

USER MANUAL



ZyWAN-G9 Cellular Routing Modem

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Document Revision History

REVISION	DESCRIPTION	DATE
A	Initial release of ZyWAN-G9 User Manual	June 2011

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Important User Information

In order to lower the risk of personal injury, electric shock, fire, or equipment damage, users must observe the following precautions as well as good technical judgment, whenever this product is installed or used.

All reasonable efforts have been made to ensure the accuracy of this document; however, Eurotech assumes no liability resulting from any error/omission in this document or from the use of the information contained herein.

Eurotech reserves the right to revise this document and to change its contents at any time without obligation to notify any person of such revision or changes.

Safety Notices and Warnings

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Eurotech assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Eurotech is aware. You, as the user of the product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Alerts that can be found throughout this manual

The following alerts are used within this manual and indicate potentially dangerous situations.



Danger, electrical shock hazard:

Information regarding potential hazards:

- Personal injury or death could occur. Also damage to the system, connected peripheral devices, or software could occur if the warnings are not carefully followed.
- Appropriate safety precautions should always be used. These should meet the requirements set out for the environment that the equipment will be deployed in.



Information and/or Notes:

Indicates important features or instructions that should be observed

Product Handling and Environmental Guidelines



Warnings:

Electric current from power and communication cables is hazardous. To avoid shock hazard when connecting or disconnecting cables, follow appropriate safety precautions. Ensure that the correct operating voltage is used when powering the device.

Do not open the equipment to perform any adjustments, measurements, or maintenance until all power supplies have been disconnected.

The ZyWAN-G9 is equipped with a certain level of protection against power surges. However, to ensure maximum protection or when using in areas susceptible to electrical disturbances and lightning, use of an external surge suppressor is strongly recommended.

Antistatic Precautions

To avoid damage caused by ESD (Electro Static Discharge), always use appropriate antistatic precautions when handling any electronic equipment.

Batteries

The ZyWAN-G9 contains a coin-type, replaceable Lithium battery to maintain its real-time clock when input power is removed. The ZyWAN-G9 is normally shipped with the battery jumper connected. If the unit will be sitting unused for lengthy periods of time, it is recommended to remove the jumper to extend the life of the battery. See [Battery Link](#) on page 22 for more details.



Warning:

To avoid possible injury:

- Do not short circuit the batteries or place in water or on a metal surface where the battery terminals could be shorted. Do not incinerate or heat to more than 100 °C (212 °F). Do not crush or otherwise disassemble the battery or attempt to repair the battery.
 - Do not recharge. The batteries are non-rechargeable. There is a danger of explosion if a lithium battery is recharged or incorrectly replaced.
 - Dispose of used batteries according to the manufacturer's instructions and local ordinances.
-

Warranty

This product is supplied with a limited warranty. The product warranty covers failure of any Eurotech manufactured product caused by manufacturing defects. Eurotech will make all reasonable effort to repair the product or replace it with an equivalent alternative. Eurotech reserves the right to replace the returned product with an alternative variant or an equivalent fit, form, and functional product. Delivery charges will apply to all returned products.

WEEE

The following information is issued in compliance with the regulations as set out in the 2002/96/CE directive, subsequently superseded by 2003/108/CE. It refers electrical and electronic equipment and the waste management of such products.

When disposing of a device, including all of its components, subassemblies, and materials that are an integral part of the product, you should consider the WEEE directive.

This symbol has been attached to the equipment or, if this has not been possible, on the packaging, instruction literature and/or the guarantee sheet. By using this symbol, it states that the device has been marketed after August 13, 2005 and implies that you must separate all of its components when possible and dispose of them in accordance with local waste disposal legislations.



- Because of the substances present in the equipment, improper use or disposal of the refuse can cause damage to human health and to the environment.
- With reference to WEEE, it is compulsory not to dispose of the equipment with normal urban refuse, and arrangements should be instigated for separate collection and disposal.
- Contact your local waste collection body for more detailed recycling information.
- In case of illicit disposal, sanctions will be levied on transgressors.

RoHS

This device, including all its components, subassemblies, and the consumable materials that are an integral part of the product, has been manufactured in compliance with the European directive 2002/95/EC known as the RoHS directive (Restrictions on the use of certain Hazardous Substances). This directive targets the reduction of certain hazardous substances previously used in electrical and electronic equipment (EEE).

Technical Assistance

If you have any technical questions, cannot isolate a problem with your device, or have any enquiry about repair and returns policies, contact your local Eurotech Technical Support Team.

See [Eurotech Worldwide Presence](#) on page 119 for full contact details.

Before returning any Eurotech supplied product, for any reason whatsoever, you must first send an e-mail to the Technical Support Team. You will receive an RMA number (Returned Material Authorization) for the return of the material.

Provide the following information in the RMA request:

- Model number
- Serial number
- Detailed fault description
- Company Details
- Contact details



Pack the product in anti-static material and ship it in a sturdy cardboard box with enough packing material to adequately protect the shipment.

Any product returned to Eurotech improperly packed will immediately void the warranty for that particular product!

Conventions

The following conventions are used throughout this manual.

Symbol / Text	Pin Definition
NC	Not Connected
Reserved	Use reserved to Eurotech, must remain unconnected

Text in `Courier font` is used to indicate commands entered or responses received at a command prompt in either the Windows or Linux operating system.

Introduction

The ZyWAN-G9 is a cellular routing modem for HSDPA/UMTS/EDGE/GPRS/GSM, EvDO/CDMA, and iDEN networks. It is ideally suited for wireless applications such as Internet access, AVL, telemetry, SCADA, mobile computing, and AMR. The ZyWAN-G9 operates as a fully configurable embedded Linux router enabling firewall, DHCP, DNS and NAT. ZyWAN-G9 provides real-time network access to any Ethernet, 802.11b/g or serial device for mobile and fixed data applications.

A GPS adapter provides a sophisticated tracking program and raw NMEA data strings for mapping applications. The tracking program reports the device location, speed and heading on regular intervals and caches data when out of network. To easily manage the ZyWAN-G9 configuration, a Web page presents a simple tool to quickly change settings locally or over-the-air.

This User Manual provides the basic configuration and hardware information required for getting started with the ZyWAN-G9 products. For more detailed information, see <http://www.eurotech-inc.com/zywan-g9.asp> for additional technical and addendum documentation.

The ZyWAN-G9 provides built-in (factory fitted) options for cellular modems. In addition, some commercial USB modems are supported, which can be obtained from cellular network carriers that may be installed in the ZyWAN-G9. There is a wide array of cellular technologies, protocols, and network standards currently in use and which are under development. For simplicity, this manual uses the following three designations to describe the cellular modem types.

