LANTRONIX®

XPort™

XPort™ User's Guide

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Disclaimer and Revisions

Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Changes or modifications to this device not explicitly approved by Lantronix will void the user's authority to operate this device.

Attention: With the purchase of XPort™, the OEM agrees to an OEM firmware license agreement that grants the OEM a non-exclusive, royalty-free firmware license to use and distribute the binary firmware image provided, only to the extent necessary to use the XPort™ hardware. For further details, please see the XPort OEM firmware license agreement.

Date	Rev.	Comments
	A	Initial release
	B	
11/03	C	Revised for v.1.6 of the firmware.
4/04	D	information to support XPort-03.

If you use a previous version of the firmware, go to the Lantronix FTP site at ftp://ftp.lantronix.com/pub to find the earlier documentation.

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1: Using This Guide

Purpose and Audience

This guide provides the information needed to configure, use and update the XPort™ and is intended for software developers and system integrators who are embedding the XPort in their designs. The information in this guide is relevant to XPort with firmware version 1.6 and higher.

Note: This document covers XPort™ Device Server versions XP1001000-01 and XP1001000-03.

Chapter Summary

The remaining chapters in this guide include:

2:Introduction	Describes the main features of the XPort and the protocols it supports.
3:Getting Started	Provides information for getting your unit up and running, using DeviceInstaller to assign an IP address, and Web-Manager to set parameters such as port and server properties.
4:Using Setup Mode	Provides instructions for accessing Setup Mode (command line interface) using a Telnet connection through the network or a terminal or terminal emulation program through the serial port. Details the parameters that you must configure.
5:GPIO Interface	Provides instructions for configuring the three General Purpose I/O pins (CP1-3).
6:Updating Firmware	Provides instructions for obtaining the latest firmware and updating the XPort.
7:Monitoring the Network	Provides instructions for accessing and using the command line interface for monitoring the network and diagnosing problems.
8:Troubleshooting	Describes common problems and error messages and how to contact Lantronix Technical Support.
A: IP Addresses	Provides detailed information about IP addressing and the components of an IP address.

Additional Documentation

The following guides are available on the product CD and the Lantronix web site (www.lantronix.com).

XPort Quick Start	Provides the steps for getting the XPort evaluation board up and running.
XPort Integration Guide	Provides information about the XPort hardware, testing the XPort using the evaluation board, and integrating the XPort into your product.
Com Port Redirector User Guide	Provides information on using the Windows-based utility to create a virtual com port.
Creating Custom Web Pages	Explains the detailed requirements for adding web services to your XPort and to other Lantronix device servers.

2: Introduction

This chapter familiarizes you with what the XPort device server can do and some basic information you need to know before you get started.

Capabilities

The XPort device server has the following capabilities:

◆ Connects devices through a TCP data channel or through a Telnet connection to computers or to another device server. The XPort also supports UDP datagrams.

◆ Contains a web [HTTP] server that allows presentation of custom content and easy configuration through the browser.

◆ Has three programmable IO pins that can be used to monitor or control attached devices.

Applications

The XPort device server connects serial devices such as those listed below to Ethernet networks using the IP protocol family.

◆ ATM machines
◆ CNC controllers
◆ Data collection devices
◆ Universal Power Supply (UPS) management units
◆ Telecommunications equipment
◆ Data display devices
◆ Security alarms and access control devices
◆ Handheld instruments
◆ Modems
◆ Time/attendance clocks and terminals

Protocol Support

The XPort device server uses the Internet Protocol (IP) for network communications. It uses 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.

◆ SMTP for e-mail transmission.

Addresses and Port Numbers

Hardware Address

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

Example: 00-20-4A-14-01-18

IP Address

Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit. (See Appendix A for further explanation of IP addresses.)

Port Numbers

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

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

Assigning an IP Address

For the unit to operate correctly on a network, it must have a unique IP address on the network. There are three basic methods for logging into the device server and assigning the IP address:

DHCP: By default, Dynamic Host Configuration Protocol (DHCP) is enabled on the device server. DHCP allows a DHCP server to automatically assign an IP address to the device server. If you use DHCP, the device server is assigned a new IP address each time it boots.

DeviceInstaller: You can manually assign the IP address using a graphical user interface (GUI) on a PC attached to a network. (See *3:Getting Started.*)

Serial Port Login: With this method, you connect a terminal or a PC running a terminal emulation program to the unit's serial port (CH 1). (See *4:Using Setup Mode.*)

3: Getting Started

This chapter covers the steps for getting the XPort device server online and working. It includes the following topics:

Required Information

Hardware Address

You need to know the unit's hardware address (also known as MAC address), which is on the product label. It is in the format: 00-20-4a-XX-XX-XX, where the XXs are unique numbers assigned to the product.

Hardware Address: 00-20-4a-_____-_____-_____

IP Address

Your XPort must have a unique IP address on your network. The systems administrator generally provides the IP address and corresponding subnet mask and gateway. The IP address must be within a valid range, unique to your network, and in the same subnet as your PC.

IP Address: _____ _____ _____ _____

Subnet Mask: _____ _____ _____ _____

Gateway: _____ _____ _____ _____

Using DeviceInstaller to Assign an IP Address

The unit's IP address must be configured before it can work correctly on a network. You have several options for assigning an IP to your unit. We recommend that you manually assign the IP address over the network using DeviceInstaller software, which is on the product CD.

Note: For information about the other methods, see Appendix A. If you want to use a serial connection instead of an Ethernet connection to configure the device, see Using the Serial Port on page 4-2.

Installing DeviceInstaller

1. Insert the product CD into your CD-ROM drive. The CD automatically starts and displays the main window.

2. 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).

3. Click the **DeviceInstaller** button. The installation wizard window displays.

4. Respond to the installation wizard prompts.

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

Assigning an IP Address

The unit's IP address is normally set to 0.0.0.0 at the factory. The hardware address is on the product label. The unit is DHCP enabled as the default.

To manually assign an IP address:

1. Click **Start→Programs → Lantronix→DeviceInstaller→DeviceInstaller.** If your PC has more than one network adapter, a message displays. Select an adapter and click **OK**.

   *Note: If the unit already has an IP address (e.g., DHCP has assigned an IP address), click the **Search** icon and select the unit from the list of Lantronix device servers on the local network.*

2. Click the **Assign IP** icon .

3. If prompted, enter the hardware address (on the product label) and click **Next**.

4. Select **Assign a specific IP address** and click **Next**.

5. Enter the **IP address**. The **Subnet mask** displays automatically based on the IP address; if desired, you may change it. On a local network, you can leave the **Default gateway** blank (all zeros). Click **Next**.

6. Click the **Assign** pushbutton and wait several seconds until a confirmation message displays. Click **Finish**.

7. 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.

8. From the **Tools** menu, 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.

9. Click the **Close** button to close the dialog box and return to the main window.

Using Web-Manager to Configure the Unit

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

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 you can configure the XPort using Web-Manager, Lantronix's browser-based configuration tool. (For information on using Setup Mode, our command line configuration interface, see 4:Using Setup Mode on page 4-1.)

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

To configure the unit:

1. Open DeviceInstaller.

2. Click the **Search** icon . A list of Lantronix device servers on the network displays.

3. Select the unit and click the **Web** icon , or select **Web Pages** from the **Device** menu.

   The Lantronix Web-Manager window displays in your browser.

   Note: You can also open your JAVA-enabled web browser and enter the IP address of the XPort to open Web-Manager. Web-Manager works with JAVA v1.3.1x or higher.

