LANTRONIX®

SGX 5150
IoT Device Gateway
User Guide

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Revision History

Date	Rev.	Comments
October 2016	A	Initial document for firmware release 8.0.0.0.
November 2016	B	Updated user guide to include software features available in all SGX 5150 device gateway models. The user will experience differing featuer availability depending on the model type installed.
March 2017	C	Updated user guide GRE section.

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1: Using This Guide

Purpose and Audience

This document provides information needed to configure, use, and update the Lantronix® SGX 5150 IoT device gateway. It is intended for system integrators who are configuring this product.

Summary of Chapters

The remaining chapters in this guide include:

Chapter	Description
2: Introduction	Describes main features of the product and the protocols it supports. Includes technical specifications.
3: Installation of the SGX 5150	Instructions for installing the SGX 5150.
4: Using DeviceInstaller	Instructions for viewing the current configuration using the Lantronix DeviceInstaller™ application.
5: Configuration Using Web Manager	Instructions for accessing Web Manager and using it to configure settings for the device.
6: Network Settings	Instructions to view and configure access point, bridge, wired network, wireless network, protocol stack Wi-Fi protected setup, WLAN Scan, QuickConnect, and WLAN Profiles settings.
7: Filesystem	Instructions to view and configure the filesystem.
8: Diagnostics	Instructions to view and configure DNS, hardware, IP socket, log, memory, ping, processes, routes, threads, and traceroute information.
9: Administration	Instructions to view and configure CLI, clock, discovery, FTP, HTTP, line, SSL, syslog, system, terminal, user management, xml, and quick setup information.
A: Lantronix Technical Support	Instructions for contacting Lantronix Technical Support.
B: Compliance	Provides SGX 5150 compliance information.

Additional Documentation

Visit the Lantronix Web site at www.lantronix.com/support/documentation for all the latest Lantronix documentation including the following documents related to this product.

Document	Description
SGX 5150 IoT Device Gateway 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, XML configuration, and status are provided.
SGX 5150 IoT Device Gateway Quick Start Guide	Instructions for getting the SGX 5150 unit up and running.

Document (continued)	Description
DeviceInstaller Utility Online Help	Instructions for using the Windows® operating system-based utility to locate the device and to view its current settings.
Com Port Redirectory Quick Start and Online Help	Instructions for using the Windows operating system-based utility to create virtual com ports.
Secure Com Port Redirector User Guide	Instructions for using the Windows operating system-based utility to create secure virtual com ports.

2: Introduction

The SGX 5150 is a turnkey WLAN IoT device gateway that securely connects deployed devices to the enterprise network through serial, USB or Ethernet interfaces. It simplifies enterprise Wi-Fi® deployments and accelerates the availability of connected devices within enterprise, medical/ healthcare and industrial automation applications.

Note: *This user guide describes all software features supported in the Lantronix SGX 5150 device gateway models available for purchase. Depending on the specific SGX 5150 device gateway model you have purchased, some descriptions may not apply.*

Key Features

- **Power Supply:** Flexible power options and input voltage range (one barrel connector for 9-30 VDC power source, USB type C VBUS 5V, and optional PoE power input via Ethernet RJ45 interface.
- **Controller:** 32-bit ARM9 microprocessor running at 400 megahertz (Mhz) with 32 Kilobyte (KB) configurable cache.
- **Memory:** 400 MHz ARM9, 64 MB SDRAM and 128 MB NAND flash
- **Ethernet:**

  - One RJ45 10Base-T/100Base-TX Ethernet port.

  - Auto sensing

  - Automatic MDI/MDI-X crossover

  - Full duplex IEEE 802.3x flow control

  - Half-duplex back pressure flow control

  - Hardware Optional PoE Power Input (Class 2). Supports inputs at both Spare Pins or Ethernet Center Taps

- **Wireless:**

  - 5G Wi-Fi (IEEE 802.11ac)
    - 1x1 ac (MCS0 - MCS9)
    - 20, 40 and 80 MHz Channels with optional SGI
  - IEEE 802.11 n
    - 1x1 n (MCS0 - MCS7)
    - 20 MHz and 40 MHz channel width with optional SGI
  - Advanced 802.11 n/ac Features
    - Tx/Rx Low Density Party Check (LDPC)
    - Rx Space Time Block Coding (STBC)
  - Compatible with IEEE 802.11 a/b/g and supports IEEE 802.11 d/h
  - Bluetooth/WLAN Coexistence
  - Dual band 2.4 GHz and 5 GHz

  - 2.412 GHz - 2.484 GHz - Channels 1 - 14
  - U-NII-1 (5.15 – 5.25 GHz) Channels 36, 40, 44, 48
  - U-NII-2 (5.25 – 5.35 GHz) Channels 52, 56, 60, 64
  - U-NII-2e (5.47 – 5.725 GHz) Channels 100 – 140
  - U-NII-3 (5.725 – 5.825 GHz) Channels 149 - 165
- **Serial Ports:** Two 300 to 921 kbaud with options of RS-232 serial ports or multi-protocol RS232/422/485 serial ports.
- **USB Ports:** One USB 2.0 high speed interfaces via USB type C connector.
- Configuration via CLI, XML and HTTP.
- Ethernet to wireless tunneling.
- Built-in site survey tool.
- **Temperature Range:** Operates over a temperature range of -40°C to +70°C (-40°F to 158°F). The storage temperature range is -40°C to 85°C (-40°F to 185°F).

Applications

- Home energy management systems
- Medical device and clinical information system (CIS) integration
- Asset and warehouse management
- Mobile driven human-machine interface (HMI) and instrumentation
- Industrial machines - weighing scales, automation controllers

SGX 5150 User Cases

Figure 2-1 Serial/USB/Ethernet to Wi-Fi Connectivity

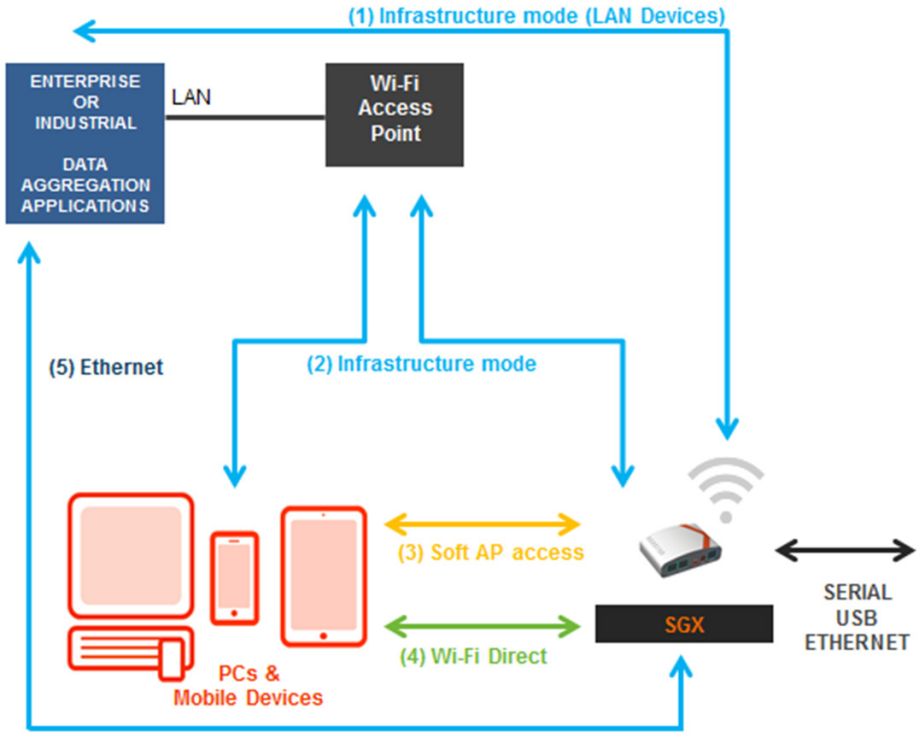
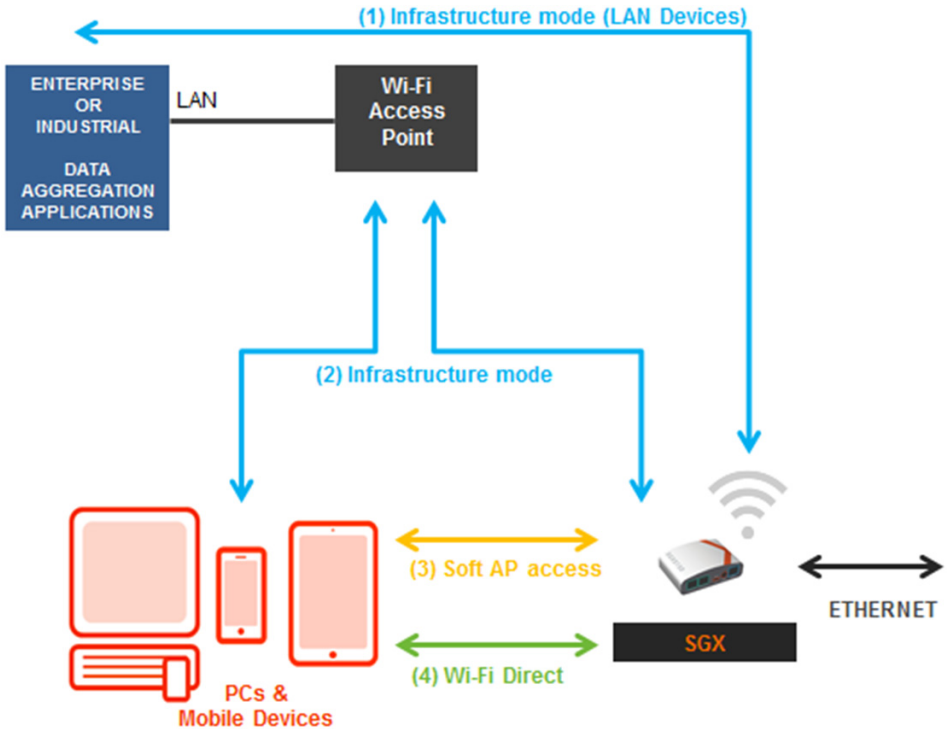


Figure 2-2 Ethernet to Wi-Fi Bridge



Protocol Support

The SGX 5150 contains a full-featured IP networking and wireless software stack:

- DHCP Client, DHCP Server, DHCPv6 Client
- uPnP (Discovery), LCAP (77FE), Telnet, SSH, SSLv3/TLSv1, (S)FTP, HTTP(S)
- IPv4/IPv6, TCP, UDP, ICMP, ARP, Auto-IP, DNS, SNMP v2/v3
- WPA/WPA2 Personal, WPA2 Enterprise (EAP-TLS, EAP-TTLS, EAP-PEAPv0/v1, EAP-FAST)

Troubleshooting Capabilities

The SGX 5150 offers a comprehensive diagnostic tool set that lets you troubleshoot problems quickly and easily. Diagnostic tools available in the CLI or Web Manager allow you to:

- View critical hardware, memory, buffer pool, IP socket information and routing table
- Perform ping and traceroute operations
- Conduct forward or reverse DNS lookup operations
- View all processes currently running on the SGX 5150 including CPU utilization
- View system log messages

Configuration Methods

After installation, the SGX 5150 requires configuration. For the unit to operate correctly on a network, it must have a unique IP address on the network. There are four basic methods for logging into the SGX 5150 and assigning IP addresses and other configurable settings:

- **Web Manager:** View and configure all settings easily through a web browser using the Lantronix Web Manager. See *Chapter 5: Configuration Using Web Manager*.
- **DeviceInstaller:** Configure the IP address and related settings and view current settings on the SGX 5150 using a Graphical User Interface (GUI) on a PC attached to a network. You will need the latest version of the Lantronix® DeviceInstaller™ utility.
  See *Chapter 4: Using DeviceInstaller*.
- **Command Mode:** Two methods for accessing Command Mode (CLI) include making a Telnet or SSH connection, or connecting a PC or other host running a terminal emulation program to the unit's serial port. See the *SGX 5150 IoT Device Gateway Command Reference* for instructions and available commands.
- **XML:** The SGX 5150 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 *SGX 5150 IoT Device Gateway Command Reference* for instructions and commands.

Addresses and Port Numbers

Hardware Address

The hardware address is also referred to as the Ethernet address, physical address, or MAC address. The first three bytes of the Ethernet address are fixed and identify the unit as a Lantronix product. The fourth, fifth, and sixth bytes are unique numbers assigned to each unit.

Sample ways hardware address may be represented:

- `00-80-A3-14-1B-18`
- `00:80:A3:14:1B:18`

IP Address

Every device connected to an IP network must have a unique IPv4 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 SGX 5150:

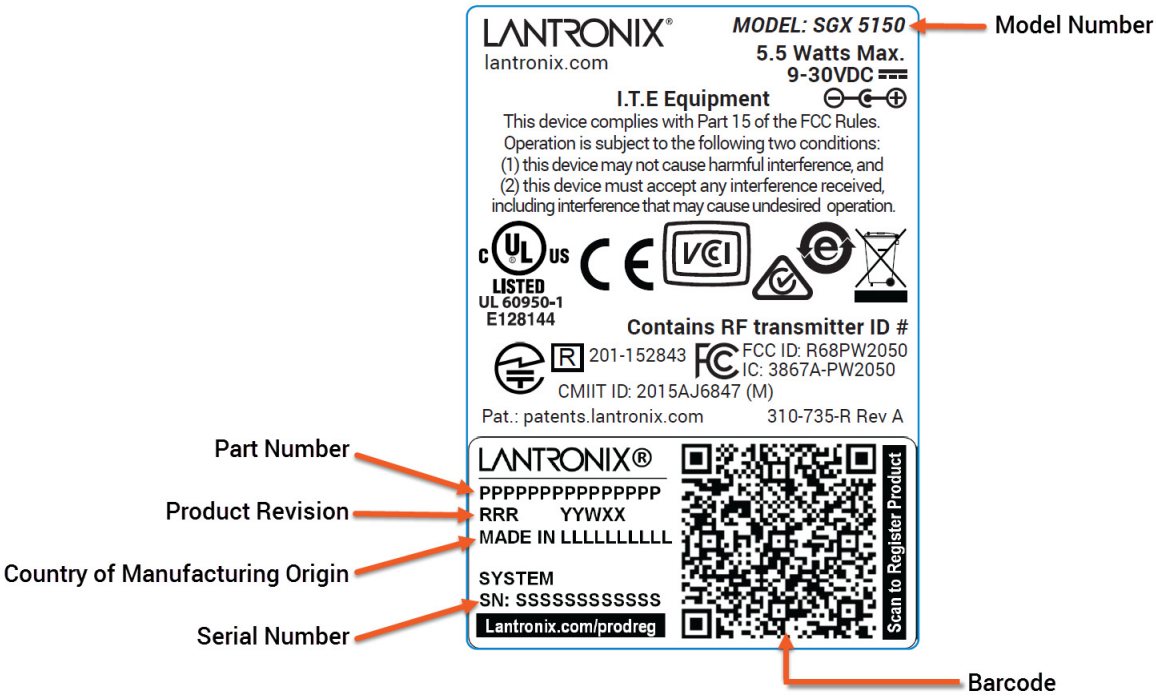
- TCP Port 22: SSH Server (Command Mode configuration)
- TCP Port 23: Telnet Server (Command Mode configuration)
- TCP Port 80: HTTP (Web Manager Configuration)
- TCP Port 21: FTP
- TCP Port 443: HTTPS
- UDP Port 30718: Lantronix Discovery Protocol

Product Information Label

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

- Model Name
- Product Part Number
- Barcode
- Product Revision
- Country of Manufacturing Origin
- Serial Number

Figure 2-3 Product Label



3: Installation of the SGX 5150

This chapter describes how to install the SGX 5150 device gateway. It contains the following sections:

Package Contents

The SGX 5150 package includes the following items:

- SGX 5150 IoT device gateway
- 2 external antennas with RP-SMA connectors
- Type A to type C USB cable

  Note: *This cable is compliant to the specification mandated 56k Ω pull-up.*
- *SGX 5150 IoT Device Gateway Quick Start Guide*

User-Supplied Items

To complete your installation, you need the following items:

- RS-232/422/485 serial device(s) requiring network connectivity
- A serial cable for each serial device

  - A null modem cable to connect the serial port to another DTE device.

  - A straight-through modem cable to connect the serial port to a DCE device
- An available connection to your Ethernet network and an Ethernet cable

Hardware Components

Front Panel

Figure 3-1 Front Panel

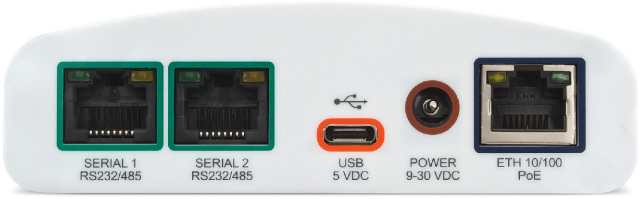
Table 3-2 SGX 5150 LEDs and Descriptions

LED	Description
Status	◆ No IP obtained from eth0 network: L, L, S, S, S ◆ No IP obtained from wlan0 network: L, L, L, S, S, S ◆ No IP obtained from the usb0 network: L, L, L, L, L, S ◆ No eth0 link: L, L, S, S ◆ No wlan link: L, L, L, S, S ◆ No usb0 link: L, L, L, L, L, S, S
WLAN	The wlan indicator light and color pattern indicates the wlan status according to *Table 3-10* and *Table 3-11* and also reflects the WPS status according to *Table 3-13*.
Signal	See *Table 3-10* and *Table 3-11* for signal strength indication information.

Note: *In Table 3-2 above, the **L** indicates a longer LED blink while the **S** indicates shorter LED blink.*

Back Panel

Figure 3-3 Back Panel



Serial Interface

One or two serial ports are available for the SGX 5150. Data rates can be configured for speeds between 300 and 921 kbaud. Hardware protocol options include the following:

- Two RJ45 RS232 Serial Ports, or
- Two RJ45 Multi-protocol RS232/422/485 ports, or
- One RJ45 RS232 Serial Port

Note: *Multi-protocol ports come with configurable terminations 120 ohm on TX+/- and RX+/-.*

Table 3-4 Serial RJ45 Connector Pinout and LEDs

Pin Number	Signal Name for RS-232	Signal Name for RS-422/485 (4 wire)
1	RTS (output from SGX)	TX+ (output from SGX)
2	DTR (output from SGX)	Not used/do not connect.
3	TXD (output from SGX)	TX- (output from SGX)
4	GND	GND
5	GND	GND
6	RXD (input to SGX)	RX+ (input to SGX)
7	DCD (input to SGX)	Not used/do not connect.
8	CTS (input to SGX)	RX- (input to SGX)
Right LED	Yellow for Transmit Data activities (TXD)	Yellow for Transmit Data activities (TXD)
Left LED	Green for Receive Data activities (RXD)	Green for Receive Data activities (RXD)

USB Connection

One USB 2.0 HS/FS port with USB type C connector is available on the SGX 5150 and can be configured in two ways:

- As a USB device (default setting) where the SGX 5150 can be powered by a VBUS 5V.
- As a USB configurable host where the SGX 5150 can provide VBUS 5V 0.5A if powered by a Lantronix provided wall adapter or PoE (hardware optional).

Table 3-5 USB Type C Connector Pinout

Upper Row Pin Number	Lower Row Pin Number	Signal Name
A1	B1	Ground
A2	B2	No Connection
A3	B3	No Connection
A4	B4	VBUS 5V
A5		CC1
	B5	CC2
A6	B6	Data+
A7	B7	Data-
A8	B8	No Connection
A9	B9	VBUS 5V
A10	B10	No Connection
A11	B11	No Connection
A12	B12	Ground

Power

Table 3-6 Power Input Interface

Power Input	Description
Barrel Connector	◆ Center contact fork type for better grip ◆ 9-30 VDC Input with center = (+) ◆ Reverse polarity protection up to 30 VDC
USB Type C Connector	◆ USB VBUS 5V powering (default setting) ◆ SGX can provide VBUS 5V 0.5A out if configured as USB host, and powered by Lantronix provided wall adaptor, or PoE power source class 2 (hardware optional)
Ethernet PoE RJ45 Connector	◆ PoE power module is optional ◆ Must provide class 2 PoE power source ◆ Supports power inputs at both spare pins or Ethernet center taps with full bridge diodes for polarity in-discrimination.
Power Consumptions	◆ 1.9 W typical if configured as USB Device, or USB Host - but not providing VBUS 5V power ◆ 5.5 W maximum if configured as USB Host and providing out VBUS 5V power ◆ The internal hardware configuration allows more than one or all power sources applied at the same time for power back up if one of them happens to fail (**caution: may not be error-free**). Not designed for one power source to take precedence over the other.

Ethernet Ports

The Ethernet port has two LEDs (see *Table 3-2*) that indicate the status of the connection as described in *Table 3-8* and *Table 3-9* below.

Table 3-7 Ethernet RJ45 Connector Pinout

Pin Number	Signal Name
1	ETX+
2	ETX-
3	ERX+
4	Spare pin for PoE power input_1
5	Spare pin for PoE power input_1
6	ERX-
7	Spare pin for PoE power input_2
8	Spare pin for PoE power input_2
Right LED	See *Table 3-8*.
Left LED	See *Table 3-9*.

Table 3-8 Left Ethernet LED

Color/Status	Solid Light
Yellow	100 Mbps activity
OFF	10 Mbps activity

Table 3-9 Right Ethernet LED

Color/Status	Blinking Light
Green	Link Up
OFF	No Link

The Ethernet port can conect to an Ethernet (10 Mbps) or fast Ethernet (100 Mbps) network.

Table 3-10 WLAN Signal Strength Indicator at 2.4 GHz

Fault Conditions	Blink Pattern
Greater than -60 dbM	3
Greater than -70 dbM and less than -60 dbM	2
Greater than -80 dbM and less than -70 dbM	1
Less than -80 dBm	All OFF

Table 3-11 WLAN Signal Strength Indicator at 5 GHz

Fault Conditions	Blink Pattern
Greater than -60 dbM	3
Greater than -65 dbM and less than -60 dbM	2
Greater than -70 dbM and less than -65 dbM	1
Less than -70 dBm	All OFF

Wi-Fi Protected Setup (WPS)

Using WPS, you have the option of connecting to SGX 5150 devices with a router or access point in a single operation instead of manually creating a profile with a network name (SSID), setting up wireless security parameters and updating the choice list.

Figure 3-12 Wi-Fi Protected Setup

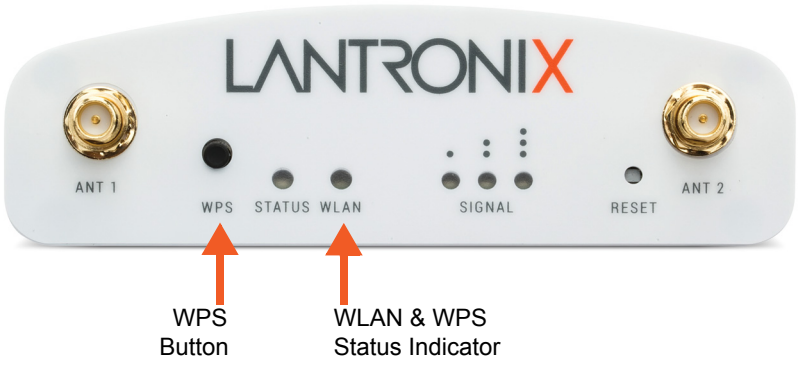


Table 3-13 WPS Status Indicator

The WLAN link LED is used to indicate WPS status. See below for blink patterns.

WPS Status	Blink Pattern
WPS is enabled and on	Short, continuous
WPS has a profile error	Long, long, long, short, short, 2 seconds off, continuous
WPS has a timeout error	Long, long, long, short, short, short, short, 2 seconds off, continuous

Notes:

- *For Table 3-11 above, a "long" blink is 0.7 seconds of light followed by 0.3 seconds of no light. A "short" blink is a light that is on for only 0.2 seconds and followed by 0.2 seconds of no light.*
- *The diagnostic blink patterns reflect the highest priority fault condition. Also, the Diagnostic LED will give an initial, identifying blink pattern to indicate the type of diagnostic information it will display. All power and other non-network related diagnostic patterns begin with one long blink. All wired LAN related diagnostics patterns begin with two long blinks. All WLAN-related diagnostics patterns begin with three long blinks.*

Reset Button

Press the **Reset** button as shown in *Figure 3-1* for 6 seconds to reset the SGX 5150 configuration parameters to factory defaults and reboot.