HSDPA – refers to modems based on GSM/GPRS networks, including EDGE, UMTS, & HSDPA

EVDO – refers to modems based on CDMA networks, including CDMA2000 and 1xEV-DO

iDEN – refers to modems based on iDEN networks

Product Overview

Features

The features offered by the ZyWAN-G9 include:

- Rugged design – handles challenging industrial or mobile telemetry environments.
- Wireless features – provides cellular, WiFi (802.11) and GPS communication.
- Ethernet – two 10/100 base-T ports provide independent wired network ports.
- Networking – takes full advantage of IP networking technologies.
- Firewall – provides data encryption and authentication.
- Security – secure routing of IP data between the cellular network, Ethernet, and 802.11 WLAN.
- Wireless router – can act as gateway for local wired or wireless LAN to access the Internet.
- Serial communication – field equipment can connect via RS-232, RS-422/485, or LAN ports.
- Localization – GPS receiver allows applications or local devices to pinpoint exact location.
- VPN – IPSec security and PPTP VPN capabilities are available.

ZyWAN-G9 Model Numbers

The standard model numbers for the ZyWAN-G9 are determined by the hardware options which are part of the product. The list of features and model number variations are explained next.

ZyWAN-G9 - Options

where,

Options identifies additional optional components.

- EVDO** = EVDO cellular modem (Sierra Wireless MC5727)
- HSDPA** = HSDPA cellular modem (Sierra Wireless MC8790)
- IDEN** = IDEN cellular modem (Motorola iO270)
- GPS** = GPS receiver
- WiFi** = WiFi (802.11b/g) wireless transmitter

Some of the available models are listed next, along with their Eurotech item numbers. In addition, project-specific model names are given to ZyWAN-G9 models, which may include specific hardware or software to meet customer project requirements.

Item Number	Description
930150-4003R	ZyWAN-G9
930150-4004R	ZyWAN-G9-GPS
930150-4005R	ZyWAN-G9-GPS-WiFi
930150-4006R	ZyWAN-G9-WiFi
930150-4008R	ZyWAN-G9-SMART003A (GPS, WiFi, COM8)
930150-4009R	ZyWAN-G9-SMART003A (GPS, WiFi)
930150-4010R	ZyWAN-G9-HSDPA-GPS-WIFI: European

Supported Modems

Cellular modems may be provided as factory-built options, as listed in the model types above, and are also available from cellular providers as plug-in USB sticks added as peripherals to the ZyWAN-G9. A list of supported third-party cellular modems is given below. Support for other modems will be developed over time as new modems become available.

Built-in Modem	Cellular Technology	Manufacturer
iO270	IDEN	Motorola
MC5727	EVDO	Sierra Wireless
MC8790	HSDPA	Sierra Wireless

USB Plug-in Modem	Cellular Technology	Manufacturer
Compass C885	HSDPA	Sierra Wireless
Compass C888	HSDPA	Sierra Wireless
Compass C889	HSDPA	Sierra Wireless
MC760	EVDO	Novatel
USB598 / T598	EVDO	Sierra Wireless
USBConnect Shockwave (USB308)	HSDPA	Sierra Wireless

Accessories

Several accessories for the ZyWAN-G9 are listed here.

Item Number	Description
2040-14214-000-000	ZyWAN-G9 Power Cable - 10ft (Included w/ base system)
930150-4007R	ZyWAN-G9 U598 Mounting Kit (includes antenna jumper and foam pads for securing modem)
7060-14301-001-191	ZyWAN-G9 STARTER KIT (Includes all of the items which are listed separately below.)

7000-14172-901-101	ZyWAN-G9 AC Power Supply
2153-10492-000-000	AC Power Cord
7000-09598-000-000	RS232 Null Modem Cable
2040-10070-000-000	Crossover RJ45 Ethernet cable

Operating Characteristics

Electrical Characteristics

General

FEATURE	DESCRIPTION
Processor/clock:	520MHz PXA270 processor
Dimensions:	238.5mm (9.4") x 141mm (5.6") x 65mm (2.6")
Weight:	1.25 kg (2.75 lbs)
Mounting:	Panel mount aluminium enclosure
Memory:	128 Mbytes SDRAM and 32Mbytes Flash
Serial ports:	(3) RS-232 and (1) RS-422/485
LAN:	(2) RJ45 10/100baseT
USB	(3) USB 1.1 ports (one external, 2 internal)
Wireless WAN:	HSDPA, EVDO, or iDEN cellular data network, and 802.11b/g option
GPS	Fastrax iTrax 03 GPS receiver

Power

FEATURE	DESCRIPTION
Input power:	+10 to +26 VDC
Overvoltage/reverse voltage protection:	100 VDC
Ignition sense input:	12 VDC protected
Power consumption:	2 W (excluding 802.11, cellular and other peripheral devices)
	Power consumption for communication devices varies depending on the amount of transmission time. Typical values for maximum power consumption are listed (assuming full transmit power over a sustained period). Realistically, the total power consumption is much less because the module does not transmit continuously.
	802.11 (Ubiquity): 5 W (max)
	iDEN (iO270) cellular module: 4.8 W (max)
	HSDPA (MC8790) cellular module: 2.6 W (max)
	EVDO (MC5727) cellular module: 3.1 W (max)
	USB cellular modules: 3 to 5 W (max), depending on the module

