

# **UDS-10-IAP User Guide**

**Rev. C 7/01**

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## **Warranty Statement**

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# 1: Introduction

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:

- ◆ CoBoxDR1-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 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 such protocols 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 Ethernet 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

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

The IP protocol 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 UDS-10-IAP 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 UDS-10-IAP.

**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 UDS-10-IAP. See Appendix F for more information on IP Addressing.

## ***Port Number***

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.

The UDS-10-IAP's serial channel (port) can be associated with a specific TCP/UDP port number. Port number 9999 is reserved for access to the UDS-10-IAP's Setup (configuration) Mode screen.

# 2: Installation

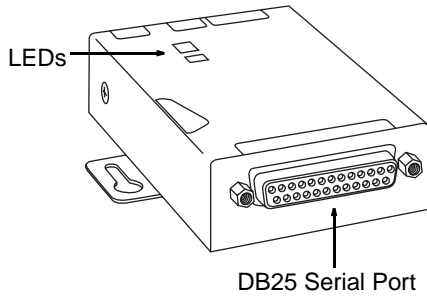
This chapter describes the UDS-10-IAP and shows how to install it on a basic network.

## Product Description

### Serial Interface

The UDS-10-IAP has a female DCE DB25 serial port that supports RS-232 and RS-485/422 serial standards (firmware selectable) up to 115.2 Kbps.

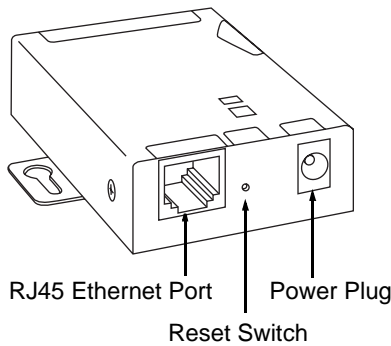
**Figure 2-1:** Serial Interface



### Network Interface

The UDS-10-IAP's back panel contains a 9-30VDC power plug, a reset switch, and an RJ45 (10Base-T) Ethernet port that supports up to 10 Mbps.

**Figure 2-2:** Network Interface



## LEDs

Five LEDs are located on the top of the unit. The following table explains their functions:

**Table 2-3: UDS-10-IAP LEDs**

LED	Function
Link	Lights solid green to indicate network port is connected to the network.
Net Tx/Rx	Blinks yellow to indicate network packets are transmitting and receiving.
Collision	Lights solid red to indicate network collisions.
Diagnostic	<p>Blinks or glows red in combination with the green Status LED to indicate error detection.</p> <p>Red solid, green (Status LED) blinking:</p> <ul style="list-style-type: none"> <li>1x: EPROM checksum error</li> <li>2x: RAM error</li> <li>3x: Token Ring error</li> <li>4x: EEPROM checksum error</li> <li>5x: Duplicated IP address on the network</li> </ul> <p>Red blinking, green (Status LED) blinking:</p> <ul style="list-style-type: none"> <li>4x: Faulty network connection</li> <li>5x: No DHCP response received</li> </ul>
Status	<p>Lights solid green to indicate that the serial port is connected to the network and is <i>idle</i>.</p> <p>Blinks green to indicate that the serial port is connected to the network and is <i>active</i>.</p>

## Product Information Label

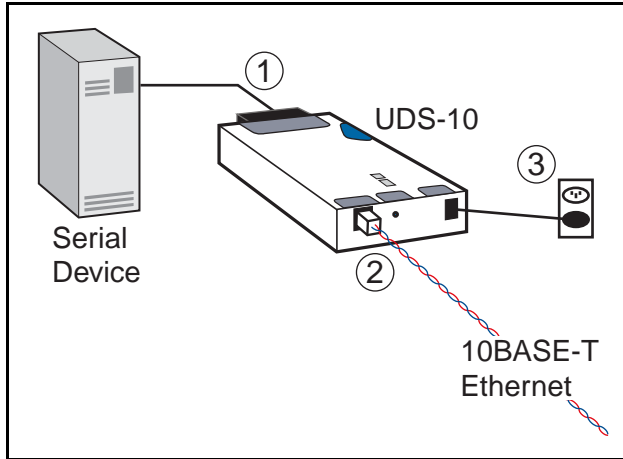
A product information label is located on the underside of the UDS-10-IAP; it contains the following information about your specific unit:

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

## Installing the UDS-10-IAP

The following diagram shows a properly installed UDS-10-IAP.

