

# **CoBox-FL-IAP User Guide**

**Rev. C 7/01**

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## Warranty Statement

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# 1: Introduction

## The IAP Family of Device Servers

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

By encapsulating serial data and transporting it over Ethernet, the Device Server allows virtual serial links to be established over Ethernet and IP networks. As a result, direct serial connections can be extended within the plant, throughout the facility, and across the global enterprise.

Existing COM-port-based Windows™ applications can access network-enabled serial devices, using Comm Port Redirector™ software. Redirector allows the creation of virtual serial ports, which can be mapped to remote Device Servers over Ethernet. When used in conjunction with an OPC server, most Windows based HMI, SCADA, and PC based control applications have full access to information in the connected device.

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

- ◆ CoBox-DR1-IAP, with a DIN rail interface for harsh environments or alongside controls instruments in electrical panels.
- ◆ CoBox-FL-IAP, with fiber connectivity for long cable runs or electrically hazardous environments.
- ◆ UDS-10-IAP, a compact design Device Server for use in less demanding environments.

A few examples of attached devices are:

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

## Key Features

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

The IAP Device Servers feature installable industrial communication protocols. Lantronix's Automation Protocols Suite (APS) includes protocols such as DF1 (Rockwell Automation) and Modbus (Schneider Electric). Where the Standard Tunneling protocol is limited to exclusive, device-to-device connections, the industrial protocols offer connections to other devices simultaneously.

You can configure the unit using the serial port, or remotely over the network using Telnet or a web browser. The APS CD (the CD that comes with your Device Server) includes Windows-based configuration software that simplifies the process of installing protocols and configuring them for use with attached devices. Flash memory provides for maintenance free, non-volatile storage and allows system upgrades.

# Network Protocols

Device Servers use IP protocols for network communications. The supported protocols are ARP, UDP, TCP, ICMP, Telnet, TFTP, DHCP, HTTP, SNMP, and BOOTP. For connections to the serial port, TCP, UDP, or Telnet protocols are used. Firmware updates can be performed using TFTP.

The Internet Protocol (IP) defines addressing, routing, and data block handling over the network. The Transmission Control Protocol (TCP) assures that no data is lost or duplicated, and that everything sent to the connection arrives correctly at the target.

For typical datagram applications in which devices interact with other devices without maintaining a point-to-point connection, User Datagram Protocol (UDP) is used.

## Packing Algorithms

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 Device Server 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.

## 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 (e.g., 00-20-4A), identifying the unit as a Lantronix product. The fourth, fifth, and sixth bytes are unique numbers assigned to each Device Server.

**Figure 1-1:** Sample Ethernet Address

|  |
|--|
| 00-20-4A-14-01-18 or 00:20:4A:14:01:18 |
|--|

## Internet Protocol (IP) Address

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

## 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 PBX system.

# 2: Installation

This chapter describes the CoBox-FL-IAP and shows how to install it on a basic network.

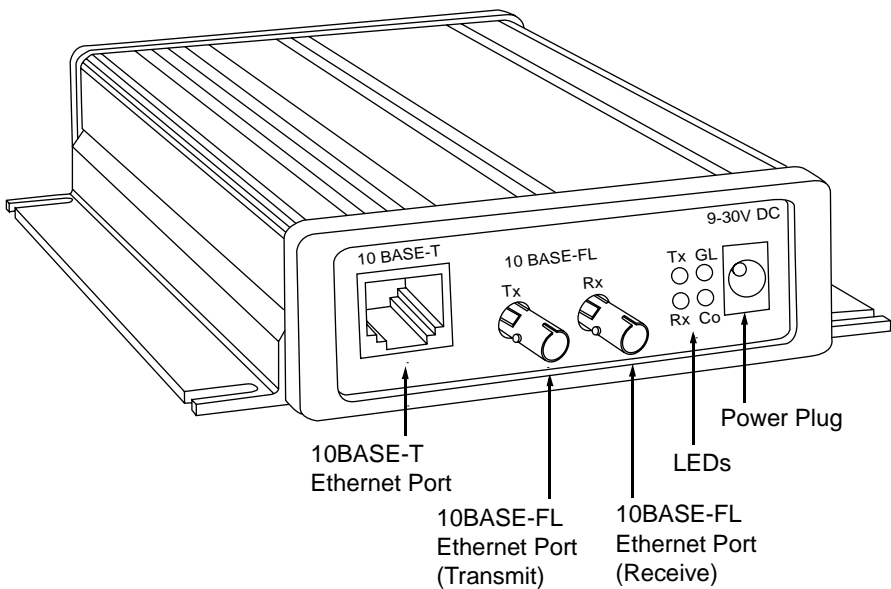
## Product Description

### Network Interface

The CoBox-FL-IAP's network panel contains a 9-30VDC or 9-25VAC power plug, four LEDs, an ST-Fiber (10BASE-FL) Ethernet port, and an RJ45 (10BASE-T) Ethernet port. Both Ethernet ports support 10 Mbps and are auto detecting.

