XPress-I/O Device Server User Guide

Part Number 900-463
Revision C July 2007

Copyright & Trademark

Contacts

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

Technical Support
Online: www.lantronix.com/support

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

Disclaimer & Revisions

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

Attention: *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.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil num'erique de la classe A est conforme 'a la norme NMB-003 du Canada.

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

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

Date	Rev.	Comments
1/07	A	Initial Document
7/07	B	Incorporates updates to input/output; EventTrak; tunnel accept and connect modes; RSS; relay, and switching voltage information.

Contents

Figures

1: Preface

Purpose and Audience

This guide describes how to install, configure, use, and update the XPress-I/O. It is for those who will use the XPress-I/O to network-enable their serial devices. It is primarily suitable for Industrial automation end users, VARs, and Integrators.

Summary of Chapters

The remaining chapters in this guide include:

Chapter	Description
2: Introduction	Main features of the XPress-I/O device servers and the applications for which they are suited.
3: Installation	Instructions for getting the XPress-I/O device server up and running. Includes a description of hardware components.
4: Getting Started	Instructions for starting DeviceInstaller and viewing current configuration settings. Introduces methods of configuring the XPress-I/O.
5: Configuration Using the Web Manager	Instructions for using the web interface to configure XPress-I/O device servers.
6: Network, Serial Line, Tunnel, and Modbus Settings	Instructions for using the web interface to configure network, serial line, tunnel, and Modbus settings.
7: Services Settings	Instructions for using the web interface to configure settings for DNS, SNMP, FTP, and other services.
8: Security Settings	Instructions for using the web interface to configure SSH and SSL security settings.
9: Maintenance and Diagnostics	Instructions for using the web interface to maintain the XPress-I/O, view statistics, files, and logs, and diagnose problems.
10: Advanced Settings	Instructions for using the web interface to configure advanced settings, e.g., configurable pins, email, CLI, and XML.
11: Updating Firmware	Instructions for upgrading the XPress-I/O firmware.
A: Factory Default Configuration	Quick reference of the XPress-I/O factory-default configuration settings.

Chapter	Description
B: Technical Specification	Table of technical data about the products.
C: Isolated I/O Specifications	Table of technical data about the digital I/Os and relay.
D: Networking and Security	In-depth description of networking and network security as it relates to the XPress-I/O device servers.
E: Modbus	Explanation and examples of the advantages of using Modbus/TCP with the XPress-I/O.
F: Technical Support	Information about contacting Lantronix Technical Support.
G: Compliance	Information about the products' compliance with regulatory standards.
H: Warranty	

Additional Documentation

The following guide is available on the product CD or the Lantronix Web site: www.lantronix.com.

Document	Description
XPress-I/O Device Server Quick Start Guide	Provides the steps for getting the XPress-I/O up and running.
XPress-I/O Device Server Command Reference	Describes how to configure the XPress-I/O using Telnet or the serial port and summarizes the CLI and XML configuration commands.
Secure Com Port Redirector User Guide	Provides information for using the Lantronix Windows-based utility to create secure virtual com ports.

2: Introduction

This chapter introduces the Lantronix XPress-I/O device server. It provides an overview of the product, lists its key features, and describes the applications for which it is suited.

The XPress-I/O industrial automation device server provides a quick and easy method to network-enable multiple industrial automation devices and equipment. Multiple serial ports, digital I/Os, and a relay enable real-time access for remote configuring, programming, monitoring, and controlling PLCs, motor drives, process controls, power monitoring equipment, barcode scanners, or virtually any RS232, RS422, or RS485 factory floor device.

XPress-I/O Overview

The XPress-I/O is a compact, easy-to-use device server that gives you the ability to network-enable asynchronous RS-232 and RS-422/485 serial devices. It can deliver fully transparent RS-232/422 point-to-point connections and RS-485 multi-drop connections without requiring modifications to existing software or hardware components in your application.

Port 1 supports RS-232 devices and Port 2 supports 422/485 devices by means of screw terminals. The XPress-I/O supports two user-configurable digital I/Os and one relay for industrial sensing and control.

Figure 2-1. XPress-I/O Device Server (Front)

Features

The following list summarizes the key features of the XPress-I/O.

- One RS-232 serial port
- One RS-422/485 serial port
- One RJ45 Ethernet port
- Two isolated configurable digital I/Os
- One isolated non-latching relay
- 4 MBytes Flash memory
- 2MB (or 16Mb) SRAM (Static Random Access Memory)
- Based on Lantronix's Evolution OS™
- Supports secure data encryption by means of AES, SSH, or SSL sessions
- Supports three convenient configuration methods (web, command line, and XML)
- Supports Modbus/RTU and Modbus/ASCII protocols
- Simultaneous communication from up to 16 Modbus CP masters
- Operational temp range -40°C to +75°C
- Wall mount tabs and optional dinrail mount clip

Evolution OS™

XPress-I/O device servers incorporate Lantronix's Evolution OS™. Key features of the Evolution OS™ include:

- Built-in web server for configuration and troubleshooting from web-based browsers
- CLI configurability
- SNMP management
- XML data transport and configurability
- Really Simple Syndication (RSS) information
- Enterprise-grade security with SSL and SSH
- Comprehensive troubleshooting tools

Web-Based Configuration and Troubleshooting

Built upon popular Internet-based standards, the XPress-I/O enables users to configure, manage, and troubleshoot efficiently through a simplified browser-based interface that can be accessed anytime from anywhere. All configuration and troubleshooting options are launched from a well-organized, multi-page interface. Users can access all functionality via a web browser, allowing them flexibility and remote access. As a result, users can enjoy the twin advantages of decreased downtime (based on the troubleshooting tools) and the ability to implement configuration changes easily (based on the configuration tools).

In addition, users can load their own web pages onto the XPress-I/O to facilitate monitoring and control of their own serial devices that are attached to the XPress.

Command-Line Interface (CLI)

Making the edge-to-enterprise vision a reality, the XPress-I/O with the Evolution OS™ uses industry-standard tools for configuration, communication, and control. For example, the Evolution OS™ uses a Cisco®-like command line interface (CLI) whose syntax is very similar to that used by data center equipment such as routers and hubs.

SNMP Management

The XPress-I/O supports full SNMP management, making it ideal for applications where device management and monitoring are critical. These features allow networks with SNMP capabilities to correctly diagnose and monitor XPress-I/O device servers.

XML-Based Architecture and Device Control

XML is a fundamental building block for the future growth of M2M networks. The XPress-I/O supports XML-based configuration setup records that makes device configuration transparent to users and administrators. The XML is easily editable with a standard text or XML editor.

Really Simple Syndication (RSS)

The XPress-I/O supports Really Simple Syndication (RSS), a rapidly emerging technology for streaming and managing on-line content. The XPress-I/O places notifications about all configuration changes that occur on the device into its RSS feed. The feed is then read (polled) by an RSS aggregator. More powerful than simple email alerts, RSS uses XML as an underlying web page transport and adds intelligence to the networked device while not taxing already overloaded email systems.

Enterprise-Grade Security

Without the need to disable any features or functionality, the Evolution OS™ provides the XPress-I/O the highest level of security possible. This data center-grade protection ensures that each device on the M2M network carries the same level of security as traditional IT networking equipment in the corporate data center.

With built-in SSH and SSL, secure communications can be established between the XPress-I/O serial ports and the remote end device or application. By protecting the privacy of serial data being transmitted across public networks, users can maintain their existing investment in serial technology, while taking advantage of the highest data-protection levels possible.

SSH and SSL can:

- Verify the data received came from the proper source
- Validate that the data transferred from the source over the network has not changed when it arrives at its destination (shared secret and hashing)
- Encrypt data to protect it from prying eyes and nefarious individuals
- Provide the ability to run popular M2M protocols over a secure SSH connection

In addition to keeping data safe and accessible, the XPress-I/O has robust defenses to hostile Internet attacks, such as denial of service (DoS), which can be used to take down the network. Moreover, the XPress-I/O cannot be used to bring down other devices on the network.

The XPress-I/O can be used with Lantronix's Secure Com Port Redirector (SCPR) to encrypt COM port-based communications between PCs and virtually any electronic device. SCPR is a Windows application that creates a secure communications path over a network between the computer and serial-based devices that are traditionally controlled via a COM port. With SCPR installed at each computer, computers that were formerly "hard-wired" by serial cabling for security purposes or to accommodate applications that only understood serial data can instead communicate over an Ethernet network or the Internet.

The XPress-I/O also supports a variety of popular cipher technologies including:

- Advanced Encryption Standard (AES)
- Triple Data Encryption Standard (3DES)
- RC4
- Hashing algorithms such as Secure Hash Algorithm (SHA-1) and MD5

Troubleshooting Capabilities

The XPress-I/O offers a comprehensive diagnostic toolset that lets you troubleshoot problems quickly and easily. Available from the Web Manager, CLI, and XML interfaces, the diagnostic tools let you:

- View critical hardware, memory, MIB-II, buffer pool, and IP socket information.
- Perform ping and traceroute operations.
- Conduct forward or backup DNS lookup operations.
- View all processes currently running on the XPress, including CPU utilization and total stack space available.

Applications

XPress-I/O device servers deliver simple, reliable, and cost-effective network connectivity for all your serial devices and address the growing need to connect individual devices to the network over industry-standard Ethernet connections. The XPress-I/O is ideal for a variety of applications, including:

- Building automation/security
- Industrial automation
- Medical/healthcare
- Retail automation/point-of-sale
- Traffic management

Building Automation/Security

Automating, managing, and controlling many different aspects of a building is possible with the XPress-I/O. It can overcome the hurdle of stand-alone networks or individual control systems that are not able to communicate with each other, and not able to share vital data, in a cost effective way.

The XPress-I/O can also be used to manage equipment and devices centrally over a new or existing Ethernet network to improve the safety and comfort of building occupants, while lowering heating, ventilating, air conditioning (HVAC), lighting, and overall energy operating costs through centralized management and monitoring.

Industrial Automation

Today's manufacturing facilities face the common challenges of productivity improvements, inventory management, and quality control. From warehouse to automotive environments, the need to attach the following devices, whether new or legacy, continues to grow:

- Programmable Logic Controllers (PLCs), Computer Numeric Control and Direct Numeric Control (CNC/DNC) equipment, process and quality-control equipment
- Pump controllers

- Bar-code readers and scanners, operator displays, scales, and weighing stations
- Printers, machine-vision systems, and other types of manufacturing equipment

The XPress-I/O is well suited to deliver network connectivity to all of these devices.

Medical/Healthcare

Hospitals, clinics, and laboratories face a rapidly growing need to deliver medical information accurately, quickly, and easily, whether at bedside, the nurse's station, or anywhere in the facility. The goal to improve healthcare services, however, is balanced with the need to keep the bottom line from exceeding already constrained budgets.

The XPress-I/O can network enable medical equipment and devices using the hospital's existing Ethernet network to improve patient care and slash operating costs. This allows medical staff members to easily monitor and control equipment over the network, whether it is located at the point of care, in a laboratory, or somewhere else in the building, all resulting in improved quality of service and reduced operational costs.

Retail Automation/Point-of-Sale

Having the right solution in the store to manage deliveries, track orders, and keep pricing current are all improvements that the XPress-I/O can offer to make retail operations more successful. From big to small, one store to thousands of outlets, the XPress-I/O can empower point-of-sale (POS) devices to share information across the network effectively.

With the XPress, retailers can increase and streamline productivity quickly and easily by network-enabling serial devices like card swipe readers, bar-code scanners, scales, cash registers, and receipt printers.

Traffic Management

With the ubiquity of Ethernet networks, managing cities over Ethernet is now within reach. The XPress-I/O provides an easy conversion from serial ports on traffic cameras, billboards, and traffic lights to Ethernet. The XPress-I/O obviates the need for long-haul modems and enables the management of traffic equipment over the network.

3: Installation

This chapter describes how to install the XPress-I/O device server.

Package Contents

Your XPress-I/O package includes the following items:

- One XPress-I/O device server
- One DB9F-to-3.5 mm 7-position screw terminal block, RoHS (Lantronix PN 500-172-R)

  Note: *The serial cable provided is for configuration set-up (female DB9 to be connected to a host computer).*

- One product CD that includes this User Guide and the Command Reference, Quick Start Guide, utilities, and video tutorial
- A printed Quick Start Guide

User-Supplied Items

To complete your XPress-I/O installation, you must provide:

- RS-232 and/or RS-422/485 serial devices that require network connectivity. One XPress-I/O serial port supports a directly connected RS-232 serial device; one serial port supports an RS-422/485.

  Note: *The XPress-I/O supports digital I/Os and has a relay, so you do not necessarily need to supply a serial device.*

- An available connection to your Ethernet network and an Ethernet cable.
- 9-30 VDC or 9-24 VAC connected to the XPress-I/O power input.
- Chassis (earth) ground

  Caution: *Even though chassis ground is not required for operation, it is mandatory for protection against transient voltages and ESD. Chassis ground is to be connected to earth.*

Identifying Hardware Connectors

Figure 3-1 shows the hardware components on the front of the XPress-I/O, and Figure 3-2 shows the hardware connectors on the back of the XPress-I/O.

Figure 3-1. Front View of the XPress-I/O

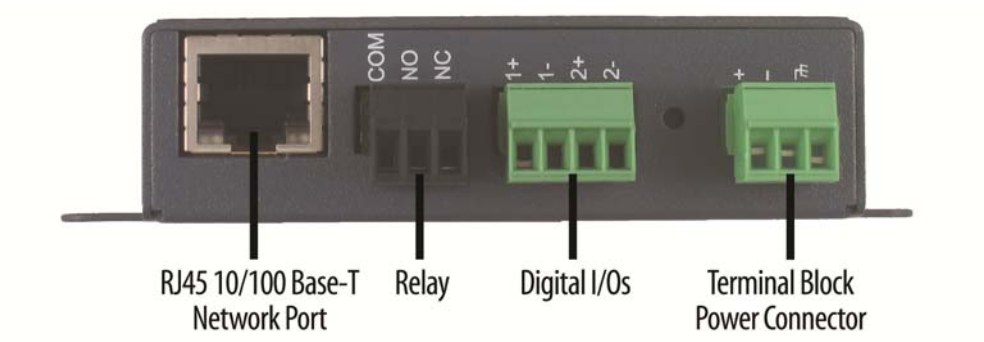
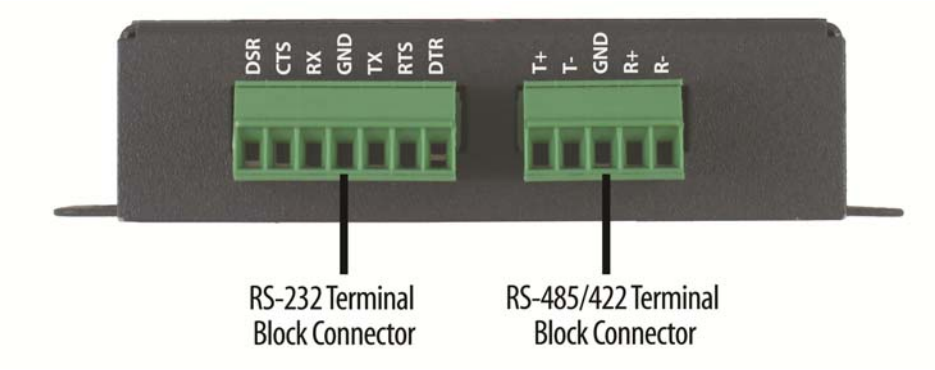


Figure 3-2. Back View of the XPress-I/O



The bottom of the XPress-I/O (not shown) has a product information label. This label contains the following information:

- Bar code
- Serial number
- Product ID (name)
- Product description
- Hardware address (also referred to as Ethernet or MAC address)
- Agency certifications

Screw Terminal Serial Connectors

The back of the XPress-I/O has two terminal block serial ports. These screw-down blocks are set for easy adaptability to industry environments. Screw down stripped wire into these blocks in wiring locations corresponding to signal names appearing on the case. You do not need special cables to attach to the XPress-I/O.

- Serial port 1 supports RS-232 devices.
- Serial port 2 supports RS-422 and RS-485 (4-wire/2-wire) serial devices. See Figure 3-4 for pin assignments.

Port 1 is configured as DTE and supports baud rates up to 230,400 baud. Serial ports have 15kv ESD protection.

Note: *Shielded cable may be required to avoid character framing errors at high speeds.*

Figure 3-3.Serial 1 Pin Assignments

Pin #	Pin Name	Description
1	DSR1	Input
2	CTS1	Input
3	RXD1	Input
4	GND	Ground
5	TXD1	Output
6	RTS1	Output
7	DTR1	Output

Figure 3-4. Serial 2 Pin Assignments

Pin #	Pin Name	Description
1	TX2+ / (+)	4-Wire: TX2+. Output from XPress-I/O. 2-Wire: (+)
2	TX2- / (-)	4-Wire: TX2-. Output from XPress-I/O. 2-Wire: (-)
3	GND	Ground
4	RX2+ / DNU	4-Wire: RX2+. Input to XPress-I/O. 2-Wire: Do not use, leave open
5	RX2- / DNU	4-Wire: RX2-. Input to XPress-I/O. 2-Wire: Do not use, leave open

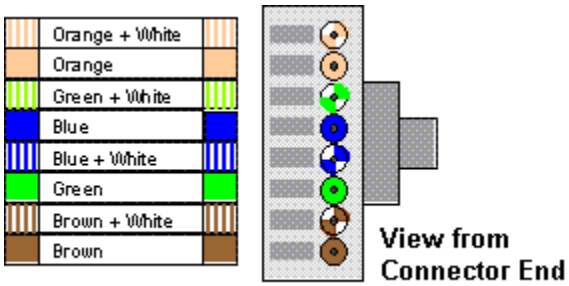
Note: *There is an on-board 120-ohm termination in 2-wire mode* configured via Web Page, CLI, or XML.

Ethernet Port

The front panel of the XPress-I/O provides an RJ45 Ethernet port. This port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network. There are two bi-color (green/amber) LEDs that indicate speed (10/100 MHz) and activity (full/half duplex). (See Figure 3-9.) You can configure the XPress-I/O to operate at a fixed Ethernet speed and duplex mode (half- or full-duplex) or auto-negotiate the connection to the Ethernet network.

The drawing below shows a typical RJ45 connector. The color is not standard but very typical of an Ethernet patch cable. Pin 1 is located at the top of the connector (orange + white). The view is from the end of the connector.

Figure 3-5.Typical RJ45 Connector



Terminal Block Power Connector

The front of the XPress-I/O has a terminal block screw connector for attaching to an appropriate power source, such as those used in automation and manufacturing industries. The terminal block connector supports a power range from 9 to 30 VDC or 9 to 24 VAC.

Figure 3-6. Power Input Port Pinouts

Pin #	Pin Name	Description
1	PWRIN+	Power Input, positive contact
2	PWRIN-	Power Input, negative contact
3	GND	Earth Ground

Notes:

- *Voltage input can be 9 to 30 VDC or 9 to 24 VAC. There are polarity indicators of the input. However, since the XPress-I/O can accept VAC, polarity reversal still results in a normal operation (XPress-I/O still operates normally if the positive contact is hooked to V-, and the negative contact is hooked to V+ of the power input).*
- *The power input port is isolated from the inner circuitry.*
- *Earth ground is not required for normal operation, but is essential and required for transient suppression, ESD protection, and EMC compliance.*

Digital I/Os

The unit has two digital I/Os (UL Class III or Class 2) that can be configured as either input or output. (See *Input/Output Page* on page 106.) The digital I/Os are isolated from each other and from the inner circuitry of XPress-I/O using opto-isolators. They support 3.3-volt level outputs.

- **When digital I/Os are configured as inputs:** High-level input logic can be as low as 3 volts with 1 mA current drawn. For higher logic level input, for example 8V or more, a current-limiting resistor is required. The inputs are protected from polarity reversal.
- **When digital I/Os are configured as outputs:** This is a solid state relay output; thus, it is not sensitive to polarity orientation and has low impedance.

For more information, see C: Isolated I/O Specifications.

Figure 3-7. Digital I/O Pins

Pin #	Pin Name	Description
1	1+	2-wired configurable digital IO, positive contact, 1st port
2	1-	2-wired configurable digital IO, negative contact, 1st port
3	2+	2-wired configurable digital IO, positive contact, 2nd port
4	2-	2-wired configurable digital IO, negative contact, 2nd port

Relay Port

A 3-terminal relay-controlled dry contact NC, COM, NO (up to 8A) is on the front of the unit. The relay is for SELV applications only (UL Class III or Class 2). The relay contacts are isolated from the inner circuit of the XPress-I/O.

Figure 3-8. Relay Port Pins

Pin #	Pin Name	Description
1	COM	Common contact
2	NO	Normally closed to COM when power ON
3	NC	Normally open when power ON

LEDs

The XPress-I/O has the following LEDs:

Figure 3-9. Ethernet Port LEDs

LEDs	Descriptions
Left – Green ON	Link Established – 100BASE-T
Left – Amber ON	Link Established – 10BASE-T
Right – Green ON	Full Duplex (Blinking = Activity)
Right – Amber ON	Half Duplex (Blinking = Activity)

Figure 3-10. LEDs on Top Cover

LEDs	Descriptions
Power/Diagnostic - Blue	Power Indicator and Diagnostic
RX Serial 1 - Green	Serial 1 Received Data Activity
TX Serial 1 - Amber	Serial 1 Transmitted Data Activity
RX Serial 2 - Green	Serial 2 Received Data Activity
TX Serial 2 - Amber	Serial 2 Transmitted Data Activity

Reset Button

The reset button is on the front panel. You can use it to reboot the unit or reload factory defaults.

To reboot:

1. Press and hold the reset button for about 3 seconds. The blue power LED blinks quickly.
2. When the fast blinks stop, release the button. When the unit reboots, the power LED changes from a fast blink to a solid ON.

To restore factory defaults:

1. Press and hold the reset button for about 11 seconds. The LED blinks quickly for about 3 seconds, then comes on for about 5 seconds, then blinks slowly for about 2 seconds.
2. When the slow blinks stop, release the button.

Physically Installing the XPress-I/O

Finding a Suitable Location

- Place the XPress-I/O on a flat horizontal or vertical surface. The XPress-I/O comes with mounting brackets installed for vertically mounting the unit, for example, on a wall.
- If using AC power, avoid outlets controlled by a wall switch.

Connecting the XPress-I/O

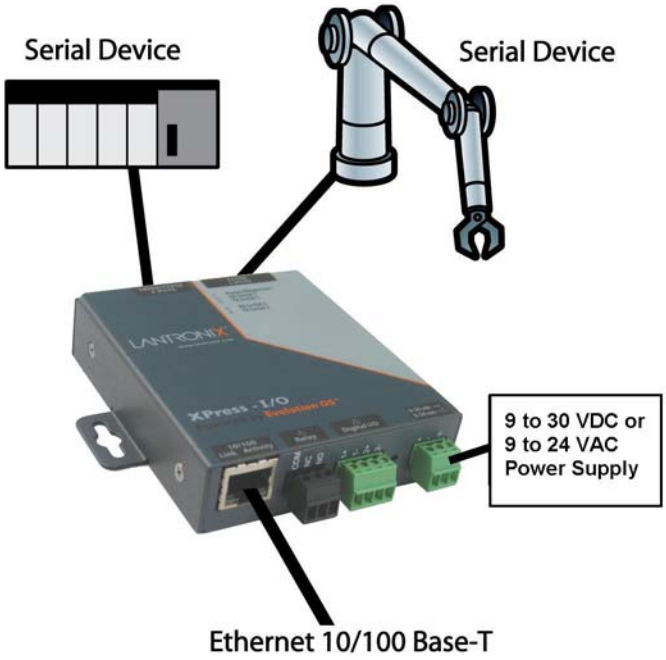
Observe the following guidelines when attaching serial devices:

- Serial port 1 supports RS-232 devices.
- Serial port 2 supports RS-422 and RS-485 (4-wire/2-wire) serial devices. See Figure 3-4 for pin assignments.

To connect the XPress-I/O to one or more serial devices:

Note: We recommend you power off the serial devices that will be connected to the XPress-I/O.

Figure 3-11. Example of XPress-I/O Connections



1. Connect serial devices to screw-down connectors.
2. Connect an Ethernet cable between the XPress-I/O Ethernet port and your Ethernet network.
3. Attach the power source to the terminal block connector on the front of the XPress-I/O. The terminal block connector supports a power range of 9 to 30 VDC or 9 to 24 VAC.

   The XPress-I/O powers up automatically. After power-up, the self-test begins and Evolution OS™ starts.
4. Power up all connected serial devices.

4: Getting Started

Using DeviceInstaller

The product CD included with your XPress-I/O package includes a program called DeviceInstaller. This program lets you view the properties of the XPress-I/O and launch XPress-I/O configuration methods.

Note: *You can also assign an IP address and other basic network settings. For instructions, see the DeviceInstaller online Help.*

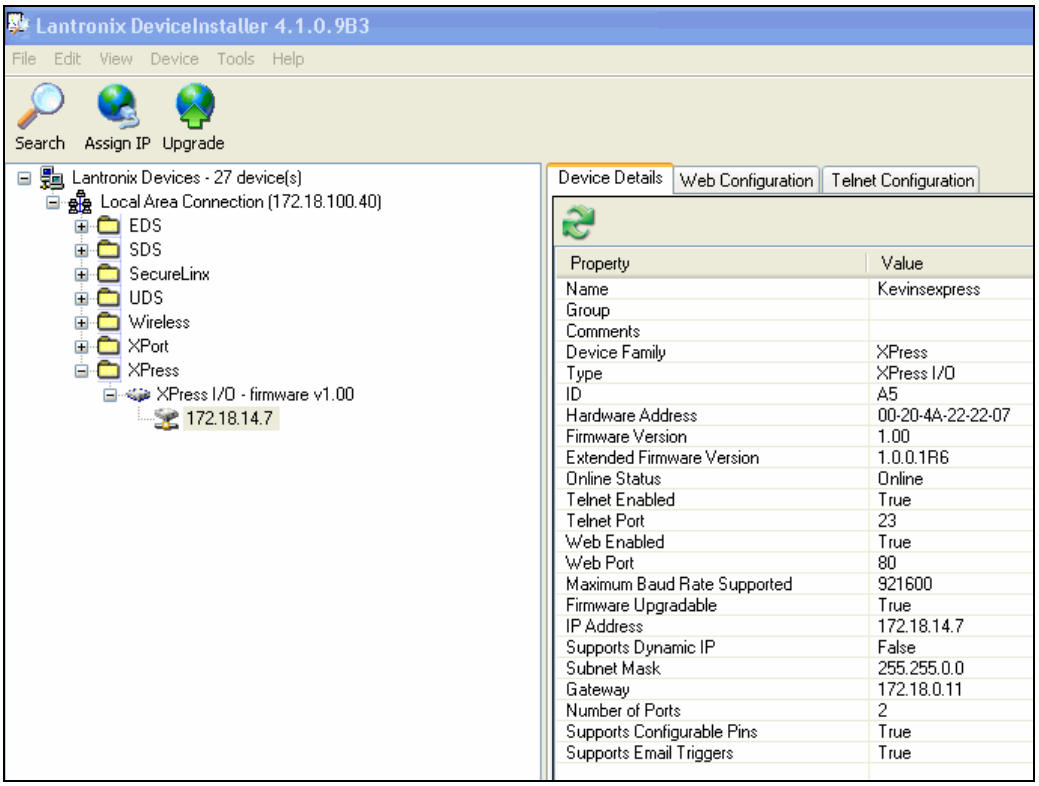
Starting DeviceInstaller

Follow the prompts to install DeviceInstaller.

To run DeviceInstaller:

1. From the Windows Start menu, click **Start→Programs, Lantronix→ DeviceInstaller→DeviceInstaller**.
2. Click the **XPress-I/O** folder. The list of Lantronix XPress-I/O devices available displays.
3. Expand the list by clicking the + symbol next to the icon for the desired XPress-I/O model.
4. To view the configuration of the XPress-I/O, select the unit by clicking its IP address.

Figure 4-1. Lantronix DeviceInstaller



Viewing XPress-I/O Properties

To view the XPress-I/O's properties, in the right window, click the **Device Details** tab. The current properties for the XPress-I/O display. Figure 4-2 lists the XPress-I/O properties and whether they are user configurable or read only.

*Note: On this screen, you can change **Group** and **Comments**. You can only view the remaining properties. To change them, use one of the XPress-I/O configuration methods described on page 28.*

Figure 4-2. XPress-I/O Properties

Property	Description
Name	Displays the name of the XPress-I/O, if configured.
Group	Enter a group to categorize the XPress-I/O. Double-click the field, enter the value, and press **Enter** to complete.
Comments	Enter comments for the XPress-I/O. Double-click the field, enter the value, and press **Enter** to complete.
Device Family	Displays the XPress-I/O's device family type as **XPress**.
Type	Displays the device type as **XPress**.
ID	Displays the XPress-I/O's ID embedded within the box.

Property	Description
Hardware Address	Displays XPress-I/O's hardware address.
Firmware Version	Displays the firmware currently installed on the XPress-I/O.
Extended Version	Displays the full version of firmware currently installed on the XPress-I/O.
Online Status	Displays the XPress-I/O status. Online = the XPress-I/O is online. Offline = the XPress-I/O is offline. Unreachable = the XPress-I/O is on a different subnet. Busy = the XPress-I/O is currently performing a task.
Telnet Enabled	Displays whether Telnet is enabled on this XPress-I/O.
Telnet Port	Displays the XPress-I/O's port for Telnet sessions.
Web Enabled	Displays whether Web Manager access is enabled on this XPress-I/O.
Web Port	Displays the XPress-I/O's port for Web Manager configuration.
Maximum Baud Rate Supported	*Displays the XPress-I/O's maximum baud rate.* ***Note:*** *The XPress-I/O may not be operating at this rate.*
Firmware Upgradeable	Displays **True** if the XPress-I/O firmware is upgradeable. For firmware-upgrade instructions, see 11: Updating Firmware on page 123.
IP Address	Displays the XPress-I/O's current IP address. To change it, click the **Assign IP** button on the DeviceInstaller menu bar.
Supports Dynamic IP	Displays **True** if the XPress-I/O automatically receives an IP address (e.g., from DHCP). Displays **False** if not.
Subnet Mask	Displays the subnet mask specifying the network segment on which the XPress-I/O resides.
Gateway	Displays the IP address of the router of this network. There is no default.
Number of Ports	Displays the number of ports on this XPress-I/O.
Supports Configurable Pins	Displays **True**.
Supports Email Triggers	Displays **True**.

Note: *These parameters are stored on the computer running DeviceInstaller.*

Configuration Methods

When your XPress-I/O boots for the first time, it automatically loads its factory-default configuration settings. For a list of the factory-default configuration settings, see A: Factory Default Configuration.

For convenience, there are three ways to configure the XPress-I/O.

- Using the Web Manager interface
- Using the CLI through an SSH/Telnet session or an XPress-I/O serial port.
- Using the XML interface

These unified configuration methods provide access to all features, giving you the same level of control over the XPress-I/O regardless of the configuration method you choose.

Configuring from the Web Manager Interface

With this method, you can use a web browser to configure the XPress-I/O using a web-based graphical point-and-click interface. The advantages to this method are ease of use and location independence. With this method, you can configure the XPress-I/O from any location that has access to a web browser and the Internet.

For more information, see 5: Configuration Using the Web Manager.

Configuring via an SSH/Telnet Session or Serial Port Using the CLI

The XPress-I/O provides a command-line interface (CLI) designed to enable the configuration and systems management functions that can also be performed through the Web Manager and XML interfaces. To configure the XPress-I/O using the CLI, you must either start an SSH or Telnet session or use a terminal or a computer attached to one of the XPress-I/O serial ports.

The difference between the SSH/Telnet and serial interfaces is the physical connection paths to the XPress-I/O. With an SSH/Telnet session, you can configure the unit without having to be in the same location as the XPress-I/O. The serial-interface method, however, requires a terminal or computer to be attached to an available XPress-I/O serial port. This means the terminal or computer must be in the same location as the XPress-I/O.

For more information, see the **XPress-I/O Command Reference** on the product CD or the Lantronix web site (www.lantronix.com).

Configuring from the XML Interface

The XPress-I/O also provides an XML interface that can be used to perform configuration and systems-management functions. This configuration method lets you automate the configuration process using XML configuration files. This method is particularly convenient if you have multiple XPress-I/O device servers that will use the same configuration settings, because you can define a configuration profile that can be imported by, and shared among, your other XPress-I/O device servers.

For more information, see the **XPress-I/O Command Reference** on the product CD or the Lantronix web site (www.lantronix.com).

5: Configuration Using the Web Manager

This chapter describes how to configure the XPress-I/O using the Web Manager, Lantronix's browser-based configuration tool. The unit's configuration is stored in nonvolatile memory and retained without power. All changes take effect immediately, unless otherwise noted.

Accessing the Web Manager through a Web Browser

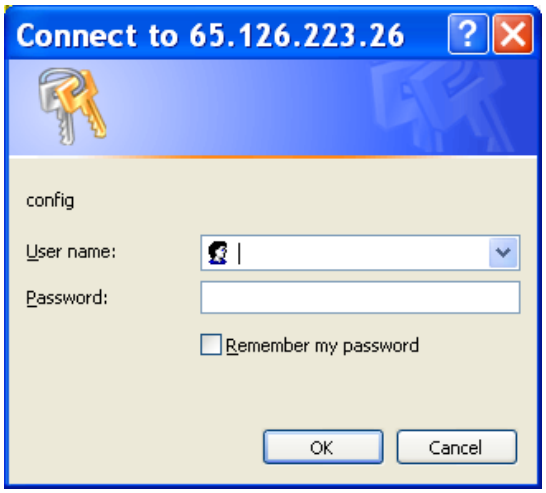
The following procedure describes how to log into the XPress-I/O using a standard web browser.

*Note: Alternatively, access the Web Manager by selecting the **Web Configuration** tab from DeviceInstaller (see Viewing XPress-I/O Properties on page 27).*

To access Web Manager:

1. Open a standard web browser such as Netscape Navigator 6.x and later, Internet Explorer 5.5 and later, Mozilla Suite, Mozilla Firefox, or Opera.
2. Enter the IP address of the XPress-I/O in the address bar. The XPress-I/O's built-in security requires you to log in with your user name and password.

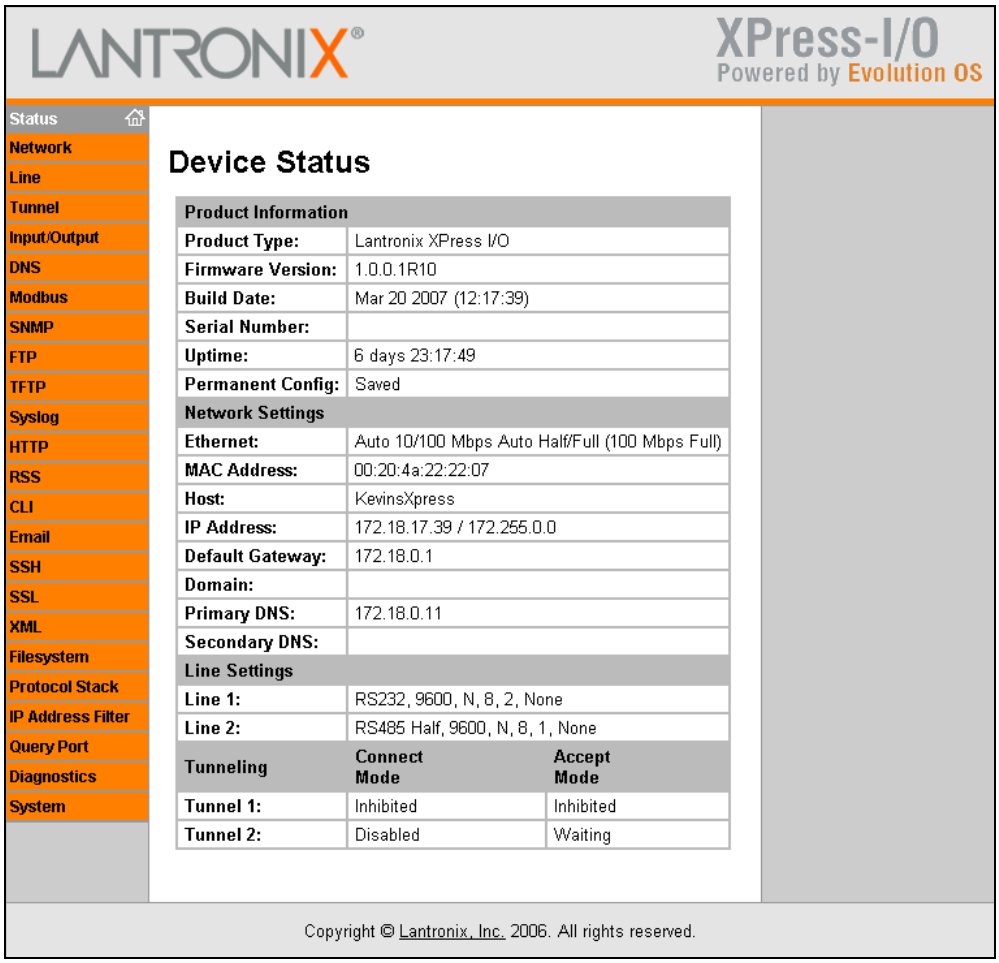
Figure 5-1. Prompt for User Name and Password



3. Enter your user name and password in the appropriate fields. The Device Status page displays (see Figure 5-2). This page is the Web Manager home page.