Temperature Range

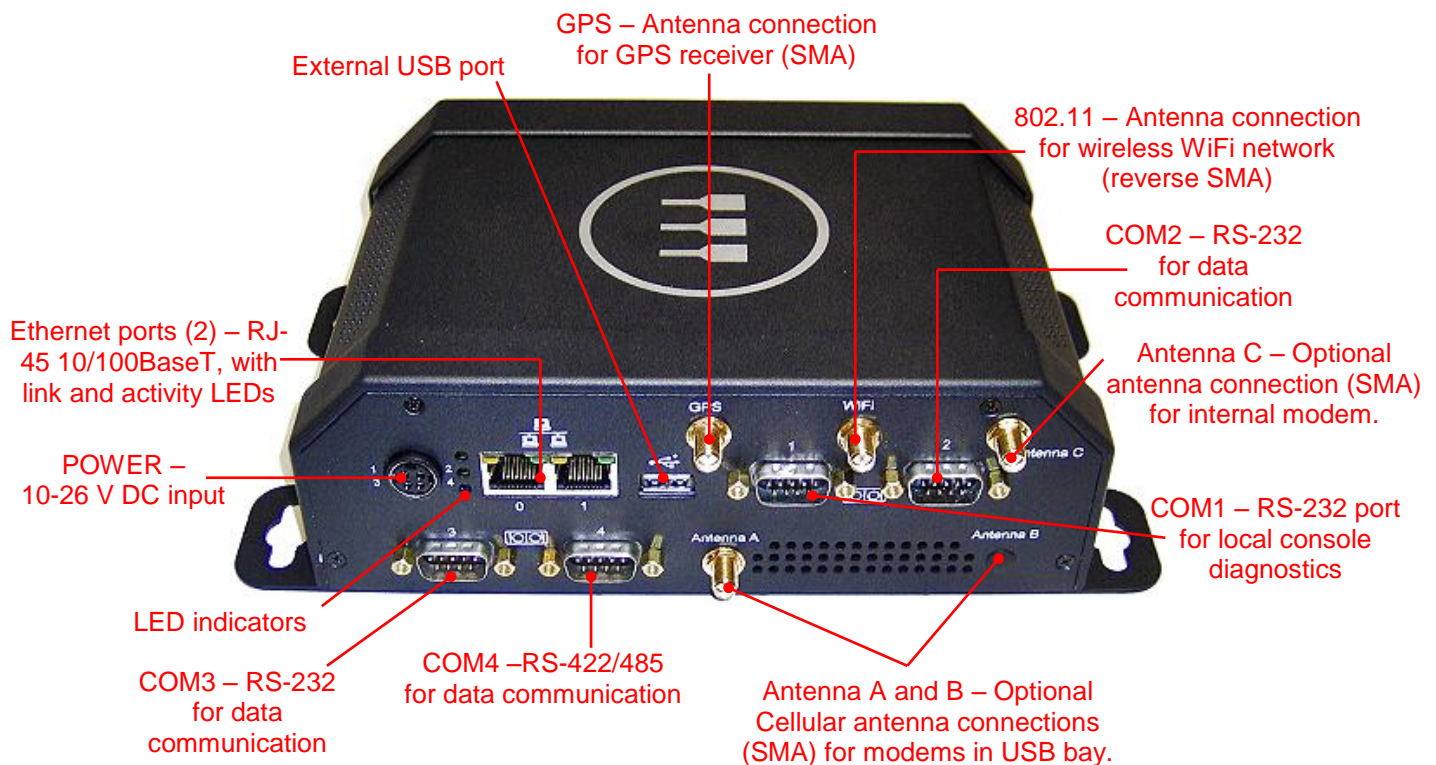
FEATURE	DESCRIPTION
Temperature:	
Operating:	-20 to +65 C Note: Certain models of cellular modems or WiFi cards may have a lower operating temperature range. Contact your local Eurotech representative for more details.
Storage:	-40 to +85 C
Humidity:	10% to 90% relative humidity (non-condensing)

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PART 1: GETTING STARTED

Chapter 1 Interfaces

The front panel of the ZyWAN-G9 contains the following ports and indicators:



Further information about these ports and connectors is provided in the following sections.

LED Indicators

The ZyWAN-G9 has three LED lights which indicate the following:

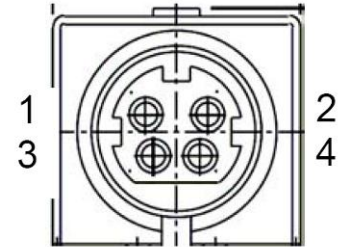
POSITION	INDICATES	DISPLAY EXPLANATION
Top	Power and GPS	Off = ZyWAN is not powered.
		On = On during startup of ZyWAN.
		Slow blink = ZyWAN is running, but there is no GPS lock. (Slow blink is approximately one blink every 2 seconds.) Fast blink = ZyWAN running, and GPS position lock obtained.
Middle	Cellular Connection Status	Off = Cellular interface not started (ppp0 not present). On = Cellular interface started, and network communication ability probable. (This does not necessarily guarantee that communication can occur. For instance, when the interface is established but the device goes out of range of cellular coverage, the light may still indicate a solid On condition.) Slow blink = Cellular network is connected and received data activity is detected.
		Off = WiFi interface not started (eth2 not present). On = WiFi interface started, and network communication ability probable. (This does not necessarily guarantee that communication can occur. For instance, when the interface is established but the device goes out of range of WiFi coverage, the light may still indicate a solid On condition.) Slow blink = Received data activity detected on WiFi network.
		Bottom

Power Connector

The ZyWAN-G9 can be powered from 10 to 26 VDC. Power to the ZyWAN-G9 is supplied via the 4-pin power socket (mating connector: Kycon KPPX-4P plug). The power plug must be inserted with the flat part of the plug facing up (toward the top of the ZyWAN front panel). The pin configuration is as follows:

PIN	SIGNAL NAME
1	+ Power
2	Ignition sense
3	- Power (GND)
4	GND

The ignition sense input is intended for sensing the on/off condition of a vehicle's ignition, but it is not yet supported in the ZyWAN-G9 application software.

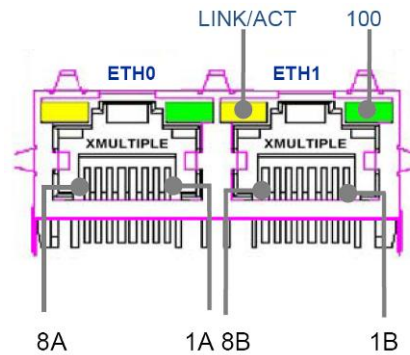


As viewed from the front panel

Ethernet

The pin assignments for the Ethernet LAN connection are shown in the following table. The yellow LED is a Link/Activity light, which illuminates when a 10/100Base-T connection is made and flashes when there is data activity. The green LED illuminates when a 100 MB/s connection is made.

PIN	SIGNAL NAME
1	Transmit +
2	Transmit -
3	Receive +
4	Reserved
5	Reserved
6	Receive -
7	Reserved
8	Reserved



USB

The external USB port is a standard USB 1.1 port available for general use.

Two other locking USB 1.1 ports are available under the ZyWAN-G9 in a covered bay, and are intended to be used with peripheral devices, generally cellular modems. To release the locking USB ports, press in the lever above the port while removing the USB peripheral device.

Antenna Connections

The Antenna A and Antenna B connectors on the front of the ZyWAN-G9 are SMA connectors, which if fitted will come from devices mounted in the USB bay. The Antenna C connector is another optional position for an SMA connector, which may come from a built-in modem mounted internally (not in the USB bay).

The cellular antennas to be connected to any of the cellular antenna connectors must be rated for operation within one or more of the ranges required by the ZyWAN-G9 model/cellular type, as given in the following table.