**Note:** *Do not attempt to connect both Ethernet ports simultaneously. If one is used, the other is disabled.*

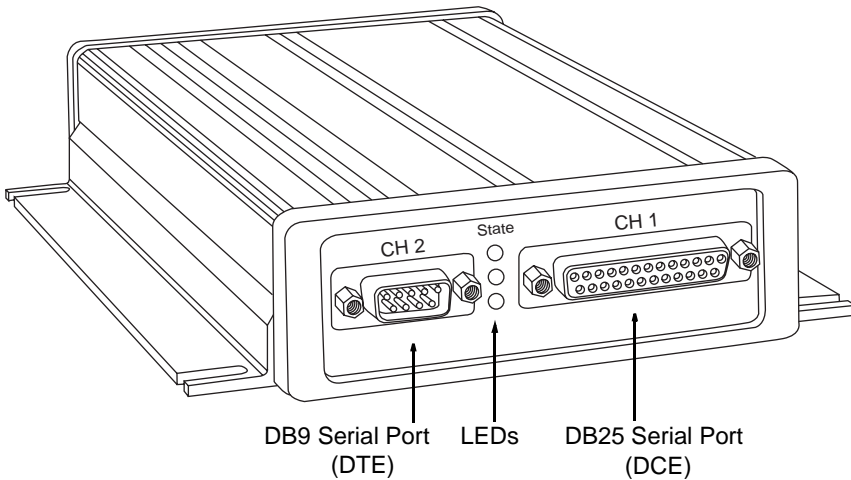
**Figure 2-1:** Network Interface



## Serial Interface

The CoBox-FL-IAP's serial panel contains two serial ports and three LEDs. Port (Channel) 1 is a female DB25 (DCE) that supports RS-232, RS-485, and RS-422 serial standards (firmware selectable) up to 115.2 Kbps. Port (Channel) 2 is a male DB9 (DTE) that supports RS-232 only. LED functionality is described in Table 2-2.

**Figure 2-2:** Serial Interface



## Product Information Label

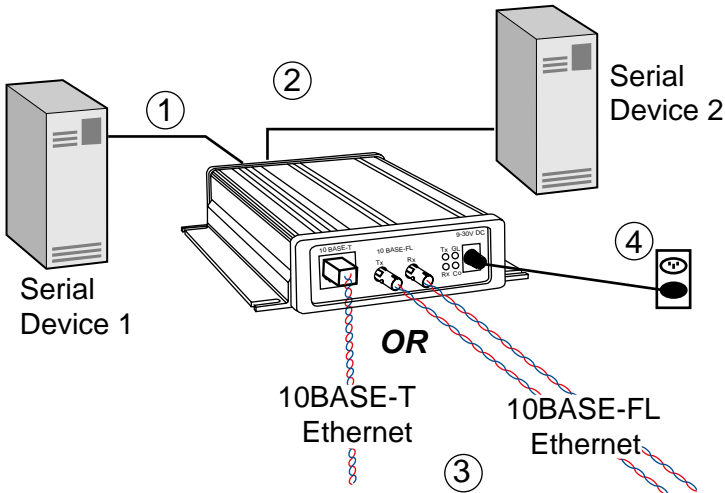
A product information label is located on the underside of the CoBox-FL-IAP, and contains the following information about your specific unit:

- ◆ Bar Code
- ◆ Serial Number
- ◆ Product ID (name)
- ◆ Product Description
- ◆ Ethernet Address (also referred to as Hardware Address or MAC Address)

# Installing the CoBox-FL-IAP

The following connection diagram shows a typical CoBox-FL-IAP used to attach serial devices to a network.

**Figure 2-3:** CoBox-FL-IAP Connected to Serial Device and Network



To install the CoBox-FL-IAP, complete the following steps in order. Refer to the numbers in the previous figure.

- 1** Connect a serial device to the CoBox-FL-IAP. See Appendix F, *Pinouts*, for more information about the kinds of device attachments the CoBox-FL-IAP supports.
- 2** Connect a second serial device to the CoBox-FL-IAP (optional).
- 3** Connect an Ethernet cable to either the 10BASE-FL **OR** the 10BASE-T Ethernet port. When connecting to the 10BASE-FL, connect the receiving cable to the Rx port and the transmitting cable to the Tx port.

**Note:** *Do not attempt to connect both Ethernet ports simultaneously. Only one Ethernet connection can be made at any one time.*

- 4** Supply power to the CoBox-FL-IAP using the power supply that was included in the packaging.

**Note:** *The required input voltage is 9-30VDC or 9-25VAC.*

- 5** Supply power to the serial devices.

## LEDs

### Network LEDs

The following table explains the function of the four network LEDs:

**Table 2-1:** CoBox-FL-IAP Network LEDs

| LED                          | Function   |
|------------------------------|--|
| <b>GL</b> (Good Link)        | Lights solid green to indicate network port is connected to the network. |
| <b>Tx</b> (Network Transmit) | Blinks yellow to indicate network packets are transmitting.              |
| <b>Rx</b> (Network Receive)  | Blinks yellow to indicate network packets are receiving.                 |
| <b>Co</b> (Collision)        | Blinks red to indicate network collisions.                               |

### Serial LEDs

Simultaneously lit red and green LEDs means something is wrong. If the red LED is lit or blinking, count the number of times the green LED blinks between its pauses. Eight blink patterns indicate which fault condition exists. The following table explains the functions of the three serial LEDs

**Table 2-2:** CoBox-FL-IAP Network LEDs.

| LED                  | Function   |
|----------------------|--|
| Serial Port 1 Status | Lights solid green to indicate that Channel 1 is <i>idle</i> .<br>Blinks green to indicate that the Channel 1 socket connection has been made.   |
| Serial Port 2 Status | Lights solid yellow to indicate Channel 2 is connected to the network and <i>idle</i> .<br>Blinks yellow to indicate the Channel 2 socket connection has been made.  |
| Diagnostics          | Blinks or lights solid red in combination with the green (Channel 1) LED to indicate diagnostics and error detection.<br><br>Red solid, green (Channel 1) blinking:<br>1x: EPROM checksum error<br>2x: RAM error<br>3x: Token Ring error<br>4x: EEPROM checksum error<br>5x: Duplicated IP address on the network<br>6x: Firmware does not match hardware<br><br>Red blinking, green (Channel 1) blinking:<br>4x: Faulty network connection<br>5x: No DHCP response received |

# 3: Getting Started

This chapter covers the required steps to get the Device Server on-line and working.

