



CalAmp Sentry 4G 2500™

2.5 GHZ

802.16-2005 SUBSCRIBER STATION BROADBAND ROUTER

User Manual
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1. PREFACE

1.1 Copyright Notice

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This manual covers the operation of the Sentry4G 2500 router. Specifications described are typical only and are subject to normal manufacturing and service tolerances.

CalAmp reserves the right to modify the equipment, its specifications or this manual without prior notice, in the interest of improving performance, reliability, or servicing. At the time of publication all data is correct for the operation of the equipment at the voltage and/or temperature referred to. Performance data indicates typical values related to the particular product.

No part of this documentation or information supplied may be divulged to any third party without the express written consent of CalAmp Corp.

Products offered may contain software which is proprietary to CalAmp Corp. The offer or supply of these products and services does not include or infer any transfer of ownership.

1.2 Router Use

The Sentry 4G 2500™ is designed and intended for use in fixed, nomadic, or mobile applications. "Fixed" assumes the device is physically secured at one location and not easily moved to another location." Nomadic" assumes the unit is installed in a vehicle but is operated when the vehicle is stationary. "Mobile" assumes the unit is physically secured in a vehicle and is operated when the vehicle is moving. The Sentry 4G router supports full mobility.

1.3 Interference Issues

Avoid possible radio frequency (RF) interference by following these guidelines:

- Do not operate in the vicinity of gasoline or diesel-fuel pumps unless use has been approved and authorized.
- Do not operate in locations where medical equipment that the device could interfere with may be in use.
- Do not operate in fuel depots, chemical plants, or blasting areas unless use has been approved and authorized.
- Use care if operating in the vicinity of protected personal medical devices, i.e., hearing aids and pacemakers.
- Operation in the presence of other electronic equipment may cause interference if equipment is incorrectly protected. Follow recommendations for installation from equipment manufacturers.

1.4 Mobile Application Safety

- Road safety is crucial. Do not change parameters or perform other maintenance of the Sentry 4G while driving.
- Avoid potential interference with vehicle electronics by correctly installing the Sentry 4G router. CalAmp Corp recommends installation by a professional.

1.5 FCC Notification

This device complies with part 27 of the FCC rules.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

Caution pertaining to the 4G output terminals:

This device is subject to different restrictions whether it is operated as a mobile terminal or as a fixed station. When this device is operated as mobile subscriber equipment, the peak equivalent isotropically radiated power (EIRP) shall not exceed 2 watts. As the default maximum conducted output power of the device is near the allowed 2 Watts, it is required that this maximum power be reduced by a ratio corresponding to the gain of the antenna used. For example if the 4G antennas installed have a 5 dBi gain, the output power shall be reduced by the equivalent 5 dB, making the conducted maximum output power 0.63 Watt at the most.

When the device is operated as a fixed station, the antenna gain shall be such that the EIRP is limited to 40 Watts.

This configuration shall be executed by a professional installer.

2. PRODUCT OVERVIEW

2.1 General Description

The Sentry 4G 2500™ from CalAmp provides high-speed, long-range 802.16-2005 compliant connectivity in the licensed 2.5 GHz band. Based on industrial grade IEEE 802.16-2005 technology, it features extensive routing capabilities with an easy-to-use interface and comprehensive remote management. Built-in GPS, two Ethernet ports, an optional 802.11b/g access point and a 3G module allows connectivity in the office or on the road.

Ensuring the protection of even the most sensitive data, Sentry 4G combines built-in standard 802.16-2005 encryption services such as TKIP/AES and EAP-TTLS supplicant. Not only versatile and secure, its rugged enclosure withstands even the harshest conditions with an extended temperature range.

2.2 Features

- 4G Subscriber station broadband router based on IEEE 802.16-2005 technology
- Secure data access with 802.16-2005 encryption services such as TKIP/AES
- Fast handover for real time applications with no service degradation
- Superior RF performance with MIMO capabilities
- AVL support through integrated GPS with local remote NMEA data
- Optional integrated 802.11 b/g local wireless connectivity (WiFi IEEE 802.11b/g 2.4GHz)
- Optional 3G cellular carrier module (EVDO Rev A with backward compatibility to EVDO Rev 0 and CDMA 1xRTT).
- Built-in WiFi client and access point
- Embedded Linux (with support for custom applications) on PowerPC processor
- Built-in DHCP server and NAT support
- Browser-based management
- Local and remote configuration
- Two (2) 10/100 Ethernet interfaces
- I/O capability

2.3 External Interfaces

2.3.1 Front Panel Connections



Figure 1 – Sentry 4G Router Front Panel

Sentry 4G front panel connections include:

TRX: Two TNC female, Transmit/Receive antenna connections. See section 2.6 “Antenna options” for more information.

WiFi: RP-SMA jack, WiFi antenna. See section 2.6 “Antenna options” for more information.

3G: SMA jack, cellular antenna. See section 2.6 “Antenna options” for more information.

ETH0 and ETH1: Inputs for standard or crossover Ethernet cable

GPS: SMA female, GPS antenna connector. This input requires a 3.3V, GPS antenna with an SMA connection. For best coverage, use an active GPS antenna with a gain between 10 and 30 dB.

USB: USB A Female connector. Reserved for future use.

Console: 3-wire serial in a USB Mini B female form factor (requires a custom USB Mini B to EIA-232-F DB9 cable) for debugging and maintenance only.

PWR: 10-30 VDC; the mating connector is a Weidmuller 1615800000 connector.

2.3.2 LEDs

There are nine LEDs on the front panel of the Sentry 4G unit. Each (except the Ethernet LEDs) can display three colors: Red, Green, and Amber. The definition for each LED is as follows:

Table 1 - LED Definitions

INDICATOR	OFF	SOLID GREEN	FLASHING GREEN	SOLID AMBER	FLASHING AMBER	SOLID RED	FLASHING RED
PWR (Power)	No Power	Power on App.Running	Test Mode	Hardware Power up Sequence	Software boot sequence	Power Supply Fault	N/A
STAT (Status)	No Power	Status Normal	N/A	Warning	Factory Defaults	Fault	N/A
GPS	GPS	Position Fix	1PPS	No	Acquiring	Fault	N/A

	Disabled	Acquired	Activity	Satellites in View	Satellites		
3G (WWAN)	I/F Disabled	Connected	RX/TX Activity	Failed to establish connection	Establishing Connection	Fault	N/A
4G (WWAN)	I/F Disabled	Connected	RX/TX Activity	Failed to establish connection	Establishing Connection	Fault	N/A
WiFi (client)	N/A	Connected	RX/TX Activity	Failed to establish connection	Establishing Connection	Fault	N/A
WiFi (Access Point)	IF/Disabled	Ready	RX/TX Activity	N/A	N/A	Fault	N/A
ETH0	No link	100mbps link	RX/TX Activity	10 mbps link	N/A	N/A	N/A
ETH1	No activity	N/A	RX/TX Activity	N/A	N/A	N/A	N/A

2.4 RJ-45 Ethernet Port Integration Parameters

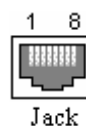
Table 2 below provides the information to purchase Ethernet cables to integrate the Sentry 4G product into your system.

Note:

The Sentry 4G unit can accept either a standard or cross over Ethernet cable. A standard Ethernet cable is one that has matching pin assignments on both ends (T568A or T568B), while a cross over Ethernet cable is one that has a T568A termination on one end and T568B on the other.

Table 2 - Standard RJ-45 Ethernet Pin-outs

Pin	Function	T568A	T568B
1	TX +	White/Green	White/Orange
2	TX -	Solid Green	Solid Orange
3	RX +	White/Orange	White/Green
4		Solid Blue	Solid Blue
5		White/Blue	White/Blue
6	RX -	Solid Orange	Solid Green
7		White/Brown	White/Brown
8		Solid Brown	Solid Brown



2.5 Power Cable Connections

If using the provided power cable to connect to a DC supply (car battery) use the following diagrams and table to connect the unit.

Note: Both ignition sense and DC power are required to start up a Sentry 4G unit.

