

XPort® *Direct*

XChip Direct™ SoC

DeviceLinx™
XPort Direct/XChip Direct SoC
User Guide

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Date	Rev.	Firmware	Comments
1/07	A		Initial release
5/07	B	6.1	Added information about product support for RS485.
8/07	C	6.5	Added XChip Direct information.

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1: Using This Guide

Purpose and Audience

This guide covers DeviceLinx XPort™ Direct Device Gateway Module (XPD1001xxx-01) and the DeviceLinx XChip™ Direct SoC (XCD1001xxx-01). It provides the information needed to configure, use and update the XPort™ Direct firmware and is intended for OEMs and system integrators who are embedding the XPort Direct or XChip Direct in their end product designs.

Note: The XChip Direct is a deployment-ready Device Gateway SoC coprocessor bundled with the XPort Direct firmware. All references to XChip Direct in this document relate to the combination of the physical chip and the licensed firmware that delivers the XPort Direct functionality.

EX100000-02R + XPort Direct firmware = XCD1001000-01 (XChip Direct)

Chapter Summary

The remaining chapters in this guide include:

Chapter	Description
2: Introduction	Describes the main features of the XPort Direct and the protocols it supports.
3: Using DeviceInstaller	Provides information for getting your unit up and running, using DeviceInstaller to assign an IP address.
4: Configuration via Telnet or Serial Port (Setup Mode)	Provides instructions for accessing Setup Mode (command line interface) using a Telnet connection through the network or the serial port.
5: Setup Mode: Server Configuration	Details the network (server) settings
6: Setup Mode: Channel Configuration	Details the serial port settings.
7: Setup Mode: Advanced Settings	Details expert and security settings and explains how to reset the unit to factory default values.
8: GPIO Interface	Provides instructions for configuring the General Purpose I/O pins.
9: Firmware Upgrades	Provides instructions for obtaining the latest firmware and updating the XPort Direct.
10: Monitor Mode	Provides instructions for accessing and using the command line interface for monitoring the network and diagnosing problems.

Chapter	Description
<i>11: Troubleshooting</i>	Describes common problems and error messages and how to contact Lantronix Technical Support.
<i>A: Alternative Ways to Assign an IP Address</i>	Details additional ways to assign an IP address, for example, DHCP, ARP, and BootP.
<i>B: Binary to Hexadecimal Conversions</i>	Provides instructions for converting binary numbers to hexadecimals.

Utilities

The following utilities and related documentation are available for download on the Lantronix web site www.lantronix.com:

Utility	Description
Com Port Redirector	A Windows-based utility to create a virtual com port. The Com Port Redirector User Guide explains how to use it.
DeviceInstaller	A utility to configure IP addresses and locate Lantronix devices on the local network. DeviceInstaller's online Help provides information on using it.

Additional Documentation

The following documentation is also available on the product CD and the Lantronix web site (www.lantronix.com).

Document	Description
XPort Direct Integration Guide	Provides information about the XPort Direct hardware, testing the XPort Direct using the demonstration kit, and integrating the XPort Direct into your product.
XPort Direct Quick Start	Provides instructions for getting your unit up and running.
XChip Direct Reference Platform Integration Guide	Provides information about XChip Direct hardware, technical specifications, and integration.

2: Introduction

This chapter summarizes the XPort Direct device networking gateway's features and the basic information needed before getting started.

Capabilities

The XPort Direct connects devices through a TCP data channel or through a Telnet connection to computers or other devices. The XPort Direct also supports UDP datagrams.

Applications

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

- ◆ Personal entertainment devices
- ◆ POS devices
- ◆ 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 Direct 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, and DHCP for network communications and management.
- ◆ TCP, UDP, and Telnet for connections to the serial port.
- ◆ TFTP for firmware 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.

Addresses and Port Numbers

Hardware Address

The hardware address (on the label on the bottom of the unit), 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

Note: Make note of the hardware address. It is needed to locate the unit using *DeviceInstaller*.

IP Address

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

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 assigning the IP address:

DeviceInstaller: Assign an IP address and view the current configuration using a Graphical User Interface (GUI) on a PC attached to a network. (See [3: Using DeviceInstaller](#)).

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

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).

Configuration Methods

After assigning the IP address, you have two basic methods for logging into the XPort Direct to configure the unit further.

Serial & Telnet Ports: There are two approaches to accessing Serial Mode. Make a Telnet connection to the network port (**9999**) or connect a terminal (or a PC running a terminal emulation program) to the unit's serial port. (See [4: Configuration via Telnet or Serial Port \(Setup Mode\)](#).)