**Figure 2-4:** UDS-10-IAP Connected to Serial Device and Network



To install the UDS-10-IAP, complete the following steps in order. Refer to the numbers in the figure.

- 1 Connect a serial device to the UDS-10-IAP. See Appendix C, Pinouts, for more information about what kinds of device attachments the UDS-10-IAP supports.
- 2 Connect an Ethernet cable to the 10BASE-T port.
- 3 Supply power to the UDS-10-IAP using the power supply that was included in the packaging.

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

- 4 Supply power to the serial device.

# 3: Getting Started

This chapter covers the steps required to get the UDS-10-IAP on-line and working.

Before logging into and configuring the UDS-10-IAP, consider the following points:

- ◆ The UDS-10-IAP'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 subnet as your PC.
- ◆ Only one person at a time may log into the configuration port (port 9999). This eliminates the possibility of several people simultaneously attempting to configure the UDS-10-IAP.
- ◆ Network port logins cannot be disabled. The system manager will always be able to access the unit. However, this port can be password protected.
- ◆ Only one terminal at a time can connect to the serial port. (In RS-485 mode, the UDS-10-IAP is capable of multidrop connections.)

## Assigning the IP Address

You can use 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 UDS-10-IAP ships with a default IP address of 0.0.0.0, which automatically enables DHCP within the UDS-10-IAP.

Provided a DHCP server exists on the network, it will supply the UDS-10-IAP with an IP address, gateway address, and subnet mask when the UDS-10-IAP boots up. (If no DHCP server exists, the UDS-10-IAP will respond with a diagnostic error: the red Diagnostic LED blinks continuously and the green Status LED blinks five times.) A DHCP-assigned IP address will **not** appear in the UDS-10-IAP's configuration screens. 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 (see Monitor Mode on page 4-2), and issue the **NC** (Network Connection) command, you will see the UDS-10-IAP's IP configuration.

### 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 a DHCP server is found, 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.

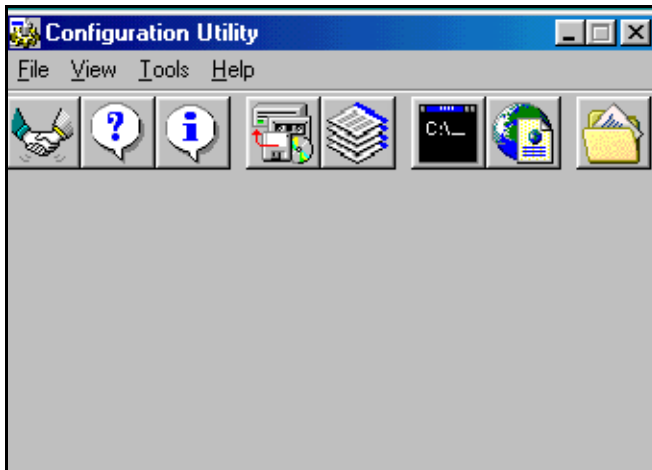
### Assign the IP Address


- 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** (for example, **E:\setup.exe**). Click **OK**.*

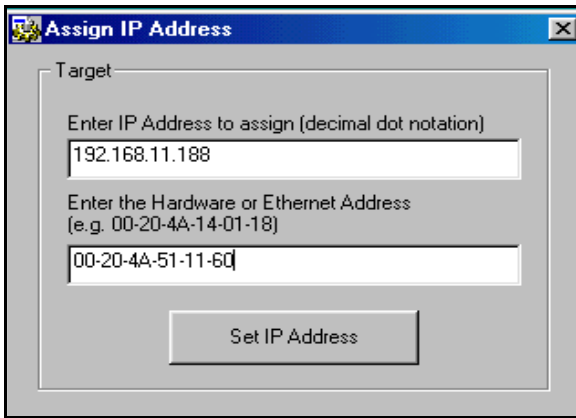
- 3 Click the **Start** button on the Windows Task Bar, and select **Programs-->APS Config-->APS Config**. The APS Configuration Utility window displays.


