LANTRONIX®

PremierWave™ EN
User Guide

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Disclaimer & Revisions

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

Revision History

Date	Rev.	Comments
January 2011	A	Initial Document.

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1: Using This Guide

Purpose and Audience

This guide provides the information needed to configure, use, and update the PremierWave EN. It is intended for software developers and system integrators who are embedding PremierWave in their designs.

Summary of Chapters

The remaining chapters in this guide include:

Chapter	Description
2: Introduction	Main features of the product and the protocols it supports. Includes technical specifications.
3: Using DeviceInstaller	Instructions for viewing the current configuration using DeviceInstaller.
4: Network Settings	Instructions for configuring network settings.
5: Line and Tunnel Settings	Instructions for configuring line and tunnel settings.
6: Configurable Pin Manager	Information about the Configurable Pin Manager (CPM) and how to set the configurable pins to work with a device.
7: Services Settings	Instructions for configuring DNS and Syslog settings.
8: Security Settings	Instructions for configuring SSL security settings.
9: Maintenance	Instructions to maintain the PremierWave EN, view statistics, files, and diagnose problems.
10: Advanced Settings	Instructions for configuring CLI and XML settings.
11: Tunneling	Information about tunneling features available on the serial lines.
12: Security in Detail	Detailed description and configuration of SSL security settings.
13: Updating Firmware	Instructions for obtaining the latest firmware and updating the PremierWave EN.

Chapter	Description
A: Technical Support	Instructions for contacting Lantronix Technical Support.
B: Binary to Hexadecimal Conversions	Instructions for converting binary values to hexadecimals.
C: Compliance	Lantronix compliance information.
D: Warranty	Lantronix warranty statement.
E: USB-CDC-ACM Device Driver File for Windows Hosts	Information about the device driver file for windows host.

Additional Documentation

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

Document	Description
PremierWave EN Integration Guide	Information about the PremierWave EN hardware, testing the PremierWave EN using the demonstration board, and integrating the PremierWave EN into your product.
PremierWave EN Command Reference	Instructions for accessing Command Mode (the command line interface) using a Telnet connection, SSH connection or through the serial port. Detailed information about the commands. Also provides details for XML configuration and status.
PremierWave Eval Board Quick Start	Instructions for getting the PremierWave EN demonstration board up and running.
PremierWave Eval Board User Guide	Information needed to use the PremierWave on the demo board.
DeviceInstaller Online Help	Instructions for using the Lantronix Windows-based utility to locate the PremierWave EN 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

The PremierWave EN embedded Ethernet Device Server is a complete network-enabling solution in a 30 (1.181) X 55 (2.165) X 6.45 (0.248) package. This miniature device server empowers original equipment manufacturers (OEMs) to go to market quickly and easily with Ethernet and/or wireless networking and web page serving capabilities built into their products. *[DIMS = mm (in.)]*

Key Features

- Power Supply: Regulated 3.3V input required. There is a step-down converter to 1.5 volts for the processor core and 1.8 volts for the memory subsystem. All voltages have LC filtering to minimize noises and emissions.
- Controller: 32-bit ARM9 microprocessor running at 400 MHz with 32kB Data Cache and 32 kB Instruction Cache Memory: Up to 64 MB SDRAM and 256 MB NAND Flash (Default 64 MB each). Up to 16 MB serial SPI Flash (Default 8 MB).
- Ethernet: 10/100 Mbps Ethernet transceiver.
- Wireless: Dual Band 802.11 a/b/g/n with an on-board antenna and option for external antennas and diversity.
- Serial Ports: Two high speed RS232/RS422/RS485 serial ports with all hardware handshaking signals. Baud rate is software selectable (300 bps to 921600 bps). One emulated serial port on the USB Device Port (up to Full Speed 12 Mbps), using standard CDC-ACM protocol.
- Two USB 2.0 Full Speed (12 Mbps) Host ports
- USB 2.0 Full Speed (12 Mbps) Device port
- Master/Slave high speed SPI interface
- I2C interface
- Configurable I/O Pins (CPs): Up to nine pins are configurable as general purpose I/Os if no DTR or DCD is used on serial ports. Not 5V tolerant.
- Interface Signals: 3.3V-level interface signals.
- Temperature Range: Operates over an extended temperature range of -40°C to +85°C.

Applications

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

- ATM machines
- CNC controllers
- Data collection devices
- Universal Power Supply (UPS) management unit
- Telecommunications equipment

- Data display devices
- Security alarms and access control devices
- Handheld instruments
- Modems
- Time/attendance clocks and terminals'
- Patient Monitoring Devices
- Glucose Analyzers
- Infusion Pumps

Protocol Support

The PremierWave EN device server contains a full-featured IP stack. Supported protocols include:

- ARP, IP, UDP, TCP, ICMP, BOOTP, DHCP, Auto IP, Telnet, DNS, FTP, TFTP, SSH, SSL/TLS, and Syslog for network communications and management.
- TCP, UDP, tunneling to the serial port.
- TFTP for uploading/downloading files.
- FTP for firmware upgrades and uploading/downloading files.

Troubleshooting Capabilities

The PremierWave EN offers a comprehensive diagnostic toolset that lets you troubleshoot problems quickly and easily. Available from the CLI, the diagnostic tools let you:

- View memory and IP socket information.
- Perform ping and traceroute operations.
- Conduct forward or backup DNS lookup operations.
- View all processes currently running on the PremierWave EN, including CPU utilization.
- View system log messages.

Configuration Methods

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

DeviceInstaller: Configure the IP address and related settings and view current settings on the PremierWave EN using a Graphical User Interface (GUI) on a PC attached to a network. (See page 16.)

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

XML: The PremierWave EN 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 PremierWave EN 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.

Figure 2-1 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 TCP port number 23.

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

- TCP Port 22: SSH Server (Command Mode configuration)
- TCP Port 23: Telnet Server (Command Mode configuration)
- TCP Port 21: FTP
- UDP Port 30718: LDP (Lantronix Discovery Protocol) port
- TCP/UDP Port 10001: Tunnel 1
- TCP/UDP Port 10002: Tunnel 2
- TCP/UDP Port 10003: Tunnel 3

Product Information Label

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

- Bar code
- Product Revision
- Part number
- Hardware Address (MAC Address)
- Manufacturing Date Code

Figure 2-2. Product Label

3: Using DeviceInstaller

This chapter covers the steps for locating a PremierWave EN unit and viewing its properties and device details.

Notes:

- For instructions on using DeviceInstaller to configure the IP address and related settings or for more advanced features, see the Device Installer online Help.
- Auto IP generates a random IP address in the range of 169.254.0.1 to 169.254.255.254, with a netmask of 255.255.0.0, if no BOOTP or DHCP server is found.

Accessing PremierWave EN using DeviceInstaller

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

To use the DeviceInstaller utility, first install the latest version from the downloads page on the Lantronix web site www.lantronix.com/downloads.

1. Run the executable to start the installation process and respond to the installation wizard prompts. (If prompted to select an installation type, select **Typical**.)

2. Click **Start→All Programs→Lantronix→DeviceInstaller →DeviceInstaller.**

3. When DeviceInstaller starts, it will perform a network device search. To perform another search, click the "Search" button.

4. Expand the PremierWave folder by clicking the **+** symbol next to the PremierWave folder icon. The list of available Lantronix PremierWave EN devices appears.

5. Select the PremierWave EN unit by expanding its entry and clicking on its IP address to view its configuration.

6. On the right page, click the **Device Details** tab. The current PremierWave EN configuration appears. This is only a subset of the full configuration; the full configuration may be accessed via CLI or XML.

Device Details Summary

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

Current Settings	Description
Name	Name identifying the PremierWave EN.
DHCP Device Name	The name associated with the PremierWave EN module's current IP address, if the IP address was obtained dynamically.
Group	Configurable field. Enter a group to categorize the PremierWave EN. 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 PremierWave EN. 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 PremierWave EN device family type as "PremierWave".
Type	Shows the device type as "PremierWave EN".
ID	Shows the PremierWave EN ID embedded within the unit.
Hardware Address	Shows the PremierWave EN hardware (MAC) address.
Firmware Version	Shows the firmware currently installed on the PremierWave EN.
Extended Firmware Version	Provides additional information on the firmware version.
Online Status	Shows the PremierWave EN status as Online, Offline, Unreachable (the PremierWave EN is on a different subnet), or Busy (the PremierWave EN is currently performing a task).
IP Address	Shows the PremierWave EN current IP address. To change the IP address, click the Assign IP button on the DeviceInstaller menu bar.
IP Address was Obtained	Appears "Dynamically" if the PremierWave EN automatically received an IP address (e.g., from DHCP). Appears "Statically" if the IP address was configured manually. If the IP address was assigned dynamically, the following fields appear: ◆ **Obtain via DHCP** with values of True or False. ◆ **Obtain via BOOTP** with values of True or False.
Subnet Mask	Shows the subnet mask specifying the network segment on which the PremierWave EN 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 PremierWave EN.
Supports Configurable Pins	Shows True, indicating configurable pins are available on the PremierWave EN.
Supports Email Triggers	Shows True, indicating email triggers are available on the PremierWave EN.
Telnet Enabled	Indicates whether Telnet is enabled on this PremierWave EN.