CELLULAR TYPE	FREQUENCIES
EVDO	US Cellular (824-894 MHz) North America PCS (1850-1990 MHz)
HSDPA	GSM 850 (824-894 MHz) EGSM 900 (880-960 MHz) GSM 1800 (1710-1880 MHz) GSM 1900 (1850-1990 MHz)
iDEN	iDEN 800 (806-870 MHz) iDEN 900 (896-941 MHz)

The GPS connector (if fitted) is a standard polarity SMA connector, which connects to a GPS antenna with a typical frequency of 1575.42 MHz (L1). Typically, GPS antennas must have line of sight to a wide area of the sky in order to receive signals from multiple positioning satellites.

The WiFi connector (if fitted) is a reverse polarity SMA (male) connector for 802.11. It connects to a WiFi antenna, with a typical range of 2.4-2.485 GHz.

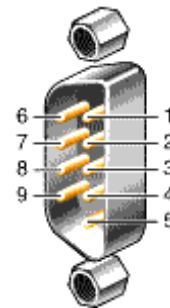
Serial Ports

The following tables show pin assignments for the serial ports.

COM1, COM2, COM3 (RS-232)

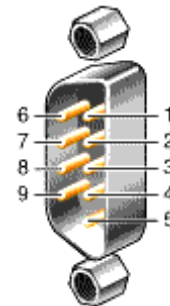
PIN	SIGNAL NAME
1	Data Carrier Detect (DCD)
2	Receive Data (RX)
3	Transmit Data (TX) *
4	Data Terminal Ready (DTR) *
5	Ground
6	Data Set Ready (DSR)
7	Request To Send (RTS) *
8	Clear To Send (CTS)
9	Ring Indicator (RI)

* = output signals



COM3 (4-wire RS-485/422)

PIN	SIGNAL NAME
1	NC
2	NC
3	RS-485/422 TX-
4	RS-485/422 RX-
5	GND
6	NC
7	RS-485/422 TX+
8	RS-485/422 RX+
9	GND



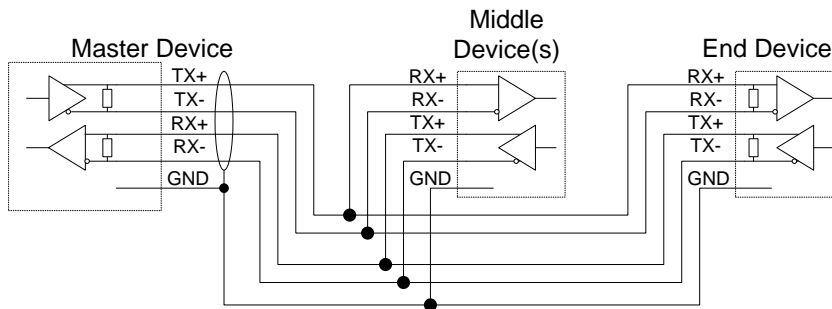
RS-485 / RS-422 wiring diagrams

When connecting RS-485 or RS-422 devices in a multidrop configuration, there must usually be a 120Ω termination resistor at one or both end devices in the network but NOT on any devices in the middle of the loop. The ZyWAN-G9 provides a 4-wire RS-485/422 interface.

In RS-485 or RS-422 systems, connect the ground terminal in common between all devices. It is recommended to use shielded, twisted pair cable. Connect the cable shield to the RS-485/422 ground AT ONLY ONE POINT in the network. In the ZyWAN-G9, the RS-485/422 ground is in common with other electrical grounds in the system.

The following wiring diagrams show the correct device connection arrangements.

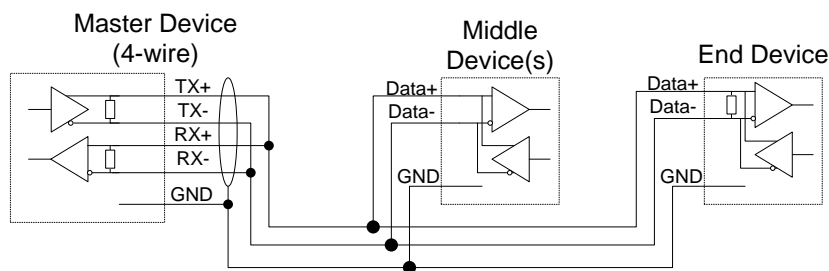
4-wire RS-485/422 Device Connections



End device (and RS-485 Master) may need 120 ohm termination resistor, optional middle device(s) must not have resistor.
 Drawing is labeled as if devices are DTE. Direction of arrows is correct, regardless of RX/TX labeling on a given device.

Drg. S15037-02b

4-wire to 2-wire RS-485/422 Device Connections



End device (and RS-485 Master) may need 120 ohm termination resistor, optional middle device(s) must not have resistor.
 Drawing is labeled as if devices are DTE. Direction of arrows is correct, regardless of RX/TX labeling on a given device.

Drg. S15037-02c

Installing SIM cards and USB Modems

The ZyWAN-G9 option for the iDEN or HSDPA networks requires a SIM card from the network provider in order to operate on the cellular data network. The following sections describe installing the SIM card and a pluggable USB cellular modem.

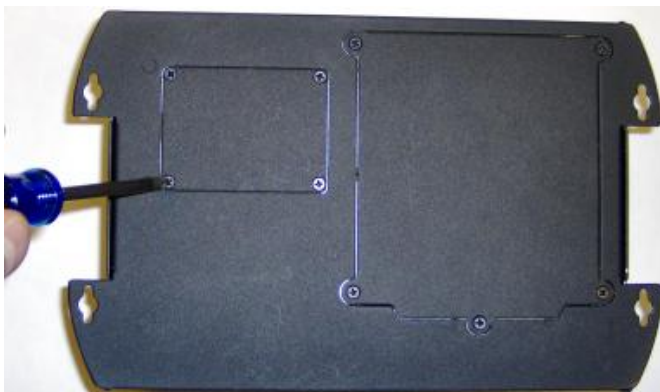
Installing SIM Card for USB Cellular Modem

When using a pluggable USB cellular module that requires a SIM card, the card fits into a SIM slot on the modem before installing it into the ZyWAN-G9 USB port.

Installing internal SIM Card for iO270 or MC8790

When using a built-in iO270 or MC8790 modem, the SIM card is accessible through an access panel on the bottom of the ZyWAN-G9. To change or install the SIM card for the iO270 or MC8790 modems, complete the following steps:

1. Disconnect the power connector, and then disconnect other connectors from the ZyWAN-G9.
2. Turn the ZyWAN-G9 upside down, remove the four screws from the small SIM access panel and remove the panel.