To Start WPS

Using the Device

1. Place the end of a paper clip or similar object into the WPS opening (see *Figure 3-12*) and press and hold down for a minimum of 5 seconds.
2. Remove the paper clip to release the button. The unit will start Wi-Fi protected setup.

Installing the SGX 5150

Be sure to place or mount the device securely on a flat horizontal or vertical surface. The device comes with brackets for mounting it, for example, on a wall. If using AC power, do not use outlets controlled by a wall switch.

Observe the following guidelines when connecting the serial devices:

- The SGX 5150 serial ports support RS-232 or multi-protocol RS232/422/485 serial ports.
- Use a null modem cable to connect the serial port to another DTE device. Use a straight-though (modem) cable to connect the serial port to a DCE device.
- Connect your RJ-45 Ethernet cable to the RJ-45 port of the unit.

Perform the following steps to install your device:

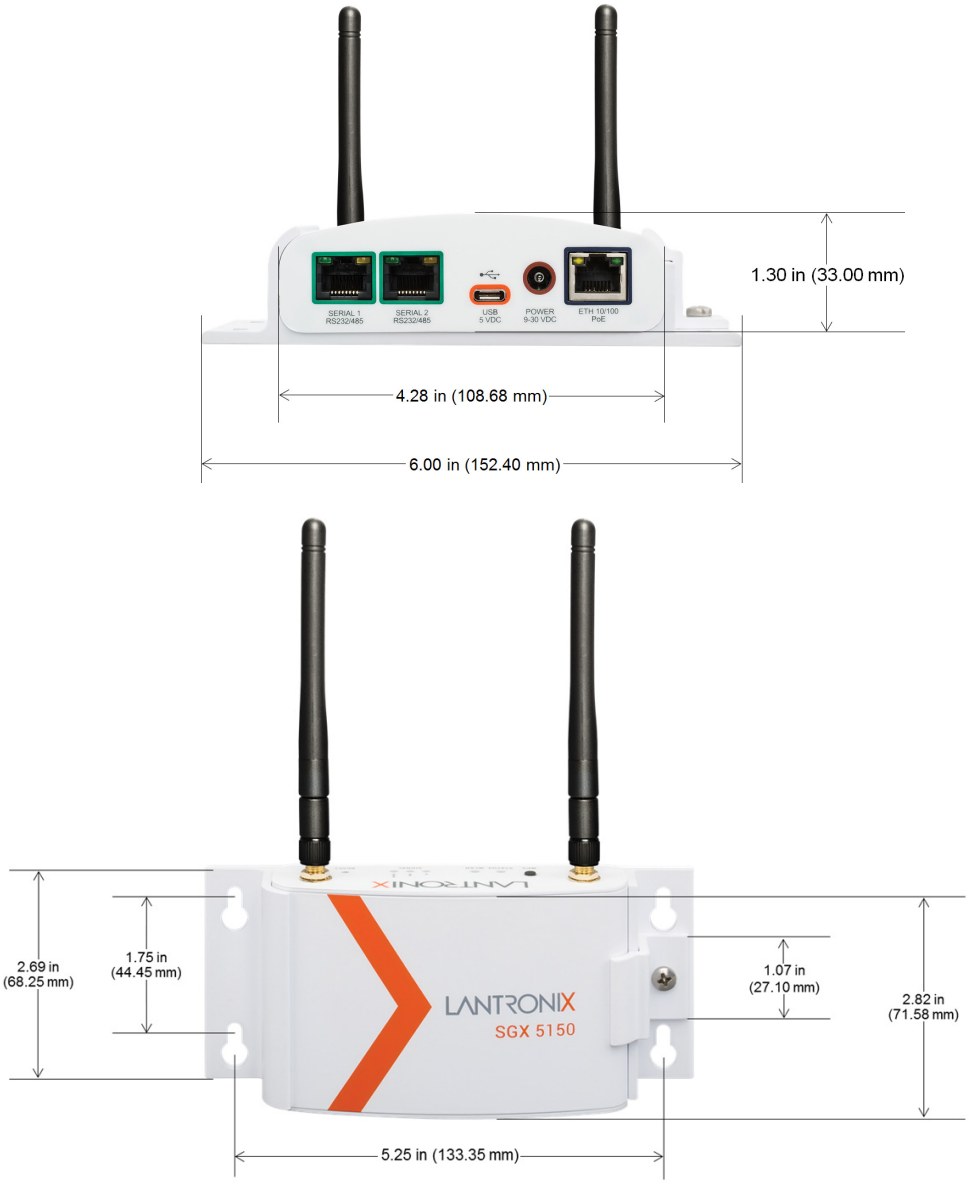
1. Attach the two antennas to the device.
2. Connect the equipment to the numbered device port (Serial 1/Serial 2) using appropriate cables and adapters.

3. Mount or place the device securely.
4. Supply power to the SGX 5150 and connect it to the user device by using the supplied tape A to type C USB cable. As soon as you plug the device into power, the device powers up automatically, the self-test begins, and LEDs would indicate the device's status.

   Note: *The SGX 5150 supports a power range of 9 to 30 VDC and can be powered up via the barrel-power adapter or USB port.*
5. Via the computer connected on the same network, you can follow one of two paths to device discovery and initial network configuration as outlined below.

Note: *Antennas must be installed prior to powering on the unit. Do not remove or connect the antennas while the unit power is on or proper wireless signals may not be transmitted or received as intended.*

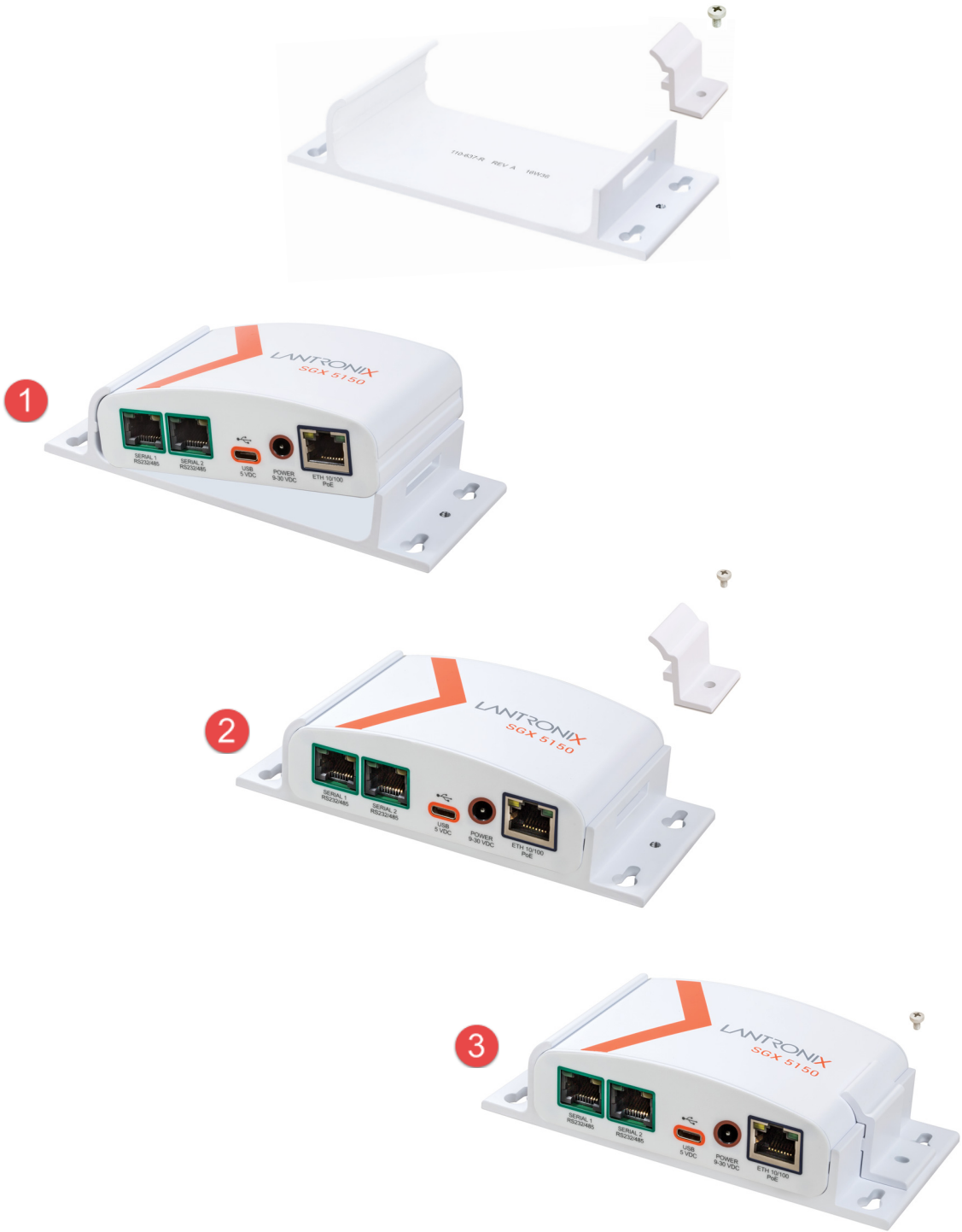
Figure 3-14 SGX 5150 Dimensions in Inches (in) and Millimeters (mm)



Optional SGX 5150 Bracket

A bracket accessory for securing the SGX 5150 IoT device gateway can be purchased at the Lantronix Online Store at https://store.lantronix.com/ or by calling Lantronix Sales at 800-422-7055. Purchased brackets will come with an installation guide.

Figure 3-15 Optional Bracket Installation



Wireless Quick Connect

Continue with these steps for Wireless Quick Connect after installing the SGX 5150 IoT device gateway.

1. From your Wi-Fi device, connect to `SSID sgx5150_*`, where `*` is your gateway 12-digit serial number.
2. From your browser, connect to `192.168.0.1` using these login credentials:
   - User ID = `admin`
   - Password = `PASS`

   Note: *For security purposes, please change the admin password during initial setup.*
3. Select **Wireless Quick Connect**, choose the appropriate network name for the gateway connection, and follow the prompts for your wireless network required security parameters.
4. Click **Apply** to save and complete the wireless network setup.

4: Using DeviceInstaller

This chapter covers the steps for getting the SGX 5150 unit online and for viewing its current configuration though the Lantronix DeviceInstaller application. DeviceInstaller is a free utility program that discovers, configures, upgrades, and manages Lantronix devices. It can be downloaded from the Lantronix website at www.lantronix.com/support/downloads.

For instructions on using DeviceInstaller to configure the IP address and related settings or for more advanced features, see the DeviceInstaller Online Help.

Note: *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. These addresses are not routable.*

Installing DeviceInstaller

1. Download the latest version of Lantronix DeviceInstaller application from: www.lantronix.com/support/downloads.
2. Run the executable to start the installation process.
3. Respond to the installation wizard prompts. (If prompted to select an installation type, select **Typical**.)

Accessing the SGX 5150 Using DeviceInstaller

Note: *Make note of the MAC address on your SGX 5150 unit. It may be needed to perform various functions in the DeviceInstaller application.*

1. Click **Start → All Programs → Lantronix → DeviceInstaller 4.4 → DeviceInstaller.**
2. When DeviceInstaller starts, it will perform a network device search. To perform another search, click **Search**.
3. Expand the **SGX** folder by clicking the + symbol next to the folder icon. A list of available Lantronix SGX 5150 units appears.
4. Select a SGX 5150 unit by expanding its entry and clicking on its IP address to view its configuration.
5. On the right page, click the **Device Info** tab. The current SGX 5150 configuration appears. This is only a subset of the full configuration; the full configuration may be accessed via Web Manager, CLI, or XML.

Table 4-1 SGX 5150 Configuration in DeviceInstaller

Current Settings	Description
Name	Configurable field. A name that identifies the SGX 5150 unit. The name field is blank by default. Double-click the field, type in the value, and press **Enter** to complete. This name is not visible on other PCs or laptops using DeviceInstaller.
DHCP Device Name	Non-configurable field. Displays the name associated with SGX 5150 unit's current IP address, if the IP address was obtained dynamically. To change the DHCP device name, see *Chapter 5: Configuration Using Web Manager* or see the *SGX 5150 IoT Device Gateway Command Reference* available at www.lantronix.com/support/documentation.
Group	Configurable field. A group name to categorize the SGX 5150 unit. Double-click the field, type in the value, and press **Enter** to complete. This group name is not visible on other PCs or laptops using DeviceInstaller.
Comments	Configurable field. Information about the SGX 5150 unit. Double-click the field, type in the value, and press **Enter** to complete. This description or comment is not visible on other PCs or laptops using DeviceInstaller.
Device Family	Non-configurable field. Displays the SGX 5150 units device family as "SGX."
Short Name	Shows "sgx5150" by default.
Long Name	Shows "Lantronix SGX5150" by default.
Type	Non-configurable field. Displays the device type as "SGX 5150."
ID	Non-configurable field. Displays the SGX 5150 unit's ID embedded within the unit.
Hardware Address	Non-configurable field. Displays the SGX 5150 unit's hardware (or MAC) address.
Firmware Version	Non-configurable field. Displays the firmware currently installed on the SGX 5150 unit.
Extended Firmware Version	Non-configurable field. Displays the full version nomenclature of the firmware.
Online Status	Non-configurable field. Displays the SGX 5150 unit's status as **Online**, **Offline**, **Unreachable** (if the unit is on a different subnet), or **Busy** (the SGX 5150 unit is currently performing a task.)
IP Address	Non-configurable field. Displays the SGX 5150 unit's current IP address. To change the IP address, click the Assign IP button on the DeviceInstaller menu bar.
IPV6 Link Local Address	Non-configurable field. Displays the SGX 5150 unit's current IPv6 address. To change the IPv6 address, click the **Assign IP** button on the DeviceInstaller menu bar.
IPV6 Global Address	Non-configurable field. Displays the SGX 5150 unit's global address.
IP Address was Obtained	Non-configurable field. Displays "Dynamically" if the SGX 5150 unit automatically received an IP address (e.g., from DHCP). Displays "Statistically" if the IP address was configured manually. If the IP address was assigned dynamically, the following fields appear: ◆ Obtain with DHCP with value of True or False ◆ Obtain with BOOTP with value of True or False
Subnet Mask	Non-configurable field. Displays the SGX 5150 unit's current subnet mask. To change the subnet mask, click the **Assign IP** button on the DeviceInstaller menu bar.

Current Settings	Description
Gateway	Non-configurable field. Displays the SGX 5150 unit's current gateway. To change the default gateway, click the **Assign IP** button on the DeviceInstaller menu bar.
Interfaces	Non-configurable field. Displays the status of the wired (eth0), wireless (wlan0), and usb (usb0) interfaces. Click the plus icon to expand eth0, wlan, or usb0 and see specific interfaces organized beneath each.
Number of Serial Ports	Non-configurable field. Displays the number of serial ports on the SGX 5150 unit.
Supports Configurable Pins	Non-configurable field. Displays **False**.
Supports Email Triggers	Non-configurable field. Displays **True**.
Telnet Supported	Non-configurable field. Indicates if Telnet sessions are permitted. Displays **True**.
Telnet Port	Non-configurable field. Displays the SGX 5150 unit's port for Telnet sessions.
Web Port	Non-configurable field. Displays the SGX 5150 unit's port for Web Manager configuration.
Firmware Upgradable	Non-configurable field. Displays **True**, indicating the SGX 5150 firmware is upgradable as newer version become available.

Next Step

Now that the SGX 5150 unit has an IP address and other initial settings, you can configure it.

1. Double-click the unit in the list. Details about the unit display.
2. You have the following options:
   - To configure the unit using a Web browser, click the Web Configuration tab. The Lantronix Web Manager window displays in your browser. Continue with *Chapter 5: Configuration Using Web Manager*.
   - To configure the unit using a Telnet session, click the Telnet Configuration tab. The Setup Mode window displays. See the *SGX 5150 IoT Device Gateway Command Reference* (available at www.lantronix.com/support/documentation) for directions on configuring the SGX 5150 unit using Command Line Interface (CLI) and/or Extensible Markup Language (XML).

5: Configuration Using Web Manager

This chapter describes how to configure the SGX 5150 unit using Web Manager, the Lantronix browser-based configuration tool. The device's configuration is stored in non-volatile memory and is retained across device reset and during loss of power to the device. All changes take effect immediately, unless otherwise noted. This chapter contains the following sections:

Accessing Web Manager

Web Manager is normally accessed through a standard web browser but you can also access Web Manager in two other ways. See *Chapter 4: Using DeviceInstaller on page 31* for additional information on accessing Web Manager through the DeviceInstaller Web Configuration tab. See the *SGX 5150 IoT Device Gateway Quick Start Guide* for instructions on accessing Web Manager through SoftAP. The quick start guide is available at www.lantronix.com/support/documentation.

To access Web Manager through a web browser:

1. Open a standard web browser. Lantronix supports the latest versions of Internet Explorer®, Firefox®, Safari®, or Chrome™ web browsers.
2. Enter the IP address or host name of the SGX 5150 unit in the address bar. The IP address may have been assigned manually using DeviceInstaller (see *Chapter 4: Using DeviceInstaller on page 31*) or automatically by DHCP.
3. Enter your username and password. The factory-default username is "**admin**" and "**PASS**" is the default password. The Status web page (see *Figure 5-1*) displays current configuration and status details for the device, network and line settings.

Status Page

This page appears upon logging into Web Manager and when you click the **Status** tab.

Figure 5-1 Status Page (Section 1 of 2)

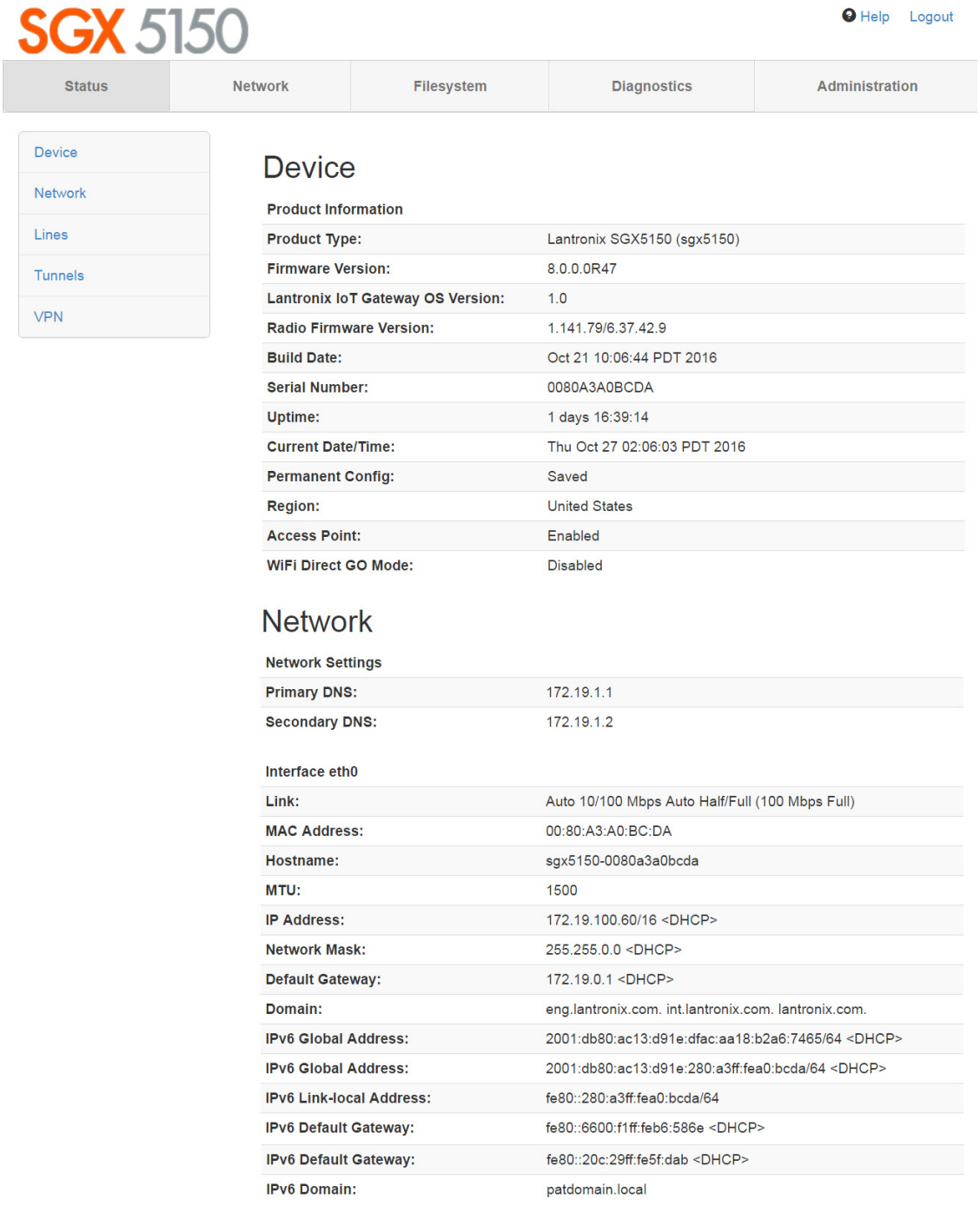


Figure 5-2 Status Page (Section 2 of 2)

Interface wlan0	
Link:	Established
MAC Address:	00:80:A3:A0:BC:DB
Hostname:	sgx5150-0080a3a0bcdb
MTU:	1500
IP Address:	172.19.100.71/16 <DHCP>
Network Mask:	255.255.0.0 <DHCP>
Default Gateway:	172.19.0.1 <DHCP>
Domain:	eng.lantronix.com. int.lantronix.com. lantronix.com.
IPv6 Global Address:	2001:db80:ac13:d91e:e469:7b7a:6205:d9f2/64 <DHCP>
IPv6 Global Address:	2001:db80:ac13:d91e:280:a3ff:fea0:bcdb/64 <DHCP>
IPv6 Link-local Address:	fe80::280:a3ff:fea0:bcdb/64
IPv6 Default Gateway:	fe80::6600:f1ff:feb6:586e <DHCP>
IPv6 Default Gateway:	fe80::20c:29ff:fe5f:dab <DHCP>
IPv6 Domain:	patdomain.local

Interface usb0	
State:	Disabled

Interface ap0	
State:	Enabled
Network Name (SSID):	sgx5150_0080a3a0bcda
Security Suite:	None
IP Address:	192.168.0.1/24

Lines

Line Settings	
Line 1:	RS232, 9600, None, 8, 1, None
Line 2:	RS232, 9600, None, 8, 1, None
USB 1:	USB-CDC-ACM

Tunnels

Tunneling	Connect Mode	Accept Mode
Tunnel 1:	Disabled	Waiting
Tunnel 2:	Disabled	Waiting
Tunnel 3:	Disabled	Waiting

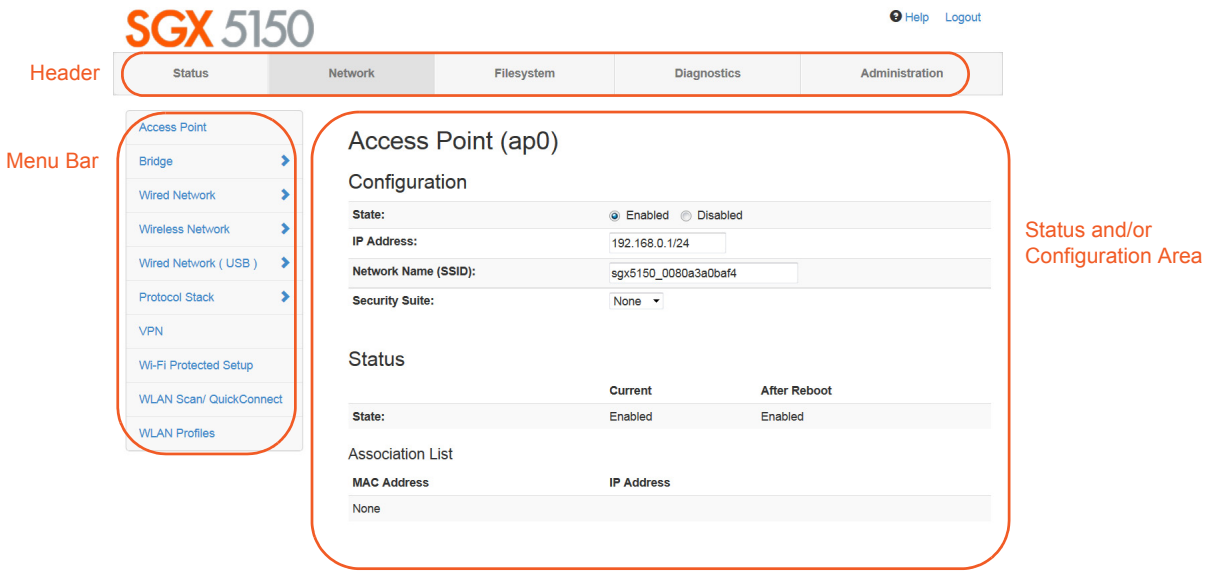
VPN

VPN	
Status:	Disabled
IP Address:	<None>

Web Manager Components

The layout of a typical Web Manager page is below.