3: Using DeviceInstaller

This chapter covers the steps for getting the XPort Direct online and viewing its current configuration.

Installing DeviceInstaller

To install DeviceInstaller if your product comes with a CD:

1. Insert the 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 DeviceInstaller, see the DeviceInstaller online Help.*

To install DeviceInstaller from the Lantronix web site:

1. Download DeviceInstaller for your product from the Lantronix website (www.lantronix.com/support/downloads.html).
2. Click **Setup.Exe**. The installation wizard window displays.
3. Respond to the installation wizard prompts.

***Note:** For more information about DeviceInstaller, see the DeviceInstaller online Help.*

Assigning 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:** To use a serial connection instead of an Ethernet connection to configure the device, see [4: Configuration via Telnet or Serial Port \(Setup Mode\)](#) on page 20.*

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 assign an IP address manually:

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 networking gateways 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** button 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.

Accessing the XPort Direct Using DeviceInstaller

1. Click **Start→Programs → Lantronix→DeviceInstaller→DeviceInstaller**.
2. Click the XPort Direct folder. The list of available Lantronix XPort Direct units displays.
3. Expand the list of XPort Directs by clicking the **+** symbol next to the XPort Direct icon. Select the XPort Direct unit by clicking on its IP address to view its configuration.

Viewing the Current Configuration

DeviceInstaller provides a view of the unit's configuration.

To view the unit's current settings:

1. Follow the instructions above to locate the XPort Direct.
2. In the right pane, click the **Device Details** tab. The current XPort Direct configuration displays.

Name	Configurable field. A name that identifies the XPort Direct. 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 Direct. 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 Direct. 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 Direct's device family type as XPort.
Type	Non-configurable field. Displays the device type as XPort Direct.
ID	Non-configurable field. Displays the XPort Direct's ID embedded within the box.
Hardware Address	Non-configurable field. Displays the XPort Direct's hardware (or MAC) address.
Firmware Version	Non-configurable field. Displays the firmware currently installed on the XPort Direct.
Extended Firmware Version	Non-configurable field. Displays the full version nomenclature of the firmware.
Online Status	Non-configurable field. Displays the XPort Direct's status as online, offline, unreachable (the XPort Direct is on a different subnet), or busy (the XPort Direct is currently performing a task).
Telnet Enabled	Non-configurable field. Permits Telnet sessions.
Telnet Port	Non-configurable field. Displays the XPort Direct's port for Telnet sessions.
Web Enabled	Non-configurable field. Displays False .
Maximum Baud Rate Supported	Non-configurable field. Displays the XPort Direct's maximum baud rate. Note: <i>The XPort Direct may not be running at this rate.</i>
Firmware Upgradeable	Non-configurable field. Displays True , indicating the XPort Direct's firmware is upgradeable as newer version become available.
IP Address	Non-configurable field. Displays the XPort Direct'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 Direct was set manually or assigned by DHCP.

Subnet Mask	Non-configurable field. Displays the XPort Direct's current subnet mask. To change the subnet mask, see Assigning an IP Address on page 15.
Gateway	Non-configurable field. Displays the XPort Direct's current gateway. To change the gateway, see Assigning an IP Address on page 15.
Number of Ports	Non-configurable field. Displays the number of ports on the XPort Direct.
TCP Keepalive	Non-configurable field. Displays 1-65s , the XPort Direct's TCP keepalive. The default setting is 45 .
Supports Configurable Pins	Non-configurable field. Displays True .
Supports Email Triggers	Non-configurable field. Displays False .
Supports AES Data Stream	Non-configurable field. Displays False .
Supports 485	Non-configurable field. Displays True .
Supports 920K Baudrate	Non-configurable field. Displays False . XPort Direct does not support baud rates up to 920 Kbps.
Supports HTTP Server	Non-configurable field. Displays False .
Supports HTTP Setup	Non-configurable field. Displays False .
Supports 230K Baud Rate	Non-configurable field. Displays True .
Supports GPIO	Non-configurable field. Displays True .

4: Configuration via Telnet or Serial Port (Setup Mode)

You must configure the unit so that it can communicate on a network with your serial device. You can use the following procedures remotely or locally:

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

The series of prompts at which you enter configuration settings is called **Setup Mode**.

Note: Detailed information about other setup methods is 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.