Current Settings	Description
Telnet Port	Shows the PremierWave EN port for Telnet sessions.
Web Enabled	Indicates whether Web Manager access is enabled on this PremierWave EN.
Web Port	Shows the PremierWave EN port for Web Manager configuration (if Web Enabled field is True).
Firmware Upgradeable	Shows True, indicating the PremierWave EN firmware is upgradeable as newer versions become available.

4: Network Settings

The Network Settings show the status of the Ethernet or WLAN interface/link and let you configure the settings on the device. Interface settings are related to the configuration of the IP and related protocols. Link settings are related to the physical link connection, which carries the IP traffic.

The PremierWave EN contains two network interfaces, only one of which may be active at a time. The Ethernet interface is also called **interface 1** or **eth0**, and the WLAN interface is called **interface 2** or **wlan0**.

Note: *Some settings require a reboot to take effect. These settings are noted below.*

Network Interface Settings

This table shows the settings for the network interface configuration. These settings apply to both the Ethernet and WLAN interfaces, but are configured independently for each interface.

Network Interface Configuration Settings	Description
State	Enables or disables the interface.
BOOTP	Select **Enable** or **Disable**. At boot up, after the physical link is up, the PremierWave EN will attempt to obtain IP settings from a BOOTP server. ***Notes:*** *Overrides the configured IP address/mask, gateway, hostname, and domain.* *When DHCP is **Enable**, the system automatically uses DHCP, regardless of whether BOOTP is **Enable.*** *Changing this value requires you to reboot the device.*
DHCP	Select **Enable** or **Disable**. At boot up, after the physical link is up, the PremierWave EN will attempt to obtain IP settings from a DHCP server and will periodically renew these settings with the server. ***Notes:*** *Overrides BOOTP, the configured IP address/mask, gateway, hostname, and domain.* *Changing this value requires you to reboot the device.*
IP Address	Enter the static IP address to use for the interface. You may enter it alone or in CIDR format. ***Notes:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are **Disable**).* *Changing this value requires you to reboot the device.* *When DHCP or BOOTP is enabled, the PremierWave EN tries to obtain an IP address from a DHCP or BOOTP server. If it cannot, the PremierWave EN generates and uses an Auto IP address in the range of 169.254.xxx.xxx, with a network mask of 255.255.0.0.*
Default Gateway	Enter the IP address of the router for this network. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are **Disable**).*

Network Interface Configuration Settings	Description
Hostname	Enter the hostname for the interface. It must begin with a letter or number, continue with a sequence of letters, numbers, or hyphens, and end with a letter or number. ***Note:*** *This setting will take effect immediately, but will not register the hostname with a DNS server until the next reboot.*
Domain	Enter the domain name suffix for the interface. ***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no Domain Suffix was acquired from the server.*
DHCP Client ID	Enter the ID if the DHCP server requires a DHCP Client ID option. 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 PremierWave EN MAC address.
Primary DNS	Enter the IP address of the primary Domain Name Server. ***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no DNS server was acquired from the server.*
Secondary DNS	Enter the IP address of the secondary Domain Name Server. ***Note:*** *This setting will be used when either Static IP or Auto IP is active, or if DHCP/BOOTP is active and no DNS server was acquired from the server.*

Table 4-1 Using the CLI to Access Network Interface Settings

Command Level - eth0	`enable->config->if 1`
Command Level - wlan0	`enable->config->if 2`

Table 4-2 Using XML to Access Network Interface Settings

Configuration group - eth0	`configgroup name = "interface" instance = "eth0"`
Configuration group - wlan0	`configgroup name = "interface" instance = "wlan0"`

Network Link Settings

The Network Link settings allow you to configure the physical link parameters for a Network Interface. The Ethernet and WLAN link settings are described below.

Table 4-3 Network 1 Ethernet (eth0) Link Settings

Network 1 Ethernet (eth0) Link Settings	Description
Speed	Select the Ethernet link speed. (Default is Auto) ◆ **Auto** = Auto-negotiation of Link Speed ◆ **10** = Force 10 Mbps ◆ **100** = Force 100 Mbps
Duplex	Select the Ethernet link duplex mode. (Default is Auto) ◆ **Auto** = Auto-negotiation of Link Duplex ◆ **Half** = Force Half Duplex ◆ **Full** = Force Full Duplex

Table 4-4 Using the CLI to Access Network Link Settings

Command level - eth0	`enable->config->if 1->link`

Table 4-5 Using XML to Access Network Link Settings

Configuration group - eth0	`configgroup name = "ethernet" instance = "eth0"`

Notes:

- *When speed is **Auto**, duplex must be **Auto** or **Half**.*
- *When speed is not **Auto**, duplex must be **Half** or **Full**.*
- *Fixed speed **Full** duplex will produce errors connected to **Auto**, due to duplex mismatch.*

Table 4-6 Network 2 WLAN (wlan0) Link Settings

Network 2 WLAN (wlan0) Link Settings	Description
Choice 1 Profile **Choice 2 Profile** **Choice 3 Profile** **Choice 4 Profile**	Up to four (4) WLAN Profiles may be selected for automatic connection to wireless networks. More information on wireless settings is available in *WLAN Settings* on page *22*. Enter the name of the WLAN Profile desired for each choice.

Network 2 WLAN (wlan0) Link Settings	Description
Debugging Level	The Debugging Level sets the verbosity level for printing WLAN Link messages to the TLOG. (Default is Info) Available levels, from most to least verbose: ◆ Dump ◆ Debug ◆ Info ◆ Warning ◆ Error

Table 4-7 Using the CLI to Access Network Link Settings

Command level - wlan0	`enable->config->if 2->link`
Command level - wlan0	`enable->config->if 2->link->choice 1|2|3|4`

Table 4-8 Using XML to Access Network Link Settings

Configuration group - wlan0	`configgroup name = "wlan" instance = "wlan0"`

WLAN Settings

WLAN Link Information Commands

These commands display information about the current state wireless network.

WLAN Link Information Commands	Description
Scan "<network SSID>"	Performs a scan for devices within range of the PremierWave EN. Including the optional **network SSID** limits the scan to devices configured with the specified network SSID. Omitting the network SSID performs a scan for all devices in range. ***Note:*** *When omitting the network SSID it is still necessary to include the opening and closing quotation marks (scan "").*
Status	Displays status information about the WLAN link.

The results of the ***scan*** command are presented in the following format:

WLAN Link Scan Results Field	Description
BSSID	Basic Service Set Identifier.
Frequency	The frequency on which the device is operating.
Signal Level	The Received Signal Strength Indication (RSSI) of the device measured in dBm.

WLAN Link Scan Results Field	Description
Flags	Indicates the security suite in use by the device as well as whether it is operating in Adhoc (IBSS) mode.
SSID	The Service Set Identifier (network name) of the device.

The results of the ***status*** command are presented in the following format:

WLAN Link Status Results Field	Description
Type	Indicates this is a WLAN link
BSSID	A unique identifier for the Basic Service Set corresponding to the MAC address of the Access Point in infrastructure mode, or a generated value in Adhoc mode.
SSID	The Service Set Identifier of the connected network.
Topology	The type of wireless network in use for the current association (Adhoc or Infrastructure).
Active WLAN Profile	Indicates which WLAN profile created the current connection to the wireless network.
Pairwise Cipher	The standard used to encrypt a particular type of data in the current wireless association.
Group Cipher	The standard used to encrypt a particular type of data in the current wireless association.
Security Suite	Indicates the security suite used for the current association.
Channel	The channel used for the current association.
IP Address	The IP address assigned to the PremierWave EN
RSSI	A measure of the power level of the received radio signal in dBm.

