LANTRONIX®

xPico® WiFi®
Embedded Device Server
User Guide

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Contacts

Lantronix, Inc. Corporate Headquarters

167 Technology Drive
Irvine, CA 92618, USA

Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support

Online: www.lantronix.com/support

Sales Offices

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

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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
July 2013	A	Initial document (firmware 1.0.0.0R7).

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1: Using This Guide

Purpose and Audience

This guide provides the information needed to configure, use, and update the xPico® Wi-Fi® embedded device server. It is intended for software developers and system integrators who are embedding this product into 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: Configuration Using Web Manager	Instructions for accessing Web Manager and using it to configure settings for the device.
4: Network Settings	Instructions for configuring network settings.
5: Line and Tunnel Settings	Instructions for configuring line and tunnel settings.
6: Services Settings	Instructions for configuring HTTP settings.
7: Maintenance and Diagnostics Settings	Instructions to maintain the xPico Wi-Fi, view statistics, files, and diagnose problems.
8: Advanced Settings	Provides additional information on security settings available.
9: Updating Firmware	Instructions for obtaining the latest firmware and updating the xPico Wi-Fi.
Appendix A: Technical Support	Instructions for contacting Lantronix Technical Support.
Appendix B: Compliance	Lantronix compliance information.
Appendix C: Binary to Hexadecimal Conversions	Instructions for converting binary values to hexadecimals.

Additional Documentation

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

Document	Description
xPico Wi-Fi Embedded Device Server Integration Guide	Information about the xPico Wi-Fi hardware, testing the device server using the demonstration board, and integrating the unit into your product.
xPico Wi-Fi Evaluation Kit Embedded Device Server Quick Start Guide	Instructions for getting the xPico Wi-Fi up and running.

Document (continued)	Description
xPico Wi-Fi Evaluation Kit Embedded Device Server User Guide	Information needed to use the xPico Wi-Fi on the evaluation board.
Com Port Redirector Quick Start and Online Help	Instructions for using the Lantronix Windows-based utility to create virtual com ports.

2: Introduction

This chapter summarizes the basic information and features of the xPico Wi-Fi embedded device server. It provides an overview of key features and describes suitable applications.

Key Features

- **Wireless LAN Interface:**

  IEEE 802.11 b/g and IEEE 802.11n (single stream)

  WLAN interface (2.4 GHz only)

  IEEE 802.11 d/h/i/j/k/w/r

  u.FL connector for external antenna

- **Serial Interface:**

  Two Serial CMOS Ports (3.3V, 5V tolerant)[1]

  1200 to 921.6Kbps

  Flow control: XON/XOFF, RTS/CTS (Line 1 only)

  Lantronix tunneling application (Line 1 only)

- **Host Interface:**

  Dual Serial Port, SPI, USB2.0 (device)

  8 GPIO

- **Network Protocols:** TCP/IP, UDP/IP, DHCP Server (software-enabled Access Point interface), ARP, ICMP, DHCP Client (WLAN interface), Auto-IP, DNS

- **Networking Capabilities:**

  Soft Access Point with DHCP Server

  Roaming: continually tracks Wi-Fi signal strength within range, resulting in smooth and automatic transition between access points without delay.

  QuickConnect: Dynamic Profiles facilitate easy and rapid connections to access points

- **Management and Control:**

  Web Server

  CLI (Serial Monitor Port)

  XML Configuration Import and Export (XCR, XML Status Export [XSR])

  Field upgradable firmware (OTA)

- **Security:**

  IEEE 802.11i Support – WPA-Personal, WPA2-Personal

  256-bit AES Encryption

1. For xPico Wi-Fi 5V tolerant pins, in order to sustain a voltage higher than Vcc+0.3, the internal pull up/pull down resistors must be disabled.

- **Architecture:**

  ARM Cortex-M3 class processor with on-chip Flash and SRAM

  1MB Flash and 128KB SRAM

  SPI Flash 1 MB

- **Power:** Input Voltage: 3.3VDC

Table 2-1 Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Units
TX Power @ 16.5dBm, 802.11b, 11Mbps	I_{CC}		330	380	mA
TX Power @ 15dBm, 802.11g, 6Mbps	I_{CC}		300	345	mA
TX Power @ 13dBm, 802.11g, 54Mbps	I_{CC}		255	295	mA
TX Power @ 14.5dBm, 802.11n, MCS0	I_{CC}		290	335	mA
TX Power @ 12dBm, 802.11n, MCS7	I_{CC}		230	265	mA
RX Power @ 802.11b, 11Mbps	I_{CC}		125	150	mA
RX Power @ 802.11g, 54Mbps	I_{CC}		125	150	mA
RX Power @ 802.11n, MCS7	I_{CC}		125	150	mA
Power Management State 1 @ 25°C	I_{CC}		6		µA
Power Management State 1 @ +85°C	I_{CC}		12		µA
Power Management State 1 @ -40°C	I_{CC}		5		µA

- **Physical Interface:** 40-pin Board-to-Board SMT Connector
- **Environmental:**

  Operating Temperature: –40°to +85° C

  Storage Temperature : –40°to +85° C

  Relative Humidity: 0% to 90% non-condensing

- **Certifications:** FCC, IC, EU, Japan, UL, CE
- **Packaging:**

  Dimensions: 24mm (L) x 16.5mm (W) x 5.64mm (H)

  Weight: 2.5g

- **Warranty:** 5-Year Limited

Protocol Support

The xPico Wi-Fi intelligent gateway contains a full-featured IP stack. Supported protocols include:

- IEEE 802.11 b/g and IEEE 802.11n (single stream) WLAN interface (2.4 GHz only)
- 802.11i - WPA-Personal, WPA2-Personal
- Soft-AP with DHCP Server
- HTTP Server
- TCP/IP, UDP/IP, DHCP Server (Software enabled Access Point interface), ARP, ICMP, DHCP Client (WLAN interface), Auto-IP, DNS

Troubleshooting Capabilities

The xPico Wi-Fi offers the abilty to view system log messages.

Configuration Methods

After installation, the xPico Wi-Fi embedded device server requires configuration. For the unit to operate correctly on a network, it must have a unique IP address on the network. These methods may be used for logging into the xPico Wi-Fi and assigning IP addresses and other configurable settings:

- **Web Manager**: View and configure settings easily through a web browser using the Lantronix Web Manager. *See "Configuration Using Web Manager" on page 14.*
- **XML:** The xPico Wi-Fi supports XML import and XML export through a terminal emulator software such as Tera Term. *See "XML Import and XML Export" on page 36.*

Addresses and Port Numbers

Hardware Address

The hardware address is also referred to as the physical address or MAC address. Sample hardware address:

- `00-80-A3-FF-FF-FF`
- `00:80:A3:FF:FF:FF`

IP Address

Every device connected to an IP network must have a unique IPv4 address. This address references the specific unit.

