EDS Device Servers/Terminal Servers User Guide

- EDS4100
- EDS8PS
- EDS16PS
- EDS8PR
- EDS16PR
- EDS32PR

Part Number 900-433
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Warranty

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

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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

Note: *This product has been designed to comply with the limits for a Class B digital device pursuant to Part 15 of FCC and EN55022:1998 Rules when properly enclosed and grounded. These limits are designed to provide reasonable protection against radio interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause interference to radio communications.* *See "Appendix C - Compliance" on page 155 for additional information.*

The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.For the latest revision of this product document, please check our online documentation at www.lantronix.com/support/documentation.

Revision History

Date	Rev.	Comments
March 2006	A	Initial Document
October 2006	B	EDS16PR and EDS32PR products added.
December 2006	D	German and English TUV certification added.
January 2007	E	EDS8PR product added.
November 2007	F	Added LPD, Terminal Host, RSS, and RT pages; updated XML and other pages.
November 2008	G	EDS8PS and EDS16PS products added.
May 2009	H	Updated for EDS8/16/32PR and EDS4100 v4.1.0.2.
April 2011	I	Updated for firmware version 5.2.0.0R24. Added support for Modbus protocol for EDS4100, configurable MTU, and additional VIP tunnel connect protocols; as well as improvements to SNMP, logging, and SSL.

Table of Contents

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1: About This Guide

This guide provides the information needed to configure, use, and update the EDS™ Device Server. It is intended for software developers and system integrators who are installing the EDS in their designs.

Chapter and Appendix Summaries

A summary of each chapter is provided below.

Chapter	Description
Chapter 2: Introduction	Main features of the product and the protocols it supports. Includes technical specifications.
Chapter 3: Installation of EDS8PS and EDS16PS	Instructions for installing the EDS8PS and the EDS16PS device servers.
Chapter 4: Installation of EDS4100	Instructions for installing the EDS4100 device server.
Chapter 5: Installation of EDS8PR, EDS16PR and EDS32PR	Instructions for installing the EDS8PR, the EDS16PR, and the EDS16PR device server.
Chapter 6: Using DeviceInstaller	Instructions for viewing the current configuration using DeviceInstaller.
Chapter 7: Configuration Using Web Manager	Instructions for accessing Web Manager and using it to configure settings for the device.
Chapter 8: Network Settings	Instructions for using the web interface to configure Ethernet settings.
Chapter 9: Line and Tunnel Settings	Instructions for using the web interface to configure line and tunnel settings.
Chapter 10: Terminal and Host Settings	Instructions for using the web interface to configure terminal and host settings.
Chapter 11: Service Settings	Instructions for using the web interface to configure settings for DNS, SNMP, FTP, and other services.
Chapter 12: Security Settings	Instructions for using the web interface to configure SSH and SSL security settings.
Chapter 13: Modbus	Instructions for using the web interface to configure Modbus. ***Note:*** *Modbus is only available on the EDS4100 and is not supported on the EDS8PR, EDS16PR, EDS32PR, EDS8PS and EDS16PS.*
Chapter 14: Maintenance and Diagnostics Settings	Instructions for using the web interface to maintain the device, view statistics, files, and logs, and diagnose problems.
Chapter 15: Advanced Settings	Instructions for using the web interface to configure email, CLI, and XML settings.
Chapter 16: VIP Settings	Information about Virtual IP (VIP) features available on the device and instructions for using the web interface to configure the VIP settings.
Chapter 17: Branding the EDS	Instructions for customizing the device.

Chapter 18: Updating Firmware	Instructions for obtaining the latest firmware and updating the device.
Appendix A - Technical Support	Instructions for contacting Lantronix Technical Support.
Appendix B - Binary to Hexadecimal Conversions	Instructions for converting binary values to hexadecimals.
Appendix C - Compliance	Lantronix compliance information.
Appendix D - Lantronix Cables and Adapters	Lantronix cables and adapters for use with the EDS devices are listed here according to part number and application.

Additional Documentation

Visit the Lantronix web site at www.lantronix.com/support/documentation for the latest documentation and the following additional documentation.

Document	Description
EDS4100 Quick Start, EDS8/16PS Quick Start, or EDS8/16/32PR Quick Start	Information about the EDS hardware installation and initial configuration of your EDS device.
EDS Command Reference	Instructions for accessing Command Mode (the command line interface) using a Telnet connection or through the serial port. Detailed information about the commands. Also provides details for XML configuration and status.
DeviceInstaller Online Help	Instructions for using the Lantronix Windows-based utility to locate the device and to view its current settings.
Com Port Redirector Quick Start and Online Help	Instructions for using the Lantronix Windows-based utility to create virtual com ports.
Secure Com Port Redirector User Guide	Instructions for using the Lantronix Windows-based utility to create secure virtual com ports.

2: Introduction

This chapter introduces the Lantronix EDS family of device servers. It provides an overview of the products, lists their key features, and describes the applications for which they are suited.

EDS is a unique, hybrid Ethernet terminal and multi-port device server product designed to remotely access and manage virtually all of your IT/networking equipment and servers. It is also designed to provide connectivity for edge devices such as medical equipment, kiosks, POS/retail terminals, security equipment, and more.

EDS device servers contain all the components necessary to deliver full network connectivity to virtually any kind of serial device. They boast a reliable TCP/IP protocol stack, a variety of remote management capabilities, and an innovative design based on the leading-edge Lantronix Evolution OS™.

Delivering a data center-grade, programmable device computing and networking platform for integrating edge equipment into the enterprise network. Rack-mountable EDS models are available in 8, 16, and 32 port configurations. Desk top EDS models are available in 4, 8, and 16 port configurations.

This chapter contains the following sections:

EDS8PS and EDS16PS Overview

The EDS8PS (8 serial ports) and EDS16PS (16 serial ports) are compact desktop device servers that give you the ability to network-enable asynchronous RS-232 serial devices. They provide fully transparent RS-232 point-to-point connections without requiring modifications to existing software or hardware in your application.

Figure 2-1 EDS8PS Device Server

Features

Key features of the EDS8PS and EDS16PS include:

- Dual-purpose Ethernet terminal server and device server design.
- 8 (EDS8PS) or 16 (EDS16PS) serial ports with hardware handshaking signals.
- RS-232 support.
- An RJ45 Ethernet port.
- 8 MB Flash memory.
- 32 MB random access memory (RAM).
- Lantronix Evolution OS™.
- A dedicated console port.
- AES, SSH, or SSL secure data encryption.
- Three convenient configuration methods (Web, command line, and XML).
- Print server functionality (LPR/LPD).

See *Chapter 3: Installation of EDS8PS and EDS16PS* for installation instructions.

EDS4100 Overview

The EDS4100 is a compact device server that allows you 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 in your application.

- Ports 1 through 4 support RS-232 devices.
- Ports 1 and 3 also support RS-422/485.

Figure 2-2 EDS4100 4 Port Device Server

Note: *RS-485 circuits support 32 full-load devices or 128 quarter-load devices. Each RS-485 port, however, counts as one device, leaving up to 31 full-load or 127 quarter-load devices that can be connected to the RS-485 circuit.*

The EDS4100 device server supports the Power-over-Ethernet (PoE) standard. With PoE, power is supplied to the EDS over the Ethernet cable, by either an Ethernet switch or a midspan device. Being able to draw power through the Ethernet cable eliminates power supply and cord clutter. It also allows the EDS to be located in areas where power is not typically available.

Features

The key features of the EDS4100 include:

- Dual-purpose Ethernet terminal server and device server design.
- Four serial ports with hardware handshaking signals.
- RS-232 and RS-422/485.
- One RJ45 Ethernet port.
- IEEE 802.3af standard for Power-over-Ethernet (PoE).
- 8 MB Flash memory.
- 32 MB Random Access Memory (RAM).
- Lantronix Evolution OS™.
- AES, SSH, or SSL secure data encryption.
- Three configuration methods (Web, command line, and XML).
- Print server functionality (LPR/LPD).

See *Chapter 4: Installation of EDS4100* for installation instructions.

EDS8PR, EDS16PR, and EDS32PR Overview

The EDS8PR (8 serial ports), EDS16PR (16 serial ports), and EDS32PR (32 serial ports) are compact easy-to-use, rack-mountable device servers that give you the ability to network-enable asynchronous RS-232 serial devices. They provide fully transparent RS-232 point-to-point connections without requiring modifications to existing software or hardware components in your application.

Figure 2-3 EDS16PR Device Server

Features

The key features of the EDS8PR, EDS16PR, and EDS32PR include:

- Dual-purpose Ethernet terminal server and device server design.
- 8 (EDS8PR), 16 (EDS16PR) or 32 (EDS32PR) serial ports with hardware handshaking signals.
- RS-232 support.
- One RJ45 Ethernet port.
- 8 MB Flash memory.
- 32 MB Random Access Memory (RAM).
- Lantronix Evolution OS™.
- A dedicated console port.
- AES, SSH, or SSL secure data encryption.
- Three configuration methods (Web, command line, and XML).
- Print server functionality (LPR/LPD).

See *Chapter 5: Installation of EDS8PR, EDS16PR and EDS32PR*, for installation instructions.

Applications

The EDS device server connects serial devices such as those listed below to Ethernet networks using the IP protocol family.

- ATM machines
- Data display devices
- Security alarms and access control devices
- Modems
- Time/attendance clocks and terminals
- Patient monitoring equipment
- Medical instrumentation
- Industrial Manufacturing/Automation systems
- Building Automation equipment
- Point of Sale Systems

Protocol Support

The EDS device server contains a full-featured TCP/IP stack. Supported protocols include:

- ARP, IP, UDP, TCP, ICMP, BOOTP, DHCP, AutoIP, Telnet, DNS, FTP, TFTP, HTTP/HTTPS, SSH, SSL/TLS, SNMP, SMTP, RSS and Syslog for network communications and management.
- TCP, UDP, TCP/AES, UDP/AES, Telnet, SSH and SSL/TLS for tunneling to the serial port.
- TFTP, FTP, and HTTP for firmware upgrades and uploading files.

Evolution OS™

The EDS incorporates the Lantronix 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 feeds
- Enterprise-grade security with SSL and SSH
- Comprehensive troubleshooting tools

Additional Features

Modem Emulation

In modem emulation mode, the EDS can replace dial-up modems. The unit accepts modem AT commands on the serial port, and then establishes a network connection to the end device, leveraging network connections and bandwidth to eliminate dedicated modems and phone lines.

Web-Based Configuration and Troubleshooting

Built upon Internet-based standards, the EDS enables you to configure, manage, and troubleshoot through a browser-based interface accessible anytime from anywhere. All configuration and troubleshooting options are launched from a web interface. You can access all functions via a Web browser, for remote access. As a result, you decrease downtime (using the troubleshooting tools) and implement configuration changes (using the configuration tools).

Command-Line Interface (CLI)

Making the edge-to-enterprise vision a reality, the EDS with the Evolution OS™ uses industry-standard tools for configuration, communication, and control. For example, the Evolution OS™ uses a Command Line Interface (CLI) whose syntax is very similar to that used by data center equipment such as routers and hubs.

VIP Access

Virtual IP Access is the Lantronix technology that solves the access-through-firewall problem. With VIP Access, the EDS can act as a ManageLinx DSC and provide direct access to your equipment behind a firewall.

SNMP Management

The EDS 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 EDS.

XML-Based Architecture and Device Control

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

Really Simple Syndication (RSS)

The EDS supports Really Simple Syndication (RSS) for streaming and managing on-line content. RSS feeds all the configuration changes that occur on the device. An RSS aggregator then reads (polls) the feed. 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

Evolution OS™ provides the EDS the highest level of networking 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.

By protecting the privacy of serial data 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 are able to do the following:

- 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 or SSL connection

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

You can use the EDS with the Lantronix 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.

Terminal Server/Device Management

Remote offices can have routers, PBXs, servers and other networking equipment that require remote management from the corporate facility. The EDS easily attaches to the serial ports on a server, Private Branch Exchange (PBX), or other networking equipment to deliver central, remote monitoring and management capability.

Troubleshooting Capabilities

The EDS 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 EDS, including CPU utilization and total stack space available.

Configuration Methods

After installation, the EDS requires configuration. For the unit to operate correctly on a network, it must have a unique IP address on the network. There are four basic methods for logging into the EDS and assigning IP addresses and other configurable settings:

DeviceInstaller: Configure the IP address and related settings and view current settings on the using a Graphical User Interface (GUI) on a PC attached to a network. See *Using DeviceInstaller (on page 41)*.

Web Manager: Through a web browser, configure the EDS settings using the Lantronix Web Manager. See *Configuration Using Web Manager (on page 43)*.

Command Mode: There are two methods for accessing Command Mode (CLI): making a Telnet connection or connecting a terminal (or a PC running a terminal emulation program) to the unit's serial port. (See the EDS Command Reference Guide for instructions and available commands.*)*

XML: The EDS supports XML-based configuration and setup records that make device configuration transparent to users and administrators. XML is easily editable with a standard text or XML editor. (See the EDS Command Reference Guide for instructions and commands.*)*

Addresses and Port Numbers

Hardware Address

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

Figure 2-4 Sample Hardware Address

`00-20-4A-14-01-18` **or** `00:20:4A:14:01:18`

IP Address

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

Port Numbers

Every TCP connection and every UDP datagram is defined by a destination and source IP address, and a destination and source port number. For example, a Telnet server commonly uses port number 23.

The following is a list of the default server port numbers running on the EDS:

- TCP Port 22: SSH Server (Command Mode configuration)
- TCP Port 23: Telnet Server (Command Mode configuration)
- TCP Port 80: HTTP (Web Manager configuration)
- TCP Port 443: HTTPS (Web Manager configuration)
- UDP Port 161: SNMP
- TCP Port 21: FTP
- UDP Port 69: TFTP
- UDP Port 514: Syslog
- TCP Port 515: LPD
- UDP Port 30718: LDP (Lantronix Discovery Protocol) port
- TCP/UDP Port 10001: Tunnel 1

Note: *Multi-port products include one or more additional supported ports and tunnels with default sequential numbering. For instance: TCP/UDP Port 10002: Tunnel 2, TCP/UDP Port 10003: Tunnel 3, etc.*

Product Information Label

The product information label on the unit contains the following information about the specific unit:

- Bar Code
- Product Revision
- Hardware Address (MAC Address or Serial Number)
- Manufacturing Date Code

Figure 2-5 Product Label

3: Installation of EDS8PS and EDS16PS

This chapter describes how to install the EDS8PS and EDS16PS device servers.

Package Contents

Your EDS package includes the following items:

- One EDS device server (EDS8PS or EDS16PS)
- One RJ45-to-DB9F serial cable
- One power cord

User-Supplied Items

To complete your EDS8/16PS installation, you need the following items:

- RS-232 serial devices that require network connectivity. Each EDS8/16PS serial port supports a directly connected RS-232 serial device.
- A serial cable for each serial device to be connected to the EDS8/16PS. All devices attached to the device ports support the RS-232C (EIA-232) standard. Category 5 cabling with RJ45 connections is used for the device port connections.

Note: *To connect an EDS8/16PS serial port to a DTE device, you need a DTE cable, such as the one supplied in your EDS8/16PS package, or an RJ45 patch cable and DTE adapter. To connect the EDS8/16PS serial port to a DCE device, you need a DCE (modem) cable, or an RJ45 patch cable and DTE adapter. For a list of the Lantronix cables and adapters you can use with the EDS8/16PS, see the* *Appendix D - Lantronix Cables and Adapters (on page 158)**.*

- An available connection to your Ethernet network and an Ethernet cable.
- A working power outlet.

Identifying Hardware Components

Figure 3-1 shows the front of the EDS8PS. *Figure 3-2* shows the back of the EDS8PS.

Figure 3-1 Front View of the EDS8PS

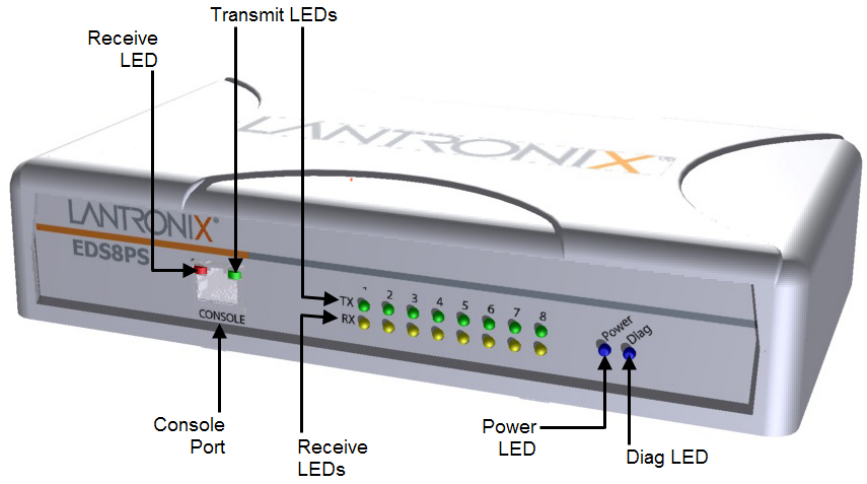
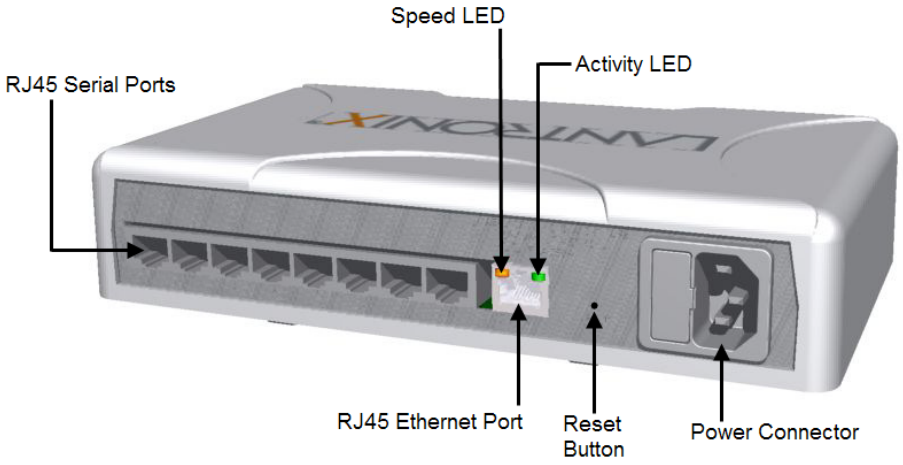


Figure 3-2 Back View of the EDS8PS



Serial Ports

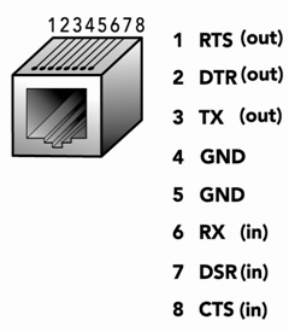
The EDS8PS has 8 serial ports and the EDS16PS has 16 serial ports on the back panel. All are configured as DTE and support up to 230,400 baud.

Console Port

The front panel of the EDS8/16/32PR provides an RJ45 Console port, configured as DTE and supports baud rates up to 230,400 baud.

Note: *The console port cannnot be used as a serial port.*

Figure 3-3 RJ45 Serial Port



Ethernet Port

The back panel of the EDS8/16PS provides a network interface via the right most RJ45 port. This port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network. The Speed LED on the back of the EDS8/16PS shows the connection of the attached Ethernet network. The EDS8/16PS can be configured to operate at a fixed Ethernet speed and duplex mode (half- or full-duplex). Otherwise by default, the EDS8/16PS auto-negotiates the connection to the Ethernet network.

LEDs

Light-emitting diodes (LEDs) on the front panel show status information.

- Each serial port plus the console port have a Transmit and a Receive LED. The Ethernet port has Speed, Activity, Power, and Status LEDs.
- The table below describes the LEDs on the front of the EDSPS.

Table 3-4 **Front Panel LEDs**

LED	Description
Transmit (green)	Blinking = EDS is transmitting data on the serial port.
Receive (yellow)	Blinking = EDS is receiving data on the serial port.
Power (blue)	On = EDS is receiving power.
Diag (green)	Fast blink = initial startup (loading OS). Slow blink (once per second) = operating system startup. On = unit has finished booting.
Speed (yellow)	On = EDS is connected to a 100 Mbps Fast Ethernet network.
	Off = EDS is connected to a 10 Mbps Ethernet network.
Activity (green)	Blink = EDS is sending data to or receiving data from the Ethernet network.

Reset Button

The reset button is on the rear of the device to the right of the Ethernet port, accessible through a hole in the case. You can use it to reboot the unit or to reload factory defaults.

Reboot the device:

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

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.

Installing the EDS8/16PS

Finding a Suitable Location

- You can install the EDS8/16PS either in a shelf or as a desktop unit.
- If using AC power, avoid outlets controlled by a wall switch.

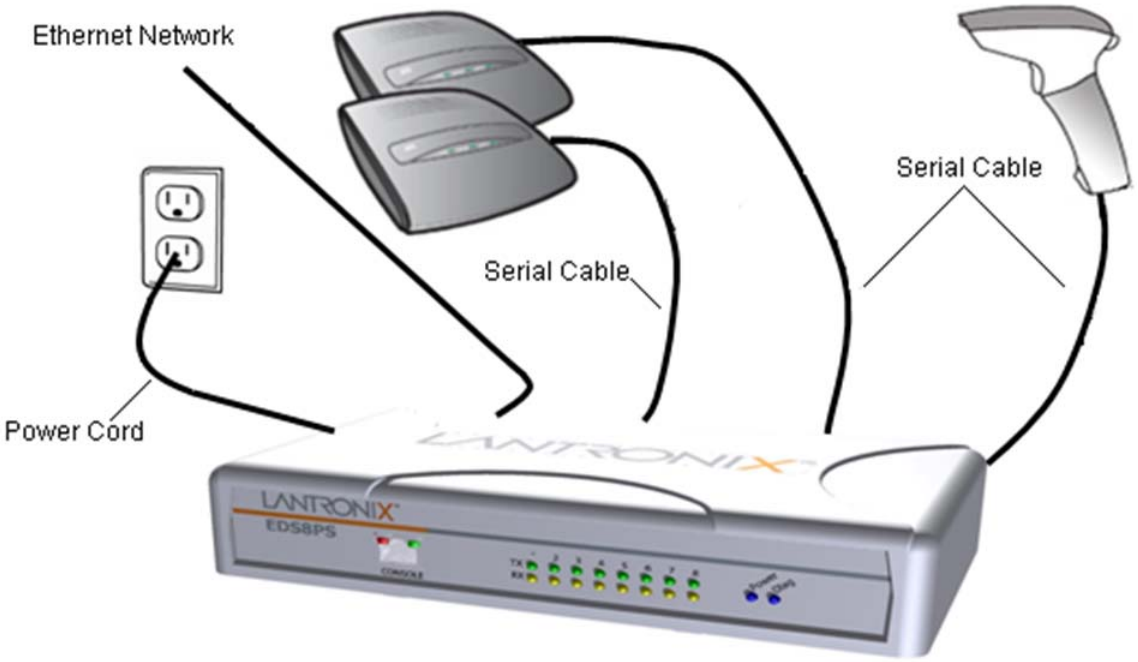
Connecting the EDS8/16PS

All EDS serial ports support RS-232 devices.

Connect the EDS8/16PS to one or more serial devices.

1. Power off the serial devices.
2. Attach a CAT 5 serial cable between the EDS8/16PS and your serial device. See the *Appendix D - Lantronix Cables and Adapters (on page 158)*, for a list of cables and adapters you can use.
3. Connect an Ethernet cable between the EDS8/16PS Ethernet port and your Ethernet network.
4. Insert the power cord into the back of the EDS8/16PS. Plug the other end into an AC wall outlet.
5. Power up the serial devices.

Figure 3-5 Example of EDS8/16PS Connections



4: Installation of EDS4100

This chapter describes how to install the EDS4100 device server.

Package Contents

Your EDS4100 package includes the following items:

- One EDS4100 device server.
- One DB9F-to-DB9F null modem cable.
- A printed Quick Start Guide.

Your package may also include a power supply.

User-Supplied Items

To complete your EDS4100 installation, you need the following items:

- RS-232 and/or RS-422/485 serial devices that require network connectivity:
- A serial cable for each serial device. One end of the cable must have a female DB9 connector for the EDS4100 serial port.
- To connect an EDS4100 serial port to another DTE device, you will need a null modem cable, such as the one supplied in your EDS4100 package.
- To connect the EDS4100 serial port to a DCE device, you will need a straight-through (modem) cable.
- An available connection to your Ethernet network and an Ethernet cable.
- A working power outlet if the unit will be powered from an AC outlet.

Identifying Hardware Components

The following two figures show the front and back of the EDS4100.

Figure 4-1 Front View of the EDS4100

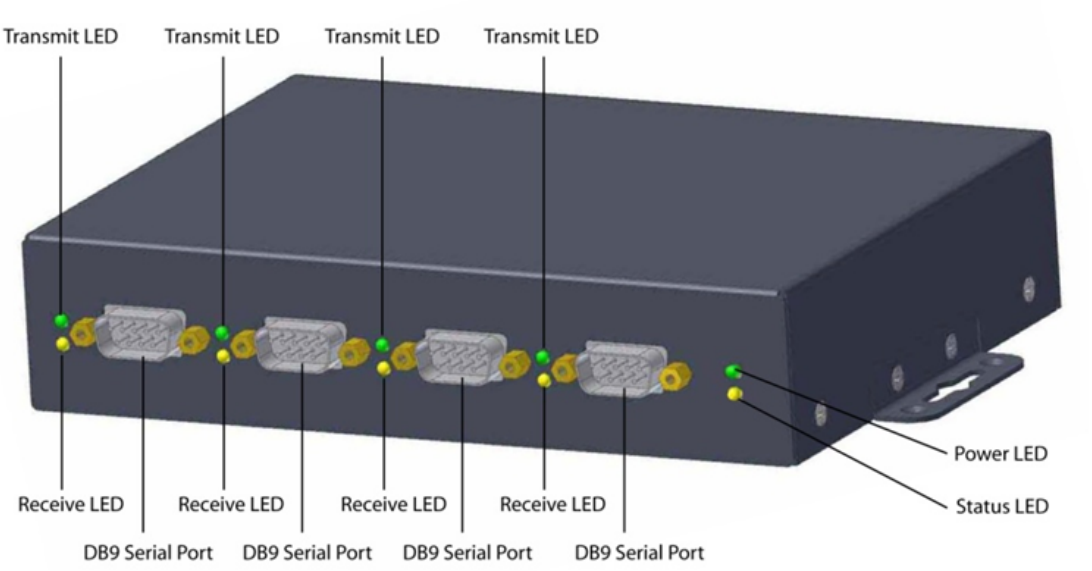
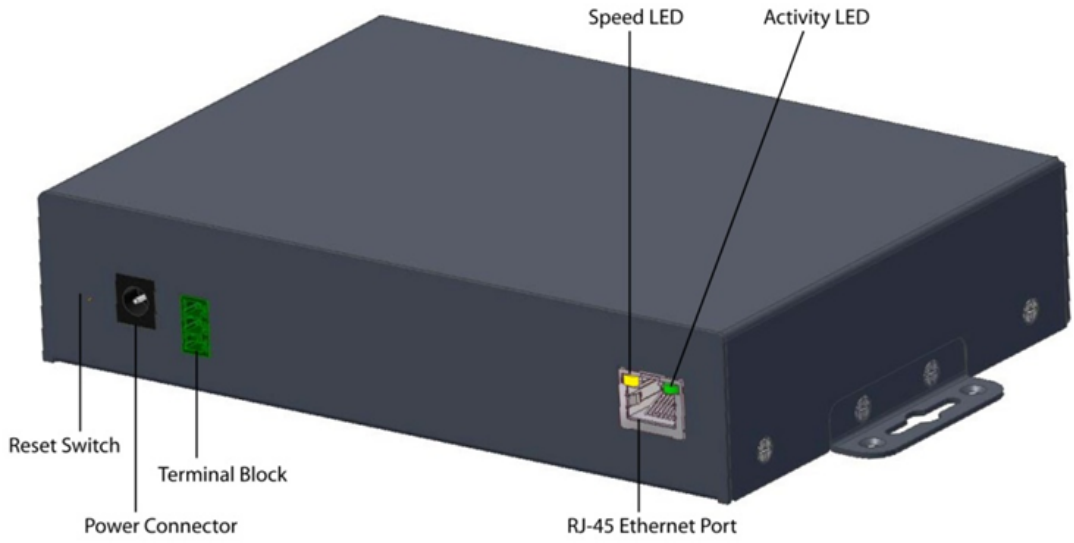


Figure 4-2 Back View of the EDS4100



Serial Ports

The front of the EDS4100 has four male DB9 serial ports. These ports allow you to connect up to four standard serial devices:

- All four serial ports support RS-232 devices. See *Figure 4-3* for pin assignments.
- Serial ports 1 and 3 also support RS-422 and RS-485 serial devices. See *Figure 4-4* for pin assignments.
- All four serial ports are configured as DTE.

- Ports 1 & 3 support up to 921600
- Ports 2 & 4 support up to 230400

Figure 4-3 RS-232 Serial Port Pins (Serial Ports 1, 2, 3, 4)

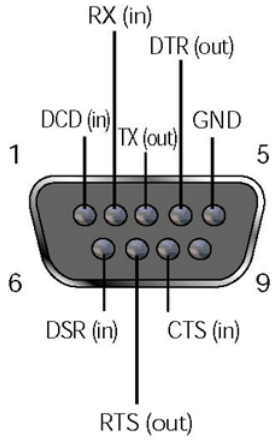
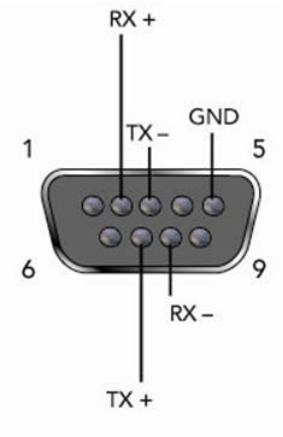
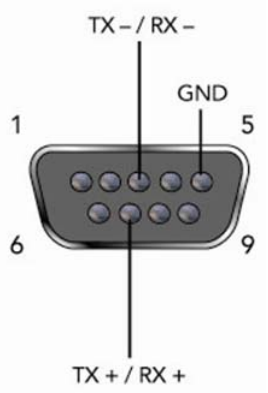


Figure 4-4 RS-422/RS-485 Serial Port Pins



R-422/485 4-wire
pin assignments
(serial ports 1 and 3)



R-485 2-wire
pin assignments
(serial ports 1 and 3)

Note: *Multi-drop connections are supported in 2-wire mode only.*

Ethernet Port

The back panel of the EDS4100 provides an RJ45 Ethernet port. This port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network. The Speed LED on the back of the EDS4100 shows the connection of the attached Ethernet network. The EDS4100 can be configured to operate at a fixed Ethernet speed and duplex mode (half- or full-duplex) or otherwise (by default) auto-negotiate the connection to the Ethernet network.

Terminal Block Connector

The back of the EDS4100 has a socket for a terminal block screw connector (not included) 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 42 VDC to 56 VDC. It can be used with the EDS4100's barrel power connector and PoE capabilities as a redundant power source to the unit. Vendors who do supply this connector can be found by doing a web search for part 'Phoenix 1803581 MC 1,5/ 3-ST-3,81'.

Figure 4-5 Terminal Block Connector Pin Assignments

Pin	Signal
Top	V+
Middle	V-
Bottom	Ground

LEDs

Light-emitting diodes (LEDs) on the front and back panels show status information.

- **Back panel -** Each serial port has a Transmit and a Receive LED. The Ethernet connector has Speed and Activity LEDs. In addition, the back panel has a Power LED and a Status LED.
- **Front panel -** The front panel has a green Power LED.
- The table below describes the LEDs on the back of the EDS4100.

Table 4-6 **Back Panel LEDs**

LED	Description
Transmit (green)	Blinking = EDS is transmitting data on the serial port.
Receive (yellow)	Blinking = EDS is receiving data on the serial port.
Power (green)	On = EDS receiving power.
Status (yellow)	Fast blink = initial startup (loading OS). Slow blink (once per second) = operating system startup. On = unit has finished booting.
Speed (yellow)	On = EDS is connected to a 100 Mbps Fast Ethernet network. Off = EDS is connected to a 10 Mbps Ethernet network
Activity (green)	Blink = EDS sending data to or receiving data from the Ethernet network.

Reset Button

The reset button is on the back of the EDS4100, to the left of the power connector. Pressing this button reboots the EDS4100 and terminates all serial and Ethernet port data activity.

Physically Installing the EDS4100

Finding a Suitable Location

- Place the EDS4100 on a flat horizontal or vertical surface. The EDS4100 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 EDS4100

Observe the following guidelines when attaching serial devices:

- All four EDS4100 serial ports support RS-232 devices.
- Alternatively, ports 1 and 3 support RS-422/485 devices.
- To connect an EDS4100 serial port to another DTE device, use a null modem cable.
- To connect the EDS4100 serial port to a DCE device, use a straight-through (modem) cable.

Connect the EDS4100 to one or more serial devices.

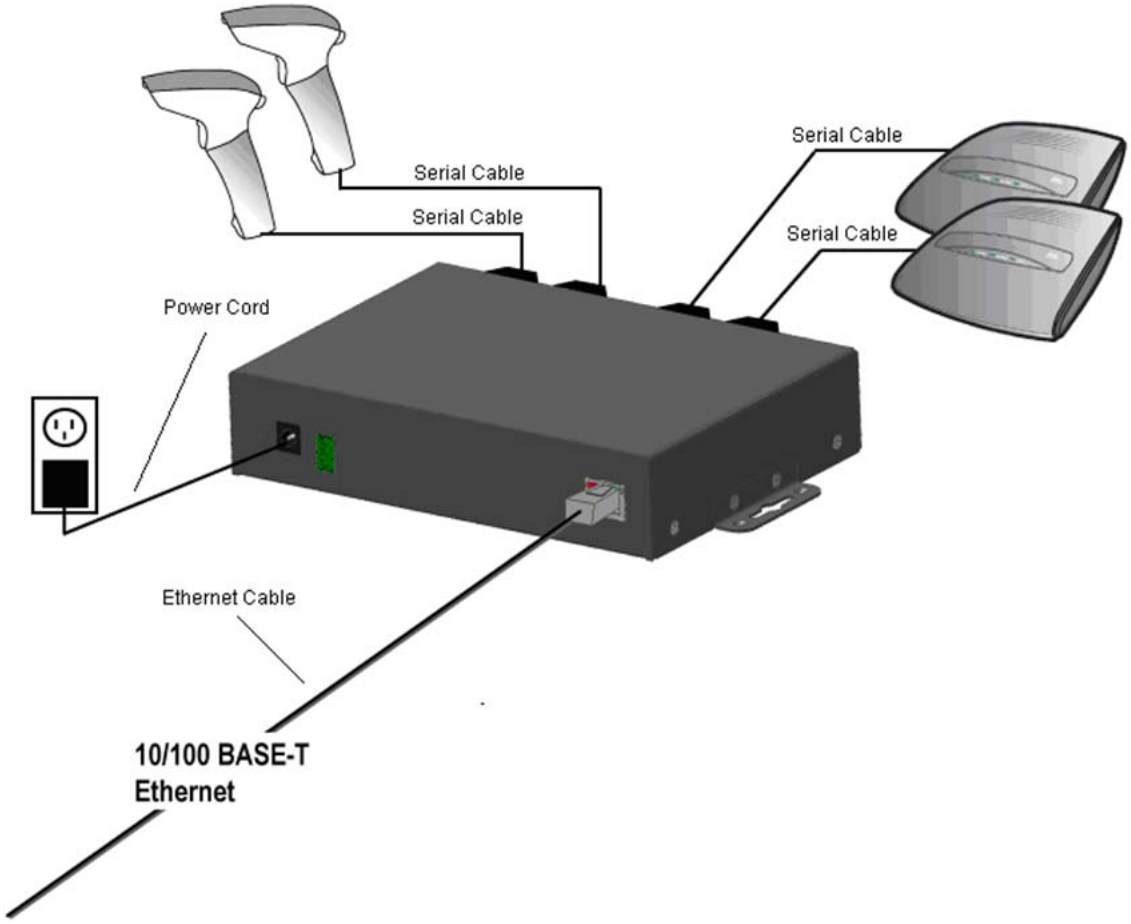
1. Power off the serial devices.
2. Attach a serial cable between the EDS4100 and each serial device.
3. Connect an Ethernet cable between the EDS4100 Ethernet port and your Ethernet network.
4. Power-up the EDS4100. Use one or more of the following methods.