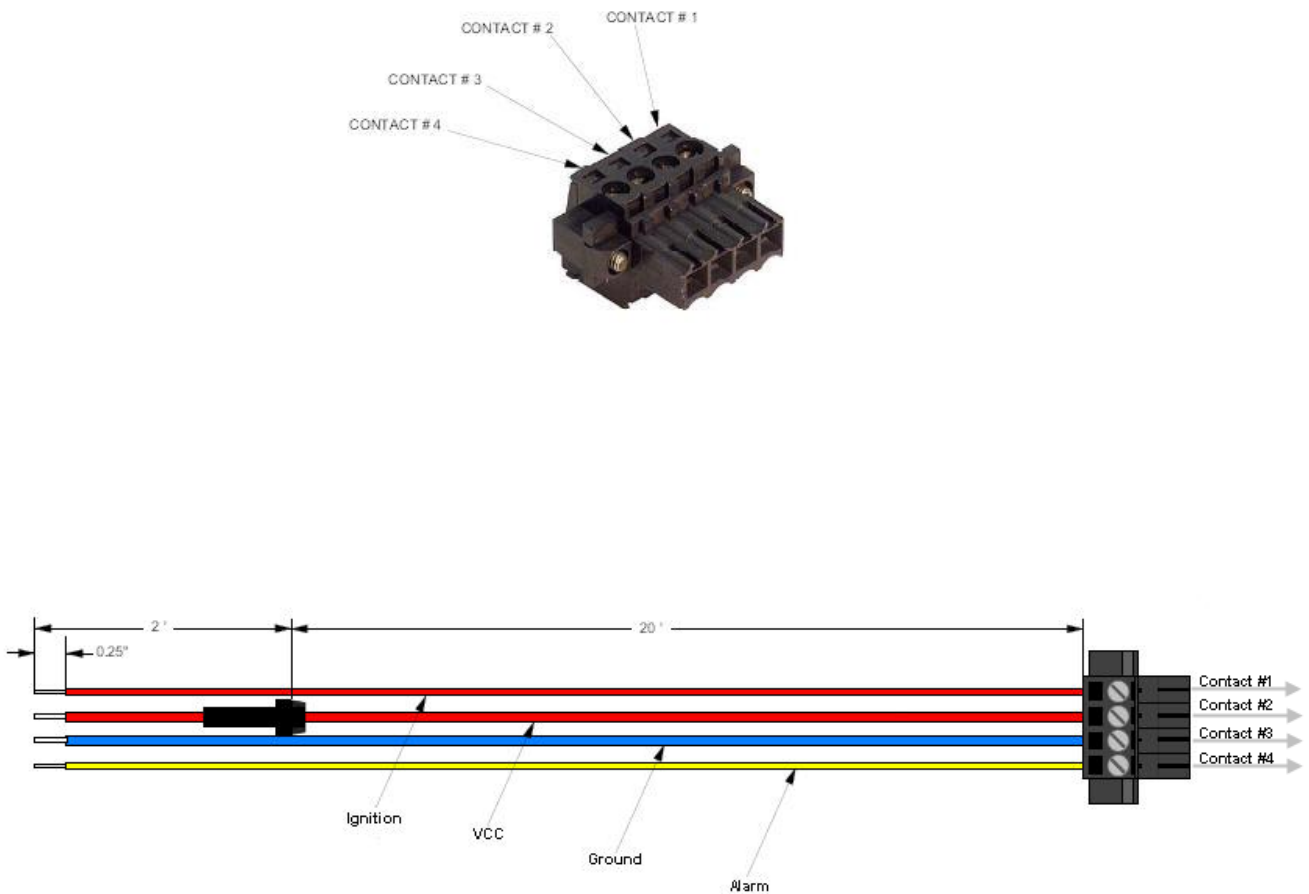


Figure 2 – Sentry 4G Power Cable Connections

Table 3 - Power supply connections

Pin	Color	Description
1	Thin Red	Ignition Sense
2	Red	DC Power, 10 to 30V DC
3	Blue	Ground
4	Yellow	Officer down alarm

If connection to an AC supply is desired, an AC/12VDC power supply and cable are available.

2.6 Antenna Options

Antennas are available for Sentry 4G routers installations from CalAmp Corp.

2.6.1 4G Transmit/Receive Antennas (MAIN-AUX)

The primary antenna connections on the Sentry 4G unit are TNC female connectors; therefore you must purchase antennas with TNC male connectors. Do not select TNC antennas with “reverse polarity” or RP-Male. Mounting options and cable lengths are the user’s choice and application specific.

Recommended antenna:

Manufacturer	Model Number	Antenna Type	Gain
PCTEL	BMAXC233805	Perm. Mount	5 dBi

If the Sentry unit is operated as a mobile terminal, the output power shall be reduced by a ratio corresponding to the antenna gain. For instance, if the recommended antenna is used, the gain shall be reduced by 5 dB. The antenna installation must be done by a professional.

2.6.2 GPS Antenna

The Sentry 4G router’s GPS connector requires an external 3.3V GPS antenna. The GPS antenna connection on the Sentry 4G product is a female SMA connector; therefore an antenna with an SMA male connector is required. For best coverage, use an active antenna with a gain between 10 and 30 dB. Mounting options and cable lengths are user’s choice and application specific.

Recommended Antenna:

Manufacturer	Model Number	Antenna type	Gain
PCTEL	AGPSPH16MM	Mag. Mount	4 dBiC

2.6.3 WiFi Antennas

The WiFi antenna connections on the Sentry 4G product are RP-SMA jacks; therefore antennas with an RP-SMA plug are required. Mounting options and cable lengths are user’s choice and application specific.

Industry Canada RSS Notices:

This device has been designed to operate with the antennas listed below, and having a maximum gain of 5.5 dBi. Antennas not included in this list or having a gain greater than 5.5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50Ω.

Manufacturer	Model Number	Antenna Type	Gain
PCTEL	BMMG24005ML195RPMSMA	Mag. Mount	5 dBi

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication.

2.6.4 3G Antennas

The cellular (3G) antenna connections on the Sentry 4G product are SMA female jacks; therefore, antennas with an SMA male connector are required. Mounting options and cable lengths are user's choice and application specific.

Recommended Antenna:

Manufacturer	Model Number	Antenna type	Gain
PCTEL	ASPRDM1994S	Mag. Mount	3 dBd

2.6.5 Antenna Spacing

For proper operation and rule compliance, it is requested that all antennas be installed in such a fashion that any antenna be at least 20 cm from the closest neighboring antenna. This requirement holds for WiMAX, 3G, WiFi and GPS antennas.

3. Networking basics

3.1 General Networking Definitions

The Sentry 4G router is based on Ethernet connectivity and follows general IP networking guidelines and terminology. Below are definitions of some basic network terminology as they pertain to the Sentry 4G environment.

Term	Definition
BTS	Base Transceiver Station, fixed equipment that incorporates all radio-intelligence functions controlling the 802.16-2005 link with one or more Sentry 4G routers.
CINR	Carrier to Interference-plus-Noise Ratio, expressed in decibels (dBs), is a measurement of signal effectiveness. It provides information on how strong the desired signal is compared to the unwanted energy (interference plus noise).
DNS	Domain Name System: operates like a phone book to translate domain names (i.e., google.com) to IP addresses (70.212.19.1). The Sentry 4G unit functions as the DNS Server in the network.
DHCP	Dynamic Host Configuration Protocol: the DHCP server assigns IP addresses, gateway and subnet masks to all clients on the network. The Sentry 4G unit functions as a DHCP Server.
Dynamic/Static IP	A device with Dynamic IP selected may have a different IP address every time it connects to the network. A device with a Static IP will always connect with the same IP address.
EAP-TTLS (Extensible Authentication Protocol-Tunneled Transport Layer Security)	A universal authentication framework frequently used in wireless networks and Point-to-Point connections. EAP-TTLS is an EAP method that encapsulates a TLS session, consisting of a handshake phase and a data phase. During the handshake phase, the server is authenticated to the client using standard TLS procedures, and keying material is generated in order to create a cryptographically secure tunnel for information exchange in the subsequent data phase. During the data phase, the client is authenticated to the server using an arbitrary authentication mechanism encapsulated within the secure tunnel.
Gateway	A (node) device enabling data transfer between different networks (i.e., from a private LAN to a public WAN).
LAN	Local Area Network. A private network.
MIMO	Multiple Input Multiple Output. MIMO algorithms send information out over two or more antennas; the information is received via multiple antennas as well. This use of multiple antennas at both the transmitter and receiver provides a significant capacity gain over conventional single antenna systems and/or a more reliable communication.
NAT	Network Address Translation: A technology that allows hosts on the LAN with private IP addresses to communicate with public IP addresses on the WAN. This is an essential function of a network router.
OFDM	Orthogonal Frequency Division Multiplexing. 802.16-2005 being a wide area network is very sensitive to interference and multi-path fading. OFDM addresses these problems by partitioning the data stream into multiple narrowband transmissions in the frequency domain using subcarriers that are orthogonal to one another (do not interfere). These subcarriers are then reassembled for over-the-air retransmission.
OFDMA	Orthogonal Frequency Division Multiple Access. Allows OFDM to serve many terminals. Each terminal will be assigned a subset of the subcarrier set for a

	given time interval.
Port	A special number present in the header of a data packet in the data transfer process. Ports are typically used to map data to a particular process running on a computer.
PPP	Point-to-point Protocol: creating a direct link between two nodes in network communication.
Private IP address	Private IP addresses are addresses that will not be routed on external networks. Any device on an internal LAN should be assigned a private IP address to avoid contention. The suggested private address ranges are Class A: 10.x.x.x Class B: 172.16.x.x through 172.31.x.x Class C: 192.168.x.x By default the Sentry 4G unit uses the 192.168.1.x address range.
RIP	Routing Information Protocol, protocol that helps routers dynamically adapt to changes of network connections by communicating information about which networks each router can reach and how far away those networks are.
SOFDMA	Scalable OFDMA. With bandwidth scalability, Mobile 802.16-2005 technology can comply with various channel assignments.
SSID	Service Set Identifier. This is a name used to identify a WiFi wireless network.
Subnet	A range of addresses assigned to a LAN. All devices connected in a Sentry 4G network must be on the same subnet as the Sentry 4G routers.
Subnet Mask	Binary string that separates the subnet portion of an IP address and the host portion.
TKIP/AES	"Temporal Key Integrity Protocol" is an encryption method used by the WiFi interface when operating in WPA mode. TKIP was designed to solve security issues in WEP (it is considered stronger than WEP). "Advanced Encryption Standard" is the encryption protocol used by the WiFi interface when it operates in WPA2 mode.
WAN	Wide Area Network, a public network. The Internet is an example of a WAN.
WEP	Wired Equivalent Privacy. This is an IEEE security protocol for wireless 802.11 networks. It is an encryption method used by the WiFi interface.
WiFi (802.11b, 802.11g)	Wireless Fidelity is an IEEE 802.11 standard for wireless LANs →802.11b is a standard for operating at 2.4 GHz frequency with data rates up to 11 Mbps →802.11g is a standard for operating at 2.4 GHz frequency with data rates up to 54 Mbps
WiFi Access Point (802.11)	A Sentry 4G unit can operate in 802.11 access point mode. It can communicate with other devices operating in 802.11 access point mode.
WiFi Client (802.11 Infrastructure mode)	A Sentry 4G unit can operate in 802.11 Infrastructure mode. In this mode it is a WiFi client and will try to connect to a WiFi access point.
WLAN	Wireless Local Area Network, a private network. Refers to the network covered by the WiFi interface.
WPA/WPA2	WiFi Protected Access" is a subset of 802.11i (security mechanisms for wireless networks). "WiFi Protected Access 2" is the complete version of 802.11i.