Consider the following points before logging into and configuring the Device Server:

- ◆ The Device Server's IP address must be configured before a network connection is available.
- ◆ The IP address must be within a valid range, unique to your network, and in the same subnetwork as your PC.
- ◆ Only one person at a time may be logged into the Setup (configuration) screen. This eliminates the possibility of several people simultaneously attempting to configure the Device Server.
- ◆ Network port logins can be disabled. The system manager will not be able to access the unit if the port is disabled. This port can also be password protected.
- ◆ Only one terminal at a time can be connected to a serial port.

## Assigning the IP Address

You can several methods to assign an IP address to your Device Server, including:

- ◆ DHCP
- ◆ AutoIP
- ◆ APS Configuration Utility
- ◆ ARP
- ◆ Direct serial connection

### DHCP

#### *IP Address*

The Device Server ships with a default setting of 0.0.0.0, which automatically enables DHCP within the Device Server.

Provided a DHCP server exists on the network, it will supply the Device Server with an IP address, gateway address, and subnet mask when the Device Server boots up. (If no DHCP server exists, the red Diagnostic LED blinks continuously, and the green Status LED blinks five times.)

A DHCP-assigned IP address does **not** appear in the Device Server's configuration screen (Setup Menu). You can, however, determine your Device Server'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 Connection) command, you will see the Device Server's IP configuration. (For more information about Monitor Mode, see the *Troubleshooting* appendix.)

## DHCP Name

A DHCP name is a unique identifier used for managing multiple DHCP hosts on a network. Your Device Server ships with a default DHCP name of Cxxxxxx, where the xxxxxx is the last six digits of your Device Server's MAC address. You can change the DHCP name (up to 8 characters) from the Server Configuration option on the Setup Menu.

The name can be changed to LTXdd, where 0.0.0.dd is the IP address assigned (dd should be a number between 1 and 99). For example, if the IP address is set to 0.0.0.5, the resulting DHCP name is LTX05.

**Figure 3-1:** Server Configuration Option

```
Change DHCP device name (LTRX) ? (N) Y
Enter new DHCP device name : LTRXYES
```

**Note:** *If you are rolling out a large number of Device Servers and do not want to track them by their MAC address, change the DHCP name to LTX##, where ## is the IP address of your Device Server. For example, if the IP address is 192.169.11.17, then the DHCP name for the Device Server will be LTX17.*

**The Device Server's IP address must be configured before a network connection is available.** If the IP address was not set automatically via DHCP, set it now using one of the following methods.

## Auto IP

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

If your Device Server cannot find a DHCP server, and you have not manually assigned an IP address to it, then it automatically selects an address from the AutoIP reserved range. Then, your device sends out an (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 Device Server uses it for local subnet communication.

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

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

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

AutoIP can be disabled by setting the Device Server's IP address to 0.0.1.0.

## APS Configuration Utility

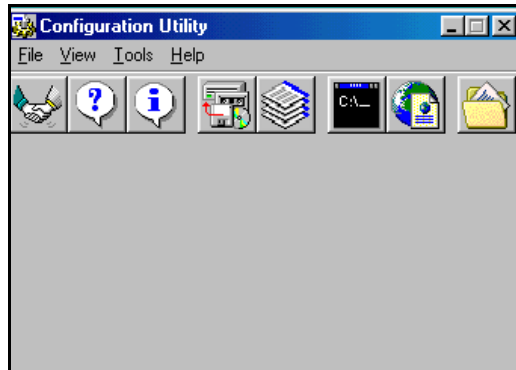
You can manually assign the IP address using the APS Configuration Utility, which you can install from the APS CD and then select the protocol (firmware) to suit your needs.

- 1 Insert the APS CD into your CD-ROM drive.
- 2 Respond to the installation wizard prompts.

**Note:** *If the CD does not launch automatically, click the **Start** button on the Windows Task Bar and select **Run**. In the **Open** field, enter your drive letter, colon, backslash, and **setup.exe** (e.g., E:\setup.exe). Click **OK**.*

- 3 Click the **Start** button on the Windows Task Bar, and select **Programs-->APS Config-->APS Config**. The Configuration Utility window displays.

**Figure 3-1:** Configuration Utility Window.




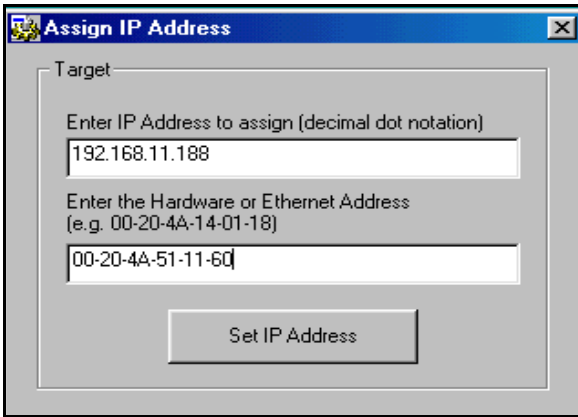
- 4 Click the **Assign IP** icon.  The Assign IP Address window displays.

Figure 3-2: Assign IP Address Window.