*Note: The factory-default user name is **admin** and the factory-default password is **PASS**. After you log in to the Web Manager, we recommend you use the FTP page to change the default FTP password (see page 71), the HTTP Authentication Page to change the HTTP authentication password (see page 78), and the Command Line Interface Configuration Page to change the CLI password (see page 111).*

Figure 5-2. Web Manager Device Status Page



Navigating Through the Web Manager

The Web Manager provides an intuitive point-and-click interface. A menu bar at the left side of each page provides links you can click to navigate from one page to another. Some pages are read-only, while others let you change configuration settings.

Note: *There may be times when you must reboot the XPress-I/O for the new configuration settings to take effect. The chapters that follow indicate when a change requires a reboot.*

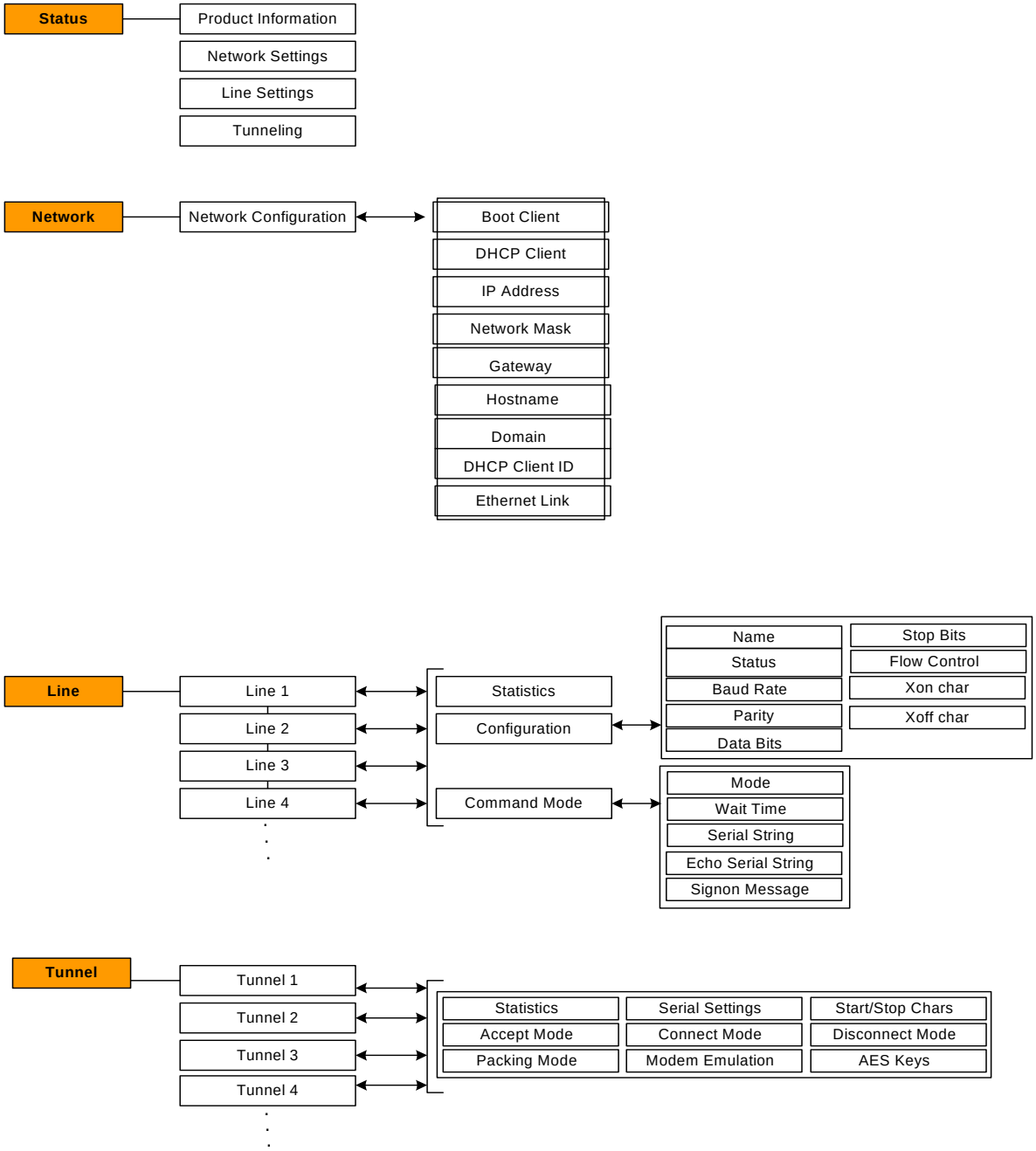
Figure 5-7 shows the structure of the multilevel Web Manager configuration pages.

Summary of Web Manager Pages

Page	Description	See Page
Device Status	Displays XPress-I/O product information and network, line, and tunneling settings.	40
Network	Lets you configure the current network interface on the XPress-I/O.	41
Line	Displays statistics and lets you change the current configuration and Command mode settings for the 2 serial lines of the XPress-I/O.	43
Tunnel	Displays the current connection statistics and lets you change the current configuration settings for 2 tunnels for the XPress-I/O.	50
Input/Output	Displays the current settings and lets you manage the input and output pins on the XPress-I/O.	106
DNS	Displays the current configuration of the DNS subsystem and lets you change primary and secondary DNS servers.	69
Modbus	Displays the current connection status of the Modbus servers listening on the TCP ports and lets you add a second server.	67
SNMP	Displays and lets you change the current Simple Network Management Protocol (SNMP) configuration settings.	70
FTP	Displays statistics and lets you change the current configuration for the File Transfer Protocol (FTP) server.	71
TFTP	Displays statistics and lets you change the current configuration for the Trivial File Transfer Protocol (TFTP) server.	73
Syslog	Lets you specify the severity of events to log and the server and ports to which the syslog should be sent.	74
HTTP	Displays HyperText Transfer Protocol (HTTP) statistics and lets you change the current configuration, authentication, and RSS settings.	75
RSS	Enables you to configure the RSS feed that contains up-to-date information about configuration changes.	80
CLI	Displays Command Line Interface (CLI) statistics and lets you change the current CLI configuration settings.	110
Email	Displays email statistics and lets you clear the email log, configure email settings, and send an email.	108

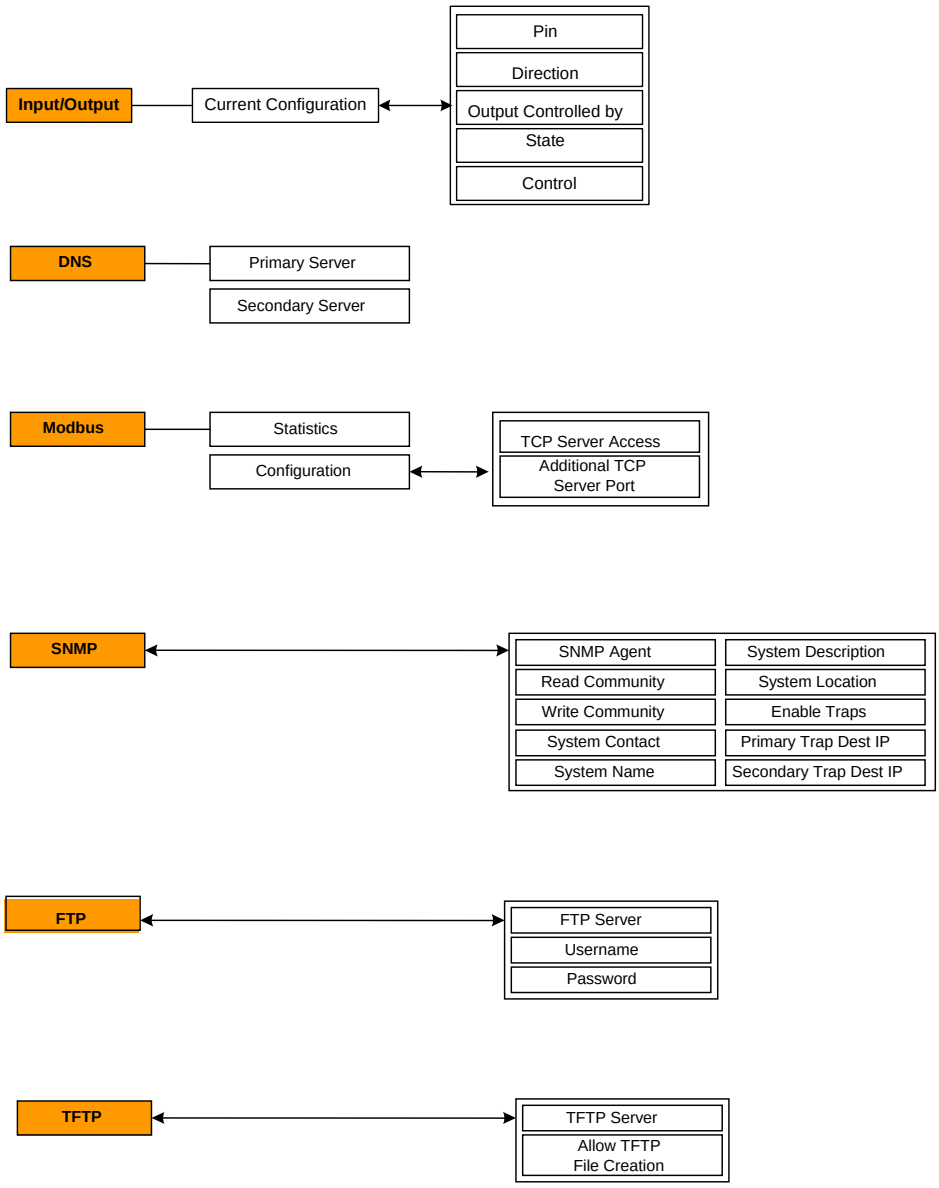
Page	Description	See Page
SSH	Displays and lets you change the configuration settings for SSH server host keys, SSH server authorized users, SSH client known hosts, and SSH client users.	144
SSL	Lets you upload an existing certificate or create a new self-signed certificate.	89
XML	Lets you export XML configuration and status records, and import XML configuration records.	113
Filesystem	Displays filesystem statistics and lets you browse the filesystem to create a file or directory, upload files using HTTP, copy a file, move a file, or perform TFTP actions.	91
Protocol Stack	Lets you perform lower level network stack-specific activities.	119
IP Address Filter	Lets you specify all the IP addresses and subnets that are allowed to send data to this device.	122
Query Port	Displays and lets you change configuration settings for the query port.	104
Diagnostics	Lets you perform various diagnostic procedures.	94
System	Lets you reboot the XPress-I/O, restore factory defaults, upload new firmware, change the XPress-I/O's long and short names, and change the time setting.	103

Figure 5-3. Web Manager Menu Structure (1 of 5)



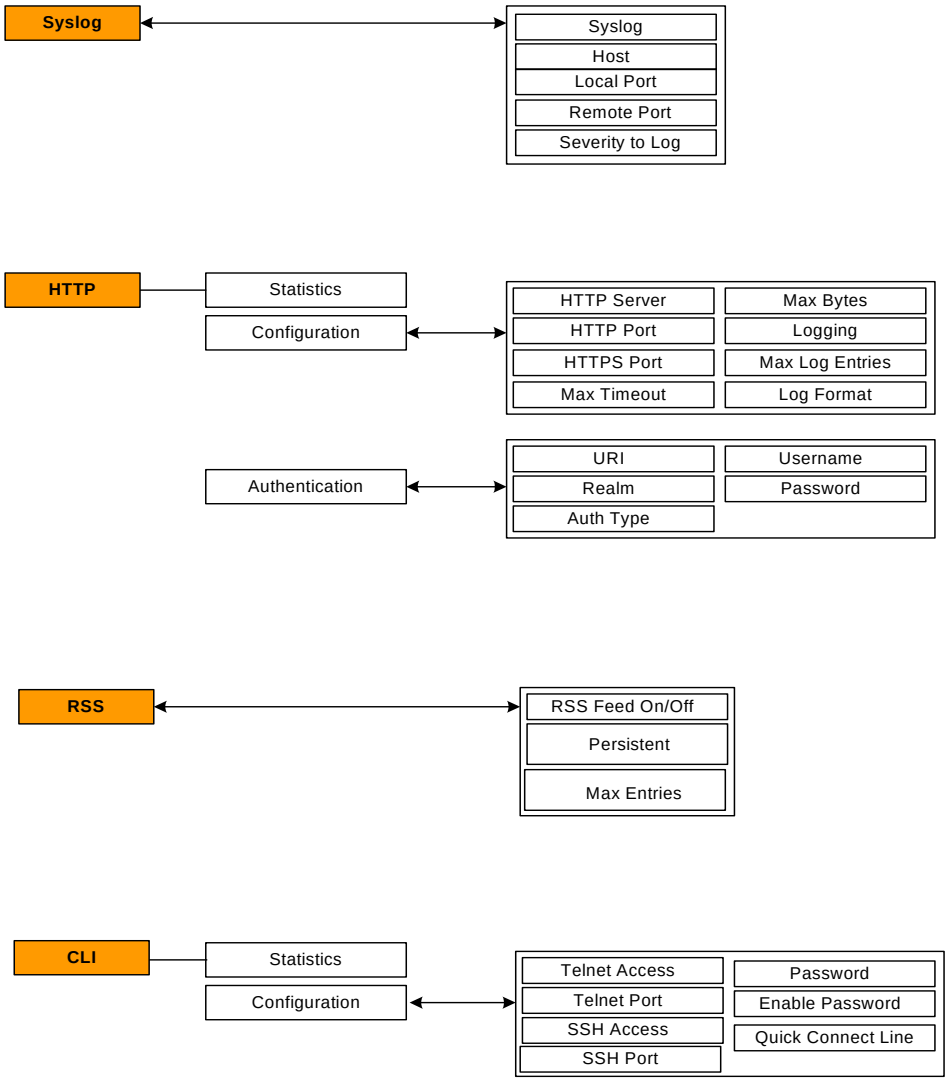
(continued on next page)

Figure 5-4. Web Manager Menu Structure (2 of 5)



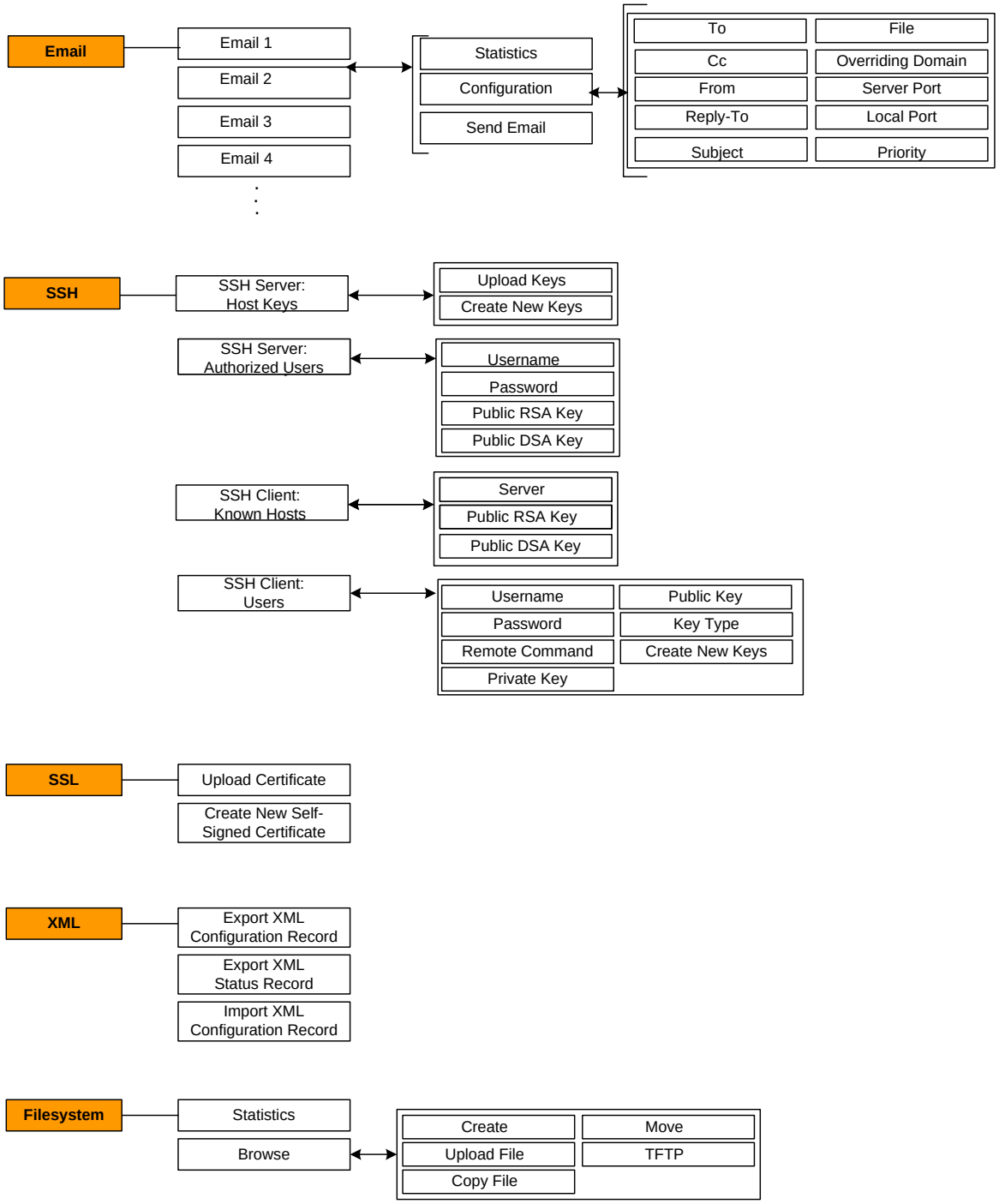
(continued on next page)

Figure 5-5. Web Manager Menu Structure (3 of 5)



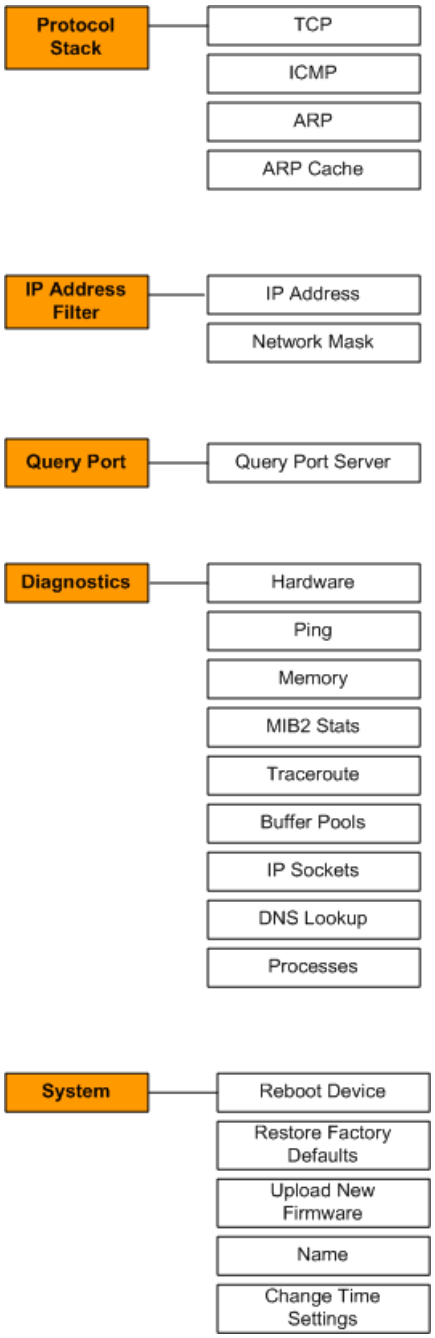
(continued on next page)

Figure 5-6. Web Manager Menu Structure (4 of 5))



(continued on next page)

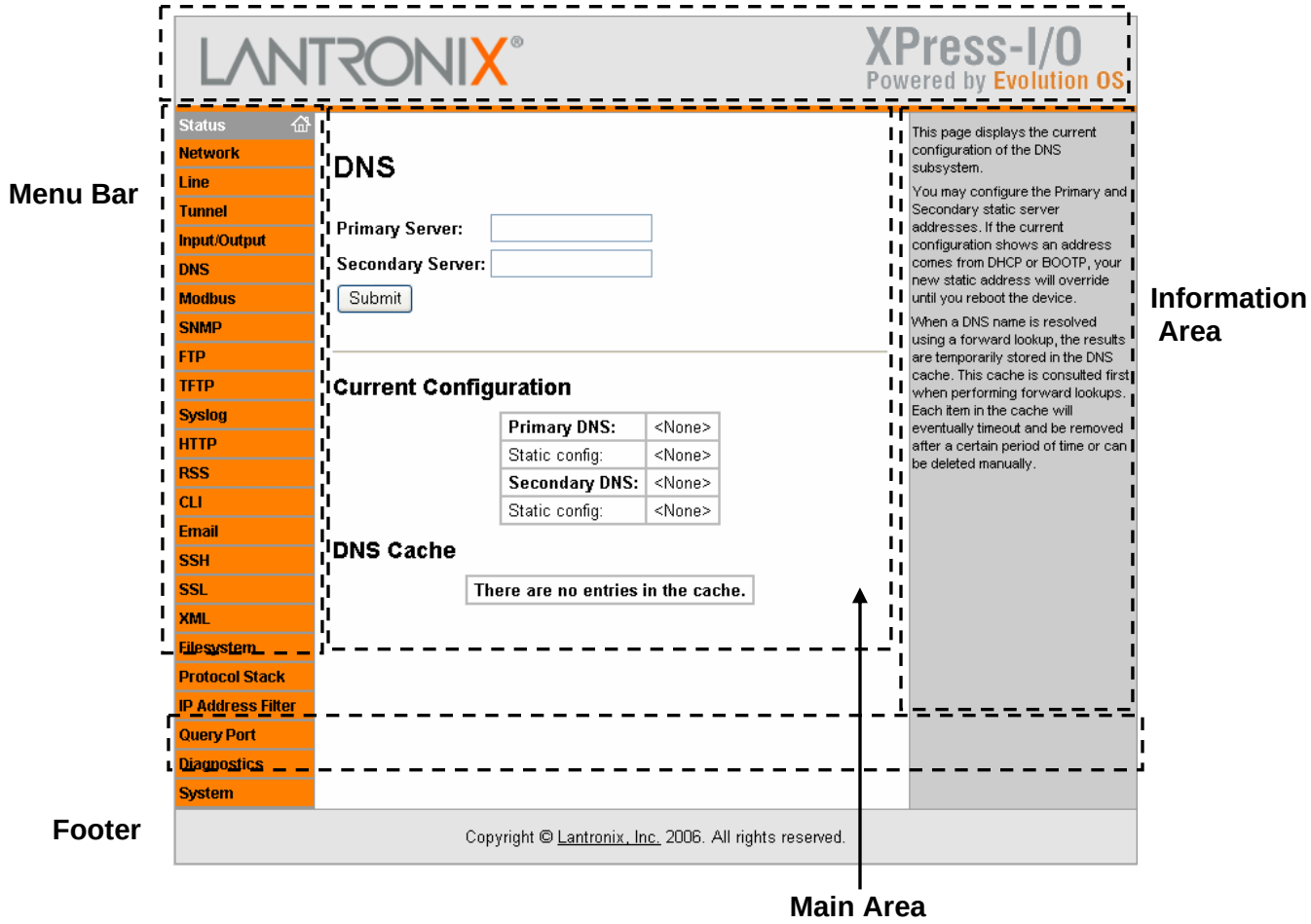
Figure 5-7. Web Manager Menu Structure (5 of 5)



Understanding the Web Manager Pages

Figure 5-8 shows the areas of the Web Manager page.

Figure 5-8. Components of the Web Manager Page



The header always displays at the top of the page. The header information remains the same regardless of the page displayed.

The menu bar always displays at the left side of the page, regardless of the page displayed. The menu bar lists the names of the pages available in the Web Manager. To display a page, click it in the menu bar.

When you click the name of a page in the menu bar, the page displays in the main area. The main area of most pages contains two sections:

- The top section lets you select or enter new configuration settings. After you change settings, click the **Submit** button to apply the change. Some settings require you to reboot the XPress-I/O before the settings take effect. Those settings are identified in the appropriate sections in this chapter.
- The bottom section shows the current configuration.

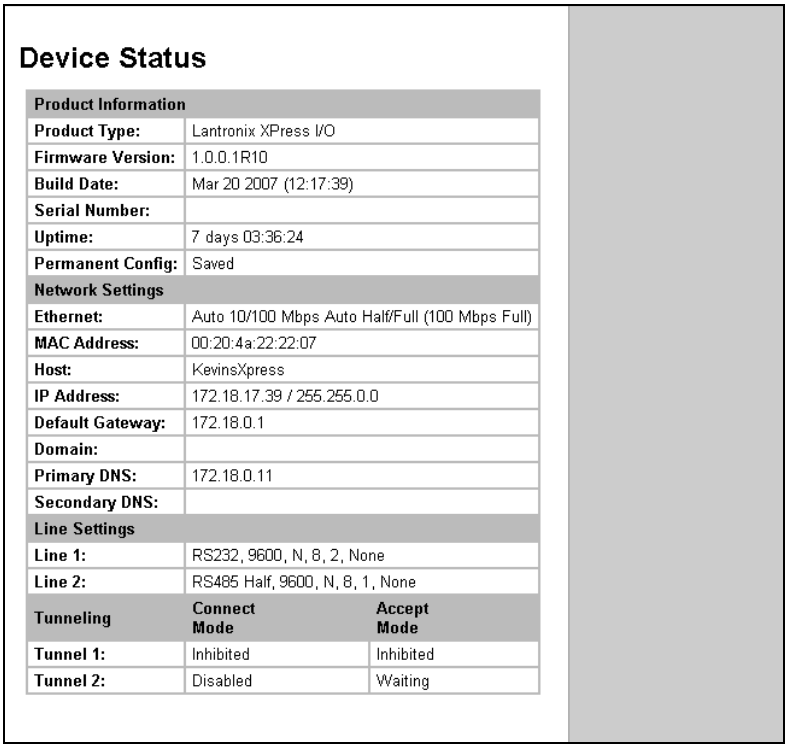
The information area shows information or instructions associated with the page.

The footer displays at the bottom of the page. It contains copyright information and a link to the Lantronix home page.

Device Status Page

The Device Status page is the first page that displays when you log into the Web Manager. It also displays when you click the **Status** link in the menu bar. This read-only page shows the XPress-I/O product information, network settings, line settings, and tunneling settings.

Figure 5-9. Device Status Page (XPress-I/O)



Device Status

Product Information		
Product Type:	Lantronix XPress I/O	
Firmware Version:	1.0.0.1R10	
Build Date:	Mar 20 2007 (12:17:39)	
Serial Number:		
Uptime:	7 days 03:36:24	
Permanent Config:	Saved	
Network Settings		
Ethernet:	Auto 10/100 Mbps Auto Half/Full (100 Mbps Full)	
MAC Address:	00:20:4a:22:22:07	
Host:	KevinsXpress	
IP Address:	172.18.17.39 / 255.255.0.0	
Default Gateway:	172.18.0.1	
Domain:		
Primary DNS:	172.18.0.11	
Secondary DNS:		
Line Settings		
Line 1:	RS232, 9600, N, 8, 2, None	
Line 2:	RS485 Half, 9600, N, 8, 1, None	
Tunneling	**Connect Mode**	**Accept Mode**
Tunnel 1:	Inhibited	Inhibited
Tunnel 2:	Disabled	Waiting

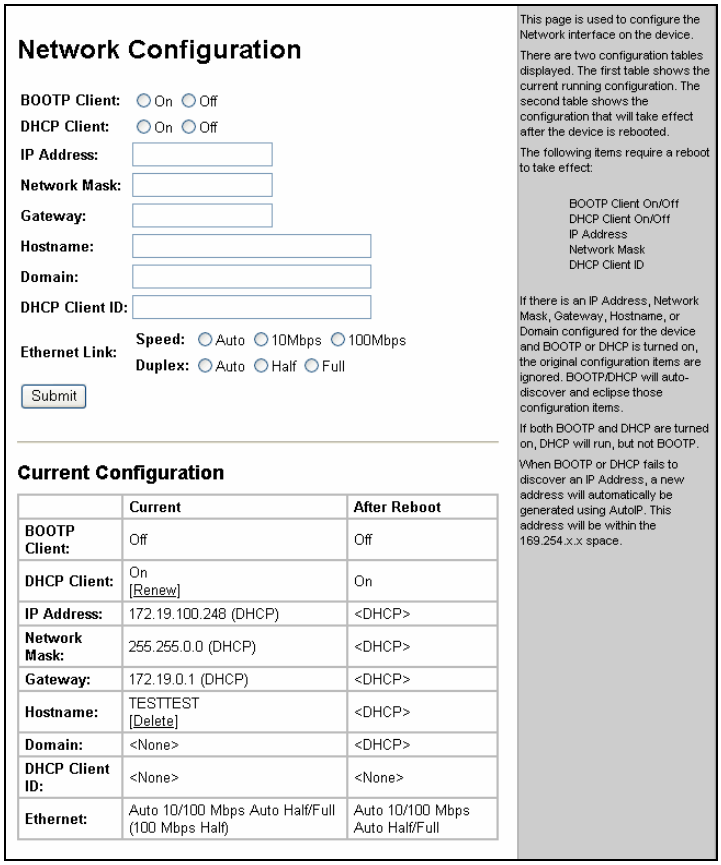
6: Network, Serial Line, Tunnel, and Modbus Settings

Network Configuration Page

Clicking the **Network** link in the menu bar displays the Network Configuration page. Here you can change the following XPress-I/O network configuration settings:

- BOOTP and DHCP client
- IP address, network mask, and gateway
- Hostname and domain
- DHCP client ID
- Ethernet transmission speed

Figure 6-1. Network Configuration



Network Configuration

BOOTP Client: On Off
DHCP Client: On Off
IP Address:
Network Mask:
Gateway:
Hostname:
Domain:
DHCP Client ID:
Ethernet Link: **Speed:** Auto 10Mbps 100Mbps
Duplex: Auto Half Full

Submit

Current Configuration

	Current	After Reboot
BOOTP Client:	Off	Off
DHCP Client:	On [Renew]	On
IP Address:	172.19.100.248 (DHCP)	<DHCP>
Network Mask:	255.255.0.0 (DHCP)	<DHCP>
Gateway:	172.19.0.1 (DHCP)	<DHCP>
Hostname:	TESTTEST [Delete]	<DHCP>
Domain:	<None>	<DHCP>
DHCP Client ID:	<None>	<None>
Ethernet:	Auto 10/100 Mbps Auto Half/Full (100 Mbps Half)	Auto 10/100 Mbps Auto Half/Full

This page is used to configure the Network interface on the device.

There are two configuration tables displayed. The first table shows the current running configuration. The second table shows the configuration that will take effect after the device is rebooted.

The following items require a reboot to take effect:

BOOTP Client On/Off
DHCP Client On/Off
IP Address
Network Mask
DHCP Client ID

If there is an IP Address, Network Mask, Gateway, Hostname, or Domain configured for the device and BOOTP or DHCP is turned on, the original configuration items are ignored. BOOTP/DHCP will auto-discover and eclipse those configuration items.

If both BOOTP and DHCP are turned on, DHCP will run, but not BOOTP.

When BOOTP or DHCP fails to discover an IP Address, a new address will automatically be generated using AutoIP. This address will be within the 169.254.x.x space.

The bottom part of this page shows the current configuration. The **After Reboot** column in the **Current Configuration** section of this page shows the settings that will take effect the next time the XPress-I/O reboots.

Changes to the following settings require you to reboot the XPress-I/O before the new settings take effect:

- **BOOTP Client**
- **DHCP Client**
- **IP Address**
- **Network Mask**
- **DHCP Client ID**

Note: *Some settings in the **Current Configuration** section, such as **IP Address** and **Network Mask** have a **Delete** link you can click to delete the setting. If you click this link, a warning message asks whether you are sure you want to delete the setting. Click **OK** to delete the setting or **Cancel** to keep it.*

Network Configuration Page Settings

Network Configuration Page Settings	Description
BOOTP Client	Select whether the XPress-I/O should send BOOTP requests. Changing this value requires the XPress-I/O to be rebooted. Choices are: **On** = XPress-I/O sends BOOTP requests on a DHCP-managed network. This setting overrides the configured IP address, network mask, gateway, host name, and domain settings. If DHCP is set to On, the XPress-I/O automatically uses DHCP, regardless of whether BOOTP Client is set to On. **Off** = XPress-I/O does not send BOOTP requests.
DHCP Client	Select whether the XPress-I/O IP address is automatically assigned by a DHCP server. Changing this value requires you to reboot the XPress-I/O. Choices are: **On** = XPress-I/O receives its IP address automatically from a DHCP server, regardless of the BOOTP Client setting. This setting overrides the configured IP address, network mask, gateway, host name, and domain settings. **Off** = XPress-I/O does not receive its IP address automatically.
IP Address	Enter the XPress-I/O static IP address. The IP address consists of four octets separated by a period and is used if BOOTP and DHCP are both set to Off. Changing this value requires you to reboot the XPress-I/O. ***Note:*** *When DHCP is enabled, the XPress-I/O tries to obtain an IP address from DHCP. If it cannot, the XPress-I/O uses an Auto IP address in the range of 169.254.xxx.xxx.*

Network Configuration Page Settings	Description
Network Mask	Enter the XPress-I/O subnet mask. The subnet mask consists of four octets separated by a period. Changing this value requires you to reboot the XPress-I/O. ***Note:*** *When DHCP is enabled, the XPress-I/O tries to obtain a network mask from DHCP. If it cannot, the XPress-I/O uses a network mask of 255.255.0.0.*
Gateway	Enter the router IP address from the local LAN the XPress-I/O is on. The address consists of four octets separated by a period.
Hostname	Enter the XPress-I/O host name. The host name can be up to 31 characters with no spaces.
Domain	Enter the XPress-I/O domain name.
DHCP Client ID	Enter a DHCP ID if used by the DHCP server. Changing this value requires the XPress-I/O to be rebooted.
Ethernet Link Speed	Select the Ethernet link speed. (default is Auto)
Ethernet Link Duplex	Select duplex mode (Auto, Half, or Full). (default is Auto)

Line Settings Pages

The Line Settings page displays the status and statistics for each of the serial lines (ports). This page also lets you change the character format and command mode settings for the serial lines.

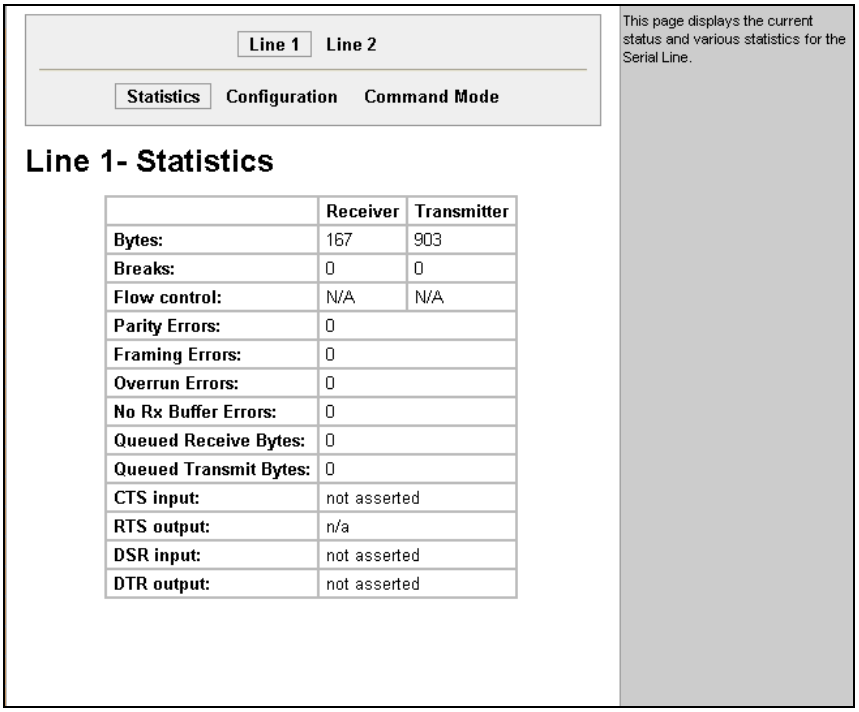
To select a line, click **Line 1** or **Line 2** at the top of the page.

After you select a serial line, you can click **Statistics**, **Configuration**, or **Command Mode** to view and change the settings of the selected serial line. Because all serial lines operate independently, you can specify different configuration settings for each line.

Line – Statistics Page

The Line – Statistics page displays when you click **Line** in the menu bar. It also displays when you click **Statistics** at the top of one of the other Line Settings pages. This read-only page shows the status and statistics for the serial line selected at the top of this page.