Port Numbers

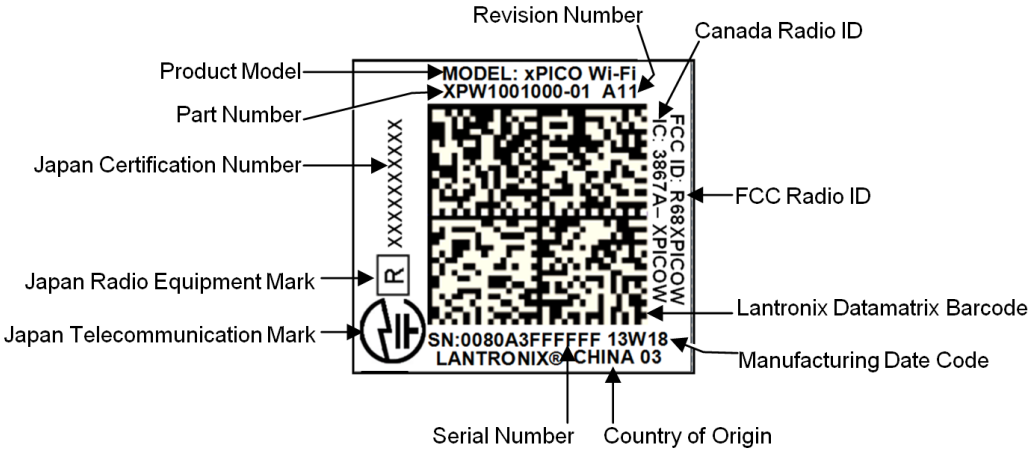
- TCP Port 80: HTTP Server (Web Manager configuration)
- TCP Port 10001: Tunnel

Product Information Label

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

- Lantronix Datamatrix Code
- Product Revision
- Part Number
- Serial Number Hardware Address (MAC Address)
- Manufacturing Date Code

Figure 2-2 xPico Wi-Fi Product Label



3: Configuration Using Web Manager

This chapter describes how to configure the xPico Wi-Fi embedded device server 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

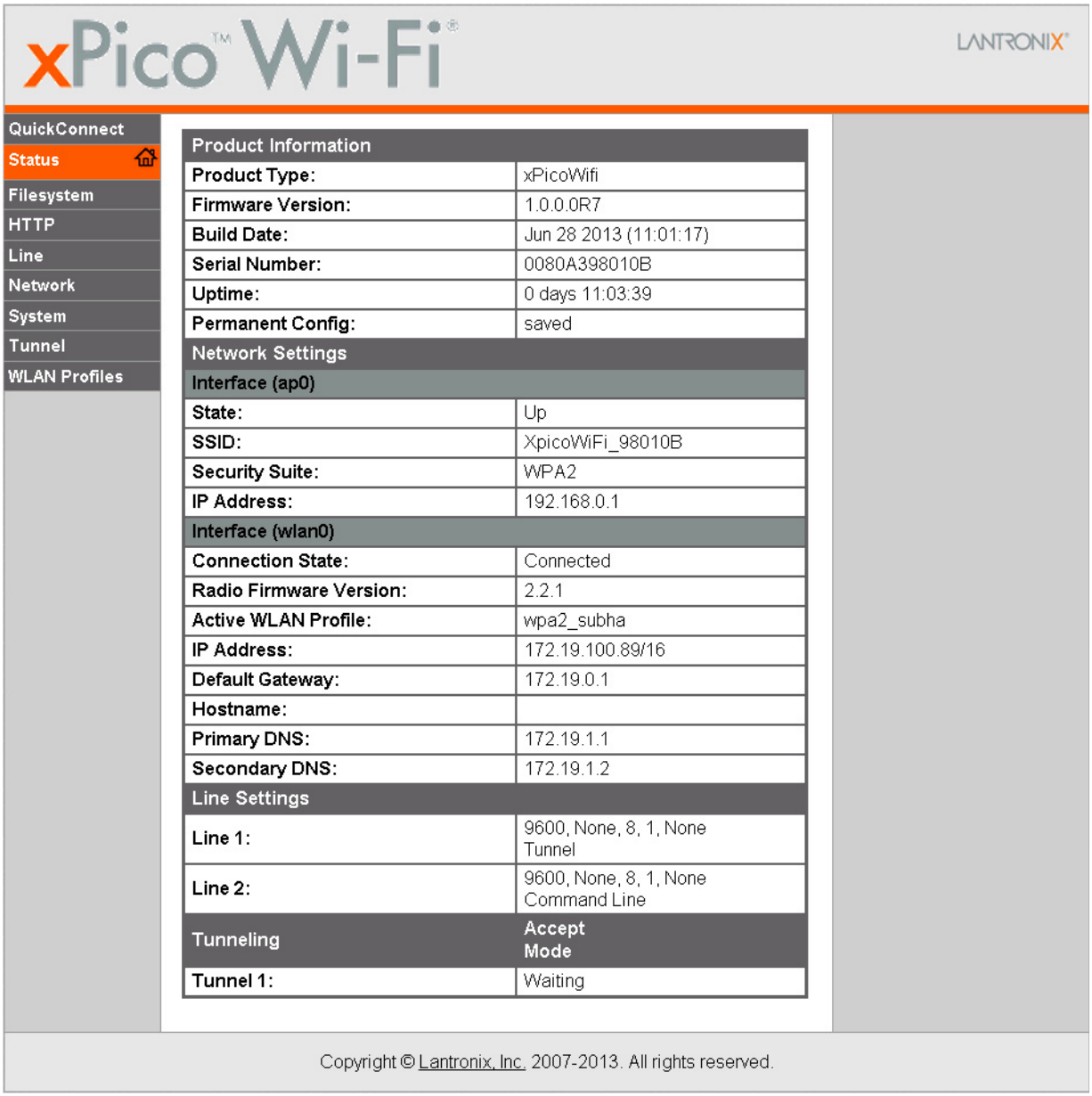
To access Web Manager, perform the following steps:

1. Open a standard web browser. Lantronix supports the latest version of Internet Explorer, Mozilla Firefox, Safari or Chrome.
2. Enter the IP address or hostname of the xPico Wi-Fi in the address bar. The IP address may have been assigned manually or automatically by DHCP.
3. Enter your username and password.The factory-default username is "**admin**" and the password is "**PASSWORD**" (all capitalized). The Status web page displays product information, network settings, line settings, and tunneling settings.

Status Page

The Status page is the first to appear after you log into Web Manager. The Status page also appears when you click **Status** tab in Web Manager.