Figure 3-1. Lantronix Web-Manager
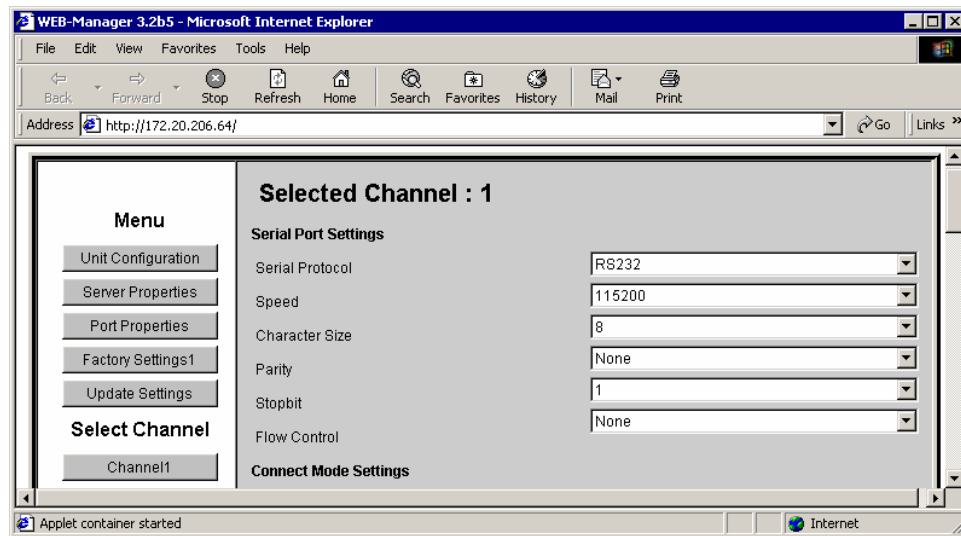
On the left, Web-Manager has the following menu options (pushbuttons):

- ◆ Unit Configuration
- ◆ Server Properties
- ◆ Port Properties
- ◆ Factory Settings1
- ◆ Update Settings
- ◆ Select Channel

4. Use the Menu to navigate to sub pages where you can configure server settings.

5. When you are finished, click the **Update Settings** button to save your settings.

Notes:

- ◆ *The next chapter, 4:Using Setup Mode, explains the configuration settings in detail.*
- ◆ *You must use Setup Mode to configure e-mail, expert, and security settings. You must use DeviceInstaller for the configurable pins' settings.*

Unit Configuration Settings

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

Note: The following examples represent typical web pages. See the Lantronix web site for the latest version.

The following figure shows the information available on the Unit Configuration web page.

Figure 3-2. Unit Configuration Web Page
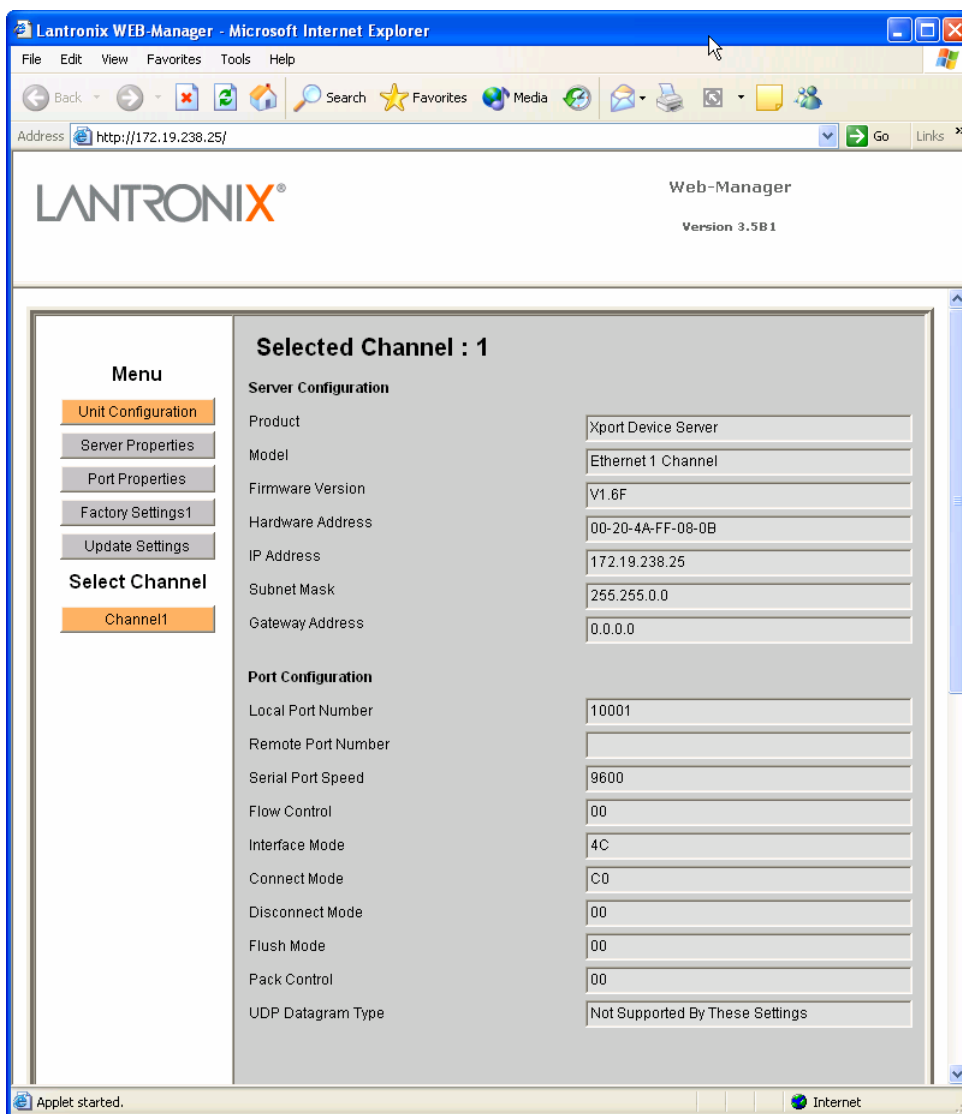
Server Properties

You can change the server properties by editing any of the fields. Holding the cursor over a field displays a help message for that field. If you change the IP address, you must enter the new IP address in the browser to reload the page.
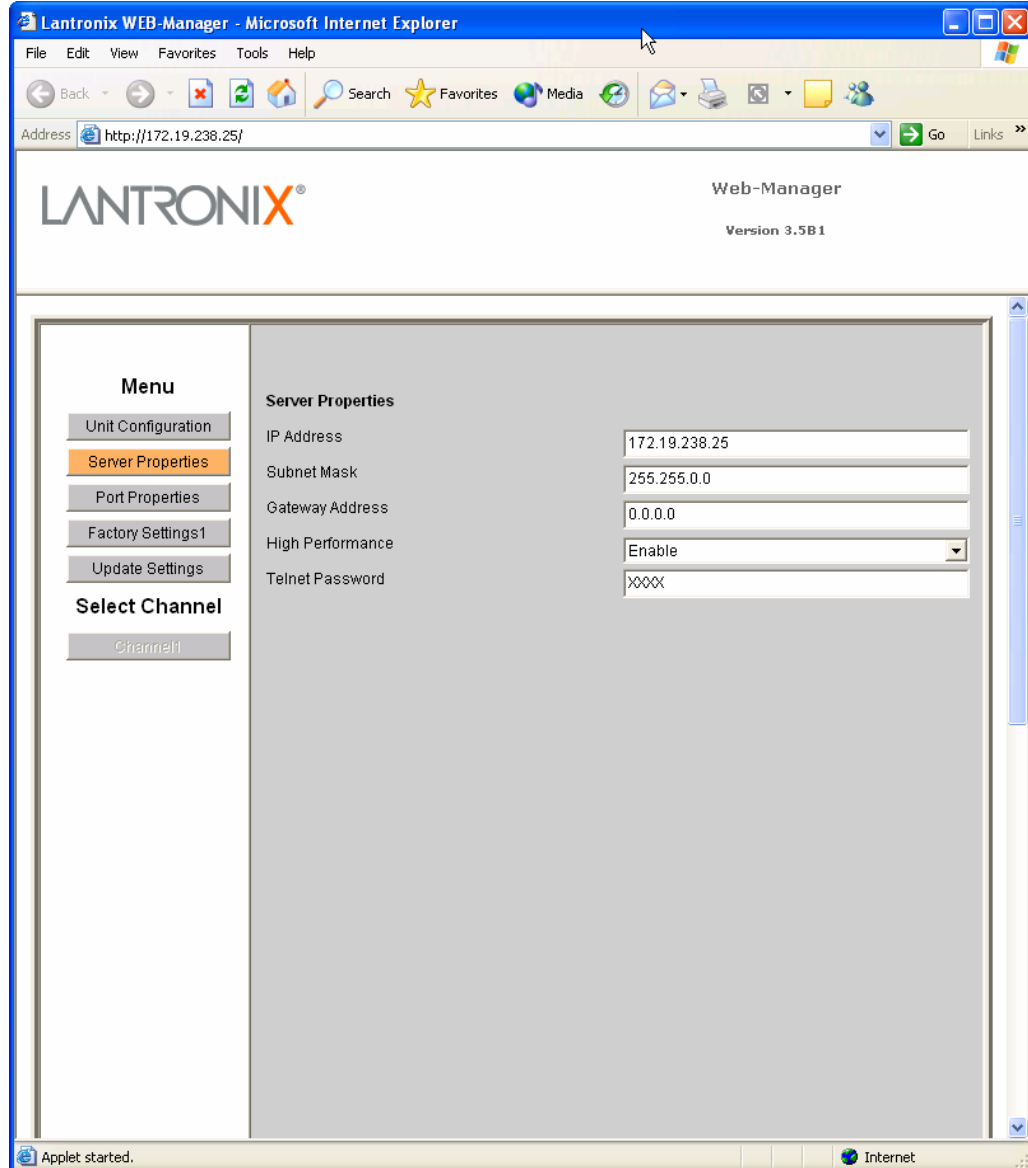
In the **Telnet Password** field, enter a password to prevent unauthorized access to the Setup Mode via a Telnet connection to port 9999. The password is limited to 4 characters. (An enhanced password setting of 16 characters is available under Security Settings on the Telnet Setup Mode window.)