Figure 6-2. Line – Statistics Page

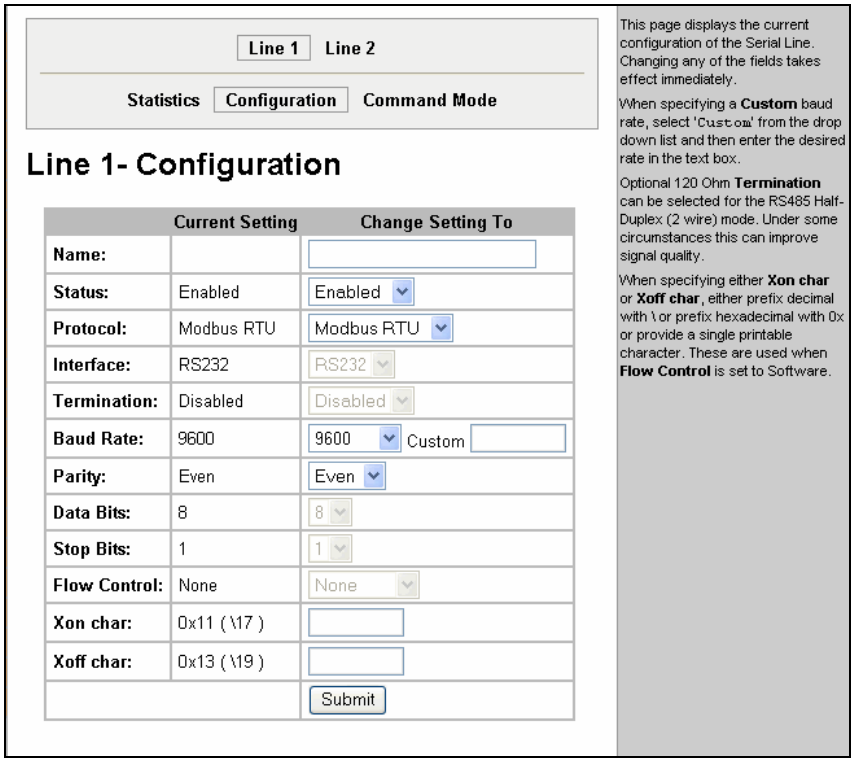


	Receiver	Transmitter
Bytes:	167	903
Breaks:	0	0
Flow control:	N/A	N/A
Parity Errors:	0	
Framing Errors:	0	
Overrun Errors:	0	
No Rx Buffer Errors:	0	
Queued Receive Bytes:	0	
Queued Transmit Bytes:	0	
CTS input:	not asserted	
RTS output:	n/a	
DSR input:	not asserted	
DTR output:	not asserted	

Line - Configuration Page

If you click **Configuration** at the top of one of the Line Settings pages, the Line – Configuration page displays. This page shows the configuration settings for the serial line selected at the top of the page and lets you change the settings for that serial line.

Figure 6-3. Line – Configuration Page



Configuration Page

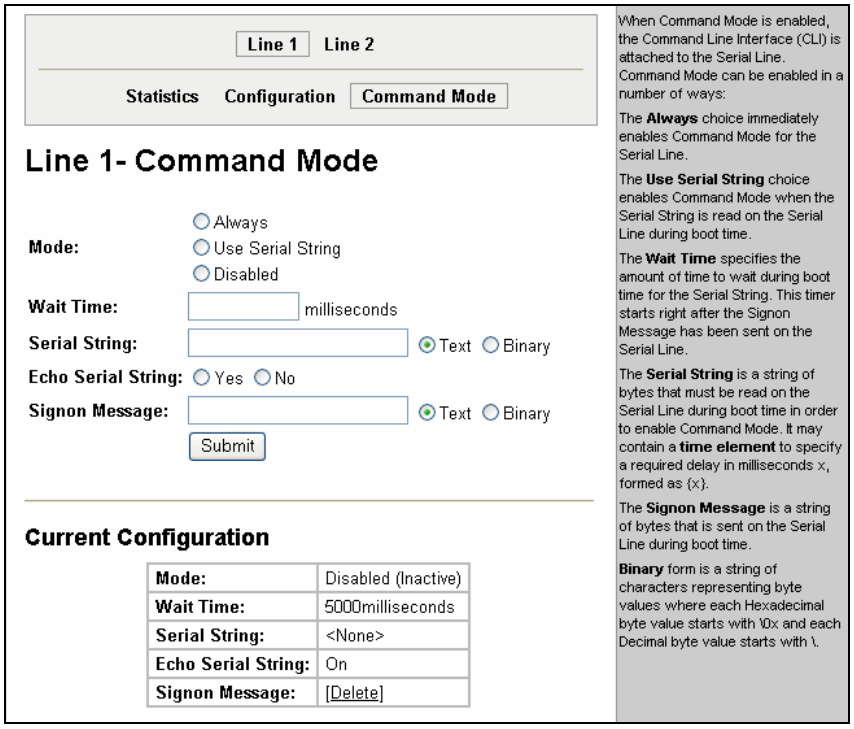
Line – Configuration Page Settings	Description
Name (optional)	Enter a name for the serial port. The name may have up to 25 characters.
Status	Select to enable or disable the selected XPress-I/O serial port.
Protocol	Select the protocol used on the currently selected serial line. Choices are: **None** **Tunnel** (default) **Modbus RTU** **Modbus ASCII** *Note: Modbus protocols change the display in several fields below.*
Interface	Line 1 is always RS232. For Line 2, select the RS485 duplex mode. Choices are: **RS485 Half Duplex** (default) **RS485 Full-Duplex**
Termination (line 2 only)	Select to enable or disable RS-485 termination.
Baud Rate	Select the baud rate for the currently selected serial port. Choices are: **300** baud to **230,400** baud. (default is 9600 baud) **Custom** = lets you enter in the **Custom** text box a speed other than those shown.
Parity	Select the parity used by the currently selected serial line. Choices are: **None** (default) **Even** (default for Modbus RTU and Modbus ASCII) **Odd**
Data Bits	Select the number of data bits used by the currently selected serial line. Choices are: **7** **8** (default) For the Modbus protocols, this setting cannot be changed. For Modbus RTU, the setting is 8. For Modbus ASCII, the setting is 7.
Stop Bits	Select the number of stop bits used by the currently selected serial line. Choices are: **1** (default) **2** For the Modbus protocols, the default is 1; this setting automatically changes to 2 if parity is None.

Line – Configuration Page Settings	Description
Flow Control	Select the flow control method used by the currently selected serial line. Choices are: **None** (default for Tunnel protocol) **Hardware** **Software** On Line 1, for the Modbus protocols, **Flow Control** defaults to None; this setting cannot be changed. On Line 2, **Flow Control** is unavailable for all protocols.
Xon char	Character to use to initiate a flow of data. When **Flow Control** is set to **Software**, specify **Xon char**. Prefix a decimal character with **** or a hexadecimal character with 0x, or provide a single printable character. The default Xon char is 0x11.
Xoff char	When **Flow Control** is set to **Software**, specify **Xoff char**. Prefix a decimal character with **** or a hexadecimal character with 0x, or provide a single printable character. The default Xoff char is 0x13.

Line – Command Mode Page

If you click **Command Mode** at the top of one of the Line Settings pages, the Line – Command Mode page displays. This page shows the command mode settings for the serial line selected at the top of the page and lets you change the settings for that serial line.

Figure 6-4. Line – Command Mode Page



Line – Command Mode Page

Line – Command Mode Page Settings	Description
Mode	Select the method of enabling command mode or choose to disable command mode. Choices are: **Always** = immediately enables command mode for the serial line. **Use Serial String** = enables command mode when the serial string is read on the serial line during boot time. **Use CP Group =** enables command mode based on the status of a CP Group. When the value matches the current value of the group, command mode is enabled on the serial line. **Use both Serial String and CP Group =** enables command mode when either condition is met. **Disabled** = Disables command mode.
Wait Time	Enter the maximum number of milliseconds the selected serial line waits to receive the specific serial string at boot time to enter command mode. Default is 5000 milliseconds.
Serial String	Enter the serial string that places the serial line into command mode. After entering a string, use the buttons to indicate whether the string is a text or binary value.
Echo Serial String	Select whether the serial line echoes the specified serial string at boot time. Choices are: **Yes** = echoes the characters specified in the **Serial String** text box. **No** = does not echo the characters specified in the **Serial String** text box.
Signon Message	Enter the boot-up signon message to be sent over the serial line at boot time. After entering the message, select whether the string is a text or binary value.

Tunnel Pages

The Tunnel pages let you view and configure settings for tunnels. (For more information, see Tunneling on page 145.)

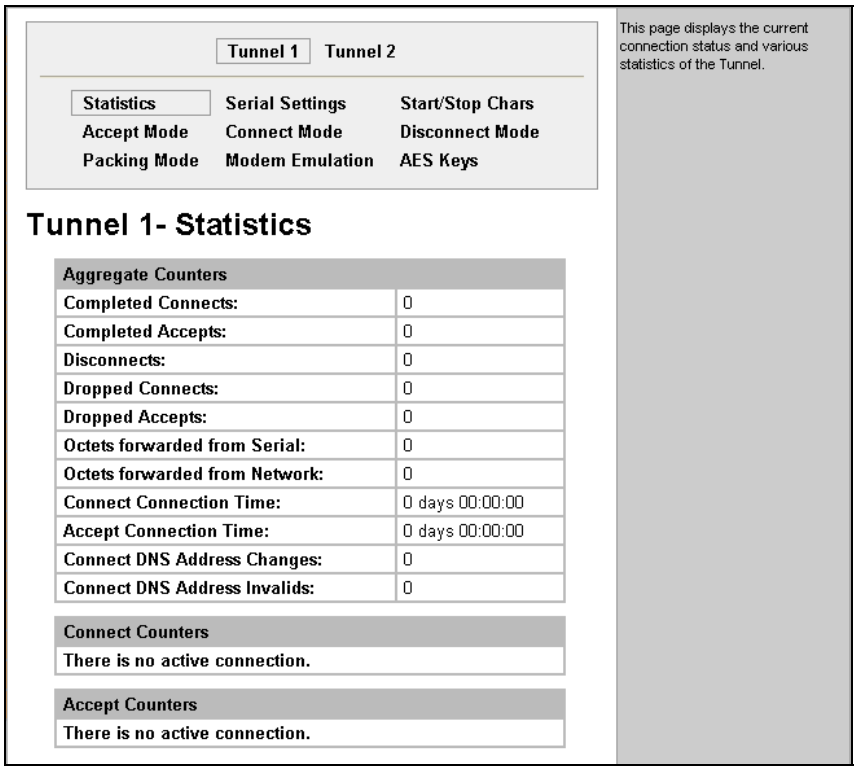
To select a tunnel, click **Tunnel 1** or **Tunnel 2** at the top of the page.

After you select a tunnel, you can click **Statistics**, **Serial Settings**, **Start/Stop Chars**, **Accept Mode**, **Connect Mode**, **Disconnect Mode**, **Packing Mode**, **Modem Emulation**, or **AES Keys** to view and change the settings of the selected tunnel. Because all tunnels operate independently, you can specify different configuration settings for each tunnel.

Tunnel – Statistics Page

The Tunnel – Statistics page displays when you click **Tunnel** in the menu bar. It also displays when you click **Statistics** at the top of one of the other Tunnel pages. This read-only page shows the status and statistics for the tunnel currently selected at the top of this page.

Figure 6-5. Tunnel - Statistics Page



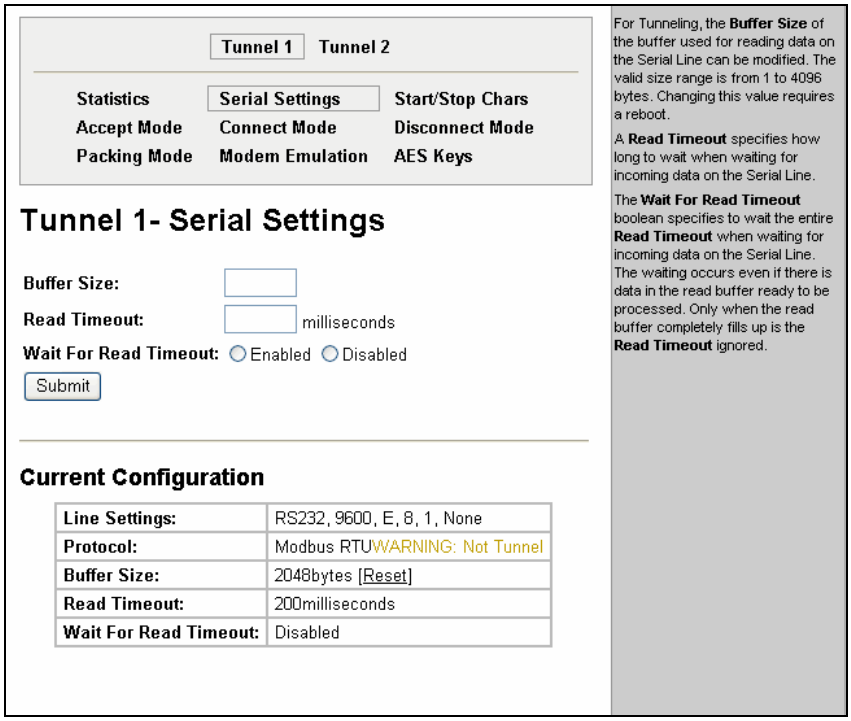
Tunnel – Serial Settings Page

If you click **Serial Settings** at the top of one of the Tunnel pages, the Tunnel – Serial Settings page displays. This page shows the settings for the tunnel selected at the top of the page and lets you change the settings. If you change the **Buffer Size** value, you must reboot the XPress-I/O or the change to take effect. Changing the other values does not require a reboot.

Under **Current Configuration**, **Buffer Size** has a **Reset** link that lets you reset the buffer size to its default value. If you click this link, a message tells you that you will have to reboot the XPress. Click **OK** to proceed or **Cancel** to cancel the operation.

Note: *The default protocol is Tunnel. The protocol on the line 1 page must be* ***Tunnel*** *for tunneling to operate.*

Figure 6-6. Tunnel – Serial Settings Page



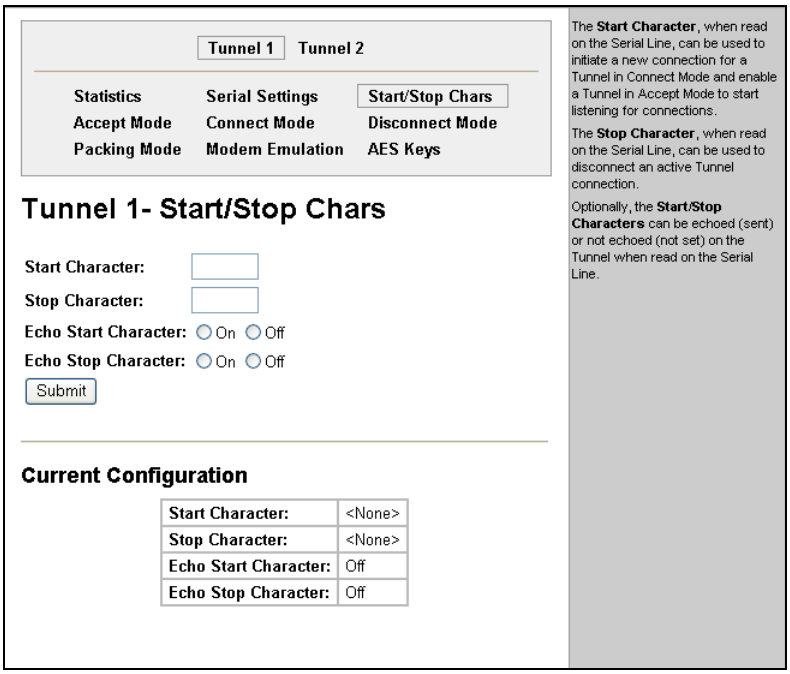
Tunnel – Serial Settings Page

Tunnel – Serial Settings Page	Description
Buffer Size	Enter the size of the buffer used to receive data on the serial line. Range = 1 to 4096 bytes. Default is 2048 bytes. Changing this value requires you to reboot the XPress-I/O.
Read Timeout	Enter the maximum number of milliseconds that the XPress-I/O waits for incoming data on the serial line. Default is 200 milliseconds.
Wait for Read Timeout	Select whether the XPress-I/O waits the entire Read Timeout value for incoming data on the serial line. Waiting occurs even if there is data in the read buffer ready to be processed. The Read Timeout is ignored only when the read buffer completely fills with data. Choices are: **Enabled** = waits the entire Read Timeout value for incoming data on the serial line. **Disabled** = does not wait the entire Read Timeout value for incoming data (default).

Tunnel – Start/Stop Characters Page

If you click **Start/Stop Chars** at the top of one of the Tunnel pages, the Tunnel – Start/Stop Chars page displays. This page shows the start and stop characters used for the tunnel selected at the top of the page and lets you change the settings for that tunnel.

Figure 6-7. Tunnel – Start/Stop Chars Page



Tunnel – Start/Stop Chars Page

Tunnel – Start/Stop Chars Page Settings	Description
Start Character	Enter the start character. When this character is read on the serial line, it either initiates a new connection (for a tunnel in Connect mode) or enables a tunnel in Accept mode to start listening for connections. Default is <none>.
Stop Character	Enter the stop character. When this character is read on the serial line, it disconnects an active tunnel connection. Default is <none>.
Echo Start Character	Select whether the start character is forwarded (or "echoed') through the selected tunnel when the serial line is read. Choices are: **On** = echo the start character on the selected tunnel when the serial line is read. **Off** = do not echo the start character. (default)
Echo Stop Character	Select whether the stop character is echoed through the selected tunnel when the serial line is read. Choices are: **On** = echo the stop character on the selected tunnel when the serial line is read. **Off** = do not echo the stop character. (default)

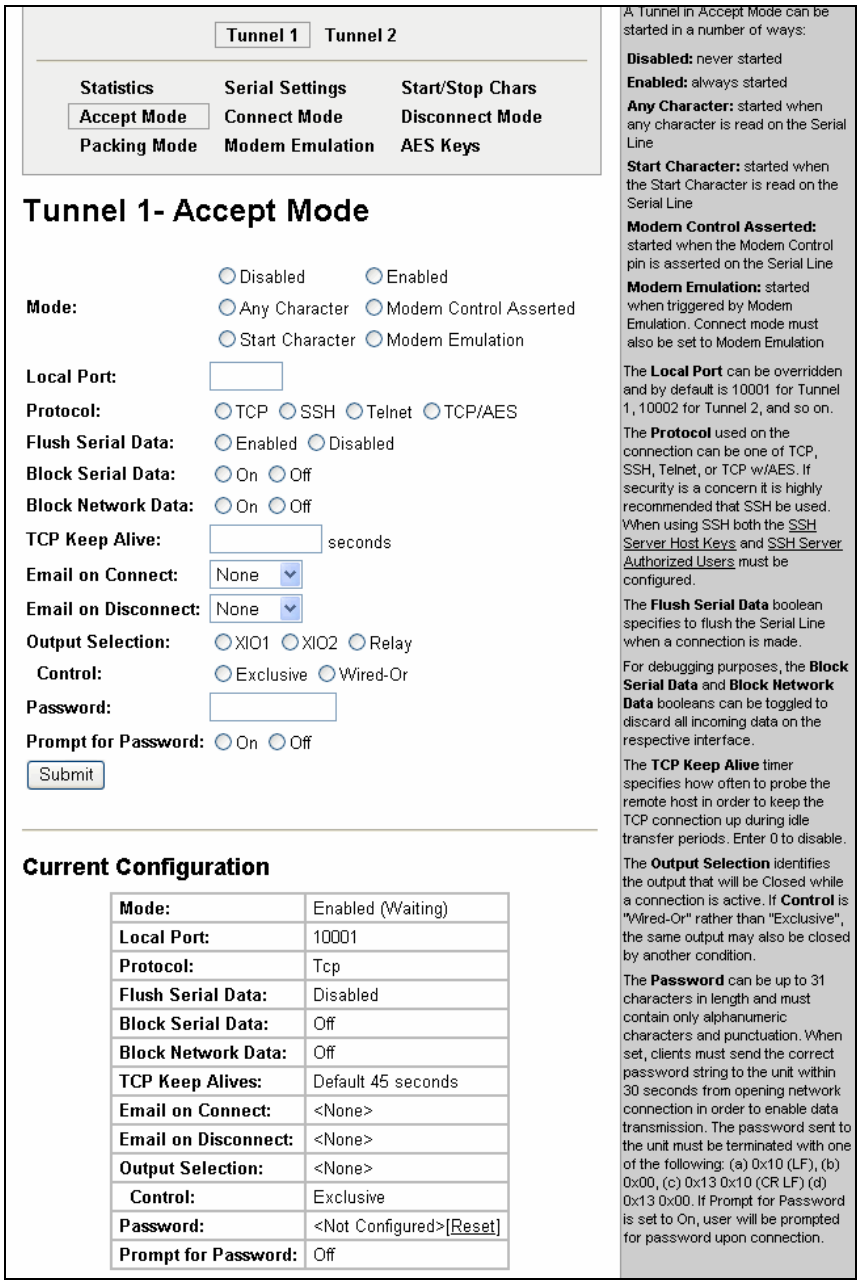
Tunnel – Accept Mode Page

Accept Mode determines how the XPress-I/O "listens" for an incoming connection. If you click **Accept Mode** at the top of one of the Tunnel pages, the Tunnel – Accept Mode page displays. Here you can select the method for starting a tunnel in Accept mode and select other settings for the tunnel selected at the top of the page.

Under **Current Configuration**, **Local Port** has a **Reset** link if it has been changed from the default. If you click this link, a message tells you that your action may stop an active connection. Click **OK** to proceed or **Cancel** to cancel the operation.

For more information about Accept mode, see Accept Mode on page 147.

Figure 6-8. Tunnel – Accept Mode Page



Tunnel – Accept Mode Page

Tunnel – Accept Mode Page Settings	Description
Mode	Select the method used to start a tunnel in Accept mode. Choices are: **Disabled** = do not accept an incoming connection. **Enabled** = accept an incoming connection. (default) **Any Character** = start waiting for an incoming connection when any character is read on the serial line. **Modem Control Asserted** = start waiting for an incoming connection as long as the Modem Control pin (DSR) is asserted on the serial line until a connection is made. **Start Character** = start waiting for an incoming connection when the start character for the selected tunnel is read on the serial line. **Modem Emulation** = start waiting for an incoming connection when triggered by modem emulation AT commands. Connect mode must also be set to **Modem Emulation** (see Tunnel – Connect Mode on page 57).
Local Port	Enter the number of the local port used to receive (or listen for) packets. Default is 10001 for Tunnel 1, 10002 for Tunnel 2, and so forth.
Protocol	Select the protocol to be used on the connection. Choices are: **TCP** (default) **SSH** = use this setting if security is a concern. When using SSH, both the SSH Server Host Keys and SSH Server Authorized Users must be configured. (See SSH on page 144.) **Telnet** **TCP/AES** = use for secure tunneling between two XPress-I/Os or software that supports AES such as the Secure Com Port Redirector. Secure Com Port Redirector is on the CD that came with your XPress-I/O or on the Lantronix web site (www.lantronix.com).
Flush Serial Data	Select whether the serial line is flushed when a connection is made. Choices are: **Enabled** = flush the serial line when a connection is made. **Disabled** = do not flush the serial line. (default)
Block Serial Data	Select whether incoming serial data should be discarded. This setting is used for debugging purposes. Choices are: **On** = discard all incoming serial data on the respective interface. **Off** = do not discard all incoming serial data. (default)
Block Network Data	Select whether incoming network data should be discarded. This setting is used for debugging purposes. Choices are: **On** = discard all incoming network data on the respective interface. **Off** = do not discard all incoming network data. (default)

Tunnel – Accept Mode Page Settings	Description
TCP Keep Alive	Specify the number of milliseconds the XPress-I/O waits during an inactive connection before checking the status of the connection. If the XPress-I/O does not receive a response from the remote host, it drops that connection.
Email on Connect	Select whether an email is sent when a connection is made. **None** = do not send an email. **Email #** = send an email corresponding to the tunnel number.
Email on Disconnect	Select whether an email corresponding to the tunnel number is sent when a connection is closed. **None** = do not send an email. **Email #** = send an email corresponding to the tunnel number.
Output Selection	Select the output to be closed while a connection is active. **XI01** = output to digital output pin 1 **XI02** = output to digital output pin 2 **Relay** = output to the relay
Control	Select whether the same output may also be closed by another condition (e.g. Connect Mode settings from Tunnel 1 and Tunnel 2 for the same digital port.) **Exclusive** = same output may not be closed by another condition. **Logical-Or** = same output may be closed by another condition.
Password	Enter a password that clients must send to the XPress-I/O within 30 seconds from opening a network connection to enable data transmission. The password can have up to 31 characters and must contain only alphanumeric characters and punctuation. When set, the password sent to the XPress-I/O must be terminated with one of the following: (a) 0x10 (LF), (b) 0x00, (c) 0x13 0x10 (CR LF), or (d) 0x13 0x00.
Prompt for Password	Indicate whether the user should be prompted for the password upon connection. **On** = prompt for a password upon connection. **Off** = do not prompt for a password upon connection.

Tunnel – Connect Mode Page

Connect Mode determines how the XPress-I/O initiates a connection to a remote host or device. If you click **Connect Mode** at the top of one of the Tunnel pages, the Tunnel – Connect Mode page displays. Here you can select the method for starting a tunnel in Connect mode and select other settings for the tunnel selected at the top of the page.

Any configuration changes you make on the displayed page apply to the tunnel you selected at the top of this page. For example, if **Tunnel 1** is selected, any configuration changes you make apply to tunnel 1.

Under **Current Configuration**, **Remote Address** has a **Delete** link that lets you delete the remote address shown. If you click this link, a message tells you that your action may stop an active connection. Click **OK** to proceed or **Cancel** to cancel the operation.

Remote Port defaults to Random. If you have configured a specific port number, a **Random** link displays that allows you to restore the default.

For more information about Connect mode, see Connect Mode on page 146.

Figure 6-9. Tunnel -- Connect Mode Page

Tunnel 1 | Tunnel 2

Statistics	Serial Settings	Start/Stop Chars
Accept Mode	Connect Mode	Disconnect Mode
Packing Mode	Modem Emulation	AES Keys

Tunnel 1- Connect Mode

Mode: ○ Disabled ○ Enabled ○ Any Character ○ Modem Control Asserted ○ Start Character ○ Modem Emulation

Remote Address:

Remote Port:

Local Port:

Protocol: ○ TCP ○ UDP ○ SSH ○ TCP/AES ○ UDP/AES

Reconnect Timer: milliseconds

Flush Serial Data: ○ Enabled ○ Disabled

SSH Username:

Block Serial Data: ○ On ○ Off

Block Network Data: ○ On ○ Off

TCP Keep Alive: seconds

Email on Connect: None

Email on Disconnect: None

Output Selection: ○ XIO1 ○ XIO2 ○ Relay

Control: ○ Exclusive ○ Wired-Or

Submit

Current Configuration

Mode:	Disabled
Remote Address:	<None>
Remote Port:	<None>
Local Port:	Random
Protocol:	Tcp
Reconnect Timer:	15000milliseconds
Flush Serial Data:	Disabled
SSH Username:	<None>
Block Serial Data:	Off
Block Network Data:	Off
TCP Keep Alives:	Default 45 seconds
Email on Connect:	<None>
Email on Disconnect:	<None>
Output Selection:	<None>
Control:	Exclusive

A Tunnel in Connect Mode can be started in a number of ways:

Disabled: never started

Enabled: always started

Any Character: started when any character is read on the Serial Line

Start Character: started when the Start Character is read on the Serial Line

Modem Control Asserted: started when the Modem Control pin is asserted on the Serial Line

Modem Emulation: started when triggered by Modem Emulation

The **Remote Address** and **Remote Port** specifies the remote host to connect to. The **Local Port** is by default random but can be overridden.

The **Protocol** used on the connection can be one of TCP, UDP, SSH, TCP w/AES, or UDP w/AES. If security is a concern it is highly recommended that SSH be used. The **SSH Username** specifies the SSH Client User to use for an SSH connection.

The **Reconnect Timer** specifies how long to wait before trying to reconnect to the remote host after a previous attempt failed or connection was closed.

The **Flush Serial Data** boolean specifies to flush the Serial Line when a connection is made.

For debugging purposes, the **Block Serial Data** and **Block Network Data** booleans can be toggled to discard all incoming data on the respective interface.

The **TCP Keep Alive** timer specifies how often to probe the remote host in order to keep the TCP connection up during idle transfer periods. Enter 0 to disable.

The **Output Selection** identifies the output that will be Closed while a connection is active. If **Control** is "Wired-Or" rather than "Exclusive", the same output may also be closed by another condition.

Tunnel – Connect Mode Page

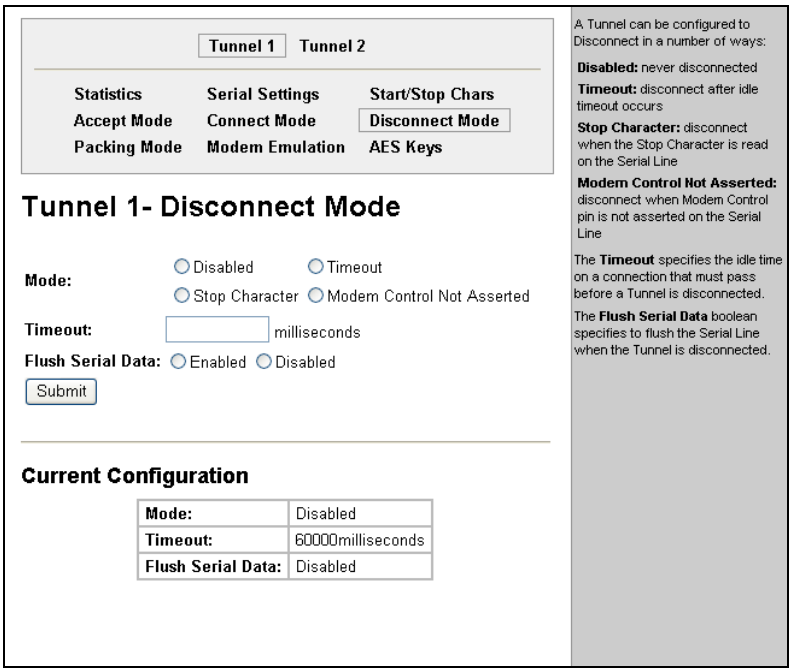
Tunnel – Connect Mode Page Settings	Description
Mode	Select the method to be used to start a connection to a remote host or device. Choices are: **Disabled** = an outgoing connection is never started. (default) **Enabled** = a connection is attempted until one is made. If the connection gets disconnected, the XPress-I/O retries until a connection is made. **Any Character** = a connection is started when any character is read on the serial line. **Modem Control Asserted** = a connection is attempted as long as the Modem Control pin (DSR) is asserted until a connection is made. **Start Character** = a connection is attempted when the start character for the selected tunnel is read on the serial line. **Modem Emulation** = a connection is started when triggered by modem emulation AT commands.
Remote Address	Enter the address of the remote host to which the selected tunnel will connect. Default is <none>.
Remote Port	Enter the number of the remote port to which the selected tunnel will connect. Default is <none>.
Local Port	Enter the number of the local port used to receive (or listen for) packets. Default is Random.
Protocol	Select the protocol to use on the connection. Choices are: **TCP** (default) **UDP** **SSH** = use this setting if security is a concern. This setting requires you to enter an SSH username. **TCP/AES** = use for secure tunneling by means of TCP between two XPress-I/O devices or other devices that support AES. **UDP/AES** = use for secure tunneling by means of UDP between two XPress-I/O devices or other devices that support AES.
Reconnect Timer	Enter the maximum number of milliseconds to wait before trying to reconnect to the remote host after a previous attempt failed or the connection was closed. Default is 15000 milliseconds.
Flush Serial Data	Select whether to flush the serial line when a connection is made. Choices are: **Enabled** = flush the serial line when a connection is made. **Disabled** = do not flush the serial line. (default)
SSH Username	If you selected SSH as the protocol for this tunnel, enter the SSH client user that is to be used for the SSH connection. Default is <none>.

Tunnel – Connect Mode Page Settings	Description
Block Serial Data	Select whether incoming block serial data should be discarded. This setting is used for debugging purposes. Choices are: **On** = discard all incoming serial data on the respective interface. **Off** = do not discard all incoming serial data. (default)
Block Network Data	Select whether incoming block network data should be discarded. This setting is used for debugging purposes. Choices are: **On** = discard all incoming network data on the respective interface. **Off** = do not discard all incoming network data. (default)
TCP Keep Alive	Specifies the number of milliseconds the XPress-I/O waits during an inactive connection before checking the status of the connection. If the XPress-I/O does not receive a response from the remote host, it drops that connection.
Email on Connect	Select whether email should be sent when a connection is made. **None** = do not send an email. **Email #** = send an email corresponding to the tunnel number.
Email on Disconnect	Select whether email should be sent when a connection is closed. **None** = do not send an email. **Email #** = send an email corresponding to the tunnel number.
Output Selection	Select the output to be closed while a connection is active. **XI01** = output to digital output pin 1 **XI02** = output to digital output pin 2 **Relay** = output to the relay
Control	Select whether the same output may also be closed by another condition (e.g. Connect Mode settings from Tunnel 1 and Tunnel 2 for the same digital port.) **Exclusive** = same output may not be closed by another condition. **Logical-Or** = same output may be closed by another condition.

Tunnel – Disconnect Mode Page

If you click **Disconnect Mode** at the top of one of the Tunnel pages, the Tunnel – Disconnect Mode page displays. Here you can select the disconnect method for the tunnel selected at the top of the page. For more information about Disconnect mode, see Disconnect Mode on page 148.

Figure 6-10. Tunnel – Disconnect Mode Page



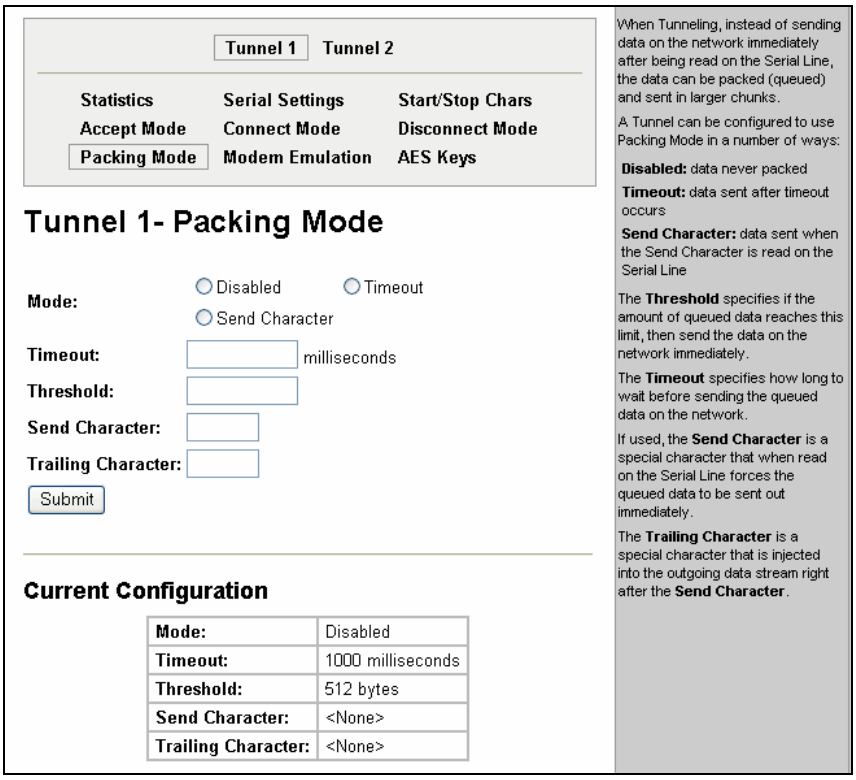
Tunnel – Disconnect Mode Page

Tunnel – Disconnect Mode Page Settings	Description
Mode	Select the method used to disconnect an active tunnel connection. Choices are: **Disabled** = an active connection is never disconnected. (default) **Timeout** = an active connection is disconnected after the specified idle time elapses. **Stop Character** = an active connection is disconnected when the specified stop character is read on the serial line. **Modem Control Not Asserted** = an active connection is disconnected when the Modem Control pin (DSR) is de-asserted on the serial line.
Timeout	Enter the idle time, in milliseconds, that must elapse for a connection before it is disconnected. Default is 60000 milliseconds.
Flush Serial Data	Select whether the serial line should be flushed when a connection is disconnected. Choices are: **Enabled** = flush the serial line when a connection is disconnected. **Disabled** = do not flush the serial line. (default)

Tunnel – Packing Mode Page

When tunneling, data can be packed (queued) and sent in large chunks on the network instead of being sent immediately after being read on the serial line. If you click **Packing Mode** at the top of one of the Tunnel pages, the Tunnel – Packing Mode page displays. Here you can select packing settings for the tunnel selected at the top of the page. For more information about Packing mode, see Packing Mode on page 148.

Figure 6-11. Tunnel – Packing Mode Page



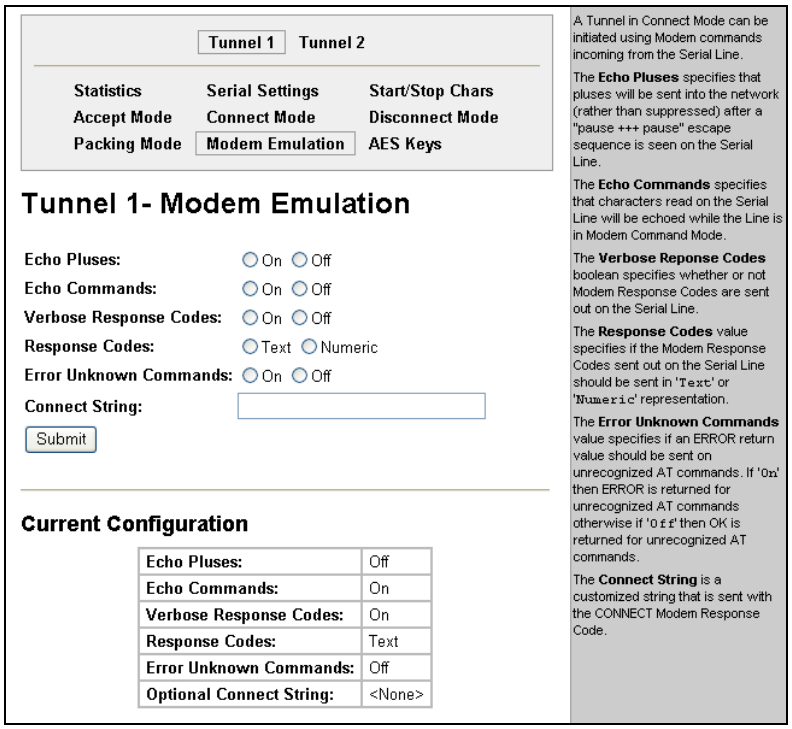
Tunnel – Packing Mode Page

Tunnel – Packing Mode Page Settings	Description
Mode	Select the method used to pack data. Choices are: **Disabled** = data is never packed. (default) **Timeout** = data is sent after the timeout elapses. **Send Character** = data is sent when the send character is read on the serial line.
Timeout	Enter the maximum number of milliseconds to wait before sending queued data across the network. Default is 1000 milliseconds.
Threshold	Enter the queued data limit that, when reached, immediately sends queued data to the network. Default is 512 bytes.
Send Character	Enter the send character. When this character is read on the serial line, it forces the queued data to be sent immediately. Default is <none>.
Trailing Character	Enter the trailing character. This character is inserted into the outgoing data stream immediately after the send character. Default is <none>.