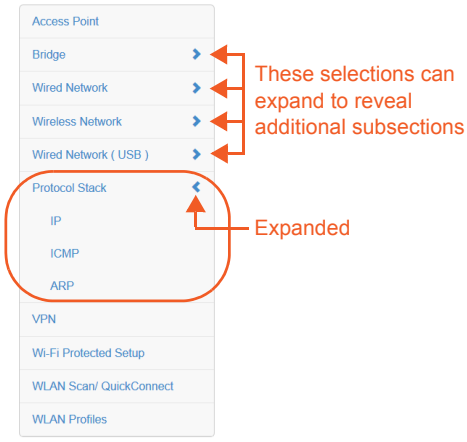
Figure 5-3 Components of the Web Manager Page



Web Manager pages have these sections:

- The **Status**, **Network**, **Diagnostics** and **Administration** tabs located in the **header** at the top of the page provide direct access to each Web Manager page of the same name. All the functionality is accessible through Web Manager and is divided between these tab/pages.
- Each Web Manager page accessed through the header tabs reveal a page-specific **menu bar** on the left side organizing available sections for that page.
  - The menu bar accessed via the **Network** and **Administration** tabs contain selections that can further expand to reveal additional subsections. A right-pointing blue arrow indicates a particular selection can be expanded to reveal subsections.
  - Expand or collapse an expandable menu bar section by clicking on it.

Figure 5-4 Expandable Menu Bar Selections



- The main body area of the page contains either view-only **Status info** or **Configuration options** according to the tab, menu bar selection or subsection selected.
- When a parameter is changed on a page, a **Submit** button will appear at the bottom of the page. Click on this button to save the change.
- A **Logout** link is available at the upper right corner of every Setup and Admin page. In Chrome or Safari, it is necessary to close out of the browser to completely logout. If necessary, reopen the browser to log back in.

Navigating Web Manager

The table below provides a shortcut to the various software features available for viewing and configuration through Web Manager.

Table 5-5 Web Manager Pages

Web Manager Page	Description	Page
Status	Shows product information, network, line, and tunneling settings.	*35*
Access Point	Allows you to configure an access point and shows the current operational state of existing access points.	*35*
Action	Allows you to view and configure the actions for a specific alarm or report.	*75*
Applications	View and configure application running scripts.	*77*
Bridge	Allows you to configure a bridge and shows the current operational state of the bridge.	*41*
CLI	Shows Command Line Interface (CLI) statistics and lets you change the current CLI configuration settings.	*78*
Clock	Allows you to view and configure the current date, time and time zone as it displays in web manager.	*79*
Diagnostics	Lets you perform various diagnostic procedures.	*69*
Discovery	Allows you to view and modify the configuration and statistics for device discovery.	*80*
DNS	Displays the current status of the DNS subsystem.	*69*
Email	Shows email statistics and lets you clear the email log, configure email settings, and send an email.	*80*
Filesystem	Shows file system statistics and lets you browse the file system to view a file, create a file or directory, upload files using HTTP, copy a file, move a file, or perform TFTP actions.	*67*
FTP	Shows statistics and lets you change the current configuration for the File Transfer Protocol (FTP) server.	*81*
Gateway	Shows statistics and lets you change the current configuration for the gateway.	*82*
GRE	Allows you to view and configure GRE settings.	*88*
Hardware	Shows hardware status and configuration options.	*70*
HTTP	Shows Hyper Text Transfer Protocol (HTTP) statistics and lets you change the current configuration and authentication settings.	*90*
IP Sockets	Shows IP socket status and lets you change hardware configuration.	*70*
Line	Shows statistics and lets you change the current configuration and Command mode settings of a serial line.	*92*
Log	Shows and allows changes with logs.	*71*
Memory	Shows memory status and lets you change hardware configuration.	*71*
Modbus	Shows the current connection status of the Modubs servers listening on the TCP ports and configure Modbus TCP server.	*96*
Network	Shows status and lets you configure the network interface.	*40*
Ping	Shows how to ping a network host with a DNS hostname or IP address.	*71*
Processes	Shows the processes currently running on the system.	*72*

Web Manager Page	Description	Page
Protocol Stack	Lets you perform lower level network stack-specific activities.	*57*
QuickConnect	Lets you change configuration settings for the Quick Connect.	*62*
Quick Setup	Shows the quick setup configuration options for the device.	*125*
Routes	Shows the current system routing table.	*72*
Threads	Shows thread ID numbers, names and CPU usage.	*73*
Traceroute	Shows how to perform a traceroute to a network host.	*73*
USB	Shows USB status, command mode, and configuration options.	*94*
User Management	Shows the configuration of users.	*122*
SMTP	Shows SMTP status and configuration options.	*98*
SNMP	Shows SNMP status and configuration options.	*98*
SSH	Lets you change the configuration settings for SSH server host keys, SSH server authorized users, SSH client known hosts, and SSH client users.	*99*
SSL	Lets you upload an existing certificate or create a new self-signed certificate.	*103*
Syslog	Lets you specify the severity of events to log and the server and ports to which the syslog should be sent.	*108*
System	Lets you reboot device, restore factory defaults, upload new firmware, and change the device long and short names.	*109*
Terminal	Lets you change current settings for a terminal.	*111*
Tunnel	Lets you change the current configuration settings for an incoming tunnel connection.	*112*
User Management	Displays the configuration of users.	*122*
VPN	Lets you view and configure VPN settings.	*59*
WLAN Profiles	Lets you view, edit, delete and create a WLAN profile on a device.	*63*
WLAN Scan	Shows a scan of wireless devices within range of the device.	*62*
XML	Lets you export XML configuration and status records, and import XML configuration records.	*122*

6: Network Settings

Network settings for the SGX 5150 can be viewed and modified under the Network tab in the Web Manager user interface. This chapter describes the following network settings:

Access Point

Configure software-enabled access point interface on this page. Access point status information displays at the bottom half of the page.

Table 6-1 Access Point Settings

Access Point Field	Description
State	Select to enable or disable the access point. If enabled, the DHCP server will assign IP addresses to the access point clients.
IP Address	Enter the IP address of the SoftAP interface.
Network Name (SSID)	Specify the network name/SSID of the access point. The SSID update will take effect after the device is rebooted.
Security Suite	Select a security suite to be used with the access point.
Passphrase	Enter a passphrase if WPA or WPA2 security suite is selected above. ***Note:*** *This field appears when WPA or WPA2 security suite is selected.*
Show Password (check box)	Check to make the passphrase entered to the left visible. ***Note:*** *This field appears when WPA or WPA2 security suite is selected.*

To View or Configure Access Point Settings

Using Web Manager

- To view access point statistics and configuration options, on the **Network** page, click **Access Point**.

Using the CLI

- To enter the command level: `enable > config > access point`

Using XML

- Include in your file: `<configgroup name=”access point”>`

Bridge

The SGX 5150 bridges traffic between an Ethernet or USB RNDIS (usb0) and WLAN interface. For example, br0 is a bridge between eth0 and wlan0. For USB RNDIS interface, USB 1 must be configured as an Ethernet device.

When a bridge is enabled, the *Wired (eth0) Network* configuration is used for configuring direct connections into the device over the primary interface; the *Wireless (wlan0) Network* configuration is ignored. Both the Ethernet and WLAN link configurations are used the same as when the bridge is disabled.

Bridging MAC Address specifies the MAC address of bridgeable traffic between the Ethernet and WLAN interfaces. When bridging is active, this MAC Address will be used as the MAC address of the WLAN interface. Packets received on the Ethernet interface from this address will be bridged to the WLAN interface (except traffic directed at the Primary Interface). If this field is not configured, then the device waits for the first packet to arrive on the Ethernet interface and uses the source address as the bridging address.

Bridging IP Address specifies the IP address of the bridged client.

When bridging is active, this IP Address will be used to create a static route between this device and the bridged client.

This route is required for connecting to the bridged client from devices connected via the access point network and from this device.

If Auto Detect IP Address is enabled, then the device will attempt to learn the IP Address by using the source or destination IP address of packets arriving on the Ethernet interface.

Warning: ***Enabling Auto Detect IP Address may affect the performance of running processes during the learning phase.***

During initialization, the bridging subsystem enables and controls both eth0 and wlan0 networks. These are important aspects to keep in mind:

- If the eth0 physical link is inactive, wlan0 is the primary interface.
- If the eth0 physical link is active, eth0 is the primary interface.

When the eth0 link is active, the wlan0 link is established. Additionally, the bridging MAC address is acquired using preconfiguration or auto-detection, and bridging enters the Active state. If either link goes down, bridging reverts to the Inactive state.

When in the Active state, all packets that arrive on the wlan0 interface are bridged out (through) the eth0 interface. Similarly, all packets that arrive on the eth0 interface are bridged out (through) the wlan0 interface. However, exceptions to this behavior include:

- Ethernet packets directed specifically to the Ethernet (eth0) MAC address are terminated internally and are not bridged to WLAN.
- An ARP request for the primary interface IP address is terminated internally and is not bridged to the WLAN.

Ethernet packets that do not originate from the bridging MAC Address are discarded.

Bridge Status and Configuration

View-only status information on the Bridge1 (br0) Status page displays whether bridging is currently enabled, active, and the following (if any): Ethernet link, WLAN link, primary interface, bridging MAC, Ethernet MAC, WLAN MAC, bridging IP address, and bridging IPv6 address. Ethernet to WLAN and WLAN to Ethernet statistics are provided for unicast, nonunicast, discards and octets.

See *Table 6-2* for the bridge settings that can be modified on the Bridge1 (br0) Configuration page.

Table 6-2 Bridge Settings

Bridge Fields	Description
State	Select to enable or disable bridging. When a bridge is Enabled, the Ethernet Network Interface Configuration is used for configuring direct connections into the device over the primary Interface. The WLAN Network Interface Configuration is ignored. Both the Ethernet and WLAN Link Configurations are used the same as when the bridge is disabled. In Bridge Statistics: ◆ **Enable State** shows whether the bridge is currently enabled. If the state is changed, it will not be reflected here until the next reboot. ◆ **Active State** shows the current state of the bridge. The bridge may be Active or Inactive, depending on the state of the bridge and the physical links.
Transparent Mode	Select to enable or disable transparent mode. ◆ If **Enabled**, the SGX 5150 can no longer be accessed via telnet or web manager from a PC and is invisible to the network. ◆ If **Disabled**, the SGX 5150 will be accessible to a PC on the network via telnet or Web Manager.
Ethernet Interface	Select interface from drop-down menu: ◆ eth0 (default) ◆ usb0
Bridging MAC Address	Enter the bridging MAC address which specifies the MAC address of bridgeable traffic between the Ethernet and WLAN interfaces. When bridging is active, this MAC Address will be used as the MAC address of the WLAN interface. Packets received on the Ethernet interface from this address will be bridged to the WLAN interface (except traffic directed at the primary interface). If this field is not configured, then the device waits for the first packet to arrive on the Ethernet interface and uses the source address as the bridging address.
Bridging IP Address	Enter the bridging IP address which specifies the IP address of the bridged client. When bridging is active, this IP address will be used to create a static route between this device and the bridged client. This route is required for connecting to the bridged client from devices connected via the access point network and from this device.
Auto Detect IPv5 Address	Select to enable or disable auto-detection of the bridged client's IP address.
Bridging IPv6 Address	Enter the bridging IPv6 address.

To View or Configure Bridge Settings

Using Web Manager

- To view the Bridge status, on the **Network** page, click **Bridge** > **Statistics**.
- To configure Bridge settings, on the **Network** page, click **Bridge** > **Configuration** in the links.

Using the CLI

- To enter the command level: `enable > config > bridge 1`

Using XML

- Include in your file: `<configgroup name="bridge" instance="br0">`

Wired (eth0) Network

Network interface settings apply to both the wired Ethernet (eth0) and wireless WLAN (wlan0) interfaces, but are configured independently for each interface. The wired network pages are described in this section.

Interface Status and Configuration

Table 6-3 displays the wired interface status and configuration information. The view-only status information is available on the Wired (eth0) Network Interface Status page. This same information is configurable on the Wired (eth0) Network Interface Configuration page.

Table 6-3 Wired (eth0) Network Interface

Field/Button	Description
State	Select to enable or disable the interface
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. This setting will take effect immediately, but will not register the hostname with a DNS server until the next reboot.
Priority	Priority ranges from 0-10. The IP stack will give the interface with the lowest numerical value highest priority and the highest numerical values lowest priority when sending data. This setting only applies when the device is not in bridging mode and both interfaces are connected to the same IP subnet.
MTU	When DHCP is enabled, the MTU size is (usually) provided with the IP address. When not provided by the DHCP server, or using a static configuration, this value is used. The MTU size can be from 576 to 1500 bytes, the default being 1500 bytes.
IPv4 State	Select to enable or disable.

Field/Button	Description
DHCP Client	Select to turn **On** or **Off**. At boot up, after the physical link is up, the *SGX 5150 unit* will attempt to obtain IPv4 settings from a DHCP server and will periodically renew these settings with the server. ***Note:*** *Overrides the BOOTP client, the configured IPv4 address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device. Within Web Manager, click* ***Renew*** *to renew the DHCP lease.*
IP Address	Enter the static IPv4 address to use for the interface. You may enter it alone or in CIDR format. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are Disabled). Changing this value requires you to reboot the device. When DHCP or BOOTP is enabled, the SGX 5150 unit tries to obtain an IPv4 address from a DHCP or BOOTP server. If it cannot, the SGX 5150 unit 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 IPv4 address of the router for this network. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are* ***Disabled****).*
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 SGX 5150 unit MAC address.
Primary DNS	Enter the IP address of the primary domain name server (DNS.) ***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.*
IPv6 State	Select to enable or disable.
IPv6 DHCP Client	Select to turn **On** or **Off**. At bootup, after the physical link is up, the SGX 5150 unit will attempt to obtain IPv6 settings from a DHCPv6 server and will periodically renew these settings with the server. ◆ **On:** enables the SGX 5150 server to obtain IPv6 setting from a DHCPv6 server upon bootup. ◆ **Off:** enables the SGX 5150 server to obtain IPv4 settings from a DHCP server upon bootup. ***Note:*** *Overrides the configured IP address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device. Within Web Manager, click Renew to renew the DHCPV6 lease.*
IPv6 Auto Configuration	Select to turn **On** or **Off** IPv6 auto configuration.
IPv6 IP Address	Enter the static IPv6 address to use for the interface. ***Note:*** *This setting is used if Static IPv6 is active (DHCPv6 is Disabled). Changing this value requires a reboot. When DHCPv6 is enabled, the SGX 5150 unit tries to obtain an IPv6 address from a DHCPv6 server. If it cannot, then SGX 5150 unit generates and uses a Link local IPv6 address.*

Field/Button	Description
IPv6 Default Gateway	Enter the default IPv6 default gateway.
IPv6 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.*
IPv6 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.*
IPv6 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.*

To Configure Network Interface Settings

Using Web Manager

- To view Ethernet (eth0) Interface statistics, on the **Network** page, select **Wired Network** > **Interface**.
- To configure Ethernet (eth0) interface settings, on the **Network** page, select **Wired Network** > **Interface** > **Configuration**.

Using the CLI

- To enter the command level: `enable > config > if 1`

Using XML

- Include in your file: `<configgroup name= "interface" instance="eth0">`

Link Status and Configuration

Table 6-4 displays the wired link status and configuration information. The view-only status information is available on the Wired (eth0) Network Ethernet Link page. This same information is configurable on the Wired (eth0) Network Ethernet Link Configuration page.

Table 6-4 Link (eth0) Configuration

Field/Button	Description
Speed	Select the Ethernet link speed. (Default is **Auto**.) ◆ **Auto** = Auto-negotiation of Link Speed ◆ **10 Mbps** = Force 10 Mbps ◆ **100 Mbps** = 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

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 produces errors when connected to **Auto**, due to duplex mismatch.*

To Configure Network Link Settings

Using Web Manager

- To view Ethernet (eth0) link statistics, on the **Network** page, select **Wired Network** > **Link**.
- To configure Ethernet (eth0) link settings, on the **Network** page, select **Wired Network** > **Link** > **Configuration**.

Using the CLI

- To enter the command level: `enable > config > if 1 > link`

Using XML

- Include in your file: `<configgroup name= "interface" instance="eth0">`

QoS Statistics and Configuration

QoS (Quality of Service) can be enabled and configured for both the Wireless (wlan0) Network and wired Network (eth0). If enabled, the router will control the flow of outbound traffic according to the user-defined filters. In other words, QoS improves performance by allowing the user to prioritize applications. Filters can be defined to prioritize traffic based on the source or destination network, source or destination port, or the source MAC address. Up to 32 user-defined filters can be added. The following are predefined priority classes:

- Network Control and Internetwork Control are typically used for network control packets such as ICMP and have the highest priorities.
- Move bandwidth allocation is a minimum 5% each to Network control.
- Voice: Bandwidth allocation is minimum 30%.
- Video: Bandwidth allocation is minimum 20%.
- Critical Applications: Bandwidth allocation is minimum 15%.
- Excellent Effort: Bandwidth allocation is minimum 10%.
- Best Effort: Bandwidth allocation is minimum 10%.
- Background: Bandwidth allocation is minimum 5% and has the lowest priority.

Table 6-5 Wired (eth0) Network QoS Settings shows the network QoS settings that can be configured including adding new filters.

Table 6-5 Wired (eth0) Network QoS Settings

Wired (eth0) Network Settings	Description
State	Click to enable or disable state.
Import filters	Click to enable or disable import filters to import configurations from other interfaces.
Uplink Speed	Enter the maximum uplink speed. Set 0 to set speed to default.
Delete	Click the checkbox to the left of any existing QoS filter to be deleted and click the Submit button.

Wired (eth0) Network Settings	Description
Filter type	Select the filter type from the drop-down window: ◆ Network ◆ Port
Network	Enter the Network, if the Network filter type is selected.
Ports	Enter the Port, if the Port filter type is selected.
Priority	Select the priority of the filter from the drop-down menu.

To View and Configure Wired Network QoS Settings

Using Web Manager

- To view Ethernet (eth0) QoS statistics, click **Network** on the menu and select **Wired Network > QoS**.
- To modify Ethernet (eth0) QoS information, click **Network** on the menu and select **Wired Network > QoS > Configuration**.

Using the CLI

- To enter the eth0 QoS command level: `enable > config > if 1 > qos`

Using XML

- Include in your file: `<configgroup name="ethernet" instance="eth0">`

Wired (eth0) Network Failover

The SGX 5150 device gateway provides WAN network failover, in the form of a "dead remote host reachability" mechanism (essentially a ping against a known host). If the remote host is determined to be not reachable, the device will failover to the Wi-Fi interface. If the remote host is determined to be reachable, the device will failback to the Ethernet interface.

Table 6-6 Wired (eth0) Network Failover Settings

Wired Network (Failover) Settings	Description
State	Click to enable or disable state.
Failover Interface	Always select wlan0 in the SGX 5150 device gateway.
Hostname	Enter the remote host to test reachability.
Method	Select ICMP or TCP based ping.
Timeout	Indicate the interval to wait for ping response from remote host.
Interval	Indicate the interval in which to test reachability
Failover Threshold	Indicate the allowed number of failed pings – after which the device will failover to the wlan0 interface.
Failback Threshold	Indicate the number of successful pings – after which the device will failback to the Ethernet interface.

To View and Configure Wired Network Failover Settings

Using Web Manager

- To view Ethernet Failover statistics, click **Network** on the menu and select **Wired Network > Failover**.
- To modify Ethernet Failover settings, click **Network** on the menu and select **Wired Network > Failover > Configuration**.

Using the CLI

- To enter the eth0 link command level: `enable > config > if 1 > failover`

Using XML

- Include in your file: `<configgroup name="network failover" instance="eth0">`

Wireless (wlan0) Network

The wireless network pages are used to configure and view the status of the wireless (wlan0) interface and link on the device. To see the effect of these items after a reboot, view the Status page.

Wireless (wlan0) Network Interface

Table 6-7 displays the wireless interface status and configuration information. The view-only status information is available on the Wireless (wlan0) Network Interface Status page. This same information is configurable on the Wireless (wlan0) Network Interface Configuration page.

Table 6-7 Wireless (wlan0) Interface Configuration

Field/Button	Description
State	Select to enable or disable the interface
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. This setting will take effect immediately, but will not register the hostname with a DNS server until the next reboot.
Priority	Priority ranges from 0-10. The IP stack will give the interface with the lowest numerical value highest priority and the highest numerical values lowest priority when sending data. This setting only applies when the device is not in bridging mode and both interfaces are connected to the same IP subnet.
MTU	When DHCP is enabled, the MTU size is (usually) provided with the IP address. When not provided by the DHCP server, or using a static configuration, this value is used. The MTU size can be from 576 to 1500 bytes, the default being 1500 bytes.
IPv4 State	Select to enable or disable.

Field/Button	Description
DHCP Client	Select to turn **On** or **Off**. At boot up, after the physical link is up, the SGX 5150 unit will attempt to obtain IPv4 settings from a DHCP server and will periodically renew these settings with the server. ***Note:*** *Overrides BOOTP, the configured IPv4 address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device. Within Web Manager, click* ***Renew*** *to renew the DHCP lease.*
IP Address	Enter the static IPv4 address to use for the interface. You may enter it alone or in CIDR format. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are Disabled). Changing this value requires you to reboot the device. When DHCP or BOOTP is enabled, the SGX 5150 unit tries to obtain an IPv4 address from a DHCP or BOOTP server. If it cannot, the SGX 5150 unit 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 IPv4 address of the router for this network. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are* ***Disabled****).*
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 SGX 5150 device 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.*
IPv6 State	Select to enable or disable.
IPv6 DHCP Client	Select to turn **On** or **Off**. At bootup, after the physical link is up, the SGX 5150 unit will attempt to obtain IPv6 settings from a DHCPv6 server and will periodically renew these settings with the server. ◆ **On:** enables the SGX 5150 server to obtain IPv6 setting from a DHCPv6 server upon bootup. ◆ **Off:** enables the SGX 5150 server to obtain IPv4 settings from a DHCP server upon bootup. ***Note:*** *Overrides the configured IP address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device. Within Web Manager, click Renew to renew the DHCPV6 lease.*
IPv6 Auto Configuration	Select to turn **On** or **Off** IPv6 auto configuration.
IPv6 IP Address	Enter the static IPv6 address to use for the interface. ***Note:*** *This setting is used if Static IPv6 is active (DHCPv6 is Disabled). Changing this value requires a reboot. When DHCPv6 is enabled, the SGX 5150 unit tries to obtain an IPv6 address from a DHCPv6 server. If it cannot, then SGX 5150 unit generates and uses a Link local IPv6 address.*

Field/Button	Description
IP v6 Default Gateway	Enter the default IPv6 default gateway.
IPv6 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.*
IPv6 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.*
IPv6 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.*

To View or Configure Wireless Network Interface Settings

Using Web Manager

- To view the wireless (wlan0) network interface status, on the **Network** page, then select **Wireless Network** > **Interface**.
- To configure wireless (wlan0) network interface settings, on the **Network** page, select **Wireless Network** > **Interface** > **Configuration**.

