LANTRONIX®

Embedded Integration Kit
User Guide

Copyright and Trademark

© 2004, 2007 Lantronix. All rights reserved. No part of the contents of this book may be transmitted or reproduced in any form or by any means without the written permission of Lantronix. Printed in the United States of America.

Ethernet is a trademark of XEROX Corporation. UNIX is a registered trademark of The Open Group. Windows 95, Windows 98, Windows 2000, and Windows NT are trademarks of Microsoft Corp. Netscape is a trademark of Netscape Communications Corporation.

Contacts

Lantronix Corporate Headquarters
15353 Barranca Parkway
Irvine, CA 92618, USA
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support
Phone: 800-422-7044 or 949-453-7198
Fax: 949-450-7226
Online: www.lantronix.com/support Email/Chat: www.lantronix.com/support

Sales Offices
For a current list of our domestic and international sales offices, go to the Lantronix web site at http://www.lantronix.com/about/contact/index.htmls

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.

The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.

Date	Rev.	Comments
12/03	F	This material was previously in the Embedded Integration Kit User Manual.
6/04	G	Updated guide, fixed errors.
10/04	H	Removed references to out-of-date documents.
7/07	I	Updated IP address reference information.

Contents

1: Using This Guide

Purpose and Audience

This guide provides the information needed to configure, use, and update the embedded device server's firmware, and is intended for software developers and system integrators who are embedding the unit in their designs.

Chapter Summary

The remaining chapters in this guide include:

2:Introduction	Describes the main features of the unit and the protocols it supports.
3:Getting Started	Provides instructions for getting your unit up and running using DeviceInstaller to assign an IP address and Web-Manager 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 through a terminal or terminal emulation program through the serial port. Details the parameters that you must configure.
5:Updating Firmware	Provides instructions for obtaining the latest firmware and updating the device server.
6:Monitoring the Network	Provides instructions for accessing and using the command line interface for monitoring the network and diagnosing problems.
7:Troubleshooting	Describes common problems and error messages and how to contact Lantronix Technical Support.

Additional Documentation

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

Embedded Integration Kit Integration Guide	Provides information about the embedded device server hardware, testing the device server using the Evaluation Board, and integrating the device server into your product.
DeviceInstaller User Guide	Provides instructions on using the Windows-based utility used to configure Lantronix embedded device servers.
Com Port Redirector User Guide	Provides information on using the Windows-based utility to create a virtual com port.

2: Introduction

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

The Lantronix embedded device servers connect serial devices to Ethernet networks using the Internet Protocol (IP) protocol family (TCP for connection-oriented stream applications and UDP for datagram applications). The main benefit of these smaller, board-level device servers is that they can be embedded inside the serial device for which they provide network connectivity. A few of the different types of serial devices supported are listed below:

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

Device servers connect these devices through a TCP data channel or through a Telnet connection to computers or other device servers. Datagrams can be sent by UDP.

Protocol Support

The embedded device server uses the IP for network communications. It uses the Transmission Control Protocol (TCP) to ensure that data is not lost or duplicated, and that everything sent to the connection arrives correctly at the destination.

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.

Addresses and Port Numbers

Ethernet (MAC) Address

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

00-20-4A-14-01-18 or 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.

For DHCP-enabled networks, the IP address is initially assigned to 0.0.0.0.

There are other variations of IP addresses that allow for IP address configuration:

0.0.1.0: disables AutoIP

0.0.2.0: disables DHCP

0.0.4.0: disables BOOTP

0.0.5.0: allow only DHCP

0.0.6.0: allow only Auto IP Only (This is for reference only and should not be used.)

0.0.7.0: disable/turn off AutoIP, DHCP, and BOOTP (This is for reference only and should not be used.).

Port Numbers

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

You can associate the unit's serial channel (port) with a specific TCP/UDP port number. Port number 9999 is reserved for access to the unit's Setup (configuration) Mode window. (For more details, see *Table 4-5. Reserved Port Numbers* on page *4-5*.)

Logon Methods

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 to assign the IP address:

◆ **DeviceInstaller:** You 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:** Connect a terminal or a PC running a terminal emulation program to the unit's first serial port (CH 1). (See *Using the Serial Port* on page *4-2.*)

◆ **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.