   These power-up methods can be used in combination to provide redundant backup power to the unit.

   - **PoE:** Power is supplied over the Ethernet cable by an Ethernet switch or a mid-span device.
   - **Barrel power connector:** The barrel power connector supports a power range of 9 to 30 VDC. Insert the round end of the supplied power cord into the barrel power connector on the back of the EDS4100. Plug the other end into an AC wall outlet.
   - **Terminal block connector:** The terminal block connector supports a power range of 42 VDC to 56 VDC. Attach the power source to the terminal block connector on the back of the EDS4100.

   As soon as you plug it in, the EDS4100 powers up automatically, the self-test begins, and Evolution OS™ starts.
5. Power up the serial devices.

Figure 4-7 Example of EDS4100 Connections



5: Installation of EDS8PR, EDS16PR and EDS32PR

This chapter describes installing the EDS8PR, EDS16PR and EDS32PR device servers.

Package Contents

Your EDS package includes the following items:

- One EDS device server (EDS8PR, EDS16PR or EDS32PR).
- One RJ45-to-DB9F serial cable.
- A printed Quick Start guide.
- Your package may also include a power supply.

User-Supplied Items

To complete your EDS8/16/32PR installation, you need the following items:

- RS-232 serial devices that require network connectivity. Each EDS8/16/32PR serial port supports a directly connected RS-232 serial device.
- A serial cable for each serial device. All devices attached to the EDS device ports must support the RS-232C (EIA-232) standard. Category 5 cabling with RJ45 connections is used for the device port connections.

Note: *To connect an EDS8/16/32PR serial port to a DTE device, you need a DTE cable, such as the one supplied in your EDS8/16/32PR package, or an RJ45 patch cable and DTE adapter. To connect the EDS8/16/32PR serial port to a DCE device, you need a DCE (modem) cable, or an RJ45 patch cable and DTE adapter.*

For a list of the Lantronix cables and adapters you can use with the EDS8/16/32PR, see Appendix C: Lantronix Cables and Adapters.

- An available connection to your Ethernet network and an Ethernet cable.
- A working power outlet.

Identifying Hardware Components

The following two figures show the components on the front and back of the EDS16PR.

Figure 5-1 Front View of the EDS16PR

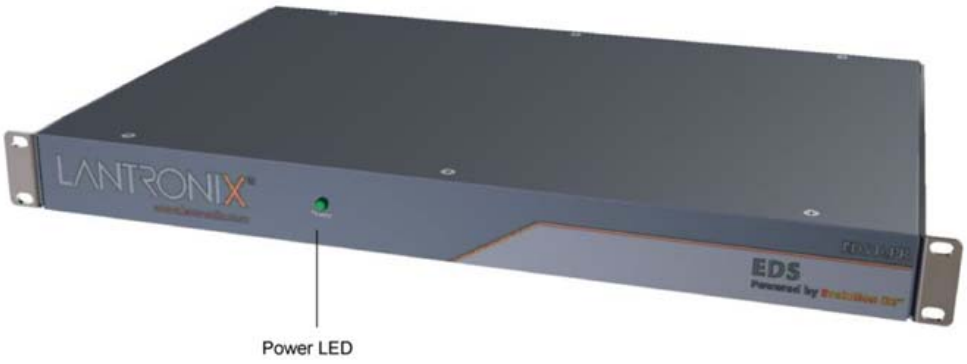
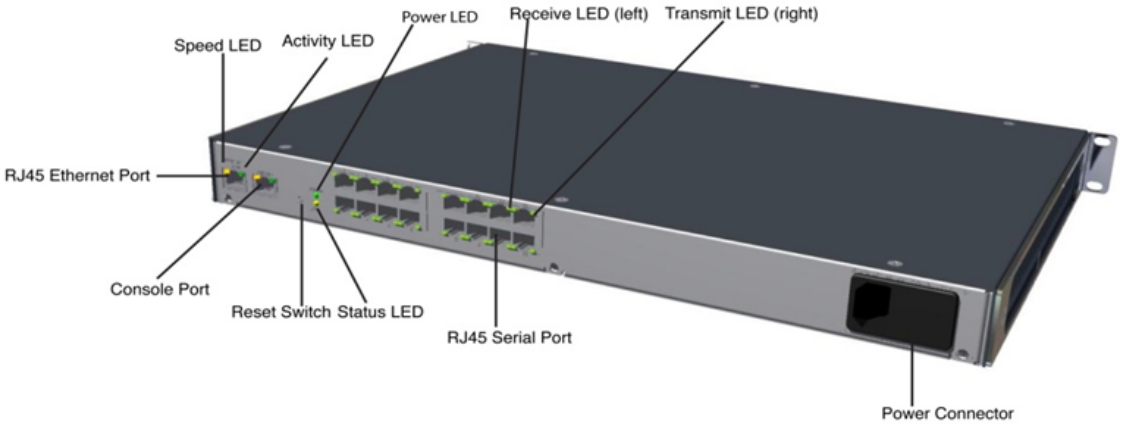


Figure 5-2 Back View of the EDS16PR



Serial Ports

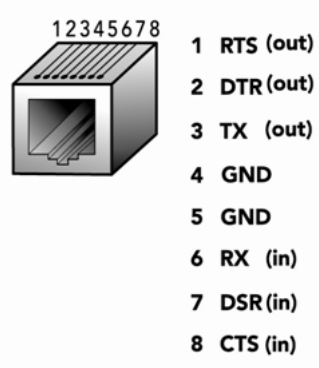
All EDS serial ports are configured as DTE and support up to 230,400 baud.

- The EDS8PR has 8 serial ports.
- The EDS16PR has 16 serial ports.
- The EDS32PR has 32 serial ports.

Console Port

The front panel has an RJ45 Console port configured as DTE and supports up to 230,400 baud.

Figure 5-3 RJ45 Serial Port



Ethernet Port

The back panel has an RJ45 Ethernet port. This port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network.

The Speed LED on the back panel shows the connection speed of the connected Ethernet network.

You can configure the EDS to operate at a fixed Ethernet speed and duplex mode (half- or full-duplex) or auto-negotiate the connection to the Ethernet network.

LEDs

Light-emitting diodes (LEDs) on the front and back panels show status information.

- **Front panel.** The front panel has a green Power LED.
- **Back panel.** Each serial port has a Transmit and a Receive LED. The Ethernet connector has Speed and Activity LEDs. There is also a Power LED and a Status LED.

The table below describes the LEDs on the back of the EDS.

Table 5-4 **Back Panel LEDs**

LED	Description
Transmit (green)	Blinking = EDS is transmitting data on the serial port.
Receive (yellow)	Blinking = EDS is receiving data on the serial port.
Power (green)	On = EDS is receiving power.
Status (yellow)	Fast blink = initial startup (loading OS). Slow blink (once per second) = operating system startup. On = unit has finished booting.
Speed (yellow)	On = EDS is connected to a 100 Mbps Fast Ethernet network.
	Off = EDS is connected to a 10 Mbps Ethernet network.
Activity (green)	Blink = EDS is sending data to or receiving data from the Ethernet network.

Reset Button

The reset button is on the back of the EDS, to the left of the power connector.

Pressing this button for 2-to-3 seconds reboots the EDS8/16/32PR and terminates all data activity occurring on the serial and Ethernet ports.

Installing the EDS8/16/32PR

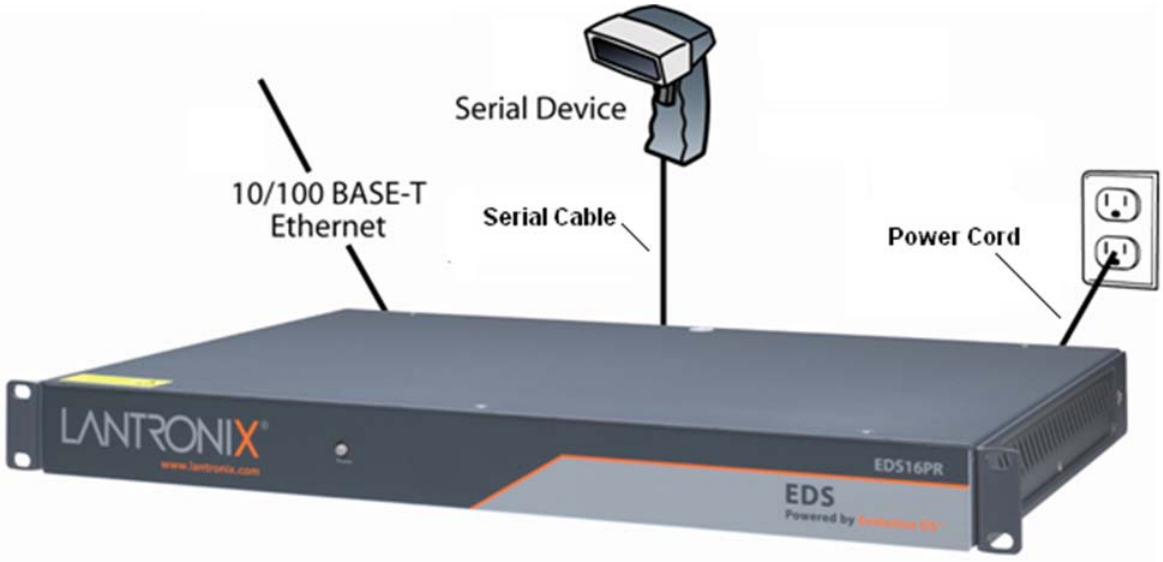
Finding a Suitable Location

You can install the EDS8/16/32PR either in an EIA-standard 19-inch rack (1U tall) or as a desktop unit. If using AC power, avoid outlets controlled by a wall switch.

Connecting the EDS8/16/32PR

1. Power off the serial devices that will be connected to the EDS8/16/32PR.
2. Attach a CAT 5 serial cable between the EDS8/16/32PR and your serial device. For a list of cables and adapters you can use with the EDS8/16/32PR, see Appendix C: Lantronix Cables and Adapters.
3. Connect an Ethernet cable between the EDS8/16/32PR Ethernet port and your Ethernet network.
4. Insert the power cord into the back of the EDS8/16/32PR. Plug the other end into an AC wall outlet. After power-up, the self-test begins.
5. Power up the serial devices.

Figure 5-5 Example of EDS16PR Connections



6: Using DeviceInstaller

This chapter covers the steps for locating a device and viewing its properties and details. DeviceInstaller is a free utility program provided by Lantronix that discovers, configures, upgrades and manages Lantronix Device Servers. It can be downloaded from the Lantronix website at www.lantronix.com/support/downloads.html. For instructions on using DeviceInstaller to configure the IP address, related settings or for more advanced features, see the DeviceInstaller online help.

Note: *AutoIP generates a random IP address in the range of 169.254.0.1 to 169.254.255.254 if no BOOTP or DHCP server is found.*

Accessing EDS Using DeviceInstaller

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

1. Click **Start > All Programs > Lantronix > DeviceInstaller > DeviceInstaller.**

   When DeviceInstaller starts, it will perform a network device search.
2. Click **Search** to perform additional searches, as desired.
3. Expand the EDS folder by clicking the **+** symbol next to the EDS folder icon. The list of available Lantronix EDS devices appears.
4. Select the EDS unit by expanding its entry and clicking on its hardware (MAC) address to view its configuration.
5. On the right page, click the **Device Details** tab. The current EDS configuration appears. This is only a subset of the full configuration; the complete configuration may be accessed via Web Manager, CLI, or XML.

Device Details Summary

Note: *The settings are Display Only in this table unless otherwise noted.*

Table 6-1 **Device Details Summary**

Current Settings	Description
Name	Name identifying the EDS.
DHCP Device Name	Shows the name associated with the EDS' current IP address, if the IP address was obtained dynamically.
Group	Configurable field. Enter a group to categorize the EDS. Double-click the field, type in the value, and press Enter to complete. This group name is local to this PC and is not visible on other PCs or laptops using DeviceInstaller.
Comments	Configurable field. Enter comments for the EDS. Double-click the field, type in the value, and press Enter to complete. This description or comment is local to this PC and is not visible on other PCs or laptops using DeviceInstaller.

Device Family	Shows the EDS device family type as “EDS”.
Type	Shows the specific device type, such as “EDS8PS”.
ID	Shows the EDS ID embedded within the unit.
Hardware Address	Shows the EDS hardware (MAC) address.
Firmware Version	Shows the firmware currently installed on the EDS.
Extended Firmware Version	Provides additional information on the firmware version.
Online Status	Shows the EDS status as Online, Offline, Unreachable (the EDS is on a different subnet), or Busy (the EDS is currently performing a task).
IP Address	Shows the EDS current IP address. To change the IP address, click the Assign IP button on the DeviceInstaller menu bar.
IP Address was Obtained	Displays “Dynamically” if the EDS automatically received an IP address (e.g., from DHCP). Displays “Statically” if the IP address was configured manually. If the IP address was assigned dynamically, the following fields appear: ◆ **Obtain via DHCP** with value of True or False. ◆ **Obtain via BOOTP** with value of True or False.
Subnet Mask	Shows the subnet mask specifying the network segment on which the EDS resides.
Gateway	Shows the IP address of the router of this network. There is no default.
Number of Ports	Shows the number of serial ports on this EDS.
Supports Configurable Pins	Shows False, indicating configurable pins are not available on the EDS.
Supports Email Triggers	Shows True, indicating email triggers are available on the EDS.
Telnet Enabled	Indicates whether Telnet is enabled on this EDS.
Telnet Port	Shows the EDS port for Telnet sessions.
Web Enabled	Indicates whether Web Manager access is enabled on this EDS.
Web Port	Shows the EDS port for Web Manager configuration.
Firmware Upgradable	Shows True, indicating the EDS firmware is upgradable as newer versions become available.

7: Configuration Using Web Manager

This chapter describes how to configure the EDS using Web Manager, the Lantronix browser-based configuration tool. The unit's configuration is stored in nonvolatile memory and is retained without power. All changes take effect immediately, unless otherwise noted. It contains the following sections:

Accessing Web Manager

Note: *You can also access the Web Manager by selecting the Web Configuration tab on the DeviceInstaller window.*

To access Web Manager, perform the following steps:

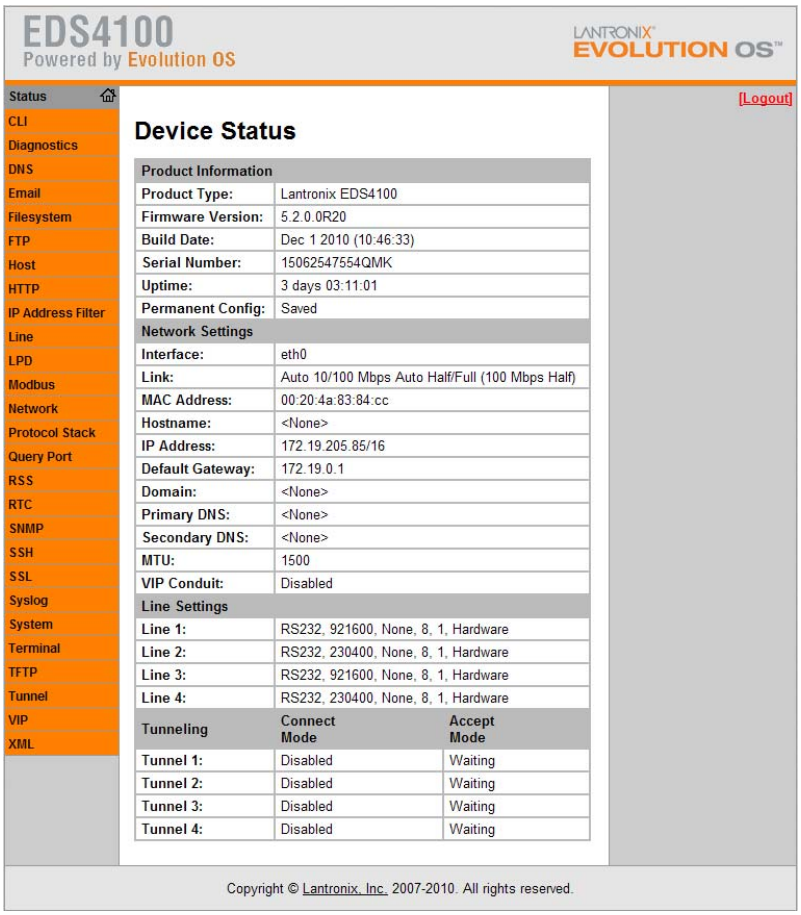
1. Open a standard web browser. Lantronix supports the latest version of Internet Explorer, Mozilla Suite, Mozilla Firefox, Safari, Chrome or Opera.
2. Enter the IP address of the EDS in the address bar. The IP address may have been assigned manually using DeviceInstaller (see the *EDS Quick Start Guide*) or automatically by DHCP.
3. Enter your username and password.The factory-default username is "admin" and the factory-default password is "PASS." The Device Status web page shown in *Figure 7-1* displays configuration, network settings, line settings, tunneling settings, and product information.

Note: *The Logout button is available on any web page. Logging out of the web page would force re-authentication to take place the next time the web page is accessed.*

Device Status Page

The Device Status page is the first page that appears after you log into the Web Manager. It also appears when you click **Status** in the Main Menu.

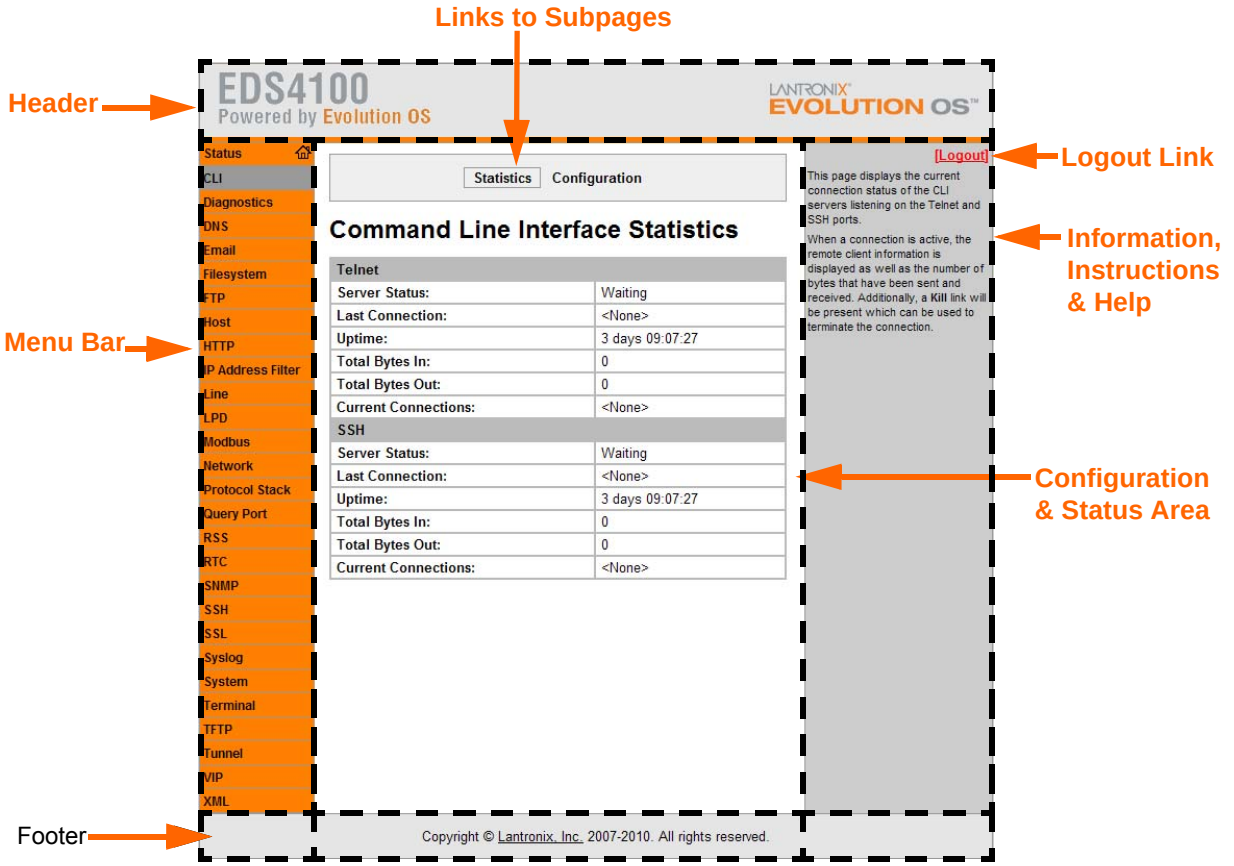
Figure 7-1 Web Manager Home Page



Web Manager Page Components

The layout of a typical Web Manager page is below.

Figure 7-2 Components of the Web Manager Page



The menu bar always appears at the left side of the page, regardless of the page shown. The menu bar lists the names of the pages available in the Web Manager. To bring up a page, click it in the menu bar.

The main area of the page has these additional sections:

- At the very top, many pages, such as the one in the example above, enable you to link to sub pages. On some pages, you must also select the item you are configuring, such as a line or a tunnel.
- In the middle of many pages, you can select or enter new configuration settings. Some pages show status or statistics in this area rather than allow you to enter settings.
- At the bottom of most pages, the current configuration is displayed. In some cases, you can reset or clear a setting.
- The information or help area shows information or instructions associated with the page.
- A **Logout** link is available at the upper right corner of every web page. In Chrome or Safari, it is necessary to close out of the browser to logout. If necessary, reopen the browser to log back in.

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

Navigating the Web Manager

The Web Manager provides an intuitive point-and-click interface. A menu bar on 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* EDS *for the new configuration settings to take effect. The chapters that follow indicate when a change requires a reboot.*

Table 7-3 **Summary of Web Manager Pages**

Web Manager Page	Description	See Page
Status	Shows product information and network, line, and tunneling settings.	*52*
CLI	Shows Command Line Interface (CLI) statistics and lets you change the current CLI configuration settings.	*137*
Diagnostics	Lets you perform various diagnostic procedures.	*122*
DNS	Shows the current configuration of the DNS subsystem and the DNS cache.	*79*
Email	Shows email statistics and lets you clear the email log, configure email settings, and send an email.	*134*
Filesystem	Shows file system statistics and lets you browse the file system to view a file, create a file or directory, upload files using HTTP, copy a file, move a file, or perform TFTP actions.	*112*
FTP	Shows statistics and lets you change the current configuration for the File Transfer Protocol (FTP) server.	*81*
Host	Lets you view and change settings for a host on the network.	*78*
HTTP	Shows HyperText Transfer Protocol (HTTP) statistics and lets you change the current configuration and authentication settings.	*85*
IP Address Filter	Lets you specify all the IP addresses and subnets that are allowed to send data to this device.	*120*
Line	Shows statistics and lets you change the current configuration and Command mode settings of a serial line.	*52*
LPD	Shows LPD (Line Printer Daemon) Queue statistics and lets you configure the LPD and print a test page.	*90*
Modbus	Shows the current connection status of the Modbus servers listening on the TCP ports and lets you configure the Modbus settings for EDS4100.	*109*
Network	Shows status and lets you configure the network interface.	*48*
Protocol Stack	Lets you perform lower level network stack-specific activities.	*115*
Query Port	Lets you change configuration settings for the query port.	*121*

Web Manager Page (continued)	Description	See Page
RSS	Lets you change current Really Simple Syndication (RSS) settings.	*89*
SNMP	Lets you change the current Simple Network Management Protocol (SNMP) configuration settings.	*80*
SSH	Lets you change the configuration settings for SSH server host keys, SSH server authorized users, SSH client known hosts, and SSH client users.	*93*
SSL	Lets you upload an existing certificate or create a new self-signed certificate.	*103*
Syslog	Lets you specify the severity of events to log and the server and ports to which the syslog should be sent.	*84*
System	Lets you reboot device, restore factory defaults, upload new firmware, and change the device long and short names.	*132*
Terminal	Lets you change current settings for a terminal.	*75*
TFTP	Shows statistics and lets you change the current configuration for the Trivial File Transfer Protocol (TFTP) server.	*83*
Tunnel	Lets you change the current configuration settings for a tunnel.	*56*
VIP	Lets you configure Virtual IP addresses to be used in Tunnel Accept Mode and Tunnel Connect Mode.	*147*
XML	Lets you export XML configuration and status records, and import XML configuration records.	*139*

8: Network Settings

This chapter describes how to access, view, and configure network settings from the Network web page. The **Network** web page contains sub-menus that enable you to view and configure the Ethernet network interface and link.

This chapter contains the following sections:

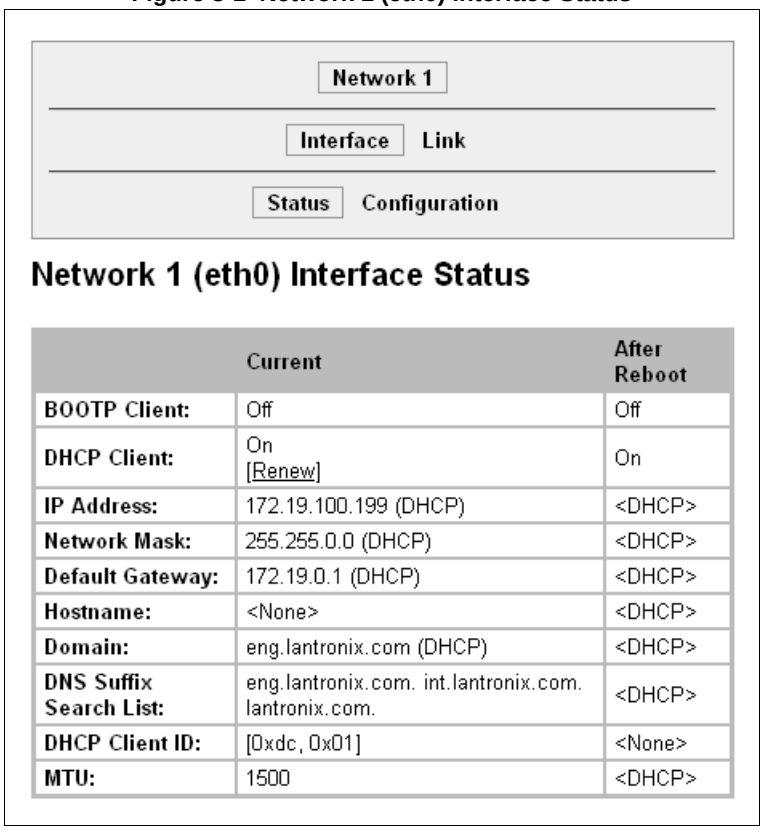
Network 1 (eth0) Interface Status

This page shows the status of the Ethernet network interface.

To view the network interface status:

1. Select **Network** on the menu bar. The Network web page appears.
2. Select **Interface > Status** submenus at the top of the page. The Network 1 (eth0) Interface Status page appears.

Figure 8-1 Network 1 (eth0) Interface Status



	Current	After Reboot
BOOTP Client:	Off	Off
DHCP Client:	On [Renew]	On
IP Address:	172.19.100.199 (DHCP)	<DHCP>
Network Mask:	255.255.0.0 (DHCP)	<DHCP>
Default Gateway:	172.19.0.1 (DHCP)	<DHCP>
Hostname:	<None>	<DHCP>
Domain:	eng.lantronix.com (DHCP)	<DHCP>
DNS Suffix Search List:	eng.lantronix.com. int.lantronix.com. lantronix.com.	<DHCP>
DHCP Client ID:	[0xdc, 0x01]	<None>
MTU:	1500	<DHCP>

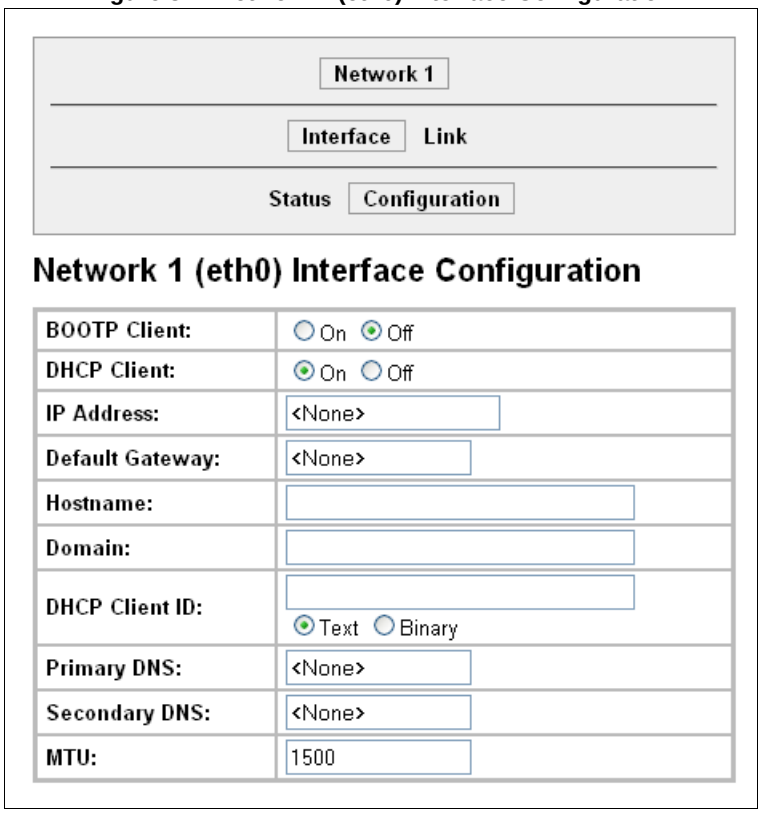
Network 1 (eth0) Interface Configuration

This page shows the configuration settings for the Ethernet connection and lets you change these settings.

To view and configure network interface settings:

1. Select **Network** on the menu bar, if you are not already in the Network web page.
2. Select **Interface > Configuration** submenus at the top of the page. The Network 1 (eth0) Interface Configuration page appears.

Figure 8-2 Network 1 (eth0) Interface Configuration



3. Enter or modify the following settings:

Table 8-3 **Network Interface Configuration**

Network 1 Interface Configuration Settings	Description
BOOTP Client	Select **On** or **Off**. At boot up, the device will attempt to obtain an IP address from a BOOTP server. **Notes:** ◆ *Overrides the configured IP address, network mask, gateway, hostname, and domain.* ◆ *When DHCP is On, the system automatically uses DHCP, regardless of whether BOOTP Client is On.*

Network 1 Interface Configuration Settings	Description
DHCP Client	Select **On** or **Off**. At boot up, the device will attempt to lease an IP address from a DHCP server and maintain the lease at regular intervals. ***Note:*** *Overrides BOOTP, the configured IP address, network mask, gateway, hostname, and domain.*
IP Address	Enter the device static IP address. You may enter it alone, in CIDR format, or with an explicit mask. 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 device. ***Note:*** *When DHCP is enabled, the device tries to obtain an IP address from DHCP. If it cannot, the device uses an AutoIP address in the range of 169.254.xxx.xxx.*
Default Gateway	Enter the IP address of the router for this network. Or, clear the field (appears as **<None>**). This address is only used for static IP address configuration.
Hostname	Enter the device hostname. It must begin with a letter, continue with a sequence of letters, numbers, and/or hyphens, and end with a letter or number.
Domain	Enter the device domain name.
DHCP Client ID	Enter the ID if the DHCP server uses a DHCP ID. The DHCP server's lease table shows IP addresses and MAC addresses for devices. The lease table shows the Client ID, in hexadecimal notation, instead of the device MAC address.
Primary DNS	IP address of the primary name server. This entry is required if you choose to configure DNS (Domain Name Server) servers.
Secondary DNS	IP address of the secondary name server.
MTU	When DHCP is enabled, the MTU size is (usually) provided with the IP address. When not provided by the DHCP server, or using a static configuration, this value is used. The MTU size can be from 576 to 1500 bytes.

4. Click **Submit** to save changes. Some changes to the following settings require a reboot for the changes to take effect:
   - BOOTP Client
   - DHCP Client
   - IP Address
   - DHCP Client ID

Note: *If DHCP or BOOTP fails, AutoIP intervenes and assigns an address.A new DHCP negotiation is attempted every 5 minutes to obtain a new IP address. When the DHCP is enabled, any configured static IP address is ignored.*

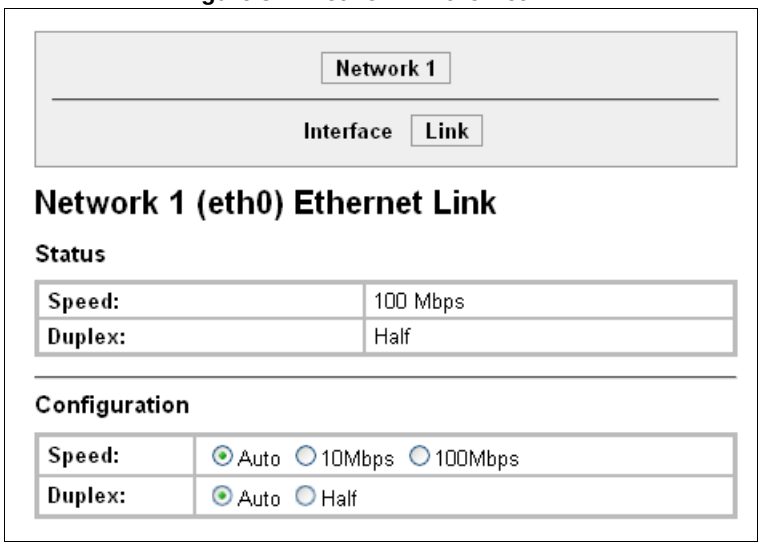
Network 1 Ethernet Link

This page shows the current negotiated Ethernet settings and lets you change the speed and duplex settings.

To view and configure the Ethernet link:

1. Select **Network** on the menu bar, if you are not already in the Network web page.
2. Select the **Link** submenu.

Figure 8-4 Network 1 Ethernet Link



The **Status** table shows the current negotiated settings. The **Configuration** table shows the current range of allowed settings.

3. Enter or modify the following settings:

Table 8-5 **Network 1 Ethernet Link**

Network 1-Ethernet Link Settings	Description
Speed	Select the Ethernet link speed. Default is **Auto**.
Duplex	Select the Ethernet link duplex mode. Default is **Auto**.

4. Click **Submit.** The changes take effect immediately.

9: Line and Tunnel Settings

This chapter describes how to view and configure lines and tunnels. It contains the following sections:

Note: *The number of lines and tunnels available for viewing and configuration differ between Lantronix DeviceLinx products. For example, an XPort Pro and EDS1100 support only one line while other device networking products (such as EDS2100, EDS4100, XPort AR, EDS8/16PS and EDS8/16/32PR) provide additional lines and tunnels.*

Line Settings

View statistics and configure serial interfaces by using the Line web page. Serial interfaces are referred to as lines in this user guide, and a different number of lines, from 1 to 32, may be available for selection depending on your product.

The following sub-menus may be used for a selected line number:

- **Line Statistics**—Displays statistics for the selected line number. For example, the bytes received and transmitted, breaks, flow control, parity errors, etc.
- **Line Configuration**—Enables the change of the name, interface, protocol, baud rates, and parity, etc.
- **Line Command Mode**—Enables the types of modes, wait time, serial strings, signon message, etc.

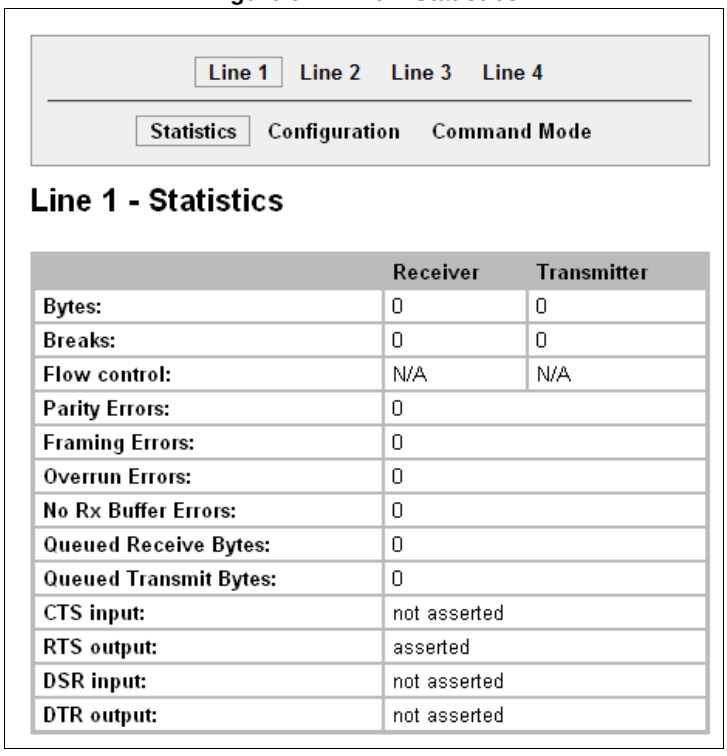
The following sections describe the steps to view and configure specific line number settings. These instructions also apply to additional line instances of the device.