Using the CLI

- To enter the command level: `enable > config > if 2`

Using XML

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

Wireless (wlan0) Network Link

Configuration details are stored in one or more WLAN profile. See *WLAN Profiles (on page 63)* to view and configure WLAN profiles. You can select and prioritize up to four preconfigured WLAN profiles for automatic connection to wireless networks. Dynamic profiles, created via quick connect/WPS, have a higher priority over a static profile. Listed dynamic and static profiles can be prioritized with 1 being highest priority through 4 being lowest priority.

Table 6-8 displays the wireless link status and configuration information. The view-only status information is available on the Wireless (wlan0) Network WLAN Link Status page. This same information is configurable on the Wireless (wlan0) Network WLAN Link Configuration page.

Table 6-8 Wireless (wlan0) Link Configuration

Field/Button	Description
Choice 1 Profile **Choice 2 Profile** **Choice 3 Profile** **Choice 4 Profile**	Enter up to four (4) *WLAN Profiles (on page 63)* for automatic connection to wireless networks in order of priority, with **Choice 1 Profile** being highest priority through **Choice 4 Profile** being lowest priority. If a profile in the choice list is deleted, that profile is skipped in the connection attempt.
Antenna Diversity	Enable antenna diversity or select a specific antenna for use.
Debugging Level	Set the verbosity level for printing WLAN Link messages to the TLOG (Default is **Info**).

Field/Button	Description
Wi-Fi Direct GO Mode	Select to enable or disable. If enabled, WPS issues the credentials when the client device indicates that it wishes to connect with our device. No password is required. Go to *Wi-Fi Protected Setup (on page 61)* to setup WPS.

To View or Configure Network Link Settings

Using Web Manager

- To view wireless (wlan0) link statistics, on the **Network** page, select **Wireless Network** > **Link**.
- To configure wireless (wlan0) link settings, on the **Network** page, select **Wireless Network** > **Link** > **Configuration**.

Using the CLI

- To enter the command level: `enable > config > if 2 > link`

Using XML

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

Wireless (wlan0) Network QoS

QoS (Quality of Service) can be enabled and configured for both Wired (eth0) Network and Wireless (wlan0) Network. If enabled, the router will control the flow of outbound traffic according to the user-defined filters. In other words, QoS improves performance by allowing the user to prioritize applications. Filters can be defined to prioritize traffic based on the source or destination network, source or destination port, or the source MAC address. Up to 32 user-defined filters can be added. The following are predefined priority classes:

- Network Control and Internetwork Control are typically used for network control packets such as ICMP and have the highest priorities.
- Bandwidth allocation is a minimum 5% each.
- Voice: Bandwidth allocation is minimum 30%.
- Video: Bandwidth allocation is minimum 20%.
- Critical Applications: Bandwidth allocation is minimum 15%.
- Excellent Effort: Bandwidth allocation is minimum 10%.
- Best Effort: Bandwidth allocation is minimum 10%.
- Background: Bandwidth allocation is minimum 5% and has the lowest priority.Table 6-7 shows the network QoS settings that can be configured including adding new filters.

Table 6-9 Wireless (wlan0) Network QoS Settings

Wireless Network (QoS) Settings	Description
State	Click to enable or disable state.
Import filters	Click to enable or disable import filters to import configurations from other interfaces.
Uplink Speed	Enter the maximum uplink speed. Set 0 to set speed to default.

Table 6-10 Adding or Deleting Wireless (wlan0) Network QoS Settings

Adding or Deleting Wireless Network (QoS) Settings	
Delete	Click the checkbox to the left of any existing QoS filter to be deleted and click the Submit button.
Filter type	Select the filter type from the drop-down window: ◆ Mac Address ◆ Network ◆ Port
MAC Address	Enter the MAC address, if the MAC Address filter type is selected.
Network	Enter the Network, if the Network filter type is selected.
Ports	Enter the Port, if the Port filter type is selected.
Priority	Select the priority of the filter from the drop-down menu.

To View or Configure Wireless Network QoS Settings

Using Web Manager

- To view Wireless (wlan0) QoS statistics, click Network on the menu and select **Wireless Network > QoS**.
- To modify Wireless (wlan0) QoS information, click Network on the menu and select **Wireless Network > QoS > Configuration**.

Using the CLI

- To enter the wlan0 QoS command level: `enable > config > if 2 > qos`

Using XML

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

Wireless (wlan0) Network Failover

The SGX 5150 device gateway provides wlan0 failover, in the form of a "dead remote host reachability" mechanism (essentially a ping against a known host). If the remote host is determined to be not reachable, the device will failover to the Ethernet interface. If the remote host is determined to be reachable, the device will failback to the Wi-Fi interface.

Table 6-11 Wireless (wlan0) Network Failover

Settings	Description
State	Click to enable or disable state.
Failover Interface	Always select eth0 in the SGX 5150 device gateway.
Hostname	Enter the remote host to test reachability.
Method	Select ICMP or TCP based ping.
Timeout	Indicate the interval to wait for ping response from remote host.
Interval	Indicate the interval in which to test reachability
Failover Threshold	Indicate the allowed number of failed pings - after which the device will failover to the wlan0 interface.

Settings	Description
Failback Threshold	Indicate the number of successful pings - after which the device will failback to the Ethernet interface.

To View or Configure Wireless Network Failover Settings

Using Web Manager

- To view wireless network Failover statistics, click **Network** on the menu and select **Wireless Network > Failover**.
- To modify wireless network Failover settings, click **Network** on the menu and select **Wireless Network > Failover > Configuration**.

Using the CLI

- To enter the wlan0 link command level: `enable > config > if 2 > failover`

Using XML

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

Wired (usb0) Network

The wired (usb0) network pages are described in this section.

Interface (usb0) Status and Configuration

Table 6-12 displays the wired (usb0) interface status and configuration information. The view-only status information is available on the Wired (usb0) Network Interface Status page. This same information is configurable on the Wired (usb0) Network Interface Configuration page.

Table 6-12 Wired (usb0) Network Interface

Field/Button	Description
State	Select to enable or disable the interface
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. This setting will take effect immediately, but will not register the hostname with a DNS server until the next reboot.
Priority	Priority ranges from 0-10. The IP stack will give the interface with the lowest numerical value highest priority and the highest numerical values lowest priority when sending data. This setting only applies when the device is not in bridging mode and both interfaces are connected to the same IP subnet.
MTU	When DHCP is enabled, the MTU size is (usually) provided with the IP address. When not provided by the DHCP server, or using a static configuration, this value is used. The MTU size can be from 576 to 1500 bytes, the default being 1500 bytes.
IPv4 State	Select to enable or disable.

Field/Button	Description
DHCP Client	Select to turn **On** or **Off**. At boot up, after the physical link is up, the *SGX 5150 unit* will attempt to obtain IPv4 settings from a DHCP server and will periodically renew these settings with the server. ***Note:*** *Overrides the BOOTP client, the configured IPv4 address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device. Within Web Manager, click* ***Renew*** *to renew the DHCP lease.*
IP Address	Enter the static IPv4 address to use for the interface. You may enter it alone or in CIDR format. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are Disabled). Changing this value requires you to reboot the device. When DHCP or BOOTP is enabled, the SGX 5150 unit tries to obtain an IPv4 address from a DHCP or BOOTP server. If it cannot, the SGX 5150 unit 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 IPv4 address of the router for this network. ***Note:*** *This setting will be used if Static IP is active (both DHCP and BOOTP are* ***Disabled****).*
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 SGX 5150 MAC address.
Primary DNS	Enter the IP address of the primary domain name server (DNS.) ***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.*
IPv6 State	Select to enable or disable.
IPv6 DHCP Client	Select to turn **On** or **Off**. At bootup, after the physical link is up, the SGX 5150 unit will attempt to obtain IPv6 settings from a DHCPv6 server and will periodically renew these settings with the server. ◆ **On:** enables the SGX 5150 server to obtain IPv6 setting from a DHCPv6 server upon bootup. ◆ **Off:** enables the SGX 5150 server to obtain IPv4 settings from a DHCP server upon bootup. ***Note:*** *Overrides the configured IP address/mask, gateway, hostname, and domain. Changing this value requires you to reboot the device. Within Web Manager, click Renew to renew the DHCPV6 lease.*
IPv6 Auto Configuration	Select to turn **On** or **Off** IPv6 auto configuration.
IPv6 IP Address	Enter the static IPv6 address to use for the interface. ***Note:*** *This setting is used if Static IPv6 is active (DHCPv6 is Disabled). Changing this value requires a reboot. When DHCPv6 is enabled, the SGX 5150 unit tries to obtain an IPv6 address from a DHCPv6 server. If it cannot, then SGX 5150 unit generates and uses a Link local IPv6 address.*

Field/Button	Description
IPv6 Default Gateway	Enter the default IPv6 default gateway.
IPv6 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.*
IPv6 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.*
IPv6 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.*

To Configure Network Interface Settings

Using Web Manager

- To view Ethernet (usb0) Interface statistics, on the **Network** page, select **Wired Network (USB)** > **Interface**.
- To configure Ethernet (usb0) interface settings, on the **Network** page, select **Wired Network (USB)** > **Interface** > **Configuration**.

Using the CLI

- To enter the command level: `enable > config > if 3 (config-if:usb0)`

Using XML

- Include in your file: `<configgroup name= "interface" instance="usb0">`

QoS Statistics and Configuration

QoS (Quality of Service) can be enabled and configured for both the Wireless (wlan0) Network and wired Wireless Network (usb0). If enabled, the router will control the flow of outbound traffic according towthe user-defined filters. In other words, QoS improves performance by allowing the user to prioritize applications. Filters can be defined to prioritize traffic based on the source or destination network, source or destination port, or the source MAC address. Up to 32 user-defined filters can be added. The following are predefined priority classes:

- Network Control and Internetwork Control are typically used for network control packets such as ICMP and have the highest priorities.
- Move bandwidth allocation is a minimum 5% each to Network control.
- Voice: Bandwidth allocation is minimum 30%.
- Video: Bandwidth allocation is minimum 20%.
- Critical Applications: Bandwidth allocation is minimum 15%.
- Excellent Effort: Bandwidth allocation is minimum 10%.
- Best Effort: Bandwidth allocation is minimum 10%.
- Background: Bandwidth allocation is minimum 5% and has the lowest priority.

Table 6-13 Wired (usb0) Network QoS Settings shows the network QoS settings that can be configured including adding new filters.

Table 6-13 Wired (usb0) Network QoS Settings

Wired (usb0) Network Settings	Description
State	Click to enable or disable state.
Import filters	Click to enable or disable import filters to import configurations from other interfaces.
Uplink Speed	Enter the maximum uplink speed. Set 0 to set speed to default.
Delete	Click the checkbox to the left of any existing QoS filter to be deleted and click the Submit button.
Filter type	Select the filter type from the drop-down window: ◆ Network ◆ Port
Network	Enter the Network, if the Network filter type is selected.
Ports	Enter the Port, if the Port filter type is selected.
Priority	Select the priority of the filter from the drop-down menu.

To View and Configure Wired Network (USB) QoS Settings

Using Web Manager

- To view Ethernet (usb0) QoS statistics, click **Network** on the menu and select **Wired Network (USB) > QoS**.
- To modify Ethernet (usb0) QoS information, click **Network** on the menu and select **Wired Network (USB) > QoS > Configuration**.

Using the CLI

- To enter the usb0 QoS command level: `enable > config > if 3 > qos`

Using XML

- Include in your file: `<configgroup name="ethernet" instance="usb0">`

Wired (usb0) Network Failover

The SGX 5150 device gateway provides a USB network failover, in the form of a "dead remote host reachability" mechanism (essentially a ping against a known host). If the remote host is determined to be not reachable, the device will failover to the Wi-Fi interface. If the remote host is determined to be reachable, the device will failback to the USB interface.

Table 6-14 Wired (usb0) Network Failover Settings

Wired (usb0) Network (Failover) Settings	Description
State	Click to enable or disable state.
Failover Interface	Always select eth0 in the SGX 5150 device gateway.
Hostname	Enter the remote host to test reachability.
Method	Select ICMP or TCP based ping.
Timeout	Indicate the interval to wait for ping response from remote host.

Wired (usb0) Network (Failover) Settings	Description
Interval	Indicate the interval in which to test reachability
Failover Threshold	Indicate the allowed number of failed pings – after which the device will failover to the wlan0 interface.
Failback Threshold	Indicate the number of successful pings – after which the device will failback to the Ethernet interface.

To View and Configure Wired (USB0) Network Failover Settings

Using Web Manager

- To view USB Failover statistics, click **Network** on the menu and select **Wired Network (USB) > Failover**.
- To modify USB Failover settings, click **Network** on the menu and select **Wired Network (USB) > Failover > Configuration**.

Using the CLI

- To enter the usb0 link command level: `enable > config > if 3 > failover`

Using XML

- Include in your file: `<configgroup name="network failover" instance="usb0">`

Protocol Stack

There are various low level network stack specific items that are available for configuration. This includes settings related to IP, ICMP, and ARP, which are described in the sections below.

IP Settings

This page contains lower level IP Network Stack specific configuration items.

Table 6-15 IP Protocol Stack Settings

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

To Configure IP Protocol Stack Settings

Using Web Manager

- To configure IP protocol settings, on the **Network** page, click **Protocol Stack** > **IP**.

Using the CLI

- To enter the command level: `enable > config > ip`

Using XML

- Include in your file: `<configgroup name="ip">`

ICMP Settings

This page contains lower level ICMP Network Stack specific configuration items.

Table 6-16 ICMP Protocol Stack Settings

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

To Configure ICMP Protocol Stack Settings

Using Web Manager

- To configure ICMP protocol settings, on the **Network** page, click **Protocol Stack** > **ICMP**.

Using the CLI

- To enter the command level: `enable > config > icmp`

Using XML

- Include in your file: `<configgroup name="icmp">`

ARP Settings

This page contains lower level ARP network stack specific configuration items.The ARP cache can be manipulated manually by adding new entries and deleting existing ones. Added entries are static and for test purposes only.

Table 6-17 ARP Protocol Stack Settings

Protocol Stack ARP Settings	Description
IP Address	Enter the IP address to add the ARP cache.
MAC Address	Enter the MAC address to add to the ARP cache.
Interface	Select the type of interface if adding to the ARP cache.
Add (button)	Click this button to add a new entry (after entering the IP address, MAC address and Interface info for the new entry above.)

Protocol Stack ARP Settings	Description
Clear	Click the **Clear** link above all listed addresses to remove all the addresses.
Remove	Click the **Remove** link beside a specific address to remove it.

To Configure ARP Network Stack Settings

Using Web Manager

- To configure ARP protocol settings, on the **Network** page, click **Protocol Stack** > **ARP**.

Using the CLI

- To enter the command level: `enable > config > arp`

Using XML

- Include in your file: `<configgroup name="arp">`

VPN

Access VPN statistics and configuration options on this page.

Table 6-18 VPN

VPN Setting	Description
Show details	Click this link to view the VPN log.
Configuration	
Name	Enter the name of this VPN connection.
State	Select to enable or disable the VPN connection.
Connection Type	Select connection type in the drop-down menu: - **Host to Host** - VPN tunnel for Local and Remote subnets are fixed. - **Host to Subnet** - VPN tunnel for Remote subnet area is dynamic and Local subnet is fixed.
Authentication Mode	Select the authentication mode of IPSec VPN. Pre-shared Key (PSK) is used when there is a single key common to both ends of the VPN. RSA uses RSA digital signatures. XAUTH provides an additional level of authentication by allowing the IPSec gateway to request extended authentication from remote users, thus forcing remote users to respond with their credentials before being allowed access to the VPN.
Mode Configuration	Select to enable or disable extended authentication operation and the settings provided to the client during the configuration exchange.
Type	Select **Tunnel** or **Transport** type from the drop-down menu. Tunnel Mode is used for protecting traffic between different networks, when traffic must pass through an intermediate, untrusted network. Transport Mode is used for end-to-end communications (for example, for communications between a client and a server).
Interface	Select the interface to use to connect to VPN Gateway.

VPN Setting	Description
Remote Network	
Endpoint	Enter the remote VPN Gateway's IP Address.
Subnet	Enter the subnet behind the VPN Gateway.
ID	Enter the identifier expected to receive from the remote host during Phase 1 negotiation.
Router/Next Hop	Enter the next-hop gateway IP address for the VPN Gateway.
Local Network	
Subnet	Enter the subnet the local devices have access to or can be accessed from the VPN connection.
ID	Enter the identifier sent to the remote host during Phase 1 negotiation.
Router/Next Hop	Enter the next-hop gateway IP address for this connection to the public network.
Key Management	
Perfect Forward Secrecy (PFS)	Select to enable or disable the Perfect Forward Secrecy. Enabling this feature will require IKE to generate a new set of keys in Phase 2 rather than using the same key generated in Phase 1.
Pre-shared Key (PSK)	Enter the Pre-Shared Key used in the IPSec setting between the Local and VPN Gateway.
ISAKMP Phase 1 (IKE)	
Aggressive Mode	Select to enable or disable Aggressive Mode. In Aggressive mode, IKE tries to combine as much information into fewer packets while maintaining security. Aggressive mode is slightly faster but less secure.
NAT Traversal	Select to enable or disable NAT Traversal. If there is an external NAT device between VPN tunnels, the user must enable NAT Traversal.
Encryption	Select the encryption algorithm in key exchange from the drop-down menu.
Authentication	Select the hash algorithm in key exchange from the drop-down menu.
DH Group	Select the Diffie-Hellman (DH) groups (the Key Exchange group between the Remote and VPN Gateways) from the drop-down menu.
IKE Lifetime	Enter the number of hours for the IKE SA lifetime.
ISAKMP Phase 2 (ESP)	
Encryption	Select the encryption algorithm in data exchange from the drop-down menu.
Authentication	Select the hash algorithm in data exchange from the drop-down menu.
DH Group	Select the Diffie-Hellman (DH) groups (the Key Exchange group between the Remote and VPN Gateways) for Phase 2 from the drop-down menu.
SA Lifetime	Enter the number of hours for the SA lifetime in Phase 2.
Unreachable Host Detection	
Host	Enter the unreachable detection host monitoring the connectivity with the host on the remote network.
Ping Interval	Enter the Ping Interval to monitor connectivity with a host on the remote network.
Max Tries	Enter the number of Max Tries for pinging the host before the VPN tunnel is restarted.

Configuring VPN Settings

You may edit or view VPN settings.

Using Web Manager

- To view or configure VPN settings on the **Network** page, click **VPN**.

Using the CLI

- To enter the VPN level: `enable > configure > vpn1`

Using XML

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

Wi-Fi Protected Setup

Using Wi-Fi® protected setup (WPS), you have the option of connecting the SGX 5150 unit to a router or access point in a single operation instead of manually creating a profile with a network name (SSID), setting up wireless security parameters and updating the choice list. You may setup WPS through pin or push button functionality through Web Manager or through CLI.

Note: *Not all access points support Wi-Fi protected setup pin or Wi-Fi protected setup push button.*

Table 6-19 Wi-Fi Protected Setup

WPS buttons	Description
WPS (PIN)	Click the **WPS (PIN)** button in Web Manager to setup WPS by pin and click **OK** in the confirmation popup which appears. A randomly generated pin will appear on the screen. Enter this pin at the access point and point your browser to the correct IP address.
WPS (PBC)	Click the **WPS (PBC)** button in Web Manager to setup WPS by push button, click **OK** in the confirmation popup which appears, and the credentials are passed to the SGX 5150 unit automatically. Then point your browser to the correct IP address. ***Note:*** *Make sure the WPS PBC is triggered on the Access Point to utilize this option.*

To Initiate WPS

Using Web Manager

- To initiate WPS, on the **Network** page, click **Wi-Fi Protected Setup**.

Using the CLI

- To enter the command level: `enable > config > if 2 > link`

Using XML

- Not applicable.

To Show WPS Status

Using the CLI

- To enter the command level: `enable > config > if 2 > link`

Using XML

- Not applicable.

WLAN Scan/QuickConnect

Going to this page initiates a scan of wireless networks within range of the SGX 5150 unit and allows users to add a WLAN profile after testing it. This list refreshes automatically every 15 seconds. There is also an option to automatically update the scan results every 60 seconds, which is disabled by default. The scan results contain the following prepopulated information about each wireless device: service set identifier (SSID), basic service set identifier (BSSI), channel number (CH), received signal strength indication (RSSI), and Security Suite. You may also run a filtered scan of network names by the first few letters within the name.

Click on any network name for QuickConnect configuration.

Table 6-20 WLAN Scan/Quick Connect Results

WLAN Quick Connect Settings	Description
Network Name (search field)	Enter the first few letters of a network name in the search field before pressing the **Scan** button (next field description below).
Scan "<network SSID>"	Click **Scan** to search for all network names containing the first few letters entered in the **Network Name** search field. Performs a scan for devices within range of the SGX 5150 unit. To limit the scan to devices that are configured with the specified SSID, include the network SSID. To perform a scan for all devices, omit the network SSID. The command syntax requires the opening and closing quotation marks. If you omit the SSID, include the quotation marks, for example, scan "".
Refresh scan results every 60 seconds (check box)	To automatically update the list every 60 seconds, select the checkbox. To stop automatically updating the list, clear the checkbox.
SSID	To display a network configuration profile, click the service set identifier (SSID) of a specific network.
BSSID	The basic service set identifier (BSSID) is a unique 48-bit address that identifies the access point that creates the wireless network.
CH (Channel)	The channel number and frequency (MHz) of a network.
RSSI	A real-time value that indicates the signal strength of the network. Green indicates the strongest, yellow indicates average, and red indicates the weakest signal strength. The received signal strength indication (RSSI) that is reported in scan results is a single sample. To review the signal strength average over time, use the status command. The average is based on the connected AP.

WLAN Quick Connect Settings (continued)	Description
Security Suite	The security suite of a network. For example: WEP, WPA, WPA2, WPS. Although WPS is reported with the security flags, it does not indicate a security setting. WPS indicates that an AP supports WPS.

To View WLAN Link Scan and Status Information

Using Web Manager

- To view the WLAN Link Scan and Status information, on the **Network** page, click **WLAN Scan/Quick Connect**.

Using the CLI

- Not applicable.

Using XML

- Include in your file: `<statusggroup name=”wlan scan”>`

WLAN Profiles

A WLAN profile defines all of the settings needed to establish a wireless connection. This is true when in infrastructure mode for an access point. A maximum of eight profiles can exist on the SGX 5150 unit at a time. All enabled profiles are active.

The SGX 5150 unit supports dynamic profiles and prioritization of the profiles. Dynamic Profiles are created using WPS or Quick Connect. Profiles are assigned numbers based on priority. For example, dynamic profiles list in reverse order of creation, followed by choice-list profiles, then any remaining profiles.

Table 6-21 WLAN Profiles

WLAN Profile Settings	Description
Enabled (check box)	Check the checkbox to the right of the WLAN profile listed right to enable the specific profile. Unchecking the enabled checkbox disables the WLAN profile.
Delete (check box)	Check the checkbox to the right of the WLAN profile listed right and click the Submit button which appears, to delete the specific profile.
Name (link to WLAN profile)	Click an existing WLAN profile listed under the Name column to reveal the configuration options as shown in *Table 6-22 Individual WLAN Profile Settings*. Modify configuration options as desired.
Name (“Add a new profile” field)	Enter the name of a new profile and click **Submit** to add it. The profile appears in the WLAN Profiles list.

Configuring WLAN Profile Settings

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

Using Web Manager

- To edit, create or delete a WLAN profile, on the **Network** page, click **WLAN Profiles**.

