the port selected for data tunneling (default 10001), regardless of whether you are using TCP or UDP.

Generally, one of two situations applies:

> Encrypted NET485-to-NET485 communication. Be sure to configure both NET485 devices with the same encryption key.

> Third-party application to NET485-encrypted communication: NET485 uses standard AES encryption protocols. To communicate successfully, products and applications on the peer side must use the same protocols and the same encryption key as the NET485.

> Lantronix Secure Com Port Redirector provides an encrypted connection from Windows-based applications to the NET485. Information about SCPR is at http://www.lantronix.com/device-networking/software-services/scpr.html

Note: *Developers can license the Lantronix Encryption Library Suite. See http://www.lantronix.com/device-networking/utilities-tools/.*

3.17.10 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 and web page access.

3.17.11 Disable Port 77F0 (Hex)

Port 77F0 is a setting that allows a custom application to query or set the three NET485 configurable pins when they are functioning as general purpose I/O (GPIO). You may want to disable this capability for security purposes. The default setting is the N (No) option, which enables GPIO control. The Y (Yes) option disables the GPIO control interface.

Note: The function of the configurable pins on the NET485 should be changed with caution. Some of the configurable pins are not connected or used for other functions.

3.18 Defaults

Select **7** to reset the unit's Channel 1 configuration, E-mail settings, and Expert settings to the default settings. The server configurations (IP address information) remain unchanged. The configurable pins' settings also remain unchanged.

3.19 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.

4. Monitoring the Network

Monitor Mode is a command-line interface used for diagnostic purposes.

4.1.1 Entering Monitor Mode via the Network Port

To enter Monitor Mode using a Telnet connection:

1. Establish a Telnet session to the configuration port (9999). The following message appears:

```
MAC address 00204A0113A3
Software version 01.8 (040806) XPT485
Press Enter to go into Setup Mode
```

2. Type M (upper case). The following message appears:
   *** NodeSet 2.0 ***

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

4.1.2 Monitor Mode Commands

The following commands are available in Monitor Mode.

Note: All commands must be in capital letters.

Command	Command Name	Function
VS	Version	Queries software header record (16 bytes) of unit.
GC	Get Configuration	Gets configuration of unit as hex records (120 bytes).
SC	Send Configuration	Sets configuration of unit from hex records.
PI x.x.x.x	Ping	Pings unit with IP address x.x.x.x to check device status.
AT	ARP Table	Shows the unit's ARP table entries.
TT	TCP Connection Table	Shows all incoming and outgoing TCP connections.
NC	Network Connection	Shows the unit's current IP address.
RS	Reset	Resets the unit.
QU	Quit	Exits diagnostics mode.
G0 to G8	Get configuration from memory page	Gets a memory page of configuration information from the device.
S0 to S8	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.

Note: Entering any of the commands listed above generates one of the following command response codes:

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

5. Updating Firmware

5.1 Obtaining Firmware

You can obtain the most up-to-date firmware and release notes for the unit from Advantage-devices . Do not upgrade firmware unless directed by Technical Support.

5.1.1 Reloading Firmware

Reloading the firmware of a device will destroy all settings and configurations.

Firmware files are not freely distributed since changing the firmware of a device will change is operational features. This should only be done under the direction of technical support.

5.1.2 Via Device Installer

After copying the firmware to your computer, use Device Installer to install it.

1. Store the firmware in a subfolder on your computer.
2. Start Device Installer and search the network for the device you want to upgrade.
3. Select the desired unit and click the **Upgrade** icon or select **Upgrade** from the Device menu. The Device Upgrade Wizard appears. Follow the instructions on the wizard screens.

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

6. Troubleshooting

This chapter discusses how you can diagnose and fix errors quickly without having to contact Advantage-devices
. 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 Problems and Error Messages

Problem/Message	Reason	Solution
Cannot ping or connect to the NET485 DHCP name.	The DHCP server is not automatically setting the DHCP name in DNS on the network.	Contact the Network Administrator to manually add the NET485 to DNS.
When you issue the ARP –S command in Windows, The ARP entry addition failed: 5 message displays.	Your user login does not have the right to use this command on this PC.	Have your IT department log you in with sufficient rights.

Problem/Message	Reason	Solution
When you attempt to assign an IP address to the unit by the ARP method and Telnet to the device server through port 1, the connection fails.	The ARP method only creates a temporary password. When you Telnet to port 1, the connection should fail. When you Telnet into port 9999 and do not press Enter quickly, the device server reboots, causing it to lose the IP address.	Telnet back to Port 1. Wait for it to fail, then Telnet to port 9999 again. Make sure you press Enter within 5 seconds.
When you Telnet to port 9999, the *Press Enter to go into Setup Mode* message displays. However, nothing happens when you press Enter, or your connection is closed.	To enter Setup Mode via Telnet, the Enter key must be pressed within 5 seconds.	Telnet to port 9999 again and press Enter as soon as you see the Press Enter to go into Setup Mode message.
When you Telnet to port 1 to assign an IP address to the device server, the Telnet window	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 must 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.

does not respond for a long time.	The device server may not have a network connection.	Make sure that the Link LED is lit. If the Link LED is not lit, then the device server does not have a network connection.
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 RS-232, 9600 baud, 8 character bits, no parity, 1 stop bit, no flow control. For NET485, you must change the setting to RS422 or RS485.
When you try to enter the setup mode on the device server via the serial port, you get no response.	Setup Mode via the serial port is NOT supported on the NET485	Setup Mode via the serial port is NOT supported on the NET485. The unit is able to receive data but it cannot transmit, since the TXEN enable pin is not accessible to the boot firmware.
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 The Telnet configuration port	Turn the device server off and then issue the following commands at the DOS prompt of your computer:
	(9999) is disabled within the device server security settings.	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. If you do not get a response, use the serial port to verify that Telnet is not disabled.

7. Binary to Hex Conversion

Many of the unit's configuration procedures require assembling a series of options (represented as bits) into a complete command (represented as a byte). Convert the resulting binary value to a hexadecimal representation.

Following are two simple ways to convert binary numbers to hexadecimals.

7.1.1 Conversion Table

Hexadecimal digits have values ranging from 0 to F, which are represented as 09, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) 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.

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

7.1.2 Scientific Calculator

Another simple way to convert binary to hexadecimals is to use a scientific calculator, such as the one available on Windows' operating systems. For example:

1. On the Windows' Start menu, click **Programs/Accessories/Calculator.**
2. On the **View** menu, select **Scientific.** The scientific calculator displays.
3. Click **Bin** (Binary), and type the number to convert.
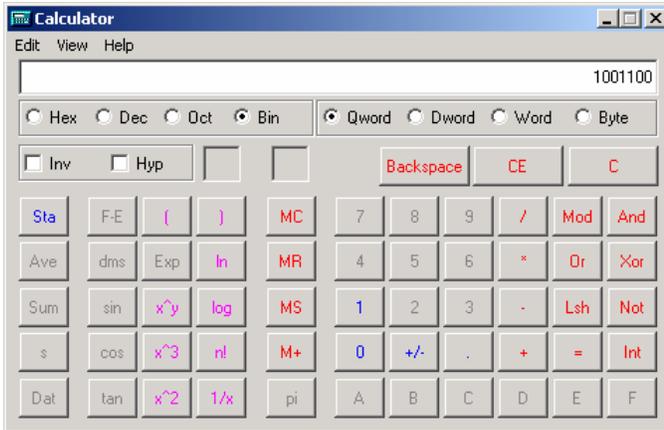
Click Hex. The hexadecimal value displays.