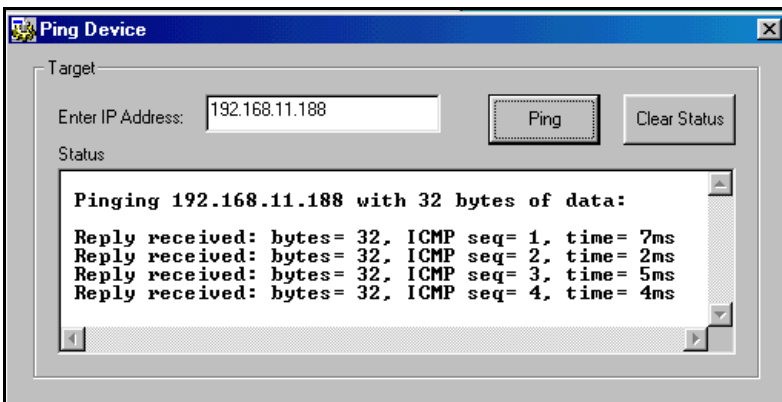
- 5 In the **Enter IP Address to assign** field, type the IP address of the Device Server (XXX.XXX.XXX.XXX format).
- 6 In the **Enter the Hardware or Ethernet Address** field, type the Ethernet address (MAC address) listed on the Device Server label.
- 7 Click the **Set IP Address** button. The *Assign IP Successful* message displays. Click **OK**.
- 8 Click the **Ping** icon.  The Ping Device window displays.
- 9 Click the **Ping** button. The *Reply received* message displays in the window, indicating that the IP address has been entered successfully.

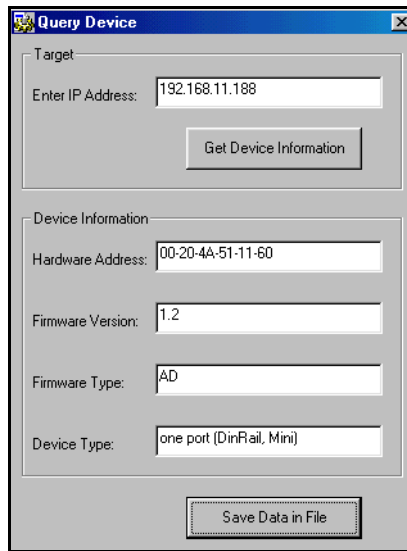
Figure 3-2: Ping Device Window



**Note:** *If you do not receive Reply received messages, make sure the Device Server 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 Network Administrator.*

- 10 Click the **Query Device** icon.  The Query Device window displays. Confirm that the IP address is correct.

**Figure 3-3:** Query Device Window




The screenshot shows a window titled "Query Device" with a blue title bar. It contains two main sections. The first section, labeled "Target", has a text box for "Enter IP Address:" with the value "192.168.11.188" and a "Get Device Information" button. The second section, labeled "Device Information", has four text boxes: "Hardware Address:" with "00-20-4A-51-11-60", "Firmware Version:" with "1.2", "Firmware Type:" with "AD", and "Device Type:" with "one port (DirRail, Mini)". At the bottom of the window is a "Save Data in File" button.

- 11 Click the **Get Device Information** button. **Firmware Type** displays the protocol that is currently loaded on the device.

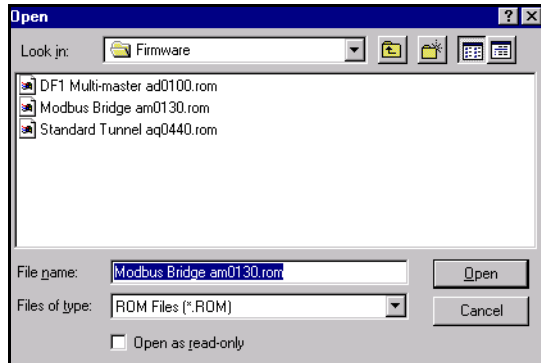
**Note:** *The communications protocol is an integrated part of the Device Server firmware. When you load the firmware, you are loading the protocol too. (For that reason, in this manual we use the terms firmware and protocol interchangeably.)*

The unit comes with the Standard Tunneling protocol installed. If your application requires a different protocol, such as Modbus (Schneider) or DF1 (Allen-Bradley), follow the steps in *Load the Protocol* below to install it. Otherwise, proceed to the *Telnet to the Device Server* section.

### Load the Protocol (Firmware)

- 1 Click the **Load** icon.  The Load Firmware window displays.
- 2 Click **Select FW File**. A list of firmware files displays

**Figure 3-4:** Firmware Files.




- 3 Select the desired protocol and click **Open**. The selected file displays in the **FW File** field.
- 4 Click **Download FW File**. The File download successful message displays. Click **OK**.

**Note:** *You can use the query tool to confirm that the protocol has been installed.*

### Telnet to the Device Server

To configure the Device Server, use the Telnet tool in the APS Configuration Utility. The tool allows you to establish a terminal session with the Device Server. Within the terminal session, menus will guide you through the process of configuring the unit.

- 1 Click the **Telnet** icon  and press **Enter** within **5 seconds**.

The Configuration Set-Up window for the protocol displays.

- 2 Continue with the configuration procedure for the protocol you installed. Instructions are in the specific protocol manual on the APS CD.

When you are finished, make sure to save the current configuration and exit. This configuration is stored in non-volatile memory and is retained even if power is removed. At this point, the Device Server will reset and restart-- using the configuration parameters just programmed.

## ARP

ARP can be used from a Windows or Unix host to assign a temporary IP address to the Device Server. The server sets its IP address from a directed ARP packet and uses it until it is rebooted. This method only works if your Windows or Unix host are on the same side of the router.

- 1 On a **UNIX** host, create an entry in the host's ARP table using the intended IP address and the hardware address of the Device Server, which is found on the product label.

**Figure 3-4:** ARP on UNIX

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

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. Type **ARP -A** at the DOS 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 Device Server:

**Figure 3-5:** ARP on Windows

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

- 2 Now open a Telnet connection to port 1. The connection should fail quickly (3 seconds), but the Device Server will temporarily change its IP address to the one designated in step 1.