Line Statistics

This read-only web page shows the status and statistics for the serial line selected at the top of this page.

1. Select **Line** on the menu bar. The Line web page appears.
2. Select a line number at the top of the page.
3. Select **Statistics**. The Line Statistics page for the selected line appears.
4. Repeat above steps as desired, according to additional line(s) available on your product.

Figure 9-1 Line 1 Statistics



	Receiver	Transmitter
Bytes:	0	0
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:	asserted	
DSR input:	not asserted	
DTR output:	not asserted	

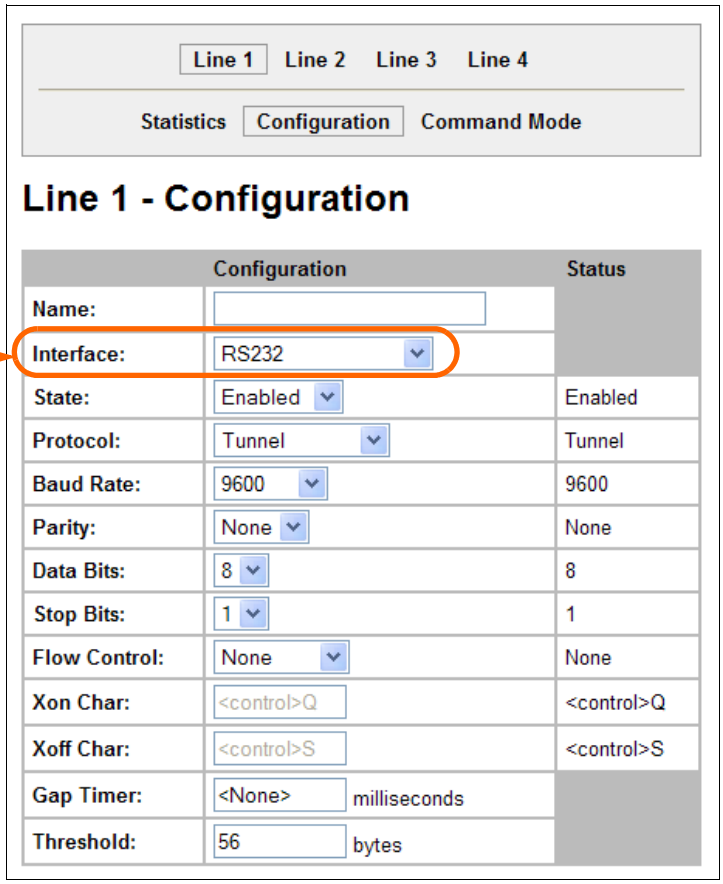
Line Configuration

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.

To configure a specific line:

1. Select **Line** on the menu bar, if you are not already in the Line web page.
2. Select a line number at the top of the page.
3. Select **Configuration**. The Configuration page for the selected line appears.

Figure 9-2 Line 1 Configuration



Note: *The **Interface** option is only supported in XPort Pro, EDS4100, EDS1100 and EDS2100.*

4. Enter or modify the following settings:

Table 9-3 **Line Configuration**

Line - Configuration Settings	Description
Name	If the Terminal Login Menu feature is being used, enter the name for the line. Leaving this field blank will disable this line from appearing in the Terminal Login Menu. The default Name is blank. See *Terminal and Host Settings on page 75* for related configuration information.
Interface	Select the interface type from the drop-down menu. The default is RS232. ***Note:*** *This option is only supported in XPort Pro, EDS4100, EDS1100 and EDS2100.*
State	Indicates whether the current line is enabled. To change the status, select Enabled or Disabled from the drop-down menu.
Protocol	Select the protocol from the drop-down menu. The default is Tunnel.
Baud Rate	Select the baud rate from the drop-down menu. The default is 9600.
Parity	Select the parity from the drop-down menu. The default is None.
Data Bits	Select the number of data bits from the drop-down menu. The default is 8.
Stop Bits	Select the number of stop bits from the drop-down menu. The default is 1.
Flow Control	Select the flow control from the drop-down menu. The default is None.
Xon Char	Specify the character to use to start the flow of data when Flow Control is set to Software. 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	Specify the character to use to stop the flow of data when Flow Control is set to Software. Prefix a decimal character with \ or a hexadecimal character with 0x, or provide a single printable character. The default Xoff char is 0x13.
Gap Timer	The driver forwards received serial bytes after the **Gap Timer** delay from the last character received. By default, the delay is four character periods at the current baud rate (minimum 1 ms).
Threshold	The driver will also forward received characters after **Threshold** bytes have been received.

5. Click **Submit.**
6. Repeat above steps as desired, according to additional line(s) available on your product.

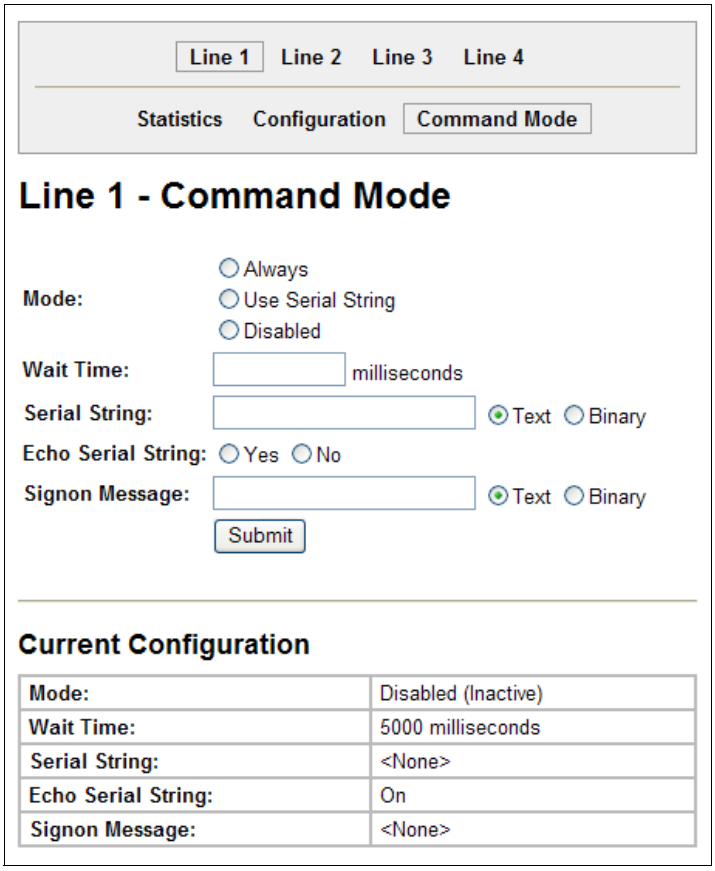
Line Command Mode

Setting the Command Mode enables the CLI on the serial line.

To configure Command Mode on a specific line:

1. Select **Line** on the menu bar, if you are not already in the Line web page.
2. Select a line number at the top of the page.
3. Select Command Mode. The Command Mode page for the selected line appears.

Figure 9-4 Line 1 Command Mode



4. Enter or modify the following settings:

Table 9-5 **Line Command Mode**

Line – Command Mode Settings	Description
Mode	Select the method of enabling Command Mode or choose to disable Command Mode. ◆ **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. ◆ **Disabled** = turns off Command Mode.
Wait Time	Enter the wait time for the serial string during boot-up in milliseconds.
Serial String	Enter the serial string characters. Select a string type. ◆ **Text** = string of bytes that must be read on the Serial Line during boot time to enable Command Mode. It may contain a time element in x milliseconds, in the format {x}, to specify a required delay. ◆ **Binary** = string of characters representing byte values where each hexadecimal byte value starts with \0x and each decimal byte value starts with \.
Echo Serial String	Select **Yes** to enable echoing of the serial string at boot-up.

Line – Command Mode Settings (continued)	Description
Signon Message	Enter the boot-up signon message. Select a string type. ◆ **Text** = string of bytes sent on the serial line during boot time. ◆ **Binary** = one or more byte values separated by commas. Each byte value may be decimal or hexadecimal. Start hexadecimal values with 0x. ***Note:*** *This string will be output on the serial port at boot, regardless of whether command mode is enabled or not.*

5. Click **Submit.**
6. Repeat above steps as desired, according to additional line(s) available on your product.

Tunnel Settings

Note: *The number of lines and tunnels available for viewing and configuration differ between Lantronix DeviceLinx products. For example, an XPort Pro and EDS1100 support only one line while other device networking products (such as EDS2100, EDS4100, XPort AR, EDS8/16PS and EDS8/16/32PR) provide additional lines and tunnels.*

Tunneling allows serial devices to communicate over a network, without "being aware" of the devices which establish the network connection between them. Tunneling parameters are configured using the Web Manager or Command Mode Tunnel Menu. See *Configuration Using Web Manager (on page 43)* or the EDS Command Reference for the full list of commands.

The EDS supports two tunneling connections simultaneously per serial port. One of these connections is Connect Mode; the other connection is Accept Mode. The connections on one serial port are separate from those on another serial port.

- **Connect Mode:** the EDS actively makes a connection. The receiving node on the network must listen for the Connect Mode's connection. Connect Mode is disabled by default.
- **Accept Mode:** the EDS listens for a connection. A node on the network initiates the connection. Accept Mode is enabled by default.
- **Disconnect Mode:** this mode defines how an open connection stops the forwarding of data. The specific parameters to stop the connection are configurable. Once the EDS Disconnect Mode observes the defined event occur, it will disconnect both Accept Mode and Connect Mode connections on that port.

When any character comes in through the serial port, it gets copied to both the Connect Mode connection and the Accept Mode connection (if both are active).

View statistics and configure a specific tunnel by using the Tunnel web page. When you select Tunnel from the Main Menu, tunnels available for your product will display. Select a specific tunnel to configure.

The following sub-menus listed may be used to configure a specific tunnel:

- *Tunnel – Statistics*
- *Tunnel – Serial Settings*
- *Tunnel – Packing Mode*

- *Tunnel – Accept Mode*
- *Tunnel – Connect Mode*
- *Tunnel – Disconnect Mode*
- *Tunnel – Modem Emulation*

The following sections describe the steps to view and configure specific tunnel number settings. These instructions also apply to additional tunnel menu options.

Tunnel – Statistics

Displays statistics for the specific tunnel. For example, Completed Accepts, Completed Connects, Disconnects, Dropped Accepts, Dropped Connects, etc. The EDS logs statistics for tunneling. The **Dropped** statistic shows connections ended by the remote location. The **Disconnects** statistic shows connections ended by the EDS.

To display statistics for a specific tunnel:

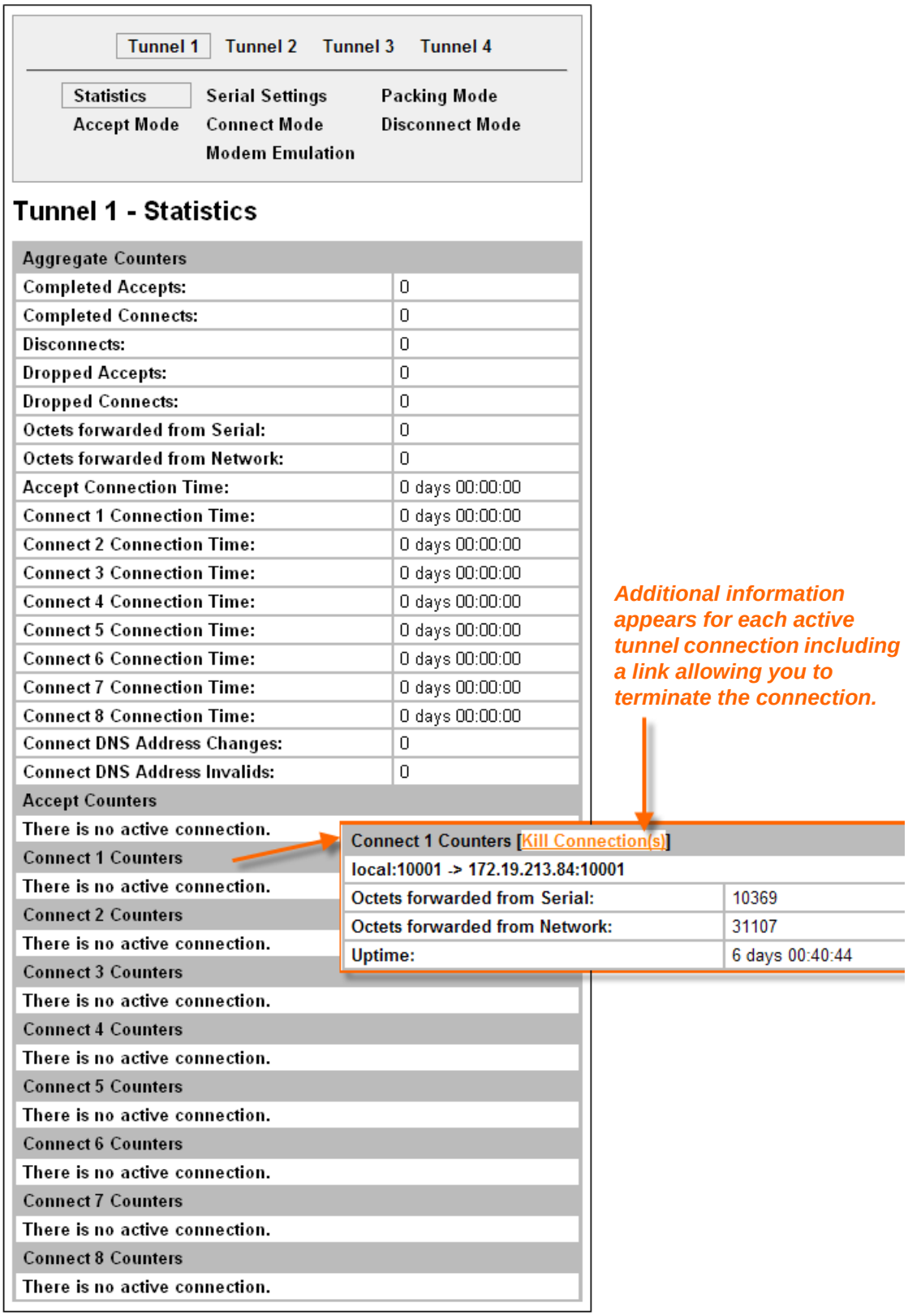
1. Select **Tunnel** on the menu bar. The Tunnel web page appears.
2. Select a tunnel number at the top of the page.
3. Select **Statistics**. The Tunnel Statistics page for the specific tunnel appears.

   If a particular tunnel is connected, the following becomes available:

   - Identifying information about the tunnel connection (i.e., “Connect 1 Counters”)
   - Address of connection (i.e., “local:10001 -> 172.22.22.22.10001”)
   - **Kill Connection(s)** link: Click this link to terminate this active tunnel connection, as desired.
   - Octets forwarded from Serial
   - Octets forwarded form Network
   - Uptime

4. Repeat above steps as desired, according to additional tunnel(s) available on your product.

Figure 9-6 Tunnel 1 Statistics



Tunnel – Serial Settings

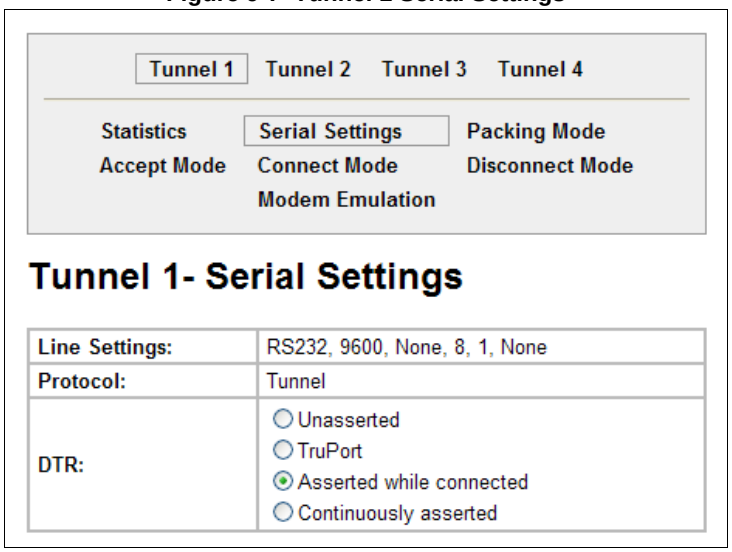
Serial line settings are configurable for the corresponding serial line of the specific tunnel. Configure the buffer size to change the maximum amount of data the serial port stores. For any active connection, the device sends the data in the buffer.

The modem control signal DTR on the selected line may be continuously asserted or asserted only while either an Accept Mode tunnel or a Connect Mode tunnel is connected.

To configure serial settings for a specific tunnel:

1. Select **Tunnel** on the menu bar, if you are not already in the Tunnel web page.
2. Select a tunnel number at the top of the page.
3. Select **Serial Settings**. The Serial Settings page for the specific tunnel appears.

Figure 9-7 Tunnel 1 Serial Settings



4. View or modify the following settings:

Table 9-8 **Tunnel - Serial Settings**

Tunnel - Serial Settings	Description
Line Settings *(display only)*	Current serial settings for the line.
Protocol *(display only)*	The protocol being used on the line. In this case, Tunnel.
DTR	Select when to assert DTR. ◆ **Unasserted** = never asserted ◆ **TruPort** = asserted whenever either a connect or an accept mode tunnel connection is active with the Telnet Protocol RFC2217 saying that the remote DSR is asserted. ◆ **Asserted while connected** = asserted whenever either a connect or an accept mode tunnel connection is active. ◆ **Continuously asserted** = asserted regardless of the status of a tunnel connection.

5. Click **Submit.**
6. Repeat above steps as desired, according to additional tunnel(s) available on your product.

Tunnel – Packing Mode

Packing Mode takes data from the serial port, packs it together, and sends it over the network. Packing can be configured based on threshold (size in bytes, timeout (milliseconds), or a single character.

Size is set by modifying the threshold field. When the number of bytes reaches the threshold, a packet is sent immediately.

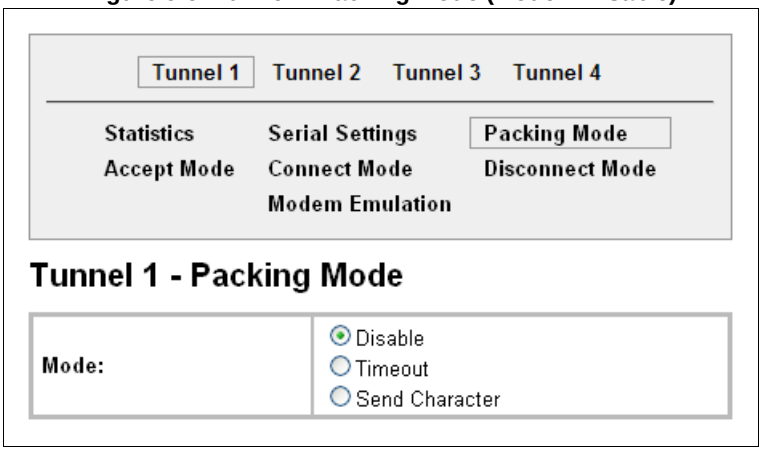
The timeout field is used to force a packet to be sent after a maximum time. The packet is sent even if the threshold value is not reached.

When Send Character is configured, a single printable character or control character read on the Serial Line forces the packet to be sent immediately. There is an optional trailing character parameter which can be specified. It can be a single printable character or a control character.

To configure the Packing Mode for a specific tunnel:

1. Select **Tunnel** on the menu bar, if you are not already in the Tunnel web page.
2. Select a tunnel number at the top of the page.
3. Select **Packing Mode**. The Packing Mode page for the specific tunnel appears.

Figure 9-9 Tunnel 1 Packing Mode (Mode = Disable)



Depending on the Mode selection, different configurable parameters for the specific tunnel number are presented to the user. The following figures show the display for each of the three packing modes.

Figure 9-10 Tunnel 1 Packing Mode (Mode = Timeout)

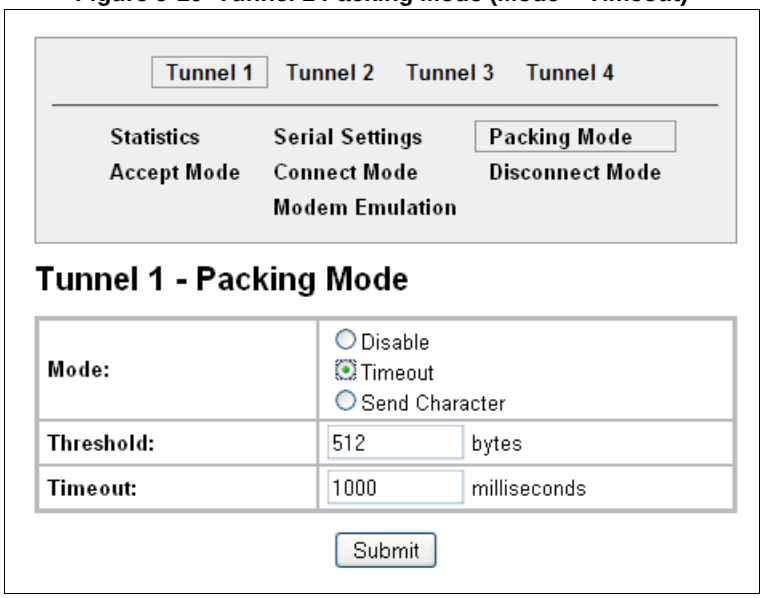
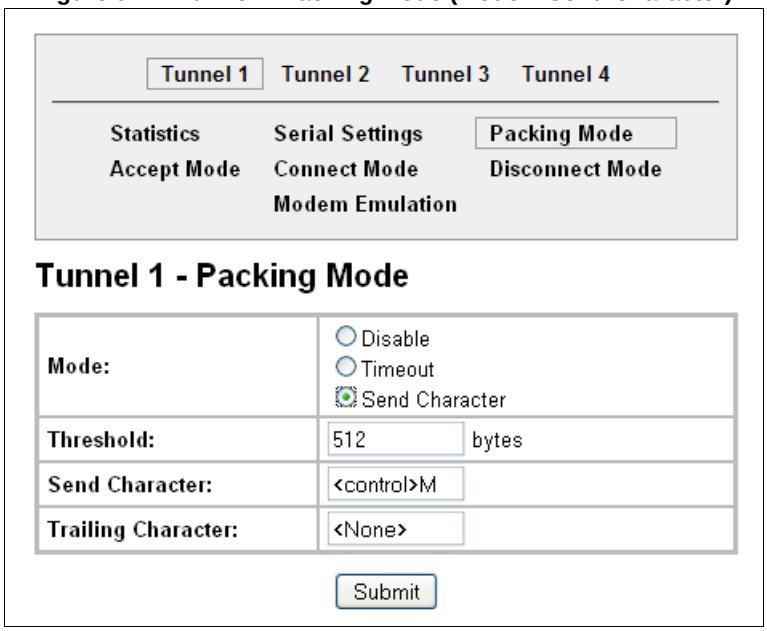


Figure 9-11 Tunnel 1 Packing Mode (Mode = Send Character)



4. Enter or modify the following settings:

Table 9-12 **Tunnel Packing Mode**

Tunnel - Packing Mode Settings	Description
Mode	◆ Select **Disable** to disable Packing Mode completely. ◆ Select **Timeout** to send data after the specified time has elapsed. ◆ Select **Send Character** to send the queued data when the send character is received.
Threshold (Appears for both Timeout and Send Character Modes)	Send the queued data when the number of queued bytes reaches the threshold. When the buffer fills to this specified amount of data in bytes (and the timeout has not elapsed), the device packs the data and sends it out; applies only if the Packing Mode is not Disabled.
Timeout (Appears for Timeout Mode)	Enter a time, in milliseconds, for the device to send the queued data after the first character was received. Specifies the time duration in milliseconds; applies only if the Packing Mode is Timeout.
Send Character (Appears for Send Character Mode)	Enter the send character (single printable or control). Upon receiving this character, the device sends out the queued data. The data is packed until the specified send character is encountered. Similar to a start or stop character, the device packs the data until it sees the send character. The device then sends the packed data and the send character in the packet. Applies only if the Packing Mode is Send Character.
Trailing Character (Appears for Send Character Mode)	Enter the trailing character (single printable or control). This character is sent immediately following the send character. This is an optional setting. If a trailing character is defined, this character is appended to data put on the network immediately following the send character.

5. Click **Submit.**
6. Repeat above steps as desired, according to additional tunnel(s) available on your product.

Tunnel – Accept Mode

Controls how a specific tunnel number behaves when a connection attempt originates from the network. In Accept Mode, the EDS waits for a connection from the network. 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 increases sequentially for each additional serial port, if supported.

Accept Mode supports the following protocols:

- SSH (the EDS is the server in Accept Mode). When using this protocol, the SSH server host keys and at least one SSH authorized user must be configured.
- SSL
- TCP
- AES encryption over TCP
- Telnet (The EDS supports IAC codes. It drops the IAC codes when Telnetting and does not forward them to the serial port).

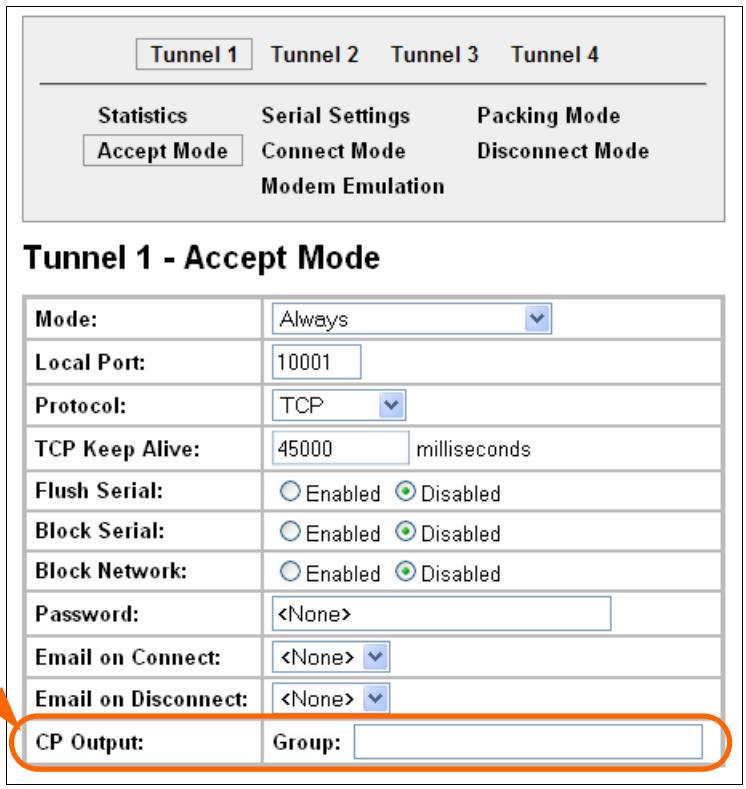
Accept Mode has the following states:

- Disabled (never a 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
- Modem emulation

To configure the Accept Mode of a specific tunnel:

1. Select **Tunnel** on the menu bar, if you are not already in the Tunnel web page.
2. Select a tunnel number at the top of the page.
3. Select **Accept Mode**. The Accept Mode page for the specific tunnel appears.

Figure 9-13 Tunnel 1 Accept Mode



Note: *The **CP Output** option is only supported in XPort Pro and XPort AR.*

4. Enter or modify the following settings:

Table 9-14 **Tunnel Accept Mode**

Tunnel - Accept Mode Settings	Description
Mode	Select the method used to start a tunnel in Accept mode. Choices are: ◆ **Disabled** = do not accept an incoming connection. ◆ **Always** = accept an incoming connection (*default*) ◆ **Any Character** = start waiting for an incoming connection when any character is read on the serial line. ◆ **Start Character** = start waiting for an incoming connection when the start character for the specific tunnel 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. ◆ **Modem Emulation** = start waiting for an incoming connection when triggered by modem emulation AT commands. Connect mode must also be set to Modem Emulation.
Local Port	Enter the port number for use as the local port. The defaults are port 10001 for Tunnel 1. Additional tunnels, if supported, increase sequentially.
Protocol	Select the protocol type for use with Accept Mode. The default protocol is TCP. If you select TCP AES you will need to configure the AES keys.
TCP Keep Alive	Enter the time, in seconds, the device waits during a silent connection before checking if the currently connected network device is still on the network. If the unit then gets no response after 8 attempts, it drops that connection.

Tunnel - Accept Mode Settings (continued)	Description
Flush Serial Data	Select Enabled to flush the serial data buffer on a new connection.
Block Serial Data	Select On to block, or not tunnel, serial data transmitted to the device.
Block Network	Select On to block, or not tunnel, network data transmitted to the device.
Password	Enter a password that clients must send to the device 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 device must be terminated with one of the following: (a) 0x0A (LF), (b) 0x00, (c) 0x0D 0x0A (CR LF), or (d) 0x0D 0x00.
Email on Connect	Select whether the device sends an email when a connection is made. Select None if you do not want to send an email. Otherwise, select the Email profile to use for sending.
Email on Disconnect	Select whether the device sends an email when a connection is closed. Select None if you do not want to send an email. Otherwise, select the Email profile to use for sending.

5. Click **Submit.**
6. Repeat above steps as desired, according to additional tunnel(s) available on your product.

Tunnel – Connect Mode

Connect Mode defines how the device makes an outgoing connection through a specific tunnel. When enabled, Connect Mode is always on and attempting a network connection if the connection mode condition warrants it. For Connect Mode to function, it must:

- Be enabled
- Have a remote host configured
- Have a remote port configured

Enter the remote host address as an IP address or DNS name. The EDS device will make a connection only if it can resolve the address. For DNS names, the EDS will re-evaluate the address after being established for 4 hours. If re-evaluation results in a different address, it will close the connection.

Connect Mode supports the following protocols:

- **TCP**
- **AES encryption over TCP and UDP**

  When setting AES encryption, both the encrypt key and the decrypt key must be specified. The encrypt key is used for data sent out. The decrypt key is used for receiving data. Both of the keys may be set to the same value.
- **SSH**

  To configure SSH, the SSH client username must be configured. In Connect Mode, the EDS is the SSH client. Ensure the EDS SSH client username is configured on the remote SSH server before using it with the EDS.
- **SSL**
- **UDP**

  Is only available in Connect Mode because it is a connectionless protocol. For Connect Mode using UDP, the EDS accepts packets from any device on the network. It will send packets to the last device that sent it packets.
- **Telnet**

Note: *The Local Port in Connect Mode is independent of the port configured in Accept Mode.*

There are six different connect modes:

- **Disable**
  No connection is attempted.
- **Always**
  A connection is always attempted.
- **Any Character**
  A connection is attempted if it detects any character from the serial port.
- **Start Character**
  A connection is attempted if it detects a specific and configurable character from the serial port.

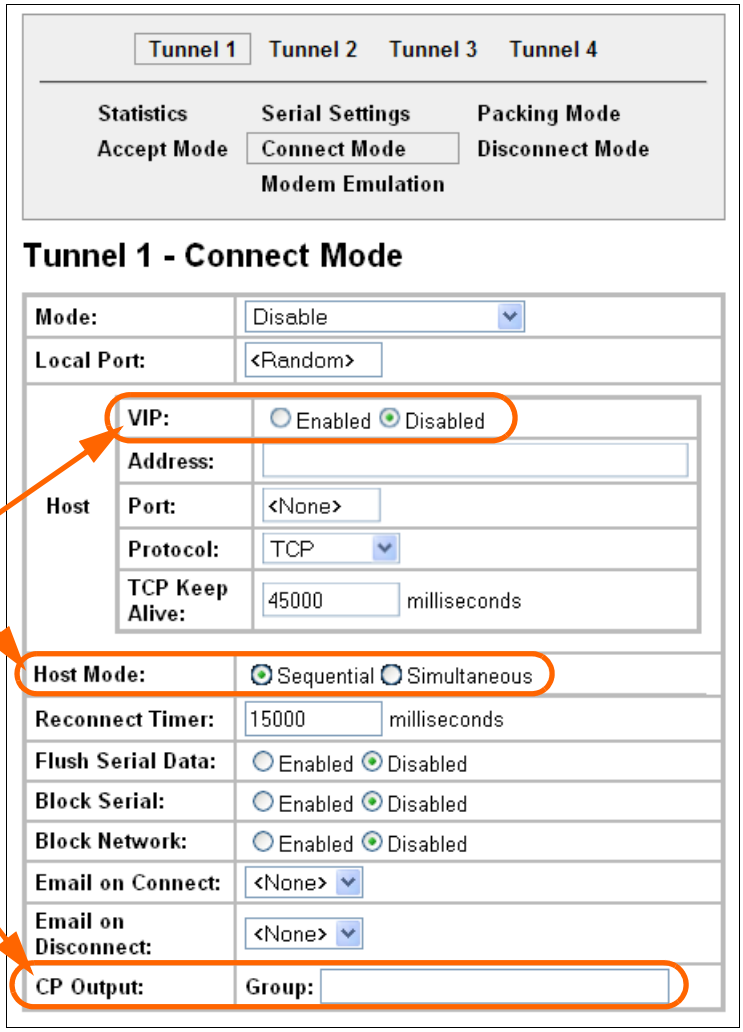
Note: *While in the "Any Character" or "Start Character" connection modes, the EDS waits and retries the connection if the connection cannot be made. Once it makes a connection and then disconnects, it will not reconnect until it sees another character or the start character again (depending on the configured setting).*

- **Modem Control Asserted**
  A connection is attempted when the modem control pin is asserted in the serial line.
- **Modem Emulation**
  A connection is attempted by an ATD command.

To configure Connect Mode for a specific tunnel:

1. Select **Tunnel** on the menu bar, if you are not already in the Tunnel web page.
2. Select a tunnel number at the top of the page.
3. Select **Connect Mode**. The Connect Mode page for the specific tunnel appears.

Figure 9-15 Tunnel 1 Connect Mode



*Note: The **VIP** and **Host Mode** options are supported in all products except XPort AR.*

*The **CP Output** option is only supported in XPort Pro and XPort AR.*

4. Enter or modify the following settings:

Table 9-16 **Tunnel Connect Mode**

Tunnel – Connect Mode Settings	Description
Mode	Select the method to be used to attempt a connection to a remote host or device. Choices are: ◆ **Always** = a connection is attempted until one is made. If the connection gets disconnected, the EDS retries until it makes a connection. (default) ◆ **Disable** = an outgoing connection is never attempted. ◆ **Any Character** = a connection is attempted when any character is read on the serial line. ◆ **Start Character** = a connection is attempted when the start character for the specific tunnel 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. ◆ **Modem Emulation** = a connection is attempted when triggered by modem emulation AT commands.
Local Port	Enter the port for use as the local port. A random port is selected by default. Once you have configured a number, click the Random link in the Current Configuration to switch back to random.
Host ***Note:*** *If security is a concern, it is highly recommended that SSH be used. When using SSH, both the SSH Server Host Keys and SSH Server Authorized Users must be configured.*	Click **<None>** in the Host field to configure the Host parameters. ◆ **VIP** = Enabling the VIP directs the tunnel to connect to a remote Lantronix Virtual IP identified by the VIP Name. When VIP is enabled, the Host 2 field displays. Default is Disabled. ◆ **VIP Name** = Displays configured VIP name. Used only if VIP is enabled. ◆ **Address** = Enter the remote Host Address as an IP address or DNS name. It designates the address of the remote host to connect to. Displays configured IP address or DNS address, used only if VIP is disabled. ◆ **Port** = Enter the port for use as the Host Port. It designates the port on the remote host to connect to. Displays configured Port. ◆ **Protocol** = Select the protocol type for use with Connect Mode. The default protocol is TCP. Additional fields may need to be completed depending on protocol chosen for the host.: ➢ For **SSH**, also enter an **SSH Username**. ➢ For **SSL**, also select Enabled or Disabled for **Validate Certificate**. ➢ For **SSL**, **TCP**, **TCP AES** and **Telnet**, use the **TCP Keep Alive** field to adjust the value. ➢ For **TCP AES**, enter the **AES Encrypt** and **AES Decrypt Keys**. Both of keys may be set to the same value. ➢ For **UDP**, there are no additional fields to complete. In this mode, the device accepts packets from any device on the network and sends packets to the last device that sent it packets. ➢ For **UDP AES**, enter the **AES Encrypt** and **AES Decrypt Keys**. ◆ **SSH Username** = Displays configured username, used only if SSH protocol is selected. ◆ **TCP Keep Alive** = Default is 45000 milliseconds. Enter zero to disable and blank the value to restore the default. ◆ **AES Encrypt/Decrypt Key** = Displays presence of key, used only if protocol with AES is selected.