3. Slide the black SIM card holder to the open position and remove the existing SIM card.



4. Install the new SIM card, sliding the cover to lock the card in place. Ensure the card is fully seated and the SIM card holder is locked firmly into place. (If the SIM card is not installed properly, the ZyWAN-G9 will not connect to the network.) Replace the access panel.

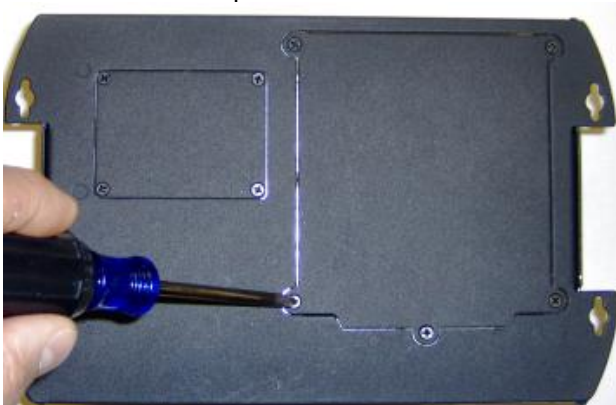
5. Restore all connections, reconnecting the power cable last.

Installing Internal USB Modem

To install an internal USB modem, complete the following steps. The modem installation requires:

- USB Modem with active EVDO or HSDPA (with SIM) account – supplied by customer. Modem should include a port for connecting an external cellular antenna.
- ZyWAN-G9 modem mounting kit, including antenna cable jumper and two foam pads – contact Eurotech.

1. Disconnect the power connector, and then disconnect other connectors from the ZyWAN-G9.
2. Turn the ZyWAN-G9 upside down, remove the five screws from the large USB bay access panel and remove the panel.

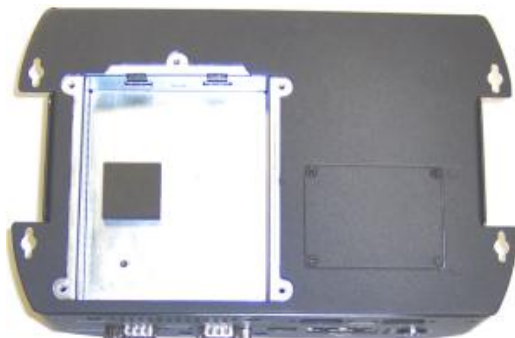


3. Attach the antenna cable jumper to the external antenna port on the modem. The location of the antenna port varies depending on the modem.



4. (optional) In mobile applications where the ZyWAN-G9 may experience vibration, the foam pads can be applied to prevent vibration of the modem. Determine which USB port will be used for the modem. Either port may be used, but the choice might depend on the location of the antenna cable jumper on the modem.

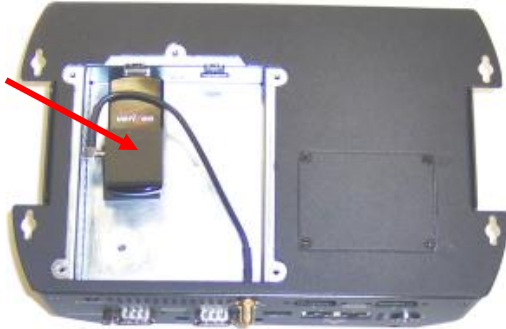
Remove the backing from one piece of foam pad to expose the adhesive. Place the foam inside the USB bay behind one of the USB ports, centered about halfway between the front and back sides of the USB bay, and adhere it to the ZyWAN-G9 enclosure.



5. Connect the antenna cable to the faceplate in the “ANT A” or “ANT B” location, and tighten the mounting nut securely. Fit the modem securely into the USB port.



6. (optional) Remove the backing from the other piece of foam padding to expose the adhesive. Adhere the foam to the top of the modem.



7. Replace access panel, restore connectors and power.

Battery Link

The ZyWAN-G9 contains a coin-type replaceable Lithium battery (CR2032, 3V) to maintain its real-time clock when input power is removed. The battery is enabled by fitting a jumper on the main circuit board, in position JP2 next to the battery. The ZyWAN-G9 is normally shipped with the battery jumper connected.

Understanding Network Interfaces

The ZyWAN-G9 contains at least four possible IP network connections or 'interfaces'. These interfaces are mentioned throughout this manual and on the ZyWAN-G9 configuration page. The ZyWAN-G9 system assigns each interface a name. The last character of each interface name is a number, 0 (zero) or 1 (one), as listed in the following table. When these interface names are used in the Web configuration page, they must be entered exactly as written (case sensitive).

NAME	INTERFACE DESCRIPTION
eth0	Ethernet port 0
eth1	Ethernet port 1
eth2	802.11 WiFi network (via internal USB/Ethernet and Ubiquity WiFi adapters)
ppp0, ppp1, etc.	Cellular network (for all cellular technologies and providers)

Chapter 2 Accessing the ZyWAN-G9

This section describes several ways to gain access to the ZyWAN-G9 for diagnostic and system maintenance purposes and some utility software that may be useful for troubleshooting.

What You Will Need

Hardware Requirements

The ZyWAN-G9 must be connected to a stand-alone computer and/or a network, so that the initial configuration may be loaded via the Web configuration page.

In order to perform the initial configuration via a stand-alone computer, you need the following hardware:

- ZyWAN-G9 unit
- Power supply
- Computer with 10base-T Ethernet network port and Web browser
- Ethernet crossover cable

In order to perform the initial configuration via an existing network, you need the following hardware:

- ZyWAN-G9 unit
- Power supply
- Network equipment and cables to connect ZyWAN-G9
- Computer with network connection, RS-232 serial port, and Web browser
- Serial crossover cable (or some other means of identifying the DHCP-assigned address of the ZyWAN-G9 after it powers on)

Software Requirements

The computer used to perform the ZyWAN-G9 configuration must have the following software:

- Windows operating system (Windows 2000, Windows XP, Windows 7)
- Web browser: Internet Explorer ver. 7 or 8, Mozilla Firefox ver. 3, or Google Chrome
- Serial terminal program, such as PuTTY, Windows HyperTerminal, or Tera Term.

Other operating systems or Web browsers may be used, but they may not work as described in this document.