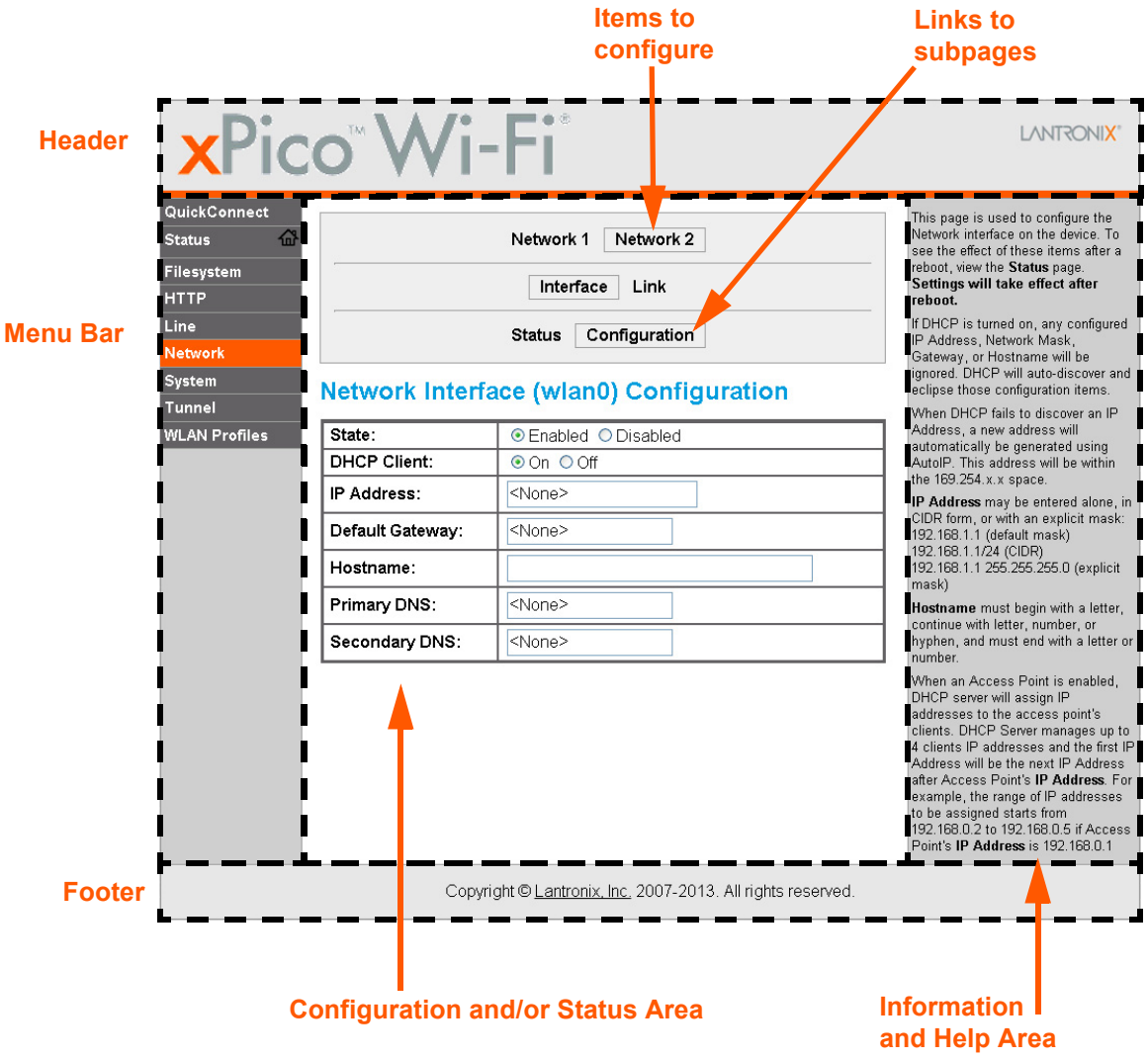
Figure 3-1 Status Page



Web Manager Components

The layout of a typical Web Manager page is below.

Figure 3-2 Components of the Web Manager Page



Navigating 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 between pages. Some pages are read-only, while others let you change configuration settings.

Note: *There may be times when you must reboot the xPico Wi-Fi for the new configuration settings to take effect. The chapters that follow indicate when a change requires a reboot. Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

Table 3-3 Web Manager Pages

Web Manager Page	Description	See Page
Status	Shows product information, network, line status, and tunneling settings.	*15*
Filesystem	Shows file system statistics and lets you perform filesystem operations.	*34*
HTTP	Shows HyperText Transfer Protocol (HTTP) status and lets you change the current configuration and authentication settings.	*32*
Line	Shows statistics and lets you change the current configuration and Command mode settings of a serial line.	*26*
Network	Shows status and lets you configure the network interface.	*18*
System	Lets you reboot the device, restore factory defaults and upload new firmware.	*34*
Tunnel	Lets you change the current configuration settings for an incoming tunnel connection.	*27*
WLAN Profiles	Lets you view, edit, delete and create a WLAN profile on a device.	*22*
Quick Connect	Lets you scan for available network in vicinity and create WLAN profile easily.	*24*

4: Network Settings

The Network Settings show the status of the Software enabled Access Point (SoftAP) 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 xPico Wi-Fi embedded device server contains two network interfaces. The Software enabled Access Point interface is also called interface 1 or ap0, and the WLAN interface is called interface 2 or wlan0.

Note: *All network settings require a reboot to take effect. Wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

Network 1 Interface (ap0) Configuration

Table 4-1 shows the network interface settings that can be configured. These settings apply to the Software enabled Access Point (ap0) interface.

Table 4-1 Network Interface Settings

Network (ap0) Interface Settings	Description
State	Click to enable or disable the SoftAP. If enabled, the DHCP server will assign IP addresses to the SoftAP's clients. The DHCP Server manages up to 4 client IP addresses and the first IP address will be the next IP address after the Access Point's IP address (see IP Address description below). ***Note:*** *A DHCP lease lasts for a day. If the IP network is managed manually, a static IP can be used outside the range of the DHCP address pool.*
IP Address	Enter the static IP address to use for the interface. You may enter it in one of the following ways: ◆ Alone (i.e., `192.168.1.1`) ◆ In CIDR format (i.e., `192.168.1.1/24`) ◆ With an explicit mask (i.e., `192.168.1.1 255.255.255.0`)

To Configure Network 1 Interface Settings

Using Web Manager

- To modify Software enabled Access Point (ap0) settings, go to **Network** on the menu and select **Network 1 -> Interface -> Configuration**.

Using XML via CLI

- Include in your file: `<configgroup name = "Interface" instance = "ap0">`

To View Network 1 Interface Status

Using Web Manager

In Network Interface Status, you can view both the current operational settings as well as the settings that would take effect upon a device reboot.

- To view current access point (ap0) settings, go to **Network** on the menu and select **Network 1 -> Interface -> Status**.

Using XML via CLI

- Look for the status header: `<statusgroup name = "Interface" instance = "ap0">`

Network 1 (ap0) Link Settings

Physical link parameters can be configured for an access point (ap0) Network Interface (see *Table 4-2*).