**Figure 3-2:** APS Configuration Utility Window.



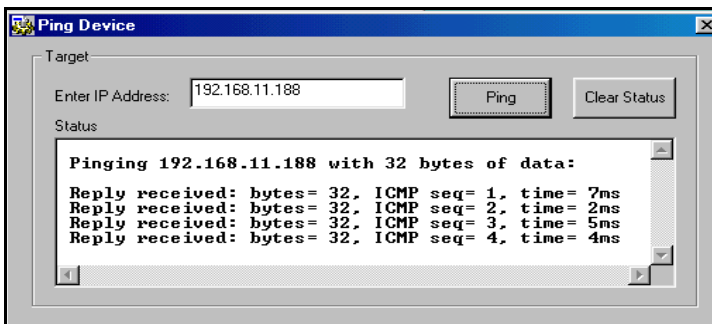
- 4 Click the **Assign IP** icon.  The Assign IP Address window displays.

**Figure 3-3:** 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) that is 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 messages* display in the window, indicating that the IP address has been entered successfully.

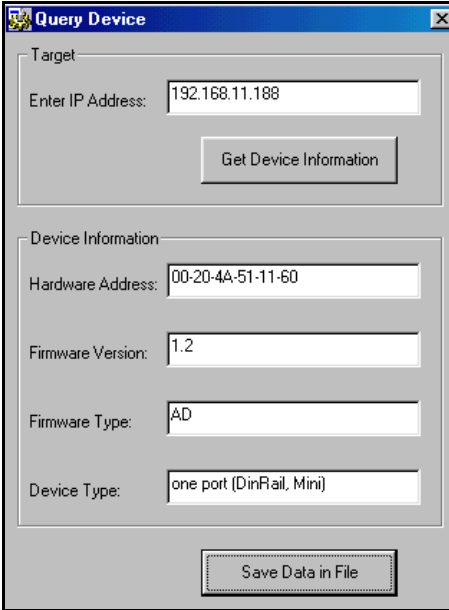
**Figure 3-4:** Ping Device Window



**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 3-5:** Query Device Window




- 11 Click the **Get Device Information** button. **Firmware Type** displays the code for 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.*

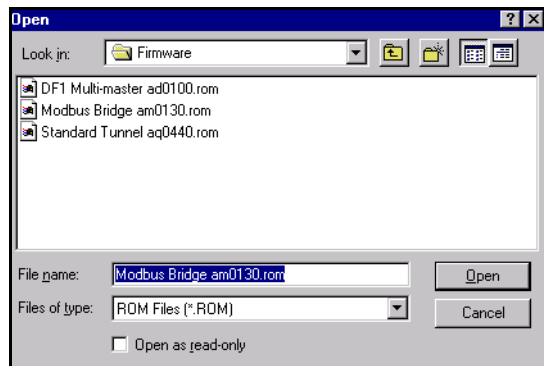
The unit comes with the Standard Tunneling protocol installed. If your application requires a different protocol, such as Modbus (Schneider) or DF1 (Allen-Bradley), follow the steps in Load the Protocol below to install it. Otherwise, proceed to Telnet to the Device Server.