This chapter tells you how to access Setup Mode and the general procedure for using it. To complete the configuration, continue with [5: Setup Mode: Server Configuration](#), [6: Setup Mode: Channel Configuration](#), and [7: Setup Mode: Advanced Settings](#).

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

Accessing Setup Mode

Telnet Connection

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

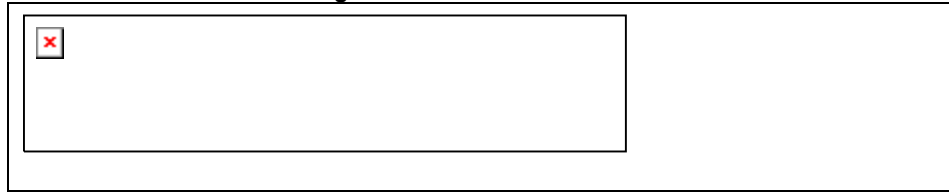
To establish a Telnet connection:

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:

```
Windows: telnet x.x.x.x 9999
UNIX: telnet x.x.x.x:9999
```

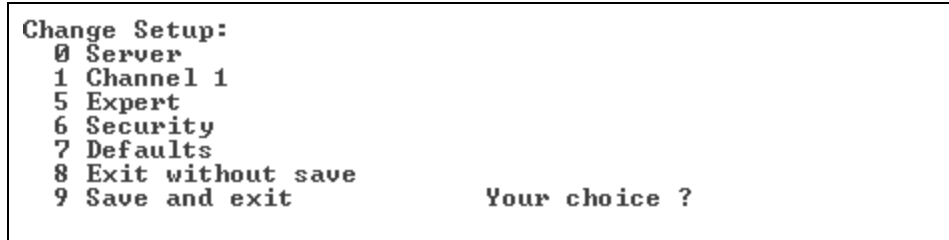
2. Click **OK**. The following information displays.

Figure 4-1. MAC Address



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

Figure 4-2. Setup Menu Options



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

Serial Port Connection

To configure the unit through a serial connection:

- 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**.
- Reset the XPort Direct unit by cycling the unit's power (turning the power off and back on). Immediately upon resetting the device, 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. **You must do this within three seconds of resetting the XPort Direct.**

At this point, the screen display is the same as when you use a Telnet connection. To continue, go to step 4 in [Telnet Connection](#), above.

Exiting Setup Mode

To exit setup mode:

You have two options:

- ◆ To save all changes and reboot the device, select option **9 Save and exit** from the **Change Setup** menu. All values are stored in nonvolatile memory.
- ◆ To exit the configuration mode without saving any changes or rebooting, select option **8 Exit without save** from the **Change Setup** menu.

5: Setup Mode: Server Configuration

This chapter explains how to configure the network settings.

Note: Current values display in parentheses.

Server Configuration (Option 0)

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.

```
IP Address : <172> .<018> .<023> .<037>
Set Gateway IP Address <Y> ?
Gateway IP addr <172> .<018> .<000> .<011>
Netmask: Number of Bits for Host Part <0=default> <16>
Change telnet config password <N> ?
```

IP Address

If 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.

```
IP Address : (000) (000) (000) (000) _
```

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 Direct to disable AutoIP, DHCP, or BootP. To disable an option, set the appropriate bit.

Table 5-1. BootP/DHCP/AutoIP options

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.

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.

```
Set Gateway IP Address (N) ? Y
Gateway IP addr (000) (000) (000) (000) _
```

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 part.

```
Netmask: Number of Bits for Host Part (0=default) (0) _
```

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 appears in standard decimal-dot notation (for example, 255.255.255.0) when the saved parameters display.

Table 5-2. 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 through a Telnet connection to port **9999**. The password must have four characters.

```
Change telnet config password (N) ? _
```

An enhanced password setting (for Telnet access only) of 16 characters is available under [Security Settings \(Option 6\)](#) on page 40.

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

DHCP Name

If a DHCP server has automatically assigned the IP address and network settings, this address does **not** appear in the unit's Setup Mode. You can discover the unit by using Monitor Mode. (See [10: Monitor Mode](#).)

Note: When you enter Monitor Mode from the serial port with network connection enabled and issue the **NC** (Network Communication) command, you see the unit's IP configuration.

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 (hardware) 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 (XPort Direct in our example).

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

- ◆ **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 XPort DirectYY 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 XPort Direct12. This method only works with 2-digit numbers (01-99).

6: Setup Mode: Channel Configuration

This chapter explains how to configure the serial port.