Table 4-2 Network 1 (ap0) Link Settings

Network 1 (ap0) Link Settings	Description
Network Name (SSID)	Specify the name of the wireless network (SSID) for the SoftAP.
Channel	Specify the channel for the SoftAP.
Suite	Specify the security suite to be used for the SoftAP. ◆ **None** = no authentication or encryption method will be used. ◆ **WPA** = WiFi Protected Access ◆ **WPA2** = Robust Secure Network.
Encryption	Select one or more encryption types, listed from strongest to least strong. ◆ **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.
Passphrase	Select the passphrase which may consist of up to 63 characters. ***Note:*** *This configuration option becomes available only when suites WPA or WPA2 are selected. Lantronix recommends using a passphrase of 20 characters or more for maximum security. Spaces and punctuation characters are permitted. 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.*

To Configure Network 1 Link Settings

Using Web Manager

- To modify network (ap0) Link information, click **Network** on the menu and select **Network 1 > Link > Configuration**.

Using XML via CLI

- Include in your file: `<configgroup name = "Access Point" instance = "ap0">`

To View Network 1 Link Status

Using Web Manager

In Network Link Status, you can view the current operational settings.

- To view current network (ap0) settings, go to **Network** on the menu and select **Network 1 -> Link -> Status**.

Using XML via CLI

- Look for the status header: `<statusgroup name = "Interface" instance = "ap0">`

Network 2 (wlan0) Interface Configuration

This page is used to configure the network 2 interface on the device. To see the effect of these items after a reboot, view the Status page.

Table 4-3 Network Interface Settings

Network Interface Settings	Description
State	Click to enable or disable the WLAN interface.
DHCP Client	Select to turn the DHCP client either **On** or **Off**. If enabled, any configured IP address, network mask, gateway or hostname will be ignored. DHCP will auto-discover and eclipse those configured items. When DHCP fails to discover an IP address, a new address will automaticaly be generated using AutoIP. This address will be within the `169.254.x.x` space. At boot up, after the physical link is up, the xPico Wi-Fi will attempt to obtain IP settings from a DHCP server and will periodically renew these settings with the server. ***Note:*** *Click renew on Interface Status page to force DHCP lease renewal.*
IP Address	Enter the static IP address to use for the interface. You may enter it in one of the following ways: ◆ Alone (i.e., `192.168.1.1`) ◆ In CIDR format (i.e., `192.168.1.1/24`) ◆ With an explicit mask (i.e., `192.168.1.1 255.255.255.0`) ***Note:*** *This setting will be used if Static IP is active (DHCP Client is **Off**).*
Default Gateway	Enter the IP address of the router for this network. ***Note:*** *This setting will be used if Static IP is active (DHCP Client is **Off**).*
Hostname	Enter the hostname for the interface. It must begin with a letter, continue with a letter, number or hyphen, and must end with a letter or number. The device will not register the hostname with a DNS server until the next reboot**.**
Primary DNS	Enter the IP address of the primary Domain Name Server. ***Note:*** *This setting will be used when Static IP is active.*

Network Interface Settings (continued)	Description
Secondary DNS	Enter the IP address of the secondary Domain Name Server. ***Note:*** *This setting will be used when Static IP is active.*

To Configure Network 2 Interface Settings

Using Web Manager

- To modify network 2 WLAN interface information, click **Network** on the menu and select **Network 2 > Interface > Configuration**.

Using XML via CLI

- Include in your file: `<configgroup name = "Interface" instance = "wlan0">`

To View Network 2 Interface Status

Using Web Manager

In Network Interface Status, you can view both the current operational settings as well as the settings that would take affect upon a device reboot.

- To view current access piont (ap0) settings, go to **Network** on the menu and select **Network 2 -> Interface -> Status**.

Using XML via CLI

- Look for the status header: `<statusgroup name = "Interface" instance = "wlan0">`

Network 2 (wlan0) Link Status

This page shows status of a Link on the device.

To View Network 2 Link Status

Using Web Manager

- To view network 2 link interface information, click **Network** on the menu and select **Network 2 > Link > Status.**

Using XML via CLI

- Include in your file: `<configgroup name = "Interface" instance = "wlan0">`

WLAN Profiles

A WLAN profile defines all of the settings necessary to establish a wireless connection with an access point (in infrastructure mode). A maximum of four profiles can exist on the xPico Wi-Fi at a time and only one profile may be active at any given time.

xPico Wi-Fi supports dynamic profiles. Dynamic Profiles are the ones created via QuickConnect.

WLAN Profile WEP Settings

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 WPA and WPA2 Settings

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 when 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 xPico Wi-Fi is compliant with both WPA2 and IEEE802.11i.

To Configure WLAN Profiles

You can view, edit, create or delete a WLAN profile.

Using WebManager

- Click **WLAN Profiles** on the menu.

Using XML via CLI

- Include in your file: `<configgroup name = "WLAN Profile" instance = "name">`

Table 4-4 Creating, Deleting or Enabling WLAN Profiles

WLAN Profile Basic Settings	Description
Create new profile	Type the name of the new profile to be created into the **Create new profile** field. Then, click the **Submit** button which appears to create the profile. Once created, the profile name may be clicked so you may edit profile settings.
Delete (checkbox)	Click the **Delete** checkbox beside the profile(s) to be deleted. Three buttons will appear: ◆ Click the **Submit** button to permanently delete profile(s). ◆ Click the **Apply** button to delete the profile for testing purposes. If the device reboots, this change will not be applied. ◆ Click the **Cancel** button to cancel this action, as desired.
Enabled (checkbox)	Click the **Enabled** checkbox beside the profile(s) to be enabled (or unchecked to disable). Three buttons will appear: ◆ Click the **Submit** button to permanently enable profile(s). ◆ Click the **Apply** button to enable the profile for testing purposes. If the device reboots, this change will not be applied. ◆ Click the **Cancel** button to cancel this action, as desired.

WLAN Profile Basic Settings (continued)	Description
View or Edit (link to specific profile)	Click on a specific WLAN Profile name to edit the WLAN profile basic settings.

To Configure WLAN Profile Settings

Using Web Manager

- To view or edit an existing WLAN profile, click **WLAN Profiles** on the menu and select an existing profile (see *Table 4-5*, *Table 4-6* and *Table 4-7*).

Using XML via CLI

- Include in your file: `<configgroup name = "WLAN Profile" instance = "name">`

Table 4-5 WLAN Profile Basic Settings

WLAN Profile Basic Settings	Description
Network Name (SSID)	Specify the name of the wireless network (SSID.)
State	Select to **Enable** or **Disable** this profile.