Network Requirements

The network used to perform the ZyWAN-G9 configuration must have the following requirements:

- Either a direct connection (via Ethernet crossover) or existing network LAN connection from the computer to the ZyWAN-G9 for the initial setup
- Network configuration of wired LAN, wireless 802.11 WAN, and/or cellular networks depending on the network used after initial configuration
- Knowledge of the final networking address requirements in order to configure the ZyWAN-G9
- If using cellular services, a registered cellular data account for this ZyWAN-G9

Optional Equipment

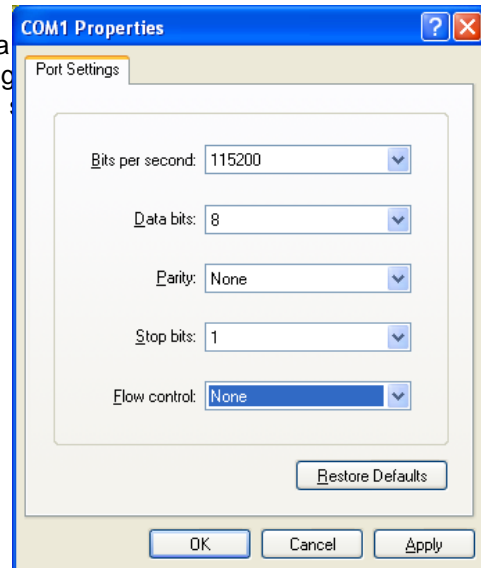
Several optional components may be supplied as components of the ZyWAN-G9, including GPS Receiver and the Wireless LAN 802.11 card. These modules are plugged into internal sockets of the ZyWAN-G9. Cellular and 802.11 antennas must conform to applicable regulations in order to ensure compliance with FCC regulations.

Additional Documentation

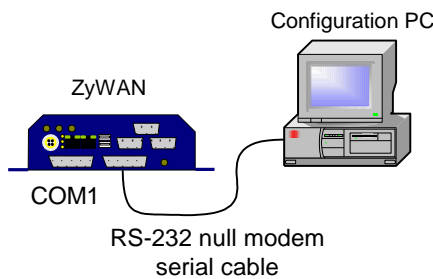
In addition to this manual, there may be additional documentation or support material relating to the ZyWAN-G9 configuration. Contact Eurotech Support using the address information at the end of this manual.

Serial Connection to COM1

The COM1 port of the ZyWAN-G9 is used for a local administrative ('root') login to the ZyWAN-G9 using a terminal program. The section describes the setup for the terminal program. The default baud rate is 115200 baud, 8 data bits, 1 stop bit, no parity, and no flow control.



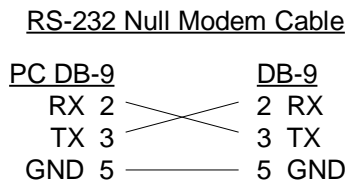
a local administrative ('root') login to the ZyWAN-G9 using a terminal program. The section describes the setup for the terminal program. The default baud rate is 115200 baud, 8 data bits, 1 stop bit, no parity, and no flow control.



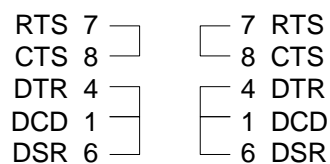
Press the **Enter** key to get a login prompt. The default login is `root` and the default password is `arcom` (case-sensitive).

RS-232 Null Modem Cable

To connect the ZyWAN-G9 to another computer (DTE) device, such as on COM1 for the console diagnostic port, a null modem serial cable must be used. The pinout for this cable is shown next.



optional (loopbacks required if hardware handshaking enabled)



Drg. S15037-03b

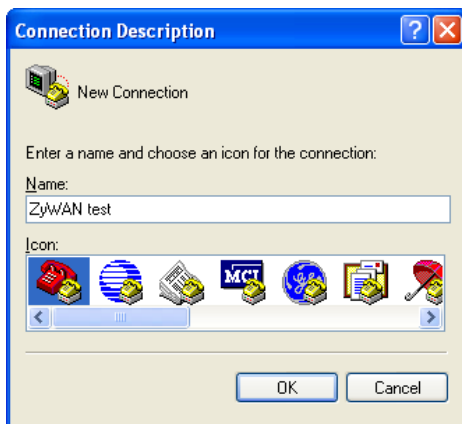
Setting Up Software

There are several third-party software programs that may be needed for configuring or using the ZyWAN-G9. A serial terminal program can be used to connect to the ZyWAN for administrative access. This section describes the setup for Windows HyperTerminal and PuTTY. Tera Term (<http://www.ayera.com/teraterm/>) is another serial terminal program that may be used, but it is not discussed here. PuTTY also allows administrative access to the ZyWAN over the network, and WinSCP may be used in some cases to upload or download files.

Windows HyperTerminal

Windows provides a serial terminal program, HyperTerminal, for serial communications. This can be used to access the console port of the ZyWAN-G9 for diagnostics. The following steps are the setup instructions for Windows HyperTerminal. (HyperTerminal is not included with Windows 7.)

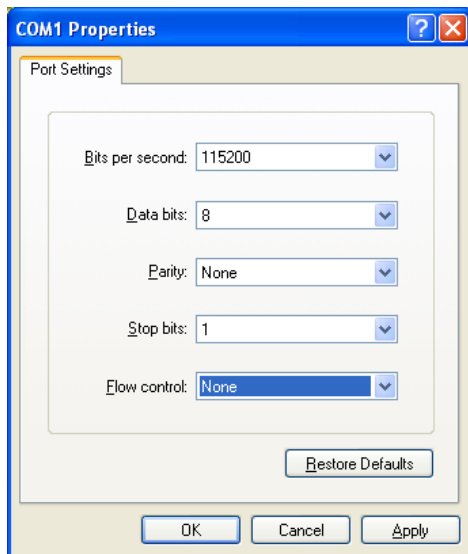
1. In the Windows Start menu, select Programs>Accessories>Communications>HyperTerminal. The Connection Description window is displayed.
2. Enter a name for this HyperTerminal configuration, as shown next.



3. Set the *Connect using* option to *COM1* or whatever free RS-232 port exists on this PC.



- Make the following settings for the serial communication, then click the **OK** button.



- If the ZyWAN-G9 is already started, press the **Enter** key to get a login prompt. The default login is `root` and the default password is `arcom` (case-sensitive).

SSH Client, Terminal Program (PuTTY)

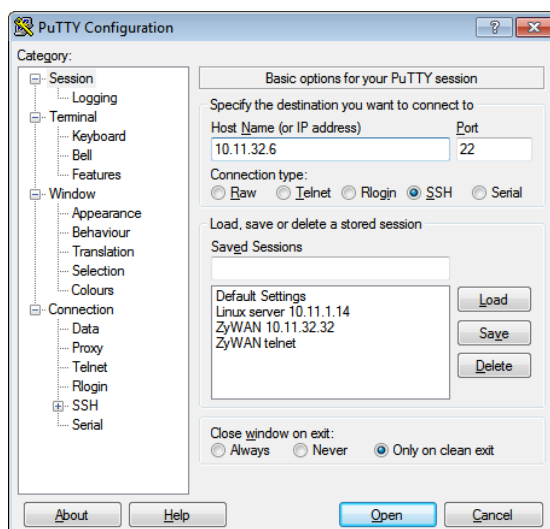
The ZyWAN-G9 allows remote console logins using Secure Shell (SSH), which requires SSH client software. Unencrypted Telnet to the ZyWAN-G9 is not an option.