Notes:

- ◆ Current values display in parenthesis.
- ◆ You must enter some values in hexadecimal notation. (See A: Converting Binary to Hexadecimal.)

Channel 1 (Option 1)

Select **Channel 1** (option 1) from the **Change Setup** menu to define how the serial port responds to network and serial communications. The following sections describe the configurable parameters within the **Channel** configuration menu.

Figure 6-1. Serial Port Parameters

```
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 <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.

```
Baudrate (9600) ? _
```

I/F (Interface) Mode

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

I/F Mode (4C) ? _

Note: All bit positions in the table that are blank represent “don’t care” bits for that particular option, which can be set to a value of 0 or 1.

Table 6-1. Interface Mode Options

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

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

(2) The RTS pin is used for RS485 transmitter control.

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

Table 6-2. 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
RS-485 2-wire, 8-bit, No Parity, 1 stop bit	0100 1111	4F
RS-422, 8-bit, Odd Parity, 1 stop bit	0101 1101	5D

Flow

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

Flow (00) ? _

Use the following table to select flow control options:

Table 6-3. 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.

Port No (10001) ? _

The default setting for Port 1 is **10001**. The range is 1-65535, except for the following reserved port numbers:

Table 6-4. 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.

Use Port **0** for the outgoing local port to change with each connection. The port range is 50,000 to 59,999. Each subsequent connection increments the number by 1 (it wraps back around to 50,000).

Only use this 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 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.

ConnectMode (C0) ? _

Enter Connect Mode options in hexadecimal notation.

Note: All bit positions in the table that are blank represent “don’t care” bits for that particular option, which can be set to a value of 0 or 1.

Table 6-5. Connect Mode Options

Connect Mode Option	7	6	5	4	3	2	1	0
a) Incoming Connection								
Never accept incoming	0	0	0					
Accept with active Modem Control In	0	1	0					
Always Accept	1	1	0					
b) Response								
Nothing (quiet)				0				
Character response (C=connect, D=disconnect, N=unreachable)				1				
c) Active Startup								
No active startup					0	0	0	0
With any character					0	0	0	1
With active Modem Control In					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				
d) Datagram Type								
Directed UDP					1	1	0	0
e) Modem Mode								
No Echo			0	0		1	1	
Data Echo & Modem Response (Numeric)			0	1		1	1	1
Data Echo & 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

a) Incoming Connection

Never Accept Incoming	Rejects all external connection attempts.
Accept with active Modem Control In	Accepts external connection requests only when the Modem Control In input is asserted. Cannot be used with Modem Mode.
Always Accept	Accepts any incoming connection when a connection is not already established. Default setting.

b) Response

Character Response	<p>A single character is transmitted to the serial port when there is a change in connection state: C = connected, D = disconnected, N = host unreachable.</p> <p>The IP address of the host connecting to the XPort Direct will be provided when you use verbose mode.</p> <p>This option is overridden when Active Start Modem Mode or Active Start Host List is in effect. Default setting is Nothing (quiet).</p>
---------------------------	---

c) Active Startup

No Active Startup	Does <i>not</i> 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 active Modem Control In	Attempts to connect when the Modem Control In 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	<p>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.</p> <p>The IP address must be in standard decimal-dot 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.</p> <p>If present, the port number must follow the IP address, be presented as a decimal number in the range 1-65535, and 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.</p> <p>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 XPort Direct enters Monitor Mode.</p> <p>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.</p>

Figure 6-2. 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	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	<p>If you enable this option, the XPort Direct 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.</p> <p>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 and Modem Modes. The unit does not accept a data connection from a remote device when the hostlist option is enabled.</p>

Figure 4-7. Hostlist Option

```

Baudrate <9600> ?
I/F Mode <4C> ?
Flow <00> ?
Port No <10001> ?
ConnectMode <25> ?
Send '+++' in Modem Mode <Y> ?
Auto increment source port <N> ?

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> ? Y
01. IP address : <172> .<019> .<000> .<001> Port : <23> ?
02. IP address : <172> .<019> .<000> .<002> Port : <3001> ?
03. IP address : <172> .<019> .<000> .<003> Port : <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 (**2X**), 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**.

d) Datagram Type

Directed UDP	<p>When selecting this option, you are prompted for the Datagram type. Enter 01 for directed or broadcast UDP. Datagrams of type 01 can be sent as a broadcast by enabling the Send as Broadcast option. The default is not to broadcast.</p> <p>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.</p>
---------------------	---

e) 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 XPort Directs, 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), **D7** (echo with numeric response), **CF** (modem responses only, numeric response), or **CE** (modem responses only, full verbose).