Table 4-9 Using the CLI to Access WLAN Link Information

Command level	`enable>configure>if 2>link`

WLAN Profiles

A WLAN profile defines all of the settings necessary to establish a wireless connection with either an access point (in infrastructure mode) or another wireless client (in Adhoc mode.) A maximum of six profiles can exist on the PremierWave EN at a time. Of these, up to four can be configured as ***active*** (see ***Profile Choices*** under *WLAN Settings on page 22*).

WLAN Profile Management Commands

These commands create, edit and remove WLAN profiles on the PremierWave EN.

WLAN Profile Management Commands	Description
Show	Display the currently configured WLAN profiles.
Create	Creates a new WLAN profile with default settings.
Edit	Selects a WLAN profile for editing. Editing begins at the 'Basic' level settings for the specified profile.
Delete	Permanently deletes a WLAN profile from the PremierWave EN.
Apply wlan	Immediately applies all changes made to the WLAN configuration without saving them in persistent storage. ***Note:*** *This command is available at all levels within the WLAN profile.*
Write	Immediately applies all changes made to the WLAN configuration and saves them to persistent storage. ***Note:*** *This command is available at all levels within the WLAN profile.*

Table 4-10 Using the CLI to Access the WLAN Profile Management Commands

Command level	`enable>configure>wlan profiles`

Table 4-11 Using XML to Access the WLAN Profile Management Commands

Configuration group name	`wlan profile:(profile name)`

WLAN Profile Basic Settings

WLAN Profile Basic Settings	Description
Network Name	The name of the wireless network (SSID.) ***Note:*** *The PremierWave EN performs only passive scans on the DFS channels (52–140.) In order for the PremierWave EN to connect with an access point on one of these channels, the access point must be configured to broadcast the SSID in its beacons.*
Topology	Specifies Infrastructure (ESS) or Adhoc (IBSS) mode. ◆ **Infrastructure**: mode that communicates with access points. ◆ **Adhoc**: mode that communicates with other clients.
Channel	Specifies the channel for an Adhoc network. ***Note:*** *This setting only applies to the creation of an Adhoc network.*

Table 4-12 Using the CLI to Configure WLAN Profile Basic Settings

Command level	`enable>configure>wlan profiles>edit (profile name)`
	or
	`enable>configure>wlan profiles>edit (profile #)`

Table 4-13 Using XML to Configure WLAN Profile Basic Settings

Configuration group name	`wlan profile:(profile name)`

WLAN Profile Advanced Settings

WLAN Profile Advanced Settings	Description
TX Data Rate Maximum	Specifies the rate for data transmission. ***Note:*** *This setting only applies if '**TX Data Rate**' is set to '**Fixed**'.*
TX Data Rate	PremireWave lets you control the transmission data rate or controls it automatically. ◆ **Fixed** = keeps the transmission rate at the configured value. ◆ **Auto-reduction** = allows the PremierWave EN to reduce the data rate automatically, depending on link quality.
TX Power Maximum	Maximum transmission output power in dBm.

WLAN Profile Advanced Settings	Description
Antenna Diversity	Selects the antenna the radio will use or allows the PremierWave EN to automatically make the selection. ◆ **Enabled** = allow the PremierWave EN to select the antenna. ◆ **Antenna 1** = use the internal antenna. ◆ **Antenna 2** = use the external antenna.
Power Management	Power management reduces the overall power consumption of the PremierWave EN unit, but can increase latency. ◆ **Enabled** = allows the PremierWave EN to turn off the receiver when it is idling. ◆ **Disabled** = keeps the receiver on at all times.
Power Management Interval	Number of beacons (100 ms interval) between 1 and 10. The above-mentioned latency can be up to this number X 100ms.

Table 4-14 Using the CLI to Configure WLAN Profile Advanced Settings

Command level	`enable>configure>wlan profiles>edit (profile name)>advanced`

Table 4-15 Using XML to Configure WLAN Profile Advanced Settings

Configuration group name	`wlan profile:(profile name)`

WLAN Profile Security Settings

The PremierWave EN supports WEP, WPA, and WPA2/IEEE 802.11i to secure all wireless communication. WPA and WPA2/IEEE 802.11i are not available for Adhoc topology.

The WPA2/IEEE 802.11i mode is compliant with the Robust Secure Network specified in the IEEE standard 802.11i.

WLAN Profile Security Settings	Description
Suite	Specifies the security suite to be used for this profile. **None** = no authentication or encryption method will be used. **WEP** = Wired Equivalent Privacy **WPA** = WiFi Protected Access **WPA2** = Robust Secure Network.
Key Type	Selects the format of the security key.

WLAN Profile Security Settings	Description
Passphrase	The passphrase consists of up to 63 characters. ***Note:*** *Lantronix recommends using a passphrase of 20 characters or more for maximum security. Spaces and punctuation characters are permitted.* ***Note:*** *The passphrase input is not the same as ASCII input (as used on some products.) ASCII is translated directly into hexadecimal bytes according to the ASCII table, while a possibly larger passphrase is hashed into a key and provides better security through a larger range of key values.*

Table 4-16 Using the CLI to Configure WLAN Profile Security Settings

Command level	`enable>configure>wlan profiles>edit (profile name)>security`

Table 4-17 Using XML to Configure WLAN Profile Security Settings

Configuration group name	`wlan profile:(profile name)`

WLAN Profile WEP Settings

WEP security is available in both **Infrastructure** and **AdHoc** modes. WEP is a simple and efficient security mode encrypting the data via the RC4 algorithm. However, WEP has become more vulnerable due to advances in hacking technology. State of the art equipment can find WEP keys in five minutes. For stronger security, please use WPA, or better, WPA2 with AES (CCMP).

WLAN Profile WEP Settings	Description
Authentication	Selects the authentication method to be used. ◆ **Shared** = encryption keys of both parties are compared as a form of authentication. If mismatched, no connection is established. ◆ **Open** = a connection is established without first checking for matching encryption keys. However, mismatched keys will result in garbled data and thus a lack of connectivity at the IP level.
Key Size	Key size in bits. Select 40 for WEP40 and WEP64, select 104 for WEP104 and WEP128.
TX Key Index	Selects one of four indexes listing keys for transmitting data. Reception is allowed with all four keys. ***Note:*** *For operability with some products that generate four identical keys from a passphrase, this index must be one.*
Keys 1-4	Enter one or more encryption keys in hexadecimal format. Enter 10 hexadecimal digits (0-9, a-f) for WEP40 and 26 for WEP104. The configured keys are not shown for security reasons.

Table 4-18 Using the CLI to Configure WLAN Profile WEP Settings

Command level	`enable>configure>wlan profiles>edit (profile name)>security>wep`

Table 4-19 Using XML to Configure WLAN Profile WEP Settings

Configuration group name	`wlan profile:(profile name)`

WLAN Profile WPA and WPA2/IEEE802.11i Settings

WPA and WPA2/IEEE802.11i security suites are available for **Infrastructure** mode only.

WPA is a security standard specified by the WiFi Alliance and is a close derivative of an early draft of the IEEE802.11i specification. WEP was becoming vulnerable and finalizing the IEEE802.11i standard was still far away. WPA2 is WiFi's subset of the broad IEEE802.11i standard to enforce better interoperability. The PremierWave EN is compliant with both WPA2 and IEEE802.11i.

WLAN Profile WPA & WPA2 Settings	Description
Authentication	Selects the authentication method to be used. ◆ **PSK** = Pre-Shared Key. The same key needs to be configured on both sides of the connection. (On the PremierWave EN and on the Access Point.) ◆ **IEEE 802.1X** = This authentication method communicates with a RADIUS authentication server that is part of the network. The RADIUS server will match the credentials sent by the PremierWave EN with an internal database.
Key	64 hexadecimal digits (32 bytes.)