Table 4-6 WLAN Profile Security Settings

WLAN Profile Security Settings	Description
Suite	Specify 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 Size	Select the appropriate key size in bits. Select 40 for WEP40 and WEP64; select 104 for WEP104 and WEP128. ***Note:*** *This option is available if WEP suite is selected above.*
TX Key Index	Select one of four index 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. This option is available if WEP suite is selected above.*
Key 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. ***Note:*** *This option is available if WEP suite is selected above.*
Key Type	Select the format of the security key. ***Note:*** *This configuration option becomes available only when suites, WPA or WPA2 are selected.*

WLAN Profile Security Settings	Description
Password	Select the password 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. 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. This configuration option becomes available only when suites, WEP, WPA or WPA2 are selected.*
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. ***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.This configuration option becomes available only when suites WPA or WPA2 are selected.*

Table 4-7 WLAN Profile Advanced Settings

WLAN Profile Advanced Settings	Description
TX Power Maximum	Specify the maximum transmission output power in dBm.
Power Management	Select to **Enable** or **Disable** power management, which reduces the overall power consumption of the xPico Wi-Fi unit, but can increase latency. ◆ **Enabled** = allows the xPico Wi-Fi to turn off the receiver when it is idling. ◆ **Disabled** = keeps the receiver on at all times.
Power Management Interval	Select number of beacons (100 msec interval) between 1 and 5. The above-mentioned latency can be up to this number “X” 100 msec.

WLAN Quick Connect

WLAN QuickConnect allows users to view and add up to four WLAN profiles from a list of up to 20 wireless devices sorted by RSSI. Details of the selected network are pre-populated, so little or no configuration is required by the user.

To Configure WLAN Quick Connect

Using Web Manager

- To view or edit an existing WLAN Quick Connect settings, click **QuickConnect** on the menu.

Using XML via CLI

- Not applicable.

Table 4-8 WLAN Quick Connect

WLAN Quick Connect Settings	Description
Network Name (search field)	Enter a network name and click Scan to search for a network.
Scan "<network SSID>"	Perform a scan for devices within range of the xPico Wi-Fi. 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.
Network Name (link)	Lists the SSID of a network. Click a specific **Network Name** to display the Quick Connect profile. If you provide the **Password** for a specific Quick Connect Profile, you can add that profile to your list of *WLAN Profiles*. Up to four WLAN profiles may be added, and only one may be connected at any given time.
BSSID	Lists the basic service set identifier. This is a unique 48-bits address that identifies the access point that creates the wireless network.
CH	Provides the channel number of a network.
RSSI	Displays an instantaneous value indicating the signal strength of the network. The best to worst signal strength is indicated by green, yellow and red respectively. ***Note:*** *RSSI reported in scan results is a single sampling.*
Security Suite	Lists the security suite of a network (e.g., WEP, WPA, WPA2).

5: Line and Tunnel Settings

The xPico Wi-Fi embedded device server has one tunnel through which you may view statistics or configure the Accept Mode. The device has two lines and the second line is available for diagnostic and maintenance.

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.

Note: *The settings described below apply to both Line 1 and Line 2 unless otherwise noted.*

Table 5-1 Line Configuration Settings

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 white space must be quoted.
State	Select to **Enable** or **Disable** the operational state of the Line. The default is an enabled state.
Protocol	Set the operational protocol for the Line. The default is **Tunnel** for Line 1 and Command Line for Line 2. Choices are: ◆ **None** ◆ **Tunnel** = Serial-Network tunneling protocol (Line 1 only) ◆ **Trouble Log** ◆ **Command Line**
Baud Rate	Set the Baud Rate (speed) of the Line. The default is **9600**. Any set speed between 1200 and 921600 may be selected: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600.
Parity	Set the Parity of the Line. The default is **None**.
Data Bits	Set the number of data bits for the Line. The default is **8**.
Stop Bits	Set the number of stop bits for the Line. The default is **1**.
Flow Control	Set the flow control for the Line. The default is **None**. Hardware flow control is only supported on Line 1.
Gap Timer	Set the Gap Timer delay to Set the number of milliseconds to pass from the last character received before the driver forwards the received serial bytes. By default, the delay is four character periods at the current baud rate (minimum 1 msec). Gap Timer range is 1 to 5000 milliseconds.
Threshold	Set the number of threshold bytes which need to be received in order for the driver to forward received characters. Default value is 56 bytes.

To Configure Line Settings

Note: *The following section describes the steps to view and configure Line 1 settings; these steps apply to other line instances of the device.*

Using Web Manager

- To configure a specific line, click **Line** in the menu and select **Line 1 -> Configuration** (*Table 5-1*).

Using XML via CLI

- Include in your file: `<configgroup name = "Line" instance = "1">`

To View Line Status

Using Web Manager

- To view statistics for a specific line, click **Line** in the menu and select **Line 1 -> Status**.

Using XML via CLI

- Look for the status header: `<statusgroup name = "Line" instance = "1">`

Tunnel Settings

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 **Tunnel** menu and submenus. The Tunnel settings allow you to configure how the Serial-Network tunneling operates. Tunneling is available only on Line 1.

Line Settings

These serial settings for the tunnel apply to the Serial Line interface. The Line Settings and Protocol are displayed for informational purposes and must be configured from the Line settings.

Table 5-2 Tunnel Line Settings

Tunnel Serial Settings	Description
Line Settings	Line Settings information here is display only. Go to the section, *To Configure Line Settings* to modify these settings.
Protocol	Protocol information here is display only. Go to the section, *To Configure Line Settings* to modify these settings.

To View Tunnel Serial Settings

Using Web Manager

- To view the Serial Settings for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Line Settings**.

Using XML via CLI

- Include in your file: `<configgroup name = "Tunnel Line" 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.

Table 5-3 Tunnel Packing Mode Settings

Tunnel Packing Mode Settings	Description
Mode	Configure the Tunnel Packing Mode. Choices are: ◆ **Disable** = Data not packed. ◆ **Timeout** = data sent after timeout occurs. ◆ **Send Character** = data sent when the Send Character is read on the Serial Line.
Threshold	Set 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 1450 bytes. Default is 512. ***Note:*** *This configuration option becomes available when Timeout is the selected Mode.*
Timeout	Set 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. ***Note:*** *This configuration option becomes available when Timeout is the selected Mode.*
Send Character	Enter Control Characters in any of the following forms: ◆ <control>J ◆ 0xA (hexadecimal) ◆ \10 (decimal) If used, the Send Character is a single printable character or a control character that, when read on the Serial Line, forces the queued data to be sent on the network immediately. ***Note:*** *This configuration option becomes available when Send Character is the selected Mode.*
Trailing Character	Enter Control Characters in any of the following forms: ◆ <control>J ◆ 0xA (hexadecimal) ◆ \10 (decimal). If used, the Trailing Character is a single printable character or a control character that is injected into the outgoing data stream right after the Send Character. Disable the Trailing Character by blanking the field (setting it to <None>). ***Note:*** *This configuration option becomes available when Send Character is the selected Mode.*

To Configure Tunnel Packing Mode Settings

Using Web Manager

- To configure the Packing mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Packing**.

Using XML via CLI

- Include in your file: `<configgroup name = "Tunnel Packing" instance = "1">`

Accept Mode

In Accept mode, the xPico Wi-Fi listens (waits) for incoming connections from the network. A remote node on the network initiates the connection.