**Figure 3-6:** Telnet to Port 1

```
telnet 191.12.3.77 1
```

- 3 Finally, open a Telnet connection to port 9999 and set all required parameters. Make sure to enter the information quickly; otherwise you will be timed out and will need to open a Telnet connection to port 1 again.

**Figure 3-7:** Telnet to Port 9999

```
telnet 191.12.3.77 9999
```

**Note:** *This IP address is temporary and will revert to the default value when the Device Server's power is reset. You must log into the Device Server and store the changes permanently.*

## Direct Serial Connection

- 1 Connect a console terminal or PC running a terminal emulation program to the Device Server's first serial port (CH 1). The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.
- 2 To enter Setup (configuration) Mode, cycle the Device Server's power (power off and back on). After power-up, the self-test begins and the red Diagnostic LED starts blinking. You have one second to enter three lowercase "x" characters.  
**Note:** *The easiest way to enter Setup Mode is to hold down the "x" key at the terminal while powering up the Device Server.*
- 3 Select **0** (Server Configuration) and follow the prompts until you get to IP address.
- 4 Enter the new IP address.
- 5 Select **9** to save the configuration and exit Setup Mode. The Device Server performs a power reset.

**Note:** *Every time you exit the configuration menu, the Device Server performs a power reset even if you did not make any changes.*

## Configuring the Device Server

Although IAP Device Servers ship with the Standard Tunneling protocol, they also support other industrial protocols. Refer to the APS CD for instructions on installing another protocol (User Guide for your Device Server) and configuring the Device Server with that protocol (appropriate Protocol Manual).

**Note:** *Only Standard Tunneling communications are simultaneously supported through both the Device Servers' serial channels. When other protocols such as Modbus or DFI are used, communication is supported through one serial channel only.*

# 4: Using the Device Server

## Comm Port Redirector

The Lantronix Comm Port Redirector application allows PCs to share modems and other serial devices connected to a Device Server using Windows-based applications. The Comm Port Redirector intercepts communications to specified communication ports and sends them over an IP network connection to the Device Server's serial port. This enables the PC to use the Device Server's serial port as if it were one of the PC's communication ports. Using their existing communications software, users can dial out to a remote host through a modem connected to the Device Server.

### Redirector Setup

To set up the Comm Port Redirector software:

- 1 Install the Redirector software from the APS CD. The software and installation instructions are included on the APS CD.
- 2 In the Redirector's configuration screen, select **Port Setup** and add as many communication ports as you need (for example, one for each Device Server).
- 3 Under each port, select **Add IP** and enter the IP address (**Host**) of the Device Server that you want to assign to that port and the **TCPPort** number (3000 to 3009).

**Note:** *Remember the TCPPort number. You will need it to configure the Device Server.*

- 4 Save the configurations, and if you've just installed the Redirector, reboot your PC.

### Device Server Configuration

The following procedure should be repeated for each Device Server defined in the Redirector setup, above.

- 1 Enter the Device Server's Setup (configuration) Mode (see the protocols manuals on the APS CD).
- 2 Set the **Port Number** to a value that is 11000 higher than the TCPPort number selected in the Redirector setup above (for example, if the TCPPort number was 3005, set the Device Server's Port Number to 14005).
- 3 Save the configurations and exit Setup Mode.

**Note:** *When using the Redirector, ensure that the Device Server serial port's configuration matches the configuration of your serial device.*

# A: Contact Information

If you are experiencing an error that you are unable to fix, there are a number of other troubleshooting options:

- ◆ Look on the APS CD that was included in your package for additional documentation and support information
- ◆ Look on the Lantronix Web site for technical FAQs and documentation updates.
- ◆ For information pertaining to your system's configuration, refer to your system's documentation or technical support. For example, for specific questions about the Microsoft Windows Operating System, refer to the Microsoft Knowledge Base Web site at [www.support.microsoft.com/directory](http://www.support.microsoft.com/directory).
- ◆ For technical support, contact the Industrial Automation Distributor assigned to sell and support in your region.

## Problem Report Procedure

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

- ◆ Your name
- ◆ Your company name, address, and phone number
- ◆ Product model number (for example, CoBox-FL-IAP-01)
- ◆ Serial number
- ◆ Software version
- ◆ Network configuration
- ◆ Description of the problem
- ◆ Debug report (stack dump), if applicable
- ◆ Status of the unit when the problem occurred, including information on user and network activity at the time of the problem, if possible.

# Full Contact Information

## Corporate Offices

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**Technical Support**

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# B: Troubleshooting

## Monitor Mode

Monitor Mode is a command-line interface used for diagnostic purposes. There are two ways to enter Monitor Mode: locally via the serial port or remotely via the network.

### Entering Monitor Mode Via the Serial Port

To enter Monitor Mode locally:

- 1 Connect a console terminal or PC running a terminal emulation program to the Device Server's first serial port (CH 1). The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.
- 2 Cycle the Device Server's power (power off and back on). After power-up, the self-test begins and the red Diagnostic LED starts blinking. **You have one second** to do **one** of the following:
  - ◆ To enter Monitor Mode **with** valid network connections, type **zzz**.
  - ◆ To enter Monitor Mode **without** valid network connections, type **yyy**.

**Note:** *The easiest way to enter Monitor Mode is to hold down the z or y key at the terminal while powering up the Device Server.*

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

### Entering Monitor Mode Via the Network Port

To enter Monitor Mode using a Telnet connection:

- 1 Establish a Telnet session to the configuration port (9999).
- 2 **Immediately** after the following message displays, type **M** (upper case).

**Figure B-3:** Entering Monitor Mode Via the Network

```
*** Lantronix Universal Device Server ***
Serial Number 1400280  MAC address 00:20:4A:14:01:18
Software Version 04.0b7 (000428)
Press Enter to go into Setup Mode
```

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 the IP address is given, the command is applied to another Device Server with that IP address. If no IP address is given, the command is executed locally.