WLAN Profile WPA & WPA2 Settings	Description
IEEE 802.1X	Selects the protocol to use to authenticate the WLAN client. ◆ **LEAP** = Lightweight Extensible Authentication Protocol. A derivative of the original **Cisco LEAP**, which was a predecessor of 802.1X. Real **Cisco LEAP** uses a special MAC layer authentication (called **Network EAP**) and cannot work with **WPA/WPA2**. The PremierWave EN uses a more generic version to be compatible with other major brand WiFi equipment. The authentication backend is the same. ◆ **EAP-TLS =** Extensible Authentication Protocol - Transport Layer Security. Uses the latest incarnation of the **Secure Sockets Layer (SSL)** standard and is the most secure because it requires authentication certificates on both the network side and the PremierWave EN side. ◆ **EAP-TTLS =** Extensible Authentication Protocol - Tunneled Transport Layer Security. ◆ **PEAP** = Protected Extensible Authentication Protocol. ◆ **EAP-TTLS** and **PEAP** have been developed to avoid the requirement of certificates on the client side (PremierWave EN), which makes deployment more cumbersome. Both make use of **EAP-TLS** to authenticate the server (network) side and establish an encrypted tunnel. This is called the outer-authentication. Then a conventional authentication method (**MD5**, **MSCHAP**, etc.) is used through the tunnel to authenticate the PremierWave EN. This is called inner authentication. ◆ **EAP-TTLS** and **PEAP** have been developed by different consortia and vary in details, of which the most visible is the supported list of inner authentications. ***Note:*** *When using **EAP-TLS**, **EAP-TTLS** or **PEAP** authority, at least one authority certificate will have to be installed in the **SSL** configuration that is able to verify the RADIUS server's certificate. In case of **EAP-TLS**, also a certificate and matching private key need to be configured to authenticate the PremierWave EN to the RADIUS server. For more information about SSL certificates see Secure Sockets Layer (SSL) on page ??. XXX FIXME: need link here*
EAP-TTLS Option	Selects the inner authentication method to be used with EAP-TTLS (if configured.) ◆ EAP-MSCHAPv2 ◆ MSCHAPv2 ◆ MSCHAP ◆ CHAP ◆ PAP ◆ EAP-MD5
PEAP Option	Selects the inner authentication method to be used with EAP-PEAP (if configured.) ◆ EAP-MSCHAPv2 ◆ EAP-MD5
Username	Userid for identifying the PremierWave EN to the RADIUS server in the network
Password	Password for identifying the PremierWave EN to the RADIUS server in the network.

WLAN Profile WPA & WPA2 Settings	Description
Encryption	Select one or more encryption types, listed from strongest to least strong. At least one selection will have to match the Access Points intended to connect with. ◆ **CCMP** = Uses AES as basis and is the strongest encryption option. ◆ **TKIP** = Uses WEP as the basis, but adds extra checks and variations for added protection. ◆ **WEP** = Based on RC4. ***Note:*** *In case the encryption settings on the Access Point(s) can still be chosen, the capabilities of the Access Point(s) and the other clients that need to use the network need to be taken into account.*
RSA Certificate Name	Name of client certificate (required for EAP-TLS.) For more information about SSL certificates see *SSL Settings on page 41*.

Table 4-20 Using the CLI to Configure WLAN Profile WPA and WPA2/IEEE802.11i Settings

Command level	`enable>configure>wlan profiles>edit (profile name)>security>wpax`

Table 4-21 Using XML to Configure WLAN Profile WPA and WPA2/IEEE802.11i Settings

Configuration group name	`wlan profile:(profile name)`

5: Line and Tunnel Settings

The PremierWave EN contains three Lines. Lines 1 and 2 are standard RS232/RS485 serial ports, while Line 3 is an emulated serial port over the USB Device (USB-CDC-ACM).

RS232/RS485

Lines 1 and 2 can be configured to operate in the following modes:

- RS232
- RS485 Full Duplex
- RS485 Half Duplex, with and without termination impedance
- All serial settings such as Baud Rate, Parity, Data Bits, etc, apply to these Lines.

USB-CDC-ACM

Line 3 can only operate as an emulated serial port over the USB Device port. It uses the standard CDC-ACM protocol, which is supported natively by most host operating systems (Windows, Linux, etc.). Since it is an emulated serial port, most standard serial port settings are irrelevant. Flow control is inherent to the USB protocol, and the line speed (Baud Rate) will be "as fast as conditions permit".

When the PremierWave EN USB Device port is cabled to a host, it will identify itself with the industry standard USB Vendor ID of 0x0525 and Product ID of 0xa4a7.

When attached to a Windows host, a device driver .inf file (see *Appendix E - USB-CDC-ACM Device Driver File for Windows Hosts*) must be installed the first time the port is cabled. Once installed, Windows will configure an available COM port, each time the USB cable is attached.

CAUTION: ***Under Windows, if the PremierWave EN device is rebooted when an active COM port is configured and in use, the COM port will come back up in an unstable state. When this happens, any terminal program accessing the COM port must be disconnected, and the USB cable physically replugged (or the COM port under Device Manager disabled/enabled).***

When attached to a Linux host, the USB-CDC-ACM connection will automatically be configured, assuming the Linux host is configured for USB host operation and the "cdc_acm" driver is available. Once recognized, the cdc_acm driver will configure a standard serial port in the /dev/ttyACMx series, where x is a number 0, 1, 2, 3, etc.

CAUTION: ***Under Linux, if the /dev/ttyACMx device is in use when the PremierWave EN is rebooted, some terminal programs under Linux will automatically disconnect while others will not. If a terminal program does not disconnect automatically, when the PremierWave EN comes back up, the CDC-ACM connection will be enumerated to a different /dev/ttyACMx device.***

Line Settings

The Line Settings allow configuration of the serial Lines (ports).

Some settings may be specific to only certain Lines. Such settings are noted below.

Line Settings	Description
Name	Enter a name or short description for the line, if desired. By default, there is no name specified. A name that contains whitespace must be quoted.
Interface	Sets the interface type for the Line. The default is **RS232** for Lines 1 and 2, and **USB-CDC-ACM** for Line 3. Choices are: ◆ **RS232** (Lines 1 and 2 only) ◆ **RS485 Full-Duplex** (Lines 1 and 2 only) ◆ **RS485 Half-Duplex** (Lines 1 and 2 only) ◆ **USB-CDC-ACM** (Line 3 only) = CDC-ACM over USB
Termination	Sets the Line Termination to **Enable** or **Disable**. The default is **Disable**. ***Note:*** *This setting is only relevant for Lines 1 and 2 with Interface type RS485 Half-Duplex.*
State	Sets the operational state of the Line to either **Enable** or **Disable**. The default is **Enable**.
Protocol	Sets the operational protocol for the Line. The default is **Tunnel**. Choices are: ◆ None ◆ Tunnel = Serial-Network tunneling protocol.
Baud Rate	Sets the Baud Rate (speed) of the Line. The default is **9600**. Any speed between 300 and 921600 may be selected, but the following standard rates are recommended: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600. ***Note:*** *For Interface type USB-CDC-ACM (Line 3 only), this setting is irrelevant.*
Parity	Sets the Parity of the Line. The default is **None**. ***Note:*** *For Interface type USB-CDC-ACM (Line 3 only), this setting is irrelevant.*
Data Bits	Sets the number of data bits for the Line. The default is 8. ***Note:*** *For Interface type USB-CDC-ACM (Line 3 only), this setting is irrelevant.*
Stop Bits	Sets the number of stop bits for the Line. The default is 1. ***Note:*** *For Interface type USB-CDC-ACM (Line 3 only), this setting is irrelevant.*
Flow Control	Sets the flow control for the Line. The default is None. ***Note:*** *For Interface type USB-CDC-ACM (Line 3 only), this setting is irrelevant.*
Command Mode	Sets the Command Mode state of the Line. When in Command

Line Settings	Description
	Mode, a CLI session operates exclusively on the Line. Choices are: ◆ Disable ◆ Always ***Note:*** *In order to enable command mode on the Line, Tunneling on the Line must be Disabled (both connect and accept modes).*

Table 5-1 Using the CLI to Configure Line Settings

To enter Line 1 level	`enable->line 1`

Table 5-2 Using XML to Configure Line Settings

For Line 1	`configgroup name = "line" instance = "1"`
For Line 1 Command Mode	`configgroup name = "serial command mode" instance = "1"`

Tunnel Settings

The Tunnel Settings allow you to configure how the Serial-Network tunneling operates. Tunneling is available on all serial Lines.

Accept Mode

In Accept Mode, the PremierWave EN listens (waits) for incoming connections from the network. Serial data can still be received while waiting for a network connection, keeping in mind serial data buffer limitations.