The configurable local port is the port the remote device connects to for this connection. There is no remote port or address. The default local port is 10001.

Serial data can still be received while waiting for a network connection, keeping in mind serial data buffer limitations.

Table 5-4 Tunnel Accept Mode Settings

Tunnel Accept Mode Settings	Description
Mode	Set 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*). ◆ **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 selected tunnel is read on the serial line.
Start Character	Enter the start character which will enable the tunnel to listen for a network connection. The start character may be designated as a single printable character or as a control character. Control characters may be input in any of the following forms: `<control>J` or `0xA (hexadecimal)` or `\10 (decimal)` ***Note:*** *This configuration option becomes available when Start Character is the selected Mode.*
Flush Start Character	Enable or disable the flush start character: ◆ **Enabled** = prevents forwarding of a start character from the Line into the network. ◆ **Disabled** = the flush start character allows forwarding of a start character from the line into the network. ***Note:*** *This configuration option becomes available when Start Character is the selected Mode.*
Local Port	Set the port number for use as the network local port. The default local port is 10001.
Protocol	Select the TCP type for use with Accept Mode.

Tunnel Accept Mode Settings (continued)	Description
Flush Line	Set whether the serial line data buffer is flushed upon a new network connection. Choices are: ◆ **Enabled** = serial data buffer is flushed on network connection ◆ **Disabled** = serial data buffer is not flushed on network connection (*default*)
Block Line	Set whether Block Line is enabled for debugging purposes. Choices are: ◆ **Enabled** = if Enabled, incoming characters from the serial line will not be forwarded to the network. Instead, they will be buffered and will eventually flow off the serial line if hardware or software flow control is configured. ◆ **Disabled** = this is the default setting; incoming characters from the Serial Line are sent into the network. Any buffered characters are sent first.
Block Network	Set whether Block Network is enabled for debugging purposes. Choices are: ◆ **Enabled** = if Enabled, incoming characters from the network will not be forwarded to the Serial Line. Instead, they will be buffered and will eventually flow off the network side. ◆ **Disabled** = this is the default setting; incoming characters from the network are sent on the Serial Line. Any buffered characters are sent first.
Password	Enter a password. This password can be up to 31 characters in length and must contain only alphanumeric characters and punctuation. When set, clients must send the correct password string to the unit within 30 seconds from opening network connection in order to enable data transmission. The password sent to the unit must be terminated with one of the following: ◆ 0A (Line Feed) ◆ 00 (Null) ◆ 0D 0A (Carriage Return/Line Feed) ◆ 0D 00 (Carriage Return/Null) If, **Prompt for Password** is set to **Enabled** and a password is provided, the user will be prompted for the password upon connection.

To Configure Tunnel Accept Mode Settings

Using Web Manager

◆ To configure the Accept Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Accept**.

Using XML via CLI

◆ Include in your file: `<configgroup name = "Tunnel Accept" instance = "1">`

Disconnect Mode

Specifies the optional conditions for disconnecting any Accept Mode connection that may be established. If any of these conditions are selected but do not occur and the network disconnects from the device, a Connect Mode connection will attempt to reconnect. However, if none of these conditions are selected, a closure from the network is taken as a disconnect.

Table 5-5 Tunnel Disconnect Mode Settings

Tunnel Disconnect Mode Settings	Description
Stop Character	Enter the Stop Character which when received on the Serial Line, disconnects the tunnel. The Stop Character may be designated as a single printable character or as a control character. Control characters may be input in any of the following forms: <control>J or 0xA (hexadercimal) or \10 (decimal). Disable the Stop Character by blanking the field to set it to <None>.
Timeout	Enter the number of milliseconds a tunnel may be idle before disconnection. The value of zero disables the idle timeout.
Flush Line	Set whether to flush the Serial Line when the Tunnel is disconnected. Choices are: ◆ **Enabled** ◆ **Disabled** (default)

To Configure Tunnel Disconnect Mode Settings

Using Web Manager

- To configure the Disconnect Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Disconnect**.

Using XML via CLI

- Include in your file: `<configgroup name = "Tunnel Disconnect" instance = "1">`

Statistics

Tunnel statistics contains data counters, error counters, connection time and connection information. Statistics are available at each individual connection and aggregated across all connections.

To View Tunnel Statistics

Using Web Manager

- To view statistics for a specific tunnel, click **Tunnel** in the menu and select the **Tunnel 1 -> Statistics**.

Using XML via CLI

- Look for the status header: `<statusgroup name = "line" instance = "1">`

6: Services Settings

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 device.

Table 6-1 **HTTP Settings**

HTTP Settings	Description
State	Select to enable or disable the HTTP server: ◆ **Enabled** (default) ◆ **Disabled**
Port	Enter the port for the HTTP server to use. The default (80) will be restored when the field is cleared.

To Configure HTTP Settings

Using Web Manager

◆ To configure HTTP settings, click **HTTP** in the menu and select **Configuration**.

Using XML via CLI

◆ Include in your file: `<configgroup name = "HTTP Server">`

To View HTTP Status

Using Web Manager

◆ To view HTTP status, click **HTTP** in the menu and select **Status**.

Using XML via CLI

◆ Look for the status header: `<statusgroup name = "HTTP Server">`

Table 6-2 **HTTP Access Control**

HTTP Access Control Settings	Description
URI	Displays the root of the Uniform Resource Identifier (URI) to apply access control settings. ***Note:*** *The URI must begin with '/' to refer to the entire filesystem.*

HTTP Access Control Settings (continued)	Description
Auth Type	Select the authentication type: ◆ **None**: no authentication is necessary. ◆ **Basic**: encodes passwords using Base64.
Users	Displays the username allowed to access the configured URI.

To Configure HTTP Access Control

Using Web Manager

- To configure HTTP Access Control, click **HTTP** in the menu and select **Access Control**.

Using XML via CLI

- Include in your file: `<configgroup name = "HTTP Server Access Control" instance="1">`

7: Maintenance and Diagnostics Settings

Filesystem Settings

Use the Filesystem to view Statistics. A user may also compact or format the Filesystem. The xPico Wi-Fi embedded device server uses an EXT3 flash file system to store files.

This is a journalled file system, which means that changes to the file system are recorded before the actual changes themselves are made. In the event of power loss, the use of journaling can usually recover from changes that had been started but not completed.

Some file systems may contain a 'lost+found' directory. In the event of power loss in the midst of file system I/O, file data that cannot be fully recovered will be placed in this directory. It is recommended to always restart the system from the Web Manager application.

Note: *It is recommended to always use the Web Manager application to shutdown/ restart the system.*

Filesystem

Table 7-1 File Display Settings

File Display Commands	Description
Format	Format the Filesystem and remove all data.
Compact	Compact the Filesystem to erase Flash and copy files.