**Note:** *All commands must be given in capital letters, with blank spaces between the parameters.*

**Table B-1:** Monitor Mode Commands

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

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

**Table B-2: Command Response Codes**

| <b>Response</b> | <b>Meaning</b>                          |
|-----------------|---|
| 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                         |

# C: Updating Firmware

## Downloading Firmware

Current firmware files are available on the APS CD. Firmware updates and release notes for Device Servers can be downloaded directly from Lantronix in one of the following ways: via the Lantronix Web site ([www.lantronix.com](http://www.lantronix.com)), or using anonymous FTP through the Internet ([ftp.lantronix.com](ftp://lantronix.com)).

There are three ways to update the Device Server's internal operational code (CBX\*.ROM or CBX\*.HEX). Using the APS Configuration Utility is the preferred method. Alternatives are by means of TFTP or through a serial port.

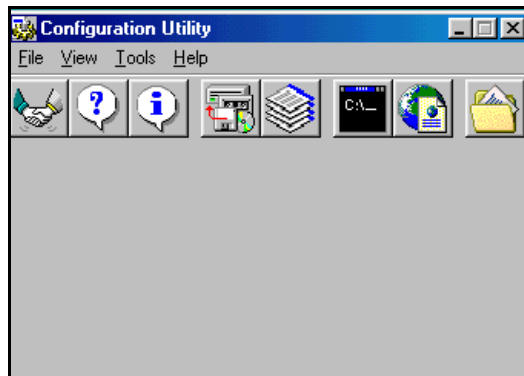
You can also update the Device Server's internal Web interface (CBXW\*.COB) via TFTP.

## Downloading Via the APS Configuration Utility

The procedure for installing updated firmware is basically the same as for installing a protocol. (Since the protocol is an integrated part of the firmware, and you can't get one without the other, in this manual we use the terms interchangeably.) You just need to download the updated firmware to your computer and then use the APS Configuration Utility to install it.

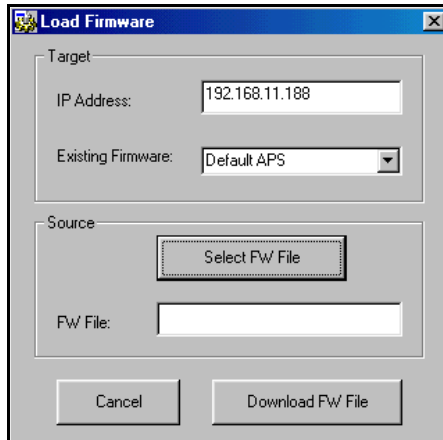
- 1 Download the updated firmware files from [www.lantronix.com](http://www.lantronix.com) or [ftp.lantronix.com](ftp://lantronix.com) and store them in the Firmware subfolder of the APSConfig. folder on your computer. If you accept all the defaults when you installed the utility, the folder will be on your hard drive under Program Files.
- 2 Click the **Start** button and select **Programs-->APS Config-->APS Config** to display the APS Configuration Utility window.

**Figure C-1:** APS Configuration Utility Window



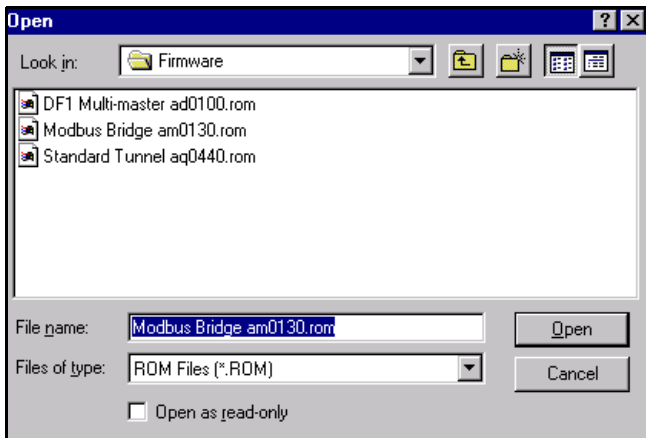
- 3 Click the **Load Firmware** icon . The Load Firmware window displays.

**Figure C-2:** Load Firmware Window



- 4 Type the Device Server’s assigned IP address in the **IP Address** field.
- 5 Click the **Select FW File** button. The files in your Firmware folder display. (If the files are stored elsewhere, browse until you find them.)

**Figure C-4:** Firmware Files



- 6 Select the file to download and click the **Open** button. The path of the selected file displays in the **FW File** field.
- 7 Click the **Download FW File** button. When the *File download successful* message displays, click **OK**.

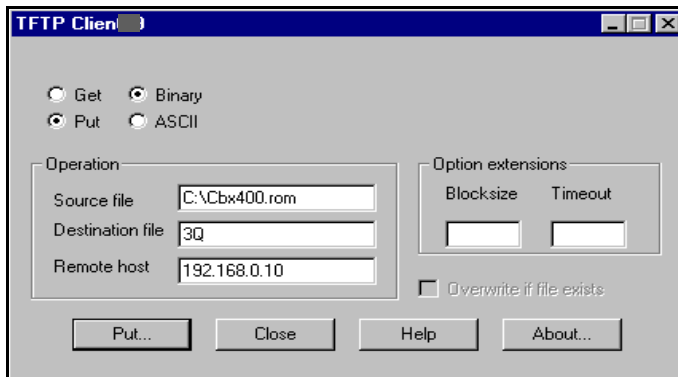
# Downloading Via TFTP

To download new firmware from a computer:

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

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

**Figure C-3:** TFTP Dialog Box



- 2 Type the full path in the **Source File** field.
- 3 Type one of the following codes in the **Destination File** field:

*Codes must be upper case.*

**AQ** - Standard Tunneling

**AM** - Modbus

**AD** - DF1

**WEB6** - Internal Web interface.

The destination file can also be **ROM** to match any firmware.