4. GETTING STARTED

4.1 Package Contents

- Sentry 4G router
- Quick Start Guide
- Power cable
- User Manual and Quick Start Guide on CD
- Mounting Screws

4.2 Setup Requirements

- Sentry 4G router
- Computer running any operating system with a web browser installed such as Microsoft Internet Explorer version 6.0 or later or Firefox version 2.0 or later.
- 10-30V 5-A power supply
- Ethernet cable*
- Two antennas with male TNC connector*
- GPS Antenna (SMA Male) *
- Two WiFi Antennas (RP-SMA Plug) * (if applicable)
- Two cellular (3G) antennas (SMA Plug) * (if applicable)

*These accessories are available from CalAmp.

4.3 Quick Start

4.3.1 Hardware Setup



Figure 3 – Sentry 4G router setup equipment

1. Connect the two Transmit/Receive antennas to the 4G MAIN and AUX TNC connectors on the front of the unit. Connect the GPS antenna to the GPS connector. For units utilizing WiFi, connect the WiFi antennas to the WiFi connectors. For units utilizing 3G, connect the 3G antennas to the 3G connectors.
2. Connect an Ethernet cable from the ETH0 connector of the Sentry 4G unit to the PC. If multiple PCs are being used, connect the Sentry 4G unit to an Ethernet switch or hub connected to the PCs.
3. Connect a power supply cable to the PWR connector of the Sentry 4G unit. Do not power the unit on yet.

4.4 Configuring Local PC

1. Verify network settings on local PC are set to automatically detect IP and DNS server. The path to network settings varies with the version of Windows you are using.
Windows XP: Start-> Control Panel -> Network Connections
Windows 2000: Start -> Settings -> Network and dial up connections
2. Select the appropriate network connection, typically the Local Area Connection -> right click on the connection and select "Properties"
3. Select "Internet Protocol (TCP/IP) properties.

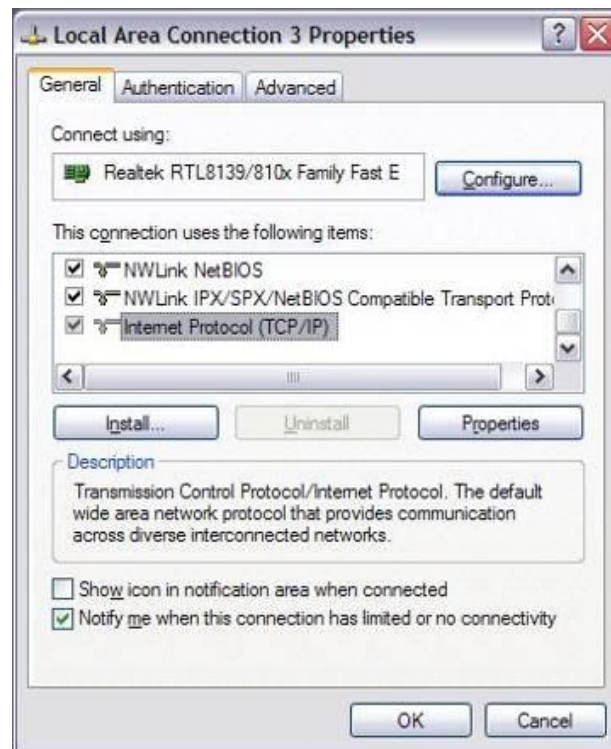


Figure 4 - Local Area Connection Properties (Windows XP)

4. Verify that "Obtain an IP address automatically" and "Obtain DNS Server address automatically" are selected.

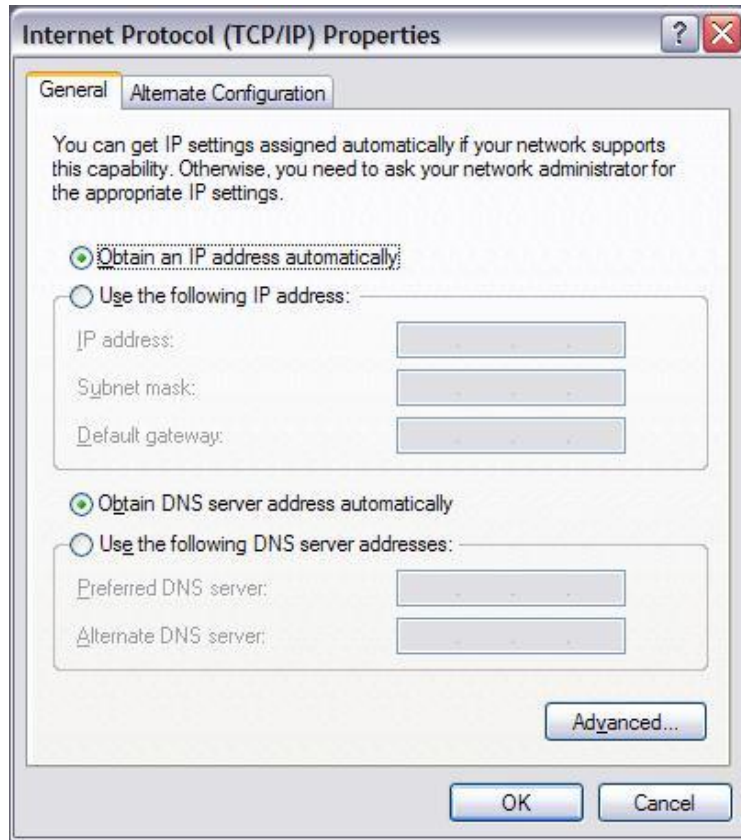


Figure 5 - Internet Protocol (TCP/IP Properties)

4.5 Sentry 4G Router Setup

1. Power on the Sentry 4G router with 10-30VDC power supply.
2. In an Internet browser, enter <http://192.168.1.50>. This will bring up the Sentry 4G product login page (Note: It may take 30 seconds from initial power-up for the homepage to be available.)
3. Login to the device
Default Login values
User logon: *admin*
password: *password*
4. This brings up the Sentry 4G product homepage. You can view status and configuration parameters from this screen. The configuration options are further explained later in this document.

The screenshot displays the web interface of a Cai Amp Sentry 4G Broadband Router. The top navigation bar includes 'HELP', 'HOME', and 'RESET' links. A left-hand menu lists various configuration options such as 'Unit Status', 'General Settings', and network interface settings. The main content area is titled 'Unit Status' and provides detailed information about the router's system and network interfaces.

Unit Status	
System Information	
Unit ID	Test1
Local Time	Fri Apr 16 11:12:51 UTC 2010
System Up Time	1 day, 0 hour, 45 minutes, 32 seconds
Software Version	1.0
ETH0	
Interface Status	Up
IP Address	192.168.97.222
Subnet Mask	255.255.255.0
MAC Address	00:0A:99:80:0C:AD
ETH1	
Interface Status	Up
IP Address	192.168.2.50
Subnet Mask	255.255.255.0
MAC Address	00:0A:99:80:0C:AE
WWAN	
Interface Status	Up
IP Address	172.30.50.51
Subnet Mask	255.255.255.0
MAC Address	04:00:00:00:00:0B
WLAN (Access Point)	
Interface Status	Up
IP Address	192.168.4.50
Subnet Mask	255.255.255.0
MAC Address	00:15:6D:54:68:21
WLAN (Client)	
Interface Status	
IP Address	
Subnet Mask	
MAC Address	--:--:--:--:--:--

Figure 6 – Sentry 4G Router Homepage

5. Sentry 4G Configuration

This section explains status information and configuration options available on all HTML pages.

5.1 General Instructions

The following instructions are common to all HTML pages

The Help, Home and Reset links are located at the top right of all HTML pages.

Help: Select this link on any of the devices configuration pages to bring up the help text for that screen.

Home: Select this link to return to the home page of the router.

Reset: Select this link to command the unit to reboot. This process will take about 40 seconds. The software will ask you to confirm this command prior to re-booting.

Save: Most changes to a configuration parameter require the user to click save before the change will take effect.

Clear/Cancel: Most configuration menus also have a "Clear/Cancel" option. Selecting this button will restore all fields in a section to their last saved value. Note: This does not return them to their factory defaults.

5.2 Home Page Parameters

The Sentry 4G home page lists the unit's primary operating parameters and status. Configuration changes cannot be made from this page.

Unit Status	
System Information	
Unit ID	
Local Time	Thu Sep 24 18:40:03 UTC 2009
System Up Time	4 hours, 23 minutes, 53 seconds
Software Version	1.2
ETH0	
Interface Status	Up
IP Address	192.168.1.50
Subnet Mask	255.255.255.0
MAC Address	00:0A:99:80:06:42
ETH1	
Interface Status	Up
IP Address	172.30.40.100
Subnet Mask	255.255.255.0
MAC Address	00:0A:99:80:06:43
WWAN	
Interface Status	Up
IP Address	192.168.14.50
Subnet Mask	255.255.255.0
MAC Address	00:0A:99:80:06:52
WLAN (Access Point)	
Interface Status	Down
IP Address	192.168.4.50
Subnet Mask	255.255.255.0
MAC Address	--:--:--:--:--:--
WLAN (Client)	
Interface Status	
IP Address	
Subnet Mask	
MAC Address	--:--:--:--:--:--

Figure 7 – Sentry 4G Router Unit Status

5.2.1 Home Page Parameter Descriptions

System Information

Unit ID: Sentry 4G unit identification number (configured under General Settings).