To View Filesystem Statistics

Using Web Manager

- To view, compact or format existing files and file contents, click **FIlesystem** in the menu.

Using XML via CLI

- Look for the status header: `<statusgroup name = "Filesystem”>`

System Settings

The xPico Wi-Fi System settings allow for rebooting the device, restoring factory defaults, updating passwords, and uploading new firmware.

Note: *Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

System Management

Table 7-2 Management Settings

System Settings	Description
Reboot (button)	Reboots the device. When rebooted, your browser should be refreshed and redirected to the main status page after 30 seconds. ***Note:*** *The redirect will not work as expected if the IP address of the devices changes after reboot. After setting the configuration back to the factory defaults, the device will automatically be rebooted. If web manager is access through SoftAP, your connection to SofAP may be dropped when device reboots.*
Factory Defaults (button)	Restores the device to the original factory settings. All configuration will be lost. The xPico Wi-Fi automatically reboots upon setting back to the defaults.
Firmware Upload (button)	Device will reboot to the Over-The-Air (OTA) firmware upgrade application to continue the operation.

Note: *Go to Chapter 9: Updating Firmware for directions on uploading new firmware.*

To Reboot or Restore Factory Defaults

Using Web Manager

- To access the area with options to reboot, restore to factory defaults, upload new firmware, click **System** in the menu and select **Management**.

Using XML via CLI

- Not applicable.

Admin User

Table 7-3 Admin User Settings

System Settings	Description
Password	Enter a new password and click **Submit**. Users will need to log in again after changing the password.

To Configure Admin User on the Device

Using Web Manager

- To access the area with options to reboot, restore to factory defaults, upload new firmware, click **System** in the menu and select **Admin User**.

Using XML via CLI

- Look for the status header: `<configgroup name = "Users" instance="admin">`

8: Advanced Settings

XML Import and XML Export

The xPico Wi-Fi embedded device server allows for the configuration of devices by using XML configuration records (XCRs). You can export an existing configuration for use on other xPico Wi-Fi devices or import a saved configuration file.

Note: *The xPico Wi-Fi module itself only supports serial TTL signaling on both Lines. If used with the evaluation board (see the xPico Embedded Device Server Evaluation Kit User Guide), then Line 2 may be routed through a serial-to-USB converter via jumper settings.*

To Import or Export XML Configuration

1. Connect the xPico Wi-Fi embedded device server to a PC using:
   - A null modem cable for line 1.
   - A USB cable for line 2. The USB driver will automatically install into your PC.
2. Configure command line on line and select hardware or software flow control.

   Note: *If you are using line 2, select software flow control as hardware flow control is not supported.*
3. Open a terminal emulator from the PC, e.g., Tera Term version 4.58.
4. Select the Com port or USB serial port and set the serial settings, on the terminal emulator, to match the appropriate line on the device server.
5. When you see prompt '>' on the terminal emulator, type 'h' to view the single character commands available.

```
>h
Single character commands:
c - Dumps XML configuration with secrets; stop with any character.
d - Dumps XML configuration without secrets; stop with any character.
h or ? - Shows this help.
s - Dumps XML status; stop with any character.
t - Shows Trouble Log; stop with any character.
(Paste of XML) - Imports XML configuration.
```

6. Type `c` in the terminal window prompt to get the current xPico Wi-Fi xml configuration in the form of a text dump.
7. Copy and paste the configuration text into notepad or some other basic text editor.
8. Remove all the spaces in the script within the text editor. This basic text is the exported XML configuration and is now available for copy-paste into any xPico Wi-Fi embedded device server.
9. Make any additional changes to the configuration text to modify the XML configuration.
10. Copy and paste <CR> all of the text into the terminal emulator connected to the desired xPico Wi-Fi embedded device server, to "import" the new configuration.

    Note: *Software flow control experiences overrun above 460800 baud.*

9: 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/downloads/) or by using anonymous FTP (ftp://ftp.lantronix.com/).

Loading New Firmware through Web Manager

Upload the firmware using the device web manager **System** page.

To upload new firmware:

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

Note: *See System Settings (on page 34) for options to restore factory defaults or reboot the debice.*

Figure 9-1 Uploading New Firmware

2. Click **Firmware Upload** (under the **Upload New Firmware** heading) to browse to the firmware file.
3. Click **OK** to confirm uploading a new firmware image. A few moments will pass as the firmware upload is prepared.
4. Click **Choose File** to select the file and click **Open**.
5. Click **Upgrade** to install the firmware on the xPico Wi-Fi embedded device server.

6. Click **OK** in the confirmation popup which appears. The firmware will be installed and the device will automatically reboot afterwards.
7. Close and reopen the web manager internet browser to view the device's updated web pages.

Note: *You may need to increase HTTP Max Bytes in some cases where the browser is sending data aggressively within TCP windows size limit when file (including firmware upgrade) is uploaded from webpage.*

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/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.

Appendix B: Compliance

(According to ISO/IEC Guide and EN 45014)

Manufacturer's Name & Address:

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA

Declares that the following product:

Product Name Model: xPico® Wi-Fi® Embedded Device Server

Conforms to the following standards or other normative documents:

Table B-1 Country Certifications

Country	Specification
USA	FCC Part 15, Subpart B, Class B ICES-003:2012 Issue 5, Class B ANSI C63.4-2009
USA	FCC Part 15, Subpart C (Section 15.247) ANSI C63.10-2009 FCC Part 2 (Section 2.1091) FCC OET Bulletin 65, Supplement C (01-01) IEEE C95.1
Canada	Canada RSS-210 Issue 8 (2010-12) Canada RSS-Gen Issue 3 (2010-12) ANSI C63.10-2009 RSS-102 Issue 4 (2010-12)
EU	EN 300 328 V1.8.1 (2012-06) EN 301 489-1 V1.9.2 (2011-09) EN 301 489-17 V2.2.1 (2012-09) EN 55022:2010+AC:2011, Class B EN62311:2008
Australia, New Zealand N11206	AS/NZS 4268: 2012
Japan	ARIB STD-T66, MIC notice 88 Appendix 43 RCR STD-33, MIC notice 88 Appendix 44

Table B-2 Country Transmitter IDs

Country	Specification
USA FCC ID	R68XPICOW
Canada IC ID	3867A-XPICOW
Japan ID	201-135275

Table B-3 Safety

Country	Specification
World Wide CE0560	CB EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 In accordance with the council directive 2006/95/EC
US, Canada	UL 60950-1 (2nd Edition)