### 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 3-6:** 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 Setup Mode screen for the protocol displays.
- 2 Continue with the configuration procedure for the protocol you installed. Instructions are in the specific protocol manuals on the APS CD.
- 3 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 unit 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 3-7:** ARP on UNIX

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

In order 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 3-8:** 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 3-9:** Telnet to Port 1

```
telnet 191.12.3.77 1
```

- 3 Finally, open a Telnet connection to port 9999 and set all required parameters. (See the appropriate manual on the APS CD.) 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 3-10:** 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 UDS-10-IAP's serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit.
- 2 To enter Setup (configuration) Mode, cycle the UDS-10-IAP'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 (or emulation) while powering up the UDS-10-IAP.*

- 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 UDS-10-IAP performs a power reset.

## 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).

# 4: Using the UDS-10-IAP

## Comm Port Redirector

The Lantronix Comm Port Redirector application allows PCs to share modems and other serial devices connected to a UDS-10-IAP using Windows-based applications. The Comm Port Redirector intercepts communications to specified communications ports and sends them over an IP network connection to the UDS-10-IAP's serial port. This enables the PC to use the UDS-10-IAP'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 UDS-10-IAP.

### **Redirector Setup**

To setup the Comm Port Redirector software:

- 1 Install the Redirector software. 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 COM ports as you need (for example, one for each UDS-10-IAP).
- 3 Under each port, select **Add IP** and enter the IP address (Host) of the UDS-10-IAP that you want to assign to that port and a number between 3000 and 3009 (TCPPort).

**Note:** *Remember the TCPPort number. You will need it to configure the UDS-10-IAP.*

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

### **UDS-10-IAP Configuration**

Repeat the following procedure for each UDS-10-IAP defined in the Redirector setup above.

- 1 Enter the UDS-10-IAP'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 UDS-10-IAP's Port Number to 14005.
- 3 Save the configurations and exit Setup Mode.

**Note:** *With Redirector, the UDS-10-IAP does **not** change its serial port configuration to match the PC application's serial settings. Ensure that the UDS-10-IAP serial port's configuration matches the configuration of your serial device.*

# Monitor Mode

## 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 4-1:** 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.*

**Figure 4-2:** Monitor Mode Commands

Command	Command Name	Function
DL	Download	Downloads firmware to the UDS-10-IAP
VS x.x.x.x	Version	Queries software header record (16-byte) of Device Server with IP address x.x.x.x
GC x.x.x.x	Get Configuration	Gets configuration of Device Server with IP address x.x.x.x as hex records
SC x.x.x.x	Send Configuration	Sets configuration of Device Server with IP address x.x.x.x from hex records
PI x.x.x.x	Ping	Pings Device Server with IP address x.x.x.x to check device status
AT	ARP Table	Shows the UDS-10-IAP's ARP table entries
TT	TCP Connection Table	Shows all incoming and outgoing TCP connections (used only with Monitor Mode)
NC	Network Connection	Shows the UDS-10-IAP's IP configuration
RS	Reset	Resets the UDS-10-IAP's power
SI x.x.x.x:n.n.n.n	Send/Set IP Address	Remotely assigns an IP address to a Device Server, where x.x.x.x is the new IP address and n.n.n.n is the remote Device Server's serial number written twice
QU	Quit	Exits diagnostics mode

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

**Figure 4-3: 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

# 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, UDS-10-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

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# Appendix B: Binary to Hexadecimal Conversion

Many of the UDS-10-IAP's configuration procedures require you to assemble a series of options (represented as bits) into a complete command (represented as a byte). The resulting binary value must be converted to a hexadecimal representation.

Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0010 0011) to a hexadecimal representation, the upper and lower four bits are treated separately, resulting in a two-digit hexadecimal number (in this case, 4C).

Use the following table to convert values from binary to hexadecimal.