**Remote Host** is the IP address of the unit being upgraded.

- 4 Click the **Put** button to transfer the file to the Device Server.
- 5 The Device Server performs a power reset after the firmware reload process has completed.

# Downloading Via the Serial Port

**Note:** *This procedure takes about 10 minutes. 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 Device Server.*

To download firmware from a computer via the Device Server’s serial port:

- 1 Enter Monitor Mode.
- 2 Download the firmware to the Device Server using the **DL** command.
- 3 Select **Send Text File** and select the CBX\*.HEX file to be downloaded.

**Note:** *The downloaded file must be the .HEX (ASCII) version.*

- 4 After the final record is received, the Device Server checks the integrity of the firmware image before programming the new firmware in the flash ROM.
- 5 The following message displays when the firmware upgrade is complete.

**Figure C-5:** Firmware Upgrade Screen Display

```

*** NodeSet 2.0 ***
0>DL
02049 lines loaded.
Max Address FFE0
Loading EEPROM ...
    
```

- 6 The Device Server performs a power reset after the firmware load has been completed.

**Note:** *You can only update the Device Server’s internal Web interface using TFTP.*

# D: Technical Specifications

## CoBox-FL-IAP

The following table lists technical information about the CoBox-FL-IAP Device Server.

**Table D-1:** CoBox-FL-IAP Technical Specifications

|                            |  |
|----------------------------|--|
| <b>Protocols Supported</b> | ARP, UDP, TCP, Telnet, ICMP, SNMP, DHCP, TFTP, HTTP, BootP, and ECHO   |
| <b>Network Interface</b>   | 10BASE-T or 10BASE-FL  |
| <b>Serial Interface</b>    | DB25 RS-232/RS-422/RS-485 serial port with DCE configuration<br>DB9 RS233 serial port with DTE configuration         |
| <b>Data Rates</b>          | Serial speed ranging from 300 bps - 115.2 Kbps   |
| <b>Serial Line Formats</b> | Characters: 7 or 8 data bits<br>Stop bits: 1 or 2<br>Parity: odd, even, none   |
| <b>Modem Controls</b>      | RTS, CTS, DSR, DCD, DTR  |
| <b>Flow Control</b>        | XON/XOFF<br>CTS/RTS  |
| <b>Management</b>          | HTTP (internal web server)<br>SNMP (read only)<br>Serial login<br>Telnet login                                       |
| <b>System Software</b>     | Flash ROM standard: downloadable from a TCP/IP host (TFTP) or over serial port                                       |
| <b>Diagnostic LEDs</b>     | Network Transmit<br>Network Receive<br>Good Link<br>Collisions<br>Channel 1 Status<br>Channel 2 Status<br>Diagnostic |
| <b>Compatibility</b>       | Ethernet: Version 2.0/IEEE 802.3   |

|                            |   |
|----------------------------|---|
| <b>Power Requirements</b>  | 9-30VDC or 9-25VAC (External adapter included)<br>Power Consumption: 3 Watts                  |
| <b>Memory</b>              | Flash: 512K<br>RAM: 128K<br>NVRAM: 2K   |
| <b>Environmental</b>       | Operating Temperature: 5 to 50C (41 to 122F)<br>Storage Temperature: -40 to 66C (-40 to 151F) |
| <b>Physical Dimensions</b> | 6.5 x 4.46 x 1.39 in (16.51 x 11.34 x 3.55 cm)  |
| <b>Weight</b>              | 1.10 lbs (.48 kg)   |

# E: IP Addressing

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

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

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

## Network Portion

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

**Table E-1:** Network Portion of IP Address

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

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

**Table E-2:** Available IP Addresses

| Class | Reserved  | Available                  |
|-------|---|----------------------------|
| A     | 0.0.0.0<br>127.0.0.0                            | 1.0.0.0 to 126.0.0.0       |
| B     | 128.0.0.0<br>191.255.0.0                        | 128.1.0.0 to 191.254.0.0   |
| C     | 192.0.0.0<br>223.255.255.0                      | 192.0.1.0 to 223.255.254.0 |
| D, E  | 224.0.0.0 to 255.255.255.254<br>255.255.255.255 | None                       |

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

## Subnet Portion

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

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

## Host Portion

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

## Network Address

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

**Figure E-1:** Sample Network Address

192.168.0.0

## Broadcast Address

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

**Figure E-2:** Sample Broadcast Address

192.168.0.255

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

# IP Subnet Mask

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

**Table E-3:** Standard IP Network Netmasks

| Network Class | Network Bits | Host Bits | Netmask       |
|---------------|--------------|-----------|---------------|
| A             | 8            | <b>24</b> | 255.0.0.0     |
| B             | 16           | <b>16</b> | 255.255.0.0   |
| C             | 24           | <b>8</b>  | 255.255.255.0 |

**Table E-4:** Netmask Examples

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

# Private IP Networks and the Internet

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

## Network RFCs

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

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

# F: Pinouts

## Ethernet Connectors

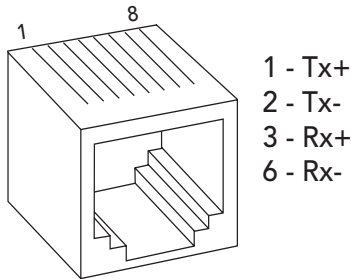
The CoBox-FL-IAP contains a 10BASE-T ethernet connector and a 10BASE-FL ethernet connector.