Note: *You do not need a password to access the Setup Mode window via a serial connection.*

Port Properties

Serial Port Settings
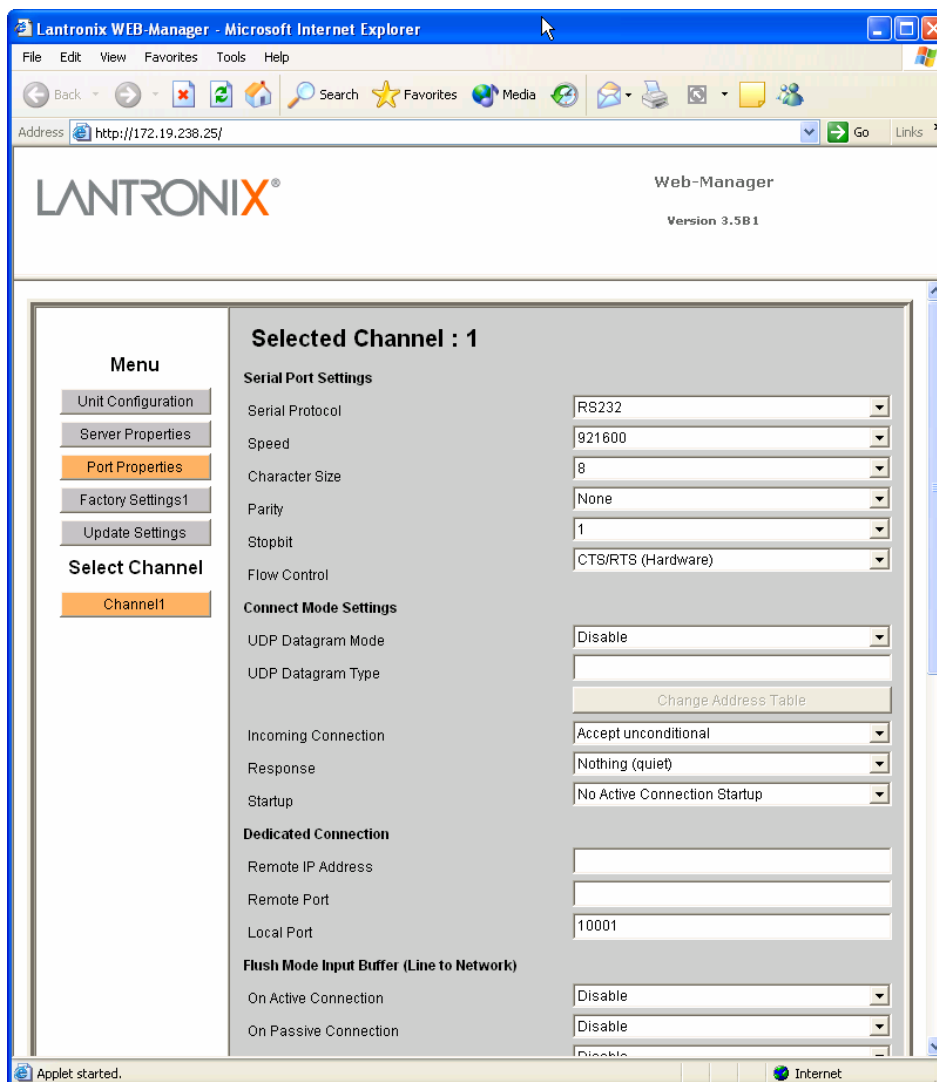
Serial Protocol	RS232
	Note: RS-232 is the only available option for XPort.
Speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, and 230400
	XPort-03 and greater provide high-performance mode that also supports the baud rates 460800 and 921600 bps (see *High CPU Performance mode* on page 4-19)
Character Size	8, 7
Parity	None, Even, Odd
Stop Bit	1,2
Flow Control	None, XON/XOFF, XON/XOFF Pass Characters to Host, CTS/RTS (Hardware)

Connect Mode Settings

Connect Mode Settings	
UDP Datagram Mode	Disable
UDP Datagram Type	
	Change Address Table
Incoming Connection	Accept unconditional
Response	Nothing (quiet)
Startup	No Active Connection Startup

UDP Datagram Mode	Enable, Disable
UDP Datagram Type	User Selectable
Incoming Connection	Accept unconditional, Accept incoming/DTR, Never accept incoming
Response	Nothing (quiet), Character Response
Startup	No Active Connection Startup, With Any Character, With a carriage return (C0x0D) Start Character, Manual Connection, Autostart, Modem Mode, With Active DTR

Dedicated Connection

Dedicated Connection	
Remote IP Address	
Remote Port	
Local Port	10001

Remote IP Address	User selectable
Remote Port	User selectable
Local Port	User selectable (default 10001)

Flush Mode Input Buffer

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

On Active Connection	Enable, Disable
On Passive Connection	Enable, Disable
At Time To Disconnect	Enable, Disable

Packing Algorithm

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

Packing Algorithm	Enable, Disable
Idle Time	Packing Interval 12 ms, Interval 52 ms, Interval 250 ms, Interval 5000 ms
Trailing Characters	None, One, Two
Send Immediate After Sendchars	Enable, Disable
Sendchar Define2-Byte Sequence	Enable, Disable
Send Character 01	User selectable
Send Character 02	User selectable

Additional Settings

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

Disconnect Mode	Ignore DTR, With DTR Drop
Check for CTRL-D to Disconnect	Enable, Disable
Port Password	Enable, Disable
Telnet Mode	Enable, Disable
Inactivity Timeout	Enable, Disable
Inactivity Timer	User Selectable
Port Password	User selectable; Port Password must be enabled

Factory Settings

Click the **Factory Settings** button to set the device server back to the factory default settings**.** For details see page *Factory Defaults* on page 4-22.

Update Settings

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

4: Using Setup Mode for Configuration

You must configure the unit so that it can communicate on a network with your serial device. You can configure it using a web browser, as described in 3:Getting Started, or using the following procedures locally or remotely:

- Use a Telnet connection to configure the unit over the network.
- Use a terminal or terminal emulation program to access the serial port locally.