Tunnel – Modem Emulation Page

A tunnel in connect mode can be initiated using modem commands incoming from the serial line. If you click **Modem Emulation** at the top of one of the Tunnel pages, the Tunnel – Modem Emulation page displays. Here you can select modem emulation settings for the tunnel selected at the top of the page. For more information about modem emulation, see Modem Emulation on page 149.

Figure 6-12. Tunnel – Modem Emulation Page



Tunnel – Modem Emulation Page

Tunnel – Modem Emulation Page Settings	Description
Echo Pluses	Select whether the modem +++ escape sequence is echoed (sent). Choices are: **On** = modem pluses are sent into the network. **Off** = modem pluses are suppressed. (default).
Echo Commands	Select whether modem commands are echoed on the serial line. Choices are: **On** = modem commands are echoed. (default) **Off** = modem commands are not echoed.
Verbose Response Codes	Select whether modem response (result) codes are sent on the serial line. Choices are: **Text** = modem responses are sent on the serial line. (default) **Numeric** = modem responses are not sent.
Response Codes	Select whether modem response (result) codes sent on the serial line take the form of words or numbers. Choices are: **Text** = modem responses are sent as words. (default) **Numeric** = modem responses are sent as numbers.
Error Unknown Commands	Select whether an ERROR or OK response is sent in reply to unrecognized AT commands. Choices are: **On** = ERROR is returned for unrecognized AT commands.

Tunnel – Modem Emulation Page Settings	Description
	Off = OK is returned for unrecognized AT commands. (default)
Connect String	If required, enter a customized string that is sent along with the CONNECT response code. Default is <none>.

Tunnel – AES Keys Page

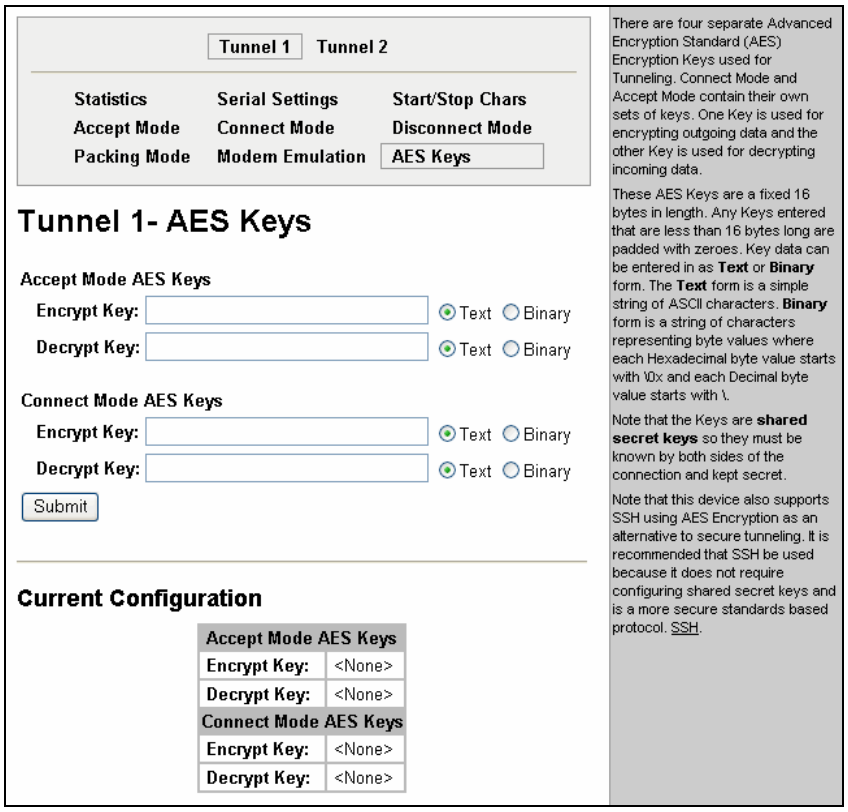
Four Advanced Encryption Standard (AES) Encryption Keys are used for tunneling. Connect mode and Accept mode contain their own sets of keys. One key is used for encrypting outgoing data and another key is used for decrypting incoming data. These AES keys are fixed at 16 bytes. Any keys entered that are less than 16 bytes long are padded with zeroes.

If you click **AES Keys** at the top of one of the Tunnel pages, the Tunnel – AES Keys page displays. Here you can enter key data as text or binary values for the tunnel selected at the top of the page. Binary values are a string of characters representing hexadecimal or decimal values.

Note: *Keys are shared secret keys that must be known by both sides of the connection and kept secret.*

Note: *Tunneling using AES encryption uses a non-standard protocol and shared keys, making it not very secure. The XPress-I/O also supports SSH as an alternative method of secure tunneling. SSH tunneling has the advantage of not using shared keys*.

Figure 6-13. Tunnel – AES Keys Page



Tunnel – AES Keys Page

Tunnel – AES Keys Page Settings	Description
Accept Mode AES Keys: Encrypt Key	Enter the AES encrypt key for Accept mode. After entering a value, select an option to specify whether the value is text or binary. Default is <none>.
Accept Mode AES Keys: Decrypt Key	Enter the AES decrypt key for Accept mode. After entering a value, select an option to specify whether the value is text or binary. Default is <none>.
Connect Mode AES Keys: Encrypt Key	Enter the AES encrypt key for Connect mode. After entering a value, select an option to specify whether the value is text or binary. Default is <none>.
Connect Mode AES Keys: Decrypt Key	Enter the AES decrypt key for Connect mode. After entering a value, select an option to specify whether the value is text or binary. Default is <none>.

Modbus Pages

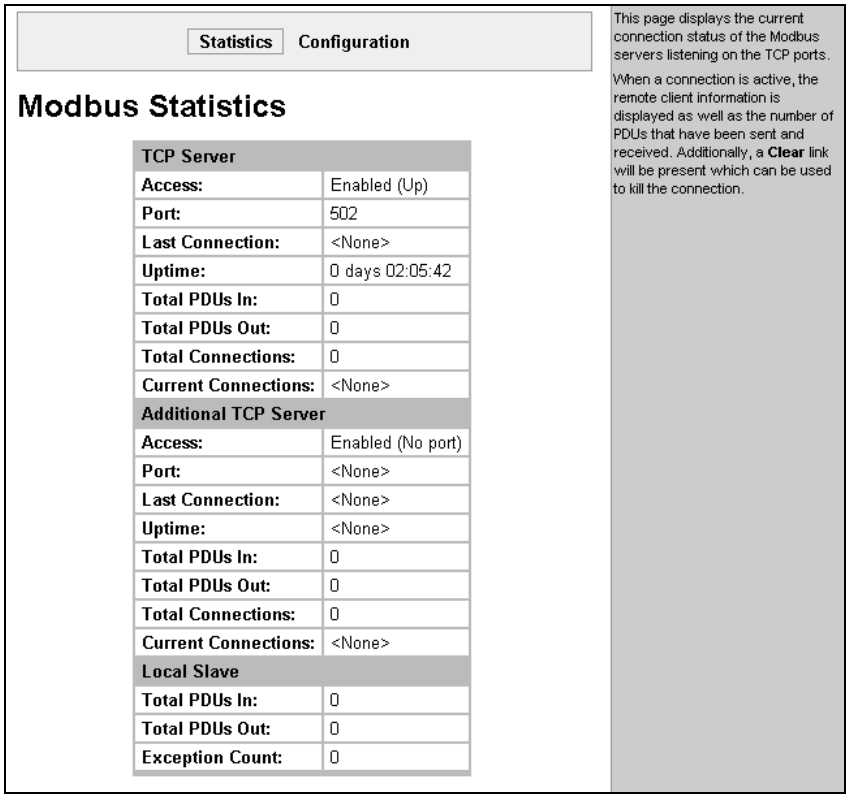
The Modbus pages let you view and configure settings for Modbus servers listening on the TCP ports. (For more information, see E: Modbus.)

Modbus – Statistics Page

The Modbus – Statistics page displays when you click **Modbus** in the menu bar. It also displays when you click **Statistics** at the top of the Modbus - Configuration page. This page shows the status and statistics for up to two Modbus servers. The standard TCP server port number is 502.

When a connection is active, the remote client information displays as well as the number of Protocol Data Units (PDUs) that have been sent and received. This is a count of messages, not bytes. If a connection is active, a **Kill** link (at its right)) enables you to close the connection.

Figure 6-14. Modbus – Statistics Page



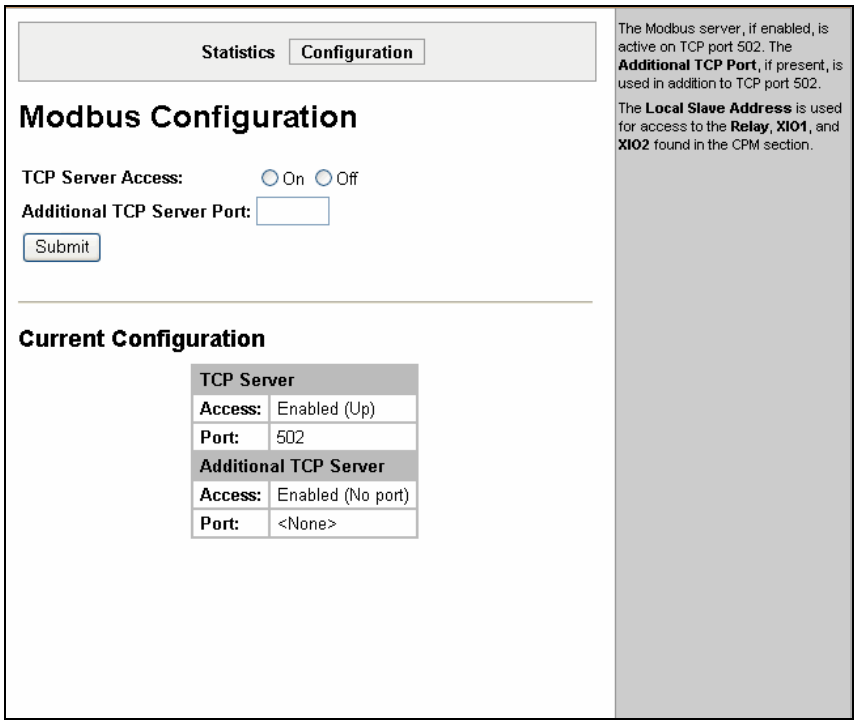
TCP Server	
Access:	Enabled (Up)
Port:	502
Last Connection:	<None>
Uptime:	0 days 02:05:42
Total PDUs In:	0
Total PDUs Out:	0
Total Connections:	0
Current Connections:	<None>
Additional TCP Server	
Access:	Enabled (No port)
Port:	<None>
Last Connection:	<None>
Uptime:	<None>
Total PDUs In:	0
Total PDUs Out:	0
Total Connections:	0
Current Connections:	<None>
Local Slave	
Total PDUs In:	0
Total PDUs Out:	0
Exception Count:	0

Modbus – Configuration Page

If you click **Configuration** at the top of one of the Modbus – Statistics page, the Modbus – Serial Settings page displays. **Current Configuration** enables you to add a Modbus server.

The Modbus server, if enabled, is active on TCP port 502. You have the option of using an additional port.

Figure 6-15. Modbus – Configuration Page



Modbus – Configuration Page

Modbus – Configuration Page Settings	Description
TCP Server Access	Select whether to enable a second Modbus server to have access. Choices are: **On** = Modbus server is enabled. (default) **Off** = Modbus server is disabled.
Additional TCP Server Port	Enter the number of the TCP port on which the XPress-I/O additional server listens for connections.

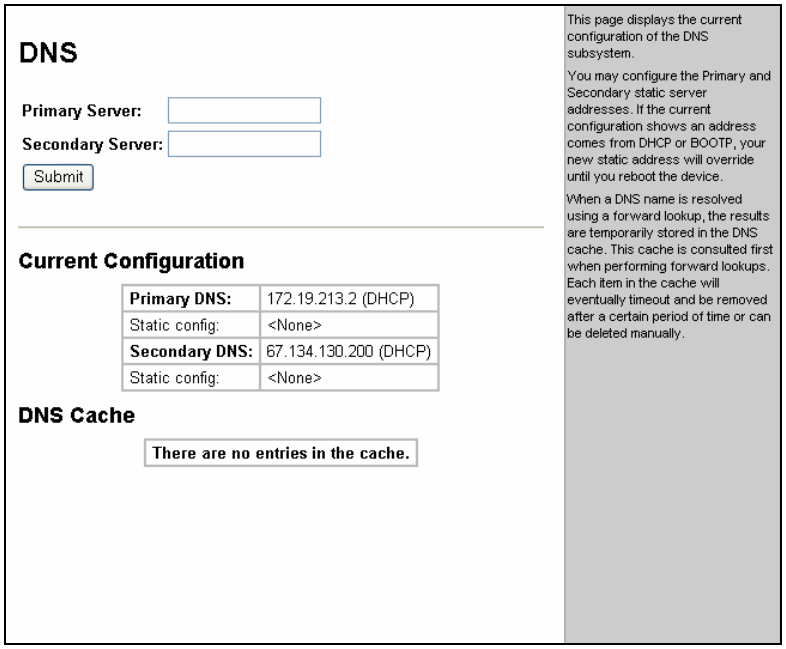
7: Services Settings

DNS Page

Clicking the **DNS** link in the menu bar displays the DNS page. This page displays configuration settings for the domain name system (DNS) and lets you change them as necessary.

The DNS page also shows any contents in the DNS cache. When a DNS name is resolved using a forward lookup, the results are stored in the DNS cache temporarily. The XPress-I/O consults this cache when performing forward lookups. Each item in the cache eventually times out and is removed automatically after a certain period, or you can delete it manually.

Figure 7-1. DNS Page



Note: *If the current configuration shows an address comes from DHCP or BOOTP, the new static address overrides it until you reboot the device.*

DNS Page

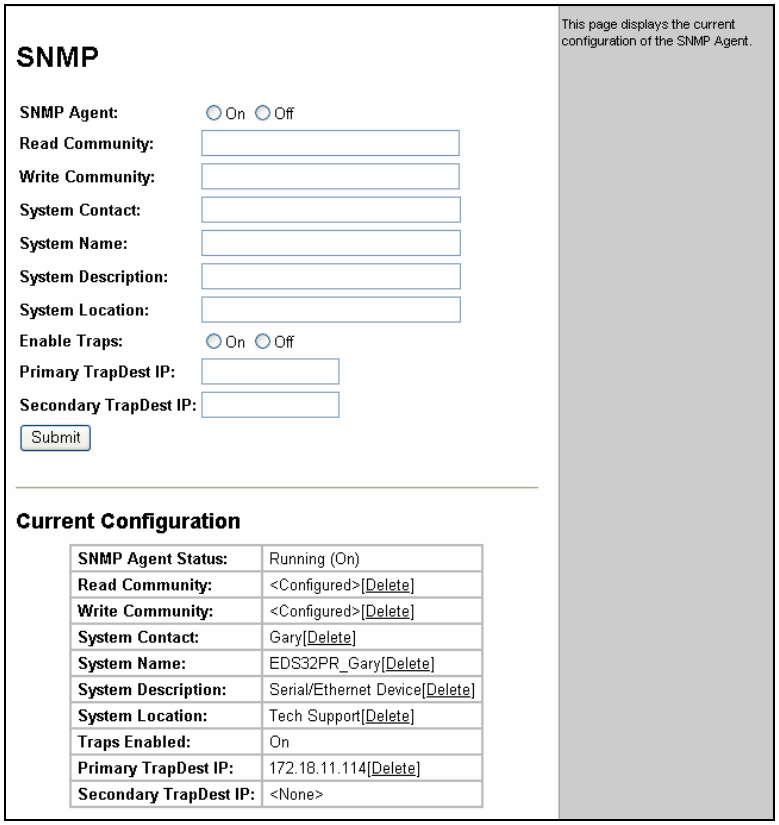
DNS Page Settings	Description
Primary Server	Enter the DNS primary server that maintains the master zone information/file for a domain. Default is <none>.
Secondary Server	Enter the DNS secondary server that backs up the primary DNS server for a zone. Default is <none>.

SNMP Page

Clicking the **SNMP** link in the menu bar displays the SNMP page. This page is used to configure the Simple Network Management Protocol (SNMP) agent. Using this page, you can configure the SNMP service to send a trap when it receives a request for information that contains an incorrect community name and does not match an accepted system name for the service.

Under **Current Configuration**, several settings have a **Delete** link that lets you delete these settings. If you click these links, a message asks whether you are sure you want to delete this information. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 7-2. SNMP Page



SNMP Page

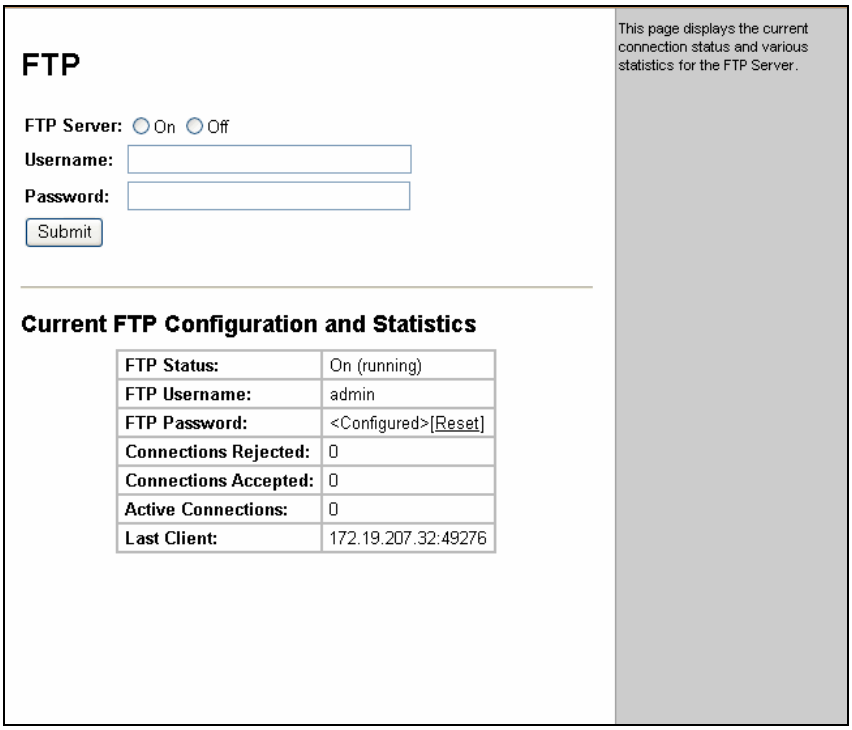
SNMP Page Settings	Description
SNMP Agent	Select whether SNMP is enabled. Choices are: **On** = SNMP is enabled. (default) **Off** = SNMP is disabled.
Read Community	Enter the case-sensitive community name from which the XPress-I/O will receive trap messages. Default is public. For security, the read community name displays as <Configured> to show that one is enabled.
Write Community	Enter the case-sensitive community name to which the XPress-I/O will send trap messages. Default is private. For security, the write community name displays as <Configured> to show that one is enabled.
System Contact	Enter the name of the system contact. Default is <None>.
System Name	Enter the XPress-I/O's name.
System Description	Enter a system description for the XPress-I/O.
System Location	Enter the geographic location of the XPress-I/O. Default is <None>.
Enable Traps	Select whether SNMP cold start trap messages are enabled at boot. Choices are: **On** = SNMP cold start trap messages are enabled at boot time. (default) **Off** = SNMP traps are disabled.
Primary TrapDest IP	Enter the primary SNMP trap host. Default is <None>.
Secondary TrapDest IP	Enter the secondary SNMP trap host. Default is <None>.

FTP Page

Clicking the **FTP** link in the menu bar displays the FTP page. This page displays the current File Transfer Protocol (FTP) connection status and various statistics about the FTP server.

Under **Current FTP Configuration and Statistics**, **FTP Password** has a **Reset** link that lets you reset the FTP password. If you click this link, a message asks whether you are sure you want to reset this information. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 7-3. FTP Page



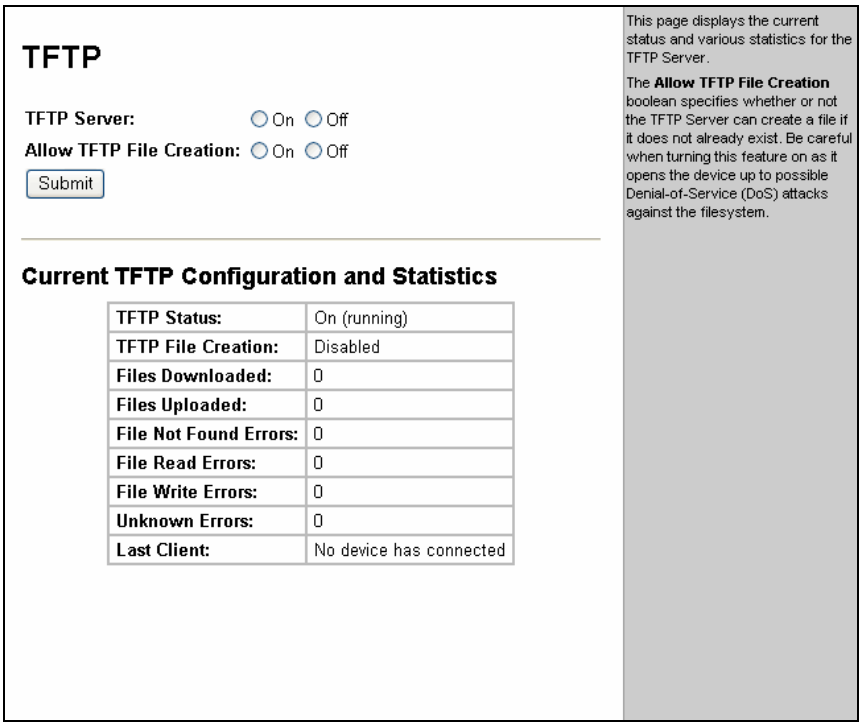
FTP Page

FTP Page Settings	Description
FTP Server	Select whether the FTP server is enabled. Choices are: **On** = FTP server is enabled. (default) **Off** = FTP server is disabled.
FTP Username	Enter the username required to gain FTP access. Default is admin.
FTP Password	Enter the password associated with the username.

TFTP Page

Clicking the **TFTP** link in the menu bar displays the TFTP page. This page displays the status and various statistics about the Trivial File Transfer Protocol (TFTP) server.

Figure 7-4. TFTP Page



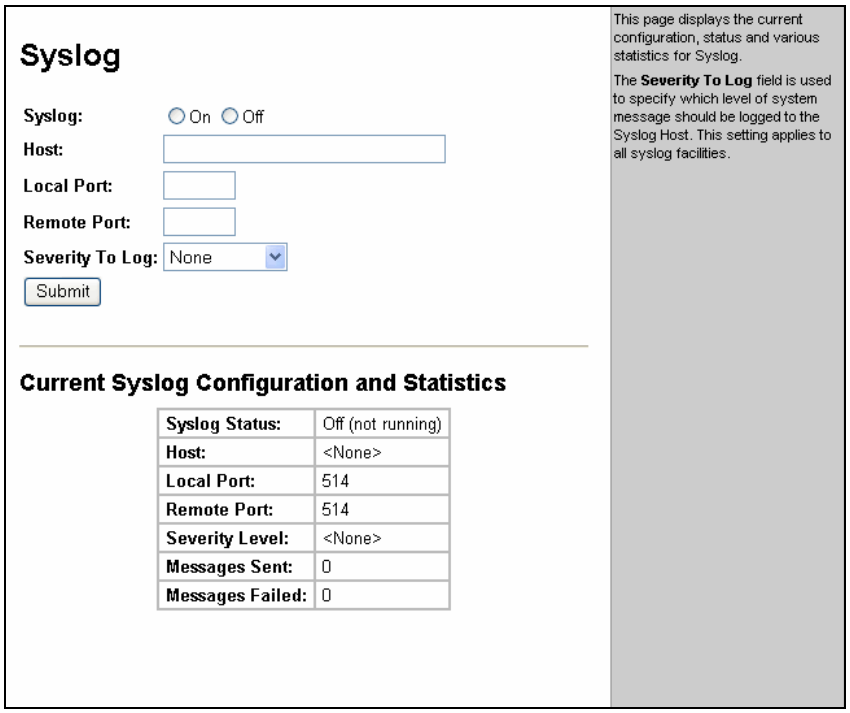
TFTP Page

TFTP Page Settings	Description
TFTP Server	Select whether the TFTP server is enabled. Choices are: **On** = TFTP server is enabled. (default) **Off** = TFTP server is disabled.
Allow TFTP File Creation	Select whether the TFTP server can create a file if it does not already exist. If you enable this feature, it exposes the XPress-I/O to possible Denial-of-Service (DoS) attacks against the filesystem. Choices are: **On** = files can be created by the TFTP server. **Off** = files cannot be created by the TFTP server. (default)

Syslog Page

Clicking the **Syslog** link in the menu bar displays the Syslog page. This page shows the current configuration, status, and statistics for the syslog. Here you can configure the syslog destination and the severity of the events to log.

Figure 7-5. Syslog Page



Syslog Page

Syslog Page Settings	Description
Host	Enter the IP address of the remote server from which system logs are sent for storage.
Local Port	Enter the number of the local port on the XPress-I/O from which system logs are sent. The default is 514. The system log is always saved to local storage, but it is not retained through reboots. Saving the system log to a server that supports remote logging services (see RFC 3164) allows the administrator to save the complete system log history.
Remote Port	Enter the number of the port on the remote server that supports logging services. The default is 514.
Severity to Log	From the drop-down box, select the minimum level of system message the XPress-I/O should log. This setting applies to all syslog facilities. The drop-down list is in descending order of severity, e.g., Emergency is more severe than Alert.

HTTP Pages

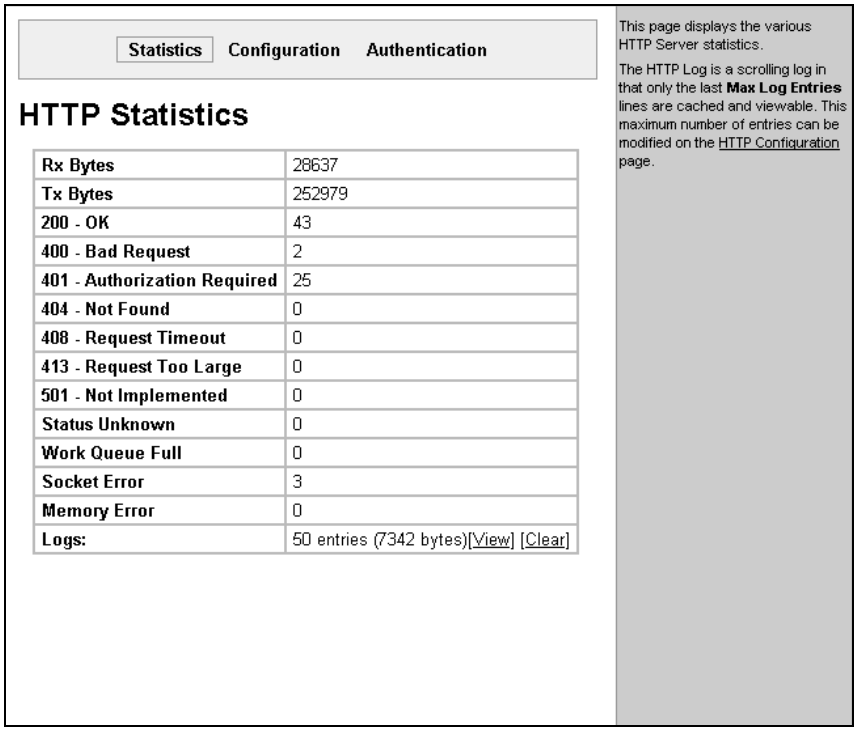
Clicking the **HTTP** link in the menu bar displays the HTTP Statistics page. This page has three links at the top for viewing statistics and for viewing and changing configuration and authentication settings.

HTTP Statistics Page

The HTTP Statistics page displays when you click **HTTP** in the menu bar. It also displays when you click **Statistics** at the top of one of the other HTTP pages. This read-only page shows various statistics about the Hyper Text Transfer Protocol (HTTP) server.

Note: *The HTTP log is a scrolling log, with the last Max Log Entries cached and viewable. To change the maximum number of entries that can be viewed, go to the HTTP Configuration page (described on page 75).*

Figure 7-6. HTTP Statistics Page



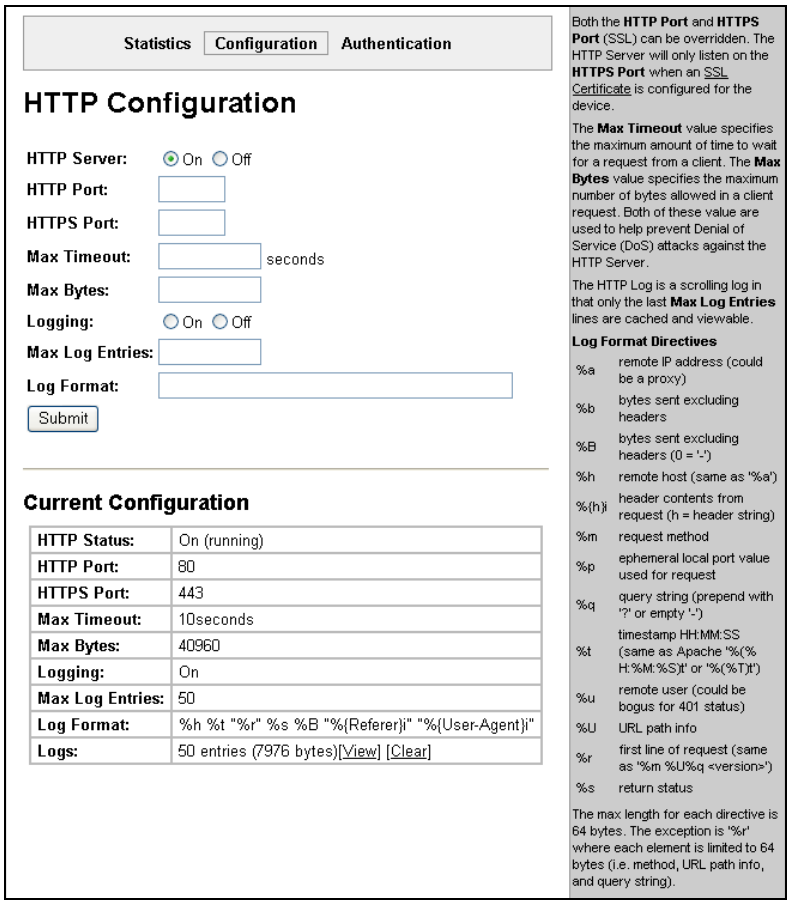
HTTP Configuration Page

If you click **Configuration** at the top of one of the HTTP pages, the HTTP Configuration page displays. Here you can change HTTP configuration settings.

Under **Current Configuration**, **Logs** has **View** and **Clear** links that let you view or clear the log. If you click **View**, the log displays. If you click **Clear**, a message asks whether you are sure you want to delete this information. Click **OK** to proceed or **Cancel** to cancel the operation.

Note: For help changing the format of the log, see Log Format Directives in the information area or page 78.

Figure 7-7. HTTP Configuration Page



HTTP Configuration Page

HTTP Configuration Page Settings	Description
HTTP Server	Select whether the HTTP server is enabled. Choices are: **On** = HTTP server is enabled. (default) **Off** = HTTP server is disabled.
HTTP Port	Enter the number of the port on which the XPress-I/O listens for incoming HTTP connections from a web browser. Default is 80.
HTTPS Port	Enter the number of the port on which the XPress-I/O listens for incoming HTTPS connections from a web browser. Default is 443. The XPress-I/O listens on the HTTPS port only when an SSL certificate has been configured for the device (see SSL on page 89).
Max Timeout	Enter the maximum number of seconds that the XPress-I/O waits for a request from a client. This value helps prevent Denial of Service (DoS) attacks against the HTTP Server. Default is 10 seconds.
Max Bytes	Enter the maximum number of bytes allowed in a client request. This value helps prevent Denial of Service (DoS) attacks against the HTTP Server. Default is 40960 bytes.
Logging	Select whether the HTTP log is enabled. Choices are: **On** = HTTP log is enabled. (default) **Off** = HTTP log is disabled.
Max Log Entries	Enter the maximum number of entries that can be cached and viewed in the HTTP log. The HTTP log is a scrolling log, with only the last Max Log Entries cached and viewable. Default is 50.
Log Format	Enter the format of the HTTP log. The log format directives are as follows: %a remote IP address (could be a proxy) %b bytes sent excluding headers %B bytes sent excluding headers (0 = '-') %h remote host (same as '%a') %{h}i header contents from request (h = header string) %m request method %p ephemeral local port value used for request %q query string (prepend with '?' or empty '-') %t timestamp HH:MM:SS (same as Apache '%(%H:%M:%S)t' or '%(%T)t') %u remote user (could be bogus for 401 status) %U URL path info %r first line of request (same as '%m %U%q <version>') %s return status The maximum length for each directive is 64 bytes. The exception is '%r' where each element is limited to 64 bytes (i.e. method, URL path info, and query string). The default log format string is: %h %t "%r" %s %B "%{Referer}i" "%{User-Agent}i"

HTTP Authentication Page

HTTP Authentication allows you to require usernames and passwords to access specific web pages or directories on the XPress-I/O's built-in web server.

For example, to add web pages to the XPress-I/O to control or monitor of a device attached to a port on the XPress-I/O, you can specify the user and password that can access that web page.

If you click **Authentication** at the top of one of the HTTP pages, the HTTP Authentication page displays. Here you can change HTTP authentication settings.

Under **Current Configuration**, **URI** and **Users** have a **Delete** link. If you click **Delete**, a message asks whether you are sure you want to delete this information. Click **OK** to proceed or **Cancel** to cancel the operation.

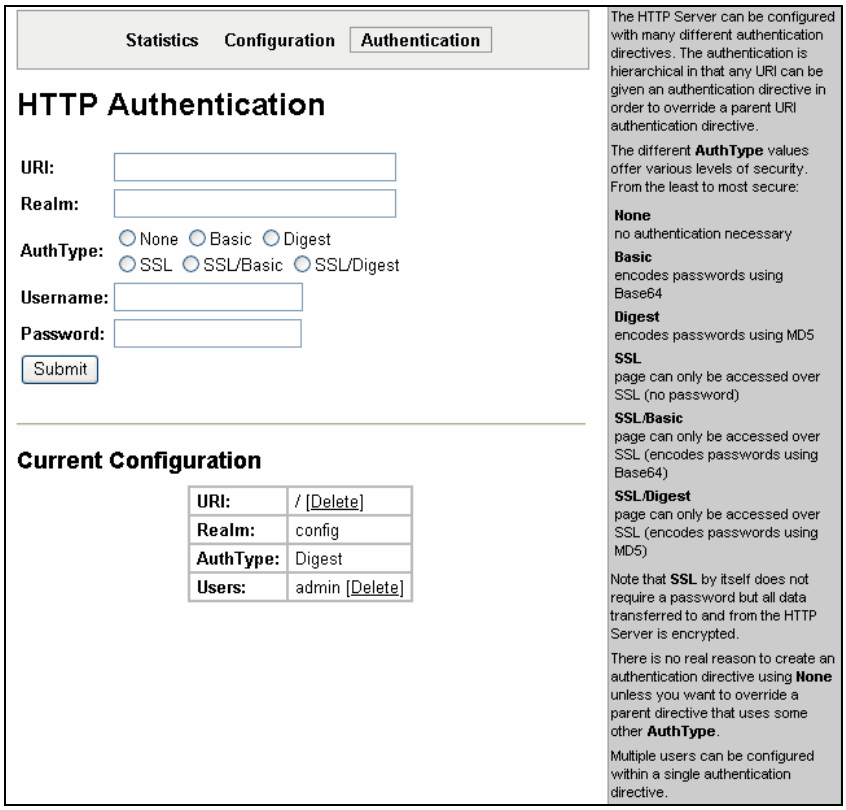
Example:

The following example shows how to add authentication to user-loaded web pages in a directory called port1control.

3. Create a directory called **port1control** in the XPress-I/O's file system (using an FTP client, Windows Explorer, or the XPress-I/O Web Manager).
4. Copy the custom web pages to this directory.
5. On the HTTP Authentication page of the XPress-I/O Web Manager, add:
   - A **URI** of **port1control**
   - A **Realm** of **Monitor**
   - An **AuthType** of **Digest**
   - A **Username** and **Password**
6. Click the **Submit** button. The XPress-I/O creates a username and password to allow the user to access all web pages located in the directory **port1control** in the XPress-I/O file system.