Tunnel Accept Mode Settings	Description
Accept Mode	Sets the method used to start a tunnel in Accept mode. Choices are: ◆ **Disable** = do not accept an incoming connection. ◆ **Always** = accept an incoming connection. (*default*)
Local Port	Sets the port number for use as the network local port. The defaults are as follows: ◆ Tunnel 1 : 10001 ◆ Tunnel 2 : 10002 ◆ Tunnel 3 : 10003
Protocol	Sets the protocol type for use with Accept Mode. Choices are: ◆ **TCP** = Use TCP protocol for network connection. (*default*)
Flush Serial	Sets whether the serial Line data buffer is flushed upon a new network connection. Choices are: ◆ **Enable** = serial data buffer is flushed on network connection ◆ **Disable** = serial data buffer is not flushed on network connection (*default*)

Tunnel Accept Mode Settings	Description
CP – Group	Configures the name of the CP Group to set upon making or breaking an Accept mode connection. By default, there is no CP Group set. ***Note:*** *See Chapter 6: Configurable Pin Manager for information on how to configure the CP groups and pins.*
CP – Connection Value	Sets the value to output to the CP Group upon Accept mode connection. Default is 0.
CP – Disconnection Value	Sets the value to output to the CP Group upon Accept mode disconnection. Default is 0.

Table 5-3 Using the CLI to Configure Tunnel Accept Mode Settings

To enter Tunnel 1 Accept Mode level	`enable->tunnel 1->accept`

Table 5-4 Using XML to Configure Tunnel Accept Mode Settings

For Tunnel 1 Accept Mode	`configgroup name = "tunnel accept" instance = "1"`

Connect Mode

In Connect Mode, the PremierWave EN continues to attempt an outgoing connection on the network, until established. If the connection attempt fails or the connection drops, then it retries after a timeout.

Tunnel Connect Mode Settings	Description
Connect Mode	Sets 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 PremierWave EN retries until it makes a connection. ◆ **Disable** = an outgoing connection is never attempted. (*default*)
Reconnect Time	Sets the value of the reconnect timeout (in milliseconds) for outgoing connections established by the device. Valid range is 1 to 65535 milliseconds. Default is 15000.
Flush Serial	Sets whether the serial Line data buffer is flushed upon a new network connection. Choices are: ◆ **Enable** = serial data buffer is flushed on network connection ◆ **Disable** = serial data buffer is not flushed on network connection (*default*)
CP – Group	Configures the name of the CP Group to set upon making or breaking a Connect mode connection. By default, there is no CP Group set. ***Note:*** *See Chapter 6: Configurable Pin Manager for information on how to configure the CP groups and pins.*
CP – Connection Value	Sets the value to output to the CP Group upon Connect mode connection. Default is 0.
CP – Disconnection Value	Sets the value to output to the CP Group upon Connect mode disconnection. Default is 0.
Host – Address	Sets the remote host with which to establish a tunneling connection. Format is either an IP address or resolvable host name. By default, there is no address configured.
Host – Port	Sets the remote port to use to establish a tunneling connection.
Host – Protocol	Sets the protocol to use for connect mode tunneling. Choices are: **TCP** (*default*) **UDP**

Table 5-5 Using the CLI to Configure Tunnel Connect Mode Settings

To enter Tunnel 1 Connect Mode level	`enable->tunnel 1->connect`

Table 5-6 Using XML to Configure Tunnel Connect Mode Settings

For Tunnel 1 Connect Mode	`configgroup name = "tunnel connect" instance = "1"`

Packing Mode

With Packing, data from the serial Line is not sent over the network immediately. Instead, data is queued and sent in segments, when either the timeout or byte threshold is reached. Packing applies to both Accept and Connect Modes.

Tunnel Packing Settings	Description
Threshold	Sets the threshold (byte count). If the received serial data reaches this threshold, then the data will be sent on the network. Valid range is 100 to 2048 bytes. Default is 2048.
Timeout	Sets the timeout value, in milliseconds, after the first character is received on the serial Line, before data is sent on the network. Valid range is 1 to 30000 milliseconds. Default is 1000.

Table 5-7 Using the CLI to Configure Tunnel Packing Mode Settings

To enter Tunnel 1 Packing level	`enable->tunnel 1->packing`

Table 5-8 Using XML to Configure Tunnel Packing Mode Settings

For Tunnel 1 Packing Mode	`configgroup name = "tunnel packing" instance = "1"`

6: Configurable Pin Manager

The Configurable Pin Manager is responsible for assignment and control of the configurable pins (CPs) available on the PremierWave EN. There are nine configurable pins on the PremierWave EN.

You can configure the CPs by making them part of a group. A CP Group may consist of one or more CPs This increases flexibility when incorporating the PremierWave EN into another system.

CPM: Configurable Pins

Each CP is associated with an external hardware pin. CPs can trigger an outside event, like sending an email message or starting Command Mode on a serial Line.

The Current Configuration table shows the current settings for each CP.

CP	Pin #	Configured as	Value	Groups	Active in group
CP1	Pin 14	Input	0	1	test1
CP2	Pin 16	Input	1	1	test2
CP3	Pin 18	Input	0	0	<available>
CP4	Pin 20	Input	1	0	<available>
CP5	Pin 32	Input	0	0	<available>
CP6	Pin 27	Input	0	0	<available>
CP7	Pin 44	Input	0	0	<available>
CP8	Pin 38	Input	0	0	<available>
CP9	Pin 42	Input	0	0	<available>

CPM – CPs Configuration	Description
CP	Indicates the configurable pin number.
Pin #	Indicates the hardware pin number associated with the CP.
Configured As	Shows the CP configuration. A CP configured as **Input** is set to read input. A CP configured as **Output** drives data out of the PremierWave EN.
Value	Indicates the current status of the CP: ◆ **1** = asserted. ◆ **0** = de-asserted. ◆ **I** = the CP is inverted (active low).
Groups	Indicates the number of groups in which the CP is a member.

Active In Group	A CP can be a member of several groups. However, it may only be active in one group. This field shows the group in which the CP is active.
	
	To display the CP status of a specific pin. Type show cp<number>. The CP Status table shows the information about the cp.
	
	`Name  : CP1`
	`State : Enabled`
	`Value : 0 (0x00000000)`
	`----------`

CPM – CPs Configuration	Description
	Bit : 8 7 6 5 4 3 2 1 0 : ---------- Level : - : ---------- I/O : I :---------- Logic : : ---------- Binary: x x x x x x x x 0 : ---------- CP# : 0 0 0 0 0 0 0 0 1 :----------
CPM – CPs Status	**Description**
Name	Shows the CP number.
State	Shows the current enable state of the CP.
Value	Shows the last bit in the CP current value.
Bit	Visual display of the bitwise 32 bit placeholders for a CP.
Level	A "**+**" symbol indicates the CP is asserted (the voltage is high). A "**-** "indicates the CP voltage is low.
I/O	Indicates the current status of the pin: ◆ **I** = input ◆ **O** = output ◆ **<blank>** = unassigned
Logic	An "**l**" indicates the CP is inverted (active low).
Binary	Shows the assertion value of the corresponding bit.
CP#	Shows the CP number.
Groups	Lists the groups in which the CP is a member.

Notes:

- To modify a CP, all groups in which it is a member must be disabled.
- The changes to a CP configuration are not saved in FLASH. Instead, these CP settings are used when the CP is added to a CP Group. When the CP Group is saved, its CP settings are saved with it. Thus, a particular CP may be defined as "Input" in one group but as "Output" in another. Only one group containing any particular CP may be enabled at once.

CPM: Groups

The CP Groups page allows for the management of CP groups. Groups can be created or deleted. CPs can be added to or removed from groups. A group, based on its state, can trigger outside events (such as sending email messages). Only an enabled group can be a trigger.

Group name	State	CP info
test1	Enabled	1 CPs assigned
test2	Enabled	1 CPs assigned

CPM – Groups Current Configuration	Description
Group Name	Shows the CP group's name.
State	Indicates whether the group is enabled or disabled.
CP Info	Provides CP group information.

CPM – Groups Group Status	Description
Name	Shows the CP Group name.
State	Current enable state of the CP group.
Value	Shows the CP group's current value.
Bit	Visual display of the 7 bit placeholders for a CP.
Level	A "+" symbol indicates the CP's bit position is asserted (the voltage is high). A "-" indicates the CP voltage is low.
I/O	Indicates the current status of the pin: ◆ I = input ◆ O = output ◆ <blank> = unassigned
Logic	An "I" indicates the CP output is inverted.
Binary	Shows the assertion value of the corresponding bit. X = group is disabled or bit is unassigned in group
CP#	Shows the configurable pin number and its bit position in the CP group.