**Note:** *Do not attempt to connect both Ethernet ports simultaneously. If one is used, the other is disabled.*

### 10BASE-T

The CoBox-FL-IAP supports 10 Mbit Ethernet through an RJ45 connector.

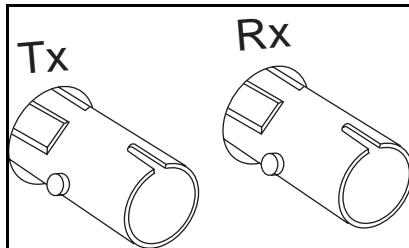
**Figure F-1:** RJ45 Ethernet Connector



### 10BASE-FL

The CoBox-FL-IAP also supports 10 Mbit Ethernet through an ST-Fiber Ethernet connector.

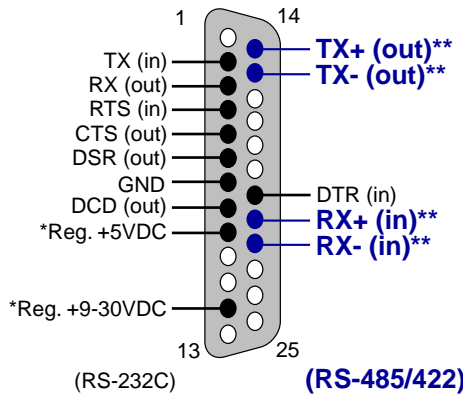
**Figure F-2:** 10BASE-FL Ethernet Connector



# Serial Connectors

The CoBox-FL-IAP's female DB25 connector provides an RS-232C, RS-485, or RS-422 DCE serial interface. The default serial port settings are 9600 baud, 8 bits, no parity, and 1 stop bit.

**Figure F-3:** DB25 Serial Connector (DCE)



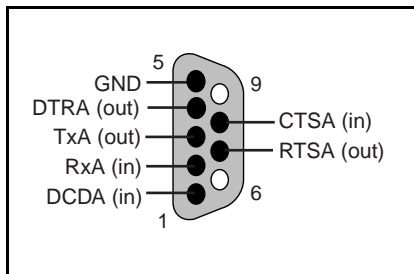
\*The Device Server can alternately be powered up via the serial port using one of these pins.

\*\*The minus sign (-) is sometimes represented as A (e.g., TXA). The plus sign (+) is sometimes represented as B (e.g., TXB).

**Note:** For RS-485 2-wire functionality, pins 14 and 21 and pins 15 and 22 must be connected to each other.

The CoBox-FL-IAP's male DB9 connector is a DTE serial interface.

**Figure F-4:** DB9 Serial Connector (DTE)



# Warranty Statement

Lantronix warrants for a period of FIVE years from the date of shipment that each CoBox-FL-IAP Device Server supplied shall be free from defects in material and workmanship. During this period, if the customer experiences difficulties with a product and is unable to resolve the problem by phone with Lantronix Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of a RMA number, the customer is responsible for returning the product to Lantronix, freight prepaid. Lantronix, upon verification of warranty will, at its option, repair or replace the product in question, and return it to the customer freight prepaid. No services are handled at the customer's site under this warranty.

Lantronix warrants software for a period of sixty (60) days from the date of shipment that each software package supplied shall be free from defects and shall operate according to Lantronix specifications. Any software revisions required hereunder cover supply of distribution media only and do not cover, or include, any installation. The customer is responsible for return of media to Lantronix and Lantronix for freight associated with replacement media being returned to the customer.

Lantronix shall have no obligation to make repairs or to cause replacement required through normal wear and tear of necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the Product, or use of the Product in such a manner for which it was not designed, or by causes external to the Product, such as, but not limited to, power or failure of air conditioning.

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Warranty claims must be received by Lantronix within the applicable warranty period. A replaced product, or part thereof, shall become the property of Lantronix and shall be returned to Lantronix at the Purchaser's expense. **All return material must be accompanied by a return material authorization number assigned by Lantronix.**

# Declaration of Conformity

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

**Manufacturer's Name:** Lantronix

*Declares that the product:*

**Product Name:** Device Server

**Model Name/Number:** CoBox-FL-IAP

*Conforms to the following standards:*

**Safety:** EN60950:1992+A1, A2, A3, A4, A11

**Electromagnetic Emissions:** FCC Part 15, Subpart B, Class B  
EN55022: 1998 (CISPR 22, Class A: 1993, A1: 1995, A2: 1996)  
IEC 1000-3-2/A14: 2000  
IEC 1000-3-3: 1994

**Electromagnetic Immunity:** EN55024: 1998 Information Technology Equipment-Immunity Characteristics  
IEC 6100-4-2: 1995 Electro-Static Discharge Test  
IEC 6100-4-3: 1996 Radiated Immunity Field Test  
IEC 6100-4-4: 1995 Electrical Fast Transient Test  
IEC 6100-4-5: 1995 Power Supply Surge Test  
IEC 6100-4-6: 1996 Conducted Immunity Test  
IEC 6100-4-8: 1993 Magnetic Field Test  
IEC 6100-4-11: 1994 Voltage Dips & Interrupts Test

(L.V.D. Directive 73/23/EEC)

**Supplementary Information:** *The product complies with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC.*

*The product has been verified as being compliant within the Class A limits of the FCC Radio Frequency Devices Rules (FCC Part 15, Subpart B), revised as of October 1993.*

**Manufacturer's Contact:** Director of Quality Assurance, Lantronix,  
15353 Barranca Parkway  
Irvine, CA 92618 USA

General Tel: 949/453-3990

Fax: 949/453-3995

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The revision date for this manual is **July 2001**.

**Part Number: CD-APS-01**  
**Rev. C**

### **WARNING**

This product has been designed to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against such interference when operating in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause harmful interference to radio communications.

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.