For Linux systems, the 'ssh' command is available as an SSH client.

For Windows systems, the PuTTY program is available as a free SSH client. Download and install PuTTY (choose the Windows installer version) from

<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>.

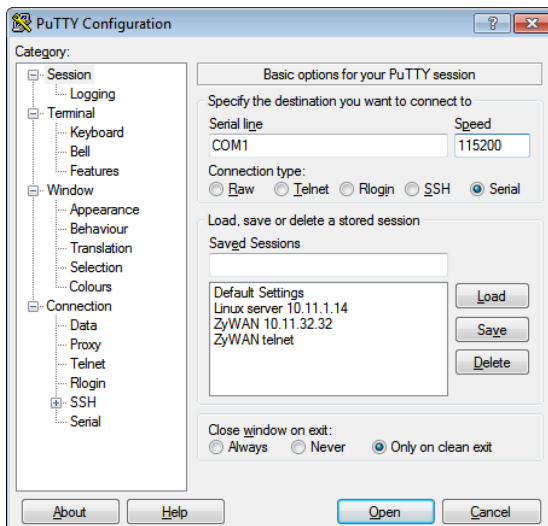
Once the PuTTY application is installed on the Windows computer, run the application and enter the IP address of the ZyWAN-G9. Set the *Connection type* to *SSH* and the *Port* to 22 (unless the port has been changed on the ZyWAN-G9 from its factory default). Click the **Open** button to connect.



The first time a connection is made with PuTTY, a security warning is given as PuTTY tries to authenticate with the ZyWAN-G9. Click **Yes** to continue, as long as you are sure that this is the correct ZyWAN-G9 device. Then log in with the correct username and password. The default administrative login is `root` and the default password is `arcom` (case-sensitive).



PuTTY also allows for serial terminal access to COM1, instead of using Windows HyperTerminal. Set the *Connection type* to Serial, and the *Speed* to 115200. Click the **Open** button to connect.



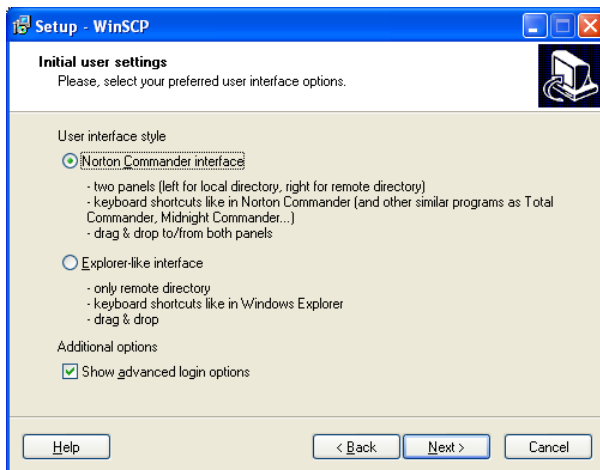
If the ZyWAN-G9 is already started, press the **Enter** key to get a login prompt. The default login is `root` and the default password is `arcom` (case-sensitive).

SFTP/SCP Client (WinSCP)

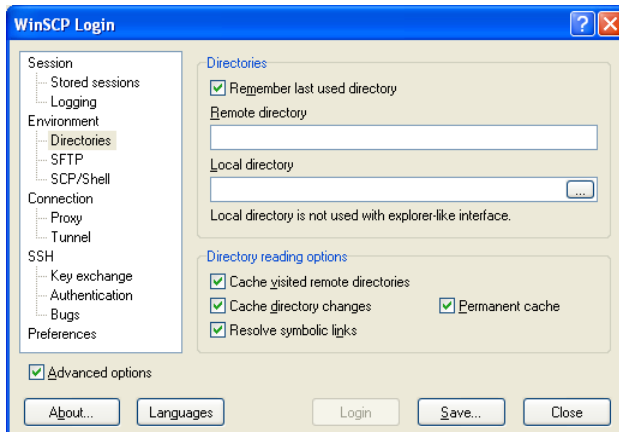
There may be occasions when you must upload or download files to/from the ZyWAN-G9. Unencrypted FTP is not an option. This requires the SFTP or SCP (Secure FTP or Secure Copy) protocol, which use an encrypted SSH network connection.

For Linux systems, the 'sftp' and 'scp' commands are available for file transfers to the ZyWAN-G9.

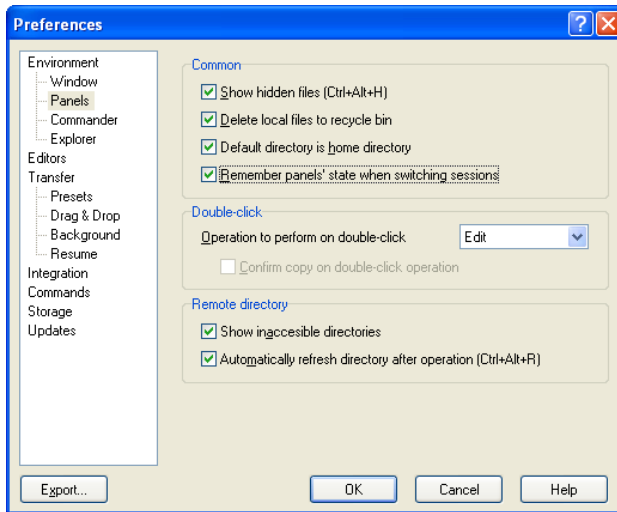
For Windows systems, the WinSCP application is available as a free download for SFTP/SCP file transfers. This is available from www.winscp.net. Download and install the latest version of WinSCP from this site. One option presented during installation is the user interface style. Either style can be used, but it is recommended to choose the Norton Commander interface that allows display of both the local and remote directories.