Tunnel – Connect Mode Settings (continued)	Description
Host Mode	Select the host mode if you have more than one host configured: ◆ Sequential ◆ Simultaneous ***Note:*** *See Connecting Multiple Hosts on page 70 for more information.*
Reconnect Timer	Enter the reconnect time in milliseconds. The device attempts to reconnect after this amount of time after failing a connection or exiting an existing connection. This behavior depends upon the Disconnect Mode. ***Note:*** ◆ *When you configure* **Tunnel - Connect Mode***, you can specify a number of milliseconds to attempt to reconnect after a dropped connection has occurred. The default is 1500 milliseconds.* ◆ *The* ***Reconnect Timer*** *only applies if a* **Disconnect Mode** *is configured. With a* **Disconnect Mode** *set, the device server maintains a connection until the disconnect mode condition is met (at which time the device server closes the connection). If the tunnel is dropped due to conditions beyond the device server, the device server attempts to re-establish a failed connection when the specified reconnect interval reaches its limit.* ◆ *Any network-side disconnect is considered an error and a reconnect is attempted without regard to the* **Connect Mode** *settings. Simultaneous* **Connect Mode** *connections require some* **Disconnect Mode** *configurations or the connections will never terminate. See Tunnel – Disconnect Mode on page 71 for more information about the parameters.* ◆ *If* **Disconnect Mode** *is disabled and the network connection is dropped, then the re-establishment of a tunnel connection is governed by the configured* **Connect Mode** *settings.*
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)
Block Serial	Select **Enabled** to block (not tunnel) serial data transmitted to the device. This is a debugging tool that causes serial data sent to the device to be ignored.
Block Network	Select **Enabled** to block (not tunnel) network data transmitted to the device. This is a debugging tool that causes network data sent to the device to be ignored.
Email on Connect	Select whether the device sends an email when a connection is made. Select None if you do not want to send an email. Otherwise, select the Email profile to use.
Email on Disconnect	Select whether the device sends an email when a connection is closed. Select None if you do not want to send an email. Otherwise, select the Email profile to use.

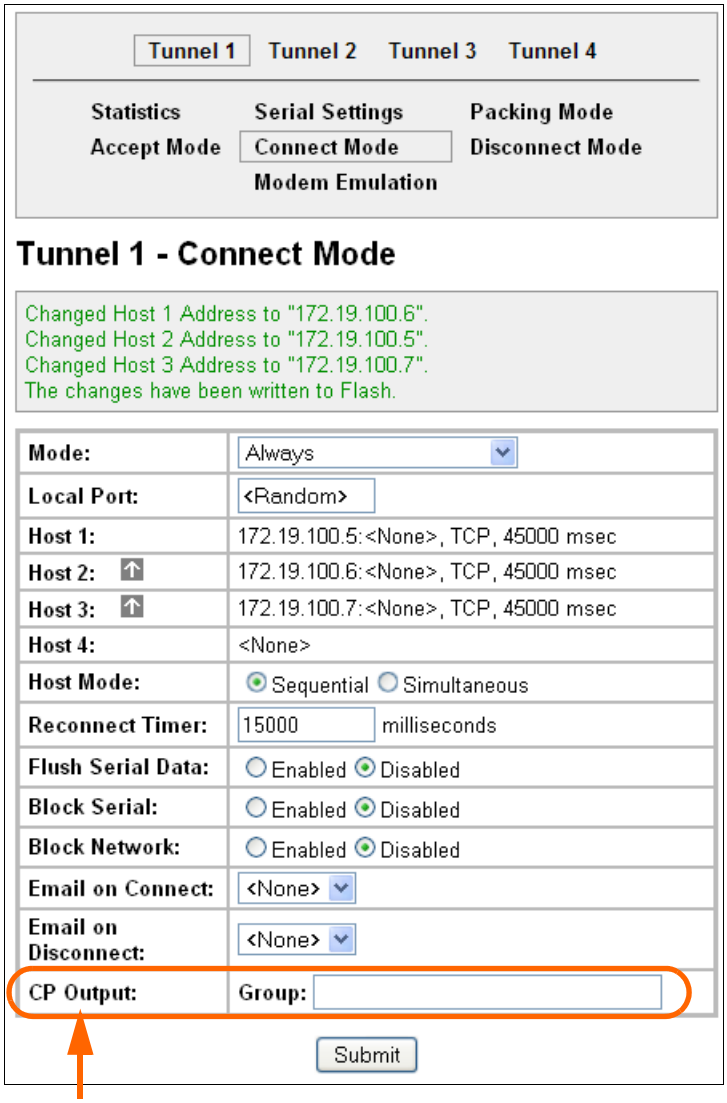
5. Click **Submit.** The host is configured. A second host appears underneath the newly configured host.Repeat these steps to configure additional hosts as necessary. EDS supports configuration of up to sixteen hosts.

Connecting Multiple Hosts

If more than one host is configured, a **Host Mode** option appears. Host Mode controls how multiple hosts will be accessed. For EDS, the Connect Mode supports up to sixteen Hosts. Hosts may be accessed sequentially or simultaneously:

- **Sequential** – Sequential host lists establish a prioritized list of tunnels. The host specified as Host 1 will be attempted first. If that fails, it will proceed to Host 2, 3, etc, in the order they are specified. When a connection drops, the cycle starts again with Host 1 and proceeds in order. Establishing the host order is accomplished with host list promotion (see *Host List Promotion on page 70*). Sequential is the default Host Mode.
- **Simultaneous** – A tunnel will connect to all hosts accepting a connection. Connections occur at the same time to all listed hosts. The device can support a maximum of 64 total aggregate connections.

Figure 9-17 Host 1, Host 2, Host 3 Exchanged



Note: *The **CP Output** option is only supported in XPort Pro and XPort AR.*

Host List Promotion

This feature allows Host IP promotion of individual hosts in the overall sequence.

To promote a specific Host:

1. Click the icon in the desired Host field, for example Host 2 and Host 3.
2. The selected Host(s) exchanges its place with the Host above it.
3. Click **Submit**. The hosts change sequence.

Tunnel – Disconnect Mode

Relates to the disconnection of a specific tunnel. Disconnect Mode ends Accept Mode and Connect Mode connections. When disconnecting, the EDS shuts down the specific tunnel connection gracefully.

The following settings end a specific tunnel connection:

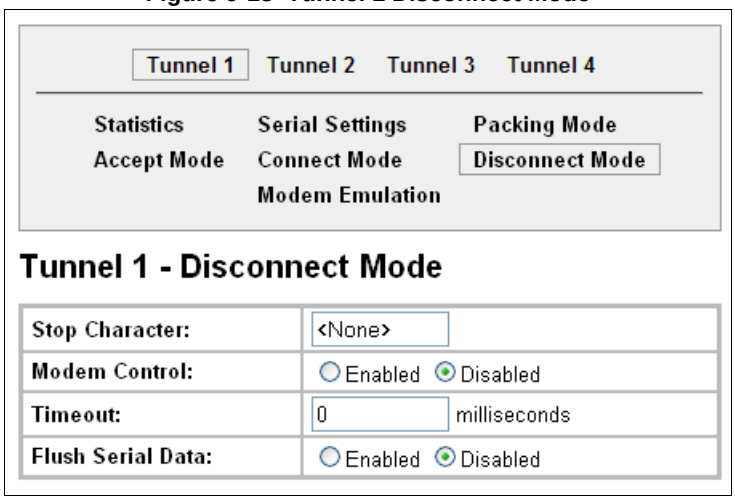
- The EDS receives the stop character.
- The timeout period has elapsed and no activity is going in or out of the EDS. Both Accept Mode and Connect Mode must be idle for the time frame.
- The EDS observes the modem control inactive setting.

Note: *To clear data out of the serial buffers upon a disconnect, enable "Flush Serial Data".*

To configure the Disconnect Mode for a specific tunnel:

1. Select **Tunnel** on the menu bar, if you are not already in the Tunnel web page.
2. Select a tunnel number at the top of the page.
3. Select **Disconnect Mode**. The specific tunnel Disconnect Mode page appears.

Figure 9-18 Tunnel 1 Disconnect Mode



4. Enter or modify the following settings:

Table 9-19 **Tunnel Disconnect Mode**

Tunnel – Disconnect Mode Settings	Description
Stop Character	Enter the stop character in ASCII, hexadecimal, or decimal notation. Select **<None>** to disable.
Modem Control	Select **Enabled** to disconnect when the modem control pin is not asserted on the serial line.
Timeout	Enter a time, in milliseconds, for the device to disconnect on a **Timeout**. The value 0 (zero) disables the idle timeout.
Flush Serial Data	Select **Enabled** to flush the serial data buffer on a disconnection.

5. Click **Submit.**
6. Repeat above steps as desired, according to additional tunnel(s) available on your product.

Tunnel – Modem Emulation

A tunnel in Connect Mode can be initiated using modem commands incoming from the Serial Line. This page enables you to configure the modem emulation settings when you select Modem Emulation as the Tunnel Connect Mode type.

The Modem Emulation 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. All of these commands behave like a modem. For commands that are valid but not applicable to the EDS, an “OK” message is sent (but the command is silently ignored).

The EDS attempts to make a Command Mode connection as per the IP/DNS/port numbers defined in Connect Mode. It is possible to override the remote address, as well as the remote port number.

The following table lists and describes the available commands.

Table 9-20 **Modem Emulation Commands and Descriptions**

Command	Description
+++	Switches to Command Mode if entered from serial port during connection.
AT?	Help.
ATDT<Address Info>	Establishes the TCP connection to socket (<*ipaddress*>:<*port*>).
ATDP<Address Info>	See ATDT.
ATD	Like ATDT. Dials default Connect Mode remote address and port.
ATD<Address Info>	Sets up a TCP connection. A value of 0 begins a command line interface session.
ATO	Switches to data mode if connection still exists. Vice versa to '+++'.
ATEn	Switches echo in Command Mode (off - 0, on - 1).
ATH	Disconnects the network session.
ATI	Shows modem information.
ATQn	Quiet mode (0 - enable results code, 1 - disable results code.)
ATVn	Verbose mode (0 - numeric result codes, 1 - text result codes.)
ATXn	Command does nothing and returns OK status.
ATUn	Accept unknown commands. (n value of 0 = off. n value of 1 = on.)
AT&V	Display current and saved settings.
AT&F	Reset settings in NVR to factory defaults.
AT&W	Save active settings to NVR.
ATZ	Restores the current state from the setup settings.

Table 9-20 **Modem Emulation Commands and Descriptions (continued)**

Command (continued)	Description
ATS0=n	Accept incoming connection. ◆ N value of 0—Disable ◆ N value of 1—Connect automatically ◆ N value of 2+—Connect with ATA command.
ATA	Answer incoming connection (if ATS0 is 2 or greater).
A/	Repeat last valid command.

For commands that can take address information (ATD, ATDT, ATDP), the destination address can be specified by entering the IP Address, or entering the IP Address and port number. For example, <ipaddress>:<port>. The port number cannot be entered on its own.

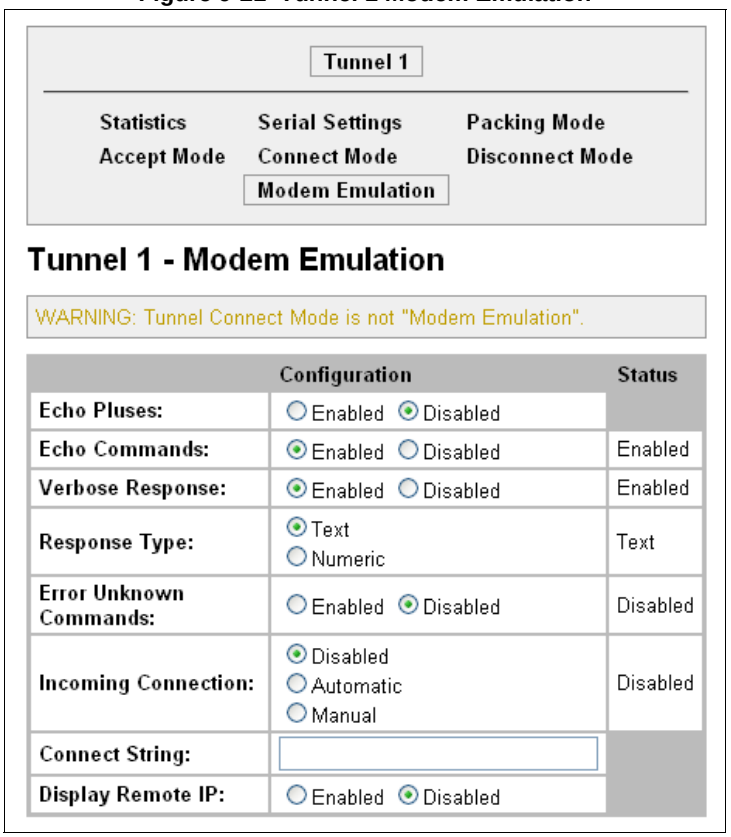
For ATDT and ATDP commands less than 255 characters, the EDS replaces the last segment of the IP address with the configured Connect Mode remote station address. It is possible to use the last two segments also, if they are under 255 characters. For example, if the address is 100.255.15.5, entering “ATDT 16.6” results in 100.255.16.6.

When using ATDT and ATDP, enter 0.0.0.0 to switch to the Command Line Interface (CLI). Once the CLI is exited by using the CLI exit command, the EDS reverts to modem emulation mode. By default, the +++ characters are not passed through the connection. Turn on this capability using the modem echo pluses command.

To configure modem emulation for a specific tunnel:

1. Select **Tunnel** on the menu bar, if you are not already in the Tunnel web page.
2. Select a tunnel number at the top of the page.
3. Select **Modem Emulation**. The Modem Emulation page for the specific tunnel appears.

Figure 9-21 Tunnel 1 Modem Emulation



4. Enter or modify the following settings:

Table 9-22 **Tunnel Modem Emulation**

Tunnel- Modem Emulation Settings	Description
Echo Pluses	Select **Enabled** to echo **+++** when entering modem Command Mode.
Echo Commands	Select **Enabled** to echo the modem commands to the console.
Verbose Response	Select **Enabled** to send modem response codes out on the serial line.
Response Type	Select the type of response code: **Text** or **Numeric**.
Error Unknown Commands	Select whether an **ERROR** or **OK** response is sent in reply to unrecognized AT commands. Choices are: ◆ **Enabled** = **ERROR** is returned for unrecognized AT commands. ◆ **Disabled** = **OK** is returned for unrecognized AT commands. Default is **Disabled**.
Incoming Connection	Select whether Incoming Connection requests will be disabled, answered automatically, or answered manually. Default is **Disabled**.
Connect String	Enter the connect string. This modem initialization string prepares the modem for communications. It is a customized string sent with the “CONNECT” modem response code.
Display Remote IP	Selects whether the incoming RING sent on the Serial Line is followed by the IP address of the caller. Default is **Disabled**.

5. Click **Submit.**
6. Repeat above steps as desired, according to additional tunnel(s) available on your product.

10: Terminal and Host Settings

This chapter describes how to view and configure the Terminal Login Connect Menu and associated Host configuration. It contains the following sections:

The Terminal Login Connect Menu feature allows the EDS device to present a menu of predefined connections when the device is accessed via telnet, ssh, or a serial port. From the menu, a user can choose one of the presented options and the device automatically makes the predefined connection.

The Terminal page controls whether a Telnet, SSH, or serial port connection presents the CLI or the Login Connect Menu. By default, the CLI is presented when the device is accessed. When configured to present the Login Connect Menu, the hosts configured via the Hosts page, and named serial lines are presented.

Terminal Settings

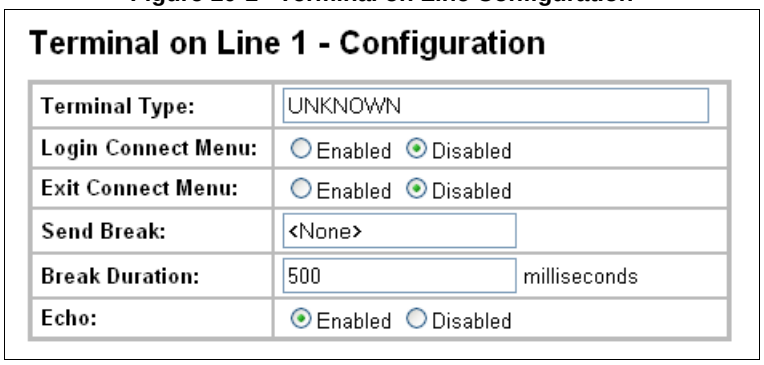
This page shows configuration settings for each terminal connection method. You can configure whether each serial line or the telnet/SSH server presents a CLI or a Login Connect menu when a connection is made.

Line Terminal Configuration

To configure a specific line to support an attached terminal:

1. Select **Terminal** on the menu bar. The Terminal web page appears.
2. Select the line number at the top of the page connected to the terminal you want to configure. The default is **Line 1**.

Figure 10-1 Terminal on Line Configuration



3. Enter or modify the following settings:

Table 10-2 **Terminal on Line 1 Configuration**

Terminal on Line Configuration Settings	Description
Terminal Type	Enter text to describe the type of terminal. The text will be sent to a host via IAC. ***Note:*** *IAC means, "interpret as command." It is a way to send commands over the network such as* **send break** *or* **start echoing**.
Login Connect Menu	Select the interface to display when the user logs in. Choices are: ◆ **Enabled** = shows the Login Connect Menu. ◆ **Disabled** = shows the CLI
Exit Connect Menu	Select whether to display a choice for the user to exit the Login Connect Menu and reach the CLI. Choices are: ◆ **Enabled** = a choice allows the user to exit to the CLI. ◆ **Disabled** = there is no exit to the CLI.
Send Break	Enter a Send Break control character, e.g., <control> Y, or blank to disable. When the Send Break control character is received from the network on its way to the serial line, it is not sent to the line; instead, the line output is forced to be inactive (the break condition).
Break Duration	Enter how long the break should last in milliseconds.
Echo	Applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable **Echo** if your terminal echoes, in which case you will see double of each character typed.

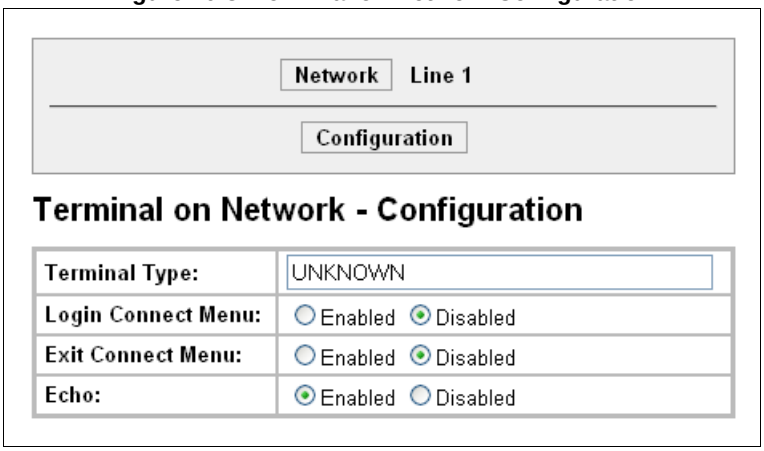
4. Click **Submit** to save changes.
5. Repeat above steps as desired, according to the additional line(s) available on your product.

Network Terminal Configuration

To configure menu features applicable to CLI access via the network:

1. Select **Terminal** on the menu bar, if you are not already in the Terminal web page.
2. Select **Network** at the top of the page. The Configuration submenu is automatically selected. The Terminal Configuration page appears for the network.

Figure 10-3 Terminal on Network Configuration



3. Enter or modify the following settings:

Table 10-4 **Terminal on Network Configuration**

Terminal on Network Configuration Settings	Description
Terminal Type	Enter text to describe the type of terminal. The text will be sent to a host via IAC. ***Note:*** *IAC means, "interpret as command." It is a way to send commands over the network such as* **send break** *or* **start echoing**.
Login Connect Menu	Select the interface to display when the user logs in. Choices are: **Enabled** = shows the Login Connect Menu. **Disabled** = shows the CLI
Exit Connect Menu	Select whether to display a choice for the user to exit the Login Connect Menu and reach the CLI. Choices are: **Enabled** = a choice allows the user to exit to the CLI. **Disabled** = there is no exit to the CLI.
Echo	Applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable **Echo** if your terminal echoes, in which case you will see double of each character typed.

4. Click **Submit** to save changes.

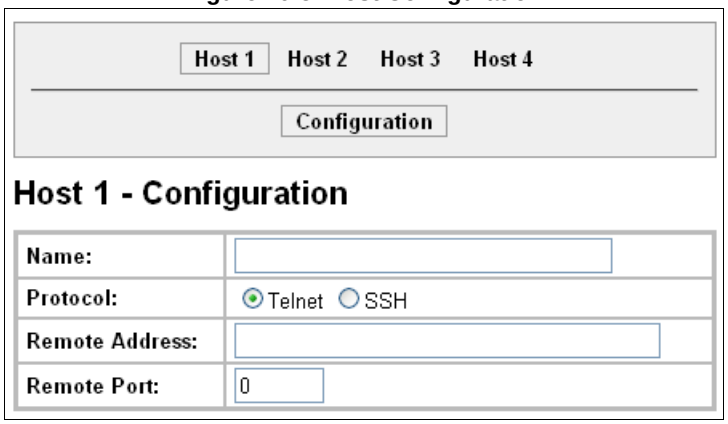
Host Configuration

This Host web page is where you may view and modify current settings for a selected remote host.

To configure a selected remote host:

1. Select **Host** on the menu bar. The Host web page appears.
2. Select a specific host number at the top of the page. The Host Configuration page for the selected host appears.

Figure 10-5 Host Configuration



3. Enter or modify the following settings:

Table 10-6 **Host Configuration**

Host Settings	Description
Name	Enter a name for the host. This name appears on the Login Connect Menu. To leave a host out of the menu, leave this field blank.
Protocol	Select the protocol to use to connect to the host. Choices are: ◆ Telnet ◆ SSH ***Note:*** *SSH keys must be loaded or created on the SSH page for the SSH protocol to work.*
SSH Username	Appears if you selected **SSH** as the protocol. Enter a username to select a pre-configured Username/Password/Key (configured on the SSH: Client Users page), or leave it blank to be prompted for a username and password at connect time.
Remote Address	Enter an IP address for the host to which the device will connect.
Remote Port	Enter the port on the host to which the device will connect.

4. Click **Submit** to save changes.
5. Repeat above steps as desired, according to additional host(s) available on your product.

11: Service Settings

This chapter describes the available services and how to configure each. It contains the following sections:

DNS Settings

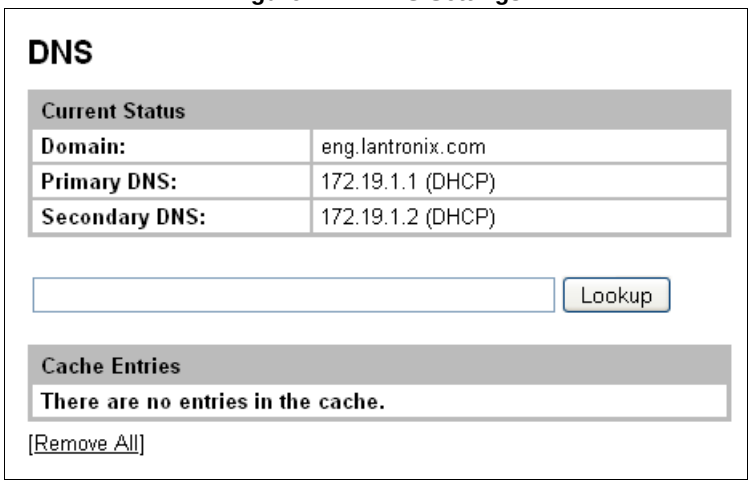
The primary and secondary domain name system (DNS) addresses come from the active interface. The static addresses from the Network Interface Configuration page may be overridden by DHCP or BOOTP. The DNS web page enables you to view the status and cache.

When a DNS name is resolved using a forward lookup, the results are stored in the DNS cache temporarily. The EDS checks 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.

To view the DNS status:

1. Select **DNS** on the menu bar. The DNS page appears.

Figure 11-1 DNS Settings



To find a DNS Name or IP Address:

1. Enter either a DNS name or an IP address.
2. Click **Lookup**.
   - When a DNS name is resolved, the results appear in the DNS cache.
   - When an IP address is resolved, the results appear in a text below the Lookup field.

To clear cache entries:

1. Click **Remove All** to remove all listed cache entries.
2. Click **Delete** next to a specirfic cache entry to remove only that one.

SNMP Settings

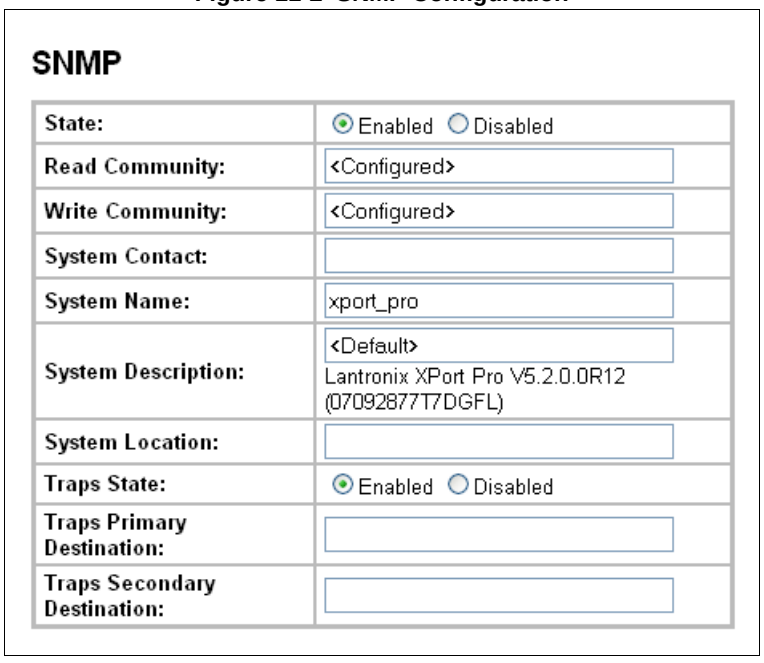
Simple Network Management Protocol (SNMP) is a network management tool that monitors network devices for conditions that need attention. The SNMP service responds to SNMP requests and generates SNMP Traps.

This page is used to configure the SNMP agent.

To configure SNMP:

1. Select **SNMP** on the menu bar. The SNMP page opens and shows the current SNMP configuration.

Figure 11-2 SNMP Configuration



2. Enter or modify the following settings:

Table 11-3 **SNMP**

SNMP Settings	Description
State	Select **Enabled** to enable SNMP.
Read Community	Enter the SNMP read-only community string.
Write Community	Enter the SNMP read/write community string.
System Contact	Enter the name of the system contact.
System Name	Enter the system name.
System Description	Enter the system description.
System Location	Enter the system location.
Traps State	Select **Enabled** to enable the transmission of SNMP Traps. The Cold Start trap is sent on device boot up, and the Linkdown trap is sent when the device is rebooted from software control.
Traps Primary Destination	Enter the primary SNMP trap host.
Traps Secondary Destination	Enter the secondary SNMP trap host.

3. Click **Submit.**

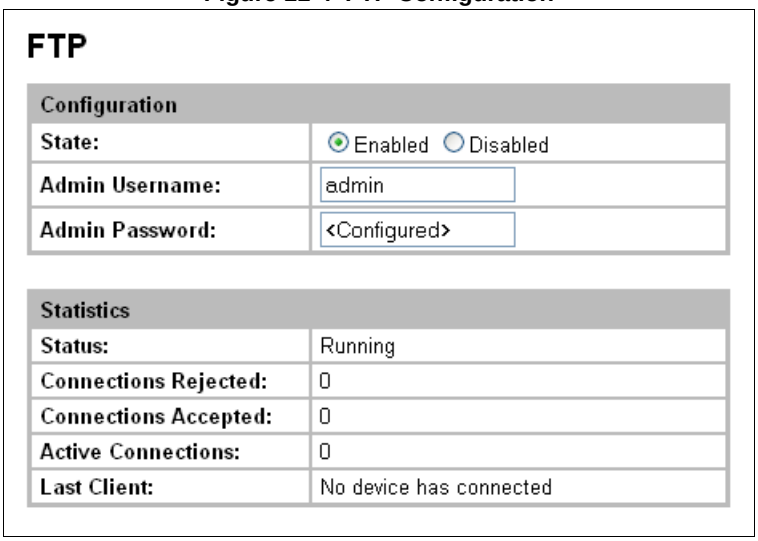
FTP Settings

The FTP web page shows the current File Transfer Protocol (FTP) configuration and various statistics about the FTP server.

To configure FTP:

1. Select **FTP** on the menu bar. The FTP page opens to display the current configuration.

Figure 11-4 FTP Configuration



2. Enter or modify the following settings:

Table 11-5 **FTP Settings**

FTP Settings	Description
State	Select **Enabled** to enable the FTP server.
Admin Username	Enter the username to use when logging in via FTP.
Admin Password	Enter the password to use when logging in via FTP.

3. Click **Submit**.

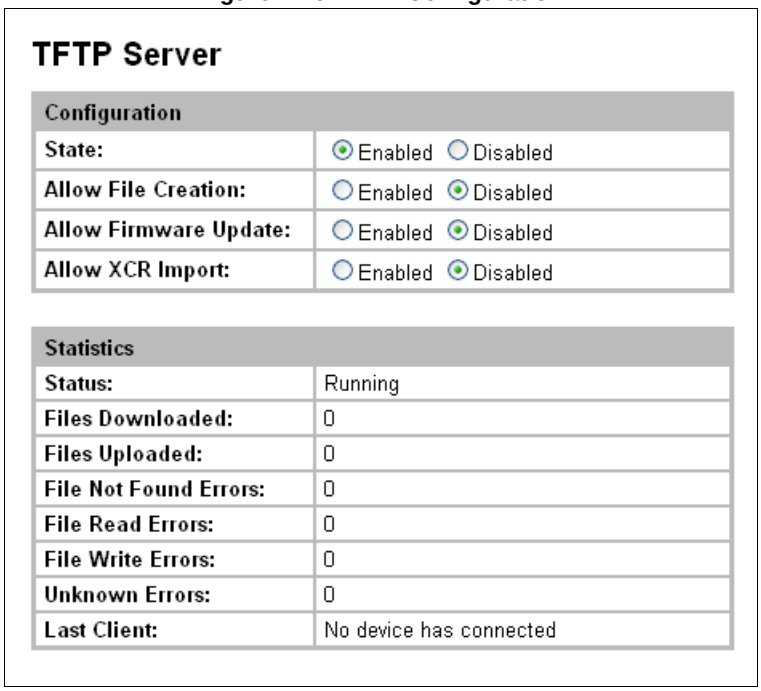
TFTP Settings

In the TFTP web page, you can configure the server and view the statistics about the Trivial File Transfer Protocol (TFTP) server.

To configure TFTP:

1. Select **TFTP** on the menu bar. The TFTP page opens to display the current configuration.

Figure 11-6 TFTP Configuration



2. Enter or modify the following settings:

Table 11-7 **TFTP Server**

TFTP Settings	Description
State	Select **Enabled** to enable the TFTP server.
Allow TFTP File Creation	Select whether to allow the creation of new files stored on the TFTP server.
Allow Firmware Update	Specifies whether or not the TFTP Server is allowed to accept a firmware update for the device. An attempt to update firmware is recognized based on the name of the file. ***Note:*** *TFTP cannot authenticate the client, so the device is open to malicious update.*
Allow XCR Import	Specifies whether the TFTP server is allowed to accept an XML configuration file for update. An attempt to import configuration is recognized based on the name of the file. ***Note:*** *TFTP cannot authenticate the client, so the device is open to malicious update.*

3. Click **Submit**.

Syslog Settings

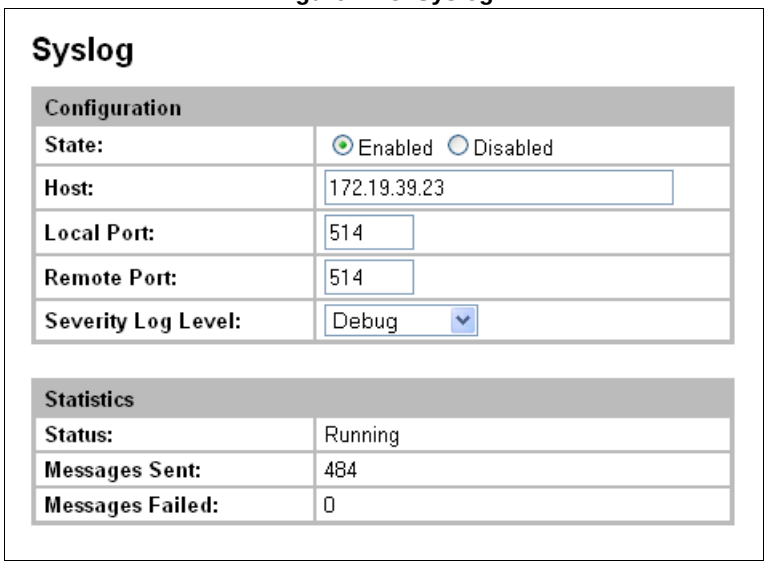
The Syslog web page shows the current configuration and statistics of the system log.

To configure the Syslog:

Note: *The syslog file is always saved to local storage, but it is not retained through reboots. Saving the syslog file to a server that supports remote logging services (see RFC 3164) allows the administrator to save the complete syslog history. The default port is 514.*

1. Select **Syslog** on the menu bar. The Syslog page opens to display the current configuration.

Figure 11-8 Syslog



2. Enter or modify the following settings:

Table 11-9 **Syslog**

Syslog Settings	Description
State	Select to enable or disable the syslog.
Host	Enter the IP address of the remote server to which system logs are sent for storage.
Local Port	Enter the number of the local port on the device from which system logs are sent.
Remote Port	Enter the number of the port on the remote server that supports logging services. The default is **514**.
Severity Log Level	From the drop-down box, select the minimum level of system message the device 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.**)

3. Click **Submit**.

HTTP Settings

Hypertext Transfer Protocol (HTTP) is the transport protocol for communicating hypertext documents on the Internet. HTTP defines how messages are formatted and transmitted. It also defines the actions web servers and browsers should take in response to different commands. HTTP Authentication enables the requirement of usernames and passwords for access to the EDS device.

This page has three links at the top for viewing statistics and for viewing and changing configuration and authentication settings.

- HTTP Statistics—Viewing statistics such as bytes received and transmitted, bad requests, authorizations required, etc.
- HTTP Configuration—Configuring and viewing the current configuration.
- HTTP Authentication—Configuring and viewing the authentication.

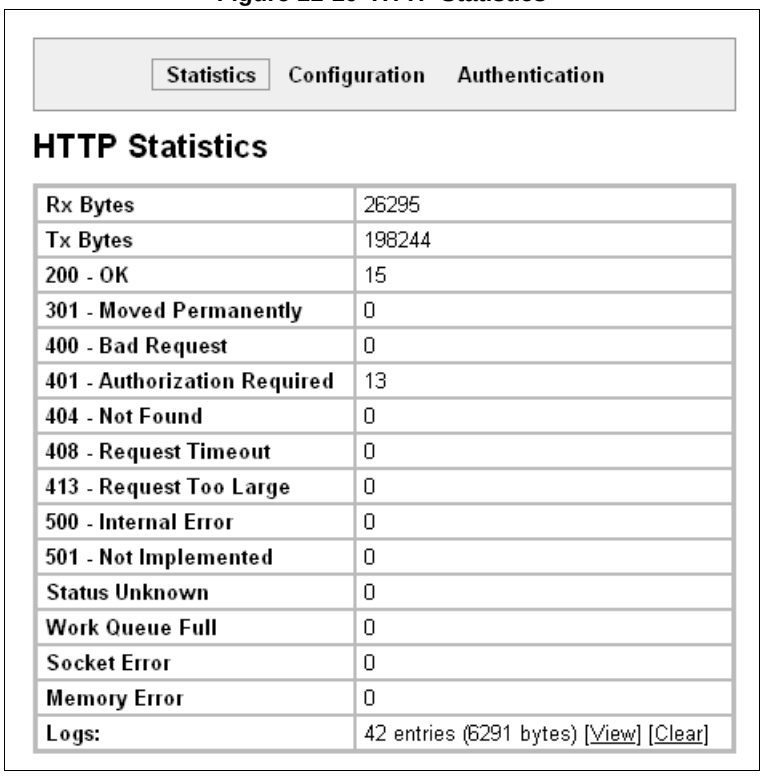
HTTP Statistics

To view HTTP statistics:

This page shows various statistics about the HTTP server.