Note: Detailed information about other setup methods are available from your Lantronix Sales Associate.

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.

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

This chapter includes the following topics:

Topic	Page
Accessing Setup Mode	4-1
Server Configuration (Network Configuration)	4-4
Channel 1 Configuration (Serial Port Parameters)	4-5
E-mail Settings	4-17
Expert Settings	4-17
Security Settings	4-19
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Exit Configuration Mode	4-24

Accessing Setup Mode

Using a Telnet Connection

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

Note: You can also use DeviceInstaller to access Telnet. Select the device

*from the main window list, and click the **Telnet** icon* *. If you use the* ***Telnet*** *icon on the DeviceInstaller toolbar, skip steps 1 and 2.*

6. 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.

7. Click **OK**. The following information displays.

Figure 4-1. MAC Address

```
MAC address 00204A41164D
Software version 01.3b1 (030605) XPTE

Press Enter to go into Setup Mode
```

8. To enter the Setup Mode, **press Enter within 5 seconds**. The configuration settings display, followed by the setup menu options.

Figure 4-2. Setup Menu Options

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

9. Select an option on the menu by entering the number of the option in the **Your choice** ? field and pressing **Enter**.

10. To enter a value for a parameter, type the value and press **Enter**, or to confirm a current value, just press **Enter**.

11. When you are finished, save the new configurations (option 9). The unit reboots.

Using the Serial Port

To initially configure the unit through a serial connection:

1. Connect a console terminal or PC running a terminal emulation program to your unit's serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1-stop bit, no-flow control.

2. To enter Setup Mode, reset the unit, either by pushing the red reset button, or cycling the unit's power (power off and back on). The self-test will begin. **You have one second** to enter three lowercase **x** characters (**xxx**).

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

3. At this point, the screen display is the same as when you use a Telnet connection. To continue, go to step 9 in Using a Telnet Connection on page 4-1.

The figure below shows all of the configuration parameters. The remainder of this chapter describes each parameter in detail.

Figure 4-2. Setup Mode Configuration Parameters

```
*** basic parameters
Hardware: Ethernet TPI
IP addr 172.19.23.60, gateway 172.019.000.001,netmask 255.255.000.000

*** Security
SNMP is                enabled
SNMP Community Name: public
Telnet Setup is        enabled
TFTP Download is       enabled
Port 77FEh is          enabled
Web Server is          enabled
ECHO is                disabled
Encryption is          disabled
Enhanced Password is disabled
Port 77F0h is          enabled

*** Channel 1
Baudrate 115200, I/F Mode 4C, Flow 00
Port 14009
Remote IP Adr: --- none ---, Port 00000
Connect Mode : C0
Disconn Mode : 00
Flush   Mode : 00

*** Expert
TCP Keepalive     : 45s
ARP cache timeout: 600s

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

*** Trigger 1
Serial Sequence: 00,00
CP1: X
CP2: X
CP3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s

*** Trigger 2
Serial Sequence: 00,00
CP1: X
CP2: X
CP3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s

*** Trigger 3
Serial Sequence: 00,00
CP1: X
CP2: X
CP3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s
```

Server Configuration (Network Configuration)

The unit's basic network parameters display when you select **Server configuration** (option **0**). The **IP Address**, **Set Gateway IP Address**, and **Netmask** fields display the current values.

Figure 4-3. Server Configuration Parameters

```
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)
```

IP Address

The IP address must be set to a unique value in your network. (See Appendix A for more information.)

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.

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 displays in standard decimal-dot notation when the saved parameters are displayed (for example, 255.255.255.0).

Table 4-1. 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

Change Telnet Configuration Password

Setting the Telnet configuration password prevents unauthorized access to the setup menu via a Telnet connection to port 9999 or via web pages. The password must have 4 characters. An enhanced password setting (for Telnet access only) of 16 characters is available under **Security Settings**.

Note: *You don't need a password to access the Setup Mode window via a serial connection.*

DHCP Name

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

There are three methods for assigning DHCP names to the unit.

◆ **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 defaults 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.

◆ **Custom DHCP Name**: You can create your own DHCP name. If you are using an IP address of 0.0.0.0, then the last option in Server configuration is **Change DHCP device name**. This option allows you to change the DHCP name to an alphanumeric name (LTX in our example).

Table 4-2. Custom DHCP Name

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

◆ **Numeric DHCP Name:** You can change the DHCP name by specifying the last octet of the IP address. When you use this method, the DHCP name is 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 is LTX12. This method only works with 2 digit numbers (0-99).

Channel 1 Configuration (Serial Port Parameters)

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

Note: You must enter some values in hexadecimal notation.

Figure 4-4. Serial Port Parameters

```
Baudrate (115200) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (14009) ?
ConnectMode (C0) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port  (0) ?
DisConnMode (00) ?
FlushMode   (00) ?
DisConnTime (00:00) ?:
SendChar 1  (00) ?
SendChar 2  (00) ?
```

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 bits per second (see *Expert Settings* on page 4-18).

I/F (Interface) Mode

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

Table 4-2. Interface Mode Options

I/F Mode Option	7	6	5	4	3	2	1	0
RS-232C [1]							0	0
7 Bit					1	0		
8 Bit					1	1		
No Parity			0	0				
Even Parity			1	1				
Odd Parity			0	1				
1 stop bit	0	1						
2 stop bits[1]	1	1						

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

Note: *If you attempt to select an I/F Mode bit that pertains to RS-422/485, a WARNING: RS-422/485 I/F Modes not supported message displays.*

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

Table 4-3. 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

Flow

Flow control sets the local handshaking method for stopping serial input/output. Use the following table to select flow control options:

Table 4-4. Flow Control Options

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

Port Number

The setting represents the source port number in TCP connections. It is the number that identifies the channel for remote initiating connections. The default setting for Port 1 is 10001. The range is 1-65535, except for the following reserved port numbers:

Table 4-5. Reserved Port Numbers

Port Numbers	Reserved for
1 – 1024	Reserved (well known ports)
9999	Telnet setup
14000-14009	Reserved for 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. Use Port 0 when you want the outgoing source port to change with each connection.

If the port number is 0, a random value of at least 50000 is used to actively establish a connection. Each subsequent connection increments the number by 1. When the port number reaches 59999, it wraps around to 50000.

Only use the automatic port increment feature to initiate a connection using TCP. Set the port to a non-zero value when the unit is in a passive mode or when you are using UDP instead of TCP.

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.

Table 4-6. 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				

Connect Mode Option	7	6	5	4	3	2	1	0
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								
Full Verbose				1	0	1	1	0
Without Echo				0	0	1	1	0
Numeric modem result codes				1	0	1	1	1

Incoming Connection

Never Accept Incoming   Rejects all external connection attempts.

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

Always Accept   Accepts any incoming connection when a connection is not already established. 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).

No Active Startup   Does *not* attempt to initiate a connection under any circumstance. 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 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. 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 may be 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 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 you omit the port number from a command string, the internally stored remote port number starts a connection.

If a partial IP address is presented in a command string, it is interpreted to be the least significant bytes of the IP address and uses the internally stored remote IP address to provide the most significant bytes of the IP address. If the IP address entered is 0.0.0.0/0, the device server enters Monitor Mode.

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 4-9. 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	Connects to 129.1.2.5, port 1234
C28.10/12	Connects to 129.1.28.10, port 12
C0.0.0.0/0	Connects to 129.1.28.10, port 12; enters Monitor Mode

Autostart (Automatic Connection)

If you enable autostart, the unit automatically connects to the remote IP address and remote port specified when the firmware starts.

Hostlist

If you enable this option, the device server 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 hostlist is disabled for Manual Mode and for Modem Mode.
The unit will not accept a data connection from a remote device when the hostlist option is enabled.