3: Getting Started

This chapter covers the steps required to get an embedded device server online and working.

Physically Connecting the Unit

The following diagram shows a properly installed CoBox-Micro. Other devices connect in a similar manner.

Figure 3-1 – Evaluation Board Connected to Serial Device and Network
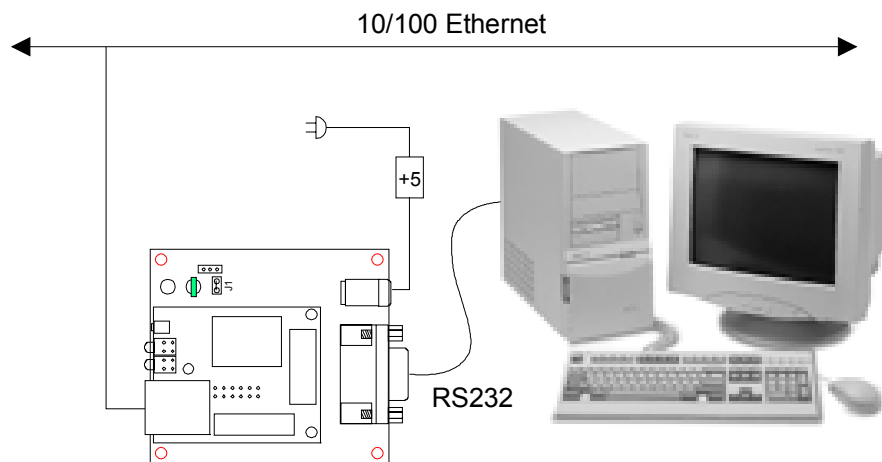
1. Connect a computer or serial device to your unit.

2. Connect an Ethernet cable to the RJ-45 Ethernet port.

3. Supply power to your unit using the power supply that was included in the packaging.

    Note: The required input voltage for the CoBox-Micro is 5VDC (3 W maximum). Other devices may require a different voltage.

4. Supply power to the serial device.

Required Information

Hardware Address

You need to know the unit's hardware address (also known as the 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 device server 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

You have several options for assigning an IP address 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: 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.

5. Restart your system.

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 Assign IP.

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 click the **Ping** icon [Ping], or select **Ping** from the **Tools** menu. The Ping Device dialog box shows the IP address of the selected unit.

8. 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.

In this chapter, we describe how to configure the device server 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 for Configuration*.) 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.

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 [Search]. A list of Lantronix device servers on the network displays.

3. Select the unit and click the **Web** icon [Web], 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 device server to open Web-Manager.

Figure 3-2. Lantronix Web-Manager
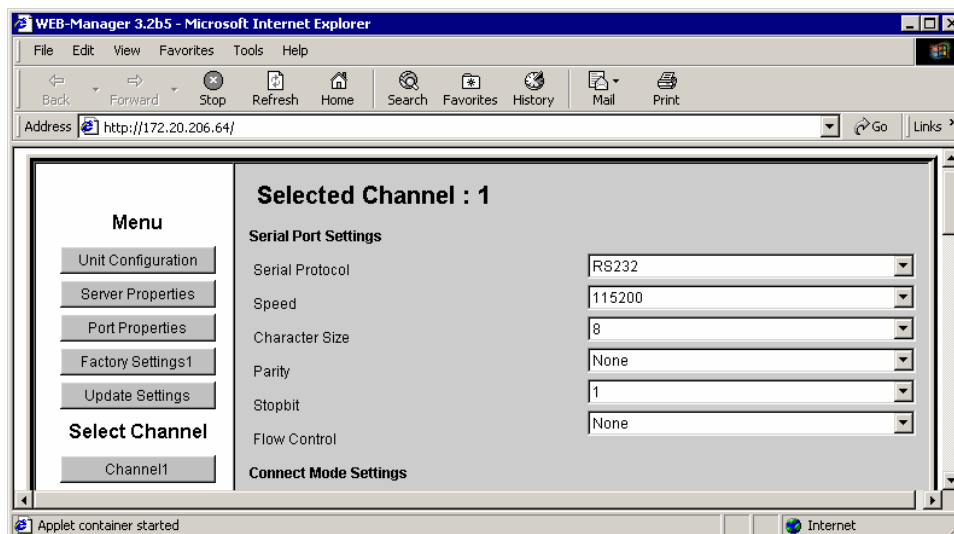
4. Use the menu (pushbuttons) to navigate to sub-pages where you can configure device server settings.