**Table B-1:** Binary to Hexadecimal Conversion Table

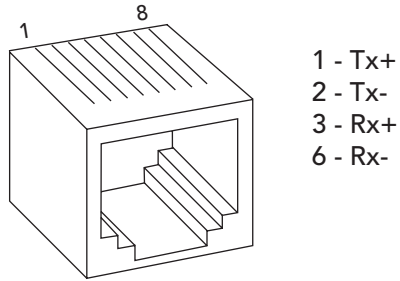
Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

# Appendix C: Pinouts

## Ethernet Connector

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

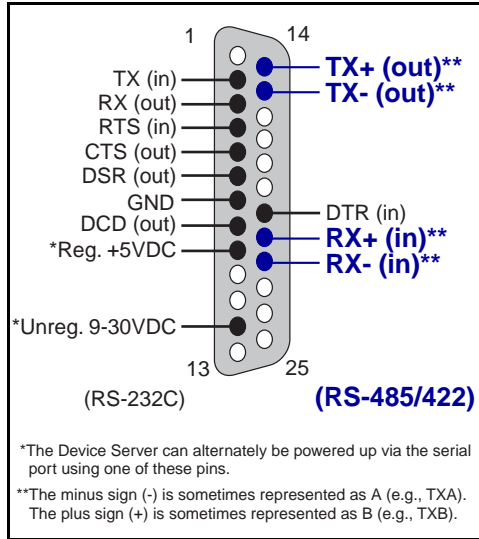
**Figure C-1:** RJ45 Ethernet Connector



# Serial Connector

The UDS-10-IAP's female DB25 connector provides an RS-232C, RS-485, or RS-422 DCE serial port. The default serial port settings are 9600 baud, 8 bits, no parity, and 1 stop bit.

**Figure C-2:** DB25 Serial Connector



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

# Appendix D: 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://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.

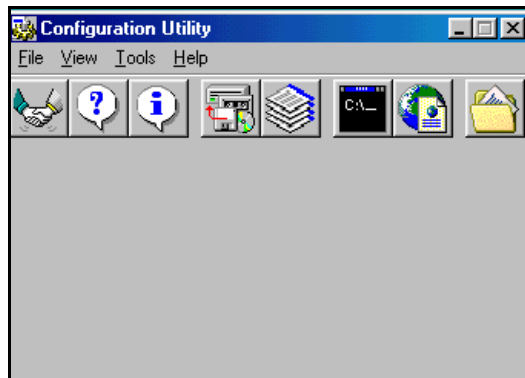
You can also update the Device Server's internal Web interface (CBXW\*.COB) via TFTP.

## 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.

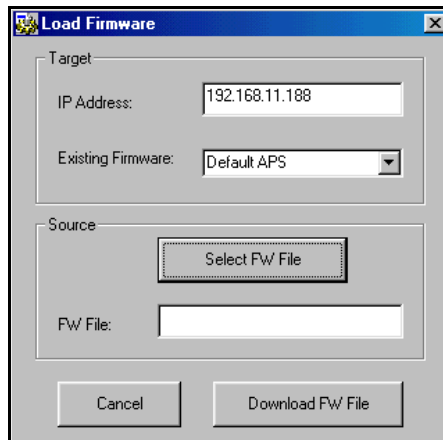
- 1 Download the updated firmware files from [www.lantronix.com](http://www.lantronix.com) or [ftp.lantronix.com](ftp://ftp.lantronix.com) and store them in the Firmware subfolder of the APSConfig. folder on your computer. If you accept all the defaults when you installed the utility, the folder will 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 D-1:** APS Configuration Utility Window



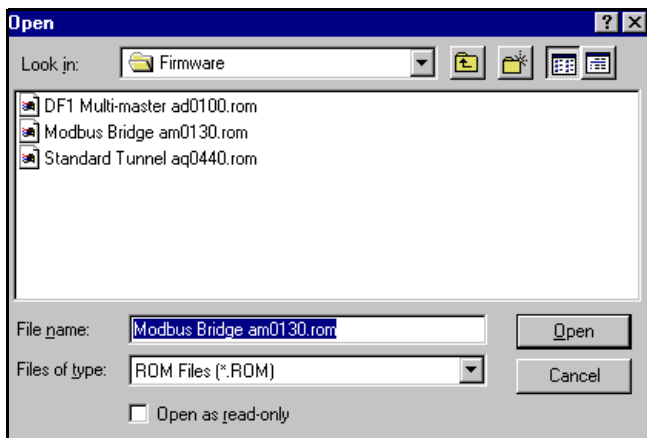
- 
- 3 Click the **Load Firmware** icon . The Load Firmware window displays.