1. Select **HTTP** on the menu bar and then **Statistics** at the top of the page. The HTTP Statistics page appears.

Figure 11-10 HTTP Statistics



Note: *The HTTP log is a scrolling log, with the last Max Log Entries cached and viewable. You can change the maximum number of entries that can be viewed on the HTTP Configuration Page.*

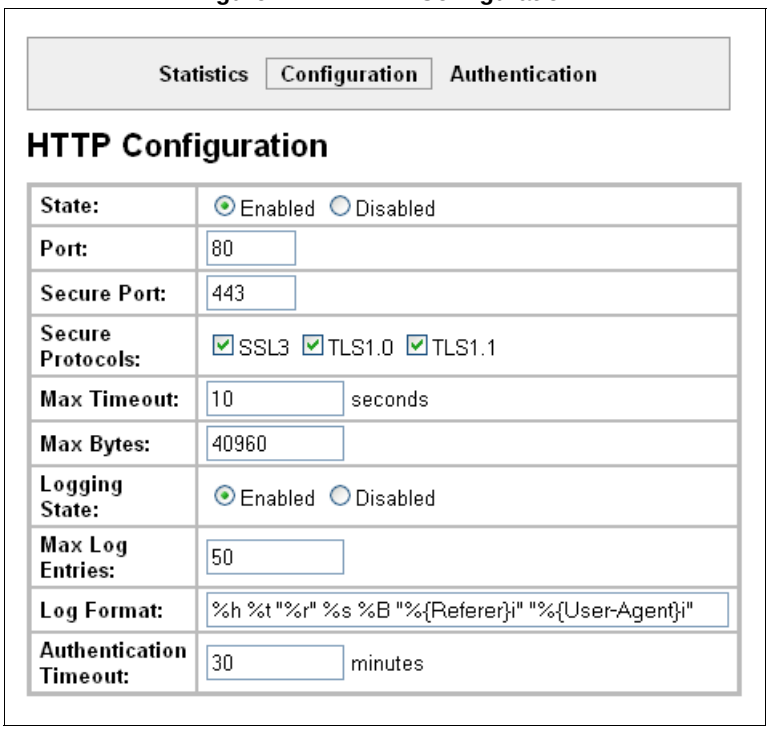
HTTP Configuration

On this page you may change HTTP configuration settings.

To configure HTTP:

1. Select **HTTP** on the menu bar and then **Configuration** at the top of the page. The HTTP Configuration page opens.

Figure 11-11 HTTP Configuration



2. Enter or modify the following settings:

Table 11-12 **HTTP Configuration**

HTTP Configuration Settings	Description
State	Select **Enabled** to enable the HTTP server.
Port	Enter the port for the HTTP server to use. The default is **80**.
Secure Port	Enter the port for the HTTPS server to use. The default is **443**. The HTTP server only listens on the **HTTPS Port** when an SSL certificate is configured.

HTTP Configuration Settings (continued)	Description
Secure Protocols	Select to enable or disable the following protocols: ◆ **SSL3** = Secure Sockets Layer version 3 ◆ **TLS1.0** = Transport Layer Security version 1.0. TLS 1.0 is the successor of SSL3 as defined by the IETF. ◆ **TLS1.1** = Transport Layer Security version 1.1 The protocols are enabled by default. ***Note:*** *A server certificate and associated private key need to be installed in the* **SSL** *configuration section to use* **HTTPS**.
Max Timeout	Enter the maximum time for the HTTP server to wait when receiving a request. This prevents Denial-of-Service (DoS) attacks. The default is **10** seconds.
Max Bytes	Enter the maximum number of bytes the HTTP server accepts when receiving a request. The default is **40** kB (this prevents DoS attacks).
Logging State	Select **Enabled** to enable HTTP server logging.
Max Log Entries	Sets the maximum number of HTTP server log entries. Only the last **Max Log Entries** are cached and viewable.
Log Format	Set the log format string for the HTTP server. Follow these **Log Format** rules: ◆ **%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
Authentication Timeout	The timeout period applies if the selected authentication type is either **Digest** or **SSL/Digest**. After this period of inactivity, the client must authenticate again.

3. Click **Submit.**

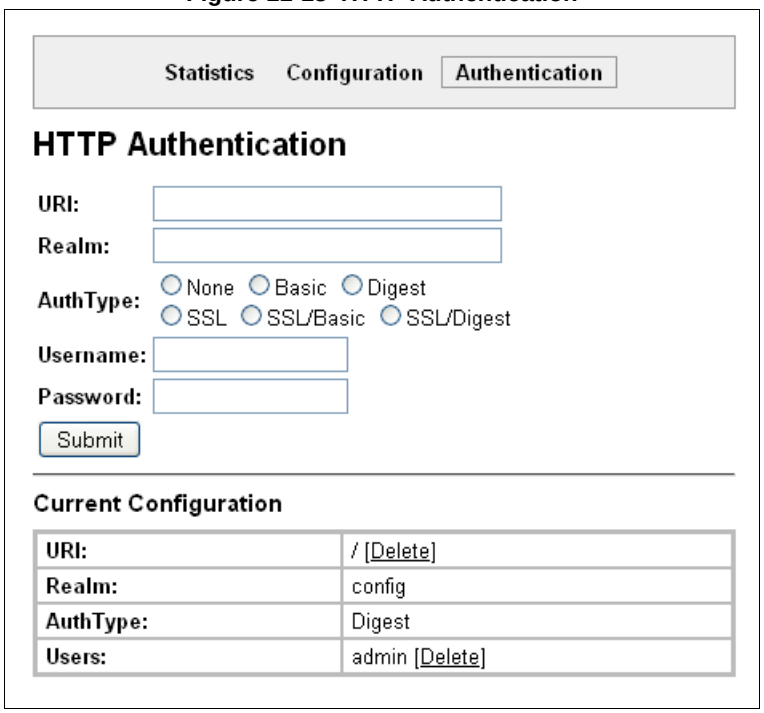
HTTP Authentication

HTTP Authentication enables you to require usernames and passwords to access specific web pages or directories on the EDS' built-in web server.

To configure HTTP authentication settings:

1. Select **HTTP** on the menu bar and then **Authentication** at the top of the page. The HTTP Authentication page opens.

Figure 11-13 HTTP Authentication



2. Enter or modify the following settings:

***Table 11-14* HTTP Authentication**

HTTP Authentication Settings	Description
URI	Enter the Uniform Resource Identifier (URI). ***Note:*** *The URI must begin with '/' to refer to the filesystem.*
Realm	Enter the domain, or realm, used for HTTP. Required with the **URI** field.

HTTP Authentication Settings (continued)	Description
Auth Type	Select the authentication type: ◆ **None** = no authentication is necessary. ◆ **Basic** = encodes passwords using Base64. ◆ **Digest** = encodes passwords using MD5. ◆ **SSL** = the page can only be accessed over SSL (no password is required). ◆ **SSL/Basic** = the page is accessible only over SSL and encodes passwords using Base64. ◆ **SSL/Digest** = the page is accessible only over SSL and encodes passwords using MD5. ***Note:*** *When changing the parameters of Digest or SSL Digest authentication, it is often best to close and reopen the browser to ensure it does not attempt to use cached authentication information.*
Username	Enter the **Username** used to access the **URI**. More than one Username per URI is permitted. Click **Submit** and enter the next Username as necessary.
Password	Enter the **Password** for the **Username**.

3. Click **Submit.**
4. To delete the URI and users, click **Delete** in the current configuration table.

Note: *The URI, realm, username, and password are user-specified, free-form fields. The URI must match the directory created on the EDS file system.*

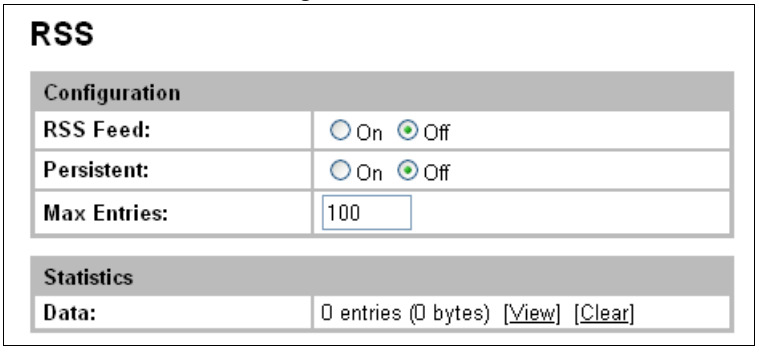
RSS Settings

Really Simple Syndication (RSS) (sometimes referred to as Rich Site Summary) is a method of feeding online content to Web users. Instead of actively searching for EDS configuration changes, RSS feeds permit viewing only relevant and new information regarding changes made to the EDS via an RSS publisher. The RSS feeds may also be stored to the file system cfg_log.txt file.

To configure RSS settings:

1. Select **RSS** on the menu bar. The RSS page opens and shows the current RSS configuration.

Figure 11-15 RSS



2. Enter or modify the following settings:

Table 11-16 **RSS**

RSS Settings	Description
RSS Feed	Select **On** to enable RSS feeds to an RSS publisher.
Persistent	Select **On** to enable the RSS feed to be written to a file (cfg_log.txt) and to be available across reboots.
Max Entries	Sets the maximum number of log entries. Only the last **Max Entries** are cached and viewable.

3. Select **Submit.**
4. In the **Current Status** table, view and clear stored RSS Feed entries, as necessary.

LPD Settings

The EDS device acts as a print server if a printer gets connected to one of its serial ports. Selecting the Line Printer Daemon (LPD) link in the Main Menu displays the LPD web page. The LPD web page has three sub-menus for viewing print queue statistics, changing print queue configuration, and printing a test page. Because the LPD lines operate independently, you can specify different configuration settings for each.

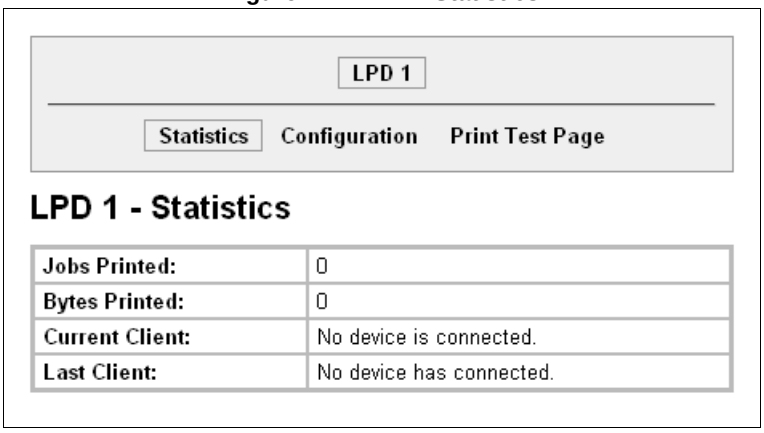
LPD Statistics

This read-only page shows various statistics about the LPD server.

To view LPD statistics for a specific LPD line:

1. Select **LPD** on the menu bar. The LPD web page appears.
2. Select an LPD line at the top of the page.
3. Select **Statistics**. The LPD Statistics page for the selected LPD line appears.
4. Repeat above steps as desired, according to additional LPD(s) available on your product.

Figure 11-17 LPD Statistics



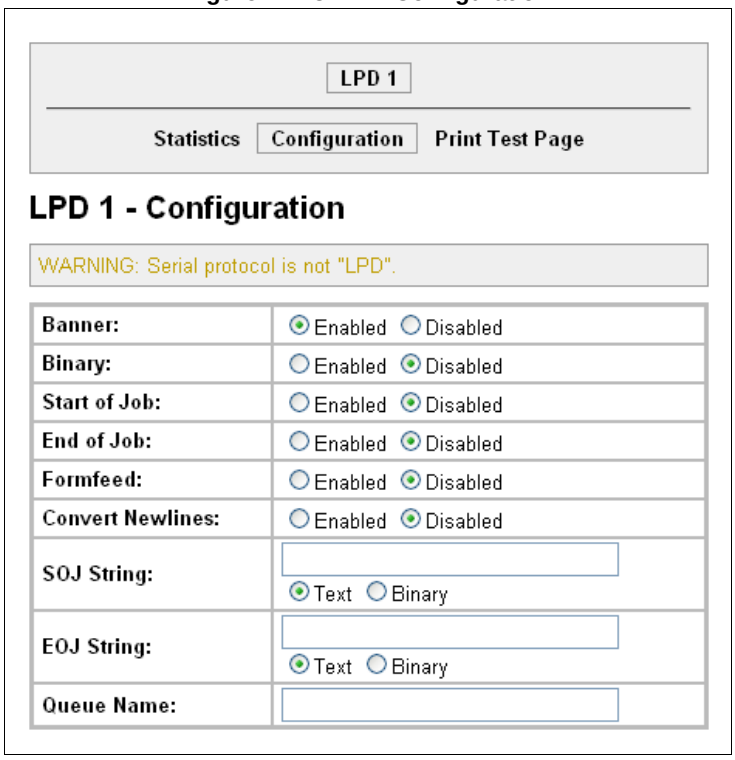
LPD Configuration

Here you can change LPD configuration settings.

To configure LPD settings for a specific LPD line:

1. Select **LPD** on the menu bar, if you are not already at the LPD web page.
2. Select a LPD line at the top of the page.
3. Select **Configuration**. The LPD Configuration for the selected LPD line appears.

Figure 11-18 LPD Configuration



4. Enter or modify the following settings:

Table 11-19 **LPD Configuration**

LPD Configuration Settings	Description
Banner	Select **Enabled** to print the banner even if the print job does not specify to do so. Selected by default.
Binary	Select **Enabled** for the device to pass the entire file to the printer unchanged. Otherwise, the device passes only valid ASCII and valid control characters to the printer. Valid control characters include the tab, linefeed, formfeed, backspace, and newline characters. All others are stripped. Disabled by default.
Start of Job	Select **Enabled** to print a "start of job" string before sending the print data.
End of Job	Select **Enabled** to send an "end of job" string.
Formfeed	Select **Enabled** to force the printer to advance to the next page at the end of each print job.

LPD Configuration Settings (continued)	Description
Convert Newlines	Select **Enabled** to convert single newlines and carriage returns to DOS-style line endings.
SOJ String	If **Start of Job** (above) is enabled, enter the string to be sent to the printer at the beginning of a print job. The limit is 100 characters. Indicate whether the string is in text or binary format.
EOJ String	If **End of Job** (above) is enabled, enter the string to send at the end of a print job. The limit is 100 characters. Indicate whether the string is in text or binary format.
Queue Name	To change the name of the print queue, enter a new name. The name cannot have white space in it and is limited to 31 characters. The default is **LPDQueueX (for line number X)**

5. Click **Submit**
6. Repeat above steps as desired, according to additional LPD lines available on your product.

12: Security Settings

The EDS device supports Secure Shell (SSH) and Secure Sockets Layer (SSL). SSH is a network protocol for securely accessing a remote device. SSH provides a secure, encrypted communication channel between two hosts over a network. It provides authentication and message integrity services.

Secure Sockets Layer (SSL) is a protocol that manages data transmission security over the Internet. It uses digital certificates for authentication and cryptography against eavesdropping and tampering. It provides encryption and message integrity services. SSL is widely used for secure communication to a web server. SSL uses certificates and private keys.

Note: *The EDS supports SSLv3 and its successors, TLS1.0 and TLS1.1. An incoming SSlv2 connection attempt is answered with an SSlv3 response. If the initiator also supports SSLv3, SSLv3 handles the rest of the connection.*

This chapter contains the following sections:

SSH Settings

SSH is a network protocol for securely accessing a remote device over an encrypted channel. This protocol manages the security of internet data transmission between two hosts over a network by providing encryption, authentication, and message integrity services.

Two instances require configuration: when the EDS is the SSH server and when it is an SSH client. The SSH server is used by the CLI (Command Mode) and for tunneling in Accept Mode. The SSH client is for tunneling in Connect Mode.

To configure the EDS as an SSH server, there are two requirements:

- **Defined Host Keys:** both private and public keys are required. These keys are used for the Diffie-Hellman key exchange (used for the underlying encryption protocol).
- **Defined Users:** these users are permitted to connect to the EDS SSH server.

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.

SSH Server Host Keys

SSH Host Keys can be obtained in a few different ways:

- Uploading keys via PUTTY or other tools which generate RFC4716 format keys.
- Creating keys through the EDS.

The steps for creating or uploading keys is described below.

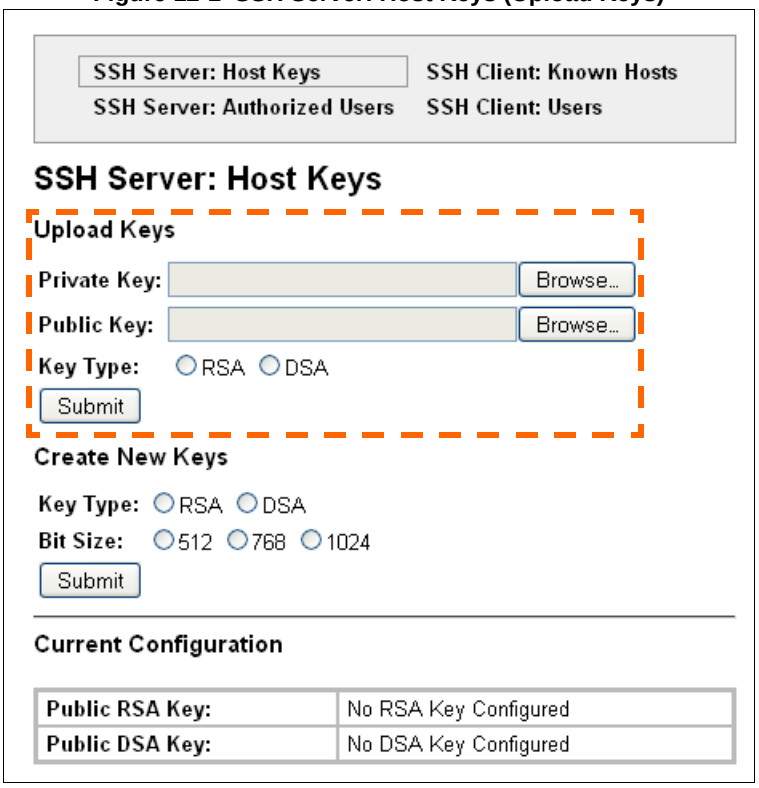
To upload SSH server host keys generated from PuTTY:

1. Create the keys with puttygen.exe. The keys are in PuTTY format.
2. Use puttygen.exe again to convert the private key to Open SSH format as follows:
   a. Import the private key using "Conversions…Import key."
   b. Create a new file using "Conversions…Export OpenSSH key."
3. Use ssh-keygen to convert the public key to OpenSSH format.

   ```
   ssh-keygen -i -f putty_file > openssh_file
   ```

4. Select **SSH** on the menu bar and **SSH Server: Host Keys** at the top of the page. The SSH Server Host Keys page appears.

Figure 12-1 SSH Server: Host Keys (Upload Keys)



5. Enter or modify the following settings in the part of the screen related to uploading keys:

Table 12-2 **SSH Server Host Keys Settings - Upload Keys Method**

SSH Server: Host Keys Settings (continued)	Description
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 use for the new key: ◆ **RSA** = use this key with the SSH1 and SSH2 protocols. ◆ **DSA** = use this key with the SSH2 protocol.

6. Click **Submit.**

To upload SSH server host RFC4716 format keys:

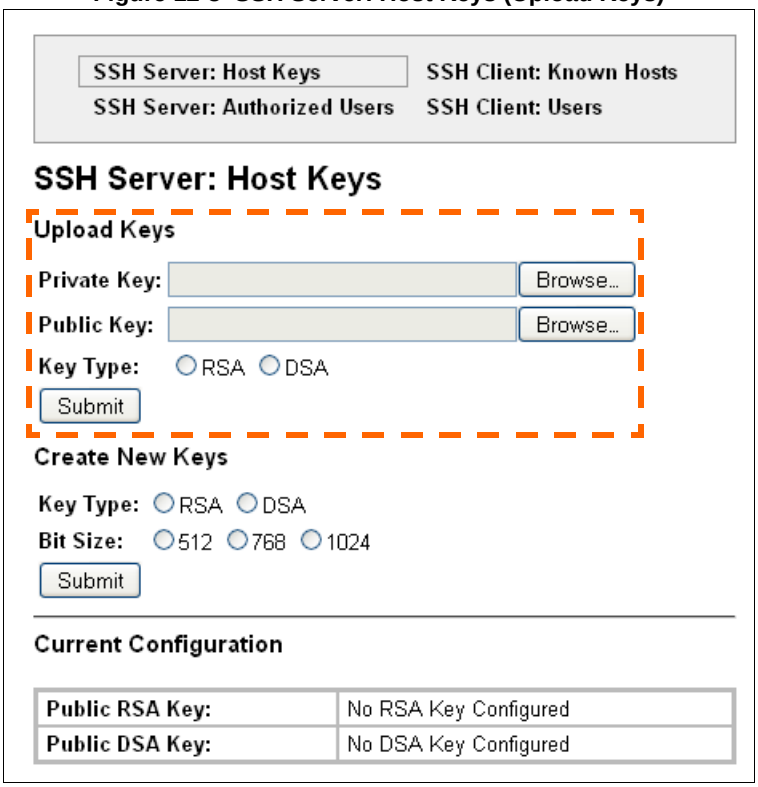
1. Use any program that can produce keys in the RFC4716 format.
2. Use ssh-keygen to convert the format to OpenSSH.

```
ssh-keygen -i -f RFC4716_file > output_file
```

Note: *If the keys do not exist, follow directions under* *To create new SSH server host keys (on page 97).*

3. Select **SSH** on the menu bar and **SSH Server: Host Keys** at the top of the page. The SSH Server Host Keys page appears.

Figure 12-3 SSH Server: Host Keys (Upload Keys)



4. Enter or modify the following settings in the part of the screen related to uploading keys:

Table 12-4 **SSH Server Host Keys Settings - Upload Keys Method**

SSH Server: Host Keys Settings (continued)	Description
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 use for the new key: ◆ **RSA** = use this key with the SSH1 and SSH2 protocols. ◆ **DSA** = use this key with the SSH2 protocol.

5. Click **Submit.**

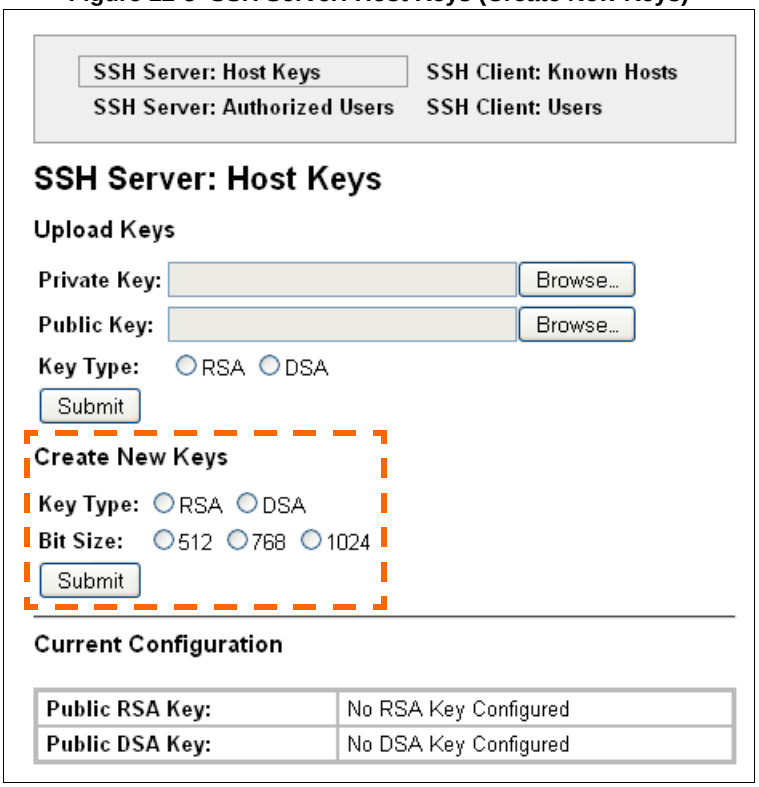
Note: *SSH keys may be created on another computer and uploaded to the EDS. For example, use the following command using Open SSH to create a 1024-bit DSA key pair:*
`ssh-keygen –b 1024 –t dsa`

To create new SSH server host keys

Note: *Generating new keys with large bit size results in longer key generation times.*

1. Select **SSH** on the menu bar and **SSH Server: Host Keys** at the top of the page. The SSH Server Host Keys page appears.

Figure 12-5 SSH Server: Host Keys (Create New Keys)



2. Enter or modify the following settings in the part of the screen related to creating new keys:

Table 12-6 **SSH Server Host Keys Settings - Create New Keys Method**

SSH Server: Host Keys Settings	Description
Key Type	Select a key type to use: ◆ **RSA** = use this key with SSH1 and SSH2 protocols. ◆ **DSA** = use this key with the SSH2 protocol. ***Note:*** *RSA is more secure.*

SSH Server: Host Keys Settings (continued)	Description
Bit Size	Select a bit length for the new key: ◆ 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 ◆ 15 seconds for a 768 bit RSA Key ◆ 1 minute for a 1024 bit RSA Key ◆ 30 seconds for a 512 bit DSA Key ◆ 1 minute for a 768 bit DSA Key ◆ 2 minutes for a 1024 bit DSA Key ***Note:*** *Some SSH clients require RSA host keys to be at least 1024 bits long. This device generates keys up to 1024 bits long. It can work with larger keys (up to 2048 bit) if they are imported or otherwise created.*

3. Click **Submit.**

Note: *SSH Keys from other programs may be converted to the required EDS format. Use Open SSH to perform the conversion.*

SSH Server Authorized Users

On this page you can change SSH server settings for Authorized Users. SSH Server Authorized Users are accounts on the EDS that can be used to log into the EDS using 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.

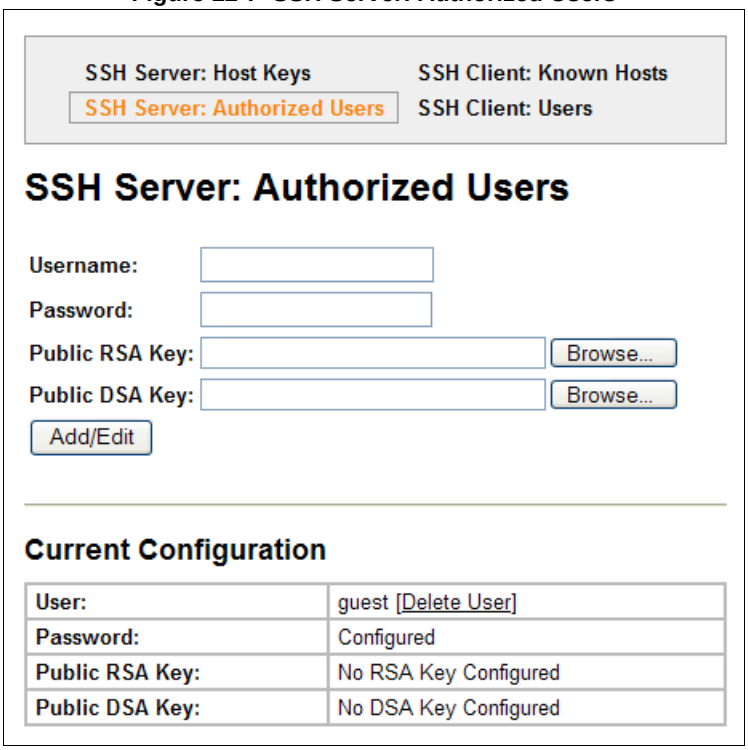
The user's public keys are optional and only necessary if public key authentication is required. Using public key authentication allows a connection to be made without the password being asked.

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.

To configure the SSH server for authorized users:

1. Select **SSH** on the menu bar and then **Server Authorized Users** at the top of the page. The SSH Server: Authorized Users page appears.

Figure 12-7 SSH Server: Authorized Users



2. Enter or modify the following settings:

Table 12-8 **SSH Server Authorized User Settings**

SSH Server: Authorized Users 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.

3. Click **Submit.**

Note: *When uploading the security keys, ensure the keys are not compromised in transit.*

SSH Client Known Hosts

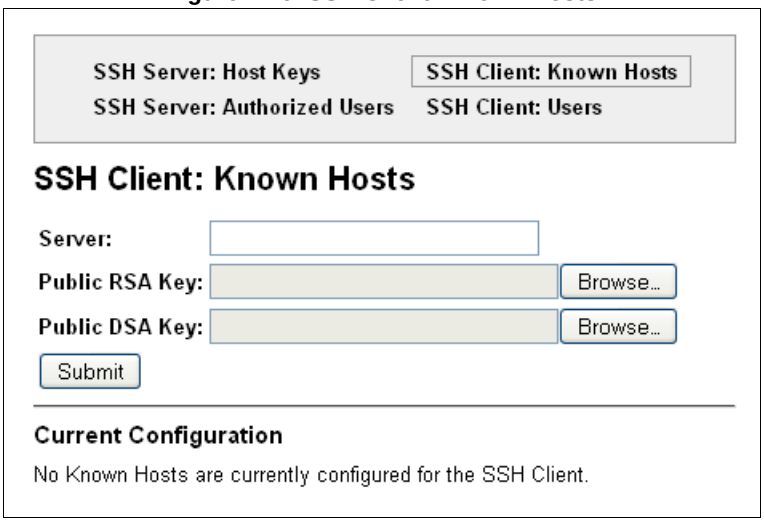
On this page you can change SSH client settings for known hosts.

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.*

To configure the SSH client for known hosts:

1. Select **SSH** on the menu bar and then **Client Known Hosts** at the top of the page. The SSH Client: Known Hosts page appears.

Figure 12-9 SSH Client: Known Hosts



2. Enter or modify the following settings:

Table 12-10 **SSH Client Known Hosts**

SSH Client: Known Hosts Settings	Description
Server	Enter the name or IP address of a known host. If you enter 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.

Note: *These settings are not required for communication. They protect against Man-In-The-Middle (MITM) attacks.*

3. Click **Submit.**
4. In the **Current Configuration** table, delete currently stored settings as necessary.

SSH Client Users

On this page you can change SSH client settings for users. To configure the EDS as an SSH client, an SSH client user must be both configured and also exist on the remote SSH server.

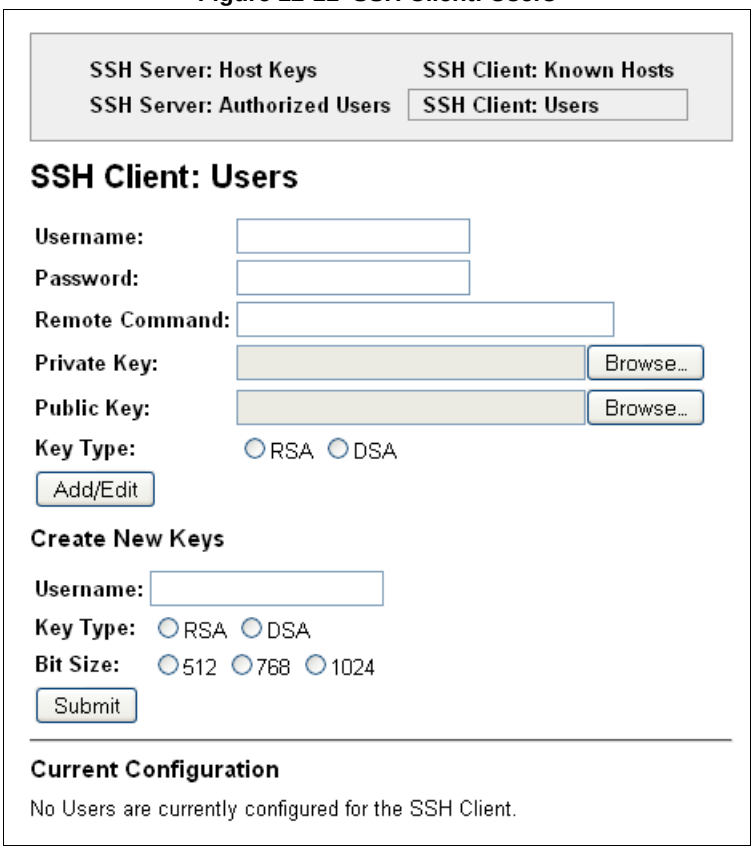
SSH client known users are used by all applications that play the role of an SSH client, specifically tunneling in Connect Mode. At the very least, a password or key pair must be configured for a user. The keys for public key authentication can be created elsewhere and uploaded to the device or automatically 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.*

To configure the SSH client users:

1. Select **SSH** on the menu bar and then **SSH Client Users** at the top of the page. The SSH Client: Users page appears.

Figure 12-11 SSH Client: Users



2. Enter or modify the following settings:

Table 12-12 **SSH Client Users**

SSH Client: Users Settings	Description
Username	Enter the name that the device uses to connect to a SSH server.
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. ***Note:*** *If the user public key is known on the remote SSH server, the SSH server does not require a password. The* **Remote Command** *is provided to the SSH server upon connection. It specifies the application to execute upon connection. The default is a command shell.* ***Note:*** *Configuring the SSH client's known hosts is optional. It prevents Man-In-The-Middle (MITM) attacks*
Key Type	Select the key type to be used. Choices are: ◆ **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: ◆ 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 ◆ 15 seconds for a 768 bit RSA Key ◆ 1 minute for a 1024 bit RSA key ◆ 30 seconds for a 512 bit DSA key ◆ 1 minute for a 768 bit DSA key ◆ 2 minutes for a 1024 bit DSA key ***Note:*** *Some SSH clients require RSA host keys to be at least 1024 bits long. This device generates keys up to 1024 bits long. It can work with larger keys (up to 2048 bit) if they are imported or otherwise created.*

3. Click **Submit.**
4. In the **Current Configuration** table, delete currently stored settings as necessary.

SSL Settings

Secure Sockets Layer (SSL) is a protocol for managing the security of data transmission over the Internet. It provides encryption, authentication, and message integrity services. SSL is widely used for secure communication to a web server.

Certificate/Private key combinations can be obtained from an external Certificate Authority (CA) and downloaded into the unit. Self-signed certificates with associated private key can be generated by the device server itself.

For more information regarding Certificates and how to obtain them, see *SSL Certificates and Private Keys (on page 104)*.

SSL uses digital certificates for authentication and cryptography against eavesdropping and tampering. Sometimes only the server is authenticated, sometimes both server and client. The EDS can be server and/or client, depending on the application. Public key encryption systems exchange information and keys and set up the encrypted tunnel.

Efficient symmetric encryption methods encrypt the data going through the tunnel after it is established. Hashing provides tamper detection.

Applications that can make use of SSL are Tunneling, Secure Web Server, and WLAN interface.

The EDS supports SSlv3 and its successors, TLS1.0 and TLS1.1.

Note: *An incoming SSlv2 connection attempt is answered with an SSlv3 response. If the initiator also supports SSLv3, SSLv3 handles the rest of the connection.*

SSL Cipher Suites

The SSL standard defines only certain combinations of certificate type, key exchange method, symmetric encryption, and hash method. Such a combination is called a cipher suite. Supported cipher suites include the following:

Table 12-13 **Supported Cipher Suites**

Certificate	Key Exchange	Encryption	Hash
DSA	DHE	3DES	SHA1
RSA	RSA	128 bits AES	SHA1
RSA	RSA	Triple DES	SHA1
RSA	RSA	128 bits RC4	MD5
RSA	RSA	128 bits RC4	SHA1
RSA	1024 bits RSA	56 bits RC4	MD5
RSA	1024 bits RSA	56 bits RC4	SHA1
RSA	1024 bits RSA	40 bits RC4	MD5

Whichever side is acting as server decides which cipher suite to use for a connection. It is usually the strongest common denominator of the cipher suite lists supported by both sides.

SSL Certificates

The goal of a certificate is to authenticate its sender. It is analogous to a paper document that contains personal identification information and is signed by an authority, for example a notary or government agency.

The principles of Security Certificate required that in order to sign other certificates, the authority uses a private key. The published authority certificate contains the matching public key that allows another to verify the signature but not recreate it.

The authority's certificate can be signed by itself, resulting in a self-signed or trusted-root certificate, or by another (higher) authority, resulting in an intermediate authority certificate. You can build up a chain of intermediate authority certificates, and the last certification will always be a trusted-root certificate.