Using the CLI

- To enter the WLAN Profile level: `enable > configure > wlan profiles`

Using XML

- Include in your file:

```
<configgroup name="wlan profile" instance="profile_name">
```

Table 6-22 Individual WLAN Profile Settings

WLAN Profile Settings	Description
Network Name (SSID)	Enter or modify the network name.
State	Click to enable or disable.
Suite	Select a security suite configuration: ◆ **None** Select None to not select a security suite. ◆ **WEP** WEP security is available in Infrastructure mode. WEP is a simple and efficient security mode, encrypting the data using 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 5 minutes. For stronger security, use WPA, or the stronger WPA2, with AES (CCMP). ◆ **WPA2/WPA Mixed Mode**
Authentication	**If WEP security suite is selected,** select one of these authentication options which appear. ◆ **Shared**: Encryption keys of both parties are compared as a form of authentication. If mismatches occur, no connection establishes. ◆ **Open**: A connection establishes without first checking for matching encryption keys. If keys do not match, however, data becomes garbled and prevents connectivity on the IP level. **If WPA or WPA2/IEEE 802.11i security suite is selected,** select one of these authentication options which appear: ◆ **PSK:** In pre-shared keying, the same key must be configured both on the SGX 5150 side and on the access point side. ◆ **IEEE 802.1X:** This authentication method communicates with a RADIUS authentication server that is part of the network. The RADIUS server matches the credentials sent by the SGX 5150 unit with an internal database. If IEEE 802.1X is selected under authentication type, select the protocol to use to authenticate the WLAN client.
PMF	Select one of the following options regarding protected management frames (PMF): ◆ Disable ◆ Optional ◆ Required ***Note:*** *This option is available when the WPA2/WPA mixed mode suite and the IEEE 802.1x authentication settings are selected.*
Key Type	Select a key **Hex** or **Passphrase** key type after indicating the security suite type.
Key Size	If the WEP security suite is selected, then select **40 bits** or **104 bits** key size in this field which becomes available.

WLAN Profile Settings	Description
Passphrase	If Passphrase key type is selected, enter an alphanumeric phrase up to 63 characters in length in this field which becomes available. Spaces and special characters are allowed. Check Show **Password** to show the passphrase entered.
TX Key Index	If WEP security suite and Hex key type have been selected, then select the TX key index from the drop-down menu, which becomes available. ◆ For interoperability with some products that generate four identical keys from a passphrase, this index must be one. ◆ For 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. For security reasons, the configured keys are not shown.
IEEE 802.1X	If IEEE 802.1X authentication is selected, choose a particular type: ◆ **LEAP**: type a User Name and Password, then select an Encryption. ◆ **EAP-TLS**: Type a Username. ◆ **EAP-TTLS** ◆ **PEAP:** For PEAP Option, select a security protocol. ◆ **FAST:** If selected, select the Fast Option and Fast Provisioning options.
FAST Option	Select the FAST option from the drop-down menu: ◆ MD5 (default) ◆ MSCHAPV2 ◆ GTC ***Note:*** *This option is available when the WPA2/WPA mixed mode suite and the IEEE 802.1x authentication settings are selected.*
FAST Provisioning	Select the FAST provisioning option from the drop-down menu: ◆ Unauthenticated ◆ Authenticated (default) ◆ Both ***Note:*** *This option is available when the WPA2/WPA mixed mode suite, the FAST IEEE 802.1x authentication, and the MSCHAPV2 FAST option are selected.*
EAP-TTLS Option	Select a security protocol: ◆ EAP-MSCHAPV2 ◆ MSCHAPV2 ◆ MSCHAP ◆ CHAP ◆ PAP ◆ EAP-MD5 ***Note:*** *This option is available when the WPA2/WPA mixed mode suite, the IEEE 802.1x authentication, and EAP-TTLS settings are selected.*
PEAP Option	Select **EAP-MSCHAPV2**, **EAP-MD5** or **EAP-TLS.** ***Note:*** *This option is available when the WPA2/WPA mixed mode suite, the IEEE 802.1x authentication, and PEAP settings are selected.*
Validate Certificate	If EAP-TLS is selected, validate the certificate installed on the device by selecting **Enabled** in the Validate Certificate field which appears. Validates the certificate installed on the device with the one received from the RADIUS server.

WLAN Profile Settings	Description
Credentials	After EAP-TLS is selected and the Validate Certificate is enabled, either: ◆ Select the credential, if listed in the drop-down menu, to validate. ◆ Type the name of the credential if the credential is not listed in the drop-down menu.
Username	Enter a username.
Password	Enter a password if the LEAP, EAP-TTLS and PEAP option is chosen. Check the **Show Password** check box to make the password viewable as you enter it in the Password field.
Inner Credentials	Provide inner credentials with enterprise authentication when PEAP/TLS is selected. Inner credentials specify the client certificate required for the TLS inner authentication. ***Note:*** *This option is available when the WPA2/WPA Mixed Mode suite, the IEEE 802.1x authentication, PEAP and PEAP EAP-TLS settings are selected.*
Apply (button)	Click this button after making configuration selections above, to apply but not submit/save your choices.
Test Connection (button)	Click this button to test the connection according to the configuration selections made above, but not to submit/save your choices.
Submit (button)	Click this button to submit and save your configuration choices.

7: Filesystem

The Filesystem page provides statistics and current usage information for the flash filesystem. From here you may format the entire filesystem.

- Directories can be created, deleted, moved, and renamed. A directory must be empty before it can be deleted.
- Files can be created, deleted, moved, renamed, uploaded via HTTP, and transfered to and from a TFTP server. Newly created files will be empty.
- Some filesystems may contain a `'lost+found'` directory.

Table 7-1 File Modification Settings

File Modification Commands	Description
`rm`	Removes the specified file from the file system.
`touch`	Creates the specified file as an empty file.
`cp`	Creates a copy of a file.
`mkdir`	Creates a directory on the file system.
`rmdir`	Removes a directory from the file system.
`format`	Format the file system and remove all data.

File Transfer and Modification

Files can be transferred to and from the SGX 5150 device via the TFTP protocol. This can be useful for saving and restoring XML configuration files. Files can also be uploaded via HTTP.

Table 7-2 File Transfer Settings

File Transfer Settings	Description
Create	Type in a **File** or **Directory** name and click the **Create** button. The newly created File or Directory will appear above.
Upload File	Click to **Choose File** to location of the file to be uploaded via HTTP. Click **Upload** to upload the chosen file.
Copy File	Enter the **Source** and **Destination** name for file to be copied and click the **Copy** button.
Move	Enter the **Source** and **Destination** name for file to be moved and click the **Move** button.
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.

File Transfer Settings	Description
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.
Transfer (button)	Click the **Transfer** button after entering all TFTP settings.

To View, Transfer, or Modify Filesystem Files

Using Web Manager

- To view current filesystem browser statistics or to format the filesystem, click **Filesystem** in the menu and select **Statistics**.

  Note: *Formatting the filesystem will cause existing files on the filesystem to be deleted.*

- To create a new file or directory, upload an existing file, copy or move a file, click **Filesystem** in the menu and select **Browse**.

Using the CLI

- To enter the Filesystem command level: `enable > filesystem`

Using XML

- Not applicable.

8: Diagnostics

Diagnostic settings for the SGX 5150 unit can be viewed and modified under the Diagnostics tab in the Web Manager user interface. This chapter describes the following diagnostic settings:

- *DNS*
- *Hardware*
- *IP Sockets*
- *Log*
- *Memory*
- *Ping*
- *Processes*
- *Routes*
- *Threads*
- *Traceroute*

DNS

The primary and secondary DNS addresses come from the active interface. DHCP or BOOTP can override the static addresses from the network interface configurations.

To look up either the DNS host name or the IP address for an address, type the address or host name in the field, then click Lookup.

This section describes 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 settings may be overridden by DHCP.

Table 8-1 DNS Settings

Field/Button	Description
Lookup	Perform one of the following and click the **Lookup** button: ◆ Enter an IP address, and perform a reverse Lookup to locate the host name for that IP address ◆ Enter a host name, and perform a forward Lookup to locate the corresponding IP address.

Accessing the DNS Settings

Using Web Manager

- To view the current DNS name or IP address, on the **Diagnostics** page, click **DNS**.
- To configure the DNS Settings, on the **Diagnostics** page, enter the name of a DNS host and click **Lookup**.

Note: *If DNS information is not supplied by DHCP, configure Ethernet (eth0) internet settings according to instructions at* *Wired (eth0) Network (on page 43)* *and configure*

Wireless (wlan0) Network interface settings according to instructions at *Wireless (wlan0) Network (on page 48)*.

Using CLI

- To enter CLI command level: `enable > dns`

Using XML

- Not applicable.

Hardware

View the CPU type, CPU speed, RAM size and flash size of the hardware on this Web Manager page.

To View Hardware Information

Using Web Manager

- To view hardware information, on the **Diagnostics** page, click **Hardware**.

Using the CLI

- To enter the command level: `enable > device, show hardware information`

Using XML

- Include in your file: `<statusgroup name= "hardware">`

IP Sockets

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

To View the List of IP Sockets

Using Web Manager

- To view IP Sockets, on the **Diagnostics** page, click **IP Sockets**.

Using the CLI

- To enter the command level: `enable > show ip sockets`

Using XML

- Include in your file: `<statusgroup name="ip sockets">`

Log

Configure a line or disable the diagnostic log on this Web Manager page.

Table 8-2 Log Settings

Diagnostics	Log Description
Output	Select a diagnostic log output type: ◆ **Disable** - Turn off the logging feature. ◆ **Line 1** or **Line 2** - Directs logging to the selected serial line. ◆ **USB 1** - Directs logging to the usb port.

To Configure the Diagnostic Log Output

Using Web Manager

- To configure the Diagnostic Log output, on the **Diagnostics** page, click **Log**.

Using the CLI

- To enter the command level: `enable > config > diagnostics > log`

Using XML

- Include in your file: `<configgroup name=”diagnostics”>`

Memory

The memory information includes the total, used, and available memory (in kilobytes).

To View Memory Usage

Using Web Manager

- To view memory information, on the **Diagnostics** page, click **Memory**.

Using the CLI

- To enter the command level: `enable > device, show memory`

Using XML

- Include in your file: `<statusgroup name="memory">`

Ping

You can use Ping to test connectivity to a remote host.

Table 8-3 Ping Configuration

IP Socket	Description
Host	Enter the IP address or host name for the SGX 5150 unit that you want to ping.

IP Socket	Description
Count	Enter the number of ping packets that the SGX 5150 unit attempts to send to the Host. The default number of packets is 3.
Timeout	Enter the time in seconds that the SGX 5150 unit waits for a response from the Host before it times out. The default time is 5 seconds.

To Ping a Remote Host

Using Web Manager

- To view memory information, on the **Diagnostics** page, click **Ping**.

Using the CLI

- To enter the command level: `ping or ping6`

Using XML

- Not applicable.

Processes

The SGX 5150 unit 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.

To View Process Information

Using Web Manager

- To view process information, on the **Diagnostics** page, click **Processes**.

Using the CLI

- To enter the command level: `enable, show processes`

Using XML

- Include in your file: `<statusgroup name="processes">`

Routes

Routing allows one system to find the network path to another system, from a gateway to a destination.

Using Web Manager

- To view the current networking routes, on the **Diagnostics** page, click **Routes**.

Using CLI

- To enter the command level: `enable, show routes`

Using XML

- Not applicable.

Threads

The SGX 5150 unit threads information shows details of threads in the ltrx_evo task which can be useful for technical experts in debugging.

To View Thread Information

Using Web Manager

- To view thread information, on the **Diagnostics** page, click **Threads**.

Using the CLI

- To enter the command level: `enable > auto show processes or show processes`

Using XML

- Not applicable.

Traceroute

You can use traceroute to trace a packet from the SGX 5150 unit to an Internet host. A traceroute shows how many hops the packet requires to reach the host, and how long each hop takes. This information can be helpful to diagnose delays for a web page that loads slowly.

Table 8-4 Traceroute Settings

Traceroute Fields	Description
Host	Enter the IP address or DNS host name of the destination device.
Protocol	Select the protocol that you want to use for the traceroute.

To Perform a Traceroute

Using Web Manager

- To view traceroute information, on the **Diagnostics** page, click **Traceroute**.

Using the CLI

- To enter the command level: `enable > trace route`

Using XML

- Not applicable.

9: Administration

Administrative features for the SGX 5150 unit are organized beneath the Administration tab in the Web Manager user interface. This chapter describes the following administrative settings:

- *Actions*
- *Applications*
- *CLI*
- *Clock*
- *Discovery*
- *Email*
- *FTP*
- *Gateway*
- *GRE*
- *Host*
- *HTTP*
- *Line*
- *USB*
- *Modbus*
- *SMTP*
- *SNMP Settings*
- *SSH*
- *SSL*
- *Syslog*
- *System*
- *Terminal*
- *Tunnel*
- *User Management*
- *XML*
- *Quick Setup*

Actions

Table 9-1 contains the configuration options for all the alarms and reports listed above.

Table 9-1 Action Settings

Action Settings	Description
Delay	Use Delay to defer alarm processing. Alarm actions will not be executed if the cause is corrected within this time.
Email	Use Email to send an email to configured Email recipients. ◆ If an **Alarm Email** profile number is selected, that email will be sent when the alarm is turned on. The contents of **Alarm Message** will be placed into the email body when an alarm email is sent. If the alarm stays on longer than the Reminder Interval, another alarm email is sent. ◆ If a **Normal Email** profile number is selected, that email will be sent when the alarm is turned off. The contents of **Normal Message** will be placed into the email body when a normal email is sent. If the alarm stays off longer than the Reminder Interval, another normal email is sent.
FTP Put	Use FTP Put to put a file on configured FTP server. Filename will be used to upload to remote FTP server. The IP **Address** or hostname is the FTP server to connect. Port number is port on which FTP server is listening on. Use Protocol to connect to FTP server. FTPS is a SSL encrypted communication channel and SSL Trusted Authorities must be setup with FTP server SSL certificate. Username is used to logon to FTP server. If FTP server does not require authentication, use anonymous. Password is used to logon to FTP server. If FTP server does not require authentication, a common practice is to use user's email address. If the alarm stays on or off longer than the **Reminder Interval**, another FTP Put is performed. In **Sequential Mode**, connections will be attempted starting with number 1 until a connection is successful. In **Simultaneous Mode**, all possible connections will be made.
HTTP Post	Use HTTP Post post to configured HTTP server. The URL appears behind the HTTP server IP address or hostname. E.g. `http://some_http_server/some_url` The IP **Address** or hostname is the HTTP server to connect to. Port number is the port which HTTP server is listening on. Use Protocol to connect to HTTP server. HTTPS is a SSL encrypted communication channel and SSL Trusted Authorities must be setup with HTTP server SSL certificate. Username used to logon to HTTP server if authentication is required. Password used to logon to HTTP server if authentication is required. If the alarm stays on or off longer than the **Reminder Interval**, another HTTP Post is performed. In **Sequential Mode**, connections will be attempted starting with number 1 until a connection is successful. In **Simultaneous Mode**, all possible connections will be made.
SNMP Trap	Use SNMP Trap to send SNMP trap to configured trap destinations. SNMP Trap **State** can be **Enabled** or **Disabled**. The contents of **Alarm Message** are included when an alarm SNMP trap is sent. If the alarm stays on longer than the **Reminder Interval**, another alarm SNMP Trap is sent. The contents of **Normal Message** are included when a normal SNMP trap is sent. If the alarm stays off longer than the Reminder Interval, another normal SNMP Trap is sent.

To Configure Action Settings

Using Web Manager

- To view Action status, on the **Administration** page, click **Action > Status** on the menu.
- To modify Action information, on the **Administration** page, click **Action > Configuration** on the menu and select a specific action from the drop-down menu. *SMTP (on page 98)* lists the options.

Using the CLI

- To enter the eth0 link state change command level: `enable > config > action > eth0 link state change`
- To enter the wlan0 link state change command level: `enable > config > action > wlan0 link state change`
- To enter device temperature change command level: `enable > config > action > device temperature change`
- To enter on scheduled reboot command level: `enable > config > action > on scheduled reboot`

Using XML

- Include in your file: `<configgroup name = "action" instance = "eth0 link state change">`
- Include in your file: `<configgroup name = "action" instance = "wlan0 link state change">`
- Include in your file: `<configgroup name = "device temperature change"`
- Include in your file: `<configgroup name = "action" instance = "on scheduled reboot">`

Python

Python™ is a dynamic, object-oriented programming language that can be used for developing a wide range of software applications. The Lantronix SGX 5150 includes the installation of Python interpreter, making it easy to load and run custom Python scripts on your device.

The version of Python programming language installed on the Lantronix SGX 5150 comes with "batteries included" by having the Python language's standard library. In addition, the developer can take advantage of thousands of available third party packages to speed up development.

IDE

Python scripts can be written with any text editor. If using Windows for development, Notepad++ is a powerful choice as this text editor includes traditional IDE features such as syntax highlighting and automatic indentation (http://notepad-plus-plus.org/). Notepad++ also includes the ability to customize through plugins. Some interesting plugins for the development of Python scripts for the Lantronix SGX 5150 platform include the following:

- **PyNPP:** https://github.com/mpcabd/PyNPP
  This plugin allows the user to use keystrokes to launch the open Python script in the local Python interpreter for debugging and testing.

- **NppFTP:** http://sourceforge.net/projects/nppftp/
  This plugin provides a one-click upload of a file to an FTP server. Debugging and testing on the SGX 5150 easier because SGX 5150 products have an FTP server through which to upload files into the file system.

Applications

The SGX 5150 supports the ability to install and uninstall user-defined Python scripts and packages and will include the following:

`bin`	`python`	
`lib`	`libpython{version}.so`	
	`<ltrx python sdk>`	
	`libpython{version}`	`"python precompiled scripts`
		`"python shared libraries`

Table 9-2 contains the setting options for configuring, installing, uninstalling and running external applications via Python scripts.

Caution: ***Use extreme caution when installing and running scripts.***

Table 9-2 Script Settings

Script Settings	Description
Script (Number)	Click the **Run** button to manually execute the script. ***Note:*** *The script is run with configuration saved to the Flash.*
Enabled (checkbox)	Check the **Enabled** checkbox within a particular script to enable it. Uncheck the checkbox to disable the script.
Run on startup (checkbox)	Check the **Run on startup** checkbox within a particular script to have it run upon the start up of the SGX 5150 unit. Uncheck the checkbox to disable automatically running the unit upon startup.
Run on shutdown (checkbox)	Check the **Run on shutdown** checkbox within a particular script to have it run on shutdown of the SGX 5150 unit. Uncheck the checkbox to disable automatically running the script upon shutdown.
Script	Enter the path of the script to run.
Parameter	Enter the script parameters (if any).
Output	Enter output log file (if desired) for the script to redirect output of script to file. If the name of output log contains "`%t`", it will translate it into time stamp (e.g., `script1_%t.log => script1_2007-01-02_19-06-57.log`)
Uninstall (button)	Click the **Uninstall** button in a Python package to uninstall it.
Remove All (button)	Click the **Remove All** button to uninstall all Python packages.
Filename (field)	Enter the package file name pathway in the file system and click the **Install** button to install it.

To Configure Application Settings

Using Web Manager

- To configure application scripts, on the **Administration** page, click **Applications** on the menu.

Using the CLI

- To enter the application script change command level: `enable > config > applications`

Using XML

- Include in your file: `<configgroup name = "applications">`

CLI

The command line interface (CLI) settings allow you to control how users connect to and interact with the command line of the SGX 5150 unit. It is possible to configure access via the Telnet and SSH protocols, in addition to general CLI options.

CLI Status and Configuration

View-only status information on the Command Line Interface Status page displays the current Telnet and SSH server status, uptime, and current connections (if any.)

See *Table 9-3* for the bridge settings that can be modified on the Command Line Interface Configuration page.

Table 9-3 CLI Configuration Settings

Command Line Interface Configuration Settings	Description
Enable Level Password	Enter the password for access to the Command Mode Enable level. There is no password by default.
Quit Connect Line	Enter the **Quit Connect Line** string to be used to terminate a Telnet and SSH session and resume the CLI. Type <control> before the key to be pressed while holding down the **[Ctrl]** key (example: **<control>L**)
Inactivity Timeout	Set a time period in which the CLI session should disconnect if no data is received. Enter 0 to disable. Blank the display field to restore the default.
Line Authentication	**Enable** or **Disable** authentication for CLI access on the serial lines.
Telnet State	**Enable** or **Disable** CLI access via Telnet
Telnet Port	Enter an alternative Telnet Port to override the default used by the CLI server. Blank the field to restore the default.
Telnet Max Sessions	Specify the maximum number of concurrent Telnet sessions that will be allowed.
Telnet Authentication	**Enable** or **Disable** authentication for Telnet logins.
SSH State	Select to **Enable** or **Disable** CLI access via Telnet.

Command Line Interface Configuration Settings	Description
SSH Port	Specify the SSH Port and override the default, as needed. Blank the field to restore the default.
SSH Max Sessions	Specify the maximum number of concurrent SSH sessions that will be allowed.

To View and Configure Basic CLI Settings

Using Web Manager

- To view CLI statistics, on the **Administration** page, click **CLI** > **Statistics**.
- To configure basic CLI settings, on the **Administration** page, click **CLI** > **Configuration**.

Using the CLI

- To enter CLI command level: `enable > config > cli`

Using XML

- Include in your file: `<configgroup name="cli">`

Clock

You can view current clock settings at the bottom of the screen, and also either manually update or synchronize the clock with an SNTP server. If you select SNTP, you can choose automatic time zone detection.

Table 9-4 Clock Settings

Bridge Fields	Description
Method	Select **Manual** or **SNTP** from the drop-down window.
Date	**If Manual method is selected,** enter the date using the **Year**, **Month** and **Day** drop down menus that become available.
Time	**If Manual method is selected,** enter the time using the **Hour**, **Minute (Min)** and **Second (Sec)** drop down menus that become available.
NTP Server	**If SNTP method is selected,** the clock will keep time synchronized with the NTP Server by default. Enter an alternative NTP server if you wish to use an address other than the default.
Time Zone	Select the desired Time Zone from the drop-down menu based on geographic location. The time zones listed are in Universal Time Coordinated (UTC), formerly known as Greenwich Mean Time (GMT). Syslog and other applications may use UTC. The UTC Offset of the form HHMM (H = hour, M = minute) is applied to the UTC time to get the local time. The device will make seasonal time changes required for Daylight Savings Time.

To Specify a Clock-Setting Method

Using Web Manager

- To view or configure basic Clock settings, on the **Administration** page, click **Clock**.

Using the CLI

- To enter Clock command level: `enable > config > clock`

Using XML

- Include in your file: `<configgroup name="clock">`

Discovery

Network discovery allows your computer to locate other computers and devices on the network. This setting also allows other computers to see your computer.

The current statistics and configuration options for device discovery, including UPnP query port, are available for the SGX 5150 unit.

Table 9-5 Discovery Settings

Discovery Settings	Description
Query Port Server State	Select to enable or disable the query port server from responding to autodiscovery messages on port 0x77FE.
UPnP Server State	Select to enable or disable the UPnP server from discovering devices in Windows network places.
UPnP Server Port	Update the UPnP server port. Leaving this field blank will restore the default settings.

To Configure Discovery

Using Web Manager

- To configure Discovery, on the **Administration** page, click **Discovery**.

Using the CLI

- To enter Discovery command level: `enable > config > discovery`

Using XML

- Include in your file: `<configgroup name="discovery">`

Email

View and configure email alerts relating to events occurring within the system.

Table 9-6 Email Configuration

Email – Configuration Settings	Description
From	Click the **Configure SMTP** link to configure SMTP. See *SMTP (on page 98)*.
To	Enter the email address to which the email alerts will be sent. Multiple addresses are separated by semicolon (;). Required field if email is to be sent.

Email – Configuration Settings (continued)	Description
CC	Enter the email address to which the email alerts will be copied. Multiple addresses are separated by semicolon (;).
Reply To	Enter the email address to list in the Reply-To field of the email alert.
Subject	Enter the subject for the email alert. ***Note:*** *Emails sent as a result of an alarm will display the name of the alarm in the subject of the email, overriding the email subject configured in this field.*
Message File	Enter the path of the file to send with the email alert. This file appears within the message body of the email, not as an attachment.
Priority	Select the priority level for the email alert: ◆ Urgent ◆ High ◆ Normal ◆ Low ◆ Very Low

To View, Configure and Send Email

Note: *The following section describes the steps to view and configure Email 1 settings; these steps apply to other emails available for the device.*

Using Web Manager

- To view Email statistics, on the **Administrations** page, click **Email > Statistics**.
- To configure basic Email settings and send an email, on the **Administrations** page, click **Email > Configuration**.

Using the CLI

- To enter Email command level: `enable > email 1`

Using XML

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

FTP

The FTP protocol can be used to upload and download user files, and upgrade the SGX 5150 firmware. A configurable option is provided to enable or disable access via this protocol.