Figure 4-5. Hostlist Option

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

Baudrate (9600) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (10001) ?
ConnectMode (C0) ?25

Hostlist :

No Entry !

Change Hostlist ? (N) Y
01. IP address : (000) 172.(000) 19.(000) 0.(000) 1    Port :
(0) ?23
02. IP address : (000) 172.(000) 19.(000) 0.(000) 2    Port :
(0) ?3001
03. IP address : (000) 172.(000) 19.(000) 0.(000) 3    Port :
(0) ?10001
04. IP address : (000) .(000) .(000) .(000)

Hostlist :
01. IP : 172.019.000.001  Port : 00023
02. IP : 172.019.000.002  Port : 03001
03. IP : 172.019.000.003  Port : 10001

Change Hostlist ? (N) N

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

To enable the hostlist:

1. Enter a **Connect Mode** of 0x20 (**2**X), where X is any digit. 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 Lantronix 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 is 250.

Datagram Type

Directed UDP   When selecting this option, you are prompted for the Datagram type. Enter **01** for directed or broadcast UDP.

When the UDP option is in effect, the unit never attempts to initiate a TCP connection because it uses 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 XPorts, and to use an Ethernet connection instead of a phone call. By not having to change communications applications, you avoid potentially expensive phone calls.

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

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

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).
Full Verbose	The unit echoes modem commands and responds to a command with a message string shown in the table below.
1-Character Response	The unit echoes modem commands and responds to a command with a single character response.

Table 4-10. Modem Mode Messages

Message	Meaning
Full Verbose	
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.
1-Character Response	
0	OK
1	Connected
2	Ring
3	No Carrier
4	Error

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

The unit ignores any character sequence received *not* starting with **AT**, and only recognizes and processes single **AT**-style commands. The unit treats compound **AT** commands as unrecognized commands.

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

If the 1-Character Response option is in effect, the unit responds to an unrecognized command string that is otherwise formatted correctly with *OK* and takes no further action.

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

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

When an active connection is in effect, the unit terminates the connection if it receives the following sequence from the attached serial device:

- ◆ No serial data is received for one second.
- ◆ The character sequence +++ is received, with no more than one second between each two characters.
- ◆ No serial data is received for one second after the last + character. At this time, the unit responds affirmatively per the selected echo/response mode.
- ◆ The character string **ATH** is received, terminated with a carriage return. The unit responds affirmatively according to the selected echo/response mode and drops the network connection. The serial interface reverts to accepting command strings.

If this sequence is not followed, the unit remains in data transfer mode.

Table 4-11. 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: The unit recognizes these **AT** commands as single commands such as ATE0 or ATV1; it does not recognize compound commands such as **ATE0V**.*

Remote IP Address

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

Remote Port

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

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

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.

Table 4-12. 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 XPort sends 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 closes 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 turns off instead of blinking.
(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** is only detected going from the serial port to the network.
(6) When DTR transitions from a high state to a low state, the network connection to or from the serial port drops.

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 4-13. 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							

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 you do not need specific functions.

Table A4-14. 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		

Option	7	6	5	4	3	2	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 this option is not enabled, the unit interprets them independently.

- ◆ If Send Immediately After Characters is *not* set, any characters already in the serial buffer are included in the transmission after a "transmit" condition is found. If this option is 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.

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

Send Characters

You can enter up to two characters in hexadecimal representation in sendchar. If the unit receives a character on the serial line that matches one of these characters, it sends the character immediately, along with any awaiting characters, to the TCP connection. This action minimizes the response time for specific protocol characters on the serial line (for example, ETX, EOT). Setting the first sendchar to **00** disables the recognition of the characters. Alternatively, the unit can interpret two characters as a sequence (see Pack Control on page 4-15).

Telnet Terminal Type

This parameter displays only if you enabled the terminal type option in Disconnect Mode. 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.

Channel (Port) Password

This parameter appears only if the channel (port) password option is enabled in Disconnect Mode. If the option is enabled, you can set a password on the serial port.

E-mail Settings

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 on the CD.

The unit can send an e-mail to multiple recipients when a specific trigger event occurs. There are three separate triggers, based on any combination of the configurable pins (PIO) when selected as user I/O functions. You can also use a two-byte serial string to initiate a trigger.

Figure 4-6. E-mail Settings

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

*** Trigger 1
Serial Sequence: 00,00
CP1: X
CP2: X
CP3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s

*** Trigger 2
Serial Sequence: 00,00
CP1: X
CP2: X
CP3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s

*** Trigger 3
Serial Sequence: 00,00
CP1: X
CP2: X
CP3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval  : 0 s
```

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 XPort 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.

Trigger Setup

A trigger event can occur when the unit receives two bytes of a specified sequence on the serial port, or because of a specified combination of conditions on the configurable pins.

If the serial sequence is set to **00,00**, the trigger is disabled. At the **Serial Sequence** prompt, enter the ASCII Hex value. Example: A two byte sequence of 12 would be 0x31, 0x32.

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

Note: You can set the configurable pins to A = Active, I = Inactive, or X = Don't Care. Active can mean Active Low or Active High. To change the configurable pins' settings, you must use DeviceInstaller or send setup records to Port 77FE.

Message	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 unit ignores the trigger.
Re-notification interval	If a single trigger event stays asserted, then the unit sends an e-mail message at this time interval.

Each trigger is independent of the others. Each condition within an individual trigger must be met before the unit will send the e-mail.

Expert Settings

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

Only an expert should change these parameters. You must 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)
High CPU performance mode (disabled or enabled)	(Disabled) applies to XPort-03 and greater only

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 drops that connection.

ARP Cache timeout in seconds

Whenever the unit communicates with another device on the network, it adds 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.

High CPU Performance mode

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.

Security Settings

You can change security 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.

Figure 4-7. Security Settings

```
Disable SNMP (N) N

SNMP Community Name (public):

Disable Telnet Setup (N) N

Disable TFTP Firmware Update (N) N

Disable Port 77FEh (N) N

Disable Web Server (N) N

Disable ECHO ports (Y) Y

Enable Encryption (N) N

Enable Enhanced Password (N) N

Disable Port 77F0h (N) N
```

Disable SNMP

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

SNMP Community Name

This setting allows you to change the SNMP community name. Community name is a required field for NMS to read or write to a device. The default setting is **public**. The name is a string of 1 to 13 characters.

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 Setup Mode by Telnet (port 9999). It only allows access locally via the web pages and the serial port of the unit.

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, you can download firmware upgrades over the serial port using DeviceInstaller's Recover Firmware procedure. (See Recovering the Firmware Using the Serial Port on page 6-2.)

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 DeviceInstaller, Web-Manager, and custom programs to configure the unit remotely. You may wish 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 DeviceInstaller, 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.

Disable Web Server

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

Disable ECHO Ports

This setting controls whether the serial port echoes characters it receives.

Enable Encryption

This option displays **only** if you purchased the encrypted version of the Lantronix XPort. You can enable or disable (default) Rijndael encryption. Rijndael is the block cipher algorithm recently chosen by the National Institute of Science and Technology (NIST) as the Advanced Encryption Standard (AES) to be used by the US government.

To enable encryption, select the key length (128, 192 or 256 bits) and enter the encryption key in hexadecimals (32, 48, or 64, respectively). The hexadecimals are echoed as asterisks to prevent onlookers from seeing the key.

Figure 4-8. Encryption Keys