Local Time: Displays local time

System Up Time: System Up Time displays a counter that starts when the unit is powered on and resets when the unit is powered down or hardware reset.

Software Version: This reflects the version of application software loaded on the unit.

ETH0 and ETH1

Interface Status: indicates if the device has an established connection to the LAN on ETH0 or ETH1 interface. Status is UP or DOWN

IP Address: IP address assigned to the ETH0/ETH1 interface

Subnet Mask: The Subnet mask assigned to the ETH0/ETH1 interface

MAC Address: Media Access Control Address of the ETH0/ETH1 interface

WWAN

Interface Status: indicates if the device has an established connection to the WWAN. Status is UP or DOWN

IP Address: WWAN IP address of the Sentry 4G unit.

Subnet Mask: This subnet mask of the WWAN interface

MAC Address: Media Access Control Address of the WWAAN interface.

WLAN (Access Point or Client)

Interface Status: Indicates if the WiFi interface is "UP" or "DOWN"

IP Address: IP address assigned to the WiFi interface of this device. When the WiFi interface is set to operate in WiFi Client mode, the WiFi Access Point must have a DHCP server running to assign an IP address to its WiFi clients.

Subnet Mask: Subnet Mask assigned to the WiFi interface of this device.

MAC Address: Media Access Control Address of the WiFi interface.

5.3 WWAN Parameters

This page contains WWAN configuration information and settings.

5.3.1 Settings

This screen contains main WWAN configuration. Select "Enabled" to enable WWAN interface and "Disabled" to disable WWAN interface.

The Sentry 4G router uses EAP-TTLS (Extensible Authentication Protocol-Tunneled Transport Layer Security) to obtain authorization and traffic key material from the BTS. The EAP-TTLS is disabled by default.

To enable EAP-TTLS authentication:

- Under "Authentication" select "EAP-TTLS" from the Protocol drop-down box. This is the Protocol type used for authentication.
- Select the desired Protocol from the Inner Protocol drop-down box. This identifies Protocol used for USER authentication.
- Fill in the User Name. Usually identifies user's organization.
- Fill in the Inner User Name and Password fields. Used by Inner Protocol for authentication.
- Click "Save"
- Click "Browse" to locate certificate file supplied by the backhaul provider and click "Save"

Contact your backhaul provider for more information.

WWAN		Settings	Channel Selection	Status	Logs	Statistics
Configuration						
Interface	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled					
IP Configuration						
Mode	<input checked="" type="radio"/> Dynamic <input type="radio"/> Static					
IP Address	192	.	168	.	3	.50
Subnet Mask	255	.	255	.	255	.0
Gateway	192	.	168	.	3	.1
MTU	1500 (576 - 1500)					
DNS Configuration						
Mode	<input checked="" type="radio"/> Dynamic <input type="radio"/> Static					
DNS Server 1	0	.	0	.	0	.0
DNS Server 2	0	.	0	.	0	.0
NAT Configuration						
NAT	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled					
Authentication						
Protocol	EAP-TTLS <input type="button" value="v"/>					
Inner Protocol	MD5 <input type="button" value="v"/>					
User Name	gordie@irap.com					
Inner User Name	<input type="text"/>					
Password	123456789					
						<input type="button" value="Cancel"/> <input type="button" value="Save"/>
Certificate File sentry-root.crt						
Load	<input type="text"/>	<input type="button" value="Browse..."/>				
						<input type="button" value="Cancel"/> <input type="button" value="Save"/>

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Figure 8 – Sentry 4G Router WWAN Settings

5.3.1.1 DNS Configuration

DNS servers can be configured as follows:

Mode:

Dynamic (Default): Obtain DNS IP addresses dynamically from a DHCP server.

Static: The DNS IP addresses are configured by the user.

DNS Server 1:

IP address of DNS server 1.

DNS Server 2:

IP address of DNS server 2.

5.3.1.2 NAT Configuration:

When NAT is enabled, the LAN interfaces (ETH0, ETH1, WLAN(Access Point)) are considered private, the WWAN is considered public. Any IP packets leaving the Sentry 4G unit through the LAN interface will have its source IP address changed to that of the WWAN interface.

Any data transfer must be initiated from the private side of the network toward the public side.

5.3.2 Channel Selection

WWAN	Settings	Channel Selection	Status	Logs	Statistics	
Configuration						
Maximum Tx Power	<input type="text" value="33.00"/> dBm					
Idle Timeout	<input type="text" value="0"/> (minutes)					
Static Channel Scanning						
Channel Filter	<input type="text" value="only 5 MHz channels"/> ▼					
					Cancel	Save
Add Static Channel						
No.	<input type="text"/> (1-32)					
Frequency	<input type="text"/> KHz					
Bandwidth	<input type="text" value="3"/> ▼ MHz					
					Clear	Add
Static Channel Table						
No.	Frequency (KHz)	Bandwidth (MHz)				
1	2550000	5	Delete Entry			

Figure 9 – Sentry 4G WWAN Channel Selection

Maximum Tx Power: The maximum advertized power of the WWAN interface (Max 34.00).

Idle Timeout: The timeout before entering idle mode (Not Yet Implemented).

Channel Filter: The mask that defined the channels to use.

To add a channel in the channel table:

- Enter the desired number in No.
- Enter the frequency
- Using the drop-down menu select the Bandwidth
- Click "Add".

5.3.3 Status

The Status tab of the WWAN page displays the current WWAN interface status including firmware version, link status, and link information. Information on this page is read-only.

WWAN	Settings	Channel Selection	Status	Logs	Statistics
Radio					
	Model	DR190-91 22 ALU-4.1			
	Description	2.5GHz high power (2.5-2.7 GHz band)			
Software Versions					
	Link manager	1.4.0			
	Firmware	4.6.1.0-20614			
	Microcode	5.9.0.7-6222			
Link Status					
	State	OPERATIONAL			
	RSSI	-051.95 (avg) -087.29 dBm			
	CINR	(r1) 33.77 (avg) 67.53, (r3) 41.02 (avg) 33.60 dB			
Link Information					
	BS MAC Address	00:04:9F:2E:31:40			
	Frequency	915000 kHz			
	Bandwidth	3500 kHz			
	Downlink FEC	QPSK-CTC-1/2			

Figure 10 – Sentry 4G Router WWAN Status

Once EAP-TTLS authentication is enabled, the IP configuration for the WWAN interface will be obtained through the BTS. Note: The IP address for the WWAN interface is displayed under the Unit Status

If no authentication is selected, the IP address for the WWAN interface must be entered manually (see WWAN→Settings)

Link Status

The RSSI information displays the average value and the instantaneous value. The average is to be considered.

The CINR information displays reuse1, reuse3 and preamble values.

5.3.4 Statistics

This tab displays information regarding the number of packets and bytes transmitted and received over the WWAN interface.

5.4 LAN Settings (ETH0 and ETH1)

ETH0		IP Settings	Statistics
IP Configuration			
IP Address	172	. 30	. 40 . 100
Subnet Mask	255	. 255	. 255 . 0
MTU	1500	(576 - 1500)	
DNS Masquerade			
DNS Auto	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled		
DHCP Server Configuration			
DHCP Server	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled		
Dynamic Leases			
Start IP Address		End IP Address	
10	. 30	. 1	. 120
10	. 30	. 1	. 200
Static Leases			
MAC Address		IP Address	
1			
2			
3			
4			
5			
Other			
Lease Duration	86400	(seconds)	
Domain Name Suffix			
DNS Server 1	10	. 30	. 1 . 50
DNS Server 2	0	. 0	. 0 . 0
		Cancel	Save

Figure 11 - IP Settings

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Sentry 4G features two Ethernet ports. The ETH0 and ETH1 *IP Settings* pages contain the basic configuration information required to customize your LAN with the Sentry 4G router as the network connection point. User configuration will primarily occur on this page.

5.4.1 IP Settings

5.4.1.1 IP Configuration

Ethernet IP address: LAN IP of the Sentry 4G unit. This address is entered into a browser on a local PC when logging into the Sentry 4G home page. To decrease the chances of unwanted access, this value should be changed from its default prior to use.

IMPORTANT NOTE:

Changing this value will cause you to lose connection to the Sentry 4G unit. Enter the new address in the browser to reconnect. If you forget an address or make a mistake entering the new value, it may be difficult to reconnect to the device.

Ethernet Subnet Mask: The Subnet mask is used in conjunction with the Ethernet IP address to partition the address into the network (subnet) portion and the host portion. This value will be entered automatically by the software based on the class of IP address entered. It is not necessary to change the default value once the Ethernet IP is entered.

5.4.1.2 DNS Masquerade

See the definition for DNS in Network Basics in section 3.1 above.

DNS Auto: The command enables/disables the Sentry 4G DNS server. Except in special cases, this should always be enabled.

5.4.1.3 DHCP Server Configuration

DHCP Server: (Dynamic Host Configuration Protocol) A protocol used by client devices that are connected to the LAN port of this device to automatically obtain an IP address assigned by this server/router. Selecting Enable will configure this device to assign IP addresses to client devices taken from a pool specified by the values entered in DHCP start range and DHCP end range. If DHCP is disabled, the information must be entered manually on all PCs.