An authority that signs another certificates is also called a Certificate Authority (CA). The last in line is then the root-CA. VeriSign is a famous example of such a root-CA. Its certificate is often built into web browsers to allow verifying the identity of website servers, which need to have certificates signed by VeriSign or another public CA. Since obtaining a certificate signed by a CA that is managed by another company can be expensive, it is possible to have your own CA. Tools exist to generate self-signed CA certificates or to sign other certificates.

A certificate request is a certificate that has not been signed and only contains the identifying information. Signing it makes it a certificate. A certificate is also used to sign any message transmitted to the peer to identify the originator and prevent tampering while transported.

When using HTTPS, SSL Tunneling in Accept mode, and/or EAP-TLS, the EDS needs a personal certificate with a matching private key to identify itself and sign its messages. When using SSL Tunneling in Connect mode and/or EAP-TLS, EAP-TTLS or PEAP, the EDS needs the authority certificate that can authenticate users with which it wishes to communicate.

SSL RSA or DSA

As mentioned above, the certificates contain a public key. Different key exchange methods require different public keys and thus different styles of certificate. The EDS supports key exchange methods that require a RSA-style certificate and key exchange methods that require a DSA-style certificate. If only one of these certificates is stored in the EDS, only those key exchange methods that can work with that style certificate are enabled. RSA is sufficient in most cases.

SSL Certificates and Private Keys

You can obtain a certificate by completing a certificate request and sending it to a certificate authority that will create a certificate/key combo, usually for a fee. Or generate your own. A few utilities exist to generate self-signed certificates or sign certificate requests. The EDS also has the ability to generate its own self-signed certificate/key combo.

You can use XML to export the certificate in PEM format, but you cannot export the key. Hence the internal certificate generator can only be used for certificates that are to identify that particular EDS.

Certificates and private keys can be stored in several file formats. Best known are PKCS12, DER and PEM. Certificate and key can be in the same file or in separate files. The key can be encrypted with a password or not. The EDS currently only accepts separate PEM files. The key needs to be unencrypted.

SSL Utilities

Several utilities exist to convert between the formats.

OpenSSL

Open source set of SSL related command line utilities. It can act as server or client. It can generate or sign certificate requests. It can convert all kinds of formats. Executables are available for Linux and Windows. To generate a self-signed RSA certificate/key combo use the following commands in the order shown:

```
openssl req –x509 –nodes –days 365 –newkey rsa:1024 –keyout
mp_key.pem –out mp_cert.pem
```

Note: *Signing other certificate requests is also possible with OpenSSL. See* www.openssl.org *or* www.madboa.com/geek/openssl *for more information.*

Steel Belted RADIUS

Commercial RADIUS server by Juniper Networks that provides a GUI administration interface. It also provides a certificate request and self-signed certificate generator. The self-signed certificate has extension .sbrpvk and is in the PKCS12 format. OpenSSL can convert this into a PEM format certificate and key by using the following commands in the order shown:

```
openssl pkcs12 -in sbr_certkey.sbrpvk -nodes -out sbr_certkey.pem
```

The sbr_certkey.pem file contains both certificate and key. If loading the SBR certificate into EDS as an authority, you will need to edit it.

1. Open the file in any plain text editor.
2. Delete all info before the following: “`----- BEGIN CERTIFICATE-----`“
3. Delete all info after the following: “`----- END CERTIFICATE-----`“
4. Save as sbr_cert.pem. SBR accepts trusted-root certificates in the DER format.
5. Again, OpenSSL can convert any format into DER by using the following commands in the order shown:

   ```
   openssl x509 -inform pem -in mp_cert.pem -outform der -out
   mp_cert.der
   ```

Note: *With SBR, when the identity information includes special characters such as dashes and periods, SBR changes the format it uses to store these strings and becomes incompatible with the current EDS release. We will add support for this and other formats in future releases. Free RADIUS—Linux open-source RADIUS server. It is versatile, but complicated to configure.*

Free RADIUS

Free RADIUS is a Linux open-source RADIUS server. It is versatile, but complicated to configure.

SSL Configuration

To configure SSL settings:

1. Select **SSL** from the main menu. The SSL page appears.

Figure 12-14 SSL

2. Enter or modify the following settings:

Table 12-15 **SSL**

SSL Settings	Description
Upload Certificate	
New Certificate	This certificate identifies the device to peers. It is used for HTTPS and SSL Tunneling. Enter the path and name of the certificate you want to upload, or use the **Browse** button to select the certificate. **RSA** or **DSA** certificates with 512 to 1024 bit public keys are allowed. The format of the file must be **PEM**. The file must start with "-----BEGIN CERTIFICATE-----" and end with "-----END CERTIFICATE-----". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
New Private Key	Enter the path and name of the private key you want to upload, or use the **Browse** button to select the private key. The key needs to belong to the certificate entered above. The format of the file must be **PEM**. The file must start with "-----BEGIN RSA PRIVATE KEY-----" and end with "-----END RSA PRIVATE KEY-----". Read **DSA** instead of **RSA** in case of a **DSA** key. Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
Upload Authority Certificate	
Authority	One or more authority certificates are needed to verify a peer's identity. It is used for SSL Tunneling. These certificates do not require a private key. Enter the path and name of the certificate you want to upload, or use the **Browse** button to select the certificate. **RSA** or **DSA** certificates with 512 to 1024 bit public keys are allowed. The format of the file must be **PEM**. The file must start with "-----BEGIN CERTIFICATE-----" and end with "-----END CERTIFICATE-----". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
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.

SSL Settings (continued)	Description
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, 2010 is entered as 05/09/2010.
Key length	Select the bit size of the new self-signed certificate. Choices are: ◆ **512 bits** ◆ **768 bits** ◆ **1024 bits** The larger the bit size, the longer it takes to generate the key. Approximate times are: ◆ 10 seconds for a 512-bit RSA key ◆ 30 seconds for a 768-bit RSA key ◆ 1 minute for a 1024-bit RSA key ◆ 30 seconds for a 512-bit DSA key ◆ 2 minutes for a 768-bit DSA key ◆ 6 minute for a 1024-bit DSA key
Type	Select the type of key: ◆ **RSA** = Public-Key Cryptography algorithm based on large prime numbers, invented by Rivest Shamir and Adleman. Used for encryption and signing. ◆ **DSA** = Digital Signature Algorithm also based on large prime numbers, but can only be used for signing. Developed by the US government to avoid the patents on RSA.

3. Click **Submit**.

13: Modbus

Note: *Modbus applies only to EDS4100, as this feature is not supported on EDS8/16/32PR and EDS8/16PS.*

Modbus ASCII/RTU based serial slave devices can be connected via the ethernet through an existing Modbus TCP/IP network. Any device having access to a given Modbus implementation will be able to perform full range of operations that the implementation supports. Modbus/TCP use a reserved TCP port of 502 and include a single byte function code (1=255) preceded by a 6 byte header:

Table 13-1 **6 Byte Header of Modbus Application Protocol**

Transaction ID (2 bytes)	Identification of request/response transaction - copied by slave
Protocol ID (2 bytes)	0 - Modbus protocol
Length (2 bytes)	Number of following bytes includes the unit identifier
Address (1 byte)	Identification of remove slave

Serial Transmission Mode

Evolution products can be set up to communicate on standard Modbus networks using either RTU or ASCII. Users select the desired mode and serial port communication parameters (baud rate, parity mode, etc) during the line configuration.

Table 13-2 **Modbus Transmission Modes**

RTU	ASCII
◆ Address: 8 bits (0 to 247 decimal, 0 is used for broadcast) ◆ Function: 8 bits (1 to 255, 0 is not valid) ◆ Data: N X 8 bits (N=0 to 252 bytes) ◆ CRC Check: 16 bits	◆ Address: 2 CHARS ◆ Function: 2 CHARS ◆ Data: N CHARS (N=0 to 252 CHARS) ◆ LRC Check: 2 CHARS

The Modbus web pages allow you to check Modbus status and make configuration changes. This chapter contains the following sections:

- *Modbus Statistics*
- *Modbus Configuration*

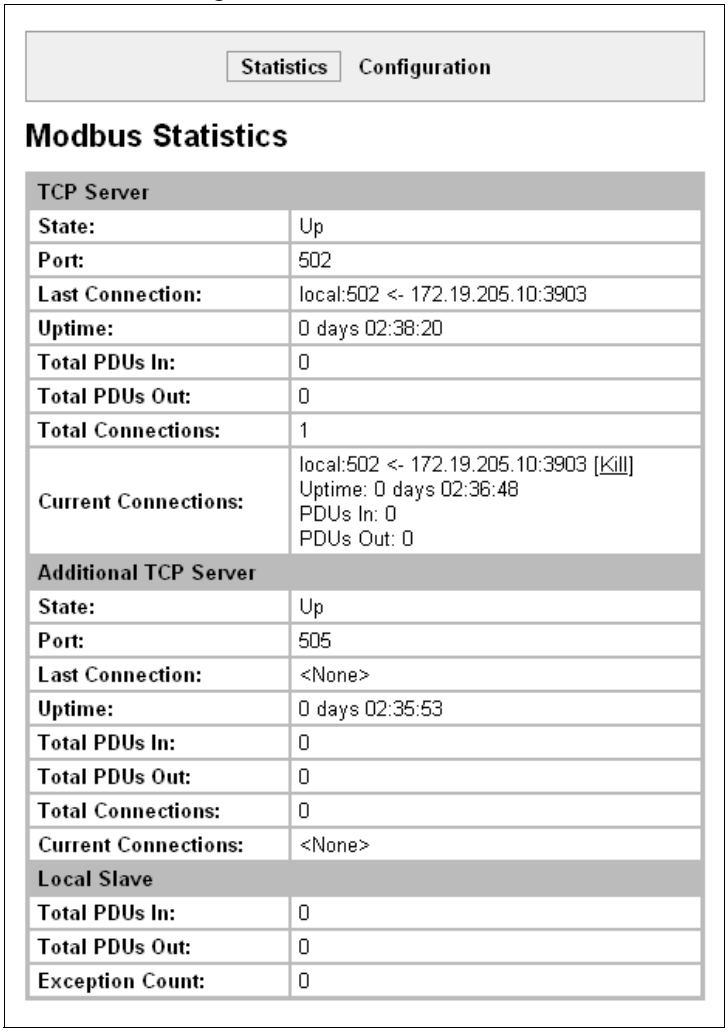
Modbus Statistics

This read-only web page displays the current connection status of the Modbus servers listening on the TCP ports. When a connection is active, the remote client information is displayed as well as the number of PDUs that have been sent and received. Additionally, a **Kill** link will be present which can be used to kill the connection.

To view modbus statistics:

1. Click **Modbus** on the menu bar and click **Statistics** at the top of the page. The Modbus Statistics page appears.

Figure 13-3 Modbus Statistics



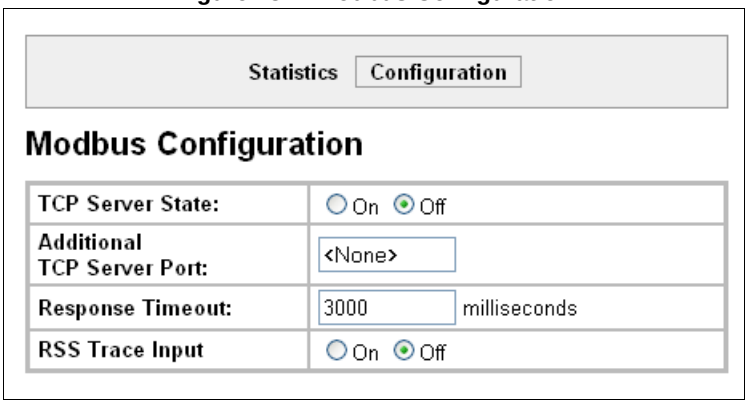
Modbus Configuration

This web page shows the current negotiated Modbus settings and allows configuration changes.

To view and configure the Modbus Server:

1. Click **Modbus** on the menu bar and then click **Configuration** at the top of the page. The Modbus Configuration page appears.

Figure 13-4 Modbus Configuration



2. Enter or modify the following settings:

Table 13-5 **Modbus Configuration**

Modbus Configuration Settings	Description
TCP Server State	If **On**, the Modbus server is active on TCP 502.
Additional TCP Server Port	If present, is used in addition to TCP port 502.
Response Timeout	The number of milliseconds to wait for a response on the serial side. The device returns exception code 11 to the network master controller if the slave serial device fails to reply within this time out.
RSS Trace Input	If **On**, each PDU received on the Modbus serial line creates a non-persistent descriptive item in the RSS feed.

3. Click **Submit.** The changes take effect immediately.

Note: *The serial line protocol must also be configured for Modbus, in addition to configuring the Modbus server. See* *Chapter 9: Line and Tunnel Settings on page 52* *for details.*

14: Maintenance and Diagnostics Settings

This chapter describes maintenance and diagnostic methods and contains the following sections:

Filesystem Settings

The EDS uses a flash filesystem to store files. Use the Filesystem option to view current file statistics or modify files. There are two subsections: Statistics and Browse.

The Statistics section of the Filesystem web page shows current statistics and usage information of the flash filesystem. In the Browser section of the Filesystem web page, you can create files and folders, upload files, copy and move files, and use TFTP.

Filesystem Statistics

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

To view filesystem statistics:

1. Select **Filesystem** on the menu bar. The Filesystem page opens and shows the current filesystem statistics and usage.

To compact or format the filesystem:

1. Back up all files as necessary.
2. Select **Filesystem** on the menubar, if you are not already in the Filesystem page.
3. Click **Compact** in the Actions row.

Note: *The compact should not be needed under normal circumstances as the system manages this automatically.*

4. Back up all files before you perform the next (Format) step, because all user files get erased in that step.
5. Click **Format** in the Actions row. The configuration gets retained.

Figure 14-1 Filesystem Statistics

Statistics | Browse

Filesystem Statistics

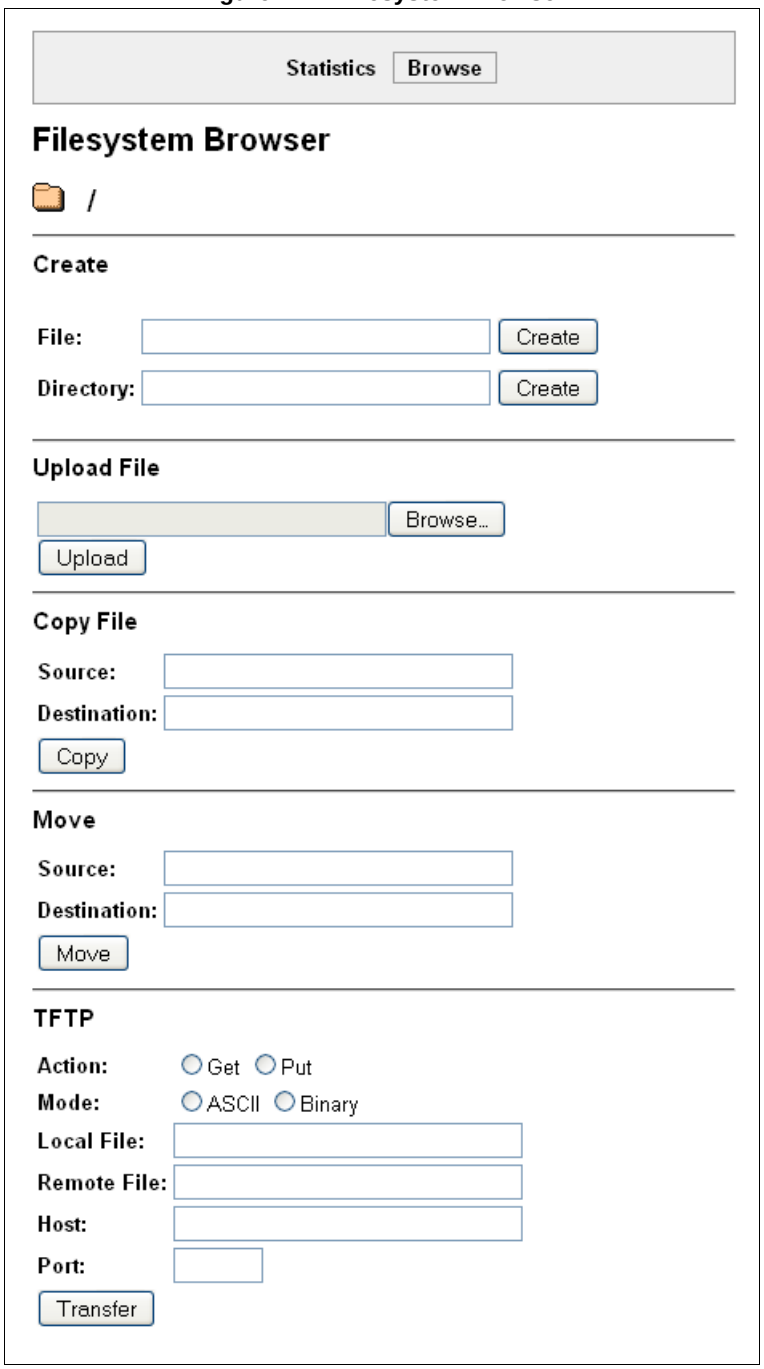
Filesystem Size:	7.500000 Mbytes (7864320 bytes)
Available Space:	7.474250 Mbytes (7837320 bytes) (99%)
Clean Space:	7.336588 Mbytes (7692972 bytes) (97%)
Dirty Space:	140.964 Kbytes (144348 bytes) (1%)
File & Dir Space Used:	26.367 Kbytes (27000 bytes) (0%)
Data Space Used:	22.650 Kbytes (23194 bytes)
Number of Files:	0
Number of Dirs:	0
Number of System Files:	2
Opened Files:	0
Locked Files:	0
Opened for Sharing:	0
Current Bank:	B
FW Sectors:	02 - 07, 9 erase cycles
Bank A Sectors:	08 - 67, 0 erase cycles
Bank B Sectors:	68 - 127, 2 erase cycles
Busy:	No
Actions:	[Compact] [Format]

Filesystem Browser

To browse the filesystem:

1. Select **Filesystem** on the menu bar and then **Browse** at the top of the page. The Filesystem Browser page opens.

Figure 14-2 Filesystem Browser



2. Select a filename to view the contents.

3. Click the **X** next to a filename to delete the file or directory. You can only delete a directory if it is empty.
4. Enter or modify the following settings:

Note: *Changes apply to the current directory view. To make changes within other folders, select the folder or directory and then enter the parameters in the settings listed below.*

Table 14-3 **Filesystem Browser**

Filesystem Browser 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 by means of HTTP/HTTPS 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: **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 on which the specified TFTP get or put command will be performed. Click **Transfer** to perform the TFTP transfer.

Protocol Stack Settings

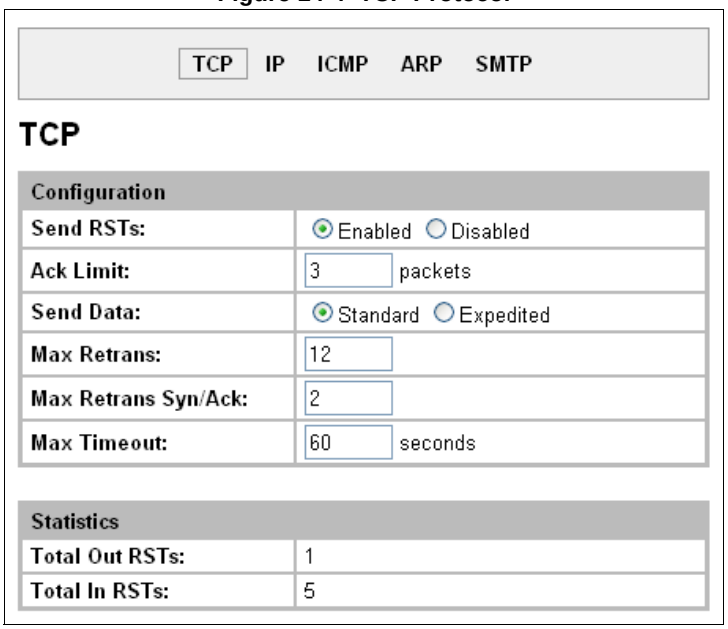
In the Protocol Stack web page, you can configure TCP, IP, ICMP, SMTP and ARP.

TCP Settings

To configure the TCP network protocol:

1. Select **Protocol Stack** on the menu bar.
2. Select **TCP**.

Figure 14-4 TCP Protocol



3. Modify the following settings:

Table 14-5 **TCP Protocol Settings**

Protocol Stack TCP Settings	Description
Send RSTs	Click **Enabled** to send RSTs or **Disabled** to stop sending RSTs. TCP contains six control bits, with one or more defined in each packet. RST is one of the control bits. The RST bit is responsible for telling the receiving TCP stack to end a connection immediately. ***Note:*** *Setting the RSTs may pose a security risk.*
Ack Limit	Enter a number to limit how many packets get received before an ACK gets forced. If there is a large amount of data to acknowledge, an ACK gets forced. If the sender TCP implementation waits for an ACK before sending more data even though the window is open, setting the **Ack Limit** to 1 packet improves performance by forcing immediate acknowledgements.
Send Data	The **Send Data** selection governs when data may be sent into the network. The Standard implementation waits for an ACK before sending a packet less than the maximum length. Select **Expedited** to send data whenever the window allows it.

Protocol Stack TCP Settings	Description
Max Retrans	Enter the maximum number of retransmissions of a packet that will be attempted before failing.
Max Retrans Syn/Ack	Enter the maximum number of retransmissions of a SYN that will be attempted before failing. It is lower than “Max Retrans” to thwart denial-of-service attacks.
Max Timeout	Enter the maximum time between retransmissions.

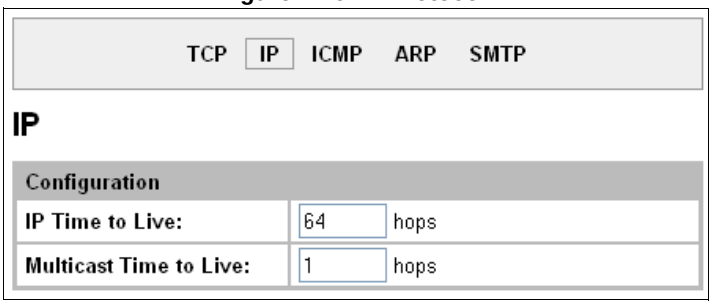
4. Click **Submit**.

IP Settings

To configure the network protocol settings for IP:

1. Select **Protocol Stack** on the menu bar.
2. Select **IP**.

Figure 14-6 IP Protocol



3. Modify the following settings:

Table 14-7 **IP Protocol Settings**

Protocol Stack IP Settings	Description
IP Time to Live	This value typically fills the Time To Live in the IP header. SNMP refers to this value as "ipDefaultTTL". Enter the number of hops to be transmitted before the packet is discarded.
Multicast Time to Live	This value fills the Time To Live in any multicast IP header. Normally this value will be one so the packet will be blocked at the first router. It is the number of hops allowed before a Multicast packet is discarded. Enter the value to be greater than one to intentionally propagate multicast packets to additional routers.

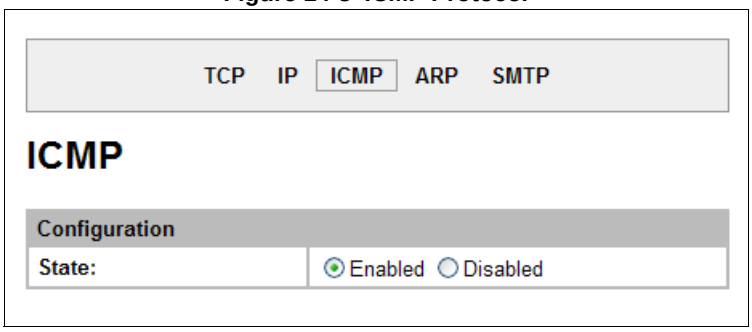
4. Click **Submit**.

ICMP Settings

To configure the ICMP network protocol:

1. Select **Protocol Stack** on the menu bar.
2. Select **ICMP**.

Figure 14-8 ICMP Protocol



3. Select the appropriate state.

Table 14-9 **ICMP Settings**

Protocol Stack ICMP Settings	Description
State	The State selection is used to turn on/off processing of ICMP messages. This includes both incoming and outgoing messages. Choose **Enabled** or **Disabled**.

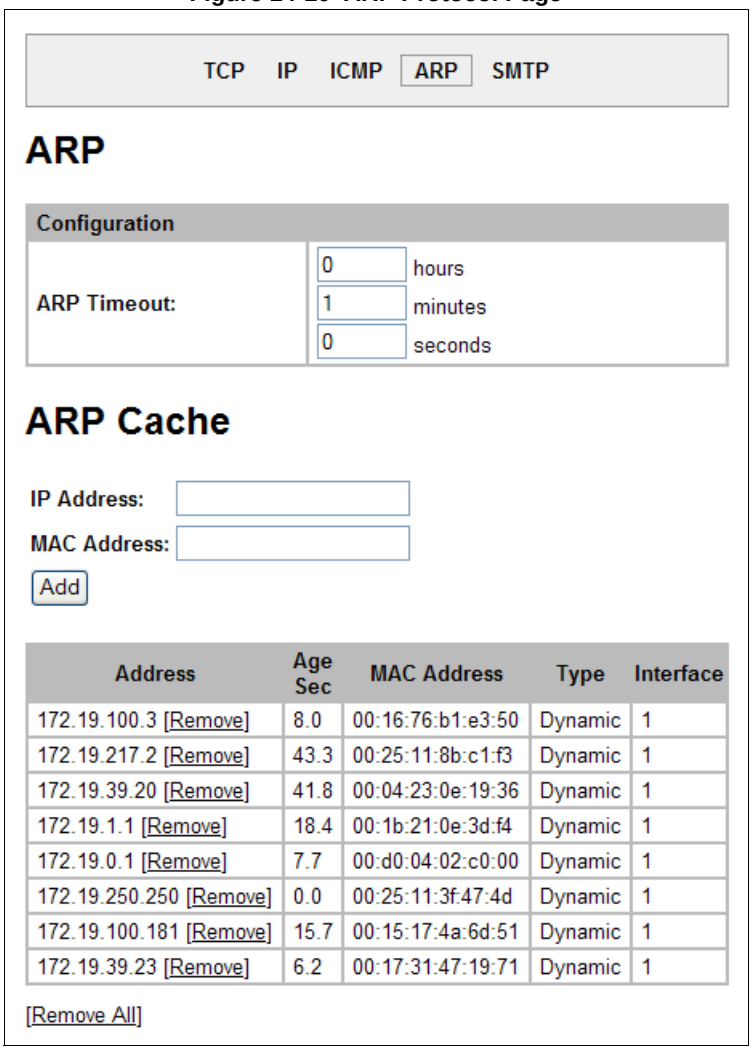
4. Click **Submit**.

ARP Settings

To configure the ARP network protocol:

1. Select **Protocol Stack** on the menu bar.
2. Select **ARP**.

Figure 14-10 ARP Protocol Page



3. Modify the following settings:

Table 14-11 **ARP Settings**

Protocol Stack ARP Settings	Description
ARP Timeout	This is the maximum duration an address remains in the cache. Enter the time, in **hours**, **minutes** and **seconds**.
IP Address	Enter the IP address to add to the ARP cache.

Table 14-11 **ARP Settings**

Protocol Stack ARP Settings (continued)	Description
MAC Address	Enter the MAC address to add to the ARP cache.

Note: *Both the IP and MAC addresses are required for the ARP cache.*

4. Click **Submit** for ARP or **Add** after supplying both address fields for ARP cache.
5. Remove entries from the ARP cache, as desired:
   - Click **Remove All** to remove all entries in the ARP cache.

     OR
   - Click **Remove** beside a specific entry to remove it from the ARP cache.

SMTP Settings

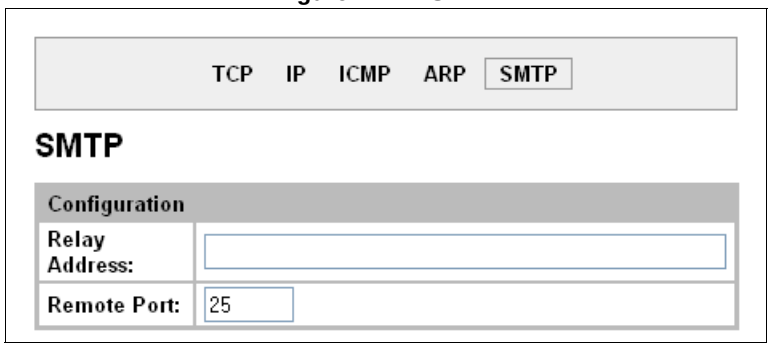
SMTP is configuration for a basic SMTP proxy. An SMTP proxy in this sense is a simple forwarding agent.

Note: *Lantronix does not support SMTP AUTH or any other authentication or encryption schemes for email. Please see* *Email Settings on page 134* *for additional information.*

To configure the SMTP network protocol:

1. Select **Protocol Stack** on the menu bar.
2. Select **SMTP**.

Figure 14-12 SMTP



3. Modify the following settings:

Table 14-13 **SMTP Settings**

Protocol Stack SMTP Settings	Description
Relay Address	Address of all outbound email messages through a mail server. Can contain either a hostname or an IP address.
Remote Port	Port utilized for the delivery of outbound email messages.

4. Click **Submit**.

IP Address Filter

The IP address filter specifies the hosts and subnets permitted to communicate with the EDS device. When the filter list is empty, then all IP addresses are allowed.

Note: *If using DHCP/BOOTP, ensure the DHCP/BOOTP server is in this list.*

To configure the IP address filter:

1. Select **IP Address Filter** on the menu bar. The IP Address Filter page opens to display the current configuration.

Figure 14-14 IP Address Filter Configuration

Note: *If you enter any filter, be careful to make sure that your network IP address is covered. Otherwise you will loose access to the EDS. You will have to then access the EDS from a different computer to reset the configuration.*

2. Enter or modify the following settings:

Table 14-15 **IP Address Filter Settings**

IP Address Filter Settings	Description
IP Address	Enter the IP address to add to the IP filter table.
Network Mask	Enter the IP address' network mask in dotted notation.

3. Click **Add.**

Note: *In the Current State table, click* **Remove** *to delete any existing settings, as necessary.*

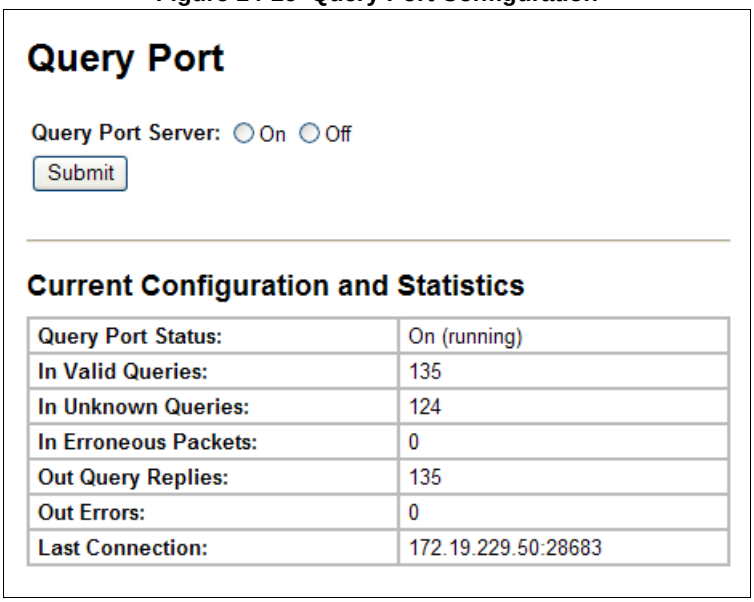
Query Port

The query port (0x77FE) is used for the automatic discovery of the device by the DeviceInstaller utility. Only 0x77FE discover messages from DeviceInstaller are supported. For more information on DeviceInstaller, see *Using DeviceInstaller (on page 41)*.

To configure the query port server:

1. Select **Query Port** on the menu bar. The Query Port page opens to display the current configuration.

Figure 14-16 Query Port Configuration



2. Select **On** to enable the query port server.
3. Click **Submit.**

Diagnostics

The EDS has several tools to perform diagnostics and view device statistics. These include information on:

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

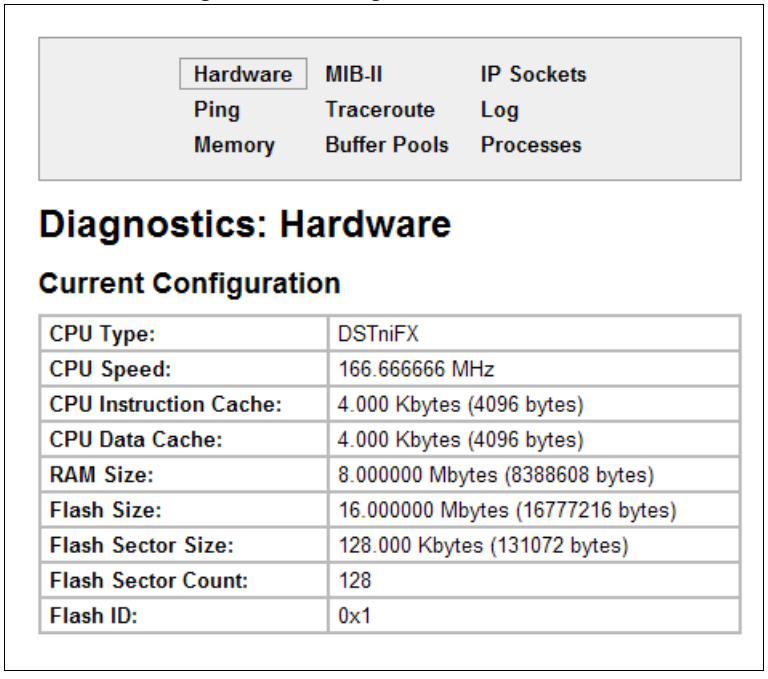
Hardware

This read-only page shows the current device's hardware configuration.

To display hardware diagnostics:

1. Select **Diagnostics** on the menu bar. The Diagnostics: Hardware page opens and shows the current hardware configuration.

Figure 14-17 Diagnostics: Hardware



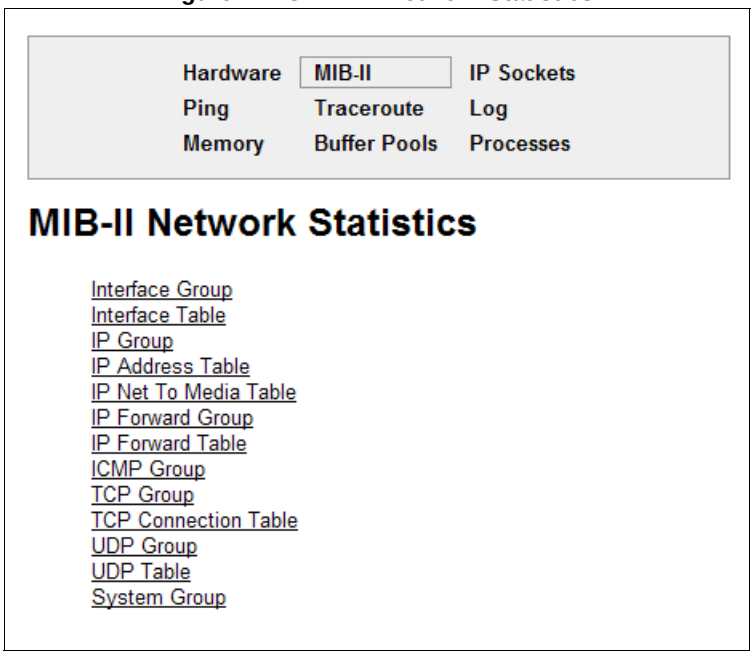
MIB-II Statistics

The MIB-II Network Statistics page shows the various SNMP-served Management Information Bases (MIBs) available on the EDS.

To view MIB-II statistics:

1. Select **Diagnostics** on the menu bar and then **MIB-II** at the top of the page menu. The MIB-II Network Statistics page opens.