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

Note: For a detailed explanation of the configuration settings, see 4:Using Setup Mode for Configuration.

Unit Configuration

Click the **Unit Configuration** button to display the page shown in Figure 3-3, which contains the current server configuration and port configuration settings read from the device.

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

Figure 3-3. 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.

Server Properties

Server Properties	
IP Address	172.20.206.64
Subnet Mask	255.255.0.0
Gateway Address	0.0.0.0
Telnet Password	XXXX

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

Serial Protocol   RS232, RS422/485 4-wire, RS485 2-wire

Speed   300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, and 230400 (Micro100 only)

Character Size   8, 7

Parity   None, Even, Odd

Stop Bit   1,2

Flow Control   None, XON/XOFF (software), XON/XOFF Pass Characters to Host (software passthru), 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

Dedicated Connection	
Remote IP Address	
Remote Port	
Local Port	10001

Startup	No Active Connection Startup, With Any Character, With a Specific Start Character, Manual Connection, Autostart, Modem Mode, With Active DTR

Dedicated Connection

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
Packing Interval	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.

Note: Factory Settings resets factory settings for the channel. This option does not change the IP address, gateway, and subnet mask to the factory default values.

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 locally or remotely using one of the following:

- ◆ Telnet connection to configure the unit over the network.
- ◆ 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.

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* ![Telnet] *, or select **Telnet** from the Device menu. If you use the **Telnet** icon on the DeviceInstaller toolbar, skip steps 1 and 2.*

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

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

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

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

   Note: The serial number does not display for the Micro 100.

Figure 4-1. MAC Address


```
*** Lantronix Universal Device Server ***
Serial Number 6348287  MAC address 00:20:4A:63:BC:9F
Software version 04.5 (011025)

Press Enter to go into Setup Mode
```

3. 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

```
Change Setup  : 0 Server configuration
                1 Channel 1 configuration
                2 Channel 2 configuration
                5 Expert settings
                6 Security
                7 Factory defaults
                8 Exit without save
                9 Save and exit                 Your choice ?
```

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

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

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

Figure 4-3. Setup Mode

```
*** basic parameters
Hardware: Ethernet Autodetect
IP addr 172.19.23.70, 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
Enhanced Password is disabled

****************** Channel 1 ******************
Baudrate 2400, I/F Mode 4C, Flow 00
Port 10001
Remote IP Adr: --- none ---, Port 00000
Connect Mode : C0  Disconn Mode: 00
Flush    Mode : 00

****************** Channel 2 ******************
Baudrate 1200, I/F Mode 4C, Flow 00
Port 10002
Remote IP Adr: --- none ---, Port 00000
Connect Mode : C0  Disconn Mode: 00
Flush    Mode : 00

****************** Expert ******************
TCP Keepalive : 0s
```

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 by 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 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 4 in Using a Telnet Connection on page 4-1.

Server Configuration (Network Configuration)

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

Figure 4-4. Server Configuration Parameters

```
IP Address : (172) .(019) .(023) .(070)
Set Gateway IP Address (Y) Y
Gateway IP addr (172) .(019) .(000) .(001)
Netmask: Number of Bits for Host Part (0=default) (16)
Change telnet config password (N) N
```

IP Address

The IP address must be set to a unique value in your network.

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 (for example, 255.255.255.0) when the saved parameters are displayed.

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 of 16 characters for Telnet access only 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).

Figure 4-5. 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 certain values in hexadecimal notation.*

Figure 4-6. Serial Port Parameters

```
Baudrate (2400) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (10001) ?
ConnectMode (C0) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port (00000) ?
DisConnMode (00) ?
FlushMode    (00) ?
DisConnTime (00:00) ?:
SendChar 1   (00) ?
SendChar 2   (00) ?
```

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 (Micro100 only) bits per second.