DHCP Start IP Address/End IP Address: Sets the range of IP addresses assigned to the PCs. The user can limit the number of devices allowed on the network by limiting the range of IP addresses.

IMPORTANT NOTE:

The addresses in this range must be on the same subnet as the Ethernet IP

IMPORTANT NOTE:

The Ethernet IP should not be in the DHCP range.

DHCP Lease Time: Number that dictates the length of time a device on the LAN can hold an IP address. In most cases, this should be set to the maximum (default value) of 86400. If this value is set too low, it can cause network connectivity problems.

Domain Name Suffix: The DNS suffix to be assigned by the DHCP server.

Preferred DNS Server: IP address of the preferred DNS server.

Alternate DNS Server: IP address of the alternate DNS server.

5.4.1.4 Disabling DHCP server

When DHCP server is enabled, any PC with physical access to the Sentry 4G Ethernet port will be assigned an IP address and have access to browse the Internet. This may cause security problems. Disabling DHCP server will allow the user to control which PCs have the ability to connect through the Sentry 4G unit. *If changes are made to the network settings, be sure to keep a record of the changes for future use.*

- Disabling DHCP server is performed on the LAN settings page. Under the DHCP section, select Disable, then click Save.

IMPORTANT NOTE:

This also disables DNS Masquerading. Disabling DHCP server will remove all values in the DHCP and DNS sections. Record all values in these fields prior to disabling in case you are required to go back to the original configuration.

- To improve security, change the Ethernet IP of the Sentry 4G unit from the default setting.

IMPORTANT NOTE:

If the DHCP server is disabled, and you do not have a record of the Ethernet IP, you will not be able to login to the Sentry 4G router home page.

On the network setting page of each PC set the following

- IP address: Set a unique address on the same subnet as the Sentry 4G
- Subnet Mask: Set to the same value as the Sentry 4G Ethernet Subnet Mask field
- Default Gateway: Ethernet IP of the Sentry 4G
- Preferred DNS: Ethernet IP of the Sentry 4G

When these settings are complete, the PC will have network access.

5.4.1.5 Static IP Setup

If your network requires each PC to have a statically set LAN IP addresses, follow the previous procedure for all PCs on the network. If the network requires a mix of static and dynamically assigned IP addresses, assign static IPs outside the DHCP address range for PCs that require static IP addresses and allow the Sentry 4G DHCP to assign the remaining PC IP addresses.

5.4.2 Statistics

This tab displays information regarding the number of packets and bytes transmitted and received over the ETH0 or ETH1 interface.

5.5 WiFi (WLAN)

A Sentry 4G unit can simultaneously operate in an access point mode and in a client mode.

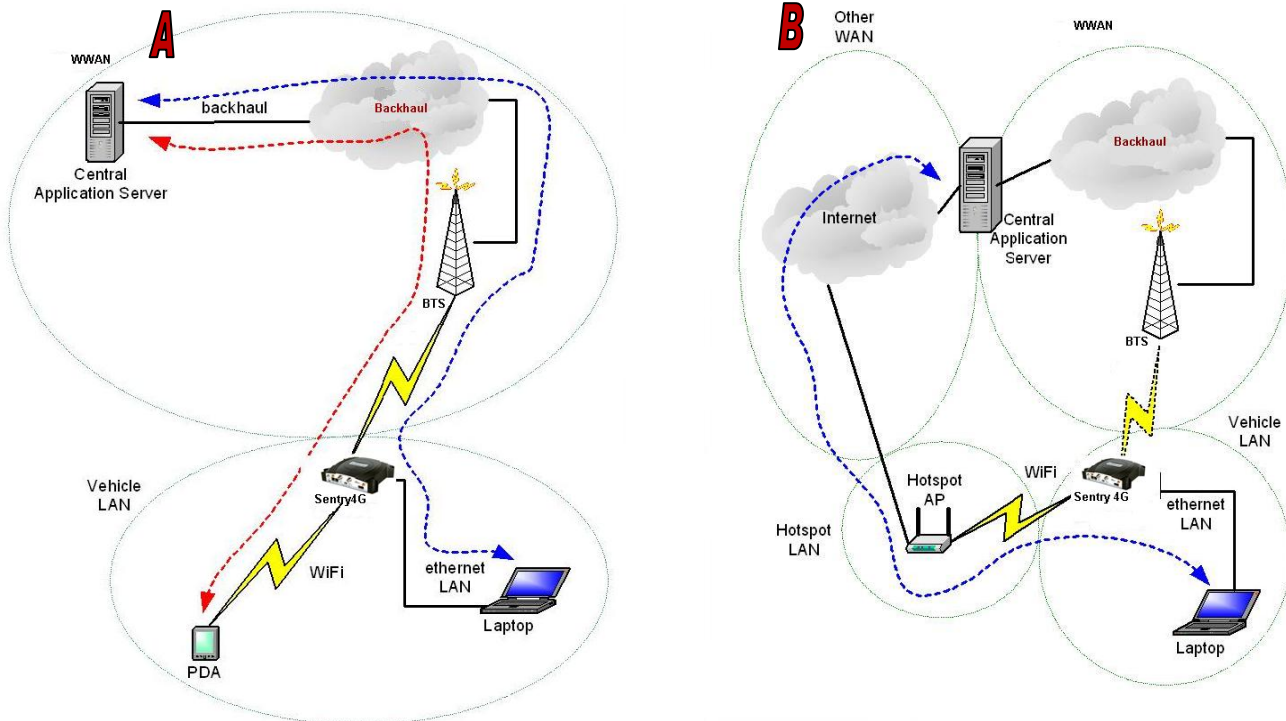


Figure 12 - Sentry 4G Router WiFi Modes: Access Point (A); Client Mode (B)

In access point mode, the Sentry 4G router offers wireless tether. It forwards local WiFi traffic to application servers over the broadband 802.16-2005 network and works in parallel with Ethernet connection, providing for simultaneous WiFi and Ethernet connections (see Figure 12A).

In client mode the Sentry 4G unit can automatically switch between broadband 802.16-2005 and WiFi connections providing for seamless handover when coupled with modern applications (see Figure 12B).

5.5.1 WiFi (WLAN)→Wireless Settings (Client)

The user can configure up to 20 access points.

Note: All access points must run a DHCP server.

In wireless client mode, the Sentry 4G unit will try to connect to the Access Point with the strongest signal on the list. When the Sentry 4G unit connects to an access point, it starts a DHCP client service. The DHCP server running on the access point must provide an IP address, netmask, and gateway to the Sentry 4G unit. When the WiFi client is connected to a WiFi access point, the default route is set to point to the gateway address obtained by the DHCP client.

WLAN	Client Settings	Client Status	Access Point Settings	Access Point Status	Advanced Settings	Site Survey	Statistics
Configuration							
Interface		<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled					
IP Configuration							
Mode		<input checked="" type="radio"/> Dynamic <input type="radio"/> Static					
IP Address		[] . [] . [] . []					
Subnet Mask		[] . [] . [] . []					
Gateway		[] . [] . [] . []					
MTU		[] (576 - 1500)					
DNS Configuration							
Mode		<input type="radio"/> Dynamic <input checked="" type="radio"/> Static					
DNS Server 1		192 . 168 . 90 . 11					
DNS Server 2		[] . [] . [] . []					
NAT Configuration							
NAT		<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled					
<input type="button" value="Clear"/> <input type="button" value="Save"/>							
Add Access Point							
No.		[] (1-10)					
SSID		[]					
Authentication		Open [v]					
Encryption		None [v]					
WEP Key Length		64-bit [v]					
WEP Key Type		ASCII(Text) [v]					
WEP Key Index		[] (1-4)					
Key		[]					
<input type="button" value="Clear"/> <input type="button" value="Add"/>							
Access Point Table							
No.	SSID	Authentication	Encryption	Key			
1	DRAP	Open	WEP(64-bit,Hex,1)	ddddddddd	Delete Entry		

Figure 13 - WiFi (WLAN) → Wireless Settings (Client)

To Add Access Point

Access Point Number: Access point number

SSID: Service Set Identifier. This is the name of the wireless local area network.

Channel: Channel number to use (Auto or 1-11)

Authentication: Authentication method to be used (Example: Open, Shared, WPANONE, WPA-PSK, WPA2-PSK)

Encryption: None, WEP, TKIP, or AES

WEP Key Length: the bit key length

WEP Key Type: type of WEP security

WEP Key Index: 1-4

Key: The encryption key

Note: For a 64-bit key, keys are 5 character strings long if WEP Key Type is set to ASCII and 10 hexadecimal digits long if WEP Key Type is set to HEX.

For a 128-bit key, keys are 13 character strings long if WEP Key Type is set to ASCII and 26 hexadecimal digits long if WEP Key Type is set to HEX.

The following table shows examples of encryption keys depending on encryption type chosen.