Action	Command
To create a CP group	`create <group>`
To delete a CP group	`delete <group>`
To enable or disable a CP group	`enable / disable <group>`
To set a CP group's value	`set <group> <value>`
To add a CP to a CP group	`add <cp> to <group>`
To delete a CP from a CP group	`delete <cp> from <group>`
To change CP to input or output	`set <cp> as [output | input]`
To change CP to an output value	`set <cp> as output assert low`

7: Services Settings

DNS Configuration

This page shows the active run-time settings for the domain name system (DNS) protocol. The primary and secondary 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 page also shows any contents in the DNS cache. When a DNS name is resolved using a forward lookup, the results are stored in the DNS cache temporarily. The PremierWave EN consults this cache when performing forward lookups. Each item in the cache eventually times out and is removed automatically after a certain period, or you can delete it manually.

Table 7-1 DNS Configuration

Action	Command
To view the PremierWave EN DNS configuration	`config-if:eth0# show`
To set the PremierWave EN DNS configuration	`config-if:eth0# primary dns <ip address>` `config-if:eth0# secondary dns <ip address>`

Syslog Configuration

The Syslog page shows the current configuration, status, and statistics of the syslog. Here you can configure the syslog destination and the severity of the events to log.

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

```
Config-syslog# show
Syslog Configuration:
   State             : Enabled
   Host              : 172.19.217.1
   Remote Port       : 514
   Severity Log Level: Debug
```

Table 7-2 Syslog Configuration

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.
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 PremierWave EN 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.)

8: Security Settings

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, and also for wireless authentication.

Certificate/Private key combinations can be obtained from an external Certificate Authority (CA) and uploaded 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 *Chapter 12: Security in Detail*.

Certificate Upload Settings

SSL certificates identify the PremierWave EN to peers, and can be used with some methods of wireless authentication. Additional uses will be possible in future releases Certificate and key pairs can be uploaded to the PremierWave through either the CLI or XML import mechanisms. Certificates can be identified on the PremierWave by a name provided at upload time.

Table 8-1 Certificate Upload Settings

Certificate Upload Settings	Description
Certificate	SSL certificate to be uploaded.. RSA or DSA certificates are allowed. The format of the certificate must be PEM. It 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.
Private Key	The key needs to belong to the certificate entered above. The format of the file must be PEM. It 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.

Table 8-2 Using the CLI to Upload an Existing SSL Certificate/Key Pair

Command level	`enable>ssl`
Commands	`rsa <cert_name>` `dsa <cert_name>`

Table 8-3 Using XML to Upload an Existing SSL Certificate/Key Pair

Configuration group name	`ssl`
Configuration item name	`RSA certificate or DSA certificate`

Authority Certificate Settings

One or more authority certificates are needed to verify a peer's identity. Authority certificates are used with some wireless authentication methods. These certificates do not require a private key.

Table 8-4 Authority Certificate Settings

Authority Certificate Settings	Description
Authority	SSL authority certificate. RSA or DSA certificates are allowed. The format of the authority certificate can be PEM or PKCS7. PEM files 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.

Table 8-5 Using the CLI to Upload an Authority Certificate

Command level	`enable>ssl`
Commands	`authority`

Table 8-6 Using XML to Upload an Authority Certificate

Configuration group name	`ssl`
Configuration item name	`trusted ca`

Certificate and Key Generation

The PremierWave can generate self signed certificates and their corresponding keys. This can be done for both the rsa and dsa certificate formats. Certificates can be identified on the PremierWave by a name provided at generation time.

Table 8-7 Certificate and Key Generation

Certificate Generation Settings	Description
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.
Organization Unit	Enter the organizational unit to be associated with the new self-signed certificate.
Common Name	Enter the common name to be associated with the new self signed certificate. Note that this is a required field.
Expires	Enter the expiration date, in mm/dd/yyyy format, for the new self-signed certificate. Example: An expiration date of May 9, 2012 is entered as 05/09/2012.

Certificate Generation Settings	Description
Key length	Select the bit size of the new self-signed certificate. Choices are: ◆ 512 bits ◆ 768 bits ◆ 1024 bits ◆ 2048 bits The larger the bit size, the longer it takes to generate the key. Approximate times are: ◆ 2 seconds for a 512-bit RSA key ◆ 2 seconds for a 768-bit RSA key ◆ 5 seconds for a 1024-bit RSA key ◆ 30 seconds for a 2048 bit RSA key ◆ 3 seconds for a 512-bit DSA key ◆ 8 seconds for a 768-bit DSA key ◆ 30 seconds for a 1024-bit DSA key ◆ 3 minutes for a 2048 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.

Table 8-8 Using the CLI to Generate a Certificate/Key Pair

Command level	`enable>ssl`
Commands	`generate rsa <cert_name>` `generate dsa <cert_name>`

9: Maintenance and Diagnostics Settings

File System Configuration

The PremierWave EN uses a flash file system to store files. Use the filesystem commands to list, view,.add, remove, and transfer files.

File Display Commands

It is possible to view the list of existing files, and to view their contents in the ASCII or hexadecimal formats.

Table 9-1 File Display Commands

File Display Commands	Description
ls	Displays a list of files on the PremierWave, and their respective sizes.
cat	Displays the specified file in ASCII format.
dump	Displays the specified file in a combination of hexadecimal and ASCII formats.

Table 9-2 Using the CLI to Display File Information

Command level	`enable>filesystem`

Commands	`ls`
	`cat <file>`
	`dump <file>`

File Modification Commands

The PremierWave allows for the creation and removal of files on its filesystem.

Table 9-3 File Modification Commands

File Modification Commands	Description
rm	Removes the specified file from the file system.
touch	Creates the specified file as an empty file.

Table 9-4 Using the CLI to Modify PremierWave Files

Command level	`enable>filesystem`
Commands	`rm <file>` `touch <file>`

File Transfer Commands

Files can be transferred to and from the PremierWave via the TFTP protocol. This can be useful for saving and restoring XML configuration files.

Table 9-5 File Transfer Commands

File Transfer Settings	Description
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.
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.

Table 9-6 Using the CLI to Transfer Files

Command level	`enable>filesystem`
Commands	`ftp get <source file> <destination file> <host> (port)` `tftp put <source file> <destination file> <host> (port)`

Query Port

The query port (UDP 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 16.

Table 9-7 Query Port Settings

Query Port Settings	Description
state	Enables or disables listening and responding to query port messages.

Table 9-8 Using the CLI to Configure Query Port Settings

Command level	`enable>configure>query port`

Commands	`state enable`
	`state disable`
	`show`

Table 9-9 Using XML to Configure Query Port Settings

Configuration group name	`query port`
Configuration item name	`State`

Diagnostics

The PremierWave EN has several tools for diagnostics and statistics. The options at the top of the page allow for the configuration or viewing of IP socket information, ping, traceroute, DNS lookup, memory, and processes.

IP Sockets

You can view the list of listening and connected IP sockets.

Table 9-10 Using the CLI to View IP Sockets

Command level	`enable`
Command	`show ip sockets`

Ping

The ping command can be used to test connectivity to a remote host.

Table 9-11 Ping Settings

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

Table 9-12 Using the CLI to Ping a Remote Host

Command level	`enable`
Command	`ping <host> (count) (timeout)`

Trace route

Here you can trace a packet from the PremierWave EN 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.

Table 9-13 Trace Route Settings

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

Table 9-14 Using the CLI to Perform the Trace Route Command

Command level	`enable`
Command	`trace route <host>`

DNS Lookup

Here you can specify a DNS Hostname for a forward lookup or an IP address for a reverse lookup.

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

Table 9-15 Using Forward or Reverse DNS Lookup

Diagnostics: DNS Lookup Page Settings	Description
Host	Perform one of the following: ◆ For reverse lookup to locate the hostname for that IP address, enter an IP address. ◆ For forward lookup to locate the corresponding IP address, enter a hostname.

Table 9-16 Using the CLI to Perform a DNS Lookup

Command level:	`enable>dns`
Command	`lookup <host_or_ip>`

Memory

This read-only page shows the total, used, and available memory (in kilobytes).

Table 9-17 Using the CLI to View Memory Statistics

Command level	`enable>device`
Command	`show memory`

Processes

The PremierWave EN Processes command shows all the processes currently running on the system. It shows the Process ID (PID), Parent Process ID (PPID), user, CPU percentage, percentage of total CPU cycles, and process command line information.