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), **D7** (echo with numeric response), **CF** (modem responses only, numeric response), or **CE** (modem responses only, full verbose).*

Without Echo	<p>In Modem Mode, echo refers to the echo of all of the characters entered in command mode; it does <i>not mean</i> to echo data that is transferred. Quiet Mode (without echo) refers to the modem <i>not</i> sending an answer to the commands received (or displaying what was typed).</p>
---------------------	---

Data Echo & Modem Response	<p>Full Verbose: The unit echoes modem commands and responds to a command with a message string shown in the table below.</p> <p>Numeric Response: The unit echoes modem commands and responds to a command with a numeric response.</p>
Modem Responses Only	<p>Full Verbose: The unit does not echo modem commands and responds to a command with a message string shown in the table below.</p> <p>Numeric Response: The unit does not echo modem commands and responds to a command with a numeric response.</p>

Table 4-11. 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.
Numeric 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 **Numeric Response** option is in effect, the unit responds to an unrecognized command string that is otherwise formatted correctly with the "OK" message 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.

6-6. Modem Mode Commands

Modem Mode Command	Function
ATDTx.x.x.x,pppp or ATDTx.x.x.x/pppp 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 numeric response or full verbose. n=0 enables numeric 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.

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

```
Send `+++` in Modem Mode (Y) ? _
```

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

Show IP addr after 'RING'

```
Show IP addr after 'RING' <Y> ?
```

Disable or enable the XPort Direct's ability to show the IP address after RING in Modem Mode. The default is **Y** (Yes), to show the IP address.

Auto Increment Source Port

```
Auto increment source port (N) ? _
```

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

Remote IP Address

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

```
Remote IP Address : (000) (000) (000) (000) _
```

Note: This option does not display when Hostlist is enabled from the **ConnectMode** prompt (see [Connect Mode](#) on page 27 for more information).

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.

```
Remote Port (0) ? _
```

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 (see [Connect Mode](#) on page 27 for more information).

DisConnMode

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

```
DisConnMode <00>
```

Notes:

In *DisConnMode* (Disconnect Mode), **modem_control_in** either drops the connection or is ignored.

Note: All bit positions in the table that are blank represent “don’t care” bits for that particular option, which can be set to a value of 0 or 1.

Table 6-7. Disconnect Mode Options

Disconnect Mode Option	7	6	5	4	3	2	1	0
Disconnect when Modem Control In is not asserted ⁽⁶⁾	1							
Ignore Modem Control In	0							
Telnet Com Port Cntrl 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 **Telnet Com Port Control** feature is used in conjunction with Com Port Redirector. The unit 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 Com Port Cntrl** 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 **Modem Control** In 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.

```
FlushMode (00) ? _
```

You can also select between two different packing algorithms.

Note: All bit positions in the table that are blank represent “don’t care” bits for that particular option, which can be set to a value of 0 or 1.

Table 6-8. Flush Mode Options

Function	7	6	5	4	3	2	1	0
Input Buffer (Serial to Network)								
Clear with a connection 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 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

The 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.

Note: All bit positions in the table that are blank represent “don’t care” bits for that particular option, which can be set to a value of 0 or 1.

Table 6-9. Pack Control Options

Option	7	6	5	4	3	2	1	0
Packing Interval								
Interval: 12 msec							0	0
Interval: 52 msec							0	1
Interval: 250 msec							1	0
Interval: 5 sec							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 msec.

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.

```
DisConnTime (00:00) ?:
```

To disable the inactivity timeout, enter **00:00**. Range is 0 (disabled) to 5999 seconds (99 minutes, 59 seconds). The default is **0**.

Send Characters

Enter up to two characters in hexadecimal representation in **SendChar**.

```
SendChar 1 (00) ? _
SendChar 2 (00) ? _
```

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 36).

Telnet Terminal Type

This parameter displays only if you enabled the terminal type option in Disconnect Mode. With this option enabled, you can use the terminal name for the Telnet terminal type. Enter only one name.

With terminal type option enabled, the unit also reacts to the EOR (end of record) and binary options, useful for applications like terminal emulation to IBM hosts.

Channel (Port) Password

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

7: Setup Mode: Advanced Settings

Expert Settings (Option 5)

Caution: Only an expert should change these parameters. You must definitely know the consequences the changes might have.