Figure 14-18 MIB-II Network Statistics



2. Click any of the available links to open the corresponding table and statistics. For more information, refer to the table below:

Table 14-19 **Requests for Comments (RFCs)**

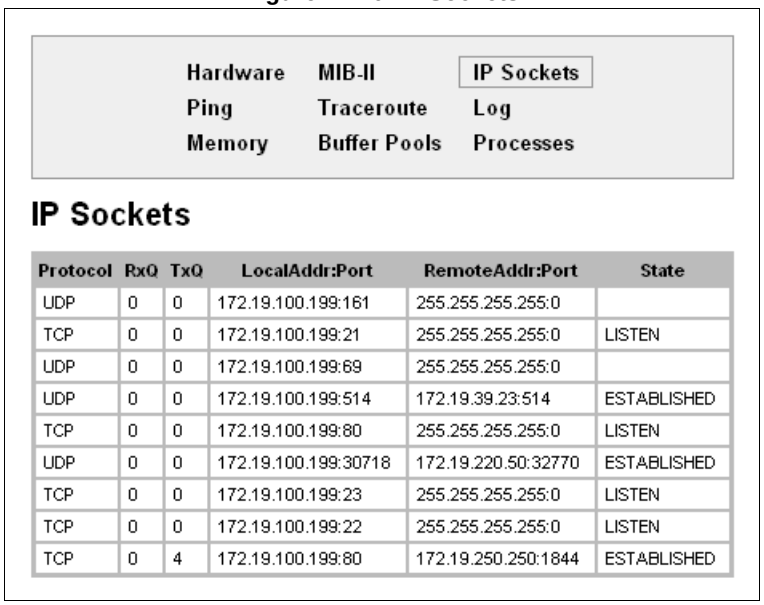
RFC 1213	Original MIB-II definitions.
RFC 2011	Updated definitions for IP and ICMP.
RFC 2012	Updated definitions for TCP.
RFC 2013	Updated definitions for UDP.
RFC 2096	Definitions for IP forwarding.

IP Sockets

To display open IP sockets:

1. Select **Diagnostics** on the menu bar and then **IP Sockets** at the top of the page. The IP Sockets page opens and shows all of the open IP sockets on the device.

Figure 14-20 IP Sockets



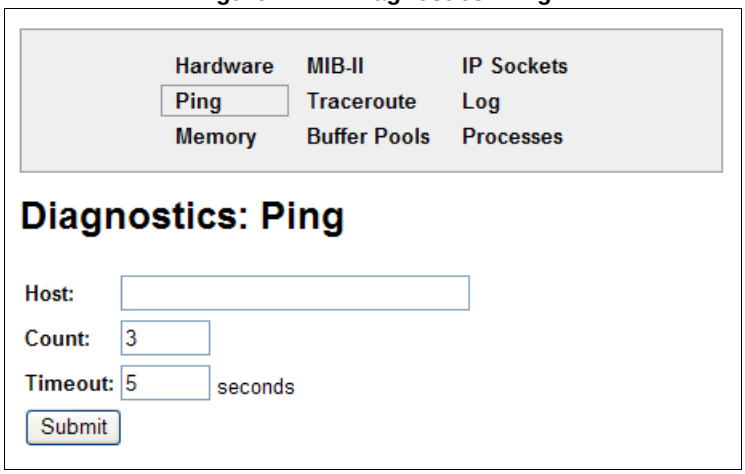
Ping

EDS uses 56 bytes of data in a ping packet. Ping size is not configurable.

To ping a remote device or computer:

1. Select **Diagnostics** on the menu bar and then **Ping** at the top of the page. The Diagnostics: Ping page opens.

Figure 14-21 Diagnostics: Ping



2. Enter or modify the following settings:

Table 14-22 **Diagnostics: Ping**

Diagnostics: Ping Settings	Description
Host	Enter the IP address or host name for the device to ping.
Count	Enter the number of ping packets the device should attempt to send to the **Host**. The default is **3**.
Timeout	Enter the time, in seconds, for the device to wait for a response from the host before timing out. The default is **5** seconds.

3. Click **Submit.** The results of the ping display in the page.

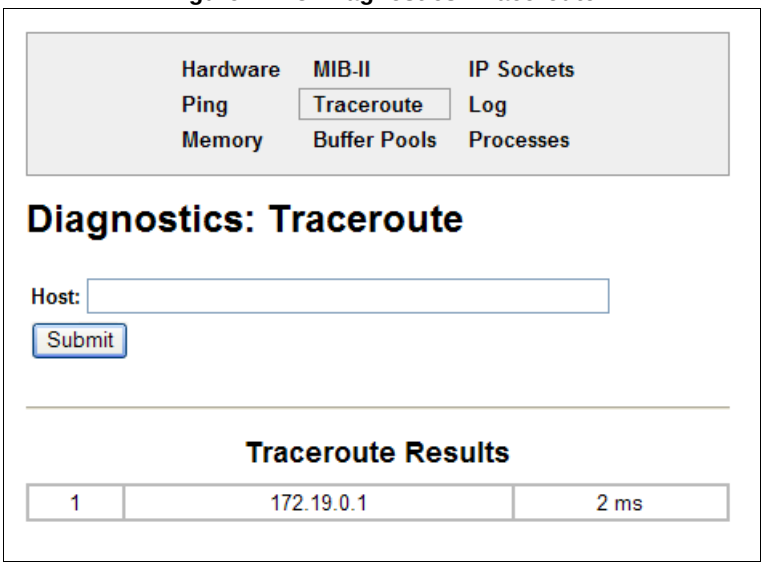
Traceroute

Here you can trace a packet from the EDS 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.

To use Traceroute:

1. Select **Diagnostics** on the menu bar and then **Traceroute** at the top of the page. The Diagnostics: Traceroute page opens.

Figure 14-23 Diagnostics: Traceroute



2. Enter or modify the following setting:

Table 14-24 **Diagnostics: Traceroute**

Diagnostics: Traceroute Settings	Description
Host	Enter the IP address or DNS hostname. This address is used to show the path between it and the device when issuing the traceroute command.

3. Click **Submit.** The results of the traceroute display in the page.

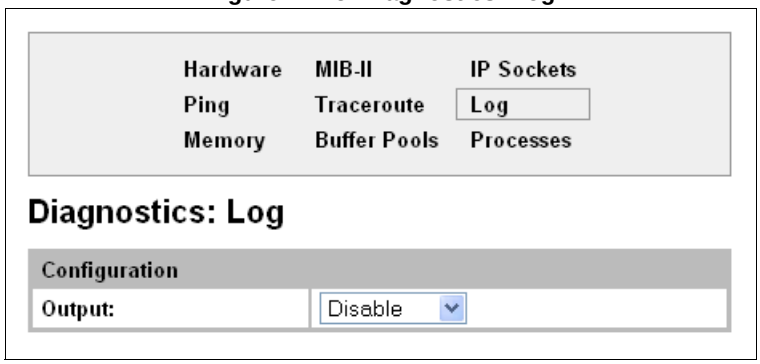
Log

Here you can enable a diagnostics log of configuration items:

To use diagnostics logging:

1. Select **Diagnostics** on the menu bar and then **Log** at the top of the page. The Diagnostics: Log page opens.

Figure 14-25 Diagnostics: Log



2. Select the **Output** type and select one of the following:
   - Disable (default)
   - Filesystem
   - Line1

Figure 14-26 Diagnostics: Log (Filesystem)

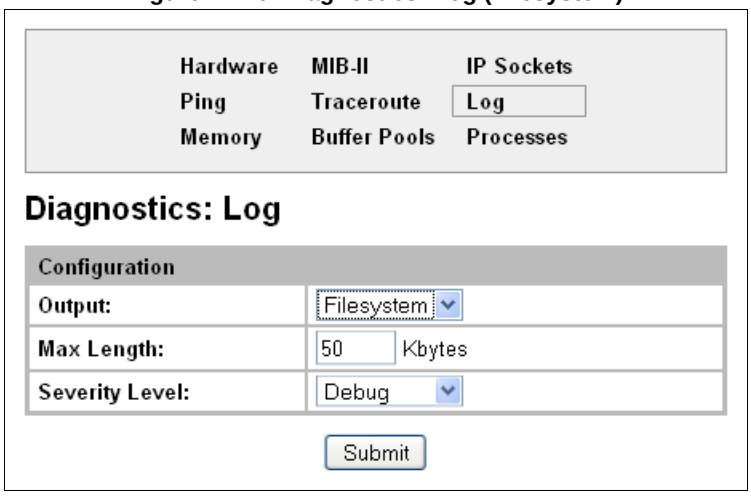
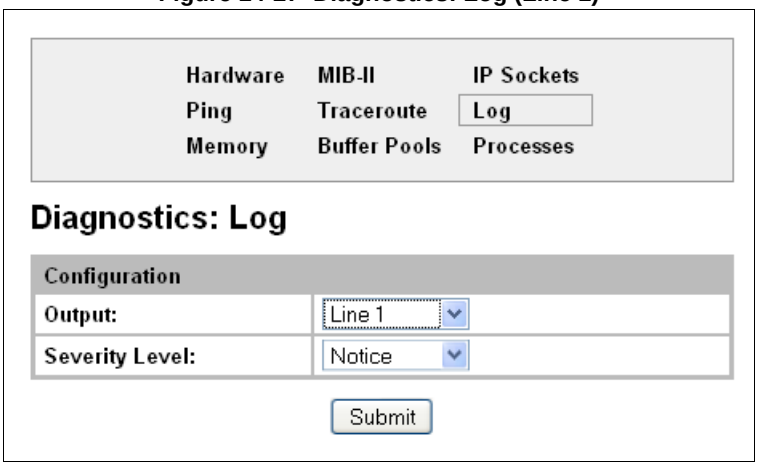


Figure 14-27 Diagnostics: Log (Line 1)



3. If you selected Filesystem or Line1 Output types also complete additional selections:
   - **Max Length** (for Filesystem only) limits the size in Kbytes of the log (/log.txt).
   - **Severity Level** specifies the level of system message to be logged.
4. Click **Submit**.

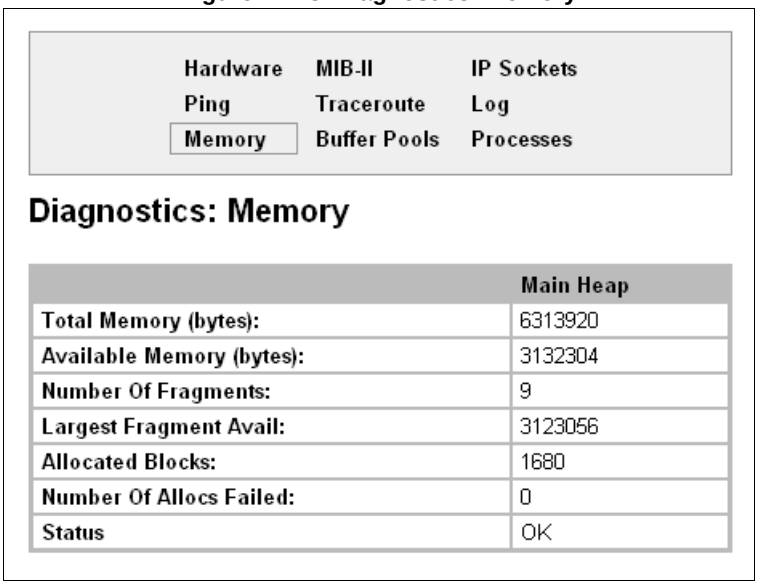
Memory

This read-only web page shows the total memory and available memory (in bytes), along with the number of fragments, allocated blocks, and memory status.

To display memory statistics:

1. Select **Diagnostics** on the menu bar and then **Memory** at the top of the page. The Diagnostics: Memory page appears.

Figure 14-28 Diagnostics: Memory



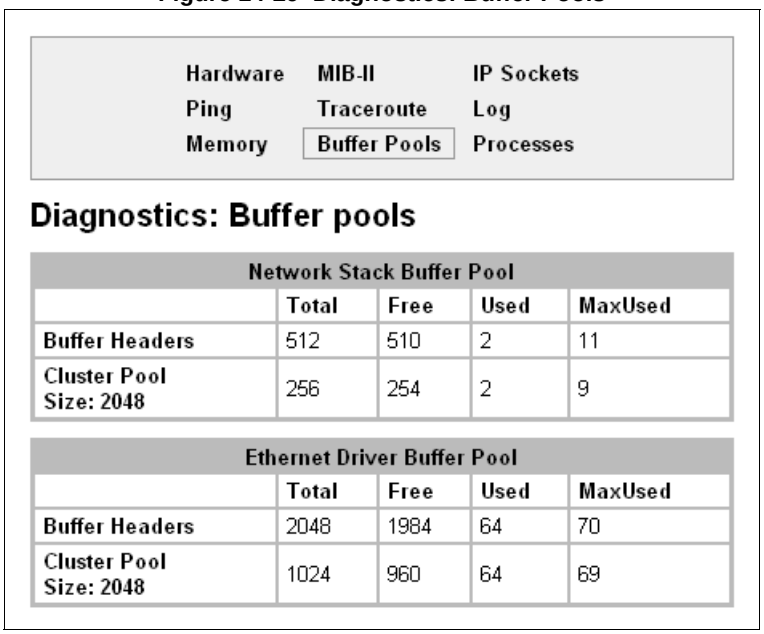
Buffer Pools

Several parts of the EDS system use private buffer pools to ensure deterministic memory management.

To display the buffer pools:

1. Select **Diagnostics** on the menu bar and then **Buffer Pools** at the top of the page. The Diagnostics: Buffer Pools page opens.

Figure 14-29 Diagnostics: Buffer Pools



Processes

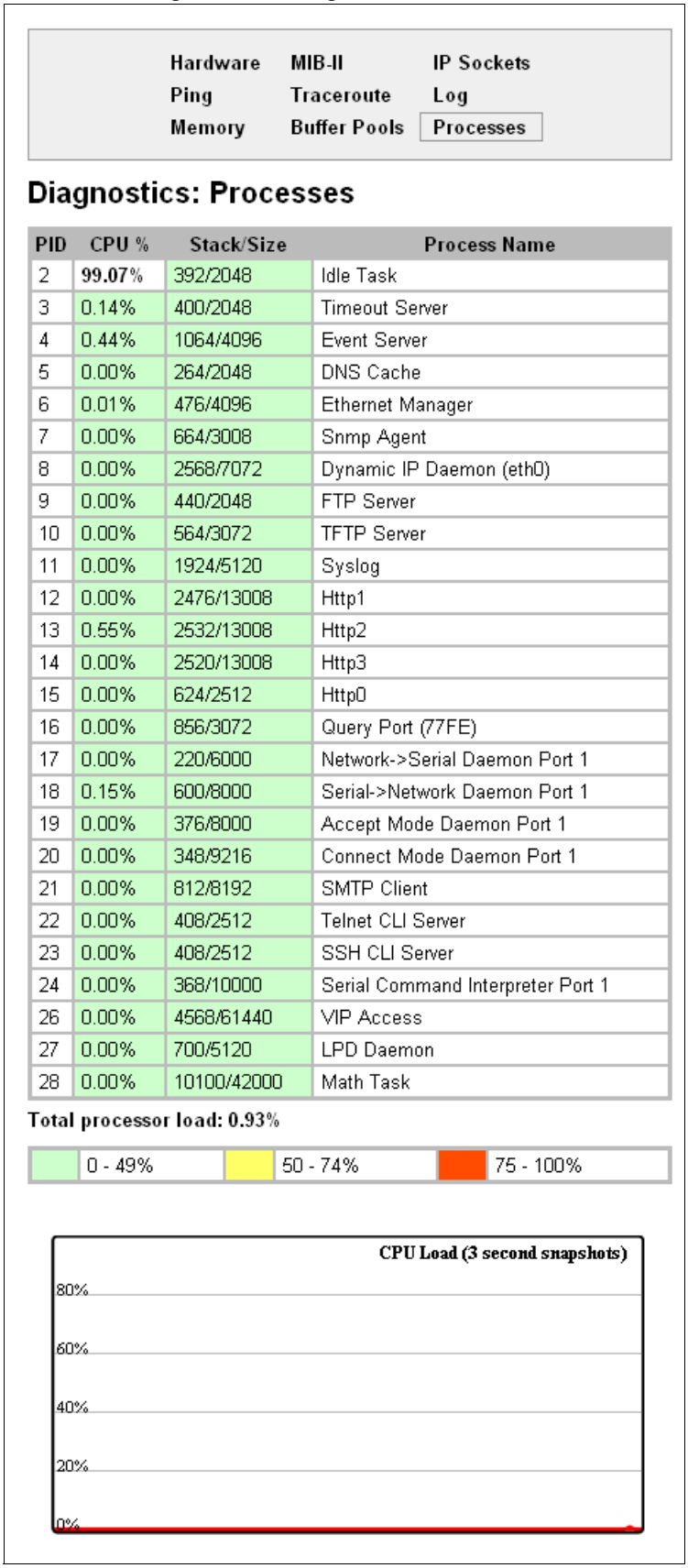
The Processes web page shows all the processes currently running on the system. It shows the Process ID (PID), the percentage of total CPU cycles a process used within the last three seconds, the total stack space available, the maximum amount of stack space used by the process since it started, and the process name.

To display the processes running and their associated statistics:

1. Select **Diagnostics** on the menu bar and then **Processes** at the top of the page.

Note: *The Adobe SVG plug-in is required to view the CPU Load Graph.*

Figure 14-30 Diagnostics: Processes



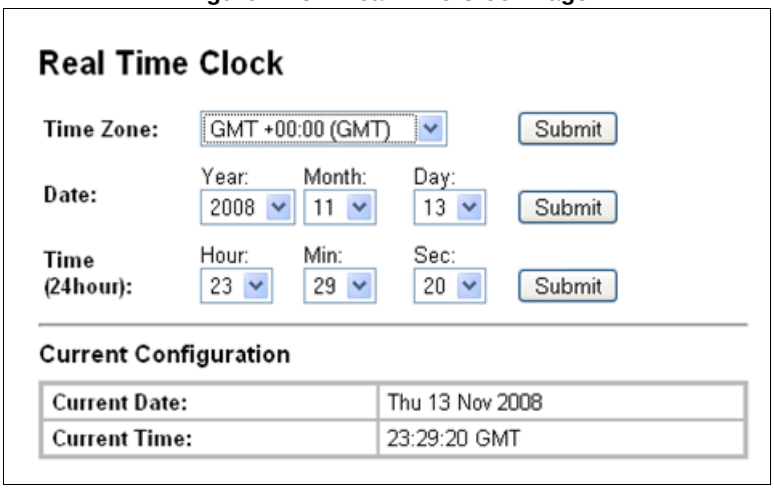
Real Time Clock

The current date or time configured on the EDS can be viewed and modified.

To configure Real Time Clock settings:

1. Select **RTC** on the menu bar. The Real Time Clock page opens.

Figure 14-31 Real Time Clock Page



2. Modify the following settings to set change the current date and time:

Table 14-32 **Real Time Clock Settings**

Real Time Clock Page Settings	Description
Time Zone	From the drop-down list, select the time zone corresponding to the location of the EDS.
Date	From the drop-down lists, select the year, month, and day corresponding to the current date at the location of the EDS.
Time (24 hour)	From the drop-down list, select the hour, minutes, and seconds corresponding to the current time at the location of the EDS.

3. Click **Submit**.

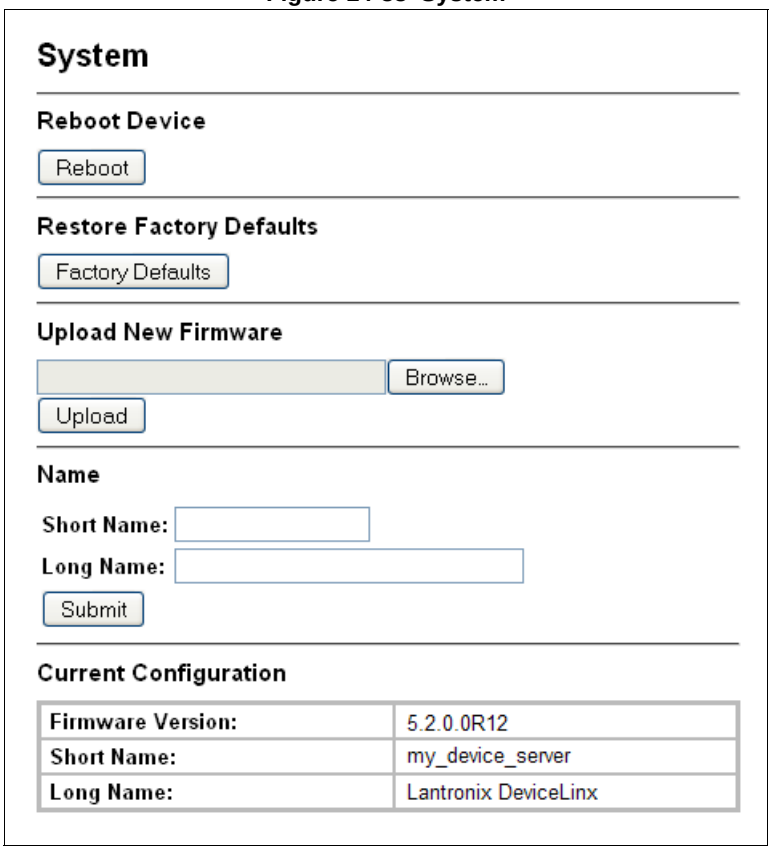
System Settings

The EDS System web page allows for rebooting the device, restoring factory defaults, uploading new firmware, configuring the short and long name, and viewing the current system configuration.

To configure system settings:

1. Select **System** on the menu bar. The System page opens.

Figure 14-33 System



2. Configure the following settings:

Table 14-34 **System**

System Settings	Description
Reboot Device	Click **Reboot** to reboot the device. The system refreshes and redirects the browser to the device home page.
Restore Factory Defaults	Click **Factory Defaults** to restore the device to the original factory settings. All configurations will be lost. The device automatically reboots upon setting back to the defaults.
Upload New Firmware	Click **Browse** to locate the firmware file location. Click **Upload** to install the firmware on the device. The device automatically reboots upon the installation of new firmware. ***Note:*** *Close and reopen the web manager browser upon a firmware update.*
Name	Enter a new **Short Name** and a **Long Name** (if necessary). The **Short Name** maximum is 32 characters. The **Long Name** maximum is 64 characters. Changes take place upon the next reboot. ***Note:*** *Additional information about long and short name customization is available in* *Short and Long Name Customization on page 150 of Chapter 17: Branding the EDS .*

3. Click **Submit**.

15: Advanced Settings

This chapter describes the configuration of Email, CLI, and XML. It contains the following sections:

Email Settings

The EDS allows you to view and configure email alerts relating to the events occurring within the system. Please see *SMTP Settings on page 119* for additional information.

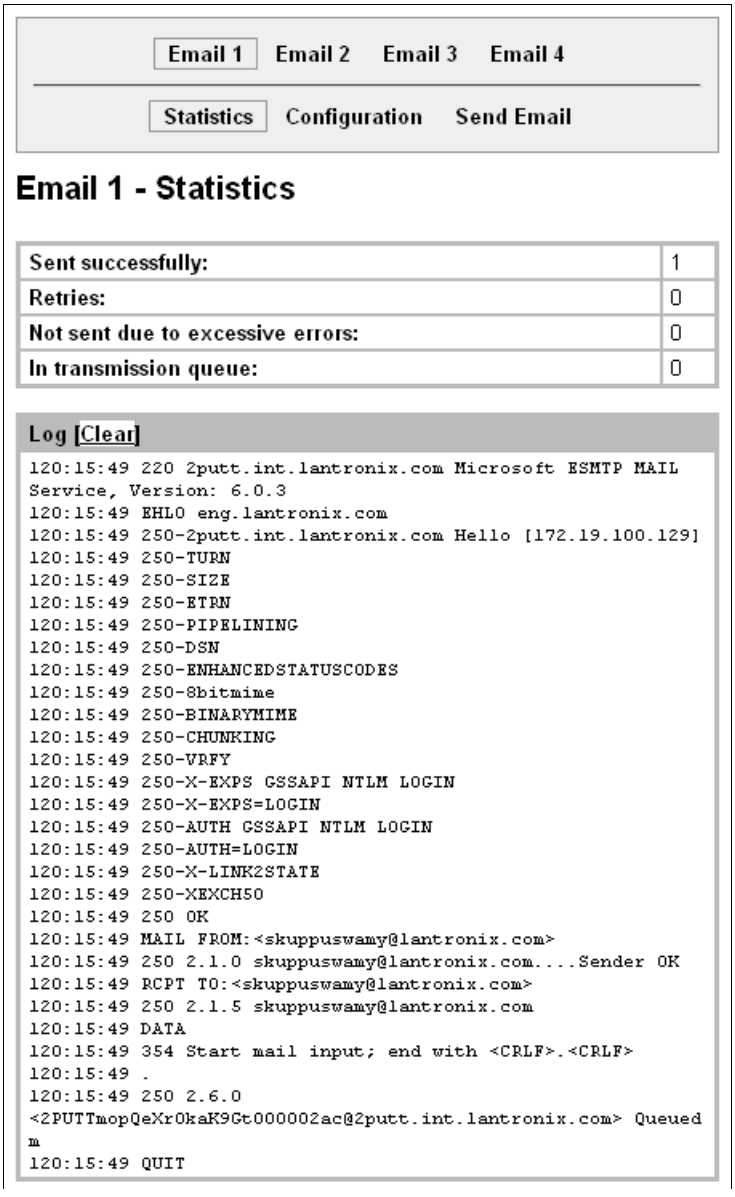
Note: *The following section describes the steps to configure Email 1; these steps also apply to the other Email instances.*

Email Statistics

This read-only page shows various statistics and current usage information about the email subsystem. When you transmit an email, the transmission to the SMTP server gets logged and displayed in the bottom portion of the page.

1. Select **Email** on the menu bar. The Email web page appears.
2. Select an email number at the top of the page.
3. Select **Statistics**. The Email Statistics page for the selected email appears.
4. Repeat above steps as desired, according to additional email(s) available.

Figure 15-1 Email Statistics



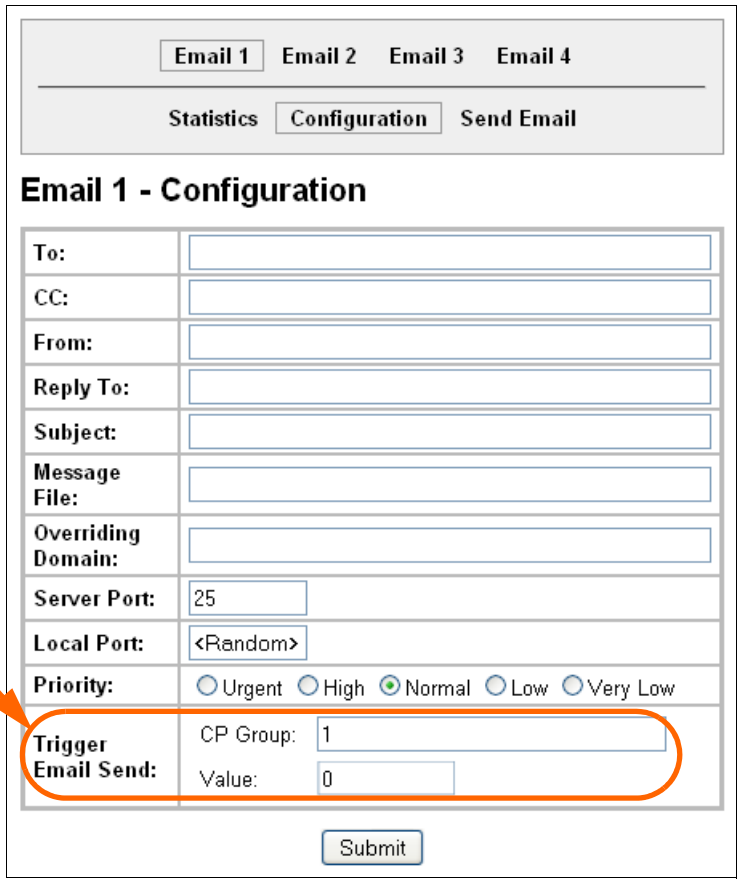
Email Configuration

The EDS allows you to view and configure email alerts relating to the events occurring within the system.

To configure email settings:

1. Select **Email** on the menu bar, if you are not already at the Email web page.
2. Select an email at the top of the page.
3. Select the **Configuration** submenu. The Email Configuration page opens to display the current email configuration.

Figure 15-2 Email Configuration



*Note: The **Trigger Email Send** option is only supported in XPort Pro and XPort AR.*

4. Enter or modify the following settings:

Table 15-3 **Email Configuration**

Email – Configuration Settings	Description
To	Enter the email address to which the email alerts will be sent. Multiple addresses are separated by semicolon (;). Required field if an email is to be sent.

Email – Configuration Settings (continued)	Description
CC	Enter the email address to which the email alerts will be copied. Multiple addresses are separated by semicolon (;).
From	Enter the email address to list in the From field of the email alert. Required field if an email is to be sent.
Reply-To	Enter the email address to list in the Reply-To field of the email alert.
Subject	Enter the subject for the email alert.
Message File	Enter the path of the file to send with the email alert. This file appears within the message body of the email.
Overriding Domain	Enter the domain name to override the current domain name in EHLO (Extended Hello).
Server Port	Enter the SMTP server port number. The default is port **25**.
Local Port	Enter the local port to use for email alerts. The default is a random port number.
Priority	Select the priority level for the email alert.

5. Click **Submit.**

   To test your configuration:

   a. Send an email immediately by clicking **Send Email** at the top of the page.

   b. Refer back to the Statistics page for a log of the transaction.

6. Repeat above steps as desired, according to additional email(s) available.

Command Line Interface Settings

The Command Line Interface (CLI) web page enables you to view statistics about the CLI servers listening on the Telnet and SSH ports and to configure CLI settings.

CLI Statistics

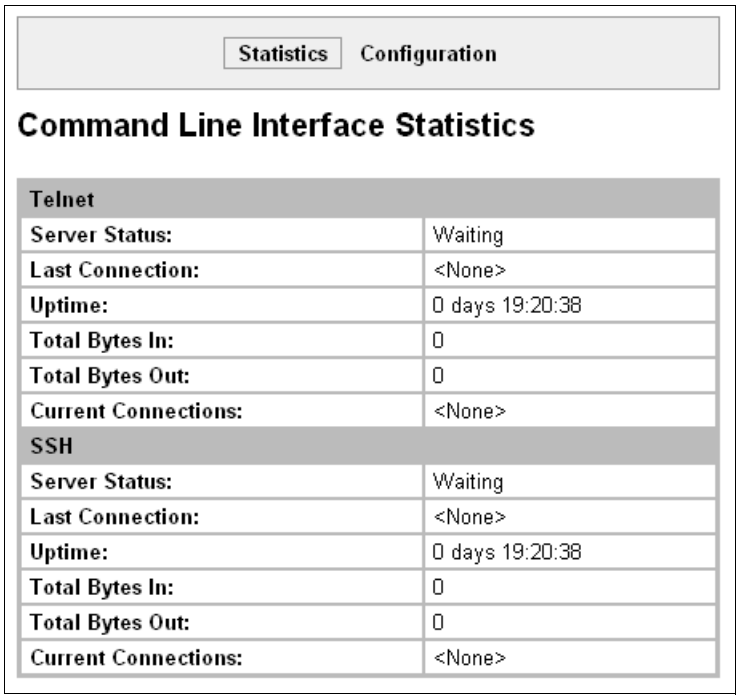
This read-only page shows the current connection status of the CLI servers listening on the Telnet and SSH ports. When a connection is active, the following display:

- Remote client information
- Number of bytes that have been sent and received
- A **Kill** link to terminate the connection

To view the CLI Statistics:

1. Select **CLI** on the menu bar. The Command Line Interface Statistics page appears.

Figure 15-4 CLI Statistics



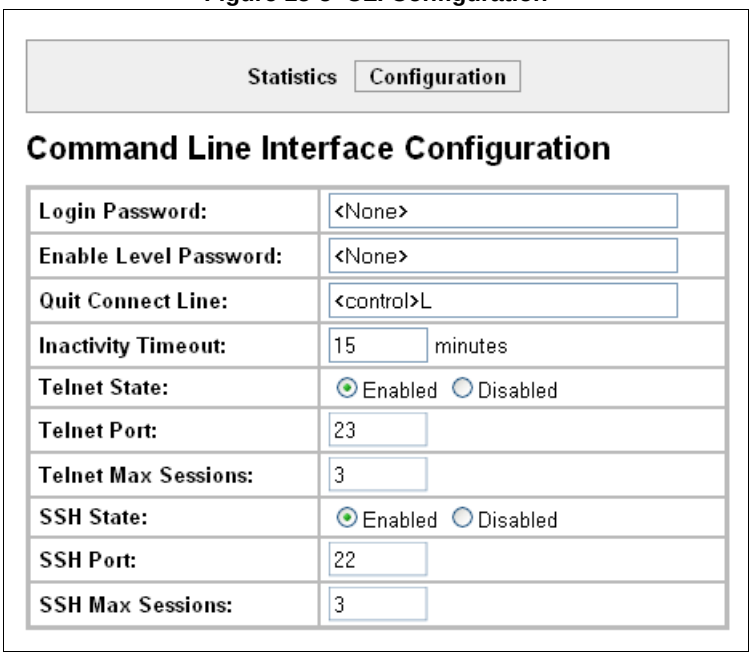
CLI Configuration

On this page you can change CLI settings.

To configure the CLI:

1. Select **CLI** on the menu and then **Configuration** at the top of the page. The Command Line Interface Configuration page appears.

Figure 15-5 CLI Configuration



2. Enter or modify the following settings:

***Table 15-6* CLI Configuration**

Command Line Interface Configuration Settings	Description
Login Password	Enter the password for Telnet access.
Enable Level Password	Enter the password for access to the Command Mode Enable level. There is no password 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 must press when holding down the **Ctrl** key. An example of such a string is **<control>L.**
Inactivity Timeout	Set an Inactivity Timeout value so the CLI session will disconnect if no data is received after the designated time period. Default is 15 minutes. Enter a value of 0 to disable.
Telnet State	Select **Disabled** to disable Telnet access. Telnet is enabled by default.
Telnet Port	Enter the Telnet port to use for Telnet access. The default is **23**.
Telnet Max Sessions	Maximum number of simultaneous Telnet sessions. The default is 3 and the maximum is 10.
SSH State	Select **Disabled** to disable SSH access. SSH is enabled by default.
SSH Port	Enter the SSH port to use for SSH access. The default is **22**.
SSH Max Sessions	Maximum number of simultaneous SSH sessions. The default is 3 and the maximum is 10.

3. Click **Submit.**

XML Settings

EDS allows for the configuration of devices by using XML configuration records (XCRs). You can export an existing configuration for use on other EDS devices or import a saved configuration file.

On the XML: Export Configuration web page, 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 EDS unit or another. The XML data can be exported to the browser window or to a file on the file system.