Table 9-18 Using the CLI to Display the Running Processes

Command level:	`enable>`
Command	`show processes`

System Configuration

The PremierWave EN allows for rebooting the device, restoring factory defaults, and uploading new firmware.

Table 9-19 System Settings

System Settings	Description
Reboot Device	Run the reload command.
Restore Factory Defaults	Run the reload factory defaults command. All configuration settings will be lost. The PremierWave EN automatically reboots upon setting back to the defaults.
Upload New Firmware	FTP to the PremierWave. Write the new firmware file to firmware.rom on the PremierWave. The device automatically reboots upon the installation of new firmware. See *Chapter 13: Updating Firmware*

Table 9-20 Using the CLI to Reboot or Restore Factory Defaults

Command level	`enable>`
Commands	`reload` `reload factory defaults`

10: Advanced Settings

Command Line Interface Settings

The Command Line Interface settings allow you to control how users connect to and interact with the PremierWave's command line. It is possible to configure access via the Telnet and SSH protocols, in addition to general CLI options.

Basic CLI Settings

The basic CLI settings control general CLI access and usability options.

Table 10-1 CLI Configuration Settings

Command Line Interface Configuration Settings	Description
Login Password	Enter the password for logins by the admin account. The default password is "PASS".
Enable Level Password	Enter the password for access to the Command Mode Enable level. There is no password by default.
Line Authentication	Enable or disable authentication for CLI access on the serial lines.

Table 10-2 Using the CLI to Configure the Basic CLI Settings

Command level	`enable>configure>cli`

Commands	`login password <text>`
	`enable level password <text>`
	`line authentication <enable|disable>`
	`show`

Table 10-3 Using XML to Configure the Basic CLI Settings

Configuration group name	`cli`

Configuration item names	`login password`
	`enable level password`
	`line authentication`

Telnet Settings

The telnet settings control CLI access to the PremierWave EN over the Telnet protocol.

Table 10-4 Telnet Settings

Telnet Settings	Description
state	Enable or disable CLI access via telnet
authentication	Enable or disable authentication for telnet logins.

Table 10-5 Using the CLI to Configure Telnet Settings

Command level	`enable>configure>cli>telnet`

Commands	`state <enable|disable>`
	`authentication <enable|disable>`
	`show`

Table 10-6 Using XML to Configure Telnet Settings

Configuration group name	`telnet`
Configuration item names	`state` `authentication`

SSH Settings

The ssh settings control CLI access to the PremierWave EN over the SSH protocol.

Table 10-7 SSH Settings

SSH Settings	Description
state	Enable or disable CLI access via telnet

Table 10-8 Using the CLI to Configure the SSH Settings

Command level	`enable>configure>cli>telnet`
	`state <enable|disable>`
	`show`

Commands	`state <enable|disable>` `show`

Table 10-9 Using XML to Configure the SSH Settings

Configuration group name	`ssh`
Configuration item names	`state`

XML Configuration

The PremierWave EN allows for the configuration of units using an XML configuration file. Export a current configuration for use on other PremierWave ENs or import a saved configuration file.

XML: Export Configuration

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 PremierWave EN unit or another. The XML data can be dumped to the screen or exported to a file on the file system.

By default, all groups are exported. You may also select a subset of groups to export.

Table 10-10 Exporting a System Configuration Record

XML Export Configuration Page Settings	Description
Export to screen	Select this option to export the XCR data in the selected fields to the user screen. Use the “xcr dump” command to export the data to the screen.
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. Use the “xcr export” command to export the data to a local file.
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.
Groups to Export	Check the configuration groups that are to be exported to the XML configuration record. The group list should be comma delimited and encased in double quotes. The list of available groups can be viewed with the “xcr list” command.

Table 10-11 Using the CLI to Export the XML Settings

Command level	`enable>xml`

Commands	`secret xcr dump (group list)`
	`secret xcr export <file> (group list)`
	`xcr dump (group list)`
	`xcr export <file> (group list)`
	`xcr list`

XML: Import System Configuration Page

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 pasted into a CLI session. The groups to import can be specified at the command line, the default is all groups.

Import Configuration from External File

This import option requires entering the path and file name of the external XCR file you want to import. The list of files can be viewed from the filesystem level of the CLI.

Table 10-12 Import Configuration from Filesystem Settings

Import Configuration from Filesystem Settings	Description
Filename	Enter the name of the file on the PremierWave EN (local to its filesystem) that contains XCR data.
Groups to Import	Select the configuration groups to import from the XML configuration record. This option imports all instances of each selected group.

Table 10-13 Using the CLI to Import and XML Settings

Command level	`enable>xml`
Commands	`xcr import <file> (group list)`

11: Tunneling

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 CLI Tunnel menu and submenus (see the *PremierWave EN Command Reference* for the full list of commands.)

The PremierWave EN supports Connect Mode and Accept Mode connections, but only one mode may be enabled at a time on each serial Line. The connections on one serial Line are separate from those on another serial port.

- Connect Mode: the PremierWave EN actively makes an outgoing network connection. The remote node on the network must listen for the Connect Mode's connection. Connect Mode is disabled by default.
- Accept Mode: the PremierWave EN listens for a network connection. A remote node on the network initiates the connection. Accept Mode is enabled by default.

Connect Mode

For Connect Mode to function, it must be enabled, have a remote station (node) configured, and a remote port configured (TCP or UDP). When enabled, Connect Mode is always on.

Enter the remote station as an IP address or DNS name. The PremierWave EN will not make a connection unless it can resolve the address.

Connect Mode supports the following protocols:

- TCP
- UDP (available only in Connect Mode, since UDP is a connectionless protocol).

For Connect Mode using UDP, the PremierWave EN accepts packets from any device on the network. It will send packets to the last device that sent it packets.

Note: *The Port in Connect Mode is not the same port configured in Accept Mode.*

The TCP keepalive time is the time in which probes are periodically sent to the other end of the connection. This ensures the other side is still connected.

Connect Mode has two states:

- Disabled (no connection)
- Always (always makes a connection)

Accept Mode

In Accept Mode, the PremierWave EN 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 line 1, 10002 for serial line 2, and 10003 for serial line 3.

Accept Mode supports the following protocols:

- TCP

Accept Mode has the following states:

- Disabled (never a connection)
- Always (always listening for a connection)

Packing Mode

Packing Mode takes data from the serial port, groups it together, and sends it out on the network. When either a queued Threshold (number of bytes) or a Timeout is reached, the data is sent. Packing Mode cannot be disabled.

The following settings are configurable for Packing Mode:

- Timeout: Specifies the time duration, in milliseconds, to collect data received from the serial line, before sending it on the network. Timeout begins when at least one byte is received on the serial line.
- Threshold: Specifies the amount of data, in bytes, to collect from the serial line, before sending it on the network.

12: Security in Detail

Secure Sockets Layer (SSL)

SSL uses digital certificates for authentication and cryptography against eavesdropping and tampering. Sometimes only the server is authenticated, sometimes both server and client. The PremierWave EN 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.

SSH and some wireless authentication methods on the PremierWave EN make use of SSL.

The PremierWave EN supports SSLv2, SSlv3, and TLS1.0.

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.

Security Certificate Principles

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 other's 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 become one's own CA. Tools exist to generate self-signed CA certificates or to sign other certificates.

A certificate before it is signed is known as a certificate request, which only contains the identifying information. Signing it makes it a certificate. One's certificate is also used to sign any message transmitted to the peer to identify the originator and prevent tampering while transported.

In short:

- When using EAP-TLS, the PremierWave EN needs a personal certificate with matching private key to identify itself and sign its messages.
- When using EAP-TLS, EAP-TTLS or PEAP, the PremierWave EN needs the authority certificate(s) that can authenticate those it wishes to communicate with.

Obtaining a Certificate and Private Key

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 PremierWave EN 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 PremierWave EN.

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 PremierWave EN currently only accepts separate PEM files. The key needs to be unencrypted.

Utilities

Several utilities exist to convert between the formats.

OpenSSL

OpenSSL is a widely used 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 from and to all kinds of formats.

Executables are available for Linux and Windows.

To generate a self-signed RSA certificate/key combo:

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

See www.openssl.org or www.madboa.com/geek/openssl for more information.