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							0	0
RS-422/485							0	1
RS-485 2-wire							1	1
7 Bit					1	0		
8 Bit					1	1		
No Parity			0	0				
Even Parity			1	1				
Odd Parity			0	1				
1 Stop bit	0	1						
2 Stop bit	1	1						

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
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. 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, and 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

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

Note: *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, the initial value of 5000 actively establishes a connection. Each subsequent connection increments the number by 1. When the port number reaches 7999, it wraps around to 5000.

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				
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).

Active Startup

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. Active Start options require an internally stored destination IP address and port number. The unit will not attempt a connection if this information is not configured. If a partial IP address is in a command string, the unit interprets it 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 4-7. 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	Connect to 129.1.28.10, port 12; enter 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 host list option is enabled.

Figure 4-7. Hostlist Option

```
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 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 device server 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.

Typically, a modem is connected to a local PC, and a modem is connected to a remote machine. A user must dial from the local PC to the remote machine, accumulating phone charges for each connection. Modem Mode allows you to replace modems with device servers and to use an Ethernet connection instead of a phone call. 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 4-8. 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 terminate with a carriage return character. (See *Table 4-9. Monitor Mode Commands* on page 4-11.)

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:

1. No serial data is received for one second.

2. The character sequence +++ is received, with no more than one second between each two characters.

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

4. 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 4-9. Monitor Mode Commands

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

Table 4-10. 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 device server 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 4-11. 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 4-12. Pack Control Options

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

Packing Interval

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

Trailing Character

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). The 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 4-12).

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.

Expert Settings

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

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

TCP Keepalive time in s   (45)
(1s – 65s; 0s=disable)

ARP Cache timeout in s   (600)
(1s – 600s)

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.

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 prevents users from accessing the setup menu from the network.

Figure 4-8. Security Settings

```
Disable SNMP (N) N
SNMP Community Name ():
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 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, please note that disabling both Telnet Setup and Port 77FE prevents 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 *Serial Port Recovery Procedure* on page 5-3.)

Disable Port 77FE (Hex)

Note: If you choose to disable this option, please note that disabling both Telnet Setup and Port 77FE prevents 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 Yes option disables many of the GUI tools for configuring the unit, including the embedded Web-Manager tool.

Enable Encryption

CoBox-Micro, CoBox-Mini, CoBox-Mini100

This option displays only if your CoBox-Micro, CoBox-Mini, or CoBox-Mini100 has encryption. This setting defaults to the N (No) option, which completely disables the 128-bit Twofish encryption algorithm. Select Y (Yes) to enable the encryption option. Enabling the encryption option will display the Change Keys option, which is used to change the encryption key code.

Enter a 32-hexadecimal (0-9, A-F) digit encryption string to be set. Example:

```
01-FA-9E-C4-37-B3-82-D5-76-99-FF-4A-0E-5B-9C-A1
```

Only customer applications using a Lantronix-supplied encryption library or a Lantronix device server configured with an identical encryption string are able to correctly decode data sent from this unit.

Note: If you select Y, you must complete the settings. To escape, complete the settings and exit without saving.

You can obtain firmware that supports 128-bit encryption by going to the Lantronix Support page at www.lantronix.com/support/download. Click on the **128-bit Encryption** icon and follow the instructions to download a zip file that contains the firmware and example code. Once you have obtained the firmware with encryption, you must load it into your device server.

Currently, Lantronix does not provide a Telnet application that will allow the user to make an encrypted socket connection to the device server serial port from a Windows PC.

Micro100

This option displays only if you purchased the encrypted version of the Micro100. 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 4-9. 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 Micro100-to-Micro100 communication (and in the future, Micro100 communication to other Lantronix device servers) is supported without extra effort.

◆ The Micro100 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 Micro100. 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.

Disable Web Server

This setting defaults to the N (No) option. The Y (Yes) option disables the web server.

Disable ECHO Ports

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

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 access.

Factory Defaults

Select **7** to reset the unit's Channel 1, Channel 2, Expert Settings, and Enhanced Security to the factory default settings. The server configurations (IP address information) remain unchanged.