Table 9-7 FTP Settings

FTP Settings	Description
State	Select to enable or disable the FTP server: ◆ Enabled (default) ◆ Disabled

To Configure FTP Settings

Using Web Manager

- To configure FTP, on the **Administration** page, click **FTP**.

Using the CLI

- To enter the FTP command level: `enable > config > ftp`

Using XML

- Include in your file: `<configgroup name="ftp server">`

Gateway

The SGX 5150 IoT device gateway can be configured as a wireless router with DHCP server functionality.

Status

This page displays the current configuration and statistics information for the gateway.

- To view gateway status: on the **Administration** page, click **Gateway > Status**.

WAN

Table 9-8 WAN Configuration

Gateway Settings	Description
Operating Mode	Select the type of operating mode: ◆ **Disabled**: prevents the device to be used as a gateway; use the device normally. ◆ **Gateway**: allows the device to be used as a router with NAT. ◆ **Router**: allows the device to be used as a router without NAT.
Firewall	Select to enable or disable firewall: ◆ **Enabled**: enables the device firewall. ◆ **Disabled**: disable the device firewall.
MAC Address filter	Select to enable or disable the MAC address filter.
Interface	Specify the WAN interface; the wlan0 interface.
IP Address	Assign a static IP address to the gateway.
IPv6 Address	Assign a static IPv6 address to the gateway.
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.*

WAN MAC Address Filters

Accept or drop traffic from specified MAC addresses using the settings below.

Table 9-9 Adding a New MAC Address Filters

Adding or Deleting New MAC Address Filter Settings	Description
Delete	Click the checkbox to the left of any existing mac address filter to be deleted (if any) and click the **Submit** button.
MAC Address	Enter a new mac address to add a new filter.
Action	Select to **Accept** or **Drop** above indicated MAC Address field.

To Configure Gateway WAN Settings

Using Web Manager

- To view gateway status information, on the **Administrations** page, click **Gateway > Status**.
- To modify gateway WAN information, on the **Administrations** page, click **Gateway > Configuration > WAN**.

Using the CLI

- To enter the gateway command level: `enable > config > gateway`

Using XML

- Include in your file: `<configgroup name="gateway"> <configitem name="wan">`

Port Forwarding

Port forwarding allows remote computers (for example, computers on the Internet) to connect to a specific computer or service within a private local-area network (LAN). Port Forwarding rules apply to inbound traffic and will not work if the device is not reachable or traffic to certain ports is blocked before it reaches the device.

If traffic is going through firewalls, all referenced ports on the gateway and LAN devices must be accessible.

Table 9-10 Port Forwarding Rules List

Port Forwarding Rule	Description
Enabled	Enables the port forwarding rule.
Delete	Deletes the port forwarding rule.
Name	User friendly name for the rule. Click on the **[Edit]** icon to make changes.
Ingress IP Address: Port Range	Port or Port range for the rule.
Protocol	Protocols for the rule: **TCP**, **UDP**, or **Both**.
IP Address: Target Port	Target for the port forwarding rule.

Table 9-11 Adding a New Port Forwarding Rule

Adding New Port Forwarding Rule Settings	Description
Name	Enter a User Friendly name for the rule (optional)
Ingress IP Address (Optional)	Enter the destination address of the packets. This option can only be used with single ports and not with port range.
Start Port	Enter the starting port number.
End Port	Enter the end port number (optional). If start port and end port are same it assumes a single port. If start port and end port are not the same – it is a port range.
Protocol	Select the protocol for the rule. **TCP**, **UDP**, or **Both**.
IP Address	Enter the target for the port forwarding rule.
Target Port	Indicate the target port. This is the port which the packets are to be forwarded. This options can only be used with single ports and not with port range. If this value is not specified. If this value is not specified, the packets are forwarded to same port or pot range. Optional field.

To Configure Gateway Port Forwarding Settings

Using Web Manager

- To modify gateway port forwarding information, on the **Administrations** page, click **Gateway > Configuration > Port Forwarding**.

Using the CLI

- To enter the gateway command level: `enable > config > gateway > port forwarding rule <number>`

Using XML

- Include in your file: `<configgroup name="gateway"> <configitem name="port forwarding" instance="<number>">`

Static Routes

Allows the user to add routes to the device routing table.

Table 9-12 Static Route Setting Routes

Static Route Settings	Description
Enabled	Enables the static route
Delete	Deletes the static route
Name	User friendly name for the route. Click on the [Edit] icon to make changes.
Route	Network or Host for the route
Applied	If the route was successfully applied. Routing table updates require a reboot and route needs to be valid as per other device configurables.

Table 9-13 Adding a New Static Route

Adding New Static Route Settings	Description
Name	User friendly name for the route
Network	Network or Host for the route
Gateway	Gateway for the route
Interface	Interface for the route
Metric	Priority for the route. Lower metric means higher priority

To Configure Gateway Static Route Settings

Using Web Manager

- To modify gateway static route information, on the **Administrations** page, click **Gateway > Configuration > Static Routes**.

Using the CLI

- To enter the gateway command level: `enable > config > gateway > static route <number>`

Using XML

- Include in your file: `<configgroup name ="gateway"> <configitem name="static routes" instance="<number>"`

DHCP Server

Allows the user to configure the device as a DHCP server.

Table 9-14 DHCP Settings

DHCP Settings	Description
State	Enable or Disable the DHCP server for the DHCP settings. ◆ **Enabled**: DHCP server is enabled ◆ **Disabled**: DHCP server is disabled.
Lease time	Duration for which lease is initially assigned. Clients must renew after this duration.
Start IP Address	Start IP Address of address pool
End IP Address	End IP Address of address pool
State	Enable or Disable the DHCP server for the DHCPv6 settings. ◆ **Enabled**: DHCP server is enabled ◆ **Disabled**: DHCP server is disabled.
Start IPv6 Address	Start IPv6 Address of address pool
End IPv6 Address	End IPv6 Address of address pool

To Configure Gateway DHCP Server Settings

Using Web Manager

- To modify gateway DHCP server or static lease information, on the **Administrations** page, click **Gateway > Configuration > DHCP Server**.

Using the CLI

- To enter the gateway command level: `enable > config > gateway > dhcp server`

Using XML

- Include in your file: `<configgroup name = "dhcp server">`

Static Lease Listing

The device also provides the ability to pre-assign specific IP addresses to connected devices using static leases. This would ensure that the connected device (identified by the MAC address) always gets the same IP address even while using DHCP.

Table 9-15 Static Lease Listing

Static Lease List Settings	Description
Delete	Click checkbox beside existing static lease MAC Address/IP Address to delete, if available and if desired.
MAC Address	MAC Address of existing static leases are listed here.
IP Address	Static IP Address of existing static leases are listed here.
IPv6 Address	Static IPv6 Address of existing static leases are listed here.

Table 9-16 Add a Static Lease

Add a Static Lease Settings	Description
MAC Address	Enter the MAC Address of the static lease to be added.
IP Address	Enter static IP address of the static lease to be added.
IPv6 Address	Enter static IPv6 address of the static lease to be added.
Add (button)	Click the **Add** button when the new static lease fields have been entered.

Routing Protocols

The SGX 5150 IoT device gateway allows the configuration of routing protocols. Routing protocols specify how routers communicate with each other, disseminating information that enables the selection of routes between any two nodes on a computer network. Routing algorithms determine the specific choice of route. Each router has a prior knowledge of networks directly attached to it. A routing protocol shares this information among immediate neighbors first, then through the network. This way, routers gain knowledge of the topology of the network. The SGX 5150device supports RIP and OSPF protocols.

Table 9-17 Routing Protocol Settings

Routing Settings	Description
State (RIP)	Select to enable or disable the RIP state.
Version	Select how the RIP is to be configured. It can accept **Version 1**, **Version 2**, or **Version 1 and 2**.
Update Interval	Indicate the number of seconds for the Update Interval. Send unsolicited Response message every Update Interval seconds containing the complete routing table to all neighboring RIP routers.
Timeout Interval	Indicate the number of seconds for the Timeout Interval. Upon expiration of the Timeout Interval, the routes are no longer valid, however, they are retained in the routing table for a short time so that neighbors can be notified that the route has been dropped.
GC Interval	Indicate the number of seconds for the GC Interval. Upon expiration of the GC Interval, the routes are finally removed from the routing table.
State (OSPF)	Select to Enable or Disable the OSPF state.
Hello Interval	Indicate the number of seconds for the Hello Interval. Hello packet will be sent every Hello Interval seconds.
Dead Interval	Indicate the number of seconds for the Dead Interval. Sets the time period for which hello packets must not have been seen before neighbors declare the router down.

To Configure Gateway Routing Protocol Settings

Using Web Manager

- To modify gateway protocol settings, on the **Administrations** page, click **Gateway > Configuration > Routing Protocol**.

Using the CLI

- To enter the gateway command level: `enable > config > gateway > routing protocols`

Using XML

- Include in your file: `<configgroup name = "routing protocols">`

Virtual IP

The SGX 5150 IoT device gateway allows the configuration of Virtual IP addresses. Virtual IP is a means to map an externally visible IP address to LAN-side IP addresses. SGX 5150units will support creating up to three virtual IP address mappings by creating loop back interfaces and publishing this information via the routing protocols.

Table 9-18 Virtual IP Settings

Virtual IP Settings	Description
Enabled (checkbox)	Uncheck the **Enabled** checkbox adjacent to a virtual IP address (if any listed) to disable it. Keep the checkbox checked to keep the virtual IP address enabled. A virtual IP address is enabled by default.

Virtual IP Settings	Description
Delete (checkbox)	Check the **Delete** checkbox adjacent to a virtual IP address (if any listed) to be deleted, clicking the **Submit** button.
Name	Enter a name of the virtual IP address.
IP Address	Enter the virtual IP address to which the LAN IP address is to be mapped.
LAN IP Address	Enter the LAN IP address to which the virtual IP address is to be mapped.

To Configure Gateway Virtual IP

Using Web Manager

- To modify gateway DHCP server information, on the **Administrations** page, click **Gateway > Configuration > Virtual IP**.

Using the CLI

- To enter the gateway command level: `enable > config > gateway`

Using XML

- Include in your file: `<configgroup name = "virtual ip">`

GRE

GRE tunneling is available on the SGX 5150, providing more capabilities than IP-in-IP tunneling. For example, it supports transporting multicast traffic and IPv6 through a GRE tunnel.

Table 9-19 GRE Settings

GRE Settings	Description
Name	Enter the user-defined name of the GRE tunnel.
State	Select to enable and disable GRE tunnel.
IP Address	Assign a IP address/mask for the GRE tunnel.
MTU	Enter the number of bytes indicating the largest physical packet size that the network can transmit.
Local Network	Select the local network to use the GRE tunnel. Select **vpn 1** to use the VPN network. Select **any** to use any available interface to remote host.
Remote Host	Enter the remote IP address to use for the GRE tunnel.
Remote Network	Enter the remote network to use for the GRE tunnel.

To Configure GRE Settings

Using Web Manager

- To view or configure GRE settings for a specific tunnel, on the **Administrations** page, click **GRE**.

Using the CLI

- To enter GRE command level: `enable > gre`

Using XML

- Include in your file: `<configgroup name="gre">`

Host

Table 9-20 Host Settings

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

To Configure Host Settings

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

Using Web Manager

- To configure a particular Host, on the **Administrations** page, click **Host > Configuration**.

Using the CLI

- To enter the Host command level: `enable > config > host 1`

Using XML

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

HTTP

Hypertext Transfer Protocol (HTTP) is a request-response standard protocol between clients and servers. HTTP defines how messages are formatted and transmitted. It also defines the actions Web servers and browsers take in response to different commands. HTTP Authentication enables the requirement of user names and passwords for access to the device.

Interface Status, Configuration and Authentication

View-only status information on the HTTP Statistics page displays various HTTP server statistics including information on Rx bytes, Tx bytes, error message types, status unknown, work queue full, socket error, memory error and logs.

See *Table 9-21* for the HTTP settings that can be modified on the HTTP Configuration page. See *Table 9-22* for the HTTP settings that can be authenticated on the HTTP Authentication page.

Table 9-21 HTTP Configuration

HTTP Settings	Description
State	Select to enable or disable the HTTP server.
Port	Enter the port for the HTTP server to use. The default is **80**.
HTTPS State	Select to enable or disable.
Secure Port	Enter the port for the HTTPS server to use. The default is **443**. The HTTP server only listens on the **HTTPS Port** when an SSL certificate is configured.
Secure Protocols	Select to enable or disable the following protocols: ◆ **SSL3** = Secure Sockets Layer version 3 ◆ **TLS1.0** = Transport Layer Security version 1.0. TLS 1.0 is the successor of SSL3 as defined by the IETF. ◆ **TLS1.1** = Transport Layer Security version 1.1 ◆ **TLS1.2** = Transport Layer Security version The protocols are enabled by default. ***Note:*** *A server certificate and associated private key need to be installed in the **SSL** configuration section to use **HTTPS**.*
Secure Credentials	Specify the name of the set of RSA and/or DSA certificates and keys to be used for the secure connection.
Max Timeout	Enter the maximum time for the HTTP server to wait when receiving a request. This prevents Denial-of-Service (DoS) attacks. The default is **10** seconds.
Max Bytes	Enter the maximum number of bytes the HTTP server accepts when receiving a request. The default is **40** KB (this prevents DoS attacks). ***Note:*** *You may need to increase this number in some cases where the browser is sending data aggressively within TCP Windows size limit, when file (including firmware upgrade) is uploaded from webpage.*
Logging State	Select to enable or disable HTTP server logging: ◆ **Enabled** (default) ◆ **Disabled**
Max Log Entries	Set the maximum number of HTTP server log entries. Only the last **Max Log Entries** are cached and viewable.

HTTP Settings	Description
Log Format	Set the log format string for the HTTP server. Follow these **Log Format** rules: ◆ **%a** - remote IP address (could be a proxy) ◆ **%b** - bytes sent excluding headers ◆ **%B** - bytes sent excluding headers (0 = '-') ◆ **%h** - remote host (same as '%a') ◆ **%{h}i** - header contents from request (h = header string) ◆ **%m** - request method ◆ **%p** - ephemeral local port value used for request ◆ **%q** - query string (prepend with '?' or empty '-') ◆ **%t** - timestamp HH:MM:SS (same as Apache '%(%H:%M:%S)t' or '%(%T)t') ◆ **%u** - remote user (could be bogus for 401 status) ◆ **%U** - URL path info ◆ **%r** - first line of request (same as '%m %U%q <version>') ◆ **%s** - return status
Authentication Timeout	The timeout period applies if the selected authentication type is either **Digest** or **SSL/Digest**. After this period of inactivity, the client must authenticate again.

To View or Configure HTTP

Using Web Manager

- To view HTTP statistics, on the **Administration** page, click **HTTP > Statistics**
- To configure HTTP, on the **Administration** page, click **HTTP > Configuration**.

Using the CLI

- To enter the HTTP command level: `enable > config > http`

Using XML

- Include in your file: `<configgroup name="http server">`

The HTTP Server can be configured with many different authentication directives. The authentication is hierarchical in that any URI can be given an authentication directive in order to override a parent URI authentication directive.

Table 9-22 HTTP Authentication

HTTP Authentication Settings	Description
URI	Enter the URI. The URI must begin with / to refer to the filesystem.
Authentication Type	Select an HTTP authentication type. The different types offer various levels of security, from the least to most secure: ◆ **None:** no authentication necessary ◆ **Basic:** encodes passwords using Base64 ◆ **Digest:** encodes passwords using MD5 When changing the parameters of Digest authentication, it is often best to close and reopen the browser to ensure that it does not attempt to use cached authentication information. There is no real reason to create an authentication directive using None unless you want to override a parent directive that uses some other Authentication Type. Click **Submit** when URI and Authentication Type is entered to submit it.

HTTP Authentication Settings	Description
Delete	Click to delete the existing configuration.

To Configure HTTP Authentication

Using Web Manager

- To configure HTTP authentication, on the **Administration** page, click **HTTP > Authentication**.

Using the CLI

- To enter the HTTP command level: `enable > config > http`

Using XML

- Include in your file: `<configgroup name="http authentication uri">`

Line

The SGX 5150 units offer 1 or 2 serial ports which use standard RS232/RS485 interfaces. The lines can be configured to operate in the following modes:

- RS232
- RS485 Full Duplex (also compatible with RS-422)
- RS485 Half Duplex, with and without termination impedance
- All serial settings such as Baud Rate, Parity, Data Bits, etc, apply to this line.

The line settings allow configuration of the serial line.

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

Line Status and Configuration

View-only status information on the Line 1 - Statistics page displays line statistics including information on bytes, queued bytes, breaks, flow control, parity errors, framing errors, overrun errors, no Rx buffer errors, CTS input, RTS output, DSR input, and DTR output.

See *Table 9-23* for the line settings that can be modified on the Line 1 - Configuration page. See *Table 9-24* for the line settings that can be established on the Line 1 - Command Mode page.

Table 9-23 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.
Interface	One interface type is available per line: ◆ RS232 (available for lines 1 and 2) ◆ USB-CDC-ACM (available for line 3)
State	Select to enable or disable the operational state of the Line. The default is Enabled.

Line Settings	Description
Protocol	Set the operational protocol for the Line. The default is Tunnel. Choices are: ◆ None ◆ Modbus RTU ◆ Modbus ASCII ◆ Tunnel ***Note:*** *The Line currently only supports None so can be used in Command Mode, for CLI. Tunnel, as in serial-networking tunneling protocol, will be supported in a future software release.*
Baud Rate	Select the desired baud rate from the drop-down menu.
Parity	Select parity from the drop-down menu: **None**, **Even** or **Odd**.
Data Bits	Select data bits from the drop-down menu: **7** or **8**.
Stop Bits	Select **1** or **2** stop bits from the drop-down menu.
Flow Control	Select **None**, **Hardware** or **Software** flow control from the drop-down menu.
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 (default value is 4000 msec).
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.

Table 9-24 Line Command Mode Setting

Line Command Mode Settings	Description
Mode	Set the Command Mode state of the Line. When in Command Mode, a CLI session operates exclusively on the Line. Choices are: ◆ Always ◆ User Serial String ◆ Disabled ***Note:*** *In order to enable Command Mode on the Line, Tunneling on the Line must be Disabled (both Connect and Accept modes). Also, custom baud rates are not supported in Command Mode.*
Wait Time	Enter the amount of time to wait during boot time for the Serial String. This timer starts right after the Signon Message has been sent on the Serial Line and applies only if mode is “Use Serial String”. ***Note:*** *This field becomes available when Use Serial String is selected for Mode.*
Serial String	Enter the Text or Binary string of bytes that must be read on the Serial Line during boot time in order to enable Command Mode. It may contain a time element to specify a required delay in milliseconds x, formed as {x}. Applies only if mode is “User Serial String”. It may contain a binary character(s) of the form [x]. For example, use decimal [12] or hex [0xc]. ***Note:*** *This field becomes available when Use Serial String is selected for Mode.*
Echo Serial String	Select Enable or Disable for Echo Serial String. Applies only if mode is “User Serial String”. Select enable to echo received characters backed out on the line while looking for the serial string. ***Note:*** *This field becomes available when Use Serial String is selected for Mode.*

Line Command Mode Settings (continued)	Description
Signon Message	Enter the string of bytes to be sent to the Serial Line during boot time. It may contain a binary character(s) of the form [x]. For example, use decimal [12] or hex [0xc]. Click the **Submit** button after entering the signon message. ***Note:*** *The **Submit** button will only appear if the Mode is not disabled.*

To View and Configure Line Configuration and Command Mode

Note: *The steps to view and configure Line 1 settings provided in this section are the same for viewing and configuring Line 2.*

Using Web Manager

- To view line 1 statistics, on the **Administration** page, click **Line > Line 1 > Statistics**.
- To configure line 1, on the **Administration** page, click **Line > Line 1 > Configuration**.
- To configure line 1 command mode on the **Administration** page, click **Line > Line 1 > Command Mode**.

Using the CLI

- To enter the Line command level: `enable > line <number>`

Using XML

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

USB

USB statistics can be viewed and USB settings and command mode may be configured on these USB pages.

USB Statistics

This page displays the current status and various statistics for the USB Line.

To View USB Statistics

Using Web Manager

- To view usb statistics, on the **Administration** page, click **USB > Statistics**.

Using the CLI

- To enter the usb command level: `enable > usb <number>`

Using XML

- Include in your file: `<configgroup name="usb line" instance="3">`

USB Configuration

This page displays the current configuration of the USB Line. Changing any of the fields takes effect immediately. Further configuration is available at Wired Network (USB) for 'Ethernet Device' mode.

Table 9-25 USB Configuration

USB Settings	Description
Name	Enter the **Name** of the USB line. Named lines appear in the 'Login Connect Menu', if enabled. Set it blank to leave it out of the menu.
Interface	Select the **Interface** from the drop-down menu.
State	Select to enable or disable the **State**.
Protocol	Select type of **Protocol** from the drop-down menu: **Tunnel** or **None**.
Line Mode	Select the USB port mode from the drop-down menu. The USB port can be configured in one of the following: **Ethernet Device, Serial Device**, or **Host**. Host mode supports connecting Mass Storage and Serial devices.
Gap Timer	Indicate the gap time in milliseconds. The driver forwards received serial bytes after the **Gap Timer** delay from the last character received. By default, the delay is four character periods at the current baud rate (minimum 1 ms).
Threshold	Enter the threshold in bytes. The driver will forward received characters after threshold bytes have been received.

To Configure USB Settings

Using Web Manager

- To configure usb settings, on the **Administration** page, click **USB > Configuration**.

Using the CLI

- To enter the usb command level: `enable > usb`

Using XML

- Include in your file: `<configgroup name="usb">`

USB Command Mode

Table 9-26 USB Command Mode

USB Command Mode Settings	Description
Mode	When Command Mode is enabled, the Command Line Interface (CLI) is attached to the USB Line. Command Mode can be enabled in a number of ways: ◆ The **Always** choice immediately enables Command Mode for the USB Line. ◆ The **Use Serial String** choice enables Command Mode when the Serial String is read on the USB Line during boot time. ◆ **Disabled**
Wait Time	Enter the **Wait Time** in milliseconds. The specified time defines the amount of time to wait during boot time for the Serial String. This timer starts right after the Signon Message has been sent on the USB Line.

USB Command Mode Settings (continued)	Description
Serial String	Enter the **Serial String**. The Serial String is a string of bytes that must be read on the USB Line during boot time in order to enable Command Mode. It may contain a time element to specify a required delay in milliseconds x, formed as {x}.
Echo Serial String	Select to enable or disable.
Signon Message	Enter the Signon Message, which is a string of bytes that is sent on the USB Line during boot time. Place a binary character into either the Serial String or the Signon Message using `[x]`. For example, use decimal `[12]` or hex `[0xc]`.

To Configure USB Command Mode

Using Web Manager

- To configure usb command mode, on the **Administration** page, click **USB > Command Mode**.

Using the CLI

- To enter the usb command level: `enable > usb`

Using XML

Include in your file: `<configgroup name="usb">`

Modbus

The SGX 5150 IoT device gateway operates as a master device that connects to slave devices. The Modbus ASCII/RTU based serial slave devices can be connected via the Ethernet through an existing Modbus TCP/IP network. Any device having access to a given Modbus implementation will be able to perform full range of operations that the implementation supports. Modbus/TCP uses a reserved TCP port of 502 and includes a single byte function code (1=255) preceded by a 6 byte header:

Table 9-27 Byte Header of Modbus Application Protocol

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

Serial Transmission Mode

SGX 5150 IoT device gateways can be set up to communicate on standard Modbus networks using either RTU or ASCII. Users select the desired mode and serial port communication parameters (baud rate, parity mode, etc) when in the line configuration options.

Table 9-28 Modbus Transmission Modes

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

The Modbus web pages allow you to check Modbus status and make configuration changes.

Modbus Statistics

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

Modbus Configuration

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

Table 9-29 Modbus Configuration

Modbus Configuration Settings	Description
TCP Server State	Select **On** or **Off**. If **On**, the Modbus server is active on TCP 502.
Additional TCP Server Port	Enter the Additional TCP Server Port, if any. ***Note:*** *If present, is used in addition to TCP port 502.*
Response Timeout	Enter the number of milliseconds to wait for a response on the serial side. The device returns exception code 11 to the network master controller if the slave serial device fails to reply within this time out.