```
Enable Encryption (N) Y

Key length in bits (0): 128

Change Keys (N) Y

Enter Keys:  **-**-**-**-**-**-**-**-**-**-**-**-**-**-**-**
```

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

Generally, one of two situations applies.

◆ Encrypted XPort-to-XPort communication (and in the future, XPort communication to other Lantronix device servers) is supported without extra effort.

◆ The XPort uses standard AES encryption protocols. To communicate successfully, products and applications on the peer side must use the same protocols and the same shared key as the XPort. To ease the development process, Lantronix provides an AES encryption DLL for Windows and protocol source code samples. See the document entitled *Encryption Enabling Your Serial Device* on the Lantronix web site (www.lantronix.com) for more instructions and sample code.

The following export agreement is required for the optional encryption:

I agree that I will not export or re-export this software file to a national resident of Cuba, Iran, Iraq, Libya, North Korea, Sudan, Syria or any other country to which the United States has embargoed goods; or to anyone on the US Treasury Department's list of Specially Designated Nationals and Blocked Persons, US Commerce Department's Table of Denial Orders and Entitles List, or the US State Department's Debarred List. By receiving this software, I am agreeing to the foregoing and I am representing and warranting that I am not located in, under the control of, or a national or resident of any such country or on any such list.

Encryption Tutorial

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 XPort supports 128, 192 and 256 bit encryption key lengths.

Follow the steps below to configure AES encryption on the XPort.

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

1. Telnet to the configuration port on the XPort (Port 9999).

   Example Telnet command syntax is shown below. In the command examples below, replace the x's with the IP address of the XPort.

   Microsoft Windows command syntax: `telnet xxx.xxx.xxx.xxx 9999` Unix command syntax: `telnet xxx.xxx.xxx.xxx:9999`

2. When prompted, press **Enter** to go into Setup Mode.

3. At the Change Setup menu, select option **6** for security.

4. When prompted to enable encryption, press **Y**.

5. Enter the encryption key length when prompted. XPort supports 128-, 192- and 256-bit encryption key lengths.

6. When prompted to change keys, press **Y**.

7. At the **Enter Keys** prompts, 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.

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

9.   At the Change Setup menu, select option **9** to save and exit.

Enable Enhanced Password

This setting defaults to the N (No) option, which allows you to set a 4-character password that protects Setup Mode by means of 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.

Disable Port 77F0 (Hex)

Port 77F0 is a setting that allows a custom application to query or set the three XPort 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.

Factory Defaults

Select **7** to reset the unit's Channel 1 configuration, e-mail settings, and expert settings to the factory default settings. The server configuration settings for IP address, gateway IP address, and netmask remain unchanged. The configurable pins' settings also remain unchanged. The specific settings that this option changes are listed below.

Channel 1 Configuration Defaults

Baudrate	9600
I/F Mode	4C (1 stop bit, no parity, 8 bit, RS-232C)
Own TCP port number	10001
Connect Mode	C0 (always accept incoming connection; no active connection startup)
Hostlist retry counter	3
Hostlist retry timeout	250 (msec)
Start character for serial channel 1	0x0D (CR)
All other parameters	0

Expert Settings Defaults

TCP keepalive	45 (seconds)
ARP cache timeout	600 (seconds)
High CPU performance mode (XPort-03 or greater only)	Disabled

Security Settings Defaults

SNMP	Enabled
SNMP community name	public
Telnet setup	Enabled
TFTP download	Enabled
Port 77FEh	Enabled
Web Server	Enabled
ECHO	Disabled
Encryption	Disabled
Enhanced password	Disabled
Port 77F0h	Enabled

E-mail Settings

Priority	L
Min. notification interval	1 (second)
All other parameters	0 (e.g., e-mail notification and triggers are disabled)

Exit Configuration Mode

You have two options:

◆ Select **8** to exit the configuration mode *without* saving any changes or rebooting, *or*

◆ Select **9** to save all changes and reboot the device. All values are stored in nonvolatile memory.

5: GPIO Interface

This chapter includes the following topics:

Topic	Page
Configurable Pins	5-1
Control Protocol	5-2
Examples	5-5

Configurable Pins

The XPort has three pins (CP1-3) that you can configure for General Purpose I/O (GPIO).

Note: You can also configure the pins for serial port control lines, such as CTS, RTS, DTR, and DCD, and diagnostic outputs to LED, using DeviceInstaller.

You can use these GPIO pins to control devices such as relays, servers, lights, monitor switches, sensors, and even processes such as data transfer.

You can set the functions for the three pins independently and in any combination. The initial directions (input/output) and active levels (active low or high) at boot up can also be configured through 77FE, for example, by using DeviceInstaller.

This chapter describes how the directions, active levels, and states can be dynamically controlled and probed through special port 77F0.

Features:

- ◆ TCP and UDP can be used.
- ◆ The protocol supports up to 32 GPIO for future products.
- ◆ Function configuration can be retrieved.
- ◆ Input or output selection can be retrieved and controlled.
- ◆ Active low or high selection can be retrieved and controlled.
- ◆ Active or inactive selection can be retrieved and controlled.
- ◆ 77F0 can be disabled.

Every change of state (active/inactive) requires a command over TCP or UDP, and thus is not very fast. If you use this port for data transfer, the throughput is low, usually up to 1Kbps.

Control Protocol

The GPIO control protocol is a simple, proprietary protocol. It is described below.

Guidelines

The GPIO control protocol is described from the PC side. *Send* means from PC to XPort. *Response* comes from XPort to PC.

The protocol allows for control of up to 32 GPIOs. How many are actually available depends on the product. XPort has only three.

The parameters are four bytes long and represent GPIOs 0-31, with GPIO0 in bit 0 of the first byte (Little Endian). Parameter bits for configurable pins not configured as GPIOs are undefined for **Get** commands and ignored on **Set** commands.

Every command consists of nine bytes: one command type of one byte and two parameters of four bytes each.

Command	Parameter 1				Parameter 2			
0	1	2	3	4	5	6	7	8

On some commands, one or all parameters are ignored.

For UDP, command type and parameters need to be in the same datagram.

Responses to valid commands are always five bytes long, consisting of the returned command byte and as parameters in the current or updated values. In case of an invalid command, only one byte with value 0FFh is returned.

Command	Parameter 1			
0	1	2	3	4

When sending a command (TCP and UDP), wait for the response before sending the next command.

Commands

Byte 0 Command Types

10h	**Get functions**
11h	**Get directions** (input or output)
12h	**Get active levels** (high active or low active)
13h	**Get current states** (active or not active)
19h	**Set directions**
1Ah	**Set active levels**
1Bh	**Set current states**

As you can, see there is no **Set functions** command. Since the pin's function depends on the hardware in which the XPort is embedded, that configuration is only allowed via 77FE. Settings changed by any of the **Set** commands are not stored and are lost when the unit is powered down or rebooted.

Command 10h, Get Functions

Send:

No parameters

Response:

1 parameter
Bytes 1-4: Functions
    Bit X   1 means general purpose IO available to the user.
              0 means dedicated function (e.g., serial flow control, diagnostics) for configurable pin X.

Command 11h, Get Directions

Send:

No parameters

Response:

1 parameter
Bytes 1-4: Directions
    Bit X   1 means GPIO X is an output.
              0 means it is an input.

Command 12h, Get Active Levels

Send:

No parameters

Response:

1 parameter
Bytes 1-4: Active levels
    Bit X   1 means GPIO X is active low (0V when active, 3.3V when inactive).
              0 means it is active high (3.3V when active, 0V when inactive).

Command 13h, Get Current States

Send:

No parameters

Response:

1 parameter
Bytes 1-4: States
    Bit X   1 means GPIO X is active
              0 means it is inactive.

Command 19h, Set Directions

Send:

2 parameters

Bytes 1-4: Mask

Bit X   1 means the direction for GPIO X will be updated with the value in the second parameter.

0 means the direction for that GPIO will not change.

Bytes 5-8: New Directions

Bit X   1 means GPIO X will become an output.

0 means it will become an input.

Response:

1 parameter

Bytes 1-4: The updated directions

Command 1Ah, Set Active Levels

Send:

2 parameters

Bytes 1-4: Mask

Bit X   1 means the direction for GPIO X will be updated with the value in the second parameter.

0 means the active type for that GPIO will not change.

Bytes 5-8: New Active Levels

Bit X   1 means GPIO X will become active low.

0 means it will become active high.

Response:

1 parameter

Bytes 1-4: Updated active levels

Command 1Bh, Set States

Send:

2 parameters

Bytes 1-4: Mask

Bit X   1 means the state for GPIO X will be updated with the value in the second parameter.

0 means the state for that GPIO will not change.

Bytes 5-8: New States

Bit X   1 means GPIO X will become active.

0 means it will become inactive.

Response:

1 parameter

Bytes 1-4: Updated states

Examples

Example 1: PC sends command 1 to find out which configurable pins are available as GPIO.

PC -> XPort: 10h, 00h, 00h, 00h, 00h, 00h, 00h, 00h, 00h
XPort -> PC: 10h, 03h, 00h, 00h, 00h

Command details:

10h = command 10h
00h, 00h, 00h, 00h = ignored
00h, 00h, 00h, 00h = ignored

Response details:

10h = response to command 10h
04h, 00h, 00h, 00h =

> bits 0 and 1 are 0 $\to$ CP1 and CP2 are configured as GPIOs.
> bit 2 is 1 $\to$ CP3 is configured as either serial control or diagnostics.
> The other bits are ignored because there are only three configurable pins on the XPort.

Example 2: PC sends command 1Bh to change the current states of GPIO 0 and 1.

PC -> XPort: 1Bh, 01h, 00h, 00h, 00h, 00h, 00h, 00h, 00h
XPort -> PC: 1Bh, 05h, 00h, 00h, 00h

Command details:

1Bh = command 1Bh
01h, 00h, 00h, 00h = the mask that determines which GPIOs will be changed.

> bit 0 is 1 $\to$ GPIO0 will be changed.
> bit 1 is 0 $\to$ GPIO1 will remain the same.

00h, 00h, 00h, 00h = the new states

> bit 0 is 0 $\to$ GPIO0 will become 0.
> bit 1 is ignored since it is masked out.

Response details:

1Bh = response to command 1Bh
05h, 00h, 00h, 00h =

> bit 0 is 1 $\to$ GPIO0 = 1
> bit 1 is 0 $\to$ GPIO1 = 0
> bit 2 is 1 $\to$ GPIO2 = 1
> The other bits are ignored because there are only three configurable pins on the XPort.

6: Updating Firmware

This chapter explains how to obtain and update the unit's firmware. It includes the following topics:

Topic	Page
Obtaining Firmware	6-1
Reloading Firmware	6-1

Obtaining Firmware

You can obtain the most up-to-date firmware and release notes for the unit from the Lantronix web site (www.lantronix.com) or by using anonymous FTP (ftp.lantronix.com).

Reloading Firmware

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

Here are *typical* names for those files. Check the Lantronix web site for the latest versions and release notes.

Table 6-1. Firmware Files

| ROM File	COB
XPTEXE16.ROM	GEN3402.COB (Web-Manager)

Using TFTP

To download new firmware from a computer:

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

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

2. In the **TFTP server** field, enter the IP address of the unit being upgraded.

3. Select **Upload** operation and **Binary** format.

4. Enter the full path of the firmware file in the **Local file name** field.

5. In the **Remote file name** field, enter the current internal operational code or **WEB6** for the internal Web interface. (For XPort-01, **X1 =** Standard Tunnel; for XPort-03, **X2 =** Standard Tunnel)

6. Click the **Upload Now** button to transfer the file to the unit.

Figure 6-1. TFTP Window
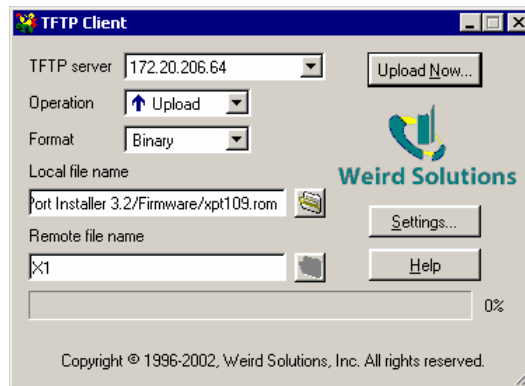
After the firmware has been loaded and stored, which takes approximately 8 seconds to complete, the unit performs a power reset.

Recovering the Firmware Using the Serial Port and DeviceInstaller

If for some reason the firmware is damaged, you can recover the firmware file by using DeviceInstaller to download the *.ROM file over the serial port.

1. Start DeviceInstaller. If your PC has more than one network adapter, a message displays. Select an adapter and click **OK**.

2. From the **Tools** menu, select **Advanced/Recover Firmware**. The Serial Port Firmware Upgrade window displays.

3. For **Port on PC**, enter the COM port to which your are connected.

4. For **Device Model**, be sure the appropriate XPort device is shown (XPort-01 or XPort-03).

5. For **Firmware File**, click the **Browse** button and go to the location where the firmware file resides.

Note: Make sure the XPort on which you are recovering firmware is connected to this selected port on your PC.

6. Click **OK** to download the file.

7. When prompted, reset the device. Status messages and a progress bar at the bottom of the screen show the progress of the file transfer. When the file transfer completes, the message "**Successful, Click OK to Close**" appears.

8. Click the **OK** button to complete this procedure.

Note For more information, see Recovering Firmware in the DeviceInstaller User Guide.

7: Monitoring the Network

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

This chapter includes the following topics:

There are two ways to enter Monitor Mode: locally via the serial port or remotely via the network.

Entering Monitor Mode via the Serial Port

To enter Monitor Mode locally:

1. Follow the same steps used for setting the serial configuration parameters (see Using the Serial Port on page 4-2).

2. Instead of typing three **x** keys, however:

   a) Type **zzz** (or **xx1**) to enter Monitor Mode with network connections.

   b) Type **yyy** (or **yy1**) to enter Monitor Mode without network connections.

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

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 01.0b9 (021219)  XPT
   Press Enter to go into Setup Mode
   ```