Figure 7-1. Expert Settings

```
TCP Keepalive time in s (1s - 65s; 0s=disable): (45) ?
ARP Cache timeout in s (1s - 600s) : (600) ?
Disable Monitor Mode @ bootup (N) ?
MTU Size (512 - 1400): (1400) ?
Enable alternate MAC (N) ?
Ethernet connection type: (0) ?
```

The default settings are listed below:

Setting	Default
TCP Keepalive time in s (1s - 65s; 0s=disable)	45
ARP Cache timeout in s (1s - 600s)	600
Disable Monitor Mode @ bootup	Enabled
MTU Size (512 - 1400)	0 (resulting in an operational value of 1400)
Enable alternate MAC	Disabled (OEM use only)
Ethernet connection type	0 (resulting in auto-negotiation)

TCP Keepalive time in seconds

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

```
TCP Keepalive time in s (1s - 65s; 0s=disable): (45) ? _
```

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.

```
ARP Cache timeout in s (1s - 65s; 0s=disable): (600) ? _
```

Disable Monitor Mode at bootup

This option allows you to disable all entries into Monitor Mode during startup, except for the 'xxx' sequence. This prevents entry using **yyy**, **zzz**, **xx1**, and **yy1** key sequences (only during the bootup sequence). The default for Monitor Mode at bootup is **N** (No). (See [10: Monitor Mode](#).)

```
Disable Monitor Mode @ bootup (N) ? _
```

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.

```
MTU Size: (1400) ? _
```

Enable alternate MAC

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

```
Enable alternate MAC (N) ? _
```

Ethernet connection type

The XPort Direct 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).

Note: *Manually configured speed/duplex settings only work correctly if the peer or switch also uses a static setting. If the peer is set for auto negotiation, it will not necessarily result in the correct mode. This is a common Ethernet problem and is not specific to the XPort Direct.*

```
Ethernet connection type: (0) ? _
```

Security Settings (Option 6)

You can change security settings by means of Telnet or serial connections. We recommend that you set security over the dedicated network or over the serial setup to prevent eavesdropping.

Caution: *Disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.*

Select **7** to configure security settings.

Figure 7-2. Security Settings

```

Disable Telnet Setup <N> ?
Disable TFTP Firmware Update <N> ?
Disable Port 77FEh <N> ?
Disable ECHO ports <Y> ?
Enable Enhanced Password <N> ?
Disable Port 77F0h <N> ?

```

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 using the serial port of the unit.

```
Disable Telnet Setup (N) ? _
```

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.

```
Disable TFTP Firmware Update (N) : _
```

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 custom programs to configure the unit remotely. You may wish to disable this capability for security purposes.

```
Disable Port 77FEh (N) ? _
```

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

The **Y** (Yes) option disables remote configuration.

Disable ECHO Ports

This setting controls whether port 7 echoes characters it receives.

```
Disable ECHO ports (Y) ? _
```

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. The **Y** (Yes) option allows you to set an extended security password of 16-characters for protecting Telnet access.

```
Enable Enhanced Password (Y) ? _
```

Disable Port 77F0 (Hex)

Port 77F0 allows a custom application to query or set the XPort Direct's configurable pins when they are functioning as general purpose I/O (GPIO). Disable this capability, if desired, for security purposes.

```
Disable Port 77F0h ? _
```

The default setting, the **N** (No) option, enables GPIO control. The **Y** (Yes) option disables the GPIO control interface.

Default Settings (Option 7)

Select **7** to reset the unit's Channel 1 configuration and expert settings to the 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)
Port number	10001
Connect Mode	C0 (always accept incoming connection; no active connection startup)
Send '+++' in Modem Mode	Enabled
Show IP addr after 'RING'	Enabled
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 time in s	45
ARP Cache timeout in s	600

Disable Monitor Mode @ bootup	No
MTU Size (512 – 1400)	0 (resulting in an operational value of 1400)
Alternate MAC	Disabled (for OEM use only)
Ethernet Connection Type	0 (auto-negotiate)

Security Settings Defaults

Disable Telnet setup	No
Disable TFTP Firmware Update	No
Disable Port 77FEh	No
Disable ECHO ports	Yes
Enable Enhanced password	No
Disable Port 77F0h	No

8: GPIO Interface

Configurable Pins

The XPort Direct has two general purpose I/O pins, CP1 and CP2, which support the following functions: general purpose input, general purpose output, and modem control input signal. These GPIO pins can control devices such as relays, servers, lights, monitor switches, sensors, and even processes such as data transfer.