Note: *The URI, realm, username, and password are user-specified, free-form fields. The URI must match the directory created on the XPress-I/O file system. The URI and realm used in the example above are only examples and would typically be different as specified by the user.*

Figure 7-8. HTTP Authentication Page



HTTP Authentication Page

HTTP Authentication Page Settings	Description
URI	Enter the Uniform Resource Identifier (URI) of the resource that will participate in the authentication process. Default is /.
Realm	Enter the domain, or realm, used for HTTP operations. Default is <config>.
AuthType	Select an authorization type. Different types of authorization offer varying levels of security. Choices are (from least to most secure): **None** = no authentication necessary. **Basic** = encodes passwords using Base64. **Digest** = encodes passwords using MD5. (default) **SSL** = page can only be accessed over SSL (no password). **SSL/Basic** = page can only be accessed over SSL (encodes passwords using Base64). **SSL/Digest** = page can only be accessed over SSL (encodes passwords using MD5). SSL alone does not require a password, but all data transferred to and from the HTTP Server is encrypted. There is no reason to create an authentication directive using None, unless you want to override a

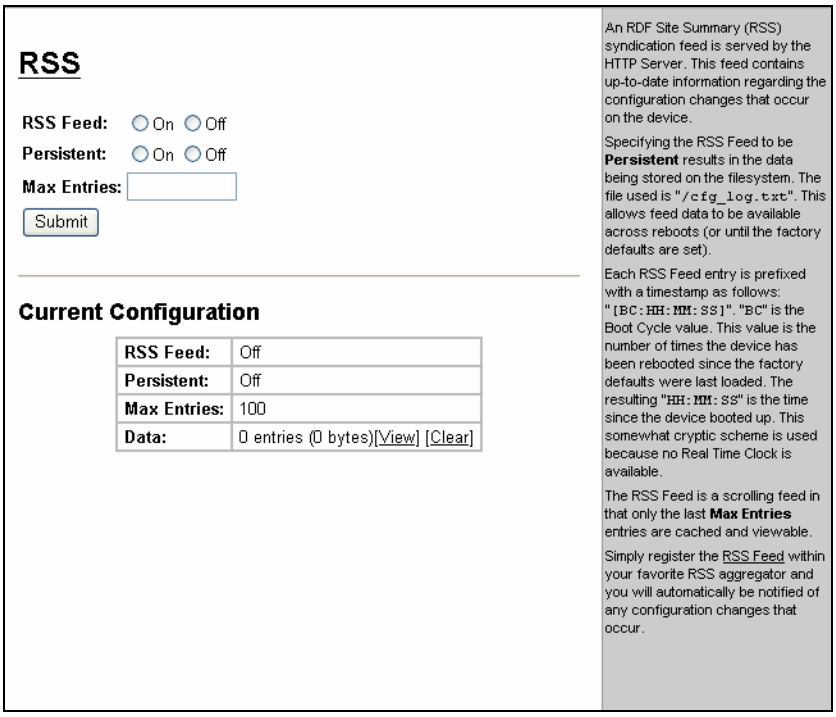
HTTP Authentication Page Settings	Description
	parent directive that uses some other **AuthType**. Multiple users can be configured within a single authentication directive.
Username	Enter the name of the user who will participate in the authentication. Default is admin.
Password	Enter the password that will be associated with the username. Default is PASS.

RSS Page

If you click **RSS** on the menu, the RSS page displays. Here you can specify Really Simple Syndication (RSS) information. RSS is a way of feeding online content to web users. Instead of actively searching for XPress-I/O configuration changes, RSS displays only relevant and new information regarding changes made to the XPress-I/O via an RSS publisher.

Under **Current Configuration**, **Data** has **View** and **Clear** links. If you click **View**, the data displays. If you click **Clear**, a message asks whether you are sure you want to delete this information. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 7-9. RSS Page



RSS Page

HTTP RSS Page Settings	Description
RSS Feed	Select whether an RSS feed is enabled or disabled. An RSS syndication feed is served by the HTTP server. This feed contains up-to-date information about configuration changes that occur on the XPress-I/O. Choices are: **On** = RSS feed is enabled. **Off** = RSS feed is disabled. (default)
Persistent	Select whether the RSS feed is persistent. Choices are: **On** = data is stored on the filesystem, in the file **/cfg_log.txt**. This allows feed data to be available across reboots or until the factory defaults are set. **Off** = data is not stored on the filesystem. (default)
Max Entries	Enter the maximum number of log entries. The RSS feed is a scrolling feed, with only the last **Max Entries** cached and viewable. To be notified automatically about any configuration changes that occur, register the RSS feed within your favorite RSS aggregator. Default is 100. Each RSS feed entry is prefixed with a timestamp [BC:HH:MM:SS]. BC is the Boot Cycle value and indicates the number of times the XPress-I/O has rebooted since factory defaults were last loaded. The resulting "HH:MM:SS" is the time since the XPress-I/O booted.

8: Security Settings

SSH Pages

Clicking the **SSH** link in the menu bar displays the SSH Server: Host Keys page. This page has four links at the top for viewing and changing SSH server host keys, SSH *server authorized keys, SSH client known hosts, and SSH client users.*

Note: *For more information, see SSH on page 144.*

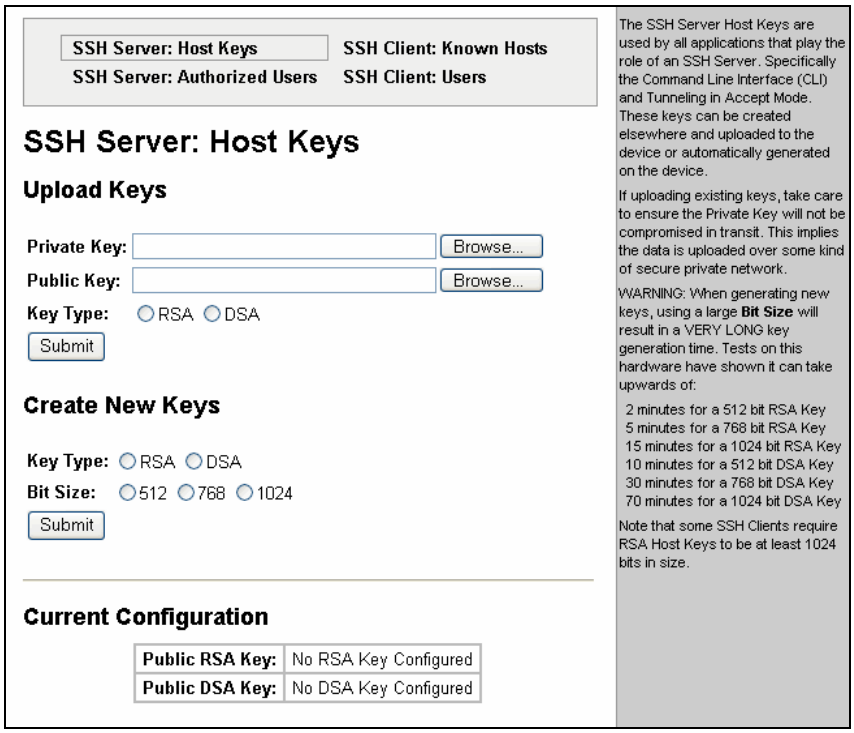
SSH Server: Host Keys Page

The SSH Server: Host Keys page displays when you click **SSH** in the menu bar. It also displays when you click **SSH Server: Host Keys** at the top of one of the other SSH pages. Here you can create new keys and upload them to an SSH server.

SSH server private and public host keys are used by all applications that play the role of an SSH server, specifically the CLI and tunneling in Accept mode. These keys can be created elsewhere and uploaded to the device, or automatically generated on the device.

Under **Current Configuration**, **Public RSA Key** and **Public DSA Key** have **View** and **Delete** links if these keys have been created. If you click **View**, the key displays. If you click **Delete**, a message asks whether you are sure you want to delete this information. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 8-1. SSH Server: Host Keys Page



SSH Server: Host Keys Page

SSH Server: Host Keys Page Settings	Description
Upload Keys	
Private Key	Enter the path and name of the existing private key you want to upload or use the **Browse** button to select the key. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
Public Key	Enter the path and name of the existing public key you want to upload or use the **Browse** button to select the key.
Key Type	Select a key type to be used. Choices are: **RSA** = use this key with SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Create New Keys	
Key Type	Select a key type to be used for the new key. Choices are: **RSA** = use this key with the SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Bit Size	Select a bit length for the new key. Choices are: **512** **768** **1024**

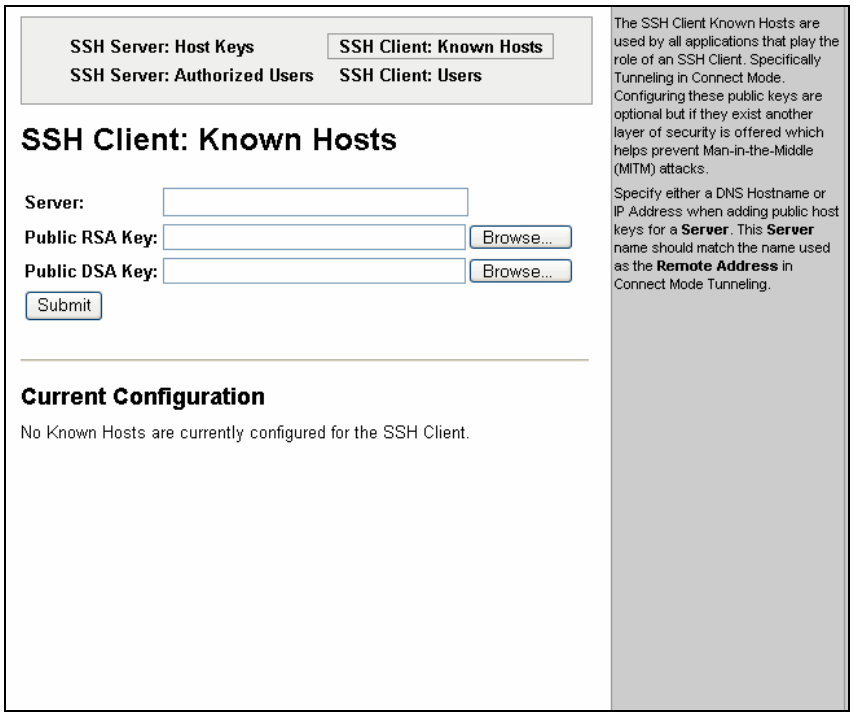
SSH Server: Host Keys Page Settings	Description
	Using a larger bit size takes more time to generate the key. Approximate times are: 10 seconds for a 512-bit RSA key 1 minute for a 768-bit RSA key 2 minutes for a 1024-bit RSA key 2 minutes for a 512-bit DSA key 10 minutes for a 768-bit DSA key 15 minutes for a 1024-bit DSA key Some SSH clients require RSA host keys to be at least 1024 bits long.

SSH Client: Known Hosts Page

If you click **SSH Client: Known Hosts** at the top of one of the SSH pages, the SSH Client: Known Hosts page displays. Here you can change SSH client settings for known hosts.

Note: *You do not have to complete the fields on this page for communication to occur. However, completing them adds another layer of security that protects against Man-In-The-Middle (MITM) attacks.*

Figure 8-2. SSH Client: Known Hosts Page



SSH Client: Known Hosts Page

SSH Client: Known Hosts Page Settings	Description
Server	Enter the name or IP address of a known host. If you entered a server name, the name should match the name of the server used as the **Remote Address** in Connect mode tunneling.
Public RSA Key	Enter the path and name of the existing public RSA key you want to use with this known host or use the **Browse** button to select the key.
Public DSA Key	Enter the path and name of the existing public DSA key you want to use with this known host or use the **Browse** button to select the key.

SSH Server: Authorized Users Page

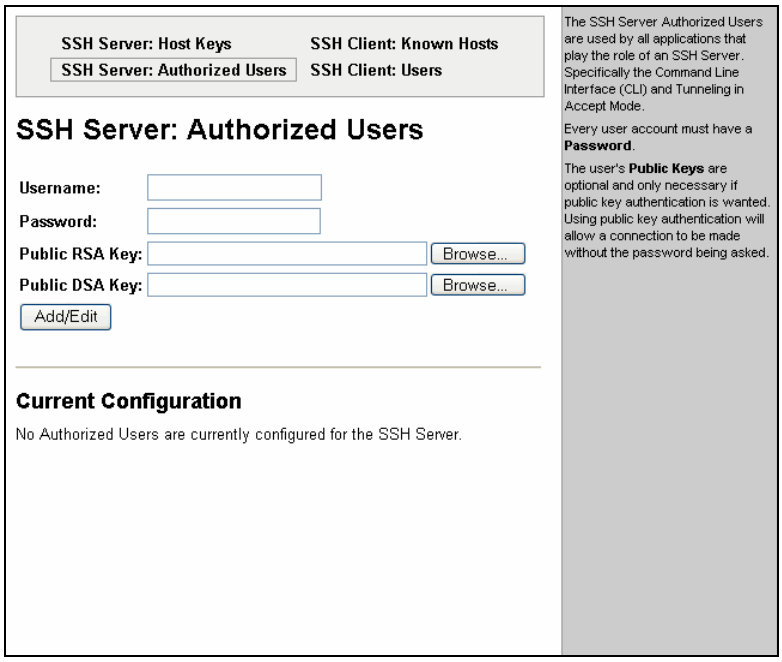
If you click **SSH Server: Authorized Users** at the top of one of the SSH pages, the SSH Server: Authorized Users page displays. Here you can change SSH server settings for authorized users.

SSH Server Authorized Users are accounts on the XPress-I/O that can be used to log into the XPress-I/O via SSH. For instance, these accounts can be used to SSH into the CLI or open an SSH connection to a device port. Every account must have a password.

The user's public keys are optional and only necessary if public key authentication is wanted. Using public key authentication allows a connection to be made without the password being asked.

Under **Current Configuration**, **User** has a **Delete User** link, and **Public RSA Key** and **Public DSA Key** have **View Key** and **Delete Key** links. If you click a **Delete** link, a message asks whether you are sure you want to delete this information. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 8-3. SSH Server: Authorized Users Page



SSH Server: Authorized Users Page

SSH Server: Authorized Users Page Settings	Description
Username	Enter the name of the user authorized to access the SSH server.
Password	Enter the password associated with the username.
Public RSA Key	Enter the path and name of the existing public RSA key you want to use with this user or use the **Browse** button to select the key. If authentication is successful with the key, no password is required.
Public DSA Key	Enter the path and name of the existing public DSA key you want to use with this user or use the **Browse** button to select the key. If authentication is successful with the key, no password is required.

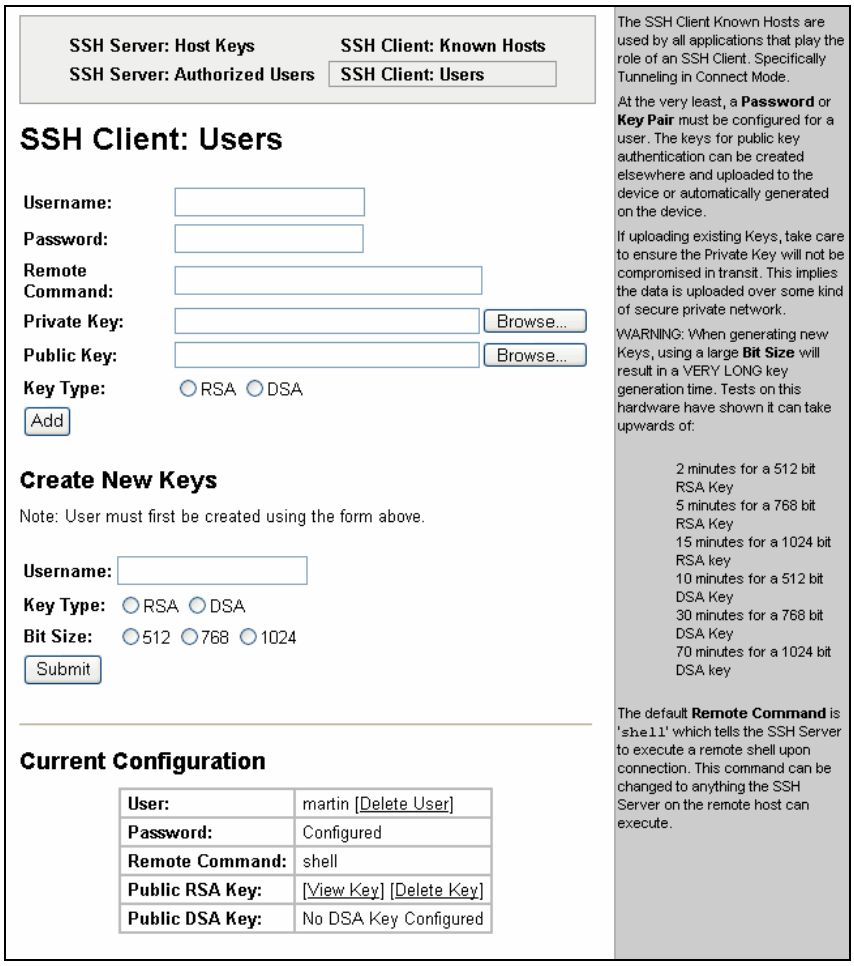
SSH Client: Users Page

If you click **SSH Client: Users** at the top of one of the SSH pages, the SSH Client: Users page displays. Here you can change SSH client settings for users.

SSH client known hosts are used by all applications that play the role of an SSH client, specifically tunneling in Connect mode. At the very least, a password or key pair must be configured for a user. The keys for public key authentication can be created elsewhere and uploaded to the device or automatically generated on the device. If uploading existing keys, be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

Note: *If you are providing a key by uploading a file, make sure that the key is not password protected.*

Figure 8-4. SSH Client: Users Page



SSH Client: Users Page

SSH Client: Users Page Settings	Description
Username	Enter the name that the XPress-I/O uses to connect to the SSH client user.
Password	Enter the password associated with the username.
Remote Command	Enter the command that can be executed remotely. Default is “shell,” which tells the SSH server to execute a remote shell upon connection. This command can be changed to anything the remote host can perform.
Private Key	Enter the name of the existing private key you want to use with this SSH client user. You can either enter the path and name of the key, or use the **Browse** button to select the key.
Public Key	Enter the path and name of the existing public key you want to use with this SSH client user or use the **Browse** button to select the key.
Key Type	Select the key type to be used. Choices are:

SSH Client: Users Page Settings	Description
	RSA = use this key with the SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Create New Keys	
Username	Enter the name of the user associated with the new key.
Key Type	Select the key type to be used for the new key. Choices are: **RSA** = use this key with the SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Bit Size	Select the bit length of the new key. Choices are: **512** **768** **1024** Using a larger Bit Size takes more time to generate the key. Approximate times are: 10 seconds for a 512-bit RSA key 1 minute for a 768-bit RSA key 2 minutes for a 1024-bit RSA key 2 minutes for a 512-bit DSA key 10 minutes for a 768-bit DSA key 15 minutes for a 1024-bit DSA key Some SSH clients require RSA host keys to be at least 1024 bits long.

SSL Page

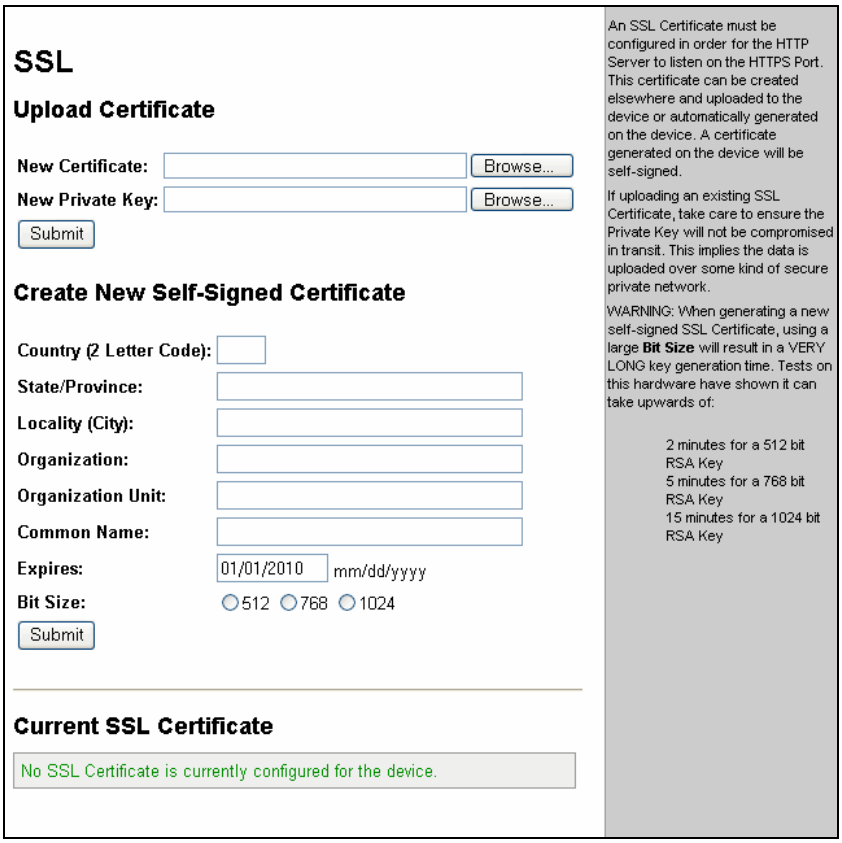
Clicking the **SSL** link in the menu bar displays the SSL page. Here you can upload an existing SSL certificate or create a new self-signed one.

Note: For more information about SSL, see SSL on page 142.

An SSL certificate must be configured for the HTTP server to listen on the HTTPS port. This certificate can be created elsewhere and uploaded to the device or automatically generated on the device. A certificate generated on the device will be self-signed. If uploading an existing SSL certificate, be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

At the bottom of this page is the current SSL certificate, if any. Under **Current SSL Certificate**, there is a **Delete** link. If you click **Delete**, a message asks whether you are sure you want to delete the current certificate. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 8-5. SSL Page



SSL Page

SSL Page Settings	Description
Upload Certificate	
New Certificate	Enter the path and name of the existing certificate you want to upload, or use the **Browse** button to select the certificate.
New Private Key	Enter the path and name of the existing private key you want to upload, or use the **Browse** button to select the private key.
Create New Self-Signed Certificate	
Country (2 Letter Code)	Enter the 2-letter country code to be assigned to the new self-signed certificate. Examples: US for United States and CA for Canada
State/Province	Enter the state or province to be assigned to the new self-signed certificate.
Locality (City)	Enter the city or locality to be assigned to the new self-signed certificate.
Organization	Enter the organization to be associated with the new self-signed certificate. **Example:** If your company is called Widgets, and you are setting up a web server for the Sales department, enter Widgets for the Organization.
Organization Unit	Enter the organizational unit to be associated with the new self-signed certificate. **Example:** If your company is setting up a web server for the Sales department, enter Sales for your Organizational Unit.
Common Name	Enter the same name that the user will enter when requesting your web site. **Example:** If a user enters http://www.widgets.abccompany.com to access your web site, the **Common Name** would be www.widgets.abccompany.com.
Expires	Enter the expiration date, in mm/dd/yyyy format, for the new self-signed certificate. **Example:** An expiration date of May 9, 2007 is entered as 05/05/2007.
Bit Size	Select the bit size of the new self-signed certificate. Choices are: **512** **768** **1024** Using a larger bit size takes more time to generate the key. Approximate times are: 10 seconds for a 512-bit RSA key 1 minute for a 768-bit RSA key 2 minutes for a 1024-bit RSA key

9: Maintenance and Diagnostics Settings

Filesystem Pages

Clicking the **Filesystem** link in the menu bar displays the Filesystem Statistics page. This page has two links at the top for viewing filesystem statistics and browsing and manipulating the entire filesystem.

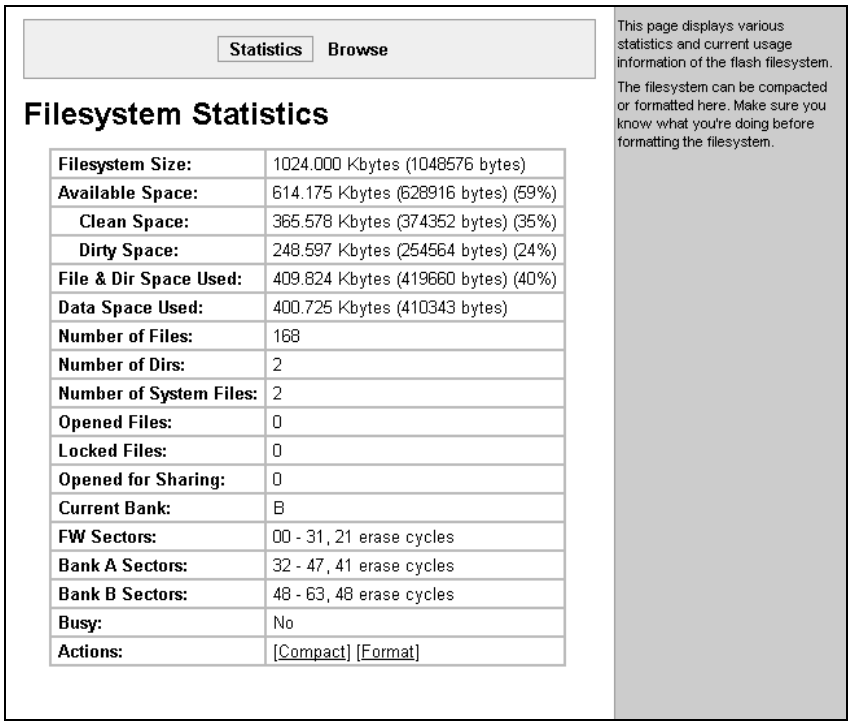
Filesystem Statistics Page

The Filesystem Statistics page displays when you click **Filesystem** in the menu bar. It also displays when you click **Statistics** at the top of the Filesystem Browser page. This page displays various statistics and current usage information of the flash filesystem.

The **Actions** row provides **Compact** and **Format** links for compacting or formatting the filesystem. Only a system administrator should perform these tasks.

*Note: **Compact** preserves data and eliminates dirty space by making a new copy. **Format** destroys all of the data in the filesystem.*

Figure 9-1. Filesystem Statistics Page



Statistics Browse

Filesystem Statistics

Filesystem Size:	1024.000 Kbytes (1048576 bytes)
Available Space:	614.175 Kbytes (628916 bytes) (59%)
Clean Space:	365.578 Kbytes (374352 bytes) (35%)
Dirty Space:	248.597 Kbytes (254564 bytes) (24%)
File & Dir Space Used:	409.824 Kbytes (419660 bytes) (40%)
Data Space Used:	400.725 Kbytes (410343 bytes)
Number of Files:	168
Number of Dirs:	2
Number of System Files:	2
Opened Files:	0
Locked Files:	0
Opened for Sharing:	0
Current Bank:	B
FW Sectors:	00 - 31, 21 erase cycles
Bank A Sectors:	32 - 47, 41 erase cycles
Bank B Sectors:	48 - 63, 48 erase cycles
Busy:	No
Actions:	[Compact] [Format]

This page displays various statistics and current usage information of the flash filesystem.

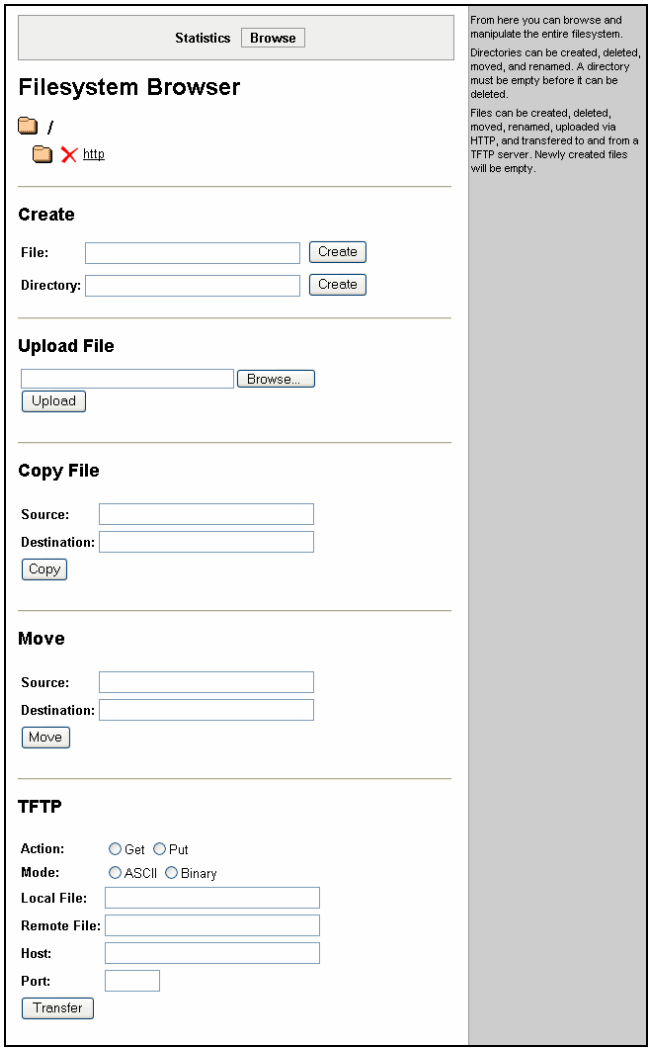
The filesystem can be compacted or formatted here. Make sure you know what you're doing before formatting the filesystem.

Filesystem Browser Page

If you click **Browse** at the top of a Filesystem page, the Filesystem Browser page displays. Here you can browse and manipulate the entire filesystem. For example, you can:

- Browse the filesystem.
- Create files and directories.
- Upload files via HTTP.
- Copy and move files.
- Transfer files to and from a TFTP server.

Figure 9-2. Filesystem Browser Page



Filesystem Browser Page

Filesystem Browser Page Settings	Description
Create	
File	Enter the name of the file you want to create, and then click **Create**.
Directory	Enter the name of the directory you want to create, and then click **Create**.
Upload File	Enter the path and name of the file you want to upload via HTTP or use the **Browse** button to select the file, and then click **Upload**.
Copy File	
Source	Enter the location where the file you want to copy resides.
Destination	Enter the location where you want the file copied. After you specify a source and destination, click **Copy** to copy the file.
Move	
Source	Enter the location where the file you want to move resides.
Destination	Enter the location where you want the file moved. After you specify a source and destination, click **Move** to move the file.
TFTP	
Action	Select the action that is to be performed via TFTP. Choices are: **Get** = a “get” command will be executed to store a file locally. **Put** = a “put” command will be executed to send a file to a remote location.
Mode	Select a TFTP mode to use. Choices are: **ASCII** **Binary**
Local File	Enter the name of the local file on which the specified “get” or “put” action is to be performed.
Remote File	Enter the name of the file at the remote location that is to be stored locally (“get’) or externally (“put”).
Host	Enter the IP address or name of the host involved in this operation.
Port	Enter the number of the port involved in TFTP operations. Click **Transfer** to complete the TFTP transfer.

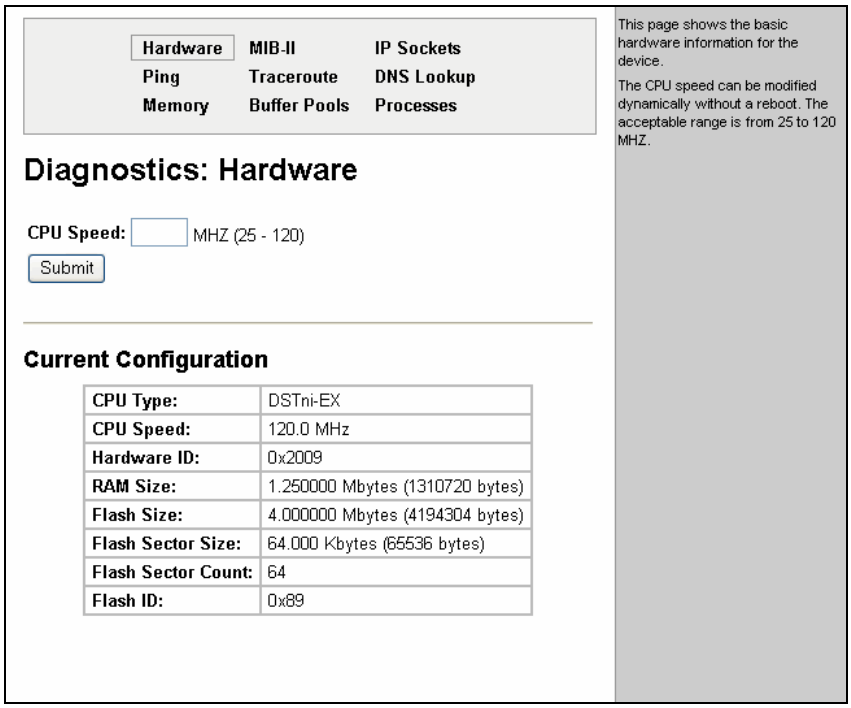
Diagnostics Pages

The XPress-I/O has several tools for performing diagnostics. To view these diagnostic tools, click the **Diagnostics** link in the menu bar to display the Diagnostics: Hardware page. The available diagnostic tools appear at the top of the page.

Diagnostics: Hardware Page

The Diagnostics: Hardware page displays when you click **Diagnostics** in the menu bar. It also displays when you click **Hardware** at the top of one of the other Diagnostic pages. This read-only page displays the current hardware configuration.

Figure 9-3. Diagnostics: Hardware Page

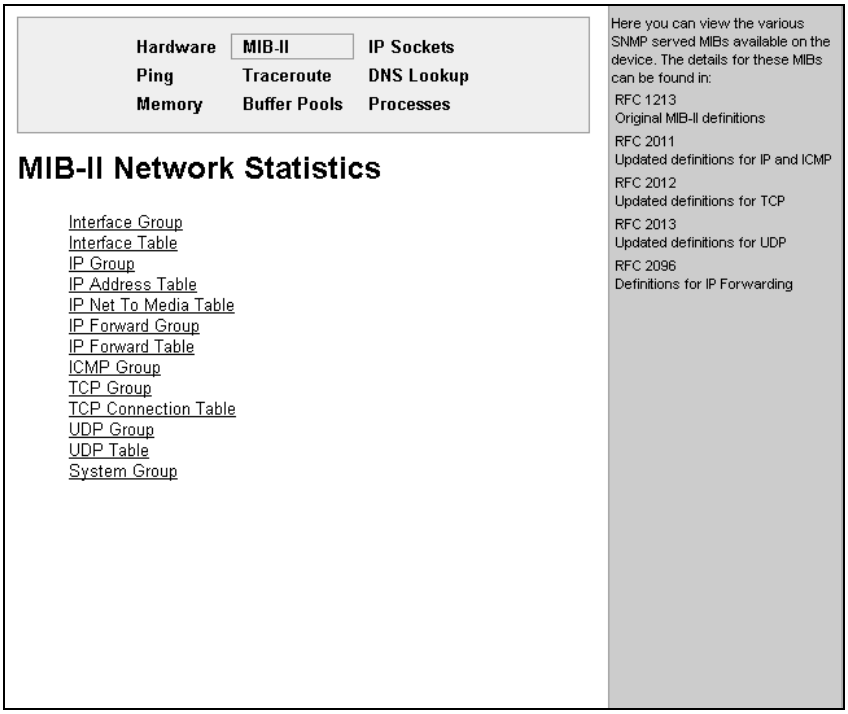


MIB-II Network Statistics Page

Clicking **MIB-II Stats** from one of the Diagnostics pages displays the MIB-II Network Statistics page. This page displays the various SNMP-served Management Information Bases (MIBs) available on the XPress-I/O. Information about these MIBs can be found in the following Request for Comments (RFCs):

- RFC 1213, Original MIB-II definitions
- RFC 2011, Updated definitions for IP and ICMP
- RFC 2012, Updated definitions for TCP
- RFC 2013, Updated definitions for UDP
- RFC 2096, Definitions for IP Forwarding

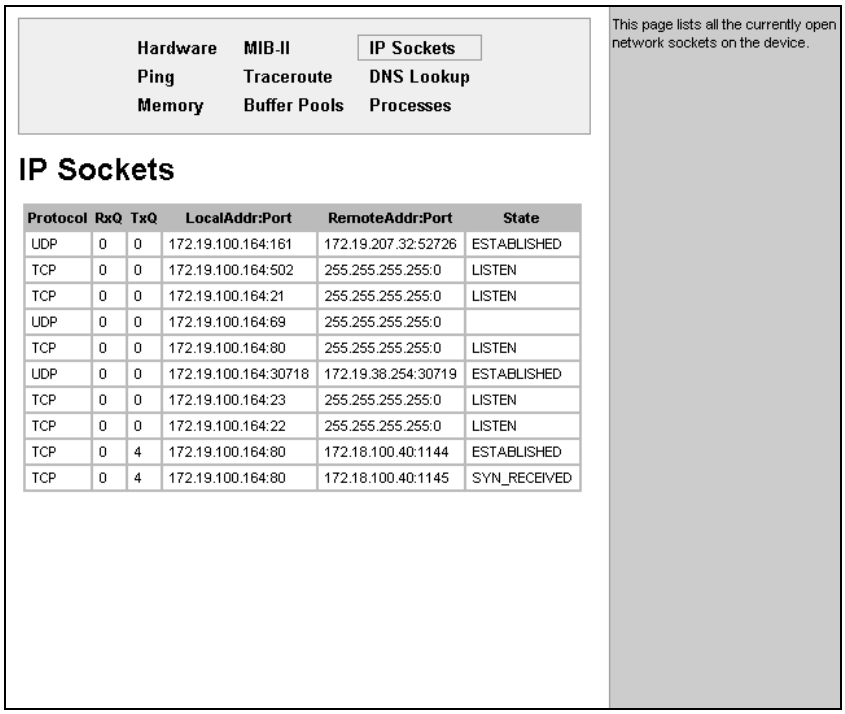
Figure 9-4. MIB-II Network Statistics Page



IP Sockets Page

Clicking **IP Sockets** from one of the Diagnostics pages displays the IP Sockets page. This read-only page lists all the network sockets on the XPress-I/O that are currently open.