Channel 1 and 2Configuration

Baudrate	9600
I/F Mode	4C (1 stop bit, no parity, 8 bit, RS-232C)
Own TCP port number	Channel 1: 10001 Channel 2: 10002
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

TCP keepalive	45 (seconds)
ARP cache timeout	600 (seconds)

Security Settings

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

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: Updating Firmware

The CoBox-Micro and CoBox-Mini products use the same version of firmware. The CoBox-Mini100 and the Micro100 use slightly different versions with similar functionality.

Note: Do not load firmware that is lower than Rev. 4.3 onto the CoBox- Mini100. Firmware prior to Rev. 4.3 will render this product inoperable.

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 or *.HEX): via DeviceInstaller (the preferred way), via TFTP, via another unit, or via the serial port. You can also update the unit's internal Web interface (*.COB) via TFTP or DeviceInstaller.

Here is a list of *typical* names for those files. Check the Lantronix web site for the latest versions and release notes.

Firmware Examples

Folder Name	ROM File	COB
CoBox-micro	Ltx45.rom	Cbxw300.cob
CoBox-mini	Ltx45.rom	Cbxw300.cob
CoBox-mini100	Ltx45.rom	Cbxw300.cob
CoBox-micro100	M100e55.rom	Cbx350.cob

Via DeviceInstaller

After downloading the firmware to your computer, you can use DeviceInstaller to install it. Please refer to the DeviceInstaller User Guide or Help files for instructions.
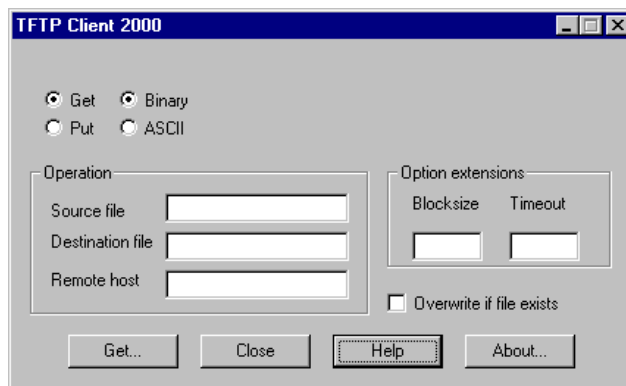
Via TFTP

To download new firmware from a computer:

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

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

Figure 5-1. TFTP Dialog Box

2. Make sure the **Put** and **Binary** options at the top of the window are selected.

3. Enter the full path of the firmware file in the **Source File** field.

4. In the **Destination File** field, do *one* of the following:

    ◆ For the internal operational code, type **3L** for the Mini, Mini100, and Micro, or type **3M** for the Micro100.

    ◆ For the internal Web interface, type **WEB6**.

5. In the **Remote Host** field, enter the IP address of the unit being upgraded.

6. Click the **Put** button to transfer the file to the unit.

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

Via Another Unit

Note: This procedure works for all of the embedded device servers except the Micro100.

To distribute firmware to another unit over the network:

1. Enter the host unit's Monitor Mode.

2. Send the firmware to the receiving unit using the SF command, where x.x.x.x is the receiving unit's IP address.

    `SF x.x.x.x`

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

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

Via the Serial Port

Note: This procedure works for all of the embedded device servers except the Micro100.The following procedure is for using the HyperTerminal software application. In some cases, the HEX format file is available on the software CD and on the Web site.

Before you can load firmware through the serial port you need to convert the ROM code to HEX format. In many cases, the HEX format file is available on the software CD and on the Web site. There is a DOS application, R2H.EXE, you can use to convert the ROM file to HEX format. The R2H.EXE application is available at ftp://ftp.lantronix.com/pub.

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

C:\ R2H *filename*

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

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

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

1. Enter Monitor Mode via the serial port.

2. Download the firmware to the unit using the **DL** command.

3. Select **Send Text File** and select the *.HEX file to be downloaded. The downloaded file must be the .HEX (ASCII) version.

4. After receiving the final record, the unit checks the integrity of the firmware image before programming the new firmware in the flash ROM. The following message displays when the firmware upgrade is complete.

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

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

Serial Port Recovery Procedure

Note: This procedure only works with the Micro100.