Note: *The serial line protocol must also be configured for Modbus, in addition to configuring the Modbus server. See Line (on page 92) and Tunnel (on page 112) for details.*

To View and Configure the Modbus Server

Using Web Manager

- To view Modbus statistics, on the **Administration** page, click **Modbus** > **Statistics**.
- To configure Modbus settings, on the **Administration** page, click **Modbus** > **Configuration**.

Using the CLI

- To enter the Modbus command level: `enable > configure > modbus`

Using XML

- Include in your file: `<configgroup name="modbus">`

SMTP

Table 9-30 SMTP Settings

SMTP Settings	Description
From Address	Enter the From Address here. This is an email address and is required. If you wish to direct oubtound email messages through a mail server, put your client email address here.
Server Address	Enter the Server Address to direct outbound email messages through a mail server.
Server Port	Enter the SMTP server port number. The default is 25
Username	Enter a Username to direct outbound email messages through a mail server.
Password	Enter a Password to direct outbound email messages through a mail server.
Overriding Domain	Enter the domain name to override the current domain name in EHLO (Extended Hello).

To Configure SMTP Settings

Using Web Manager

- To configure SMTP protocol settings, on the **Administration** page, click **SMTP** in the menu.

Using the CLI

- To enter the command level: `enable > config > smtp`

Using XML

- Include in your file: `<configgroup name="smtp">`

SNMP Settings

Simple Network Management Protocol (SNMP) settings may be viewed and configured in this section.

Table 9-31 SNMP Settings

SNMP Settings	Description
State	Select to enable or disable the SNMP agent state.
Version	Select the SNMP version used by the SNMP agent.
Read Community	Specify the read community used by the agent (defaults to public community).
Write Community	Specify the write community used by the agent (defaults to private community).
System Contact	Specify the system contact.
System Name	Update the system name, as necessary. The default system name is .

SNMP Settings	Description
System Description	Update the system description, as necessary. The default system information includes the manufacturer name, model name, version and the serial number of the device.
System Location	Specify a system location for the SNMP setting.
Primary Destination	Enter the primary destination address of the SNMP trap.
Secondary Destination	Enter the secondary destination address of the SNMP trap.
Lantronix MIB File	Click the Lantronix MIB file name to save and load it into the MIB browser and trap receiver. This is the base MIB file for Lantronix products. Load or compile this file first.
MIB File	Click the MIB file name to save and load it into the MIB browser and trap receiver. This is the product specific MIB file. Load or compile this after the Lantronix MIB File.

To Configure SNMP Settings

Using Web Manager

- To configure SNMP, on the **Administration** page, click **SNMP** in the menu.

Using the CLI

- To enter the SNMP command level: `enable > config > snmp`

Using XML

- Include in your file: `<configgroup name="snmp">`

SSH

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

Configuration is required when the SGX 5150 device is either (1) the SSH server or (2) an SSH client.. The SSH server is used by the CLI (Command Mode) and for tunneling in Accept Mode. The SSH client is for tunneling in Connect Mode.

To configure the SGX 5150 as an SSH server, there are two requirements:

- **Defined Host Keys:** both private and public keys are required. These keys are used for the Diffie-Hellman key exchange (used for the underlying encryption protocol).
- **Defined Users**: these users are permitted to connect to the SGX 5150 SSH server.

SSH Server: Host Keys

The SSH Server Host Keys are used by all applications that play the role of an SSH Server. Specifically Tunneling in Accept Mode. These keys can be created elsewhere and uploaded to the device or automatically generated on the device.

If uploading existing keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

Note: *Some SSH Clients require RSA Host Keys to be at least 1024 bits in size.*

Table 9-32 SSH Server Host Keys

SSH Settings	Description
Private Key	Click the **Browse...** button to navigate to the existing private key you want to upload. In Web Manager, you can also browse to the private key to be uploaded. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
Public Key	Click the **Browse...** button to navigate to the existing public key you want to upload. In Web Manager, you can also browse to the public key to be uploaded.
Submit (button)	Click the **Submit** button after changes are made in the above Upload Keys fields.
Key Type	Select a key type to use for the new key: ◆ RSA ◆ DSA
Bit Size	Select a bit length for the new key: ◆ 512 ◆ 768 ◆ 1024 ◆ 2048 ◆ 4096
Submit (button)	Click the **Submit** button after changes are made in the above Create New Keys fields.

Note: *SSH Keys from other programs may be converted to the required SGX 5150 format. Use Open SSH to perform the conversion.*

SSH Server: Authorized Users

The SSH Server Authorized Users are used by all applications that play the role of an SSH Server and specifically Tunneling in Accept Mode. Every user account must have a Password.

The user's Public Keys are optional and only necessary if public key authentication is wanted. Using public key authentication will allow a connection to be made without the password being asked at that time.

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

Table 9-33 SSH Server Authorized Users

SSH Settings	Description
Username	Enter a new username or edit an existing one.
Password	Enter a new password or edit an existing one.
Public RSA Key	Click the **Browse...** button to browse to the existing public RSA key you want to use with this user. In Web Manager, you can also browse to the public RSA key to be uploaded. If authentication is successful with the key, no password is required.

SSH Settings	Description
Public DSA Key	Click the **Browse...** button to browse to the existing public DSA key you want to use with this user. In Web Manager, you can also browse to the public DSA key to be uploaded.If authentication is successful with the key, no password is required.
Add/Edit (button)	Click the **Add/Edit** button after changes are made in the above SSH Server: Authorized Users fields.

SSH Client: Known Hosts

The SSH Client Known Hosts are used by all applications that play the role of an SSH Client. Specifically in Connect Mode. Configuring these public keys are optional, but if they exist another layer of security is offered which helps prevent Man-in-the-Middle (MITM) attacks.

Table 9-34 SSH Client Known Hosts

SSH	Settings Description
Server	Specify either a DNS Hostname or IP Address when adding public host keys for a Server. This Server name should match the name used as the Remote Address in Connect Mode Tunneling.
Public RSA Key	Click the **Browse...** button to browse to the existing public RSA key you want to use with this user. In Web Manager, you can also browse to the public RSA key to be uploaded. If authentication is successful with the key, no password is required.
Public DSA Key	Click the **Browse...** button to browse to the existing public DSA key you want to use with this user. In Web Manager, you can also browse to the public DSA key to be uploaded. If authentication is successful with the key, no password is required.
Submit (button)	Click the **Submit** button after changes are made in the above SSH Server: Known Hosts fields.

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

SSH Client: Users

The SSH Client Users are used by all applications that play the role of an SSH Client. Specifically Tunneling in Connect Mode. To configure the SGX 5150 as an SSH client, an SSH client user must be both configured and also exist on the remote SSH server.

At the very least, a Password or Key Pair must be configured for a user. The keys for public key authentication can be created elsewhere and uploaded to the device or automatically generated on the device.

If uploading existing Keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

The default Remote Command is '<Default login shell>' which tells the SSH Server to execute a remote shell upon connection. This can be changed to anything the SSH Server on the remote host can execute.

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

Table 9-35 SSH Client Users

SSH Settings	Description
Username	Enter the name that the device uses to connect to an SSH server.
Password	Enter the password associated with the username.
Remote Command	Enter the command that can be executed remotely. Default is shell, which tells the SSH server to execute a remote shell upon connection. This command can be changed to anything the remote host can perform.
Private Key	Click the **Browse...** button to browse to the existing private key you want to upload by clicking the **Choose File** button. In Web Manager, you can also browse to the private key to be uploaded. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
Public Key	Click the **Browse...** button to browse to the existing public key you want to upload by clicking the **Choose File** button. In Web Manager, you can also browse to the public key to be uploaded.
Key Type	Select a bit length for the key: ◆ RSA ◆ DSA
Add/Edit (button)	Click the **Add/Edit** button after changes are made in the above SSH Server: Users fields.
Public Key	Click the **Browse...** button to browse to the existing public key you want to upload by clicking the **Choose File** button. In Web Manager, you can also browse to the public key to be uploaded.

Table 9-36 Create New Keys

SSH Setting	Description
Key Type	Select a bit length for the new key: ◆ RSA ◆ DSA
Bit Size	Select the bit length of the new key: ◆ 512 ◆ 768 ◆ 1024 ◆ 2048 ◆ 4096 Using a larger bit size takes more time to generate the key. Approximate times are: ◆ 1 second for a 512 bit RSA key ◆ 1 second for a 768 bit RSA key ◆ 1 second for a 1024 bit RSA key ◆ 2 seconds for a 512 bit DSA key ◆ 2 seconds for a 768 bit DSA key ◆ 20 seconds for a 1024 bit DSA key ***Note:*** *Some SSH clients require RSA host keys to be at least 1024 bits long. This device generates keys up to 2048 bits long.*
Submit (button)	Click the **Submit** button after changes are made in the above Create New Keys fields.

To Configure SSH Settings

Using Web Manager

- To configure SSH, on the **Administration** page, click **SSH** in the menu.

Using the CLI

- To enter the SSH command level: `enable > ssh`

Using XML

- Include in your file: `<configgroup name="ssh">`
- Include in your file: `<configgroup name="ssh client">`
- Include in your file: `<configgroup name="ssh server">`

SSL

Secure Sockets Layer (SSL) is a protocol that creates an encrypted connection between devices. It also provides authentication and message integrity services. SSL is used widely for secure communication to a Web server, and also for wireless authentication.

SSL certificates identify the SGX 5150 unit to peers and are used with some methods of wireless authentication. Provide a name at upload time to identify certificates on the SGX 5150 unit.

You can upload Certificate and Private key combinations, obtained from an external Certificate Authority (CA), to the SGX 5150 unit. The SGX 5150 unit can also generate self-signed certificates with associated private keys.

Credentials

The SGX 5150 unit can generate self-signed certificates and their associated keys for both RSA and DSA certificate formats. When you generate certificates, assign them a credential name to help identify them on the SGX 5150 unit. Once you create your credentials, then configure them with the desired certificates.

To Create a New Credential

Using Web Manager

1. In Web Manager, click the **Administration** tab in the header.
2. Click **SSL**.
3. Click **Credentials**.
4. Type the name for your credential in the **Create new credential** field.
5. Click **Submit**. The new SSL credential appears in the list.

Using the CLI

- To enter the SSL command level: `enable > ssl`

Using XML

- Include in your file: `<configgroup name="ssl"`

To Delete a Credential

Using Web Manager

1. In the Web Manager, click the **Administration** tab.
2. Click **SSL**.
3. Click **Credentials**.
4. Click **X** beside the existing credential you wish to delete.
5. To confirm the delete, click **OK**.

Using CLI

- To enter the SSL command level: `enable > ssl`

Using XML

- Include in your file: `<configgroup name="ssl"`

Table 9-37 SSL Credential - Upload Certificate

Upload Certificate Settings	Description
New Certificate	Click the **Browse...** button to browse to the SSL certificate to be uploaded. RSA or DSA certificates are allowed.
New Certificate Type	Select the certificate type to upload: ◆ PEM ◆ PKCS7 ◆ PKCS12
New Private Key	Click the **Browse...** button to browse to the SSL private key to be uploaded. The key must belong to the entered certificate.
New Key Type	Select the key type being uploaded: ◆ PEM ◆ Encrypted PEM ◆ PKCS12

Table 9-38 SSL Credential - Create New Self-Signed Certificate

Field	Description
Country (2 Letter code)	Enter the 2 letter code for the country where the organization is located. This is a two-letter ISO code (e.g., “US” for the United States).
State/Province	Enter the state or province where the organization is located.
Locality (City)	Enter the city where the organization is located.
Organization	Enter the organization name to which the SGX 5150 unit belongs.
Organization Unit	Enter the organization unit which specifies the department or organization to which the SGX 5150 unit belongs.

Field	Description
Common Name	Enter a network name for the SGX 5150 unit when installed in the user's network (usually the fully qualified domain name). It is identical to the name that is used to access the SGX 5150 unit with a web browser without the prefix `http://`. In case the name given here and the actual network name differ, the browser will pop up a security warning when the SGX 5150 unit is accessed using HTTPS.
Expires	Type the date that the self-signed certificate expires in **mm/dd/yyyy** format.
Type	Select **RSA** or **DSA**.
Key length	Select the key length from the drop-down menu.

To Configure an SSL Credential to Use an Uploaded Certificate

1. In the Web Manager, click the **Administration** tab.
2. Click **SSL**.
3. Click **Credentials**.
4. Under the **View or Edit** heading, click the credential that you want to modify to access the information page for that credential.
5. To upload a **New Certificate** to assign to the credential, click **Browse...** beside **New Certificate**, locate the valid certificate, then double-click the file to select it.
6. Identify the **New Certificate Type** selected.
   - If you select SSL authority, RSA, or DSA certificates, select **PEM** or **PKCS7**.
   - If the Web Manager determines that the certificate is an Authority Certificate type, the New Certificate Type field updates to **PKCS12** automatically. For PKCS12 certificates, enter a password.

   Note: *Ensure that the certificate is formatted properly with a valid open and close tag. Also ensure that the Private Key is associated to the selected certificate and that it is formatted properly with a valid open and close tag.*
7. To locate the associated valid **New Private Key** for this certificate, click **Browse...** to browse to and select the file.
8. Select the **New Key Type** from the drop-down menu.
9. Click **Submit**.

To Configure an SSL Credential to Use a Self-Signed Certificate

1. In the Web Manager, click the **Administration** tab.
2. Click **SSL**.
3. Click **Credentials**.
4. Under **View or Edit,** click the credential you wish to modify to access the information page for that credential.
5. Enter the details for a new self-signed certificate for this credential. Reference *Table 9-38 SSL Credential - Create New Self-Signed Certificate on page 104*.
6. Click **Submit**. The process to create a self-signed certificate can take up to 30 seconds, depending on the length of the key.

Trusted Authorities

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

Table 9-39 SSL Trusted Authority

Trusted Authorities Settings	Description
Authority	Click the **Browse...** button to browse to an existing 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 comments must be deleted before upload.
New Certificate Type	Select the certificate type through the drop-down window. This field may automatically update, depending upon extension of the certificate entered.
Delete All	To delete all existing certificate authorities as listed, click the **Delete ALL** button.
Delete	To delete an existing certificate authority, click the **Delete** button beside the specific authority listed under **Current Certificate Authorities**.

To Upload an Authority Certificate

You can upload SSL authority, RSA, or DSA certificates.

To upload a trusted authority certificate:

1. In the Web Manager, click the **Administration** tab.
2. Click **SSL**.
3. Click **Trusted Authorities.**
4. Click **Browse...** to browse to and select an authority certificate.
5. Select the **New Certificate Type** from the drop-down window:
   - If you select SSL authority, RSA, or DSA certificates, select **PEM** or **PKCS7**.
   - If the Web Manager determines that the certificate is an authority certificate type, the field updates to **PKCS12** automatically. For PKCS12 certificates, type a **Password**.

Notes:

- *Ensure that the certificate is formatted properly with a valid open and close tag.*
- *Ensure that the Private Key is associated to the selected certificate and that it is formatted properly with a valid open and close tag.*
- *If the New Certificate field is set to **None**, the certificate is not supported.*

6. Click **Submit**.

CSR (Certificate Signing Request)

The SGX 5150 unit uses the Secure Socket Layer (SSL) protocol for any encrypted network traffic between itself and a connected client. During the connection establishment the SGX 5150 unit has to expose its identity to a client using a cryptographic certificate. Upon leaving the factory this certificate and the underlying secret key is the same for all SGX 5150 units and will not match the network configuration where it is installed. The certificate's underlying secret key is also used for securing the SSL handshake. Leaving the default certificate unmodified is all right in most circumstances and is necessary only if the network facility is vulnerable to man-in-the-middle attack.

It is possible to generate and install a new base64 encoded x.509 certificate that is unique for a particular SGX 5150 unit. The SGX 5150 unit is able to generate a new cryptographic key and the associated Certificate Signing Request (CSR) that needs to be certified by a certification authority (CA).

To create and install an SSL certificate, perform the following steps.

1. On the **Administration** page, click **SSL > CSR (Certificate Signing Request)**. The Certificate Signing Request page displays.
2. Modify the following fields:

Table 9-40 SSL CSR (Certificate Signing Request)

Field	Description
Country (2 Letter code)	Enter the two-letter ISO code (e.g., US for the United States) for the country where the organization is located.
State/Province	Enter the state or province where the organization is located.
Locality (City)	Enter the city where the organization is located.
Organization	Enter the organization name to which the SGX 5150 unit belongs.
Organization Unit	Enter the department within the organization to which the SGX 5150 unit belongs.
Common Name	Enter the network name of the SGX 5150 unit once it is installed in the user's network (usually the fully qualified domain name). It is identical to the name that is used to access the SGX 5150 unit with a web browser without the prefix http:// . In case the name given here and the actual network name differ, the browser will pop up a security warning when the SGX 5150 unit is accessed using HTTPS.
Key length	Select the key length: **2048** or **4096**.

3. Click **Submit** to initiate the Certificate Signing Request generation. After a few moments, the CSR file created will appear.
4. Click the CSR file to download it if desired.

Syslog

The system log (Syslog) provides information that shows the current configuration and statistics of the Syslog. You can configure the Syslog host and set the severity level for events to log.

Note: *The system log is saved to local storage, but is not retained through reboots unless diagnostics logging to the file system is enabled. To allow the administrator to save the complete system log, save the system log to a server that supports remote logging services. For details, refer to RFC 3164. The default port is 514.*

To Configure Syslog Settings

Using Web Manager

1. In the Web Manager, click the **Administration** tab.
2. Click **Syslog**.
3. To enable Syslog, for **State**, select **Enabled**.
4. For **Host**, type the IP address of the remote server that stores the logs.
5. For **Remote Port**, enter the port number for the remote host that supports logging services. The default port number is 514.
6. For **Severity Log Level**, click the arrow to select the minimum level message type that you want the system to log.
7. Click **Submit**.

Using CLI

- To enter the Syslog command level: `enable > configure > syslog`

Using XML

- Include in your file: `<configgroup name="syslog"`

System

The SGX 5150 settings allow for rebooting the device, restoring factory defaults, uploading new firmware and updating a system's short and long name.

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.*

Table 9-41 System Settings

System Settings	Description
State	Select to enable or disable the reboot schedule. ***Warning:*** ***Use extreme caution when using scheduled reboots. The device will automatically reboot as scheduled. Any configuration changes not saved to flash memory will be lost. CLI/WEB sessions and network traffic will be interrupted. To avoid frequent reboots, device will not be rebooted if it was started or configured less than 30 minutes from the current date/time.***
Schedule	Select the reboot schedule interval: **Daily** or **Interval**
Time (24 hour)	Set the time to reboot by selecting the **Hour** and **Min** (Minute) in the drop-down menus. ***Note:*** *This configuration option appears when the **Daily** schedule is selected.*
Interval	Enter the interval number in the field. Then select the type of interval from the drop-down menu: ◆ Hours ◆ Days ◆ Weeks ◆ Months ***Note:*** *This configuration option appears when the **Interval** schedule is selected.*
Key Type	Select a bit length for the new key: ◆ RSA ◆ DSA
Bit Size	Select the bit length of the new key: ◆ 512 ◆ 768 ◆ 1024 ◆ 2048 ◆ 4096 Using a larger bit size takes more time to generate the key. Approximate times are: ◆ 1 second for a 512 bit RSA key ◆ 1 second for a 768 bit RSA key ◆ 1 second for a 1024 bit RSA key ◆ 2 seconds for a 512 bit DSA key ◆ 2 seconds for a 768 bit DSA key ◆ 20 seconds for a 1024 bit DSA key ***Note:*** *Some SSH clients require RSA host keys to be at least 1024 bits long. This device generates keys up to 2048 bits long.*

System Settings	Description
Submit (button)	Click the **Submit** button after settings are made in the above Reboot Schedule fields.
Reboot Device	Click the **Reboot** button to reboot the device. When the device is 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 device changes after reboot.*
Restore Factory Defaults	Click the **Factory Defaults** button to restore the device to the original factory settings. All configuration will be lost. The SGX 5150 unit automatically reboots upon setting back to the defaults. After setting the configuration back to the factory defaults, the device will automatically be rebooted.
Upload New Firmware	Click **Browse...** to browse to and select the firmware file. This process writes the new firmware file to firmware.rom on the SGX 5150 unit. The device automatically reboots upon the installation of new firmware. See the section *FTP on page 81*. ***Caution:*** ***Do not to power off or reset the device while uploading new firmware. Once the upload has completed and the new firmware has been verified and flashed to memory, the device will automatically be rebooted.***
Standalone Firmware Installer	Click **Reboot to Standalone Firmware Installer** to reboot the device to a standalone firmware installer mode. When the device is rebooted, your browser should be refreshed and redirected to the firmware installer page after 30 seconds. Upload and install new device firmware from that page.
Short Name	Enter a short name for the system name. A maximum of 32 characters are allowed.
Long Name	Enter a long name for the system name. A maximum of 64 characters are allowed.

To access System settings:

Using Web Manager

- To access System settings with options to set up a reboot schedule, reboot, restore factory defaults, upload new firmware, reboot the standalone firmware installer, update the system name (long or short names) or to view the current configuration, on the **Administration** page, click **System**.

Using the CLI

- To reboot or restore factory defaults, enter the System command level: `enable`
- To setup a reboot schedule, update the system name (long or short names), enter the Device command level: `enable > device`

Using XML

- Include in your file: `<configgroup name=”xml import control”>`
- Include in your file: `<configgroup name="reboot schedule">`
- Include in your file: `<configgroup name="device">`

Terminal

You can configure whether each serial line or the Telnet/SSH server presents a CLI or a Login Connect menu when a connection is made.

Table 9-42 Terminal on Network and Line Settings

Terminal on Network and Line Settings	Description
Terminal Type	Enter text to describe the type of terminal. The text will be sent to a host via IAC. ***Note:*** *IAC means, "interpret as command." It is a way to send commands over the network such as* **send break** *or* **start echoing**. *IAC is only supported in Telnet.*
Login Connect Menu	Select the interface to display when the user logs in. Choices are: ◆ **Enabled** = shows the Login Connect Menu. ◆ **Disabled** = shows the CLI (default)
Exit Connect Menu	Select whether to display a choice for the user to exit the Login Connect Menu and reach the CLI. Choices are: ◆ **Enabled** = a choice allows the user to exit to the CLI. ◆ **Disabled** = there is no exit to the CLI (default)
Send Break	Enter the Send Break control character received from the network on its way to a serial line which would cause the line output to be forced inactive. Example setting: `<Ctrl> Y` Blank the field to set to `<None>`. ***Note:*** *This field is not available for terminal network configuration.*
Break Duration	Specify the length of the spacing condition placed on the line when a break is sent. ***Note:*** *This field is not available for terminal network configuration.*
Echo	Select whether to enable echo: ◆ **Enabled** ◆ **Disabled** ***Note:*** *Applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable* ***Echo*** *if your terminal echoes, in which case you will see double of each character typed. Default is enabled.*

To Configure the Terminal Network Connection

Using Web Manager

◆ To configure the Terminal on Network, click **Administration** in the header and select **Terminal > Network**.

Using the CLI

◆ To enter the Terminal Network command level: `enable > config > terminal network`

Using XML

◆ Include in your file: `<configgroup name="terminal" instance="network">`

To Configure the Terminal Line or USB Connection

Note: *The following section describes the steps to view and configure terminal line 1 settings; these steps apply to terminal line 2 and terminal line 3 of the device.*

Using Web Manager

- To configure a particular Terminal Line, click **Administration** in the header and select **Terminal > Line 1**.
- To configure the Terminal USB, click **Administration** in the header and select **Terminal > USB 1**.

Using the CLI

- To enter the Terminal Line command level: `enable > config > terminal 1`

Using XML

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

Tunnel

Tunneling allows serial devices to communicate over a network without 'being aware' of the devices that 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 on all serial lines. The connections on one serial line are separate from these on another serial port.

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

Tunnel 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, on the **Administration** page, click **Tunnel** > **Tunnel 1 > Statistics**.