Hereby, Lantronix, declares that this xPico Wi-Fi is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Table 2-4 Europe – EU Declaration of Conformity

cs Česky [Czech]	*Lantronix, Inc.* tímto prohlašuje, že tento *xPico Wi-Fi* je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
da Dansk [Danish]	Undertegnede *Lantronix, Inc.* erklærer herved, at følgende udstyr *xPico Wi-Fi* overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
de Deutsch [German]	Hiermit erklärt *Lantronix, Inc.*, dass sich das Gerät *xPico Wi-Fi* in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
et Eesti [Estonian]	Käesolevaga *Lantronix, Inc.* seadme *xPico Wi-Fi* vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
en English	Hereby, *Lantronix, Inc.*, declares that this *xPico Wi-Fi* is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
es Español [Spanish]	Por medio de la presente *Lantronix, Inc.* declara que el *xPico Wi-Fi* cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
el Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ *Lantronix, Inc.* ΔΗΛΩΝΕΙ ΟΤΙ *xPico Wi-Fi* ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
fr Français [French]	Par la présente *Lantronix, Inc.* déclare que l'appareil *xPico Wi-Fi* est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
it Italiano [Italian]	Con la presente *Lantronix, Inc.* dichiara che questo *xPico Wi-Fi* è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar šo *Lantronix, Inc.* deklarē, ka *xPico Wi-Fi* atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]	Šiuo *Lantronix, Inc.* deklaruoja, kad šis *xPico Wi-Fi* atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
nl Nederlands [Dutch]	Hierbij verklaart *Lantronix, Inc.* dat het toestel *xPico Wi-Fi* in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
mt Malti [Maltese]	Hawnhekk, *Lantronix, Inc.]*, jiddikjara li dan *xPico Wi-Fi* jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
hu Magyar [Hungarian]	Alulírott, *Lantronix, Inc.* nyilatkozom, hogy a *xPico Wi-Fi* megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
pl Polski [Polish]	Niniejszym *Lantronix, Inc.* oświadcza, że *xPico Wi-Fi* jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
pt Português [Portuguese]	*Lantronix, Inc.* declara que este *xPico Wi-Fi* está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

Table 2-4 Europe – EU Declaration of Conformity (continued)

sl Slovensko [Slovenian]	*Lantronix, Inc.* izjavlja, da je ta *xPico Wi-Fi* v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky [Slovak]	*Lantronix, Inc.* týmto vyhlasuje, že *xPico Wi-Fi* spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
fi Suomi [Finnish]	*Lantronix, Inc.* vakuuttaa täten että *xPico Wi-Fi* tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
sv Svenska [Swedish]	Härmed intygar *Lantronix, Inc.* att denna *xPico Wi-Fi* står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

***FCC Caution**: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.*

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: *In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.*

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: R68XPICOW”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Industry Canada Statement

This device complies with RSS-210 of the Industry Canada Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Ce dispositif est conforme à la norme CNR-210 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This device is intended only for OEM integrators under the following conditions: (For module device use)

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

L'antenne doit être installée de telle sorte qu'une distance de 20 cm est respectée entre l'antenne et les utilisateurs, et

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE: *In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.*

NOTE IMPORTANTE: *Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.*

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following:

“Contains IC: 3867A-XPICOW".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un dispositif où l'antenne peut être installée de telle sorte qu'une distance de 20cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 3867A-XPICOW".

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

Antenna Requirement

This device has been designed to operate with a PIFA antenna have a maximum gain of 2.5dBi. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter xPico Wi-Fi has been approved by Industry Canada to operate with the antenna type, maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this user's manual, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Ce dispositif a été conçu pour fonctionner avec une antenne ayant un gain maximal de PIFA antenne avec dBi 2.5. Une antenne à gain plus élevé est strictement interdite par les règlements d'Industrie Canada. L'impédance d'antenne requise est de 50 ohms.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peutfonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pourl'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectriqueà l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que lapuissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire àl'établissement d'une communication satisfaisante.

Le présent émetteur radio xPico Wi-Fi a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Table 2-5 Approved Antenna(s) List

Type	Gain	Brand
PIFA	2.5dBi	ethertronics
Dipole	2.38	Wanshih

Manufacturer's Contact:

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA
Tel: 949-453-3990
Fax: 949-453-3995

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)
DSC	0	0	0	0	0	0
EDS	0	0	0	0	0	0
IntelliBox	0	0	0	0	0	0
MatchPort	0	0	0	0	0	0
Micro	0	0	0	0	0	0
MSS100	0	0	0	0	0	0
PremierWave	0	0	0	0	0	0
SCS	0	0	0	0	0	0
SecureBox	0	0	0	0	0	0
SLB	0	0	0	0	0	0
SLC	0	0	0	0	0	0
SLP	0	0	0	0	0	0
Spider and Spider Duo	0	0	0	0	0	0
UBox	0	0	0	0	0	0
UDS1100 and 2100	0	0	0	0	0	0
WiBox	0	0	0	0	0	0
WiPort	0	0	0	0	0	0
xDirect	0	0	0	0	0	0
xPico	0	0	0	0	0	0
xPico Wi-Fi	0	0	0	0	0	0
xPort	0	0	0	0	0	0
xPort Pro	0	0	0	0	0	0
xPress DR & xPress-DR+	0	0	0	0	0	0
xPrintServer	0	0	0	0	0	0
xSenso	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.

Appendix C: Binary to Hexadecimal Conversions

Many unit 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.

Scientific Calculator

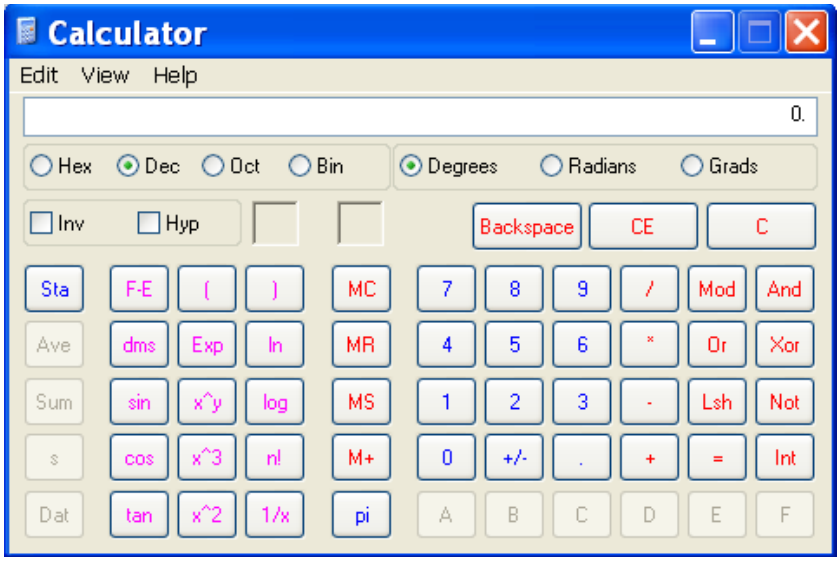
Another simple way to convert binary to hexadecimal is to use a scientific calculator, such as the one available on the Windows operating systems. For example:

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.

Table C-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

Figure C-2 Windows Scientific Calculator



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

Figure C-3 Hexadecimal Values in the Scientific Calculator