Table 4 - Encryption Keys Examples

Encryption Type	Description	Key (Example)
WEP Encryption		
64-bit/ASCII	5 character string	CrYpT
64-bit/Hexadecimal	10 hexadecimal digits	mYEncryptKeY4
128-bit/ASCII	13 character string	LongHello1234
128-bit/Hexadecimal	26 hexadecimal digits	12345678901234567890ABCDEF
TKIP Encryption		
Any Key	A string of 8 to 63 characters	AbCdEfGhIjKIMnOp
AES Encryption		
Any Key	A string of 8 to 63 characters	AbCdEfGhIjKIMnOp

5.5.2 WiFi (WLAN)→Wireless Settings (Access Point)

WLAN	Client Settings	Client Status	Access Point Settings	Access Point Status	Advanced Settings	Site Survey	Statistics
Configuration							
Interface			<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled				
IP Configuration							
IP Address			10 . 30 . 5 . 50				
Subnet Mask			255 . 255 . 255 . 0				
MTU			<input type="text"/> (576 - 1500)				
DNS Masquerade							
DNS Auto			<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled				
DHCP Server							
DHCP Server			<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled				
Dynamic Leases							
Start IP Address				End IP Address			
10 . 30 . 5 . 120				10 . 30 . 5 . 200			
Static Leases							
MAC Address				IP Address			
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Other							
Lease Duration			86400 (seconds)				
Domain Name Suffix			<input type="text"/>				
DNS Server 1			10 . 30 . 5 . 50				
DNS Server 2			0 . 0 . 0 . 0				
Wireless Configuration							
SSID		<input type="text" value="SENTRY4G"/>				hide <input type="checkbox"/>	
Authentication		<input type="text" value="Open"/>					
Encryption		<input type="text" value="WEP"/>					
WEP Key Length		<input type="text" value="64-bit"/>					
WEP Key Type		<input type="text" value="Hex"/>					
WEP Key Index		1 (1-4)					
Key		<input type="text" value="ABCDEFABCD"/>					
						<input type="button" value="Cancel"/>	<input type="button" value="Save"/>

Figure 14 - WiFi (WLAN)→Wireless Settings (Access Point)

IP Configuration

IP Address: IP address of the WiFi interface

Subnet Mask: The network mask of the WiFi interface

DNS Masquerade

DNS Auto: Enables or disables the Sentry 4G DNS server on the WiFi interface

DHCP Server

DHCP Server: Enables or disables DHCP server on the WiFi interface

Start IP Address: Starting IP address (defines the pool of addresses allocated for DHCP purpose)

End IP Address: Ending IP address (defines the pool of addresses allocated for DHCP purpose)

Lease Time: The period over which the IP address allocated to a DHCP client is referred to as a "lease". Lease duration is the amount entered in seconds.

Domain Name Suffix: DNS suffix to be assigned by the DHCP server

Preferred DNS Suffix: IP address of the preferred DNS server

Alternate DNS Suffix: IP address of the alternate DNS server

Wireless Configuration

SSID: Service Set Identifier. This is the name of the wireless local area network.

Channel: Channel number to use (Auto or 1-11)

Authentication: Authentication method to be used (Example: Open, Shared, WPANONE, WPA-PSK, WPA2-PSK)

Encryption: Encryption method currently used

WEP Key Length: the bit key length

WEP Key Type: type of WEP security

WEP Key Index: 1-4

Key: The encryption key

Note: For a 64-bit key, keys are 5 character strings long if WEP Key Type is set to ASCII and 10 hexadecimal digits long if WEP Key Type is set to HEX.

For a 128-bit key, keys are 13 character strings long if WEP Key Type is set to ASCII and 26 hexadecimal digits long if WEP Key Type is set to HEX.

Refer to Table 4 for examples of encryption keys depending on encryption type chosen.

5.5.3 WiFi (WLAN)→Wireless Settings (Advanced)

Not supported in the current version.

5.5.4 WiFi (WLAN)→Statistics

WiFi (WLAN)	Main	Wireless Settings (Client)	Wireless Settings (Access Point)	Wireless Settings (Advanced)	Statistics	Site Survey
Transmit						
		TX Packets	0			
		TX Bytes	0			
Receive						
		RX Packets	0			
		RX Bytes	0			
						Refresh

Figure 15 - WiFi (WLAN) → Statistics

Transmit

TX Packets: Number of packets sent by the Sentry 4G unit over the WiFi interface

TX Bytes: Number of bytes sent by the Sentry 4G unit over the WiFi interface

Receive

RX Packets: Number of packets received by the Sentry 4G unit over the WiFi interface

RX Bytes: Number of bytes received by the Sentry 4G unit over the WiFi interface

5.5.5 WiFi (WLAN)→Site Survey

WiFi (WLAN)	Main	Wireless Settings (Client)	Wireless Settings (Access Point)	Wireless Settings (Advanced)	Statistics	Site Survey
Wireless Site Summary						
BSSID	SSID	Channel	Authentication	Encryption	RSSI	
-- Wireless Site Table Empty --						

Figure 16 - WiFi (WLAN) → Wireless Settings (Site Survey)

When the WiFi interface of the Sentry 4G unit operates in Client mode, this screen shows the WiFi Access Point detected during last wireless scan.

The list is empty when the Sentry 4G unit is operating in Access Point mode.

5.6 Router Settings

Router settings provide advanced user configuration for large network setups.

5.6.1 Static Routes

Router Settings		Static Routing	IP Filtering	Port Forwarding	Routing Table	Interface Priority
Add Static Route						
No.	<input type="text"/> (1-20)					
Description	<input type="text"/>					
IP Address	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>					
Subnet Mask	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>					
Gateway	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>					
Metric	<input type="text"/> (1-65535)					
						<input type="button" value="Clear"/> <input type="button" value="Add"/>
Static Route Table						
No.	Description	IP Address	Subnet Mask	Gateway	Metric	
-- Static Route Table Empty --						

Figure 17 - Static Routes

The Sentry 4G unit will automatically set up routing to all devices on the same subnet. In some cases however, the Sentry 4G unit may need to communicate with a previously existing subnet other than its own. This route cannot be automatically generated; it must be manually entered as a static route by the user. The static route gives the Sentry 4G router its “next hop” instructions.

Route no: A generic number assigned to the route. Multiple static routes can be assigned as long as they have distinct route numbers.

Description: Nickname assigned to the route by the user.

IP Address: This is the destination IP address that is delivered to the Sentry 4G unit. Since this IP address will not be on the same subnet, the Sentry 4G unit will not have a defined route, and will not know where to send it by default. Setting up the static route will inform the Sentry 4G unit where to send the data.

Subnet Mask: The Subnet mask is determined by the subnet of the destination address

Gateway: This is the address that the data packet will be routed to.

Note:

The device at this address must be a router that is either on the same subnet as the Destination IP or one with its own statically setup route to the destination address. If this is not the case, the packet data will be dropped.

Metric: This sets the priority of the routes compared to other static routes defined. The lower the number, the higher the priority of the route.

Click on "Add" when all necessary information has been entered. The route will be shown on the bottom of the screen (under Static Routing Table). Additional routes can be added provided they have a unique Route no, name and metric. Routes can be deleted by clicking the Delete Entry option of the desired entry.

Note:

Routing table (found under "Routing Table" tab) shows all routes, while Static Table (found under "Static Routing" tab) shows manually entered routes only.

5.6.2 IP Filtering

IP Filtering provides certain Internet firewall protection. The user can enter up to 20 IP filters. Each IP filter is identified by a unique number (from 1 to 20). When IP filtering is enabled, any custom IP filter entered by the user as well as predefined IP filters will be taken into account when processing IP packets. See Figure 18.

An IP packet passes through the filtering logic when IP filtering is enabled:

- 1) An IP packet is received on one of the interface and is destined to the Sentry 4G unit
- OR
- 2) An IP packet is sent by the Sentry 4G unit
- OR
- 3) An IP packet is forwarded by the Sentry 4G unit.

5.6.2.1 Predefined IP Filters

Drop Remote Pings: If IP filtering is enabled, any ICMP echo request coming from the WAN interface will not be replied to. This prevents remote hosts from detecting your IP address on the WAN.

Drop Remote IP Fragments: If IP filtering is enabled, any fragmented IP packets coming from the WAN interface will be dropped.

Drop Invalid Packets: If IP filtering is enabled, any *invalid* packet received by the unit will be silently dropped. An invalid IP packet is one that cannot be identified.

5.6.2.2 Add Custom IP Filters

Fill in the parameters described below and click "Add...". Your entry will appear in the **Custom IP Filters** table on the bottom of the page.

Note: Criteria are for inclusion by default. Select "exclude" if your criterion is for exclusion.

Filter Number: Each IP filter is identified by a unique number from 1 to 20.

Router Settings	Static Routing	IP Filtering	Port Forwarding	Routing Table	Interface Priority
IP Filters					
IP Filtering		<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled			
					<input type="button" value="Cancel"/> <input type="button" value="Save"/>

Predefined IP Filters					
Drop Remote Pings	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled				
Drop Remote IP Fragments	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled				
Drop Invalid Packets	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled				
					<input type="button" value="Cancel"/> <input type="button" value="Save"/>

Add Custom IP Filter					
No.	<input type="text" value=""/> (1-20)				
Source IP Address	<input checked="" type="radio"/> Any <input type="radio"/> <input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/> / <input type="text" value=""/>	Exclude <input type="checkbox"/>			
Destination IP Address	<input checked="" type="radio"/> Any <input type="radio"/> <input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/> . <input type="text" value=""/> / <input type="text" value=""/>	Exclude <input type="checkbox"/>			
Protocol	<input checked="" type="radio"/> Any <input type="radio"/> ICMP <input type="radio"/> TCP <input type="radio"/> UDP <input type="radio"/> Other <input type="text" value=""/> (1-255)	Exclude <input type="checkbox"/>			
Source Port	<input checked="" type="radio"/> Any <input type="radio"/> <input type="text" value=""/> to <input type="text" value=""/> (1-65535)	Exclude <input type="checkbox"/>			
Destination Port	<input checked="" type="radio"/> Any <input type="radio"/> <input type="text" value=""/> to <input type="text" value=""/> (1-65535)	Exclude <input type="checkbox"/>			
Direction	<input checked="" type="radio"/> Any <input type="radio"/> <input type="text" value="wwan->eth0"/>	Exclude <input type="checkbox"/>			
Action	<input checked="" type="radio"/> Keep <input type="radio"/> Drop				
					<input type="button" value="Clear"/> <input type="button" value="Add"/>

Custom IP Filter Table							
No.	Src IP	Dst IP	Proto	Src Port	Dst Port	Dir	Act
-- IP Filter Table Empty --							

Figure 18 - IP Filtering

5.6.3 Port Forwarding

Port Forwarding is used to provide remote access to third party devices on the LAN, such as Web Cameras or printers. Port Forwarding routes incoming requests from the WWAN, with a specific port to a local device with a static IP. Note: the value 0.0.0.0 can be entered in the Source IP Address if data from any IP Address is to be forwarded.