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

1. Start DeviceInstaller, and select the device.

2. Click **Action** and select **Advanced/Recover Firmware.** The Recover Firmware window displays.

3. Enter the **Local Port** on your PC and the location of the Firmware File. The Device Model should indicate device server.

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

6: Monitoring the Network

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

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

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

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

    b) Type **yyy** (or **yyy**) 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:

3. Establish a Telnet session to the configuration port (9999). The following information displays:

```
*** Lantronix Universal Device Server ***
Serial Number 6348287  MAC address 00:20:4A:63:BC:9F
Software version 04.5 (011025)

Press Enter to go into Setup Mode
```

4. 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 applies to another unit with that IP address. If you do not enter the IP address, the command executes locally.

Note: All commands must be in capital letters.

Table 6-1. 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

Command	Command Name	Function
		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.

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

Table 6-2. 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

7: 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 device server is powered up. Confirm that you are using a good network connection.

Problems and Error Messages

Table 7-1 - 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.	The currently logged-in user does not have the correct rights to use this command on this PC.	Have someone from your IT department log you in with sufficient rights.
When you attempted to assign an IP address to the device server via the ARP method, the *Press Enter to go into Setup Mode* error (described below) displayed. Now when you Telnet to the device, the connection fails.	When you Telnet into port 1 on the device server, you are only assigning a temporary IP address. When you Telnet into port 9999 and do not press **Enter** quickly, the device server will reboot, causing it to lose the IP address.	Telnet back into Port 1. Wait for it to fail, then Telnet to port 9999 again. Make sure you press **Enter** quickly.
When you Telnet to port 9999, the message *Press Enter to go into Setup Mode* displays. However, nothing happens when you press **Enter**, or your connection is closed.	You did not press **Enter** quickly enough. You only have **5** seconds to press **Enter** before the connection is closed.	Telnet to port 9999 again, but press **Enter** as soon as you see the message *Press Enter to go into Setup Mode*.
When you Telnet to port 1 to assign an IP address to the device server, the Telnet window does not respond for a long time.	You may have entered the Ethernet address incorrectly with the ARP command.	Confirm that the Ethernet address that you entered with the ARP command is correct. The Ethernet address may only include numbers 0-9 and letters A-F. In Windows and usually in Unix, the segments of the Ethernet address are separated by dashes. In some forms of Unix, the Ethernet address is segmented with colons.

Problem/Message	Reason	Solution
	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.*
No LEDs are lit.	The unit or its power supply is damaged.	Test the power source and replace if faulty.
The device server will not power up properly, and the LEDs are flashing.	Various	Consult the LEDs section in the *Integration Guide* for the LED flashing sequence patterns. Call Lantronix Technical Support if the blinking pattern indicates a critical error.
The device server is not communicating with the serial device it is attached to.	Most likely, 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 likely to be something covered in the previous problem, or you may have **Caps Lock** on.	Double-check everything in the problem above. Confirm that **Caps Lock** is not on.
You can ping the device server, but not Telnet to the device server on port 9999.	There may be an IP address conflict on your network You are not Telneting 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 receive a response, then there is a duplicate IP address on the network (the LEDs on the device server should flash a sequence that tells you this). If you do not get a response, use the serial port to verify that Telnet is not disabled.

Problem/Message	Reason	Solution
With DeviceInstaller you get the *Wrong Password error* when you try to upgrade the firmware.	You have chosen the incorrect setting for the **Existing Firmware** field.	Try upgrading the firmware again, but make sure to use the correct setting in the **Existing Firmware** field.
The device server appears to be set up correctly, but you are not communicating with your serial 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 looking at the Status LED. If the Status LED is blinking consistently, or is completely off, then there is a good socket connection. If the Status LED is solid green, then the socket connection does not exist. Use the Connect Mode option **C0** for making a connection to the device server from the network. Use Connect Mode option **C1** or **C5** for a connection to the network from the device server. See the full list of Connect Mode Options in the Binary to Hexadecimal Conversions chapter.
When connecting to the Web-Manager within the device server, the message *No Connection With The xxx* 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 contact Technical Support, go to www.lantronix.com/support.
- ◆ 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).