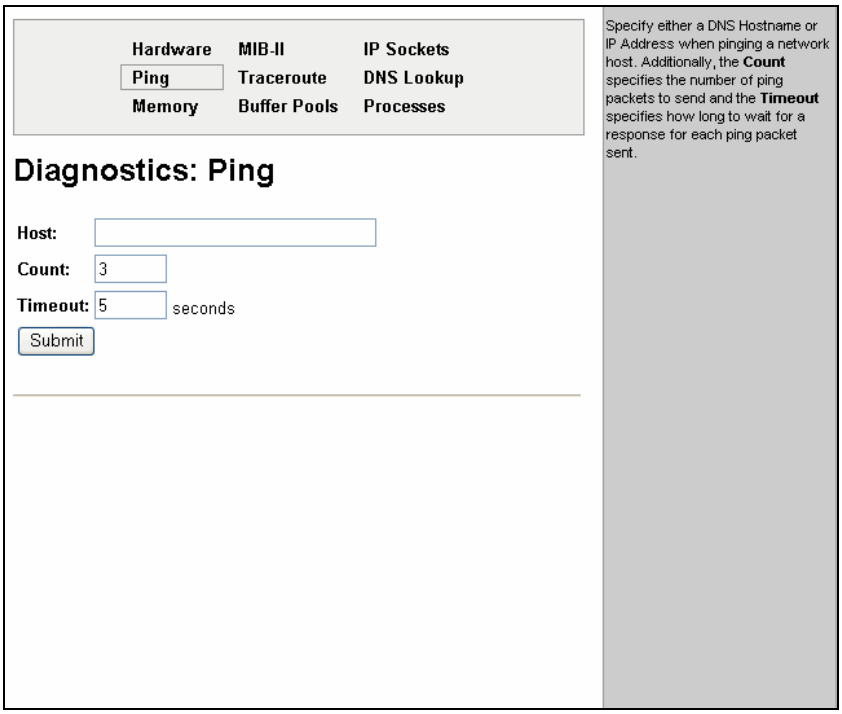
Figure 9-5. IP Sockets Page



Protocol	RxQ	TxQ	LocalAddr:Port	RemoteAddr:Port	State
UDP	0	0	172.19.100.164:161	172.19.207.32:52726	ESTABLISHED
TCP	0	0	172.19.100.164:502	255.255.255.255:0	LISTEN
TCP	0	0	172.19.100.164:21	255.255.255.255:0	LISTEN
UDP	0	0	172.19.100.164:69	255.255.255.255:0	
TCP	0	0	172.19.100.164:80	255.255.255.255:0	LISTEN
UDP	0	0	172.19.100.164:30718	172.19.38.254:30719	ESTABLISHED
TCP	0	0	172.19.100.164:23	255.255.255.255:0	LISTEN
TCP	0	0	172.19.100.164:22	255.255.255.255:0	LISTEN
TCP	0	4	172.19.100.164:80	172.18.100.40:1144	ESTABLISHED
TCP	0	4	172.19.100.164:80	172.18.100.40:1145	SYN_RECEIVED

Diagnostics: Ping Page

Figure 9-6 Diagnostics: Ping Page



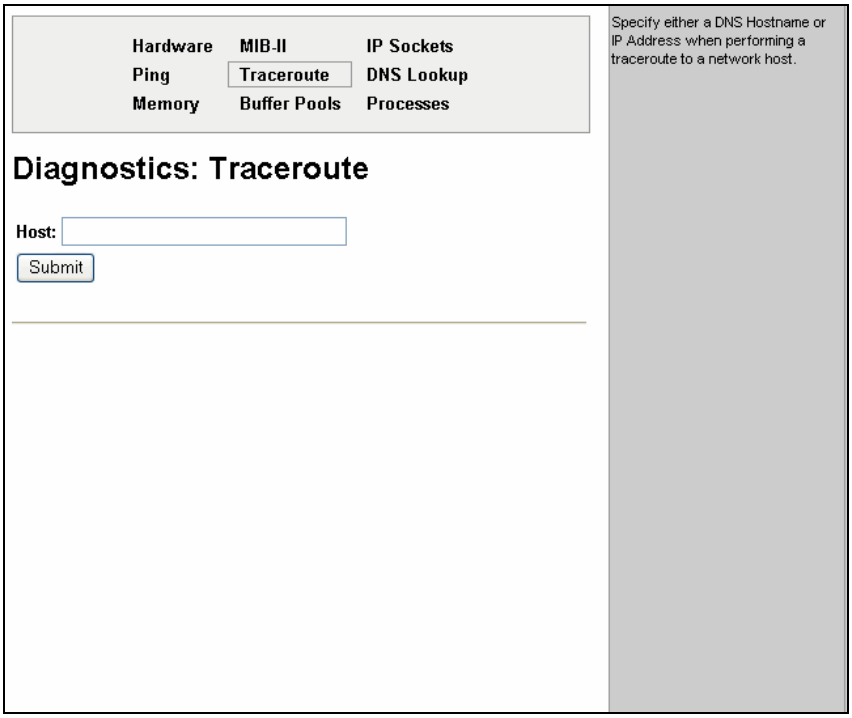
Diagnostics: Ping Page

Diagnostics: Ping Page Settings	Description
Host	Enter the IP address you want the XPress-I/O to ping.
Count	Enter the number of ping packets that the XPress-I/O should try to send to the Host. Default is 3.
Timeout	Enter the maximum number of seconds that the XPress-I/O should wait for a response from the host before timing out. Default is 5 seconds.

Diagnostics: Traceroute Page

Clicking **Traceroute** from one of the Diagnostics pages displays the Diagnostics: Traceroute page. Here you can trace a packet from the XPress-I/O to an Internet host, showing how many hops the packet requires to reach the host and how long each hop takes. If you visit a web site whose pages appear slowly, you can use traceroute to determine where the longest delays are occurring.

Figure 9-7 Diagnostics: Traceroute Page



Diagnostics: Traceroute Page

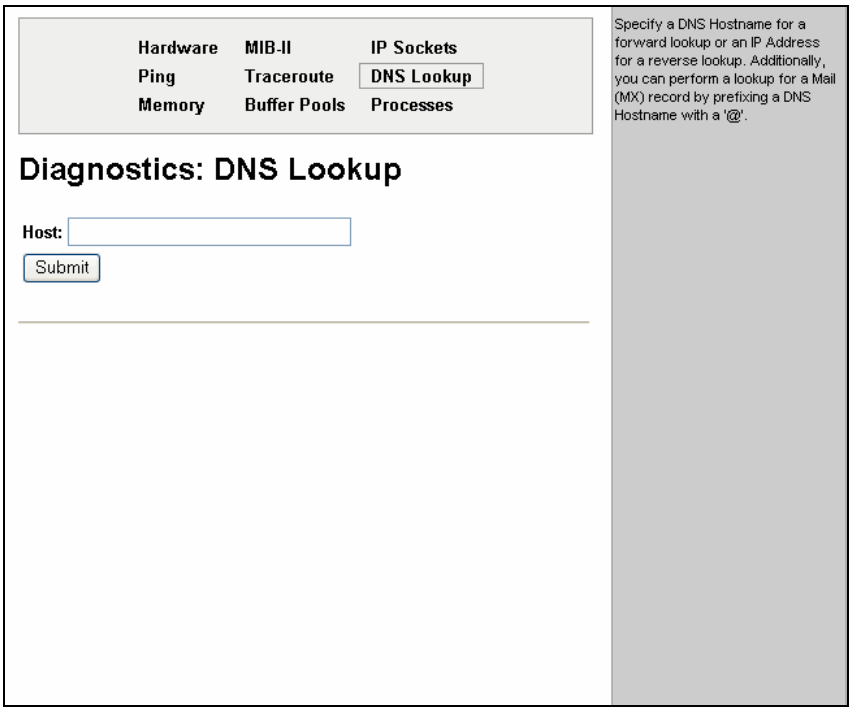
Diagnostics: Traceroute Page Settings	Description
Host	Enter the IP address or DNS host name of the remote host that you want to traceroute from the XPress-I/O.

Diagnostics: DNS Lookup Page

Clicking **DNS Lookup** from one of the Diagnostics pages displays the Diagnostics: DNS Lookup page. Here you can specify a DNS Hostname for a forward lookup or an IP address for a reverse lookup. You can also perform a lookup for a Mail (MX) record by prefixing a DNS Hostname with @.

Note: *A DNS server must be configured for traceroute to work.*

Figure 9-8 Diagnostics: DNS Lookup Page



Diagnostics: DNS Lookup Page

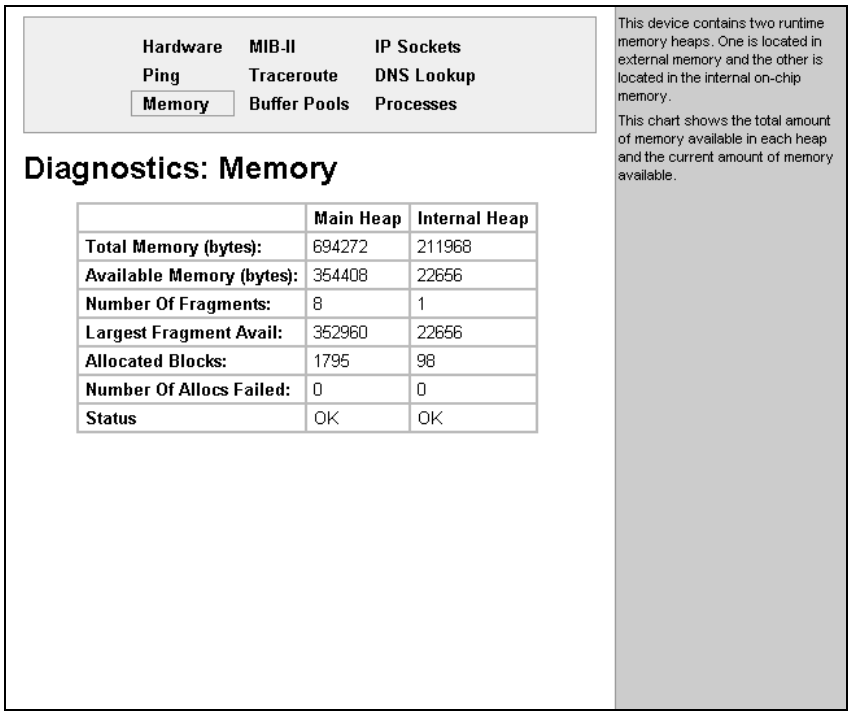
Diagnostics: DNS Lookup Page Settings	Description
Host	Perform one of the following: For reverse lookup to locate the hostname for that IP address, enter an IP address. For forward lookup to locate the corresponding IP address, enter a hostname. To look up the Mail Exchange (MX) record IP address, enter a domain name prefixed with @.

Diagnostics: Memory Page

Clicking **Memory** from one of the Diagnostics pages displays the Diagnostics: Memory. This read-only page shows the total memory and available memory (in bytes), along with the number of fragments, allocated blocks, and memory status.

The Diagnostics: Memory page also shows the current amount of available memory.

Figure 9-9 Diagnostics: Memory Page

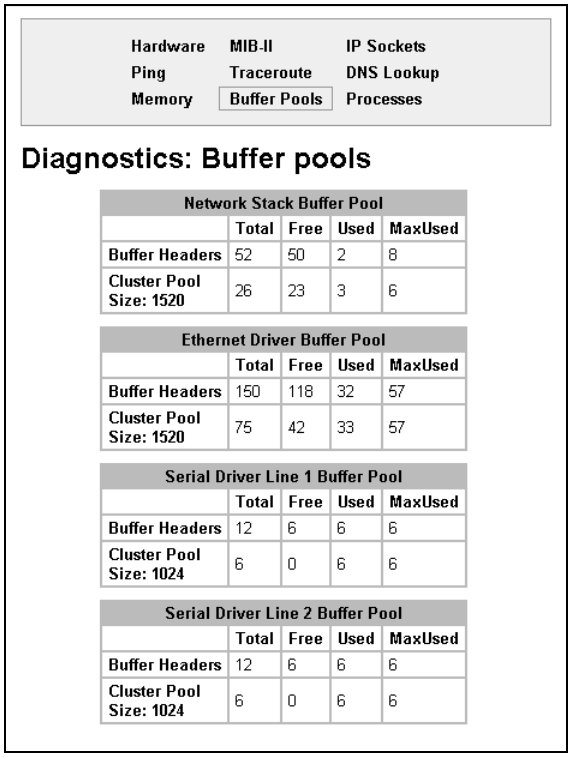


	Main Heap	Internal Heap
Total Memory (bytes):	694272	211968
Available Memory (bytes):	354408	22656
Number Of Fragments:	8	1
Largest Fragment Avail:	352960	22656
Allocated Blocks:	1795	98
Number Of Allocs Failed:	0	0
Status	OK	OK

Diagnostics: Buffer Pool

Clicking **Buffer Pools** from one of the diagnostics page displays a read-only screen that shows the current usage of the private buffer pools. Private buffer pools are used in various parts of the system to ensure deterministic memory management, thus eliminating any contention for memory from the generic heap space.

Figure 9-10. Diagnostics: Buffer Pools Page



Hardware	MIB-II	IP Sockets
Ping	Traceroute	DNS Lookup
Memory	Buffer Pools	Processes

Diagnostics: Buffer pools

Network Stack Buffer Pool				
	Total	Free	Used	MaxUsed
Buffer Headers	52	50	2	8
Cluster Pool Size: 1520	26	23	3	6

Ethernet Driver Buffer Pool				
	Total	Free	Used	MaxUsed
Buffer Headers	150	118	32	57
Cluster Pool Size: 1520	75	42	33	57

Serial Driver Line 1 Buffer Pool				
	Total	Free	Used	MaxUsed
Buffer Headers	12	6	6	6
Cluster Pool Size: 1024	6	0	6	6

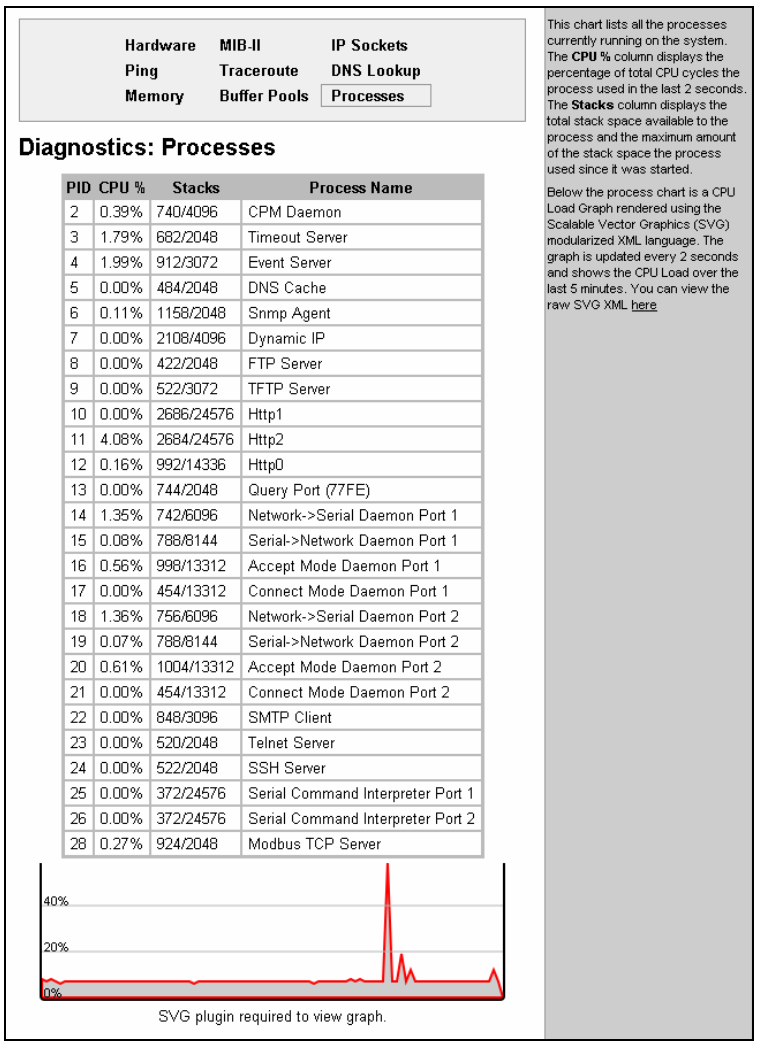
Serial Driver Line 2 Buffer Pool				
	Total	Free	Used	MaxUsed
Buffer Headers	12	6	6	6
Cluster Pool Size: 1024	6	0	6	6

Diagnostics: Processes Page

Clicking **Processes** from one of the diagnostics page displays a read-only screen that lists all processes running on the XPress-I/O.

- The **CPU %** column displays the percentage of total CPU cycles a process used in the last two seconds.
- The **Stacks** column displays the total stack space available to the process and the maximum amount of the stack space the process used since it was started.

Figure 9-11. Diagnostics: Processes Page



Hardware | MIB-II | IP Sockets
Ping | Traceroute | DNS Lookup
Memory | Buffer Pools | Processes

Diagnostics: Processes

PID	CPU %	Stacks	Process Name
2	0.39%	740/4096	CPM Daemon
3	1.79%	682/2048	Timeout Server
4	1.99%	912/3072	Event Server
5	0.00%	484/2048	DNS Cache
6	0.11%	1158/2048	Snmp Agent
7	0.00%	2108/4096	Dynamic IP
8	0.00%	422/2048	FTP Server
9	0.00%	522/3072	TFTP Server
10	0.00%	2686/24576	Http1
11	4.08%	2684/24576	Http2
12	0.16%	992/14336	Http0
13	0.00%	744/2048	Query Port (77FE)
14	1.35%	742/6096	Network->Serial Daemon Port 1
15	0.08%	788/8144	Serial->Network Daemon Port 1
16	0.56%	998/13312	Accept Mode Daemon Port 1
17	0.00%	454/13312	Connect Mode Daemon Port 1
18	1.36%	756/6096	Network->Serial Daemon Port 2
19	0.07%	788/8144	Serial->Network Daemon Port 2
20	0.61%	1004/13312	Accept Mode Daemon Port 2
21	0.00%	454/13312	Connect Mode Daemon Port 2
22	0.00%	848/3096	SMTP Client
23	0.00%	520/2048	Telnet Server
24	0.00%	522/2048	SSH Server
25	0.00%	372/24576	Serial Command Interpreter Port 1
26	0.00%	372/24576	Serial Command Interpreter Port 2
28	0.27%	924/2048	Modbus TCP Server

SVG plugin required to view graph.

This chart lists all the processes currently running on the system. The **CPU %** column displays the percentage of total CPU cycles the process used in the last 2 seconds. The **Stacks** column displays the total stack space available to the process and the maximum amount of the stack space the process used since it was started.

Below the process chart is a CPU Load Graph rendered using the Scalable Vector Graphics (SVG) modularized XML language. The graph is updated every 2 seconds and shows the CPU Load over the last 5 minutes. You can view the raw SVG XML here

Below the process chart is a CPU Load Graph that shows the CPU load over the last five minutes. The XPress-I/O generates the graph using the Scalable Vector Graphics (SVG) modularized XML language and updates every two seconds. The information area contains a link for viewing the raw SVG XML.

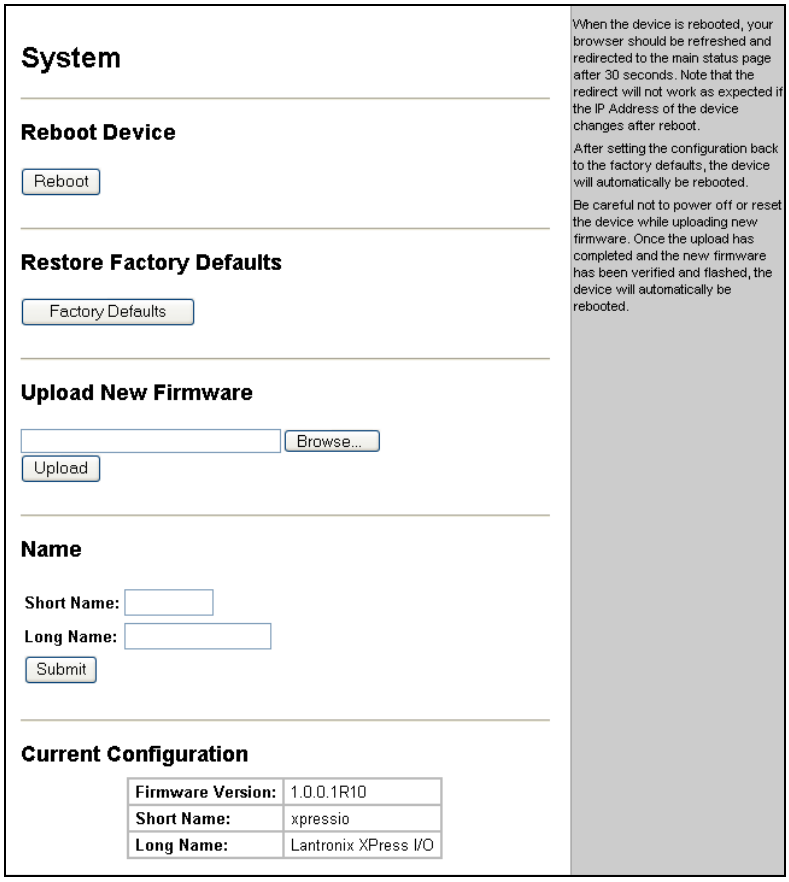
Note: *The SVG plug-in is available on the Internet.*

System Page

Clicking the **System** link in the menu bar displays the System page. Here you can:

- Reboot the XPress-I/O.
- Restore factory defaults.
- Upload new firmware.
- Assign short and long names to the XPress-I/O.
- Change time settings.

Figure 9-12. System Page



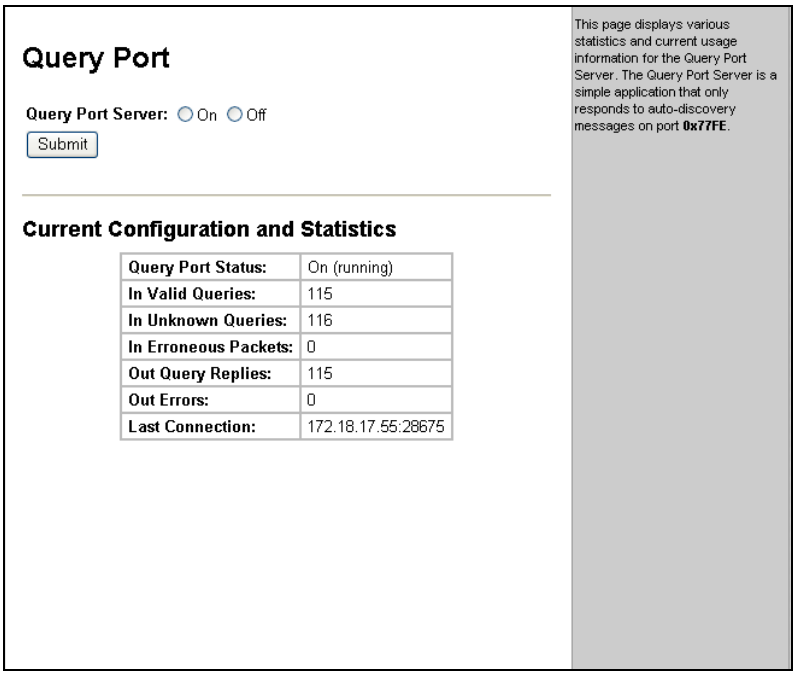
System Page

System Page Settings	Description
Reboot Device	Click the **Reboot** button to reboot the XPress-I/O. When the XPress-I/O reboots, refresh your web browser and redirect it to the IP address for the XPress-I/O.
Restore Factory Defaults	Click the **Factory Defaults** button to return the XPress-I/O to its factory-default configuration. A: Factory Default Configuration identifies the factory-default configuration. If you restore the factory default configuration, the XPress-I/O reboots automatically.
Upload New Firmware	Lets you update the XPress-I/O firmware. Do not power off or reset the XPress-I/O while uploading new firmware. Once the upload has completed and the new firmware has been verified and flashed, the XPress-I/O reboots automatically. For instructions about upgrading firmware, see 11: Updating Firmware on page 123.
Name	Enter the short name and long name for the XPress-I/O. Default short name is xpressio and default long name is Lantronix XPress-I/O.
Change Time Settings	Lets you specify the system time zone, date, and time. After changing any of these settings, click the **Submit** button next to the field to accept the change.

Query Port Page

Clicking the **Query Port** link in the menu bar displays the Query Port page. This page displays statistics and current usage information about the query port server. The query port server is an application that only responds to auto-discovery messages on port 0x77FE. It is used when DeviceInstaller is used to discover the XPress-I/O automatically.

Figure 9-13. Query Port Page



Query Port Page

Query Port Page Settings	Description
Query Port Server	Select whether the query port server is enabled or disabled. Choices are: **On** = query port server is enabled. (default) **Off** = query port server is disabled.

10: Advanced Settings

Input/Output Page

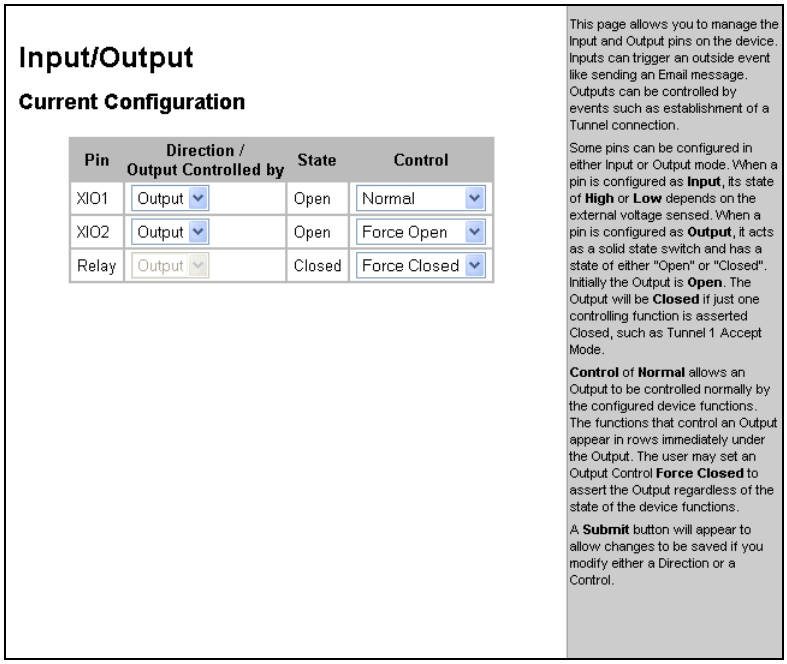
The XPress-IO has two digital input/outputs (I/Os) and a relay. This page allows you to manage the digital I/Os on the XPress-IO. Inputs can monitor external devices that have digital outputs and trigger an outside event like sending an email message. Tunnel connections can use outputs to control external devices.

You can monitor or control digital I/Os on the Tunnel Connect and Tunnel Accept pages. The Input/Output page enables you to manually control the digital output and relay.

Input/Output Page

The Input/Output page displays when you click **Input/Output** in the menu bar. A **Submit** button displays if you modify either a direction or a control. Clicking **Submit** applies changes immediately to the XPress-IO.

Figure 10-1. Input Output Page



Input/Output Page

Input/Output Page Settings	Description
Pin	Identifies the configurable pins and the relay.
Direction	Select the direction of data flow. Choices are: **Input** = pin is set to read input **Output** = pin is set to drive data out of the XPress-IO .
Output Controlled by	The functions that control an output display in rows below the output.
State	Displays the state of an input or output pin. The state of an input pin, **High** or **Low**, depends on the external voltage sensed. When a pin is configured as output, it acts as a solid state switch and has a state of either **Open** or **Closed**. Initially the output is **Open**. The Output is **Closed** if just one controlling function is asserted **Closed**, such as in Tunnel1 Connect Mode.
Control	Select the output controls. Choices are: **Normal** = allows an output to be controlled normally by the configured device functions **Force Closed** = asserts the output as **Closed** regardless of the state of the device functions. For example, even if other functions within the XPress-IO have not changed the pin state, you can still force the output state closed manually. **Force Open**: asserts the output as **Open** regardless of the state of the device functions. For example, even if other functions within the XPress-IO have not changed the pin state, you can still force the output state closed manually.
RSS Trace transitions	A change in the state of a pin triggers the XPress-IO to send an RSS feed. Primarily used for troubleshooting.

Email Pages

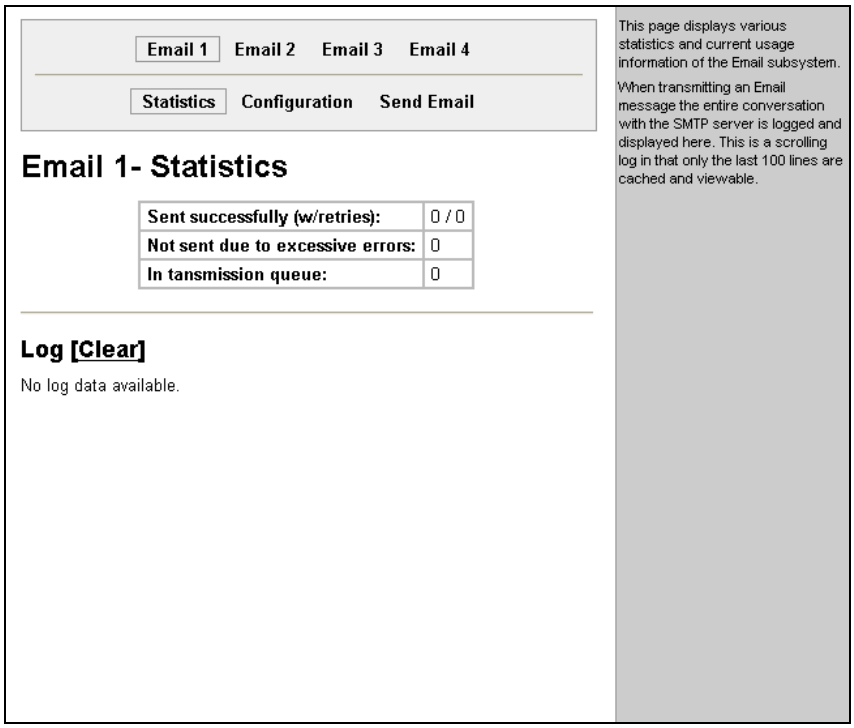
Clicking the **Email** link in the menu bar displays the Email Statistics page. This page has links at the top for displaying the email configuration and for sending an email. You can configure the email subsystem for delivering email notifications and send an email.

Email Statistics Page

The Email Statistics page displays when you click **Email** in the menu bar. It also displays when you click **Statistics** at the top of one of the Configuration page. This read-only page shows various statistics and current usage information about the email subsystem. Click the desired email at the top of the page to view its statistics.

When you transmit an email, the entire conversation with the SMTP server is logged and displayed in the bottom portion of the page. To clear the log, click the **Clear** link.

Figure 10-2. Email Statistics Page

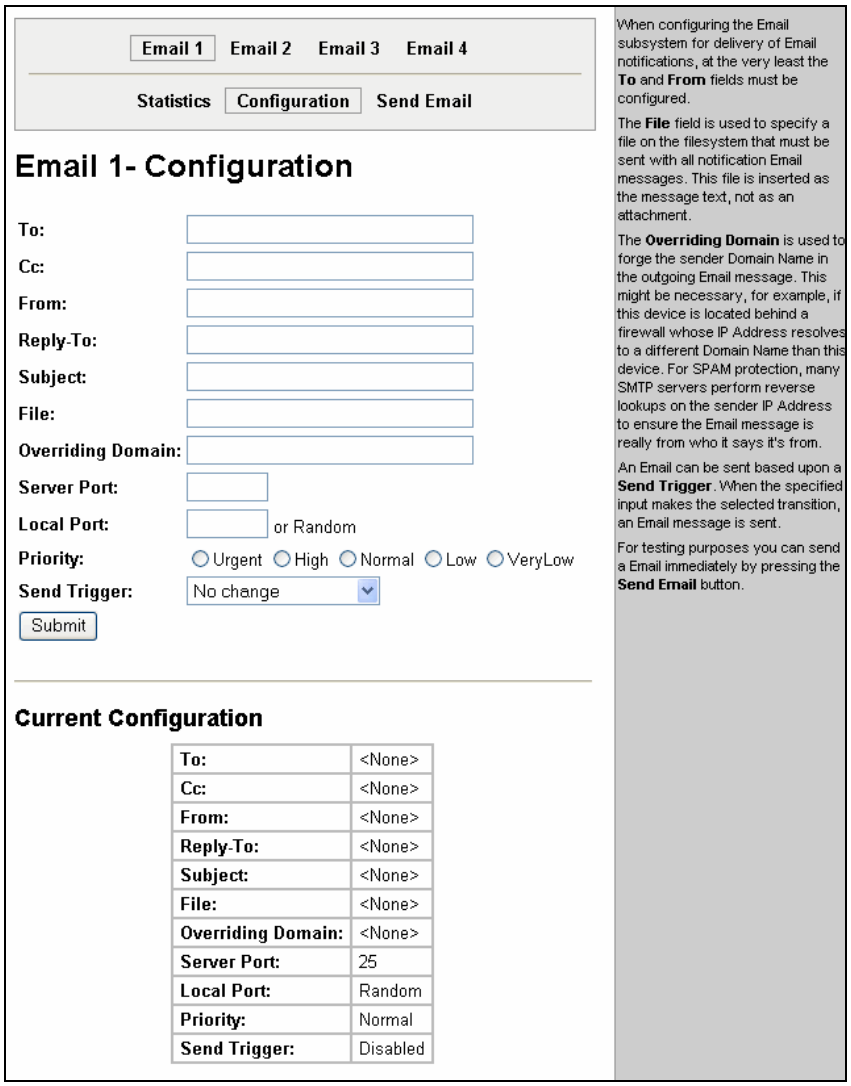


Email Configuration Page

If you click **Configuration** at the top of one of the Email pages, the Email Configuration page displays. Here you can change email configuration settings.

From the **Select Email** drop-down list at the top of the page, select the email whose configuration you want to view. The number of emails is the number of email configurations available. For example, if the highest email number available is 4, then four different email addresses can be used.

Figure 10-3. Email Configuration Page



Email Configuration Page

Email Configuration Page Settings	Description
To (Required)	Enter the email address of the recipient of this message. Separate multiple email addresses with semi-colons.
Cc	Enter the email address to receive a copy of this message. Separate multiple email addresses with semi-colons.
From (Required)	Enter the email address of the sender of this type of email.
Reply –To	Enter the email address to which replies should be sent.
Subject	Enter the subject of the email.
File	Enter the file on the filesystem that will be sent with each notification email message. The file is inserted as the message text, not as an attachment.
Overriding Domain	Enter the sender's domain name that will be forged in the outgoing email message. This domain name may be needed if this device is located behind a firewall whose IP address resolves to a different domain name than this device. For SPAM protection, many SMTP servers perform reverse lookups on the sender IP address to ensure the email message is really from whom it says it is from.
Server Port	Enter the SMTP server port number. The default is 25.
Local Port or Random	Enter the local port to use for email alerts. The default is a random port number.
Trigger Email Send	Select the condition that serves as a trigger for sending an email.

To test your configuration, you can send an email immediately by clicking **Send Email** at the top of the page.

CLI Pages

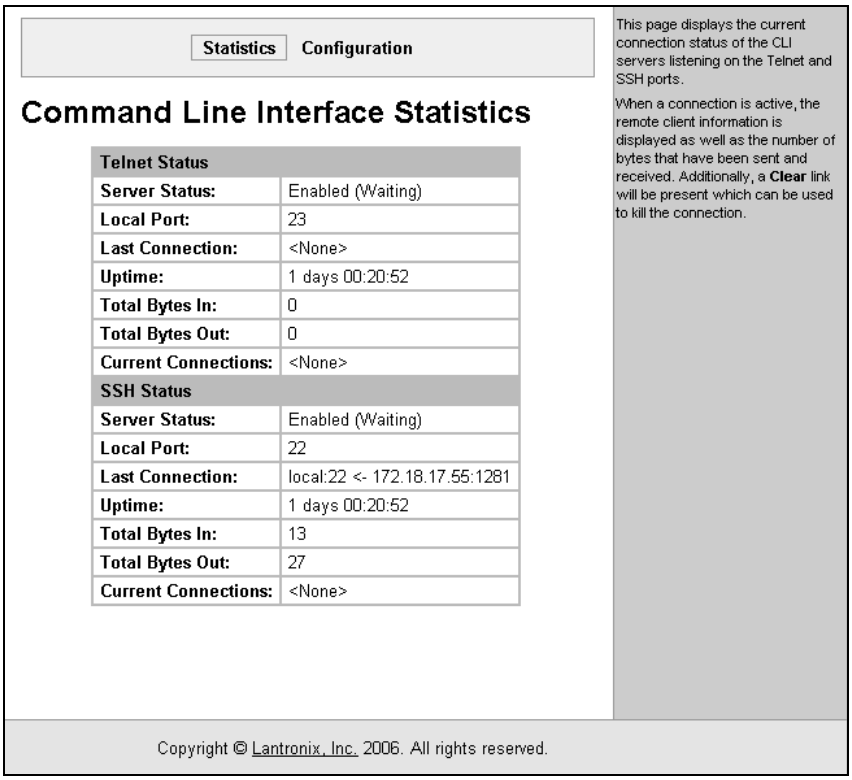
Clicking the **CLI** link in the menu bar displays the Command Line Interface Statistics page. This page has two links at the top for viewing statistics and for viewing and changing configuration settings.