Router Settings	Static Routing	IP Filtering	Port Forwarding	Routing Table	Interface Priority	
Add Rule						
No.	<input type="text"/> (1-20)					
Protocol	tcp ▼					
Source IP Address	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>					
Public Port Number	<input type="text"/> (1-65535)					
Private IP Address	<input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/>					
Private Port Number	<input type="text"/> (1-65535)					
				Clear	Add	
Rule Table						
No.	Protocol	Source IP Address	Public Port Number	Private IP Address	Private Port Number	
-- Port Map Table Empty --						

Figure 19 - Port Forwarding

5.6.4 Routing Table

The table in Figure 20 shows a list of all routes (static and dynamic).

Router Settings	Static Routing	IP Filtering	Port Forwarding	Routing Table	Interface Priority		
Routing Table							
Destination	Gateway	Subnet Mask	Flags	Metric	Ref	Use	Iface
192.168.1.0	*	255.255.255.0	U	0	0	0	eth0
172.30.40.0	*	255.255.255.0	U	0	0	0	eth1
127.0.0.0	*	255.0.0.0	U	0	0	0	lo

Figure 20 - Routing Table

5.6.5 Interface Priority

When there is more than one WAN interface up at the same time, the unit needs to make a selection on where to put the default route and what DNS servers must be used. To select interface priority navigate to Interface Priority tab under Router Settings (see Figure 21).

Note: Highest priority is given to the interface identified as having Priority Number 1.

Router Settings	Static Routing	IP Filtering	Port Forwarding	Routing Table	Interface Priority
Select Preferred Interface					
Priority Number 1	WLAN (Client) ▼				
Priority Number 2	WWAN ▼				

Figure 21 - Interface Priority

5.7 General Settings

5.7.1 General Settings-Unit ID

The Sentry 4G unit identification number is configured under General Settings→Unit ID.

5.7.2 Advanced Settings-Password

The Sentry 4G unit’s web interface management login details are modified using the Password tab of the Advanced Settings page.

To change the login details, enter the current and new password. The new password must be entered twice (reconfirmed).

5.7.3 General Settings-Remote Administration

General Settings	Unit ID	Password	Remote Administration	Dynamic DNS	Power Management
Remote Administration					
Remote Configuration	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled				
Configuration Port	<input type="text" value="80"/> (1 - 65535)				

Figure 22 - Remote Admin

5.7.3.1 Remote Admin

Remote Configuration: Selecting Enabled will allow remote access to the unit’s configuration screens through the WWAN network connection. Selecting Disabled will shut off the ability to remotely access the unit’s configuration screens.

Configuration Port: Change the port of incoming requests. It is not necessary to change this parameter unless it conflicts with other devices on the network.

Users can be logged into a single unit both locally and remotely at the same time. Changes made on one end will not be reflected on the other unless the web page is refreshed.

5.7.3.1.1 Example of Remote Login

The following should be entered into a browser on a remote PC to remote login to the Sentry 4G. The Sentry 4G unit must have remote administration enabled for this functionality to work.

Note: "HTTP" must be specified or browser will assume other uses → <http://70.209.115.93:8080>



Figure 23 - Example of Remote Login

5.7.4 General Settings-Power Management

The Sentry 4G unit is designed to stay ON even if the ignition is turned OFF. You can configure your Sentry 4G unit to automatically shut down 1, 5, 30, or 60 minutes after ignition is turned off or when the supply voltage drops to a certain level.

Shutdown Method: Disabled by default (unit always ON after ignition is turned OFF). Select "Power Off" to enable power management.

After ignition line off: Select between the following time intervals: 1 minute, 5 minutes, 30 minutes, or 60 minutes.

When Voltage Drops to: Enter desired voltage. Enter "0" to disable. (Note: A value of 11V would be usually entered here as a precaution in order to ensure the car battery does not drain.)

General Settings	Unit ID	Password	Remote Administration	Dynamic DNS	Power Management
Power Configuration					
Shutdown Method	<input type="radio"/> Disabled <input checked="" type="radio"/> Power Off				
	Debounce time: <input type="text" value="500"/> msec				
	Debounce range is [100 msec - 3200 msec]				
After ignition line off	<input type="text" value="Shutdown in 1 minute"/>				
When supply Voltage drops to	<input type="text" value="11.0"/> Volts (set to 0 to turn off)				
					<input type="button" value="Cancel"/> <input type="button" value="Save"/>

Figure 24 - Power Management

5.8 GPS Status and Settings

The Sentry 4G unit incorporates a highly sensitive 16-channel GPS receiver and an intelligent algorithm that offers outstanding receive sensitivity. Summarized below are the specifications of the integrated GPS module:

Typical sensitivity	-135 dBm
Reacquisition time	Less than 2 seconds
Average Cold/Warm/Hot Start time to first fix	Under 45/15/3.5 seconds
Position Accuracy	
GPS Standard Positioning Service (SPS)	<15 meters
DGPS (WAAS) corrected	<3 meters

The GPS page allows the user to see the GPS status and configure remote or local delivery of GPS position reports. Viewing the GPS data from a local or remote PC requires a UDP port listener program be installed on the PC. Any UDP listener will work provided you can set an appropriate port value for the program.

5.8.1 GPS Status

GPS	Status	AAVL Settings
Condition	No Fix / Invalid	
Number of Satellites	0	
UTC (hh:mm:ss)	12:06:50	
Position (Lat, Long)	0deg 0.00000min, 0deg 0.00000min	
Altitude (meters)	0.00	
True Course	0.0	
Ground Speed (Km/h)	0.0	

Figure 25 - GPS Status

Condition: Indicates No Fix, Standard GPS Fix, Differential GPS Fix, or Estimated / Last Known Position

Number of Satellites: Indicates the number of satellites the GPS has locked on to. A minimum of 3 is required to establish a position. Generally, the more satellites the GPS has locked, the more accurate the position reporting will be.

UTC: Time of day in Universal Coordinated Time

Position: Device position reported in degrees and minutes

Altitude: Altitude from Mean Sea Level reported in meters.

True Course: Heading, reported in degrees (0 – 360)

Ground Speed: Reported in km/hr

5.8.2 AAVL Settings (Local and Remote Delivery)

GPS	Status	AAVL Settings
Autonomous Automatic Vehicle Location Settings		
TAIP Vehicle ID		
Differential Correction	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
Local delivery		
TCP Server Format	NMEA, GGA+VTG on port 6257	
UDP Host 1 Format	disabled	
UDP Host 1 Address	0 . 0 . 0 . 0	
UDP Host 1 Port	65535 (1024-65535)	
UDP Host 2 Format	disabled	
UDP Host 2 Address	0 . 0 . 0 . 0	
UDP Host 2 Port	65535 (1024-65535)	
Remote delivery		
Report every	5 seconds	
Report every	0 meters	
But no less than	3 seconds between reports	
TCP Server Format	NMEA, RMC on port 6258	
UDP Host 1 Format	disabled	
UDP Host 1 Address	0 . 0 . 0 . 0	
UDP Host 1 Port	65535 (1024-65535)	
UDP Host 2 Format	disabled	
UDP Host 2 Address	0 . 0 . 0 . 0	
UDP Host 2 Port	65535 (1024-65535)	
UDP Host 3 Format	disabled	
UDP Host 3 Address	0 . 0 . 0 . 0	
UDP Host 3 Port	65535 (1024-65535)	

Figure 26 - AAVL Settings

TAIP Vehicle ID: User assigned number to identify the vehicle or Sentry 4G unit that each GPS report belongs to. This will be reported in the GPS messages if TAIP with ID is selected for TCP Server Format and/or UDP Host format. Configured under Basic Settings.

Differential Correction: Differential GPS corrects various inaccuracies in the GPS system to yield measurements accurate to a couple of meters when the mobile is moving and even better when stationary.

5.8.3 Local Delivery

The GPS data can be delivered to up to two local PCs with UDP viewer programs can provide data through a TCP connection, e.g. telnet. GPS data will be delivered once per second to all local PCs

TCP Server Format: Select one of the following options for the format of the GPS messages

TAIP no ID: Trimble ASCII Interface Protocol, a Trimble specified digital communication interface. When this option is selected, the TAIP vehicle ID is not included in the GPS messages.

TAIP with ID: Same as above except the Vehicle ID is reported

NMEA National Marine Electronics Association interface specification for electronic equipment. The NMEA GPS message set includes several message types, each containing specific GPS information. See message descriptions below. TAIP Vehicle ID is not reported when NMEA is selected.

NMEA GLL: Position in LAT/LONG coordinates and time of day in UTC coordinates.

NMEA GGA: Position in LAT/LONG coordinates, time of day in UTC coordinates, fix quality, number of satellites and altitude

NMEA RMC: Position in LAT/LONG coordinates, time of day in UTC coordinates, ground speed in knots, heading in degrees and date

NMEA VTG: Ground speed in kilometers per hour and knots, heading in degrees.

To get GPS data by telnetting into the device, enter the following from a prompt

telnet <local IP address of the Sentry 4G > 6257.