Using the CLI

- To view Tunnel 1 statistics: `enable > tunnel 1, show statistics`

Using XML

- Include in your file: `<statusgroup name="tunnel" instance="1">`

Serial 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 9-43 Tunnel Serial Settings

Terminal Serial Settings	Description
Line Settings	Line Settings information here is display only. Go to the section, *To Configure the Terminal Line or USB Connection* to modify these settings.
Protocol	Protocol information here is display only. Go to the section, *To Configure the Terminal Line or USB Connection* to modify these settings.
DTR	Select the conditions in which the Data Terminal Ready (DTR) control signal on the serial line are asserted. Choices are: ◆ **Unasserted** ◆ **TruPort** = the DTR is asserted whenever either a connect or an accept mode tunnel connection is active with the Telnet Protocol RFC2217 saying that the remote DSR is asserted. ◆ **Asserted while connected** = the DTR is asserted whenever either a connect or an accept mode tunnel connection is active. ◆ **Continuously asserted**

To Configure Tunnel Serial Settings

Using Web Manager

- To configure the Serial Settings for a specific tunnel, on the **Administration** page, click **Tunnel** > **Tunnel 1 > Serial Settings**.

Using the CLI

- To enter Tunnel 1 command level: `enable > tunnel 1 > serial`

Using XML

- Include in your file: `<configgroup name=”tunnel serial” 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 9-44 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 appears when Timeout mode is selected.*

Tunnel Packing Mode Settings (continued)	Description
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. This setting becomes available when the Timeout mode is selected. ***Note:*** *This configuration option appears when Timeout mode is selected.*
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 appears when Send Character mode is selected.*
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 appears when Send Character mode is selected.*

To Configure Tunnel Packing Mode Settings

Using Web Manager

- To configure the Packing Mode for a specific tunnel, on the **Administration** page, click **Tunnel > Tunnel 1 > Packing Mode**.

Using the CLI

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

Using XML

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

Accept Mode

In Accept Mode, the SGX 5150 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. Supported serial lines and associated local port numbers progress sequentially in matching value. For instance, the default local port is 10001 for serial line 1 and the default local port for serial line 2 is 10002, and so on for the number of serial lines supported. Serial data can still be received while waiting for a network connection, keeping in mind serial data buffer limitations.

Table 9-45 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. ◆ **Modem Control Asserted** = start waiting for an incoming connection as long as the Modem Control pin (DSR) is asserted on the serial line until a connection is made. ◆ **Modem Emulation** = start waiting for an incoming connection when triggered by modem emulation AT commands. Connect mode must also be set to Modem Emulation.
Local Port	Set the port number for use as the network local port. The default local port number for each supported serial line number progresses sequentially in equal value so that Tunnel X: 1000X. For example: ◆ Tunnel 1: 10001 ◆ Tunnel 2: 10002
Protocol	Select the protocol type for use with Accept Mode: ◆ SSH ◆ SSL ◆ TCP (default protocol) ◆ TCP AES ◆ Telnet
TCP Keep Alive	Enter the time, in milliseconds, the SGX 5150 waits during a silent TCP connection before checking if the currently connected network device is still on the network. If the unit gets no response after 1 attempt, it drops the connection. Enter 0 to disable. Blank the display field to restore the default.
Initial Send	Enter the **Initial Send** data to be sent out the network upon connection establishment before any data from the Line. It may contain one or more **Directives** of the form `%<char>`. The Initial Send string can be entered in **Text** or **Binary** form. The Binary form allows square braces `[ ]` to enclose one or more character designations separated by commas. Use straight decimal numbers up to 255 or hexadecimal numbers prefixed with `0x` up to `0xFF` within the square braces. To specify an open brace in binary mode, use two in a row. Example (in Binary mode): `AB[255,0xFF]C[[D]` Results in a string containing binary values where the dots appear: `AB··C[D]` **Directives** ◆ `%i` local IP address ◆ `%m` MAC address ◆ `%n` network interface name ◆ `%p` local port ◆ `%s` serial number ◆ `%%` %
Flush Serial	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*)

Tunnel Accept Mode Settings (continued)	Description
Block Serial	Set whether Block Serial 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 on 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 networkare sent on into 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.
Email on Connect	Select an email profile number to which an email notification will be sent upon the establishment of an accept mode tunnel.
Email on Disconnect	Select an email profile number to which an email notification will be sent upon the disconnection of an accept mode tunnel.

To Configure Tunnel Accept Mode Settings

Using Web Manager

- To configure the Accept Mode for a specific tunnel, on the **Administration** page, click **Tunnel > Tunnel 1 > Accept Mode**.

Using the CLI

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

Using XML

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

Connect Mode

In Connect Mode, the SGX 5150 continues to attempt an outgoing connection on the network, until established (based on which connection method is selected in the configuration described in *Table 9-46*). If the connection attempt fails or the connection drops, then it retries after a timeout. The remote node on the network must listen for the Connect Mode's connection.

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

remote station as an IPv4 or IPv6 address or DNS name. The SGX 5150 will not make a connection unless it can resolve the address. For Connect Mode using UDP, the SGX 5150 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. Telnet protocol is not supported in Tunnels on USB interfaces. 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.*

Table 9-46 Tunnel Connect Mode Settings

Tunnel Connect Mode Settings	Description
Mode	Set the method to be used to attempt a connection to a remote host or device. Choices are: ◆ **Disable** = an outgoing connection is never attempted. (*default*) ◆ **Always** = a connection is attempted until one is made. If the connection gets disconnected, the device retries until it makes a connection. ◆ **Any Character** = a connection is attempted when any character is read on the serial line. ◆ **Start Character** = a connection is attempted when the start character for the selected tunnel is read on the serial line. ◆ **Modem Control Asserted** = a connection is attempted as long as the Modem Control pin (DSR) is asserted, until a connection is made. ◆ **Modem Emulation** = a connection is attempted when triggered by modem emulation AT commands.
Local Port	Enter an alternative Local Port. The Local Port is set to <Random> by default but can be overridden. Blank the field to restore the default.
Host 1	Click on the displayed information to expand it for editing. Complete the Host fields that appear according to *Table 9-47*. If <None> is displayed, clicking it will allow you to configure a new host. At least one Host is required to enable Connect Mode as this information is necessary to connect to that host. Once you start to edit Host 1, a box for Host 2 will show up. Editing Host 2 will cause a Host 3 box to appear. Up to 32 hosts are available.
Reconnect Timer	Set 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 Data	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 Serial	Set whether Block Serial 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 on into the network. Any buffered characters are sent first.

Tunnel Connect Mode Settings (continued)	Description
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 into the Serial Line. Any buffered characters are sent first.
Email on Connect	Select an email profile number to which an email notification will be sent upon the establishment of an accept mode tunnel.
Email of Disconnect	Select an email profile number to which an email notification will be sent upon the disconnection of an accept mode tunnel.

Table 9-47 Host Settings

Host Field	Description
Address	Enter the address for the remote host connection. Either a DNS address or an IP address maybe provided.
Port	Designate the TCP or UDP port on the remote host for connection.
Protocol	Select the desired security protocol. SSH is recommended for circumstances with high security concerns. When using SSH, both the SSH server host keys and the SSH server authorized users must be configured.
SSH Username	Enter a Username. This configuration field becomes available when the SSH Protocol is selected.
Validate Certificate	Select to enable or disable. This configuration field becomes available when the SSL protocol is selected.
TCP Keep Alive	Specify the amount of time to wait before Keep Alive probe is sent to the remote host in order to keep the TCP connection up during idle transfer periods. Set to 0 to disable and blank the display field to restore the default.
TCP User Timeout	Specify the amount of time the TCP segments will be retransmitted before the connection is closed.
AES Encrypt Key	Enter the AES Encrypt Key and select **Text** or **Hexadecimal** to indicate format. This configuration field becomes available when the TCP AES or UDP AES protocol is selected.
AES Decrypt Key	Enter the AES Decrypt Key and select **Text** or **Hexadecimal** to indicate format. This configuration field becomes available when the TCP AES or UDP AES protocol is selected.
Initial Send	Enter the Initial Send character and select either **Text** or **Binary** format. This configuration field becomes available when the SSH, TCP, UDP, or UDP AES protocol is selected.

Notes:

- *If the keep alive time expires, the user timeout is expired, and there are probes in flight, the connection will be reset. For this reason, it is recommended that if keep alive is used in conjunction with the user timeout, the keep alive timeouts be larger than the user timeout. If it is smaller, what will typically be seen is that the initial probe will be sent, then at the interval where the next probe would normally be sent, the connection will be reset, with no additional probes sent. Also note that in these cases: if the keep*

alive timer is significantly smaller than the user timeout, probes will continue to be sent for an unreachable host until the user timeout expires.

- *If there is data in flight when the TCP retransmission timeout kicks in, the user timeout is checked as a limiting condition only when the timer expirations would normally be checked during RTO handling. In other words, the user timeout will not be an exact limit; in practice, it will always take somewhat longer for the connection to be closed. The longer the user timeout is, the more likely it will expire between exponentially slower retransmissions, and the connection will not experience an error until the next retransmission timeout is checked. Also note that the user timeout expiration during retransmission returns an error to the application; it does not automatically reset the connection as happens with keep alive timeout. It is up to the application (e.g., tunneling) to close the connection (this happens almost immediately with tunneling).*

To Configure Tunnel Connect Mode Settings

Using Web Manager

- To configure the Connect Mode for a specific tunnel, on the **Administration** page, click **Tunnel > Tunnel 1 > Connect Mode**.

Using the CLI

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

Using XML

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

Connecting Multiple Hosts

If more than one host is configured, a **Host Mode** option appears. Host Mode controls how multiple hosts will be accessed. For the SGX 5150, the Connect Mode supports up to 32 hosts. Hosts may be accessed sequentially or simultaneously:

- **Sequential** – Sequential host lists establish a prioritized list of tunnels. The host specified as Host 1 will be attempted first. If that fails, it will proceed to Host 2, 3, etc, in the order they are specified. When a connection drops, the cycle starts again with Host 1 and proceeds in order. Establishing the host order is accomplished with host list promotion (see *Host List Promotion on page 119*). Sequential is the default Host Mode.
- **Simultaneous** – A tunnel will connect to all hosts accepting a connection. Simultaneous connections occur at the same time to all listed hosts. The device can support a maximum of 64 total aggregate connections.

Host List Promotion

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

To promote a specific Host:

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

Disconnect Mode

Specifies the optional conditions for disconnecting any Accept Mode or Connect Mode connection that may be established. If any of these conditions are selected but do not occur and the network disconnects to 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 disconnected host. The device can support a maximum of 64 total aggregate connections.

Table 9-48 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>`.
Modem Control	Set whether Modem Control enables disconnect when the Modem Control pin is not asserted on the Serial Line. Choices are: ◆ **Enabled** ◆ **Disabled** (default)
Timeout	Enter the number of milliseconds a tunnel may be idle before disconnection. The value of zero disables the idle timeout.
Flush Serial Data	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, on the **Administration** page, click **Tunnel > Tunnel 1 > Disconnect Mode**.

Using the CLI

- To enter the Tunnel 1 Disconnect command level: `enable > tunnel 1 > disconnect`

Using XML

- Include in your file: `<configgroup name=”tunnel disconnect” instance=”1”>`

Modem Emulation

Some older equipment is designed to attach to a serial port and dial into a network with a modem. This equipment uses AT commands to control the connection. For compatibility with these older devices on modern networks, the SGX 5150 mimics the behavior of the modem.

Table 9-49 Tunnel Modem Emulation Settings

Tunnel Modem Emulation Settings	Description
Echo Pluses	Set whether the pluses will be echoed back during a “pause +++ pause” escape sequence on the Serial Line. Choices are: ◆ **Enabled** ◆ **Disabled** (default)
Echo Commands	Set whether characters read on the Serial Line will be echoed, while the Line is in Modem Command Mode. Choices are: ◆ **Enabled** ◆ **Disabled** (default)
Verbose Response	Set whether Modem Response Codes are sent out on the Serial Line. Choices are: ◆ **Enabled** ◆ **Disabled** (default)
Response Type	Select a representation for the Modem Response Codes sent out on the Serial Line. Choices are: ◆ **Text** (ATV1) (default) ◆ **Numeric** (ATV0)
Error Unknown Commands	Set whether the Error Unknown Commands is enabled (ATU0) and ERROR is returned on the Serial Line for unrecognized AT commands. Otherwise (ATU1) OK is returned for unrecognized AT commands. Choices are: ◆ **Enabled** ◆ **Disabled** (default)
Incoming Connection	Set how and if requests are answered after an incoming RING (ATS0=2). Choices are: ◆ **Disabled** (default) ◆ **Automatic** ◆ **Manual**
Connect String	Enter the customized Connect String sent to the Serial Line with the Connect Modem Response Code.
Display Remote IP	Set whether the Display Remote IP is enabled so that the incoming RING sent on the Serial Line is followed by the IP address of the caller. Choices are: ◆ **Enabled** ◆ **Disabled** (default)

To Configure Tunnel Modem Emulation Settings

Using Web Manager

- To configure the Modem Emulation for a specific tunnel, on the **Administration** page, click **Tunnel > Tunnel 1 > Modem Emulation**.

Using the CLI

- To enter the Tunnel 1 Modem command level: `enable > tunnel 1 > modem`

Using XML

- Include in your file: `<configgroup name=”tunnel modem” instance=”1”>`

User Management

This page displays the configuration of users. The Admin Password is used for initial login access from the Telnet port, SSH port, FTP, HTTP, and serial line.

To Change the User Admin Password

Using Web Manager

1. In the Web Manager, click the **Administration** tab.
2. Click **User Management**.
3. In the **Admin Password** field, enter the desired password. The default password is **PASS**.
4. Clicking the **Show Password** checkbox allows you to see the existing password. Unchecking this checkbox will hide the password.
5. Click **Submit**.

Using the CLI

- To enter the User Management command level: `enable > config > user management`

Using XML

- Include in your file: `<configgroup name="user management">`

XML

This page is used to clone the current system configuration. The generated file can be imported at a later time to restore the configuration.

Caution: ***The 'User Management', 'WLAN Profile', 'HTTP Authentication', Access Point, and SSL groups must be imported with secrets manually filled in (e.g., passwords and private key) before import.***

The exported file can be modified and imported to update the configuration on this device or another.

The clone file can be exported to the browser window. XML records can also be exported to browser window or to a download link on the device.

Notice that by default, all Groups to Export are checked except some pertaining to the network configuration; this is so that if you later 'paste' the entire clone configuration, it will not break your network connectivity. You may check or uncheck any group to include or omit that group from export.

Selection of Lines to Export filters instances to be exported are in the line, relay, serial, terminal, and groups.

To Export Configuration

By default, all settings groups are checked.

Using Web Manager

1. In the Web Manager, click the **Administration** tab.
2. Click **XML**.
3. Click **Export Configuration**.
4. Select where to send exported status information:
   - **Export to browser** sends the information into a separate web window which appears.
   - **Export to local file** sends information into a new locally saved file. A file name must be specified in field provided if this option is selected.
5. Select **Download (from link)** to download this content as a file, or click **Export to browser** to open a web browser with this content.
6. To include descriptive comments in the XML file, check **Comments**.
7. For **Lines to Export**, check the lines and/or the network that you want to export to the XML configuration file.
   - Clicking the **Clear All** button will uncheck all checkboxes.
   - Clicking the **Select All** button will check all checkboxes.
8. Click the desired **Groups to Export**. Several checkboxes are available.
   - Clicking the **Clear All** button will uncheck all checkboxes.
   - Clicking the **Select All but Networking** button will check all checkboxes except `Interface:etho, Bridge:br0 and Interface:wlan0.`

     Note: *Ensure that the group list is comma delimited and encased in double-quotes. To view the list of available groups, type* ***xcr list****.*
9. Click **Export**.

Note: *Though keys are not exported with XML objects and variables, there is a placeholder value included in the XML variable that would need to be populated with the correct key value when using an exported configuration for an import operation.*

Using the CLI

- To enter the XML command level: `enable > xml`

Using XML

- Include in your file: `<configgroup name="xml">`

To Export Status

You can export the current status in XML format. By default, all groups are exported, or you can select a subset of groups to export.

Using Web Manager

1. In the Web Manager, click the **Administration** tab.
2. Click **XML**.

3. Click **Export Status**.
4. Select where to send exported status information:
   - **Export to browser** sends the information into a separate web window which appears.
   - **Export to local file** sends information into a new locally saved file. A file name must be specified in field provided if this option is selected.
5. For **Lines to Export**, check the lines and/or the network that you want to export to the XML configuration file.
   - Clicking the **Clear All** button will uncheck all checkboxes.
   - Clicking the **Select All** button will check all checkboxes.
6. Click the desired **Groups to Export**. Several checkboxes are available.
   - Clicking the **Clear All** button will uncheck all checkboxes.
   - Clicking the **Select All** button will check all checkboxes.

Notes:

- *Ensure that the group list is comma delimited and encased in double-quotes.*
- *To view the list of available groups, type **xcr list**.*

7. Click **Export**.

Using the CLI

- To enter the XML command level: `enable > xml`

Using XML

- Include in your file: `<configgroup name="xml">`

To Import Configuration

To import system XML configuration file that you saved previously, use Import Configuration.

Using Web Manager

1. In the Web Manager, click the **Administration** tab.
2. Click **XML**.
3. Click **Import Configuration**.
4. Select where to import configuration information:
   - **Configuration from External file** picks up all the settings from the external file. For this option, click **Browse...** to locate and select the XML configuration file that you wish to import. The name of the file will appear in the Web Manager screen. Click **Import**.
   - **Configuration from Filesystem** picks up settings from the selected Groups, Lines and Instances. Make selections in form which appears (see *Table 9-50*) and click **Import**.
   - **Line(s) from single line Settings on the Filesystem** copies lines settings from an the input file containing only one Line instance to all of the selected Lines. Make selections in form which appears (see *Table 9-51*) and click **Import**.

Using the CLI

- To enter the XML command level: `enable > xml`

Using XML

- Include in your file: `<configgroup name="xml import control">`

Table 9-50 Configuration from Filesystem

Setting	Description
Filename	Enter the name of the file on the SGX 5150 unit (local to its filesystem) that contains XCR data.
Lines to Import	Select filter instances to be imported in the line, serial, tunnel and terminal groups. This affects both Whole Groups to Import and Text List selections. Click **Clear All** to clear all checkmarks, or **Select All** to check all checkmarks.
Whole Groups to Import	Select the configuration groups to import from the XML configuration record. This option imports all instances of each selected group. Click **Clear All** to clear all checkmarks, or **Select All but Networking** to check all checkmarks except Networking.
Text List	Enter the string to import specific instances of a group. The textual format of this string is: `<g>:<i>;<g>:<i>;...` Each group name <g> is followed by a colon and the instance value <i> and each <g>:<i> value is separated by a semi-colon. If a group has no instance then only the group name <g> should be specified.
Import (button)	Click the **Import** button when the Configuration from Filesystem fields are completed above.

Table 9-51 **Line(s) from single line Settings on the Filesystem**

Setting	Description
Filename	Enter the name of the file on the SGX 5150 unit (local to its filesystem) that contains XCR data.
Lines to Import	Select filter instances to be imported in the line, serial, tunnel and terminal groups. This affects both Whole Groups to Import and Text List selections. Click **Clear All** to clear all checkmarks, or **Select All** to check all checkmarks.
Whole Groups to Import	Select the configuration groups to import from the XML configuration record. This option imports all instances of each selected group. Click **Clear All** to clear all checkmarks, or **Select All but Networking** to check all checkmarks except Networking.
Import (button)	Click the **Import** button when the Line(s) from single line Settings on the Filesystem fields are completed above.

Quick Setup

Quick Setup provides a place to configure all basic settings in one place. You may access Quick Setup through the Administration menu or whenever you reset your system to factory defaults.

Note: *The SGX 5150 IoT Device Gateway Quick Start Guide provides for instructions on accessing Web Manager via SoftAP (go to www.lantronix.com/support/documentation).*

To Utilize Quick Setup

Using Web Manager

1. In the Web Manager, click the **Administration** tab.
2. Click **Quick Setup**.
3. Click **OK** in the verification window which appears.
4. Update the Quick Setup information below:

Table 9-52 Bridge 1 (br0) Configuration

Setting	Description
State	Select to enable or disable the state
Transparent Mode	Select to enable or disable the transparent mode.
Ethernet Interface	Select the desired interface: eth0 or usb0
Bridging MAC Address	Enter the bridging MAC address
Bridging IP Address	Enter the bridging IP address
Auto Detect IPv4 Address	Check the radio button to enable it. If checked, the device will attempt to learn the IP Address by using the source or destination IP address of packets arriving on the Ethernet interface. This may affect the performance of running processes during the learning phase.
Bridging IP Address	Select to enable or disable autodetection of the IPv4 address.
Bridging IPv6 Address	Enter the bridging IPv6 address

Table 9-53 Wi-Fi Protected Setup

Setting	Description
WPS (PBC)	Click this button for push button connect.
WPS (PIN)	Click this button for pin hole connect.

Table 9-54 Current Configuration

Setting	Description
Network Name (SSID)	View existing network name/SSID, if any.
State	Select to enable or disable the state
IPv4 State	Select to enable or disable the state
DHCP Client	Select to turn on or off
IPv6 State	Select to enable or disable the state
IPv6 DHCP Client	Select to turn on or off
IPv6 Auto Configuration	Select to turn on or off

Table 9-55 Available Networks

Setting	Description
Refresh scan results every 60 seconds	Check this checkbox and click **Scan** to scan available networks every 60 seconds. Scroll through list of available networks listed, as desired.

5. Click **Clear** at any time to clear all fields of choices made (if any). The **Clear** button will only appear when changes have been made to fields above.
6. Click **Manual Setup** to return to the Status page where you may make changes directly in the configuration pages accessible through the **Network**, **Diagnostic** and **Administration** tabs.
7. Click **Submit** to submit configuration choices on the Quick Setup page.

Using the CLI

- Not applicable.

Using XML

- Not applicable.

A: Lantronix Technical Support

Lantronix offers many resources to support our customers and products at http://www.lantronix.com/support. For instance, you can ask a question, find firmware downloads, access the FTP site and search through tutorials. At this site you can also find FAQs, bulletins, warranty information, extended support services and product documentation.

To contact technical support or sales, look up your local office at http://www.lantronix.com/about/contact.html. When you report a problem, please provide the following information:

- Your name, company name, address, and phone number
- Lantronix product and model number
- Lantronix MAC address or serial number
- Firmware version and current configuration
- 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).

B: Compliance

(According to ISO/IEC Guide and EN 45014)

Manufacturer's Name & Address:

Lantronix, Inc. 7535 Irvine Center Drive, Suite 100, Irvine, CA 92618 USA

Product Name Model:

SGX 5150 IoT Device Gateway

Conforms to the following standards or other normative documents:

Safety

- UL 60950-1, 2nd Edition, 2011-12-19
  (Information Technology Equipment - Safety - Part 1: General Requirements)
- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
- CSA C22.2 No. 60950-1-07, 1st Edition, 2011-12
  (Information Technology Equipment - Safety - Part 1: General Requirements)
- VCCI

Emissions

- CFR Title 47 FCC Part 15, Subpart B, Class B Emissions
- EN55022: 2010, Class B Emissions
- CISPR 22: 2009, Class B Emissions
- VCCI V-3: 2015.04

Immunity

- EN55024: 2010
- EN610000-4-2: 2009
- EN61000-4-3: 2006 + A1: 2008 + A2: 2010
- EN61000-4-4: 2004
- EN61000-4-5: 2005
- EN61000-4-6: 2009
- EN61000-4-8: 2010
- EN61000-4-11: 2004
- CISPR 16-1-4: 2008
- ICES-0003 Issue 6

Table B-1 Country Transmitter IDs

Country	Specification
USA FCC ID	R68PW2050
Canada IC ID	3867A-PW2050
Mexico	RCPLAPW15-2109
Japan ID	201-152843

Manufacturer's Contact:

Lantronix, Inc.
7535 Irvine Center Drive
Suite 100
Irvine, CA 92618 USA
Tel: 949-453-3990
Fax: 949-453-3995

RoHS, REACH and WEEE Compliance Statement

Please visit http://www.lantronix.com/legal/rohs/ for Lantronix's statement about RoHS, REACH and WEEE compliance.