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

In the XML: Import System Configuration Page you can import a system configuration from an XML file. The XML data can be imported from a file on the file system 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>;...
```

For example, if you only wanted to import the line 1 setting from an XCR, use a filter string of line:1.

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.

The number of lines available for importing and exporting differ between Lantronix DeviceLinx products. The screenshots in this chapter represent one line, as available, for example, on an XPort Pro and EDS1100. However, other device networking products (such as EDS2100, EDS4100, XPort AR, EDS8/16PS and EDS8/16/32PR) support additional lines.

XML: Export Configuration

On this web page you can export the current system configuration in XML format.

To export the system configuration:

1. Select **XML** on the menu bar. The **XML: Export Configuration** page appears.

   The number of **Lines to Export** and the specific **Groups to Export** displayed on your screen may vary according to your particular product.

2. Enter or modify the following settings:

Figure 15-7 XML: Export Configuration

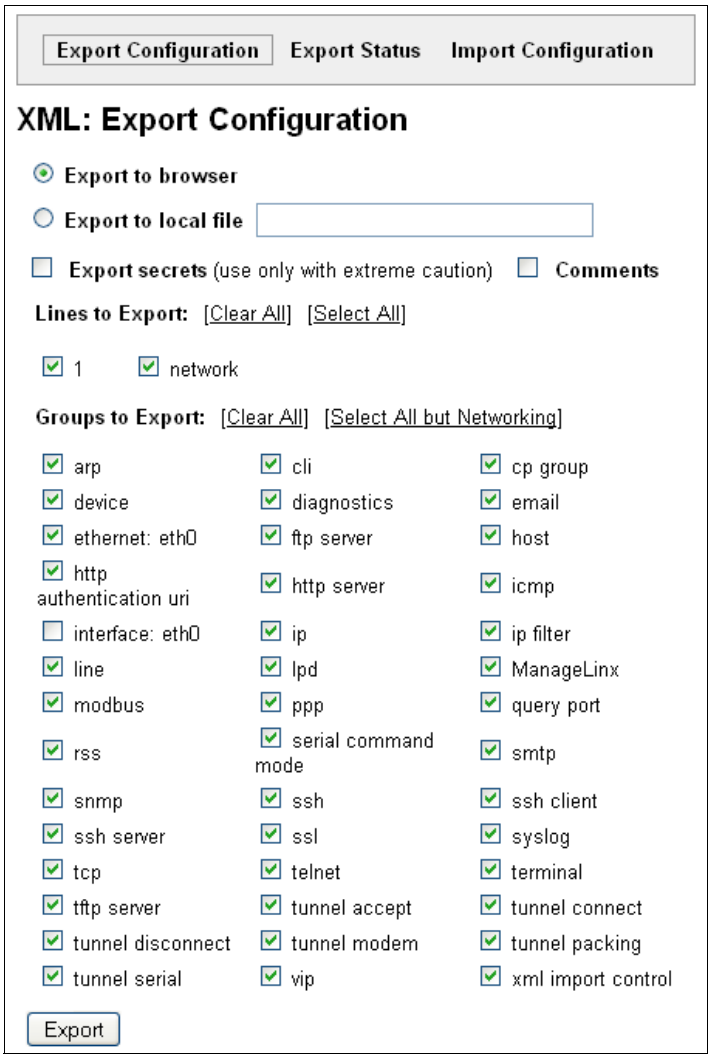


***Table 15-8* XML Export Configuration**

XML Export Configuration Settings	Description
Export to browser	Select this option to export the XCR data in the selected fields to a web browser.
Export to local file	Select this option to export the XCR data to a file on the device. If you select this option, enter a file name for the XML configuration record.
Export secrets	Only use this with extreme caution. If selected, secret password and key information will be exported. Use only with a secure link, and save only in secure locations.
Lines to Export	Select the instances you want to export in the line, LPD, tunnel, and terminal groups.
Groups to Export	Check the configuration groups that are to be exported to the XML configuration record.

3. Click **Export**. The groups display if exporting the data to the browser. If exporting the data to a local file, the file is stored on the file system.

Note: *Most browsers will interpret and display the XML data without the XML tags. To view the raw XML, choose the view file source feature of your browser.*

XML: Export Status

On this page you can export the current system status in XML format. The XML data can be exported to the browser page or to a file on the file system.

To export the system status:

1. Select **XML** on menu bar and then **Export Status** at the top of the page. The XML: Export Status page appears.

   The number of **Lines to Export** and the specific **Groups to Export** displayed on your screen may vary according to your particular product.

2. Enter or modify the following settings:

Figure 15-9 XML: Export Status

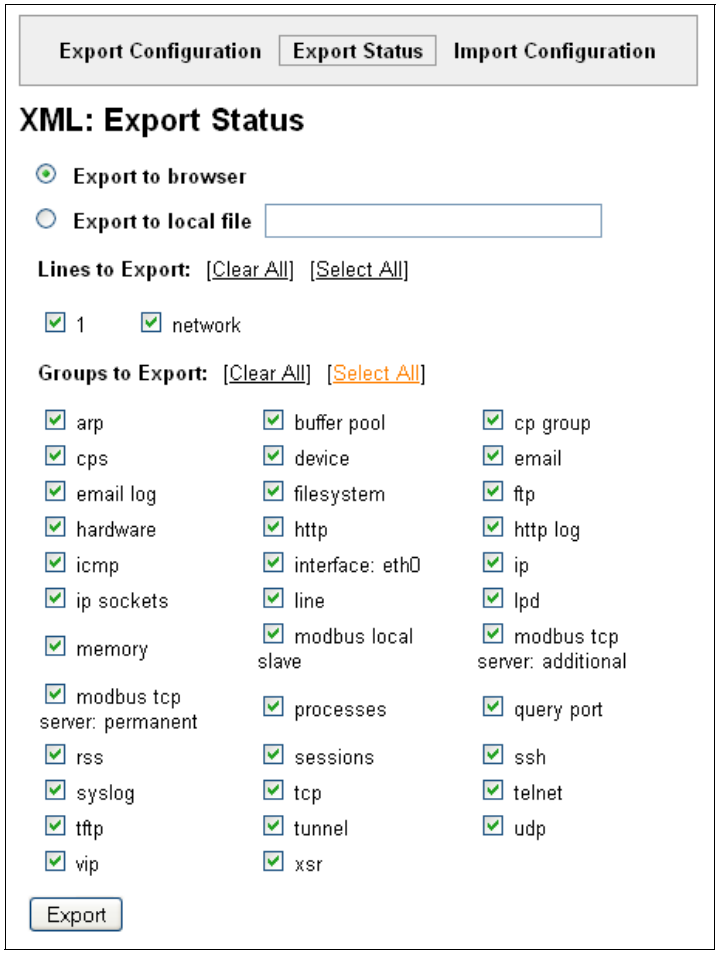


Table 15-10 **XML Export Status**

XML: Export System Status Settings	Description
Export to browser	Select this option to export the XML status record to a web browser.
Export to local file	Select this option to export the XML status record to a file on the device. If you select this option, enter a file name for the XML status record.
Lines to Export	Select the instances you want to export in the line, LPD, tunnel, and terminal groups.
Groups to Export	Check the configuration groups that are to be exported into the XML status record.

3. Click **Export**. The groups display if exporting the data to the browser. If exporting the data to a local file system, the file is stored on the file system.

Note: *Most browsers will interpret and display the XML data without the XML tags. To view the raw XML, choose the view file source feature of your browser.*

XML: Import Configuration

Here you can import a system configuration from an XML file.

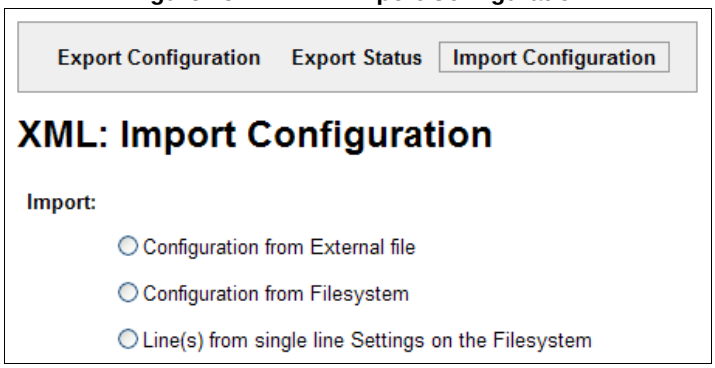
The XML data can be imported from a file on the file system or uploaded using HTTP. The groups to import can be specified by toggling the respective group item or entering a filter string. When toggling a group item, all instances of that group will be imported. The filter string can be used to import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

To import a system configuration:

1. Select **XML** on the menu bar and then **Import Configuration** at the top of the page. The XML: Import Configuration web page appears.

Figure 15-11 XML: Import Configuration

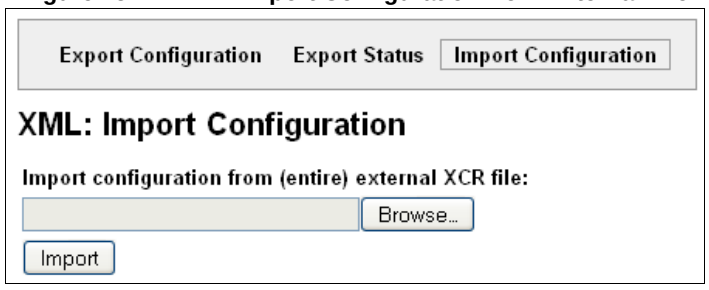


2. Click one of the following radio buttons:
   - Configuration from External file. *See Import Configuration from External File on page 142.*
   - Configuration from Filesystem. *See Import Configuration from the Filesystem on page 143.*
   - Line(s) from single line Settings on the Filesystem. *See Import Line(s) from Single Line Settings on the Filesystem on page 145.*

Import Configuration from External File

This selection shows a field for entering the path and file name of the entire external XCR file you want to import. You can also browse to select the XCR file.

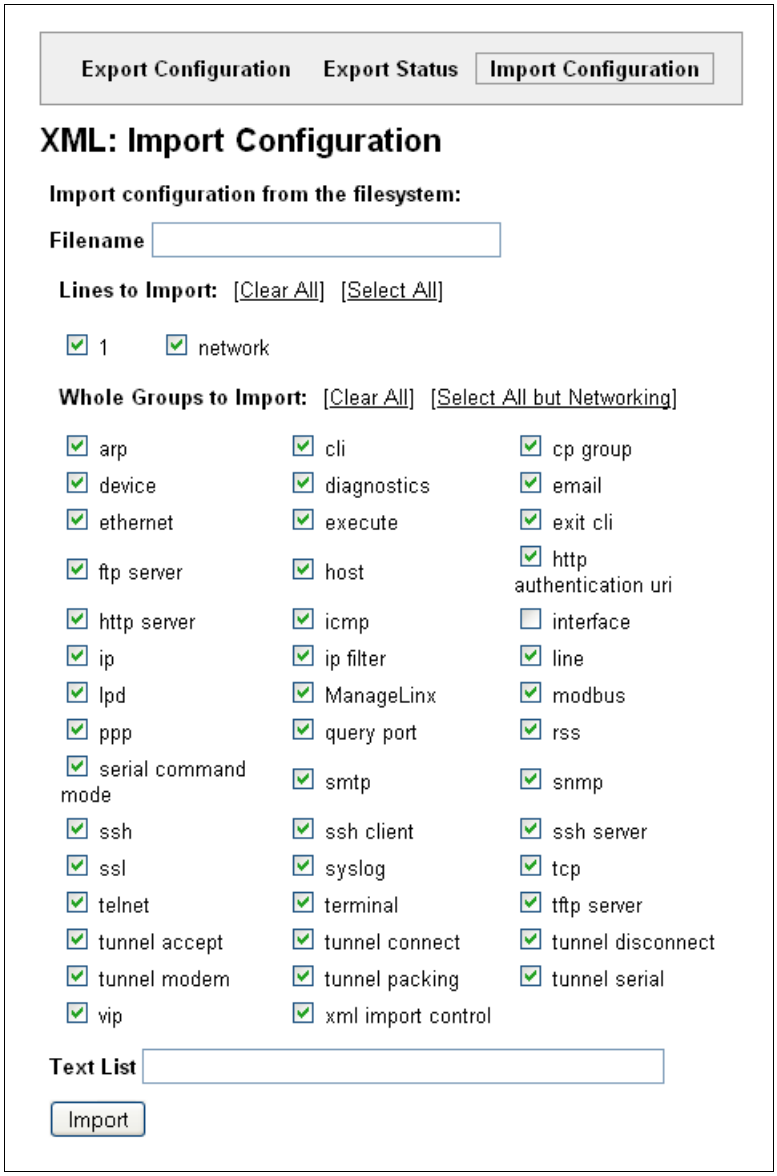
Figure 15-12 XML: Import Configuration from External File



Import Configuration from the Filesystem

This selection shows a page for entering the filesystem and your import requirements – groups, lines, and instances. The number of **Lines to Import** and the specific **Whole Groups to Import** displayed on your screen may vary according to your particular product.

Figure 15-13 XML: Import from Filesystem



1. Enter or modify the following settings.

Figure 15-14 XML: Import Configuration from Filesystem

Import Configuration from Filesystem Settings	Description
Filename	Enter the name of the file on the device (local to its filesystem) that contains XCR data.
Lines to Import	Select the lines or network whose settings you want to import. Click the **Select All** link to select all the serial lines and the network lines. Click the **Clear All** link to clear all of the checkboxes. By default, all line instances are selected. Only the selected line instances will be imported in the line, LPD, tunnel, and terminal groups.
Whole Groups to Import	Select the configuration groups to import from the XML configuration record. This option imports all instances of each selected group unless it is one of the **Lines to Import**. ***Note:*** *By default, all groups are checked except those pertaining to the network configuration; this is so that import will not break your network connectivity.* You may check or uncheck any group to include or omit that group from import. To import all of the groups, click the **Select All but Networking** link to import all groups. To clear all the checkboxes, click the **Clear All** link.
Text List	Enter a string to import specific instances of a group. The textual format of this string is: <g>:<i>;<g>:<i>;... Each group name <g> is followed by a colon and the instance value <i> and each <g>:<i> value is separated by a semi-colon. If a group has no instance, then specify the group name <g> only. Use this option for groups other than those affected by **Lines to Import**.

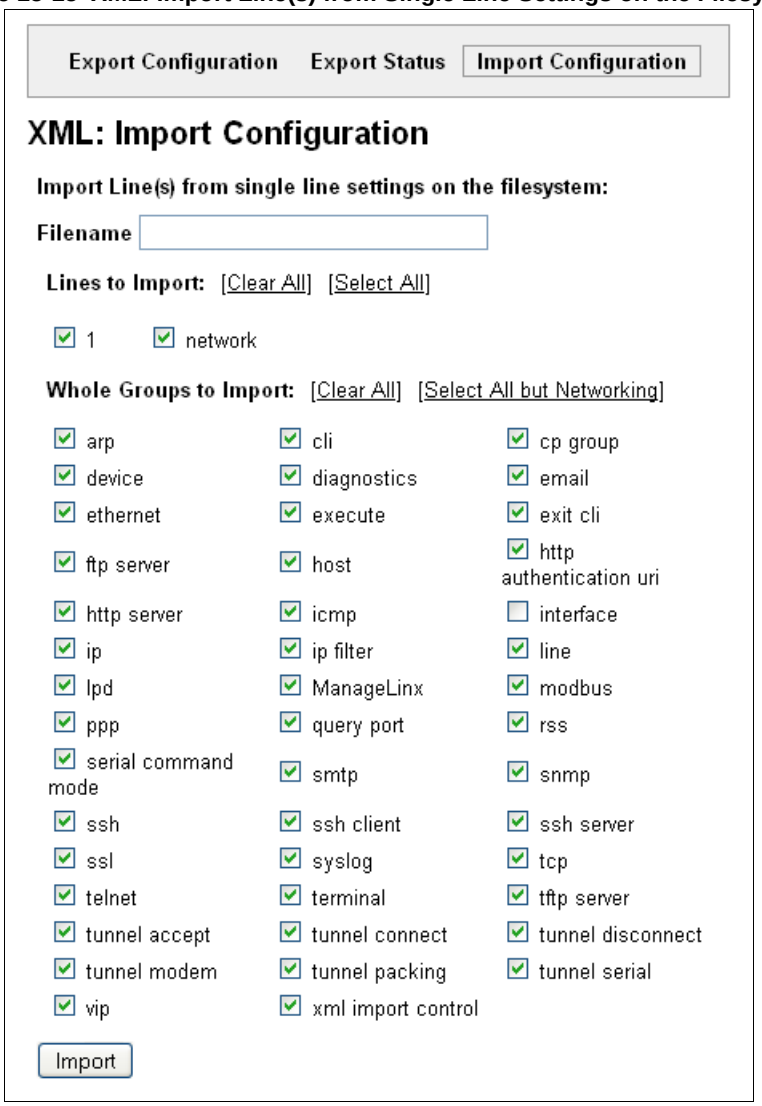
2. Click **Import**.

Import Line(s) from Single Line Settings on the Filesystem

This selection copies line settings from the single line instance in the input file to selected lines. The import file may only contain records from a single line instance; this is done by selecting a single **Line to Export** when exporting the file. The number of **Lines to Import** and the specific **Whole Groups to Import** displayed on your screen may vary according to your particular product.

To modify Single Line Settings on the Filesystem:

Figure 15-15 XML: Import Line(s) from Single Line Settings on the Filesystem



1. Enter of modify the following settings:

Table 15-16 **XML: Import Line(s) from Single Line Settings**

Import Line(s) Settings	Description
Filename	Provide the name of the file on the device (local to its file system) that contains XCR data.
Lines to Import	Select the line(s) whose settings you want to import. Click the **Select All** link to select all the serial lines and the network lines. Click the **Clear All** link clear all of the checkboxes. By default, all serial line instances are selected.
Whole Groups to Import	Select the configuration groups to import from the XML configuration record. ***Note:*** *By default, all groups are checked except those pertaining to the network configuration; this is so that import will not break your network connectivity.* You may check or uncheck any group to include or omit that group from import. To import all of the groups, click the **Select All but Networking** link to import all groups. To clear all the checkboxes, click the **Clear All** link.

2. Click **Import**.

16: VIP Settings

VIP (Virtual IP) takes advantage of the Lantronix ManageLinx technology that solves the access-through-firewall problem. ManageLinx utilizes existing network infrastructure to create a virtual device network (VDN). The VDN provides direct access to only authorized equipment, behind firewalls, from anywhere via the net.

ManageLinx is a secure and totally transparent remote access solution. The VDN technology enables you to create dedicated TCP/IP connections between any two devices, using easily deployed hardware appliances. There is no client software to install. No changes are required to network software or applications at either end of the connection.

The VDN hardware consists of a publicly accessible Device Services Manager (DSM) and individual Device Services Controller (DSC) appliances in multiple locations. Together, these two components enable you to set up and manage individual Virtual IP (VIP) addresses and routes.

The EDS, with VIP enabled, takes the place of a DSC and provides direct access to your equipment.

The EDS supports both Accept and Connect Mode tunneling through VIPs. Configuring an EDS to use VIP Access involves:

- *Obtaining a Bootstrap File*
- *Importing the Bootstrap File*
- *Enabling VIP*
- *Configuring Tunnels to Use VIP*

Once the EDS is configured and enabled to use VIPs, it will immediately attempt to establish a conduit with the ManageLinx DSM. Once the conduit is up, tunneling via VIP Access is ready to go. This chapter also contains the following VIP sections:

- *Virtual IP (VIP) Statistics*
- *Virtual IP (VIP) Counters*
- *Virtual IP (VIP) Configuration*

Obtaining a Bootstrap File

The ManageLinx XML bootstrap file is an XML file that contains the information required to contact and authenticate to a DSM. This file must be generated and sent to you by the DSM administrator. See the ManageLinx documentation for more details.

Importing the Bootstrap File

To configure an EDS to use VIP Access, import the bootstrap file as you would any XML Configuration Record (XCR). For instructions on importing XCRs see *Advanced Settings (on page 134)*.

Enabling VIP

Once the bootstrap file has been imported, VIP Access can be enabled and a conduit with the DSM will be established. The VIP Statistics shows the current state of the conduit. When configured correctly, a conduit with the DSM will be maintained at all times.

Configuring Tunnels to Use VIP

Configuring Connect Mode tunnels to use VIP is a simple matter of configuring a tunnel as is normally done, but also enabling VIP in the Tunnel Host settings, and using a VIP Name for the address.

VIP Accept Mode tunnels do not require special configuration. If VIP access is enabled (in the VIP configuration page), then VIP Accept Mode requests from a ManageLinx device will be accepted.

Virtual IP (VIP) Statistics

To view the EDS VIP Statistics:

1. Select **VIP** from the main menu. The VIP Status page appears.

Figure 16-1 VIP Status

Status | Counters | Configuration

Virtual IP (VIP) Status

Config Name:	EDS2100-213-200
Current DSM IP Address:	
Current Tunnel Port:	0
DSM IP Address List:	172.19.38.1
Tunnel Port List:	22,80,443
Conduit Status:	Disabled
Conduit Uptime:	0 days 00:00:00
Time of Last Replication:	Fri Oct 22 10:41:51 PDT 2010
Replication Period:	900 seconds
Tunnel Proxy Host:	
Tunnel Proxy Port:	
VIP Pools:	0
Network Interfaces:	EDS2100 EDS32PR EDS4100
Local Dna ID:	dna.dev.rnd:d6642facf
Tunnel User:	TUN58baf
Tunnel HTTP Port List:	80,443

Virtual IP (VIP) Counters

To view EDS VIP settings:

1. Select **VIP > Counters** from the main menu. The VIP Counters page displays.

Figure 16-2 VIP Counters

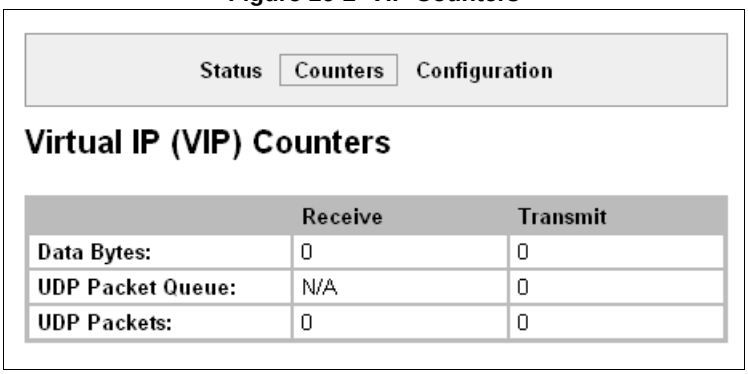


***Table 16-3* VIP Counters**

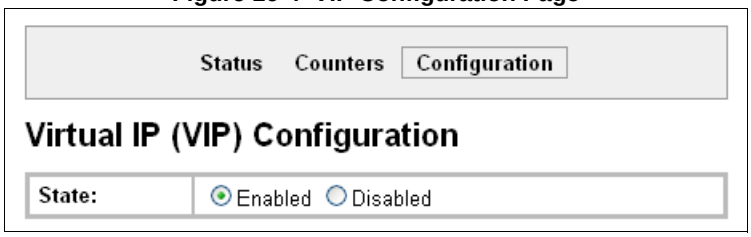
VIP Counters	Description
Data Bytes	Total bytes in the TCP packets (not the UDP packets)
UDP Packet Queue	The number of packets queued for transmission.
UDP Packets	The number of packets transmitted. ***Note:*** *UDP counts are packet based, and do not record the number of data bytes.*

Virtual IP (VIP) Configuration

To configure the EDS VIP settings:

1. Select **VIP >Configuration** from the main menu. The VIP Configuration page displays.

Figure 16-4 VIP Configuration Page



2. Click **Enabled/Disabled** to use/turn off VIP addresses in Tunnel Accept Mode and Tunnel Connect Mode. The default is disabled.
3. Click **Submit** save a changed state.

17: Branding the EDS

This chapter describes how to brand your EDS by using Web Manager and Command Line Interface (CLI). It contains the following sections on customization:

- *Web Manager Customization*
- *Short and Long Name Customization*

Web Manager Customization

Customize the Web Manager's appearance by modifying index.html and style.css. The style (fonts, colors, and spacing) of the Web Manager is controlled with style.css and the text and graphics are controlled with index.html.

The Web Manager files are hidden and are incorporated directly into the firmware image but may be overridden by placing the appropriate file in the appropriate directory on the EDS file system.

Web Manager files can be retrieved and overridden with the following procedure:

1. FTP to the EDS device.
2. Make a directory (**mkdir**) and name it http/config
3. Change to the directory (**cd**) that you created in step 2. (http/config)
4. Get the file by using **get** <filename>
5. Modify the file as required or create a new one with the same name
6. Put the file by using **put** <filename>
7. Type **quit**. The overriding files appear in the file system's http/config directory.
8. Restart any open browser to view the changes.
9. If you wish to go back to the default files in the firmware image, simply delete the overriding files from the file system.

Short and Long Name Customization

Short and long names may be customized in Web Manager according to the directions in *System Settings on page 132* of *Chapter 14: Maintenance and Diagnostics Settings*. The names display in the CLI show command and in the System web page in the Current Configuration table. The short name is used for the show command. Both names display in the CLI Product Type field in the following example:

```
(enable)# show
```

The long and short names appear in the Product Type field in the following format:

```
Product Type: <long name> (<short name>)
```

For example:

```
(enable)# show EDS
Product Information:
Product Type: Lantronix EDS (EDS)
```

18: Updating Firmware

Obtaining Firmware

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

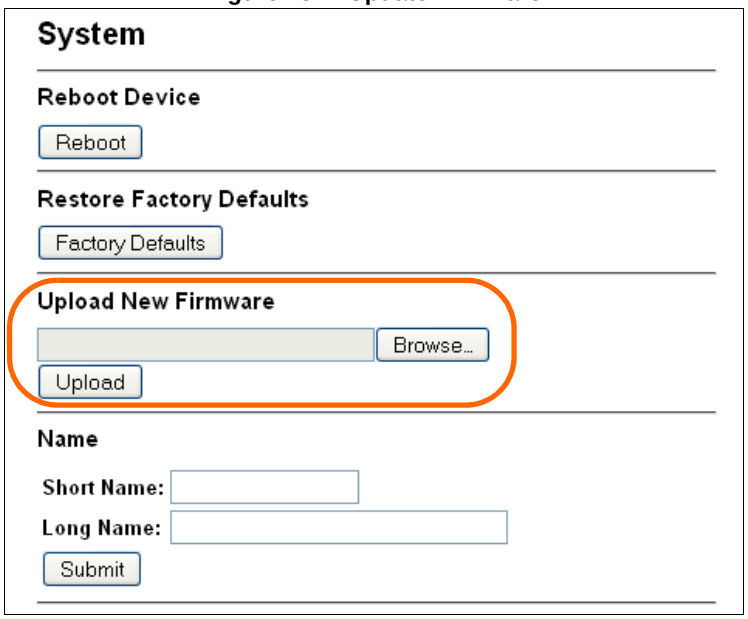
Loading New Firmware

Reload the firmware using the device web manager Filesystem page.

To upload new firmware:

1. Select **System** in the menu bar. The **Filesystem** page appears.

Figure 18-1 Update Firmware



2. Click **Browse** to browse to the firmware file.
3. Highlight the file and click **Open**.
4. Click **Upload** to install the firmware on the EDS. The device automatically reboots on the installation of new firmware.
5. Close and reopen the web manager internet browser to view the device's updated web pages.

Note: *Alternatively, firmware may be updated by sending the file to the EDS over a FTP or TFTP connection.*

Appendix A - Technical Support

If you are unable to resolve an issue using the information in this documentation, please contact Technical Support:

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 13 930 4172
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
- Firmware version (on the first screen shown when you Telnet to the device and type show)
- Description of the problem
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem)
- Additionally, it may be useful to export and submit the XML Configuration and XML Status files

Appendix B - Binary to Hexadecimal Conversions

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

Use this chapter to learn to convert binary values to hexadecimals or to look up hexadecimal values in the tables of configuration options. The tables include:

- Command Mode (serial string sign-on message)
- AES Keys

Converting Binary to Hexadecimal

Conversion Table

Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) to a hexadecimal representation, treat the upper and lower four bits separately to produce a two-digit hexadecimal number (in this case, 4C). Use the following table to convert values from binary to hexadecimal.

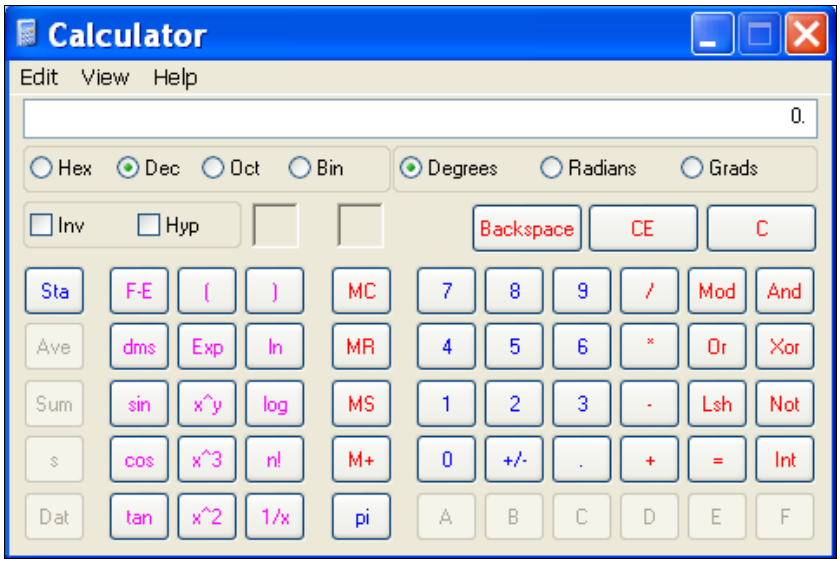
Table 20-1 **Binary to Hexadecimal Conversion Table**

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

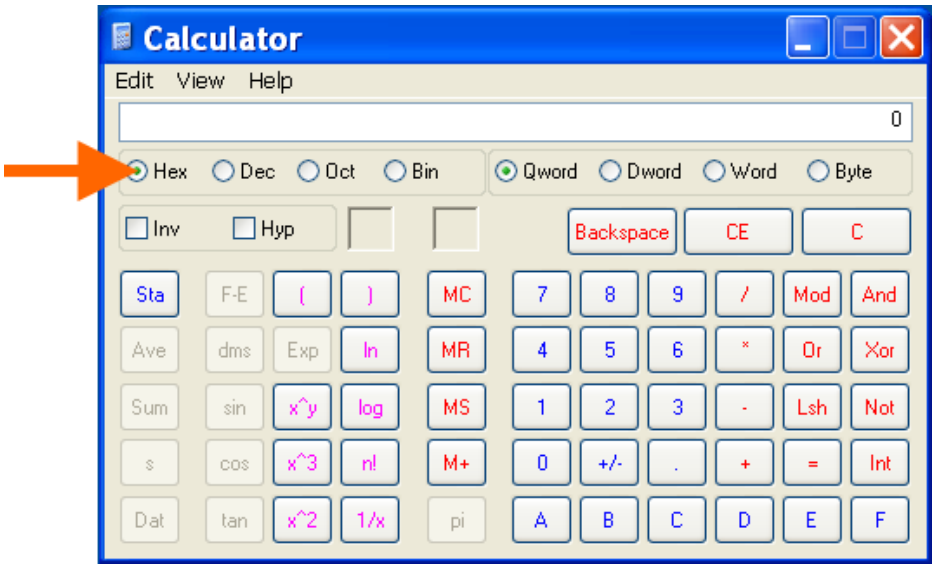
Scientific Calculator

Another simple way to convert binary to hexadecimal is to use a scientific calculator, such as the one available on the Windows operating systems. For example:

1. On the Windows Start menu, click **Programs > Accessories > Calculator**.
2. On the View menu, select **Scientific**. The scientific calculator appears.
3. Click **Bin** (Binary), and type the number you want to convert.



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



Appendix C - Compliance

(According to ISO/IEC Guide 22 and EN 45014)

Manufacturer's Name & Address:

Lantronix 167 Technology Drive, Irvine, CA 92618 USA

Product Name Model:

EDS4100 4 Port Device Server, EDS8PR 8 Port Device Server, EDS16PR 16 Port Device Server, and EDS32PR 32 Port Device Server, EDS8PS 8 Port Device Server, and EDS16PS 16 Port Device Server

Conform to the following standards or other normative documents:

Radiated and Conducted Emissions

Class B limits of EN55022: 1998
EN55024: 1998 + A1: 2001

Direct & Indirect ESD

EN61000-4-2: 1995

RF Electromagnetic Field Immunity

EN61000-4-3: 1996

Electrical Fast Transient/Burst Immunity

EN61000-4-4: 1995

Surge Immunity

EN61000-4-5: 1995

RF Common Mode Conducted Susceptibility

EN61000-4-6: 1996

Power Frequency Magnetic Field Immunity

EN61000-4-8: 1993

Voltage Dips and Interrupts

EN61000-4-11: 1994

Manufacturer's Contact:

Lantronix
167 Technology Drive, Irvine, CA 92618 USA
Tel: 949-453-3990
Fax: 949-450-7249

RoHS Notice

All Lantronix products in the following families are China RoHS-compliant and free of the following hazardous substances and elements:

• Lead (Pb)	• Mercury (Hg)	• Polybrominated biphenyls (PBB)
• Cadmium (Cd)	• Hexavalent Chromium (Cr (VI))	• Polybrominated diphenyl ethers (PBDE)

Product Family Name	Toxic or hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
UDS1100 and 2100	0	0	0	0	0	0
EDS	0	0	0	0	0	0
MSS100	0	0	0	0	0	0
IntelliBox	0	0	0	0	0	0
XPress DR & XPress-DR+	0	0	0	0	0	0
SecureBox 1101 & 2101	0	0	0	0	0	0
WiBox	0	0	0	0	0	0
UBox	0	0	0	0	0	0
MatchPort	0	0	0	0	0	0
SLC	0	0	0	0	0	0
XPort	0	0	0	0	0	0
WiPort	0	0	0	0	0	0
SLB	0	0	0	0	0	0
SLP	0	0	0	0	0	0
SCS	0	0	0	0	0	0
SLS	0	0	0	0	0	0
DSC	0	0	0	0	0	0
PremierWave	0	0	0	0	0	0

O: toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Lithium Battery Notice

ATTENTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

ACHTUNG: WIRD BEIM BATTERIEWECHSEL EINE FALSCHE BATTERIE EINGESETZT, BESTEHT EXPLOSIONSGEFAHR. SETZEN SIE NUR EINE BATTERIE DES GLEICHEN ODER EINES ENTSPRECHENDEN, VOM HERSTELLER EMPFOHLENEN TYPS EIN. ENTSORGEN SIE VERBRAUCHTE BATTERIEN GEMÄSS DEN ANWEISUNGEN DES HERSTELLERS.

Installationsanweisungen

Rackmontage

Bei Montage in ein geschlossenes Rack oder in ein Rack mit mehreren Einheiten ist unter Umständen eine weitere Prüfung erforderlich. Folgende Punkte sind zu berücksichtigen.

- Die Umgebungstemperatur innerhalb des Racks kann höher sein als die Raumtemperatur. Die Installation muss so durchgeführt werden, dass der für den sicheren Betrieb erforderliche Luftstrom nicht beeinträchtigt wird. In dieser Umgebung darf die

maximale Temperatur von 50°C nicht überschritten werden. Dabei sind auch die maximalen Auslegungstemperaturen zu berücksichtigen.

- Die Installation ist so durchzuführen, dass auch bei ungleichmäßiger Lastverteilung die Stabilität gewährleistet bleibt.

Energiezufuhr

Anhand der Angaben auf dem jeweiligen Typenschild ist sicherzustellen, dass keine Überlastung an der Einspeisung erfolgt, die den Überstromschutz und die Versorgungsleitungen beeinträchtigt.

Erdung

Eine zuverlässige Schutzerdung dieser Ausrüstung muss gewährleistet sein. Dies gilt besonders bei Anschluss an Mehrfachsteckdosen.

Installation Instructions

Rack Mounting

If rack mounted units are installed in a closed or multi-unit rack assembly, they may require further evaluation by certification agencies. You must consider the following items:

- The ambient conditions within the rack may be greater than the room conditions. Installation should be so that the amount of air flow required for safe operation is not compromised. The maximum temperature for the equipment in this environment is 50°C. Consideration should be given to the maximum rated ambient conditions.
- Installation should be so that a hazardous stability condition is not achieved due to uneven loading.

Input Supply

Check nameplate ratings to assure there is no overloading of supply circuits that have an effect on over current protection and supply wiring.

Grounding

Reliable earthing of this equipment must be maintained. Particular attention should be given to supply connections when connecting to power strips, rather than direct connections to the branch circuit strips.

Appendix D - Lantronix Cables and Adapters

Lantronix cables and adapters for use with the EDS devices are listed here according to part number and application.

Lantronix P/N	Description	Applications
500-103	6' RJ45-to DB9F	Included with EDS8/16/32PR for setup or device connectivity. Connects the RJ45 RS232 serial ports of EDS8/16/32PR to a DB9M DTE interface of a PC or serial device.
200.2062	Cable Ethernet CAT5; RJ45, 2 m (6.6 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/ hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the adapters listed below.
200.2063	Cable Ethernet CAT5; RJ45, 5 m (16.4 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/ hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the below listed adapters.
200.2064	Cable Ethernet CAT5; RJ45, 10 m (32.8 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/ hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the adapters listed below.
200.2065	Cable Ethernet CAT5; RJ45, 15 m (49.2 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/ hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the adapters listed below.
200.2066A	Adapter RJ45-to-DB25M	Allows a standard straight-pinned CAT5 cable to connect the EDS8/ 16/32PR RJ45 serial ports to the DB25F DTE interface of a serial device.
200.2067A	Adapter RJ45-to-DB25F	Allows a standard straight-pinned CAT5 cable to connect the EDS8/ 16/32PR RJ45 serial ports to the DB25M DTE interface of a serial device.
200.2069A	Adapter RJ45-to-DB9M	Allows a standard straight-pinned CAT5 cable to connect the EDS8/ 16/32PR RJ45 serial ports to the DB9F DCE interface of a serial device.
200.2070A	Adapter RJ45-to-DB9F	Allows a standard straight-pinned CAT5 cable to connect the EDS8/ 16/32PR to the DB9M DTE interface of a PC or serial device.
200.2073	Adapter RJ45-to-DB25M	Allows a standard straight-pinned CAT5 cable to connect the EDS8/ 16/32PR RJ45 serial ports to the DB25F DCE interface of a serial device.
200.2074	Adapter RJ45-to-DB25F	Allows a standard straight-pinned CAT5 cable to connect the EDS8/ 16/32PR RJ45 serial ports to the DB25M DCE interface of a serial device.
ADP010104-01	Adapter "Rolled" RJ45-to-RJ45	Allows a standard straight-pinned CAT5 cable to connect the EDS8/ 16/32 to an RJ45 console port on products from Cisco and other manufacturers.

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