2. Type M (upper case).

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

Monitor Mode Commands

The following commands are available in Monitor Mode. Many commands have an IP address as an optional parameter (xxx.xxx.xxx.xxx). If you enter the IP address, the command is applied to another unit with that IP address. If you do not enter the IP address, the command is executed locally.

Note: All commands must be in capital letters.

Table 7-1. Monitor Mode Commands

Command	Command Name	Function
VS x.x.x.x	Version	Queries software header record (16 bytes) of unit with IP address x.x.x.x.
GC x.x.x.x	Get Configuration	Gets configuration of unit with IP address x.x.x.x as hex records (120 bytes).
SC x.x.x.x	Send Configuration	Sets configuration of unit with IP address x.x.x.x 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 IP configuration.
RS	Reset	Resets the unit's power.
QU	Quit	Exits diagnostics mode.
G0, G1, ...,Ge, Gf	Get configuration from memory page	Gets a memory page of configuration information from the device.
S0, S1,...,Se, Sf	Set configuration to memory page	Sets a memory page of configuration information on the device.

Responses to some of the commands are given in Intel Hex format.

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

Table 7-2. Command Response Codes

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

8: Troubleshooting

This chapter discusses how you can diagnose and fix errors quickly without having to contact a dealer or Lantronix. It helps to connect a terminal to the serial port while diagnosing an error to view summary messages that may be displayed. When troubleshooting, always ensure that the physical connections (power cable, network cable, and serial cable) are secure.

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

When troubleshooting the following problems, make sure that the XPort is powered up. Confirm that you are using a good network connection.

This chapter includes the following topics:

Topic	Page
Problems and Error Messages	8-1
Technical Support	8-4

Problems and Error Messages

Problem/Message	Reason	Solution
When you issue the **ARP –S** command in Windows, *The ARP entry addition failed: 5* message displays.	Your currently logged-in user does not have the correct rights to use this command on this PC.	Have someone from your IT department log you in with sufficient rights.
When you attempt to assign an IP address to the unit by the ARP method, the *Press Enter to go into Setup Mode error* (described below) message displays. Now when you Telnet to the device server, the connection fails.	When you Telnet to port 1 on the device server, you are only assigning a temporary IP address. When you Telnet into port 9999 and do not press **Enter** quickly, the device server 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** quickly.
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.	You did not press **Enter** quickly enough. You only have 5 seconds to press **Enter** before the connection is closed.	Telnet to port 9999 again, but press **Enter** as soon as you see the *Press Enter to go into Setup Mode* message.