Command Line Interface Statistics Page

The Command Line Interface Statistics page displays when you click **CLI** in the menu bar. It also displays when you click **Statistics** at the top of the CLI Configuration page. This read-only page shows the current connection status of the CLI servers listening on the Telnet and SSH ports. When a connection is active:

- The remote client information displays.
- The number of bytes that have been sent and received displays.
- A **Kill** link can be used to terminate the connection.

Figure 10-4. Command Line Interface Statistics Page



Statistics Configuration

Command Line Interface Statistics

Telnet Status	
Server Status:	Enabled (Waiting)
Local Port:	23
Last Connection:	<None>
Uptime:	1 days 00:20:52
Total Bytes In:	0
Total Bytes Out:	0
Current Connections:	<None>
SSH Status	
Server Status:	Enabled (Waiting)
Local Port:	22
Last Connection:	local:22 <- 172.18.17.55:1281
Uptime:	1 days 00:20:52
Total Bytes In:	13
Total Bytes Out:	27
Current Connections:	<None>

This page displays the current connection status of the CLI servers listening on the Telnet and SSH ports.

When a connection is active, the remote client information is displayed as well as the number of bytes that have been sent and received. Additionally, a **Clear** link will be present which can be used to kill the connection.

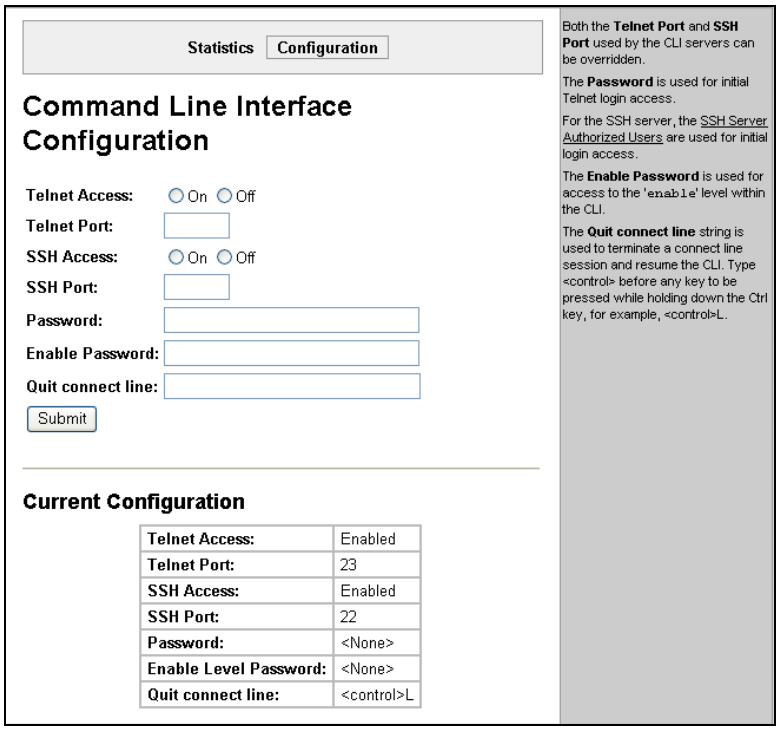
Copyright © Lantronix, Inc. 2006. All rights reserved.

Command Line Interface Configuration Page

If you click **Configuration** at the top of the Command Line Interface Statistics page, the Command Line Interface Configuration page displays. Here you can change CLI configuration settings.

Under **Current Configuration**, **Password** has a **Delete** link at its right. If you click **Delete**, a message asks whether you are sure you want to delete this information. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 10-5. Command Line Interface Configuration Page



Command Line Interface Configuration Page

Command Line Interface Configuration Page Settings	Description
Telnet Access	Select whether Telnet access is enabled. Choices are: **On** = Telnet access is enabled. (default) **Off** = Telnet access is disabled.
Telnet Port	Enter the number of the port on which the XPress-I/O listens for incoming Telnet connections. Default is 23.
SSH Access	Select whether Secure Shell (SSH) access is enabled. Choices are: **On** = SSH access is enabled. (default) **Off** = SSH access is disabled. ***Note:*** *The SSH Server Authorized Users are used for initial login access. See SSH Server: Authorized Users Page on page 85*
SSH Port	Enter the number of the port on which the XPress-I/O listens for incoming SSH connections. Default is 22.
Password	Enter the password that must be specified for the initial Telnet login session. Default is PASS.
Enable Password	Enter the password that must be specified to access the “enable” level in the CLI. Disabled by default.
Quit connect line	Enter a string to terminate a connect line session and resume the CLI. Type **<control>** before any key the user

Command Line Interface Configuration Page Settings	Description
	must press when holding down the **Ctrl** key. An example of such a string is **<control>L.** ***Note:*** *A connect line session is a CLI-only feature. Type* `connect <line>` *and subsequent characters go out the selected line and a subsequent display comes from characters received on the line. This mode ends after you type this string (e.g.,* `<control>L`*). The CLI command mode returns.*

XML Pages

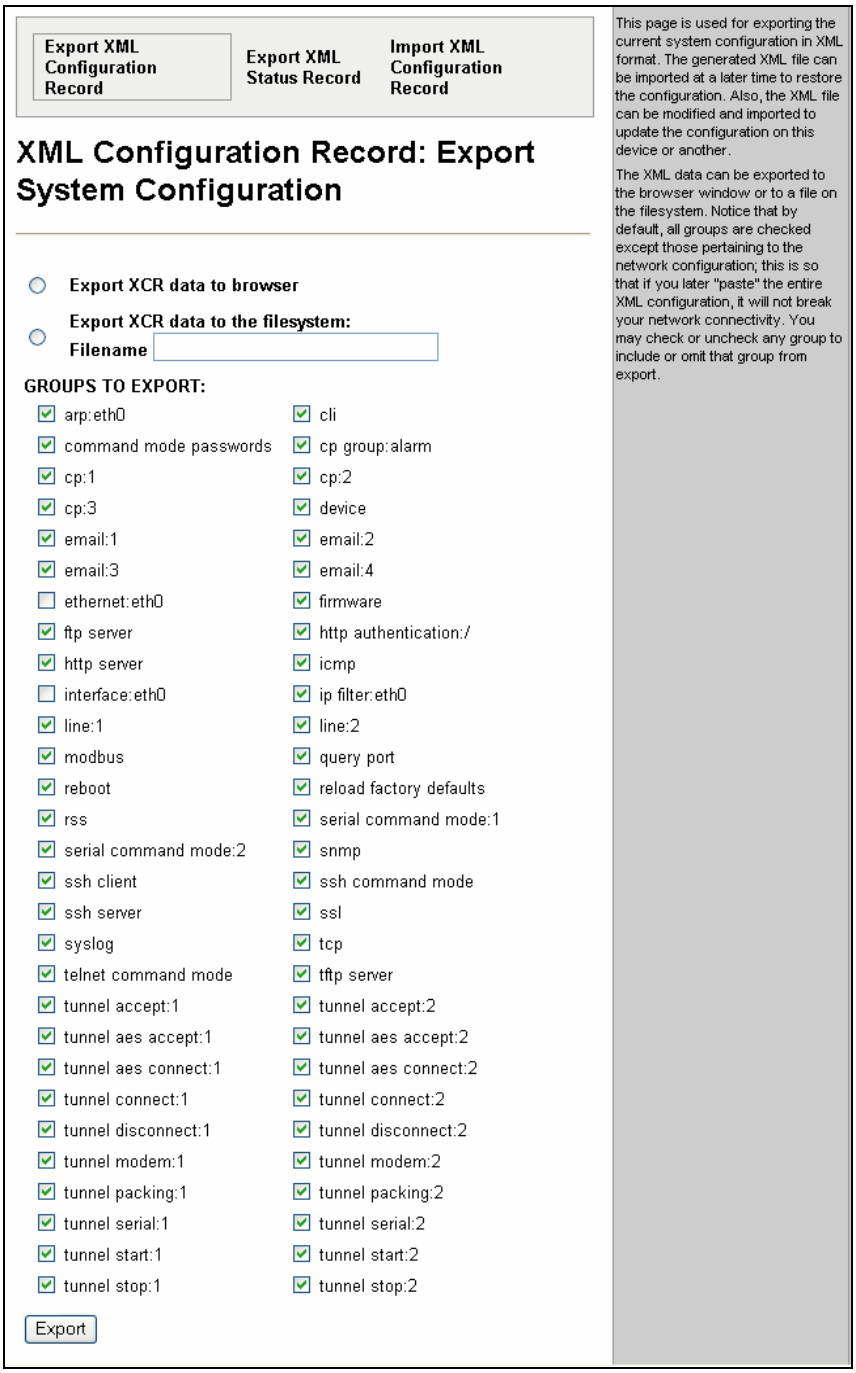
The XPress-I/O can be configured using an XML configuration record. Clicking the **XML** link in the menu bar displays the XML page. This page has three links at the top for exporting an XML configuration record, exporting an XML status record, and importing an XML configuration record.

XML Configuration Record: Export System Configuration Page

The XML Configuration Record: Export System Configuration page displays when you click **XML** in the menu bar. It also displays when you click **Export XML Configuration Record** at the top of one of the other XML pages. Here you can export the current system configuration in XML format. The generated XML file can be imported later to restore a configuration. It can also be modified and imported to update the configuration on this XPress-I/O unit or another. The XML data can be exported to the browser window or to a file on the filesystem.

By default, all groups are selected except those pertaining to the network configuration (Ethernet and interface). This is so that if you later export the entire XML configuration, it will not break your network connectivity. You may select or clear the checkbox for any group.

Figure 10-6. XML Configuration Record: Export System Configuration Page



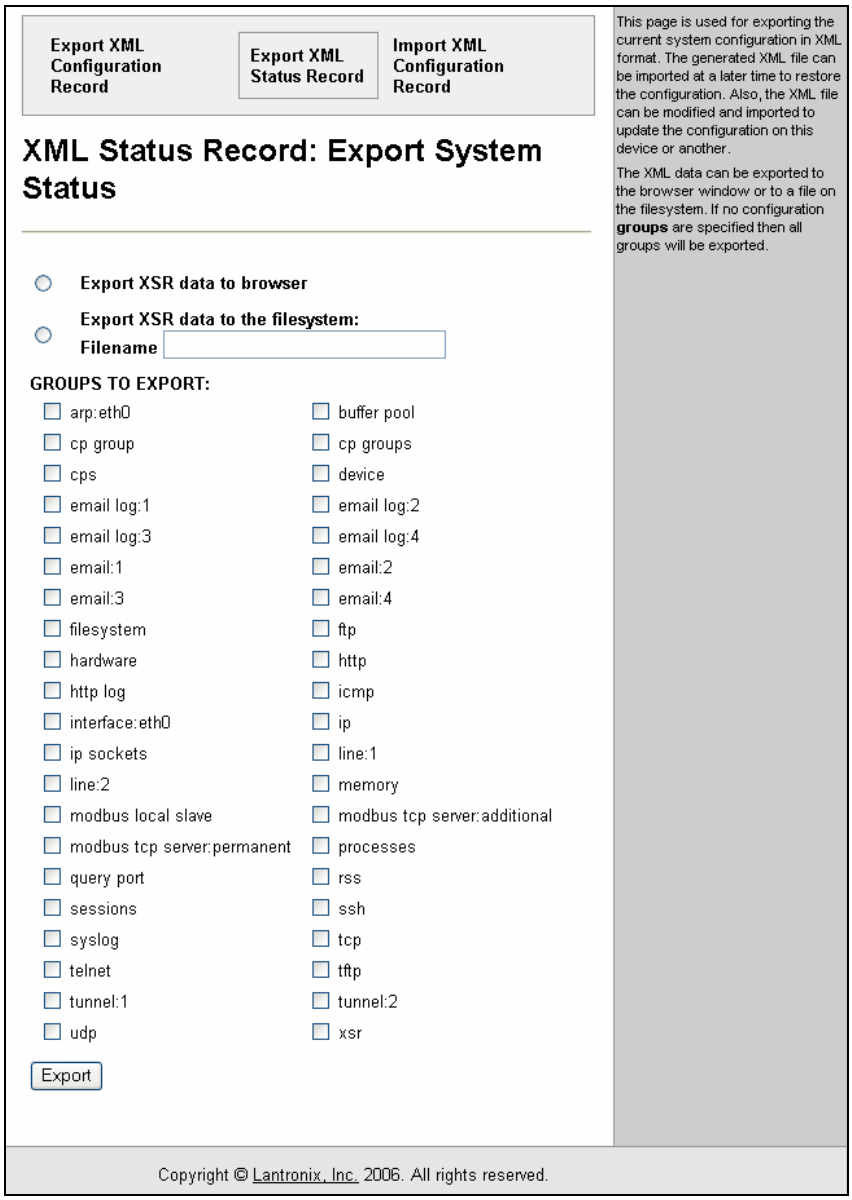
Configuration Record: Export System Configuration Page

XML Configuration Record: Export System Configuration Page Settings	Description
Export XCR data to browser	Select this option to export the XCR data in the selected fields to a web browser.
Export XCR data to the filesystem	Select this option to export the XCR data to a filesystem. If you select this option, enter a file name for the XML configuration record.
Groups to Export	Check the configuration groups that are to be exported to the XML configuration record. If no groups are checked, all groups will be exported.

XML Status Record: Export System Status

If you click **XML Status Record** at the top of an XML page, the XML Status Record: Export System Status page displays. Here you can export the current system status in XML format. The XML data can be exported to the browser window or to a file on the filesystem.

Figure 10-7. XML Status Record: Export System Status Page



XML Status Record: Export System Status Page

XML Status Record: Export System Status Page Settings	Description
Export XSR data to browser	Select this option to export the XML status record to a web browser.
Export XSR data to the filesystem	Select this option to export the XML status record to a filesystem. If you select this option, enter a file name for the XML status record.
Groups to Export	Check the configuration groups that are to be exported into the XML status record. If no groups are checked, all groups will be exported.

XML: Import System Configuration Page

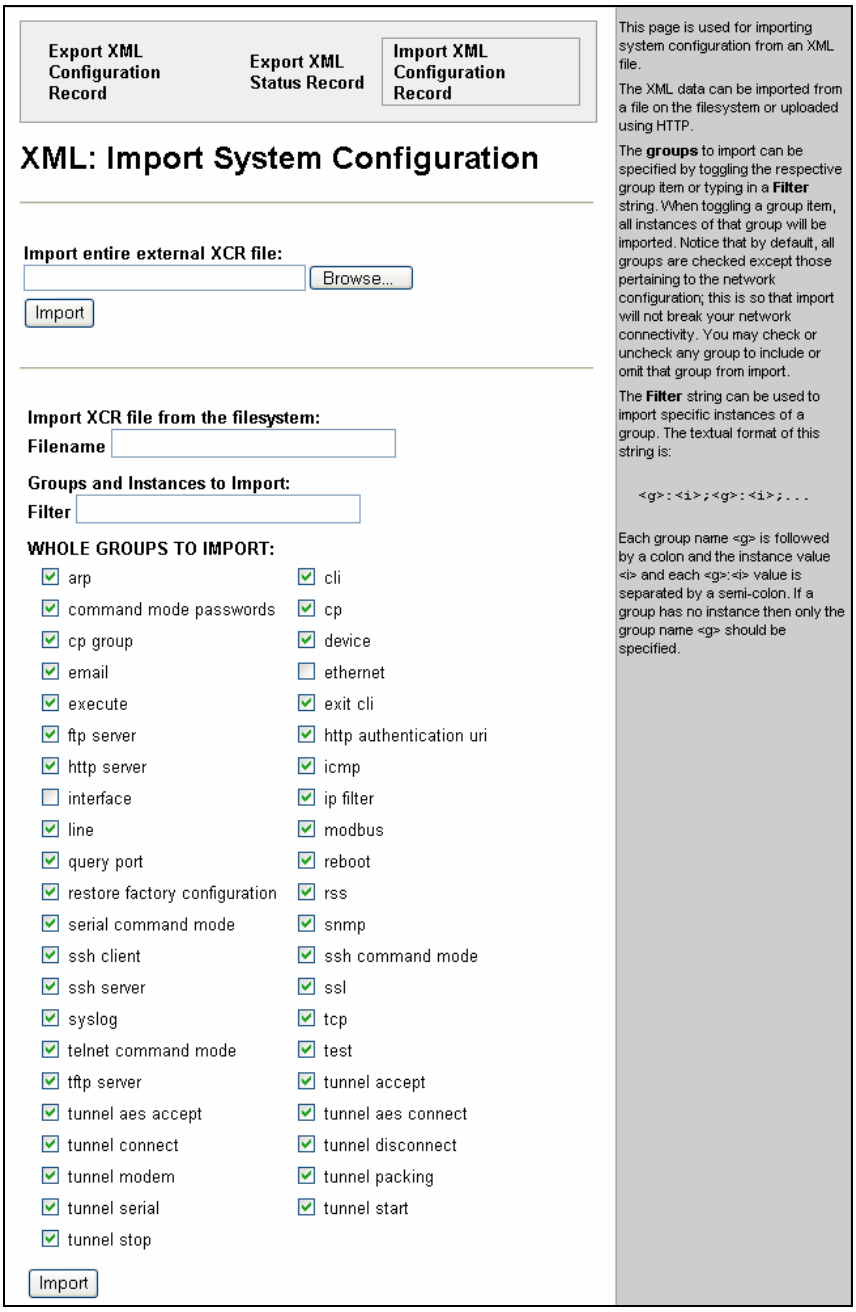
If you click **Import XML Configuration Record** at the top of an XML page, the XML: Import System Configuration page displays. Here you can import a system configuration from an XML file.

The XML data can be imported from a file on the filesystem or uploaded using HTTP. The groups to import can be specified by toggling the respective group item or entering a filter string. When toggling a group item, all instances of that group will be imported. The filter string can be used to import specific instances of a group. The text format of this string is:

<g>:<i>;<g>:<i>;...

Each group name <g> is followed by a colon and the instance value <i>. Each <g> :<i> value is separated with a semicolon. If a group has no instance, specify the group name <g> only.

Figure 10-8. XML: Import System Configuration Page



XML: Import System Configuration Page

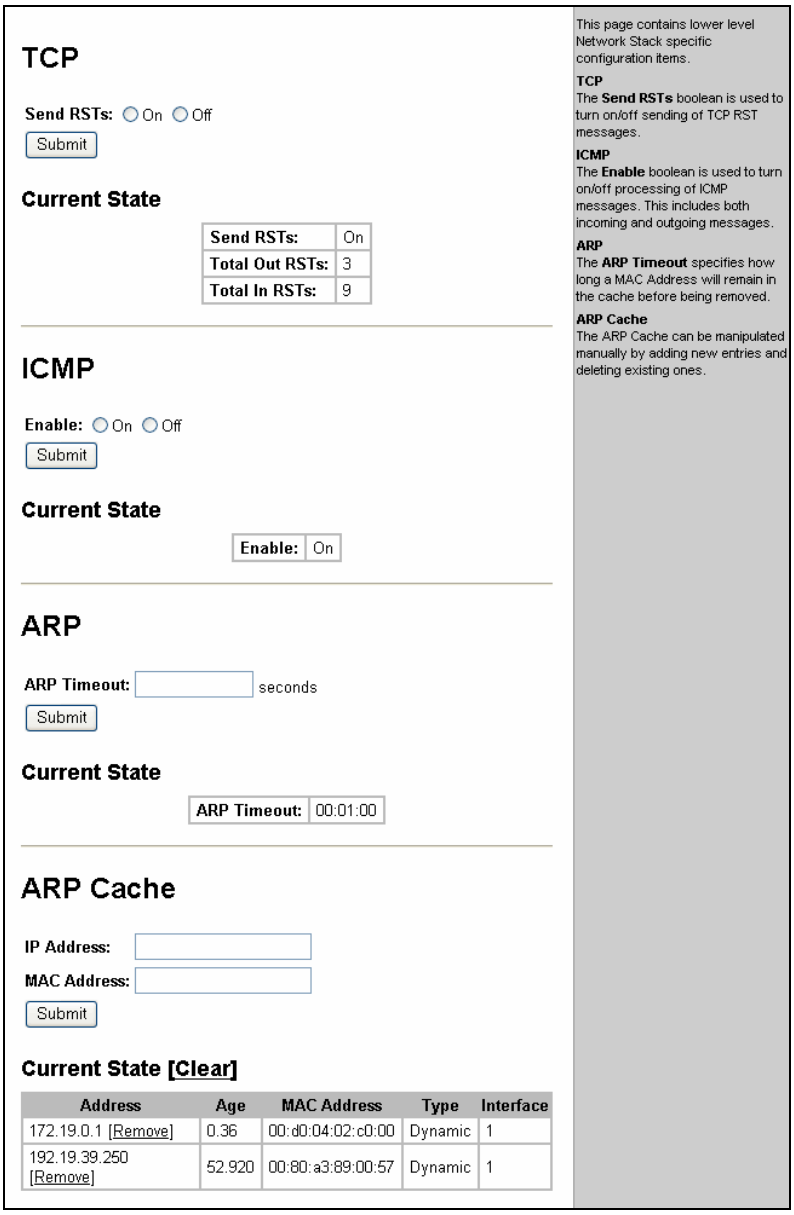
XML: Import System Configuration Page Settings	Description
Import entire external XCR file	Enter the path and file name of the entire external XCR file you want to import or use the **Browse** button to select the XCR file.
Import XCR file from filesystem	Enter the filename of the XCR file that has certain groups you want to import.
Groups and Instances to Import	If required, enter the filter string for importing specific instances of a group.
Whole Groups to Import	Check the configuration groups that are to be imported into the XML configuration record. If no groups are checked, all groups will be imported.

Protocol Stack Page

Clicking the **Protocol Stack** link in the menu bar displays the Protocol Stack page. Here you can configure lower level network stack-specific configuration settings.

Under **Current State**, there is a **Clear** link to remove all addresses and a **Remove** link to remove the individual address shown. If you click **Clear** or **Remove**, a message asks whether you are sure you want to perform the operation. Click **OK** to proceed or **Cancel** to cancel the operation.

Figure 10-9. Protocol Stack Page



Protocol Stack Page

Protocol Stack Page Settings	Description
TCP	
Send RSTs	RST is a TCP control bit that informs the receiving TCP stack to end a connection immediately. However, sending this bit may pose a security risk. Select whether you want the RST control bit sent to end a connection immediately. Choices are: **On** = the RST bit is sent. (default) **Off** = the RST bit is not sent. After selecting an option, click **Submit**.
ICMP	Internet Control Message Protocol (ICMP) can be used as an error-reporting protocol between two hosts. This setting specifies whether incoming and outgoing ICMP messages are processed. Choices are: **On** = ICMP messages are processed. (default) **Off** = ICMP messages are not processed. After selecting an option, click **Submit**.
ARP	Enter the maximum number of seconds that a MAC address will remain in cache before being removed. Default is 00:01:00. (one minute). After selecting an option, click **Submit**.
ARP Cache	
IP Address	Enter the IP address of the entry to be added to the Address Resolution Protocol (ARP) cache.
MAC Address	Enter the MAC address of the entry to be added to the ARP cache. After entering an IP address and a MAC address, click **Submit**.

IP Address Filter Page

Clicking the **IP Address Filter** link in the menu bar displays the IP Address Filter page. Here you can specify the IP addresses and subnets allowed to send data to the XPress-I/O. All packets sent from IP addresses not on this list are ignored and discarded. By default, the IP address list is empty, so all addresses are allowed.

The network mask and IP address settings you specify on this page determine the range of IP addresses that can access the XPress-I/O. For example:

- An IP address of 10.0.0.0 and a network mask of 255.0.0.0 allow any device with an IP address in the 10.x.x.x range to access the XPress-I/O.
- An IP address of 192.168.1.1 with a network mask of 255.0.0.0 causes the XPress-I/O to allow all IP addresses in the range of 192.x.x.x.
- An IP address of 192.168.1.1 with a network mask of 255.255.255.0 only allows IP addresses in the range of 192.168.1.x to access the XPress-I/O.

Figure 10-10. IP Address Filter Page

IP Address Filter Page

IP Address Filter Page Settings	Description
IP Address	Enter the IP address that is allowed to send packets to the XPress-I/O. If using DHCP with BOOTP, enter the IP address of the DHCP/BOOTP server.
Network Mask	Enter the network mask associated with the IP address that is allowed to send packets to the XPress-I/O.

11: Updating Firmware

Lantronix periodically releases updates to the firmware to fix problems or provide feature upgrades.

Obtaining Firmware

Obtain the most up-to-date firmware and release notes for the XPress-I/O from the Lantronix web site (http://www.lantronix.com/support/downloads.html) or by using anonymous FTP (ftp://ftp.lantronix.com/).

Upgrading Using DeviceInstaller

Loading New Firmware

1. Download the XPress-I/O firmware from http://www.lantronix.com/support/downloads.html.
2. Unzip the files and save them to a directory on your PC

Updating Firmware

1. Open DeviceInstaller. (See Starting DeviceInstaller on page 26.)
2. Open the XPress-I/O folder in the left Window pane.
3. Select the XPress-I/O that you would like to upgrade.
4. Click the **Web Configuration** tab and click **Go**.
5. Enter the **User name** and **Password**. The default user name is **admin** with a default password of **PASS** (all caps).
6. On the menu bar, click **System**. The System page displays.

3. Under **Upload New Firmware**, click **Browse** and navigate to the directory where you saved the XPress-I/O firmware.
4. Select **xpress-io.rom.gz** and click **Upload**.

A: Factory Default Configuration

This appendix lists the XPress-I/O factory-default configuration. The types of settings are in alphabetical order.

CLI Settings

Telnet

CLI Telnet Parameters	CLI Telnet Settings
Telnet Access	Enabled
Telnet Port	23
SSH Access	Enabled
SSH Port	22
Password	<None>
Enable Password	<None>
Quit Connect Line	<control>L

CPM Settings

CPM Parameters		CPM Settings
CP1	Configured as	Input
	Assert	High
CP2	Configured as	Input
	Assert	High
CP3	Configured as	Output (not user changeable)
	Assert	High

Diagnostics Settings

Ping

Diagnostics Ping Parameters	Diagnostic Ping Settings
Count	3
Timeout	5 seconds

Email Settings

Email Parameters	Email Settings
To	<None>
Cc	<None>
From	<None>
Reply –To	<None>
Subject	<None>
File	<None>
Overriding Domain	<None>
Server Port	25
Local Port or Random	Random
Priority	Normal

FTP Settings

FTP Parameters	FTP Settings
FTP Server	On
Username	admin
Password	PASS

HTTP Settings

Configuration

HTTP Configuration Parameters	HTTP Settings
HTTP Server	On
HTTP Port	80
HTTPS Port	443
Max Timeout	10 seconds
Max Bytes	40960
Logging	On
Max Log Entries	50
Log Format	%h %t "%r" %s %B "%{Referer}i" "%{User-Agent}i"

Authentication

HTTP Authentication Parameters	HTTP Authentication Settings
URI	/
Realm	config
AuthType	Digest
Username	admin
Password	PASS

IP Address Filter Settings

IP Address Parameters	IP Address Settings
IP Address	<None>
Network Mask	<None>

Modbus Settings

Modbus Parameters	Modbus Settings
TCP Server Access	Enabled
TCP Server Port	502 (not changeable)
Additional TCP Server Port	<None>

Network Configuration Settings

Network Configuration Parameters	Network Configuration Settings
BOOTP Client	Off (disabled)
DHCP Client	On (enabled)
IP Address	0.0.0.0 (auto-IP if DHCP fails)
Network Mask	0.0.0.0 (auto if DHCP fails)
Gateway	0.0.0.0
MAC Address	Specified by manufacturer
Hostname	<None>
Domain	<None>
DHCP Client ID	<None>
Ethernet	Auto speed, auto duplex

Query Port Settings

Query Port Parameters	Query Port Settings
Query Port Server	On

RSS Settings

RSS Parameters	RSS Settings
RSS Feed	Off
Persistent	Off
Max Entries	100

Serial Port Line Settings

Serial Port Line Parameters	Serial Port Line Settings
Name	<None>
Status	Enabled
Protocol	Tunnel
Interface	Disabled
Baud Rate	9600 baud
Parity	<None>
Data Bits	8
Stop Bits	1
Flow Control	<None>
Xon char	0x11 (\17)
Xoff char	0x13 (\19)
Command Mode	Disabled
Use Serial String	Off (disabled)
Echo Serial String	On (enabled)

Serial Port Line Parameters	Serial Port Line Settings
Wait Time (milliseconds)	5000 milliseconds
Serial String (text or binary)	<None>
Signon Message	<None>

SNMP Settings

SNMP Parameters	SNMP Settings
SNMP Agent	Running
Read Community	Public
Write Community	Private
System Contact	<None>
System Name	xpressio
System Description	Lantronix XPress-I/O
System Location	<None>
Enable Traps	On
Primary TrapDest IP	<None>
Secondary TrapDest IP	<None>

Syslog Settings

Syslog Parameters	Syslog Settings
Syslog Status	Off
Host	<None>
Local Port	514
Remote Port	514
Severity to Log	<None>

System Settings

System Parameters	System Settings
System Name	xpressio
System Description	Lantronix XPress-I/O
Time Zone	GMT +0.00 (GMT)
Date	<None>
Time (24 hour)	<None>

TFTP Settings

TFTP Parameters	TFTP Settings
TFTP Server	On
Allow TFTP File Creation	Disabled

Tunnel Settings

Serial Settings

Serial Parameters	Serial Settings
Buffer Size	2048 bytes
Read Timeout (milliseconds)	200 milliseconds
Wait for Read Timeout	Disabled

Start/Stop Characters

Start/Stop Character Parameters	Start/Stop Character Settings
Start Character	<None>
Stop Character	<None>
Echo Start Character	Off
Echo Stop Character	Off

Accept Mode

Accept Mode Parameters	Accept Mode Settings
Accept Mode	Enabled
Local Port	Port 1 = 10001, Port 2 = 10002
Protocol	TCP
Flush Serial Data	Disabled
Block Serial Data	Off
Block Network Data	Off
TCP Keep Alives	45 seconds
Email on Connect	<None>
Email on Disconnect	<None>
Output Selection	<None>
Control	Exclusive
Password	<None>
Prompt for Password	Off

Connect Mode

Connect Mode Parameters	Connect Mode Settings
Connect Mode	Disabled
Remote Address	<None>
Remote Port	<None>
Local Port	Random
Protocol	TCP
Reconnect Timer	15000 milliseconds
Flush Serial Data	Disabled
SSH Username	<None>
Block Serial Data	Off

Connect Mode Parameters	Connect Mode Settings
Block Network Data	Off
TCP Keep Alives	45 seconds
Email on Connect	<None>
Email on Disconnect	<None>
Output Selection	<None>
Control	Exclusive

Disconnect Mode

Disconnect Mode Parameters	Disconnect Mode Settings
Mode	Disabled
Timeout	60000 milliseconds
Flush Serial Data	Disabled

Packing Mode

Packing Mode Parameters	Packing Mode Settings
Mode	Disabled
Timeout	1000 milliseconds
Threshold	512 bytes
Send Character	<None>
Trailing Character	<None>

Modem Emulation

Modem Emulation Parameters	Modem Emulation Settings
Echo Pluses	Off
Echo Command	On
Verbose Response Codes	On
Response Codes	Text

Modem Emulation Parameters	Modem Emulation Settings
Error Unknown Commands	Off
Optional Connect String	<None>

AES Keys

AES Key Parameters	AES Key Settings
Accept Mode AES Keys: Encrypt Key	<None>
Accept Mode AES Keys: Decrypt Key	<None>
Connect Mode AES Keys: Encrypt Key	<None>
Connect Mode AES Keys: Decrypt Key	<None>

B: Technical Specification

Category	XPress-I/O Specifications
CPU	Lantronix's DSTni-EX controller with 256 KB SRAM, 16 KB of boot ROM, and an integrated AMD 10/100B Ethernet PHY
Flash	4 MB Flash
RAM	2 MB SRAM
EEPROM	64 Kbits
Firmware	Upgradable via the Web Manager, TFTP, or FTP; Evolution-based OS runs up to 120 MHz
Serial Interface	2 serial ports: 1 RS232, 1 RS422/485 (4-Wire/2-Wire) with terminal block connection Baud rate selectable from 300 to 230k Kbps Customizable baud rate support for non-standard serial speeds LED indicators for TXD and RXD activities
Serial Line Formats	Characters: 7 or 8 data bits Stop bits: 1 or 2 Parity: odd, even, none
Digital I/O	2 independently configurable digital I/Os, configured via Web Page, CLI, or XML Opto-isolated to eliminate grounding issues Logically compatible with 3.3V and higher voltage levels Solid state relay if configured as outputs; thus, can also be used as small signal DC/AC switches Transient voltage and polarity reversal protections built in
Relay	Contacts capable of handling up to 8A resistive load Contacts mechanically isolated to eliminate grounding issues Contacts non-latching with Normally Open (NO) or Normally Closed (NC) for simple applications such as power failure indication
Modem Control	CTS, RTS, DTR, DCD on Serial 1
Flow Control	Hardware: RTS/CTS on Serial 1 Software: XON/XOFF
Power Input	Removable screw terminal block connector 9-30 VDC or 9-24 VAC with chassis ground 2.3W maximum
Network Interface	1 RJ45 Ethernet port 10Base-T or 100Base-TX Full or half duplex Auto-negotiating or hard coded LED indicators

Category	XPress-I/O Specifications
Dimensions (LxWxH)	115 x 109 x 23 mm (4.54 x 4.30 x .90 in), terminal blocks included
Weight	0.3 Kg (0.63 lb) (10 oz)
Temperature	-40°C to 75°C (-40°F to 167°F) Operating -40°C to +85°C (-40°F to 185°F) Storage
Relative Humidity	10 to 90%, non-condensing
Case	Metal enclosure with wall mounts
Protocols Supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, FTP, DNS, Traceroute, HTTP, Modbus TCP, Modbus ASCII/RTU
Management	Internal web server SNMP v2C (MIB-II, RS232MIB) Serial login Telnet/SSH login XML DeviceInstaller software
Security	SSL v3, SSH v2 MD5, SHA-1 Rijndael/AES 128-bit encryption 3DES encryption ARC4 128-bit encryption Password protection IP address filtering Hardened OS and stack
Internal Web Server	Serves static and dynamic CGI-based pages and Java applets Storage capacity: Limited to size of file system
System Software	Windows-based DeviceInstaller configuration software and Windows-based Com Port Redirector
LEDs	10Base-T and 100Base-TX Link Ethernet Activity Serial Transmit Data Serial Receive Data Power/Status
Isolation and Transient Voltage Protection	1.5 KVAC/2.1 KVDC galvanic isolation between power input port and Ethernet ports (except chassis ground) 1.5 KVAC / 2.1 KVDC galvanic isolation between power input port and serial ports 1.5 KVAC / 2.1 KVDC galvanic isolation between Ethernet port and serial ports 1.5 KVAC / 2.1 KVDC opto-isolation between digital I/O ports and all other ports 1.5 KVAC / 2.1 KVDC mechanical isolation between relay contacts and all other ports 8 KV direct contact, 15 KV air discharge, ESD protection on all serial ports (IEC 1000-4-2, IEC 61000-4-2) 40 A (5/50 ns) EFT protection (IEC 61000-4-4), 12 A (8/20 us) lightning protection (IEC 61000-4-5) on Ethernet port Transient voltage protection and ESD at power input with max non-repetitive surge current 800 A 8/20 us) (IEC 61000-4-2) Transient voltage protection and ESD with max non-repetitive surge power 600W peak (10/1000 us) at digital I/O ports
Agency Approvals	UL, CSA, FCC, CE, TUV, CTick, VCCI

Category	XPress-I/O Specifications
EMC Standards	
ITE	FCC Part 15 Subpart B Class A ICES-003 Issue 4 February 2004 Class A AS/NZS CISPR 22: 2006 Class A EN55022: 1998 + A1: 2000 + A2: 2003 CLASS A EN61000-3-2: 2000 Class A EN61000-3-3: 1995 +A1: 2001 EN55024: 1998 +A1: 2001 +A2: 2003 IEC_61000-4-2: 1995 IEC_61000-4-3: 1995 IEC_61000-4-4: 1995 IEC_61000-4-5: 1995 IEC_61000-4-6: 1996 IEC_61000-4-8: 1993 IEC_61000-4-11: 1994
Industrial Environment	FCC Part 18 Subpart C ICES-001 Issue 4 July 2004 EN61000-6-4: 2001 and AS/NZS 4251.2: 1999 CISPR11 EN61000-6-2: 2001 and AS/NZS 61000.6.2: 2002 IEC_61000-4-2: 1995 IEC_61000-4-3: 1995 IEC_61000-4-4: 1995 IEC_61000-4-5: 1995 IEC_61000-4-6: 1996 IEC_61000-4-8: 1993 IEC_61000-4-11: 1994
Safety Standards	UL 60950-1 CSA 22.2. No 60950-1-03 EN 60950-1 TUV VCCI C-Tick
Product Label Markings	FCC Part 15 Statement Class A Device, ICES-003 Class A Device, C-Tick, VCCI, CE Marking, UL-CUL Mark

C: Isolated I/O Specifications

Absolute Maximum Ratings

Parameters	Symbols	Value	Units	Notes
Operating temperature	T_{OPR}	-40 to 75	C	
Output characteristics of Digital I/O ports (see note 5)				
Load current when ON	I_L	120	mA	1
Breakdown load voltage when OFF	V_L	+/-50	VDC	
Input characteristics of Digital I/O ports (see note 5)				
Input current	I_I	8	mA	2
Input voltage	V_I	10	VDC	2, 4
Input reverse voltage	V_I	-50	VDC	
Transient voltage suppression on digital I/O (see note 5)				
Peak pulse power dissipation on 10/1000 usec Waveform	P_{TVS}	600	W	
Isolation Characteristics of digital I/O ports (see note 5)				
Between primary to secondary of IO ports	V_{IOISO1}	1500	VAC	
Between adjacent IO Ports	V_{IOISO2}	300	VAC	
Isolation characteristics of relay port (see note 5)				
Between contacts and coil (inner circuit)	$V_{RLYISO1}$	1500	VAC	
Between open contacts	$V_{RLYISO2}$	300	VAC	
Between relay port and IO Ports	$V_{RLYISO3}$	1500	VAC	

Stressing the device above the rating listed in the Absolute Maximum Ratings table may cause permanent damage to the IO ports. Exposure to Absolute Maximum Rating conditions for extended periods may affect the IO port reliability.