The modem control input (`modem_control_in`) functionality is supported in our standard firmware; where this functionality is incorporated into some of the channel connect/disconnect settings. With custom applications, the general purpose input/output functionality can be used for event signaling and/or triggering.

You can set the functions for the two 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.

The configurable pins' default configuration is:

- ◆ Function: General Purpose Input
- ◆ Active Level: Active Low

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

Note: For specific configuration information contact Lantronix customer support.

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 1 Kbps.

Control Protocol

The GPIO control protocol is a simple, proprietary protocol.

Guidelines

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

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

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

There is no **Set functions** command. Since the pin's function depends on the hardware in which the *XPort Direct* is embedded, that configuration is only allowed using 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 I/O 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 10h to find out which configurable pins are available as GPIO.**

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

XPort Direct -> 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

03h, 00h, 00h, 00h =

bits 0 and 1 are 1 → CP1 and CP2 are configured as GPIOs.

The other bits are ignored because there are only two configurable pins on the XPort Direct.

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

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

XPort Direct -> 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 → GPIO0 will be changed.

bit 1 is 0 → GPIO1 will remain the same.

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

bit 0 is 0 → 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 → GPIO0 = 1

bit 1 is 0 → GPIO1 = 0

bit 2 is 1 → GPIO2 = 1

The other bits are ignored because there are only two configurable pins on the XPort Direct.

9: Firmware Upgrades

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](ftp://lantronix.com)).

Reloading Firmware

To update the unit's internal operational code (*.ROM), use TFTP or DeviceInstaller.

Following is a *typical* name for the file. Check the Lantronix web site for the latest versions and release notes.

Table 9-1. Typical Firmware File

ROM File
xptd_6303.rom

Please refer to the DeviceInstaller online Help for information about reloading firmware using DeviceInstaller. The other methods are discussed below.

Using TFTP: Graphical User Interface

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.

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, **X7**.
6. Click the **Upload Now** button to transfer the file to the unit.

Figure 9-1. TFTP Window



After the firmware has been loaded and stored, which takes approximately 8 seconds, the unit performs a power reset.

Using TFTP: Command Line Interface

To download new firmware from a computer:

1. Enter the following from a TFTP command line interface:

```
tftp -i <ip address> put <local filename> <destination file name>
```

The following example demonstrates the TFTP command sequence to download the .rom file.

```
tftp -i 192.168.1.111 put xptd_6303.rom X7
```

2. In the **Remote file name** field, enter the current internal operational code.

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.

To recover firmware:

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 on the PC that is connected to the serial port of the Lantronix unit.
4. For **Device Model**, be sure the appropriate XPort Direct device displays.

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

Note: Make sure the unit 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 online Help*.

10: Monitor Mode

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

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

Entering Monitor Mode Using the Serial Port

To enter Monitor Mode locally:

1. Follow the same steps used for setting the serial configuration parameters (see [Serial Port](#) on page 20).
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 Using 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 00204A808BE8
Software version V6.3.0.3RC3 <061110>

Press Enter for 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.

10-1. 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.
GM	Get MAC address	Shows the unit's 6-byte MAC address.
SS	Set Security record	Sets the security record without the encryption key and length parameters. The entire record must still be written, but the encryption-specific bytes do not need to be provided (they can be null since they are not overwritten).
SA	Scan	Initiates a wireless scan if the wireless interface is enabled. Reports any stations found, including BSSID, SSID, and RSSI. If SA is followed by a string, the string is used to filter SSIDs before reporting. If the BSS does not broadcast its SSID, only the BSSID and RSSI are returned.
NS	Network Status	Reports the network interfaces' statuses. Includes potentially negotiated parameters like speed/duplex for Ethernet or encryption, or BSSID and authentication for wireless interfaces of applicable Lantronix products).

Responses to some of the commands are 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

11: Troubleshooting

This chapter discusses how you can diagnose and fix errors quickly without having to contact a reseller or Lantronix. It helps to connect a terminal to the serial port while diagnosing an error to view summary messages that may display. 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 Direct is powered up. Confirm that you are using a good network connection.