Problem/Message	Reason	Solution
When you Telnet to port 1 to assign an IP address to the device server, the Telnet window does not respond for a long time.	You may have entered the Ethernet address incorrectly with the ARP command.	Confirm that the Ethernet address that you entered with the ARP command is correct. The Ethernet address may only include numbers 0-9 and letters A-F. In Windows and usually in Unix, the segments of the Ethernet address are separated by dashes. In some forms of Unix, the Ethernet address is segmented with colons.
	The IP address you are trying to assign is not on your logical subnet.	Confirm that your PC has an IP address and that it is in the same logical subnet that you are trying to assign to the device server.
	The device server may not be plugged into the network properly.	Make sure that the Link LED is lit. If the Link LED is not lit, then the device server is not properly plugged into the network.
When you try to assign an IP with DeviceInstaller, you get the following message: *No response from device! Verify the IP, Hardware Address and Network Class. Please try again.*	The cause is most likely one of the following: The Hardware address you specified is incorrect. The IP address you are trying to assign is not a valid IP for your logical subnet. You did not choose the correct subnet mask.	Double-check the parameters that you specified. *Note: You cannot assign an IP address to a device server through a router.*
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.
When you try to enter the setup mode on the device server via the serial port, you get no response.	The issue is most likely something covered in the previous problem, or possibly, you have **Caps Lock** on.	Double-check everything in the problem above. Confirm that **Caps Lock** is not on.

Problem/Message	Reason	Solution
You can ping the device server, but not Telnet to the device server on port 9999.	There may be an IP address conflict on your network You are not Telnetting to port 9999. The Telnet configuration port (9999) is disabled within the device server security settings.	Turn the device server off and then issue the following commands at the DOS prompt of your computer: ARP -D X.X.X.X (X.X.X.X is the IP of the device server). PING X.X.X.X (X.X.X.X is the IP of the device server). If you get a response, then there is a duplicate IP address on the network. If you do not get a response, use the serial port to verify that Telnet is not disabled.
The device server appears to be set up correctly, but you are not communicating with your device attached to the device server across the network.	If you are sure that the serial port setting is correct, then you may not be connecting to the correct socket of the device server. Another possibility is that the device server is not set up correctly to make a good socket connection to the network.	You can check to see whether there is a socket connection to or from the device server by checking the state of CP1, if it has been configured for LED1 functionality. If the state of CP1 is blinking consistently, or is completely off, then there is a good socket connection. If the state of CP1 is low, use the Connect Mode option **C0** for making a connection to the device server from the network. Use Connect Mode option **C1** or **C5** for a connection to the network from the device server. See the full list of Connect Mode options in Connect Mode on page 4-7.
When connecting to the Web-Manager within the device server, the *No Connection With The Device Server* message displays.	Your computer is not able to connect to port 30718 (77FEh) on the device server.	Make sure that port 30718 (77FEh) is not blocked with any router that you are using on the network. Also, make sure that port 77FEh is not disabled within the Security settings of the device server.

Technical Support

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

◆ To check our online knowledge base or send a question to Technical Support, go to http://www.lantronix.com/support.

◆ E-mail us at support@lantronix.com.

◆ Call us at:

(800) 422-7044 Domestic
(949) 453-7198 International
(949) 450-7226 Fax

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

Technical Support Europe, Middle East, and Africa
Phone: +49 (0) 89 31787 817
E-mail: eu_techsupp@lantronix.com or eu_support@lantronix.com

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

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

◆ Your name, and your company name, address, and phone number

◆ Lantronix model number

◆ Lantronix MAC number

◆ Software version (on the first screen shown when you Telnet to port 9999)

◆ Description of the problem

◆ Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem).

A: IP Addresses

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

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

This chapter includes the following topics:

Components of the IP Address

Network Portion

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

Table A-1. Network Portion of IP Address

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

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

Table A-2. Available IP Addresses

Class	Address Range	Comments
A	1.0.0.1 to 126.255.255.254	126 networks of 16,777,214 hosts
B	128.1.0.1 to 191.254.255.254	16,328 networks of 65,534 hosts
C	192.0.1.1 to 223.255.254.254	2,097,150 networks of 254 hosts
D	224.0.0.0 to 239.255.255.254	Reserved for multicast groups
E	240.0.0.0 to 254.255.255.254	Reserved for experimental and future use

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

Subnet Portion

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

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

Host Portion

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

Network Address

A host address with all host bits set to 0 addresses the network as a whole (as in routing entries), for example, 192.168.0.0.

Broadcast Address

A host address with all host bits set to 1 is the broadcast address (for every station), for example, 192.168.0.255.

You may *not* use a network or broadcast address as a host address; for example, 192.168.0.0 identifies the entire network, and 192.168.0.255 identifies the broadcast address.

IP Subnet Mask

An IP subnet mask divides an IP address differently from the standards defined by the classes A, B, and C. An IP subnet mask defines the number of bits to be taken from the IP address as the network or host sections. The unit prompts for the number of host bits to be entered and then calculates the netmask, which displays in standard decimal-dot notation (for example, 255.255.255.0) after you save the parameters.

Table A-3. Standard IP Network Netmasks

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

Table A-4. Netmask Examples

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

Private IP Networks and the Internet

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

Network RFCs

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

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

Alternative Ways to Assign an IP Address

In 3:Getting Started, we described how to assign an IP address using DeviceInstaller. This section covers other methods for assigning an IP address over the network.

Note: You can also assign the IP address using a serial connection. (See Using the Serial Port on page 4-2.)

DHCP

The unit ships with a default IP address of 0.0.0.0, which automatically enables DHCP. If a DHCP server exists on the network, it will provide the unit with an IP address, gateway address, and subnet mask when the unit boots up.

You can use the DeviceInstaller software to search the network for the IP address your unit has been assigned by the DHCP server and add it to the managed list.

*Note: This DHCP address does **not** appear in the unit's Setup Mode and Web-Manager screens. You can, however, determine your unit's DHCP-assigned IP address in Monitor Mode. When you enter Monitor Mode from the serial port with network connection enabled (see Entering Monitor Mode via the Serial Port on page 7-1) and issue the **NC** (Network Communication) command, you will see the unit's IP configuration.*

AutoIP

The unit ships with a default IP address of 0.0.0.0, which automatically enables Auto IP within the unit. AutoIP is an alternative to DHCP that allows hosts to automatically obtain an IP address in smaller networks that may not have a DHCP server. A range of IP addresses (from 169.254.0.1 to 169.254.255.1) has been explicitly reserved for AutoIP-enabled devices. The range of Auto IP addresses is not to be used over the Internet.

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

If the selected address is not in use, then the unit uses it for local subnet communication.

If another device is using the selected IP address, the unit selects another address from the AutoIP range and reboots. After reboot, the unit sends out another ARP request to see if the selected address is in use, and so on.

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

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

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

ARP and Telnet

If the unit has no IP address, you can use Address Resolution Protocol (ARP) method from UNIX and Windows-based systems to assign a temporary IP address.

To assign a temporary IP address:

1. On a UNIX or Windows-based host, create an entry in the host's ARP table using the intended IP address and the hardware address of the unit (on the product label on the bottom of the unit).

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

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

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

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

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

   ```
   telnet 191.12.3.77 1
   ```

4. Finally, open a Telnet connection to port 9999, and press **Enter** within **five seconds** to go into Setup Mode. If you wait longer than five seconds, the unit reboots.

   ```
   telnet 191.12.3.77 9999
   ```

Continue with Using Setup Mode on page 4-1.

Note: The IP address you just set is temporary and will revert to the default value when the unit's power is reset unless you configure the unit and store the changes permanently.