Note:

It is possible to telnet to the Sentry 4G unit's port 6257 from a remote location however this is not recommended as delivering the data once per second across the broadband 802.16-2005 network will greatly increase the amount of data transferred.

UDP Host Format: Same options as TCP server format

UDP Host Address: IP address of local PC that GPS data will be delivered to. This address must be on the same subnet as the Sentry 4G LAN IP

UDP Host Port: Port assigned to UDP program. This must match the port assigned in the chosen UDP Port Listener Program.

5.8.4 Remote Delivery

The GPS data can be delivered to up to three remote PCs with UDP viewer programs running on the host.

Report every: GPS can be programmed to report position after a specified time has elapsed or the unit has moved a specified distance since its last report.

But no less than: This feature prevents a fast moving vehicle from reporting too frequently if its "Report every meters" setting is sufficiently low" by setting a minimum amount of time, in seconds, between GPS reports.

5.9 I/O Settings

The Sentry 4G router supports the following I/Os:

- Ignition Sense
- One external digital alarm

See Table 5 for pinout.

J4 Pin	Signal	I/O	Description / specification
1	Ignition Sense	Input to <i>Sentry 4G</i>	Standard ignition-on signal 1. Pin 1 is the left most pin when looking directly at the front panel. Maximum voltage above which Ignition Sense will be detected as ignition asserted = 9.0V; Minimum voltage below which Ignition Sense will be detected as ignition de-asserted = 5.7V.
4	External Alarm	Input to <i>Sentry 4G</i>	Active low signal. To trigger an alarm, short this signal to V_{IN-} using a low impedance path (100-Ohm max) For 200ms minimum. Otherwise, leave open or connect to V_{IN+} . This signal can also be driven from a 5V/3.3V TTL/LVTTL or CMOS circuit.

Table 5 - I/O Signal Pinout

5.9.1 I/O Configuration

The Sentry 4G I/O subsystem is configured via the Sentry 4G WEB pages. Status Monitoring is provided via NMEA-based protocol. The Sentry 4G I/O subsystem operates according to a manager/agent model. The PC-hosted manager sends requests to the Sentry 4G I/O agent, which performs the required actions. The Sentry 4G agent reports alarms and indications to the PC-hosted manager.

I/O Settings	Status	Setting	Labels
Sentry Input Status			
Input Voltage		12.13 V	
Radio Voltage		27.79 V	
Board temperature		37.5 C	

Figure 27 - I/O Settings-Status

The Manager IP address is configured under I/O Settings→NMEA Settings→ **Manager IP address** (see Figure 28).

The port number is 6969 by default and can be customized under I/O Settings→NMEA Settings→ Manager IP address→ **Port**.

Note: If Auto is selected for “Manager IP address”, the Sentry 4G automatically computes the manager IP address to be Sentry 4G ETH address +1 if DHCP is disabled. If DHCP is enabled, the IP address is the starting address offered by the DHCP server.

The unit IP address is the source IP address (displayed in the alarm messages received by the Manager). The user can configure this to be the WAN Sentry 4G IP address or the LAN (Ethernet) Sentry 4G IP address. If auto is selected, the source IP address is automatically computed to be Sentry 4G ETH address +1 if DHCP is disabled. If DHCP is enabled, the IP address is the starting address offered by the DHCP server.

The user can enable and disable digital alarms by selecting appropriate “enabled” and “disabled” radio buttons under I/O Settings (**Error! Reference source not found.** 28).

The alarm messages can be configured for each diagnostic value under I/O Settings→Labels (see 29).

Remember to save your settings for each configuration.

I/O Settings		Status	Setting	Labels
NMEA Settings				
Unit IP address	<input type="radio"/> Auto <input checked="" type="radio"/> LAN <input type="radio"/> WAN			
Manager IP address	<input checked="" type="radio"/> Auto <input type="radio"/> Manual: <input type="text" value=""/>			
Manager port address	<input type="text" value="6969"/>			
Manager connection type	<input checked="" type="radio"/> TCP <input type="radio"/> UDP			
NMEA Signal monitoring				
External alarm	<input checked="" type="radio"/> Enable <input type="radio"/> Disable			
	Debounce time: <input type="text" value="500"/> msec			
	Debounce range is [100 msec - 3200 msec]			
Jumper alarm	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled			
Setup button	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled			

Figure 28 - I/O Settings

I/O Settings		Status	Setting	Labels
Sentry NMEA Labels				
When Out Of Range				
Input Voltage	<input type="text" value="INPUT VOLT OUT_OF_RANGE"/>			
Radio Voltage	<input type="text" value="RADIO VOLT OUT_OF_RANGE"/>			
Board Temperature	<input type="text" value="BOARD TEMP OVER"/>			
When Returns Normal				
Input Voltage	<input type="text" value="INPUT VOLT NORMAL"/>			
Radio Voltage	<input type="text" value="RADIO VOLT NORMAL"/>			
Board Temperature	<input type="text" value="BOARD TEMP NORMAL"/>			
Digital Input NMEA Labels				
When Active (alarm)				
Ignition-Off	<input type="text" value="KEY TURNED OFF"/>			
External Alarm	<input type="text" value="D ALARM ACTIVE"/>			
Jumper Alarm	<input type="text" value="D JUMPER ACTIVE"/>			
Setup button	<input type="text" value="D SETUP ACTIVE"/>			
When Inactive (notify)				
Ignition-Off	<input type="text" value="KEY TURNED ON"/>			
External Alarm	<input type="text" value="D ALARM NORMAL"/>			
Jumper Alarm	<input type="text" value="D JUMPER NORMAL"/>			
Setup button	<input type="text" value="D SETUP NORMAL"/>			

Figure 29 - I/O Settings-Labels

5.10 System Upgrade (Optional Service)

It is possible to update the system firmware by receiving an update file from CalAmp. This may be done periodically to add features or fix errata. When you receive an update file, perform the following to update the unit. Upgrading can only be performed from a local PC, not remotely.

- Save the file on a local drive or network accessible directory.
- On the System Upgrade page (see Figure 30), browse to the update file and select it.
- Click Save. The system update can take up to 6 minutes. Do not navigate away from the system upgrade page during the transfer. A result page will be displayed automatically when the upgrade is completed.

Note: This will not delete your configuration settings.

System Upgrade	
Status	Upgrade
Package Upgrade	
<i>The whole upgrade procedure takes approximately 6 minutes.</i>	
<i>Do not navigate away from this page during the transfer.</i>	
<i>A result page will be displayed automatically at the end.</i>	
Current Package	SENTRY4G-2.5GHZ-HP PROD V1.2-R200909251530
Upload File	<input type="text"/> <input type="button" value="Browse..."/>
<input type="button" value="Cancel"/> <input type="button" value="Save"/>	

Figure 31 - Sentry 4G Upgrade

6. SPECIFICATIONS

Product specifications are subject to change without notice.

GENERAL SPECIFICATIONS

Interface Connectors:	Two 10/100 BaseT auto-MDIX, RJ-45 USB A Female Client port ¹ 3-wire RS-232 in a USB mini B female form factor
Power Connector:	4-pin Weidmuller 1615550000
LED Indicators:	PWR, STAT, GPS, 4G, WiFi, 3G, ETH0, ETH1
Antenna Interface:	Two 4G Antennas: 50-Ohm TNC Female GPS Antenna: 50-Ohm, 3.3V SMA Female Two WiFi Antennas: 50-Ohm RP-SMA Plug Two 3G Antennas: 50-Ohm SMA Female.
Size:	7 (L) x 7 (W) x 2.2(H) inches (17.8 x 17.8 x 5.6 cm)
Weight:	4 lbs (1.81 kg)
Power Input:	10-30 VDC

Current Drain:
(Average at 13.8 VDC)

Current Drain	TX
With WiFi module	3 A
Without WiFi module	2.2 A

TX Power Range:	WWAN: BTS controlled, up to 34 dBm WiFi: 26 dBm (802.11b) & 21-26 dBm (802.11g)
Frequency Range:	WWAN: 2.496 GHz to 2.69 GHz
Channels:	Static list
Modulation:	S-OFDMA TDD QPSK, 16QAM, 64QAM
Diversity:	2x2 MIMO Matrix A
Operating Temperature:	-30°C to +60°C (-22 to +140 °F)
Protocols:	Ethernet / IPV4 suite, DHCP client/server, NAT
Management:	HTTP embedded WEB server

7. ABBREVIATIONS

Abbreviation	Description
BTS	Base Transceiver Station
CTS	Clear to Send
DHCP	Dynamic Host Configuration Protocol
DNS	Domain name Server
ESN	Electronic Serial Number
GPS	Global Positioning System
HSDPA	High Speed Downlink Packet Access
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode
NAT	Network Address Translation
PAD	Packet Assembly/Disassembler
PPP	Protocol Point to Point
PRL	Preferred Roaming List
RIP	Routing Information Protocol
RSSI	Receive Signal Strength Indication
RTS	Request to Send
WAN	Wide Area Network
WLAN	Wireless Local Area Network
WWAN	Wireless Wide Area Network
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

8. SERVICE AND SUPPORT

8.1 PRODUCT WARRANTY, RMA AND CONTACT INFORMATION

CalAmp Corp guarantees that every Sentry 4G will be free from physical defects in material and workmanship for one (1) year from the date of purchase when used within the limits set forth in the Specifications section of this manual. Extended warranty plans are available.

If the product proves defective during the warranty period, contact CalAmp Customer Service to obtain a Return Material Authorization (RMA).

8.2 RMA REQUEST

8.3 PRODUCT DOCUMENTATION

8.4 TECHNICAL SUPPORT