Notes:

1. *Solid state relay output; can source or sink current. See Figure C-1.*
2. *Opto-isolator with emitter input and a series resistor to limit current. See Figure C-2.*
3. *To realize a logic high input, a typical current of I_I = 1mA is required; that translates to a minimum of V_{IH} = 3V.*
4. *For $V_I = V_{IH}$ > 10 VDC an external series resistor is required as shown in Table C-1.*
5. *Connect RELAY and DIGITAL IO Ports only to Class III or Class 2 circuit.*

Electrical Characteristics

Parameters	Symbols	Min	Typ	Max	Units	Notes
Output characteristics of digital I/O ports (see note 5)						
Continuous load current	I_L			100	mA	1
On resistance (I_L = 50 mA)	R_{ON}			15	Ohm	
Load voltage when ON (I_L = 50 mA)	V_L			0.75	VDC	
Leakage current when OFF	I_L			50	uA	
Input characteristics of digital/O ports (see note 5)						
High level input voltage (I_I = 1 mA typically)	V_{IH}	3.0			VDC	2, 3
Low level input voltage	V_{IL}			0.8	VDC	2
Characteristics of relay port (see note 5)						
Switching voltage	V_{RLY}			250	VAC	5
Switching voltage	V_{RLY}			30	VDC	
Switching current (resistive load)	I_{RLY}			8	A	

Notes:

1. *Solid state relay output; can source or sink current. See Figure C-1.*
2. *Opto-isolator with emitter input and a series resistor to limit current. See Figure C-2.*
3. *To realize a high logic input, a typical current of II = 1mA is required; that translates to a minimum of VIH = 3V.*
4. *For VI = VIH > 10 VDC an external series resistor is required as shown in Table C-1.*
5. *Connect RELAY and DIGITAL IO Ports only to Class III or Class 2 circuit.*

Figure C-1. Optically Isolated I/O Configured as an Output with Solid State Relay

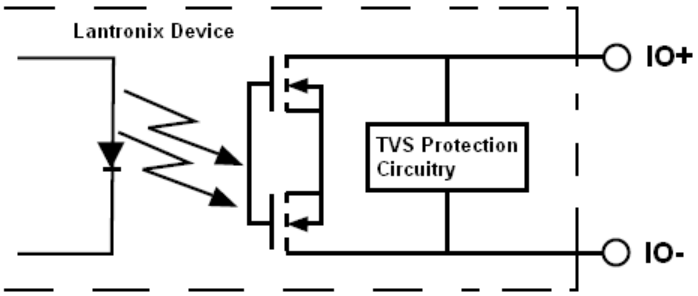


Figure C-2. Optically Isolated I/O Configured as an Input with Opto-Isolator's Emitter

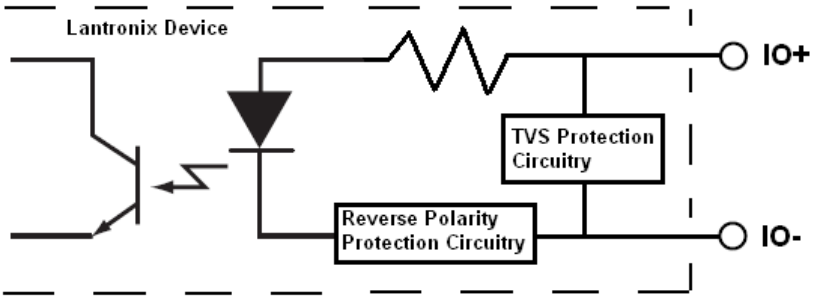


Figure C-3. Application Circuit

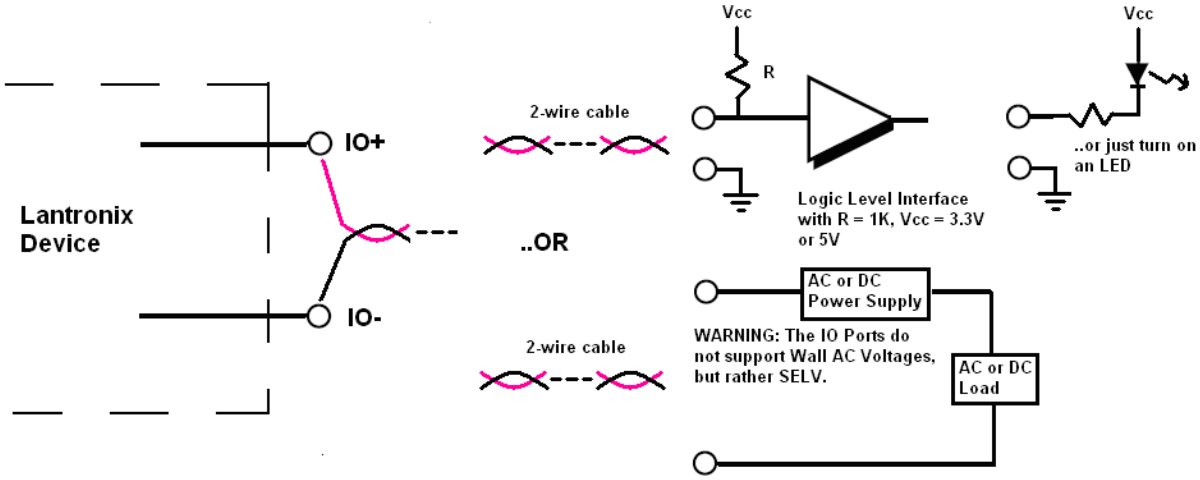
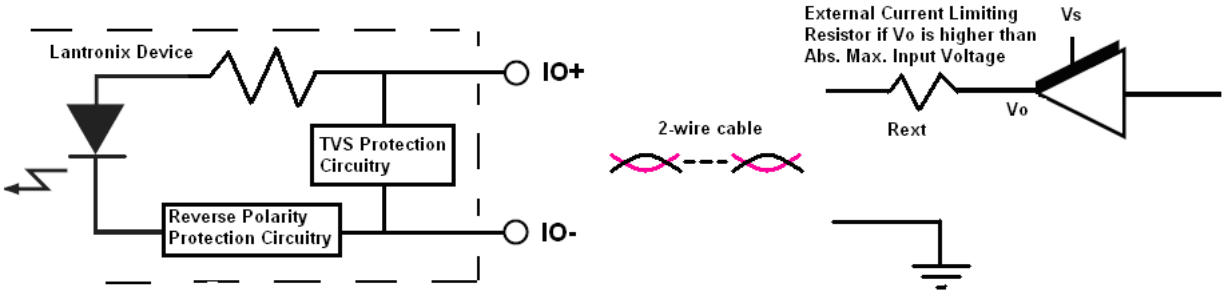


Figure C-4. Isolated General Purpose Input Application Circuit



Note: *For input close to or higher than Absolute Maximum Rating value, use a series resistor Rext as in Figure C-4. Table C-1 has the tabulated values for Rext in such cases.*

Table C-1. Rext Values

VOH (V)	REXT (K)
7	2.57
8	3.23
9	3.9
10	4.57
11	5.23
12	5.9
13	6.57
14	7.23
15	7.9
16	8.57
17	9.23
18	9.9
19	10.6
20	11.2
21	11.9
22	12.6
23	13.2
24	13.9
25	14.6
26	15.2
72	15.9
28	16.6
29	17.2
30	17.9

The Rext resistor limits the current I to about 1.5 mA, and Rext is 1/4W.

Figure C-5. Relay Contact Positions When De-Energized (RLY_CTRL=0)

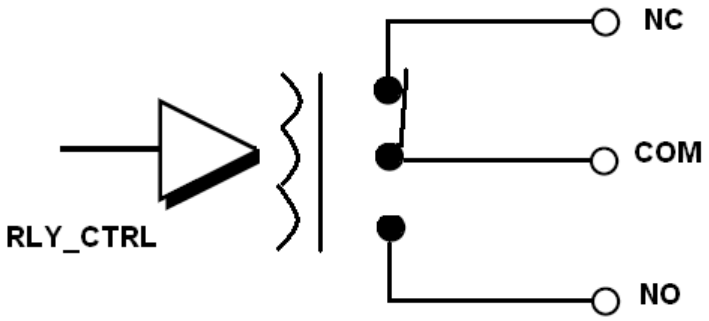
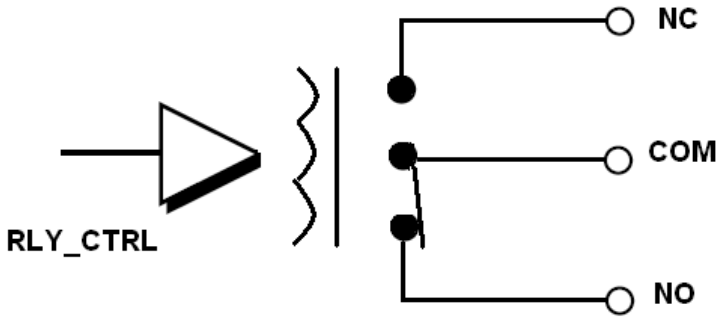


Fig C-6. Relay Contact Positions When Energized (RLY_CTRL=1)



D: Networking and Security

This chapter describes the following networking and security concepts as they relate to the XPress-I/O:

- SSL — described below.
- SSH — see page 144
- Serial tunneling — see page 145

This chapter concludes with a description of modem emulation (page 149).

SSL

Secure Sockets Layer (SSL) is an open-standard security protocol that provides privacy through encryption, server authentication, and message integrity. From its introduction in 1994, SSL has become the industry standard for securing e-commerce transactions over TCP/IP connections. And it is easy to see why.

Imagine mailing a letter in a clear envelope that anyone could see. If the envelope contained a check, credit card, or other valuable information, some nefarious individual could steal the letter or change its contents. Information traveling over networks, including the Internet, is just as vulnerable.

Prior to SSL, packets of information would travel networks in full view of anyone who could access the data. As the World Wide Web grew and gained in popularity, a solution became necessary for securing e-commerce transactions over the Internet. The solution would have to enable Internet consumers to reliably identify the Internet vendors (e-commerce servers) with whom they transact business while, at the same time, protect the confidentiality of the consumers' sensitive information as it traversed the Internet. With the advent of SSL, personal information that could be seen by anyone with access to view it could now be secure.

Benefits of SSL

The following list summarizes the benefits of SSL:

- Widely implemented standard for e-commerce applications
- Reduces the complexities associated with keeping user information confidential
- Works with existing web servers and browsers
- Eliminates the need for additional software applications
- Provides high level of security
- Platform and O/S neutral

- Allows server authentication via certificates

How SSL Works

SSL uses cryptography to deliver authentication and privacy to message transmission over the Internet. SSL permits the communication of client/server applications without eavesdropping and message tampering.

SSL runs on layers between application protocols (HTTP, SMTP, etc.) and the TCP transport protocol. To set up an SSL connection, a TCP/IP connection must be established first. The SSL connection sets up a secure channel within the TCP/IP connection in which all traffic between the client and server is encrypted. All the calls from the application layer to the TCP layer are replaced with calls to the SSL layer, with the SSL layer handling communication with the TCP layer.

SSL is most commonly used with HTTP (thus forming HTTPS). Web sites protected by SSL start with a URL that begins with “https” and displays a padlock icon at the bottom of the page (and for Mozilla Firefox in the address bar as well).

When a web browser accesses a domain secured by SSL, an SSL handshake authenticates the server and client, and establishes an encryption method and a unique session key. Once this handshake has been completed, the client and server can begin a secure session that guarantees message privacy and message integrity.

SSL uses Digital-Certificate technology to identify target servers reliably and uses encryption to protect the confidentiality of information passing between client and server. You can configure the XPress-I/O to use an SSL certificate for the HTTP server. The certificate can be created elsewhere and uploaded to the XPress-I/O, or it can be automatically generated as a self-signed certificate on the XPress-I/O. For more information about uploading a new certificate or create a new self-signed certificate, see SSL on page 89.

Note: *When uploading the certificate and the private key, be sure the private key is not compromised in transit.*

The following steps summarize how SSL works:

1. A client contacts a server secured by SSL.
2. In response to the client request, the server sends its certificate to the client.
3. The client generates a master key, which it encrypts with the server's public key and transmits the encrypted master key back to the server.
4. The server recovers the master key and authenticates itself to the client by returning a message authenticated with the master key. Subsequent data is encrypted and authenticated with keys derived from this master key.

Digital Certificates

Authentication with SSL is achieved with a Digital Certificate issued and signed by a Certificate Authority (CA) and stored on the server. Without a certificate signed by a CA, the server cannot be reliably identified to the client, yet a connection can still proceed if allowed.

The Digital Certificate resides on a secure server and is used to encrypt data and identify the web site. The Digital Certificate verifies that a site belongs to who it claims to belong to and contains information about the certificate holder, the domain that the certificate

was issued to, the name of the Certificate Authority who issued the certificate, the root and the country it was issued in. In addition to proving the veracity of a site, the Digital Certificate provides the receiver with a way to encode a reply. Digital Certificates come in 40-bit and 128-bit versions.

There are two principal ways to obtain a Digital Certificate. It can be bought from a certificate vendor or a user can "self-sign" his or her own certificate. With the latter method, a user can use various tools, both open source and proprietary, to sign his or her own Digital Certificate, saving the time and expense of going through a certificate vendor.

SSH

Like SSL, Secure Shell (SSH) is a protocol that provides secure encrypted communications over unsecured TCP/IP networks such as the Internet. SSH allows for secure access to remote systems, eliminating potential security breaches such as spoofing and eavesdropping or hijacking of sessions. However, SSH differs significantly from SSL and, in fact, cannot communicate with SSL. The two are different protocols, though they have some overlap in how they accomplish similar goals.

How Does SSH Authenticate?

SSH authenticates using one or more of the following:

- Password (the /etc/passwd or /etc/shadow in UNIX)
- User public key (RSA or DSA, depending on the release)
- Host based (.rhosts or /etc/hosts.equiv in SSH1 or public key in SSH2)

What Does SSH Protect Against?

SSH provides strong authentication and secure communications over insecure channels. It also provides secure connections that protect a network from attacks such as:

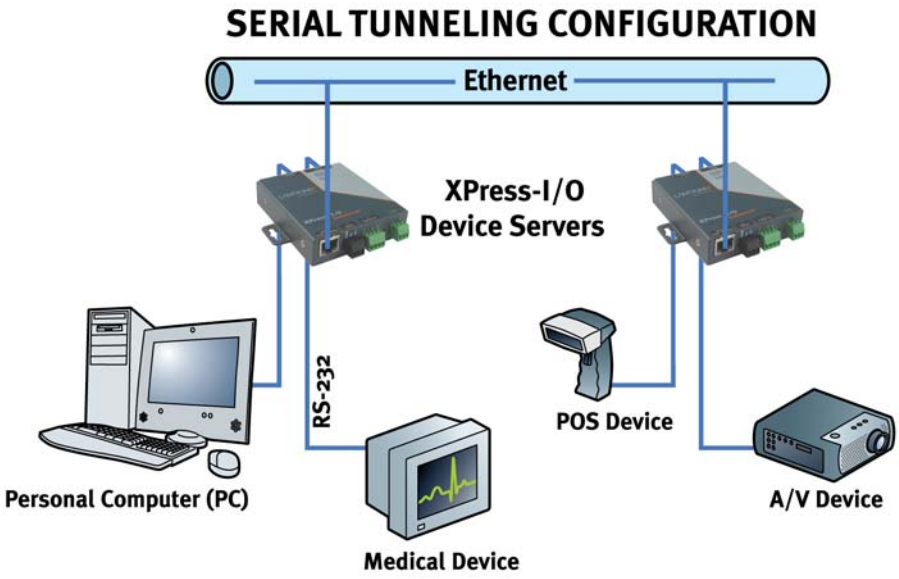
- IP spoofing, where a remote host sends packets that pretend to originate from another, trusted host. SSH even protects against a spoofer on the local network that is pretending to be a router to the outside.
- IP source routing, where a host pretends that an IP packet comes from another, trusted host.
- DNS spoofing, where an attacker forges name server records.
- Interception of cleartext passwords and other data by intermediate hosts.
- Manipulation of data by people in control of intermediate hosts.
- Attacks based on listening to authentication data and spoofed connections to the server.

Tunneling

Tunneling provides a way to create a connection between two serial devices across an untrusted network so the devices can share data. The sharing of information is achieved through a direct connection (or “serial tunnel”) between the two devices that encapsulates, authenticates, and encrypts the serial data into TCP packets and sends them across the Ethernet network. In this way, two previously isolated and non-networked devices can securely and effectively communicate and exchange information and operate with existing installed software applications or devices that are configured to run independent of an Ethernet network. And because the tunnel can be secure, anyone who tries to monitor the conversation between the two devices would see encrypted, unintelligible data.

The figure below shows how a pair of device servers can be used in tandem to provide transparent serial tunneling across an Ethernet network. In this example, a POS device in a store collects data and sends it to a device server attached to a POS serial port. The device server forwards the collected data, through an encrypted tunnel established over the Ethernet network, to a device server connected to a remote PC. The data received at the remote device server is decrypted and forwarded to the PC’s serial port and received at the remote PC. In this way, serial data that goes in one end comes out at the other end.

Example of an Encrypted Tunnel



Tunneling and the XPress-I/O

Each XPress-I/O serial port supports two concurrent tunneling connections, Connect mode and Accept mode. These connections operate independently of the other XPress-I/O serial ports.

- In Connect mode, the XPress-I/O actively makes a connection. The receiving node on the network must listen for the Connect mode's connection. By default, Connect mode is disabled.
- In Accept mode, the XPress-I/O listens for a connection. A node on the network initiates the connection. By default, Accept mode is enabled.
- Disconnect mode defines how an active connection is disconnected. The parameters used to drop the connection are user configurable. The XPress-I/O's Disconnect mode disconnects both Accept mode and Connect mode connections on a serial port when it observes the defined event occur on that port.

When any character arrives through the serial port, it gets copied to both the Connect mode connection and Accept mode connection if both are active.

Connect Mode

For Connect mode to work:

- Connect mode must be enabled on the XPress-I/O (see

- Tunnel – Connect Mode Page on page 57).
- A remote station (node) must be configured for Connect mode.
- A remote TCP or UDP port must be configured.

When Connect mode is enabled, it remains on until it is ended by Disconnect mode.

Connect mode supports the following protocols:

- TCP
- AES encryption over UDP
- AES encryption over TCP
- SSH (the XPress-I/O is the SSH client)
- UDP (available only in Connect mode since it is a connectionless protocol)

For AES encryption, both the encrypt key and the decrypt key must be specified. The encrypt key is used with data sent from the XPress-I/O, while the decrypt key is used when the XPress-I/O receives data. Both keys can have the same value.

If the remote address or port is not configured and Connect mode is set to UDP, the XPress-I/O accepts packets from any device on the network and sends packets to the last device that sent it packets. To ensure the XPress-I/O does not accept UDP packets from all devices on the network, you must configure the remote address and port. When the remote port and station are configured, the XPress-I/O ignores data from other sources.

To configure SSH, you must configure the SSH client username. In Connect Mode, the XPress-I/O is the SSH client. Ensure the XPress-I/O SSH client username is configured on the SSH server before using it with the XPress-I/O.

Connect Mode has six variations:

- Disabled (no connection)
- Enabled (always makes a connection)
- Active if it sees any character from the serial port (makes a connection upon receiving any character)
- Active if it sees a specific (configurable) character from the serial port
- Modem emulation (controlled by modem commands)
- Modem control asserted (makes a connection when the modem central signal on the serial line becomes active)

For the “any character” or “specific character” connection states, the XPress-I/O waits and retries the connection if the connection cannot be made. Once it makes a connection and then disconnects, it does not reconnect until it sees any character or the start character again (depending on the configured setting).

Accept Mode

In Accept mode, the XPress-I/O waits for a connection. The configurable local port is the port the remote device connects to for this connection. There is no remote port or address. The default local port is 10001 for serial port 1, and 10002 for serial port 2.

Accept Mode supports the following protocols:

- SSH (XPress-I/O is the server in Accept Mode). For this protocol, the SSH server host keys and at least one SSH authorized user must be configured.
- TCP
- AES encryption over TCP

Accept Mode has the following options:

- Disabled (close the connection)
- Enabled (always listening for a connection)
- Active if it receives any character from the serial port
- Active if it receives a specific (configurable) character from the serial port (same start character as Connect Mode's start character)
- Modem control signal (when the modem control on the serial line corresponding to the tunnel becomes active)

Disconnect Mode

Disconnect mode ends Accept mode and Connect mode connections. When disconnecting, the XPress-I/O shuts down connections gracefully.

The following three settings end a connection:

- The XPress-I/O receives the stop character.
- The timeout period elapses and no activity is going in or out of the XPress-I/O. Both Accept mode and Connect mode must be idle for the time frame.
- The XPress-I/O observes the modem control inactive setting.

To clear out data from the serial buffers upon disconnecting, configure the XPress-I/O to flush serial data (see Tunnel – Disconnect Mode Page on page 60).

Packing Mode

Packing mode takes data from the serial port, groups it together, and sends it out to nodes on the network. The groupings may be configured by size or by time intervals.

The following settings are configurable for Packing mode:

- Enable or disable Packing mode
- Packing mode timeout. Data that is packed for a specified period before being sent out.
- Packing mode threshold. When the buffer fills to a specified amount of data and the timeout has not elapsed, the XPress-I/O packs the data and sends it out.
- Send character. Similar to a start or stop character, the XPress-I/O packs data until it sees the send character. When it sees the send character, the XPress-I/O sends the packed data and the send character in the packet.
- Trailing character. If a trailing character is defined, this character is appended to data put on the network immediately following the send character.

Modem Emulation

The XPress-I/O supports Modem Emulation mode for devices that transmit modem AT commands. The XPress-I/O supports two different modes:

- **Command Mode:** The XPress-I/O serial ports accept modem commands that instruct the XPress-I/O to perform an action such as start or drop a connection.
- **Data Mode:** Serial data received in the XPress-I/O serial port is sent through the active network connection.

The Tunnel – Modem Emulation page lets you configure modem emulation settings for two tunnels (see Tunnel – Modem Emulation Page on page 63). Each tunnel can have different settings.

Note: *When the XPress-I/O serial port is in Modem Emulation mode, the serial port remains in Command mode until an active tunnel starts. Once an active tunnel starts, the serial port remains in Data mode until the connection is dropped or the serial port is placed in Command mode by issuing the modem command +++.*

Command Mode

The Modem Emulation's Command mode supports the standard **AT** command set. For a list of available commands from the serial or telnet login, enter **AT?**. Use **ATDT**, **ATD**, and **ATDP** to establish a connection:

+++	Switches to command mode if entered from serial port during connection.
AT?	Help.
ATDT<Address Info>	Establishes the TCP connection to socket (<IP>/<port>).
ATDP<Address Info>	See ATDT.
ATD	Like ATDT. Dials default connect mode remote address and port.
ATO	Switches to data mode if connection still exists. Vice versa to '+++'.
ATEn	Switches echo in command mode (off – n = 0, on –n = 1).
ATH	Disconnects the network session.
ATI	Displays modem information.
ATS0 = n	Accept incoming connection. (n = 0: disable, n = 1: connect automatically, n = 2+: connect with ATA command (basically wait for the user or application to issue a command to "pick up the phone")
ATQn	Quiet mode (0 - enable results code, 1 - disable result codes)
ATVn	Verbose mode (0 - numeric result codes, 1 - text result codes)
ATZ	Restores the current state from the setup settings.
A/	Repeat last valid command.

These commands allow the XPress-I/O to emulate a modem. The XPress-I/O ignores valid AT commands that do not apply to the XPress-I/O and sends an OK response code.

In Command mode, the XPress-I/O can make a connection to the remote host using the remote address and remote port information specified on the Tunnel – Connect Mode page (see

Tunnel – Connect Mode Page on page 57).

When making a connection from the XPress-I/O using an ATDT or ATDP command, full or partial IP addresses can be used. If a partial IP address is used, the XPress-I/O uses the remote address and port as configured in the Connect Mode settings.

For the following examples, we assume that the remote address is 192.168.16.10 and the port is set to 10001 in the Connect mode settings:

- Entering **ATDT** alone causes the XPress-I/O to connect to the IP address and remote port configured in Connect Mode.
- Entering **ATDT 119.25.50** causes the XPress-I/O to assume the first octet in the IP address and connects to the remote IP address 192.119.25.50, port 10001. (Since the remote port was not specified in the **ATDT** command, the remote port defined under Connect mode is used.)
- Entering **ATDT 28.150** causes the XPress-I/O to assume the first two octets in the IP address and connects to the remote IP address 192.168.28.150, port 10001.
- Entering **ATDT 150** causes the XPress-I/O to assume the first three octets and connects to the remote IP address 192.168.16.150, port 10001.
- Entering **ATDT 28.150:10012** causes the XPress-I/O to assume the first two octets in the IP address and connects to the remote IP address 192.168.28.150, port 10012.

Note: *If you add 10012 after the IP address segment, port 10012 is used instead of the port defined in Connect mode.*

By default, the +++ characters are not passed through the connection. To pass them through the connection, enable Echo Pluses on the Tunnel - Modem Emulation page (see Tunnel – Modem Emulation Page on page 63).

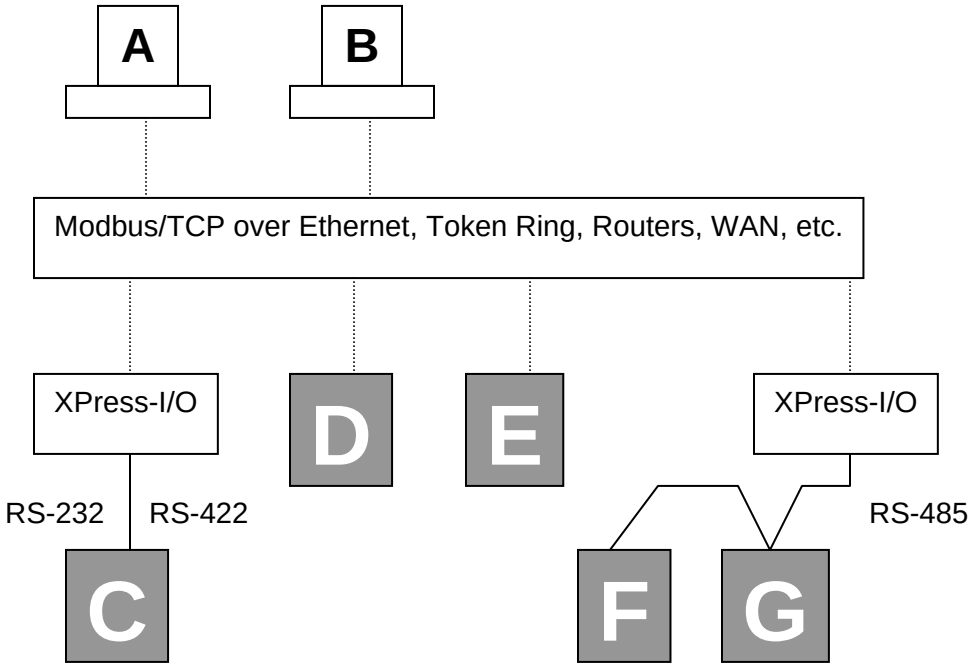
E: Modbus

Overview

When it comes to planning data communication for open, multi-vendor industrial control systems, Modbus is the first choice of end users and integrators alike. The Modbus/RTU protocol defines how a master device polls one or more slave devices to read and write data in real time by means of RS232, RS422, or RS485 serial data communication. Although not the most powerful protocol available, its rare simplicity allows not only rapid implementation but also enough flexibility to apply in virtually all industrial situations. Modbus/TCP, an extension of Modbus/RTU, defines how Modbus/RTU and Modbus/ASCII encode and transport messages over TCP/IP-based networks. Modbus/TCP is just as simple to implement and as flexible to apply as the original Modbus/RTU. You can find the specifications for both online at www.Modbus.org.

The XPress-I/O allows users to integrate new and existing Modbus/RTU and Modbus/ASCII serial devices with newer TCP/IP network-based devices. This appendix describes a system that integrates three Modbus/RTU slave devices with four Modbus/TCP devices.

Extended Modbus System Example



The figure above shows various specific styles of Modbus operations. Traditionally, Modbus/RTU devices fall into two groups:

Modbus slave devices: These are generally the workhorse devices. They perform their tasks 24 hours a day, 365 days a year. Flow metering, temperature control, batch loading, and running entire automated assembly lines are examples of such tasks. The slave devices are called slaves because as far as data communications is concerned, they function as passive servers. Modbus slave devices passively sit and wait for a remote Modbus master device to ask them to report existing data values (read) or accept new data values (write).

Modbus master devices: These are generally higher-level computers, devices in which data and software are very important. The most common examples of Modbus master devices are the “Human-Machine-Interface” (HMI) computers, which allow human operators to monitor, adjust, and maintain the operations of field devices. Modbus master devices are clients that actively go out and read from and/or write to remote Modbus slave devices to monitor or adjust slave behavior.

Examples

Modbus/TCP Master Talking to Modbus/TCP Slave

Devices A, B, D, and E are new Modbus/TCP devices, which are improved over Modbus/RTU (see more about Modbus/RTU limitations below). All four devices can function concurrently as both Modbus master and Modbus slave. Both computers A and B can treat controller D as a slave, polling data in real time. Yet controller D can also act as a master and poll data from controller E, which can in turn also act as a master to write alarm data directly up to computers A and B to alert the operators to the alarm condition. Traditional Modbus/RTU requires slave devices, even with severe alarm conditions, to sit patiently and wait for a remote master to poll the specific data that caused the alarm condition.

It is revolutionary for such a simple and flexible protocol as Modbus to offer such functionality. Therefore, Modbus/TCP offers exciting new design options for industrial users, which the Xpress-I/O extends to traditional Modbus/RTU serial devices.

Modbus/TCP Master Talking to Modbus/RTU Serial Slave

Devices C, F, and G are traditional Modbus/RTU slave devices. Device C uses a point-to-point electrical interface like RS232. This allows only a single Modbus/RTU master to talk to device C. However, the XPress-I/O makes device C appear on the Modbus/TCP network as a full Modbus/TCP slave device. All Modbus/TCP enabled devices, A, B, D, and E, can actively share access to slave device C. A limitation in traditional Modbus/RTU implementation expects devices to be dedicated as either master or slave devices, so device C can only act as a Modbus slave.

Devices F and G are different from device C. They share a single RS485 multi-drop line that strictly limits them to act as slaves to a single Modbus/RTU master. However, all Modbus/TCP enabled devices A, B, D, and E can actively share access to both slave devices F and G. XPress-I/O manages and coordinates the shared access. In fact, the XPress-I/O allows up to sixteen concurrent Modbus masters (or thirty-two if an additional TCP Server is also used) to share access to the slaves.

Local Slave

The XPress-I/O itself hosts a local Modbus slave role. This local slave is addressable from Modbus/TCP at Unit Identifier 255 (0xFF).The local slave provides access to the relay and digital I/Os as a single data block:

Address	Name	CP	I/O
0	XIO1	CP1	User configurable as input or output (CP menu)
1	XIO2	CP2	User configurable as input or output (CP menu)
2	Relay	CP3	Output

The server treats broadcast (Unit Identifier 0) as a request to forward to the Modbus serial port, but does not attempt to apply the function locally.

The local slave supports the following Modbus functions:

Number	Name
1	Read Coils
2	Read Discrete Inputs
3	Read Holding Registers
4	Read Input Registers
5	Write Single Coil
6	Write Single Register
15	Write Multiple Coils
16	Write Multiple Registers
23	Read/Write Multiple Registers
43/14	Read Device Identification (Basic)

Note: *Any attempt to write to a CP that the user has configured as an input returns exception 4 (**slave device failure**).*

F: Technical Support

If you are unable to resolve an issue using the information in this documentation:

Technical Support US
Check our online knowledge base or send a question to Technical Support at http://www.lantronix.com/support.

Technical Support Europe, Middle East, Africa

Phone: +33 1 39 30 41 72
Email: eu_techsupp@lantronix.com or eu_support@lantronix.com

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

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

- Your name, and your company name, address, and phone number
- Lantronix model number
- Lantronix serial number
- Software version (on the first screen shown when you Telnet to port 23)
- Description of the problem
- Debug report (stack dump), if applicable
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem)

G: Compliance

Declaration of Conformity

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

Manufacturer's Name & Address:

Lantronix, 15353 Barranca Parkway, Irvine, CA 92618 USA

Declares that the following product:

Product Name Model: XPress-I/O 2 Port Industrial Device Server

Description: 2-Port Industrial Device Server with Optically Isolated Digital I/Os and a Relay

Conforms to the following standards or other normative documents:

Safety:

UL 60950-1

CSA 22.2. No 60950-1-03

EN 60950-1

TUV

VCCI

C-Tick

Electromagnetic Emissions and Immunity:

ITE	
Emissions:	**Immunity:**
FCC Part 15 Subpart B Class A ICES-003 Issue 4 February 2004 Class A AS/NZS CISPR 22: 2006 Class A EN55022: 1998 + A1: 2000 + A2: 2003 CLASS A EN61000-3-2: 2000 Class A EN61000-3-3: 1995 +A1: 2001	EN55024: 1998 +A1: 2001 +A2: 2003 IEC_61000-4-2: 1995 IEC_61000-4-3: 1995 IEC_61000-4-4: 1995 IEC_61000-4-5: 1995 IEC_61000-4-6: 1996 IEC_61000-4-8: 1993 IEC_61000-4-11: 1994

Industrial Environment	
Emissions:	**Immunity**
FCC Part 18 Subpart C ICES-001 Issue 4 July 2004 EN61000-6-4: 2001 and AS/NZS 4251.2: 1999 CISPR11	EN61000-6-2: 2001 and AS/NZS 61000.6.2: 2002 IEC_61000-4-2: 1995 IEC_61000-4-3: 1995 IEC_61000-4-4: 1995 IEC_61000-4-5: 1995 IEC_61000-4-6: 1996 IEC_61000-4-8: 1993 IEC_61000-4-11: 1994

Supplementary Information:

This Class A digital apparatus complies with Canadian ICES-003 (CSA) and has been verified as being compliant within the Class A limits of the FCC Radio Frequency Device Rules (FCC Title 47, Part 15, Subpart B CLASS A), measured to CISPR 22: 1993 limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment. The product complies with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC.

Manufacturer's Contact:

Director of Quality Assurance, Lantronix
15353 Barranca Parkway, Irvine, CA 92618 USA
Tel: 949-453-3990
Fax: 949-453-3995

H: Warranty

Lantronix warrants each Lantronix product to be free from defects in material and workmanship for a period of **TWO YEARS** after the date of shipment. During this period, if a customer is unable to resolve a product problem with Lantronix Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of an RMA number, the customer shall return the product to Lantronix, freight prepaid. Upon verification of warranty, Lantronix will -- at its option -- repair or replace the product and return it to the customer freight prepaid. If the product is not under warranty, the customer may have Lantronix repair the unit on a fee basis or return it. No services are handled at the customer's site under this warranty. This warranty is voided if the customer uses the product in an unauthorized or improper way, or in an environment for which it was not designed.

Lantronix warrants the media containing its software product to be free from defects and warrants that the software will operate substantially according to Lantronix specifications for a period of **60 DAYS** after the date of shipment. The customer will ship defective media to Lantronix. Lantronix will ship the replacement media to the customer.

* * * *

In no event will Lantronix be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss of equipment, plant or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing software, hardware, equipment or facilities, or claims against the user by its employees or customers resulting from the use of the information, recommendations, descriptions and safety notations supplied by Lantronix. Lantronix liability is limited (at its election) to:

refund of buyer's purchase price for such affected products (without interest)

repair or replacement of such products, provided that the buyer follows the above procedures.

There are no understandings, agreements, representations or warranties, express or implied, including warranties of merchantability or fitness for a particular purpose, other than those specifically set out above or by any existing contract between the parties. Any such contract states the entire obligation of Lantronix. The contents of this document shall not become part of or modify any prior or existing agreement, commitment or relationship.

For details on the Lantronix warranty replacement policy, go to our web site at www.lantronix.com/support/warranty.

Index