**Figure D-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 D-3:** 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**.

---

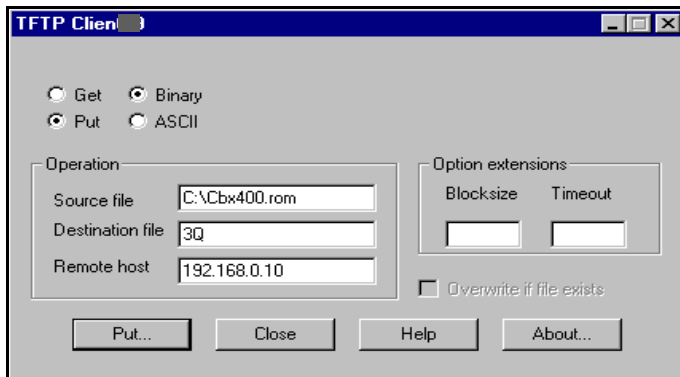
# Downloading Via TFTP

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 D-4:** 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

**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 D-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**.*

# Appendix E: Technical Specifications

## CPU, Memory Controllers

- ◆ AMD 188ES CPU, 25MHz
- ◆ Realtek Ethernet Controller
- ◆ 128kByte RAM, 512kByte Flash PROM

## Serial Interface

- ◆ Female DB25 connector (DCE pinout)
- ◆ Speed software selectable (300 to 115 kBaud)
- ◆ Software selectable RS-232C or RS-422/485

## Network Interface

- ◆ 10Base-T (RJ45 connector)

## Power Supply

- ◆ External adapter included
- ◆ 110VAC (-01 models)
- ◆ 230VAC (-02 models)

## Power Input

- ◆ 9-30VDC (current draw of 250mA maximum)

## Dimensions

- ◆ Height: 2.3 cm (0.9 in)
- ◆ Width: 6.4 cm (2.5 in)
- ◆ Depth: 9.0 cm (3.5 in)

---

## Weight

- ◆ 0.35 Kg (0.8 lbs)

## Environmental Limitations

### Temperature

- ◆ Operating range: 5° to 50° C (41° to 122° F)
- ◆ Storage range: -40° to 66° C (-40° to 151° F)
- ◆ Maximum temperature change per hour: 20° C (36° F)

**Note:** *Maximum temperature changes may affect operation. Therefore, do not operate the UDS-10-IAP near heating or cooling devices, large windows, or doors that open to the outdoors.*

### Altitude

- ◆ Operating: 2.4 km (8,000 ft) maximum
- ◆ Storage: 9.1 (30,000 ft) maximum

**Note:** *If operating the UDS-10-IAP above 2.4 km (8,000 ft), decrease the operating temperature rating by 1° for each 1000 ft.*

### Relative Humidity

- ◆ Operating: 10% to 90% noncondensing, 40% to 60% recommended
- ◆ Storage: 10% to 90% noncondensing

# Appendix F: 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 F-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 F-2:** Available IP Addresses

Class	Reserved	Available
A	0.0.0.0 127.0.0.0	1.0.0.0 to 126.0.0.0
B	128.0.0.0 191.255.0.0	128.1.0.0 to 191.254.0.0
C	192.0.0.0 223.255.255.0	192.0.1.0 to 223.255.254.0
D, E	224.0.0.0 to 255.255.255.254 255.255.255.255	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 F-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 F-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 F-3:** Standard IP Network Netmasks

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

**Table F-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

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

**Part No. CD-APS-O1  
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.

# Warranty Statement

Lantronix warrants for a period of FIVE years from the date of shipment that each UDS-10-IAP Universal 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:** Universal Device Server

**Model Name/Number:** UDS-10-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.*

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