Note: *Signing other certificate requests is also possible with OpenSSL but is too complicated to explain here.*

Steel Belted RADIUS

Steel Belted RADIUS is a 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:

```
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 PremierWave EN as an authority, you will need to edit it.

1. Open the file in any plain text editor.

2. Delete all info before “`----- BEGIN CERTIFICATE-----`“and after “`----- END CERTIFICATE-----`“, and then save as `sbr_cert.pem`.

SBR accepts trusted-root certificates in the DER format. Again, OpenSSL can convert any format into DER:

```
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 PremierWave EN release. We will add support for this and other formats in future releases.*

Free RADIUS

Free RADIUS is another versatile Linux open-source RADIUS server.

13: Updating Firmware

Obtaining Firmware

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

Loading New Firmware

Firmware may be updated by sending the file to the PremierWave EN over a FTP connection. The destination file name on the PremierWave EN must be **"firmware.rom"**. The device will reboot upon successful completion of the firmware upgrade.

Example FTP session:

```
$ ftp 192.168.10.127
Connected to 192.168.10.127.
220 (vsFTPd 2.0.7)
Name (192.168.10.127:user): admin
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> put premierwave_en_7_0_0_0R8.rom firmware.rom
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
9308164 bytes sent in 3.05 seconds (3047859 bytes/s)
ftp> quit
221 Goodbye.
```

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/MAC address
- 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 exported XML Configuration file.

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

Following are two simple ways to convert binary numbers to hexadecimal notation.

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.

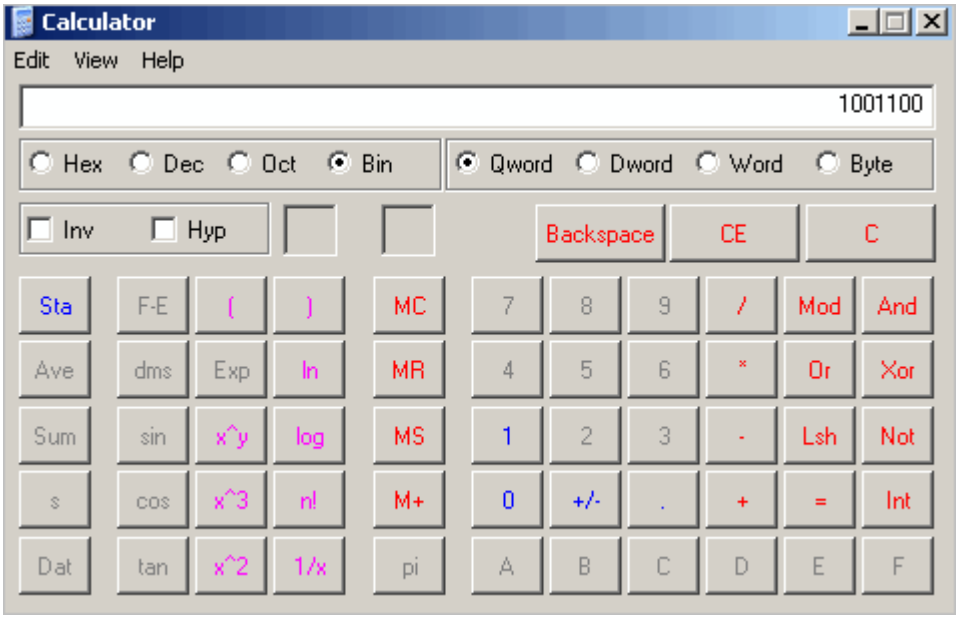
Table 13-1 Binary to Hexadecimal Conversion

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

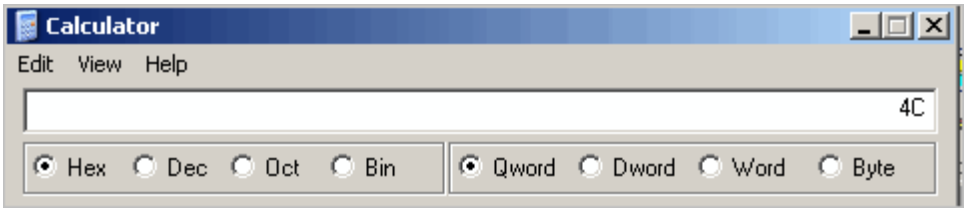
Scientific Calculator

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.



C: Compliance

(According to ISO/IEC Guide 17050-1, 17050-2 and EN 45014)

Manufacturer's Name & Address:

Lantronix
167 Technology Drive, Irvine, CA 92618 USA

Product Name Model: PremierWave EN Embedded Device Server

Conforms to the following standards or other normative documents:

- FCC Part 15.247/15.407 Class B
- RSS-210
- RSS-Gen Issue 2
- ICES-003 Issue 4
- ETSI EN 301 489-1 V1.8.1
- ETSI EN 301 489-17 V1.3.2
- ETSI EN 300 328 V1.7.1
- ETSI EN 301 893 V1.5.1

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)
- Cadmium (Cd)
- Mercury (Hg)
- Hexavalent Chromium (Cr (VI))
- Polybrominated biphenyls (PBB)
- 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.

D: Warranty

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

E: USB-CDC-ACM Device Driver File for Windows Hosts

The following file may be used to enable Windows to recognize the USB-CDC-ACM connection to the PremierWave EN's USB Device port. This file is copied verbatim from the Linux distribution (2.6.36+) at Documentation/usb/linux-cdc-acm.inf.

Place this file on the Windows host somewhere. When Windows prompts for a device driver for the USB connection, point it to this file.

```
; Windows USB CDC ACM Setup File
; Based on INF template which was:
;     Copyright (c) 2000 Microsoft Corporation
;     Copyright (c) 2007 Microchip Technology Inc.
; likely to be covered by the MLPL as found at:
;    <http://msdn.microsoft.com/en-us/cc300389.aspx#MLPL>.
; For use only on Windows operating systems.
[Version]
Signature="$Windows NT$"
Class=Ports
ClassGuid={4D36E978-E325-11CE-BFC1-08002BE10318}
Provider=%Linux%
DriverVer=11/15/2007,5.1.2600.0
[Manufacturer]
%Linux%=DeviceList, NTamd64
[DestinationDirs]
DefaultDestDir=12
;------------------------------------------------------------------------------
;  Windows 2000/XP/Vista-32bit Sections
;------------------------------------------------------------------------------
[DriverInstall.nt]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles.nt
AddReg=DriverInstall.nt.AddReg
[DriverCopyFiles.nt]
usbser.sys,,,0x20
[DriverInstall.nt.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,USBSER.sys
HKR,,EnumPropPages32,,"MsPorts.dll,SerialPortPropPageProvider"
[DriverInstall.nt.Services]
AddService=usbser, 0x00000002, DriverService.nt
[DriverService.nt]
DisplayName=%SERVICE%
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\USBSER.sys
;------------------------------------------------------------------------------
;  Vista-64bit Sections
;------------------------------------------------------------------------------
[DriverInstall.NTamd64]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles.NTamd64
AddReg=DriverInstall.NTamd64.AddReg
[DriverCopyFiles.NTamd64]
USBSER.sys,,,0x20
[DriverInstall.NTamd64.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,USBSER.sys
HKR,,EnumPropPages32,,"MsPorts.dll,SerialPortPropPageProvider"
[DriverInstall.NTamd64.Services]
AddService=usbser, 0x00000002, DriverService.NTamd64
```

```
[DriverService.NTamd64]
DisplayName=%SERVICE%
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\USBSER.sys
;------------------------------------------------------------------------------
;  Vendor and Product ID Definitions
;------------------------------------------------------------------------------
; When developing your USB device, the VID and PID used in the PC side
; application program and the firmware on the microcontroller must match.
; Modify the below line to use your VID and PID.  Use the format as shown
; below.
; Note: One INF file can be used for multiple devices with different
;       VID and PIDs.  For each supported device, append
;       ",USB\VID_xxxx&PID_yyyy" to the end of the line.
;------------------------------------------------------------------------------
[SourceDisksFiles]
[SourceDisksNames]
[DeviceList]
%DESCRIPTION%=DriverInstall, USB\VID_0525&PID_A4A7, USB\VID_0525&PID_A4AB&MI_02
[DeviceList.NTamd64]
%DESCRIPTION%=DriverInstall, USB\VID_0525&PID_A4A7, USB\VID_0525&PID_A4AB&MI_02
;------------------------------------------------------------------------------
;  String Definitions
;------------------------------------------------------------------------------
;Modify these strings to customize your device
;------------------------------------------------------------------------------
[Strings]
Linux               = "Linux Developer Community"
DESCRIPTION         = "Gadget Serial"
SERVICE             = "USB RS-232 Emulation Driver"
```

Index

U

W

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