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 XPort Direct, the connection fails.	When you Telnet to port 1 on the XPort Direct, you are only assigning a temporary IP address. When you Telnet into port 9999 and do not press Enter quickly, the XPort Direct 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 XPort Direct, 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 XPort Direct.
	The XPort Direct 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 XPort Direct is not properly plugged into the network.
When you try to assign an IP with DeviceInstaller, you get the following : "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 an XPort Direct through a router.
The XPort Direct is not communicating with the serial device to which it is attached.	The most likely reason is the wrong serial settings were chosen.	The serial settings for the serial device and the XPort Direct must match. The default serial settings for the XPort Direct 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 XPort Direct using 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 XPort Direct, but not Telnet to the XPort Direct on port 9999.	<p>There may be an IP address conflict on your network</p> <p>You are not Telnetting to port 9999.</p> <p>The Telnet configuration port (9999) is disabled within the XPort Direct security settings.</p>	<p>Turn the XPort Direct off and then issue the following commands at the DOS prompt of your computer:</p> <p>ARP -D X.X.X.X (X.X.X.X is the IP of the XPort Direct).</p> <p>PING X.X.X.X (X.X.X.X is the IP of the XPort Direct).</p> <p>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.</p>

Technical Support

If you experience an error that is not described in this chapter, or if you are unable to fix the error, you have the following options:

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

Technical Support Europe, Middle East, and Africa

Phone: +33 (0) 1 39 30 41 72

Email: 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: Alternative Ways to Assign an IP Address

Earlier chapters describe how to assign a static IP address using DeviceInstaller or Setup Mode (through a Telnet or serial connection). This section covers other methods for assigning an IP address over the network.

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 provides 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 DHCP-assigned IP address and add it to the list of Lantronix units retrieved.

Note: *This DHCP address does **not** appear in the unit's Setup Mode. You can determine your unit's DHCP-assigned IP address in Monitor Mode. When you enter Monitor Mode from the serial port with network connection enabled and issue the **NC** (Network Communication) command, you 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 obtain an IP address automatically 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. Do not use this range of Auto IP addresses 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 does not replace DHCP. The unit continues to look for a DHCP server on the network. If it finds a DHCP server, the unit switches to the DHCP server-provided address and reboots.

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.

BOOTP

Similar to DHCP, but for smaller networks. Automatically assigns the IP address for a specific duration of time.

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 fails quickly, but the unit temporarily changes its IP address to the one designated in this step.

```
telnet 191.12.3.77 1
```

4. 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
```

Note: The IP address you just set is temporary and reverts to the default value when the unit's power is reset, unless you configure the unit with a static IP address and store the changes permanently.

B: Binary to Hexadecimal Conversions

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.

Converting Binary to Hexadecimal

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

Conversion Table

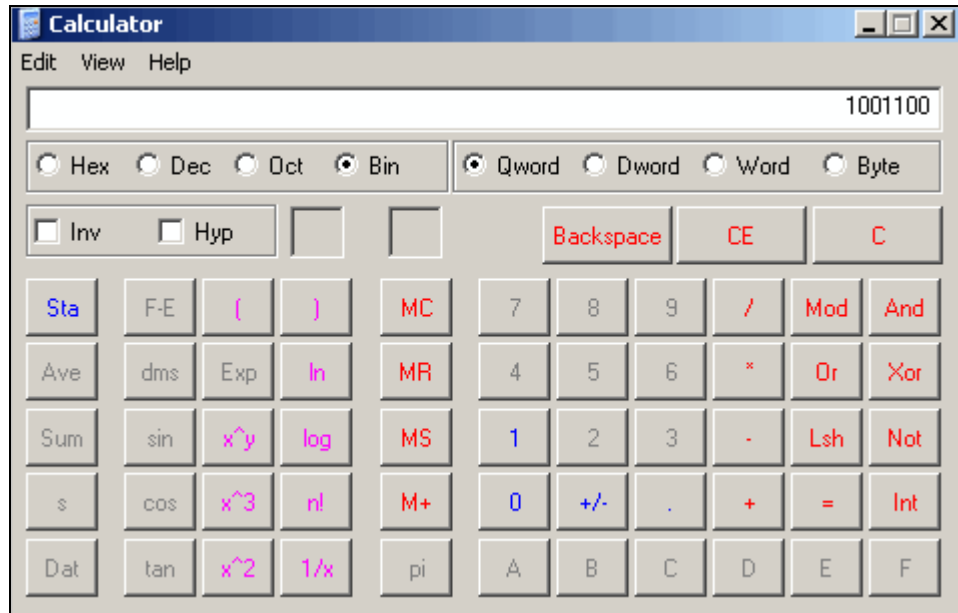
Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) to a hexadecimal representation, the upper and lower four bits are treated separately, resulting in a two-digit hexadecimal number (in this 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

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. Select **Bin** (Binary), and type the number to convert.



4. Click **Hex**. The hexadecimal value displays.