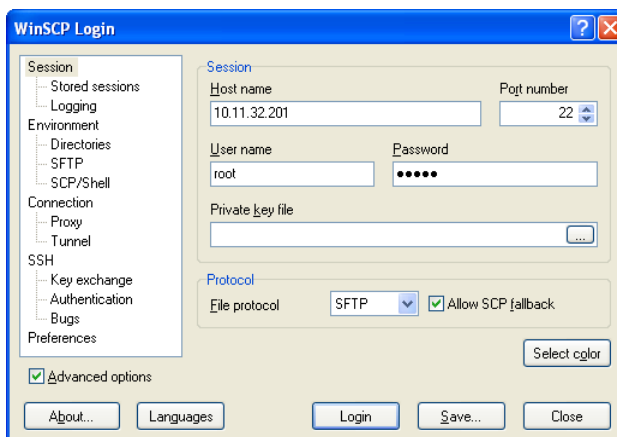
Run WinSCP after installing it. It may be useful to set the option *Remember last used directory* under the Environment>Directories menu.



Also, select the *Preferences* option, and then click the **Preferences** button. It may be useful to set the *Remember panels' state when switching sessions* option in the Environment>Panels menu.

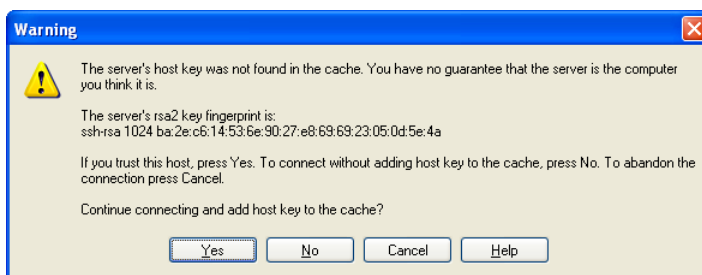


In the main window of WinSCP, select the Session menu. In the *Host name* field, enter the IP address of the ZyWAN-G9. The username and password can also be entered at this time. Individual session configurations may be saved, if repeated connections need to be made to the same address. These will appear in the Stored sessions menu of the WinSCP menu.



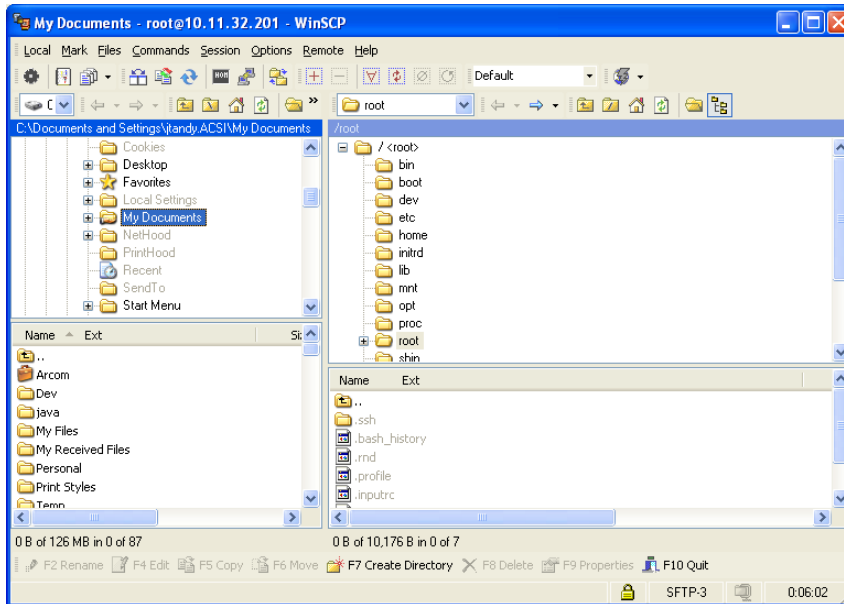
Click **Login** to connect.

The first time a connection is made with WinSCP, a security warning is given as WinSCP tries to authenticate with the ZyWAN-G9. Click **Yes** to continue.



Once connected, WinSCP shows the local directories and files in the left panes. The right panes show the directories and files on the ZyWAN-G9 (using WinSCP's Norton Commander interface only). If all four panes are not visible, they can be displayed by choosing the *Options>Local Panel>Tree* and *Options>Remote Panel>Tree* menu options.

You can drag and drop files between the panes or other Windows Explorer windows. Navigate through the local or remote directory structures in the upper panes, as needed.



Initial Connection with Single PC

The ZyWAN-G9 typically comes factory loaded with default settings, which need to be configured for the network on which it will ultimately be used. The instructions in the following two sections describe how to set up the hardware and software necessary to perform this initial configuration.



Note:

Ethernet port '1' is used in this section, which typically comes with standard settings of address 192.168.1.1, subnet mask 255.255.255.0, and operating as a DHCP server. In some cases, the ZyWAN-G9 may come factory loaded with different settings. The instructions given here may or may not apply, depending on the customer configuration.

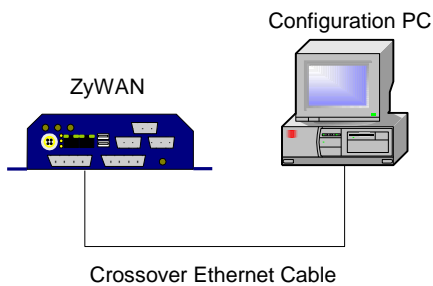
The simplest way to start the ZyWAN-G9 and perform an initial configuration is to use a direct connection to another computer (PC). To make a direct connection, complete the following steps:

1. Connect the configuration PC using a crossover Ethernet cable.
2. Apply power to the ZyWAN-G9.
3. Set up the PC's network settings.
4. Configure the ZyWAN-G9 via its Web page.

The following sections provide detailed explanations of these actions.

1. Connect the Configuration PC

Connect a crossover Ethernet cable from the network port labelled '1' on the ZyWAN-G9 to an Ethernet port on the PC as shown in the following diagram.



The crossover Ethernet cable may be purchased from Eurotech, or it may be obtained from a network equipment supplier.

2. Apply Power

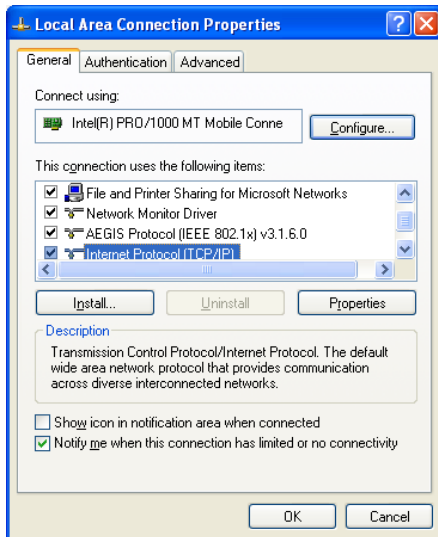
Connect the power supply to a wall outlet and to the 4-position power connector on the ZyWAN-G9. See [Power Connector](#) on page 17 for the power input socket pin configuration details.

3. Set Up the Network

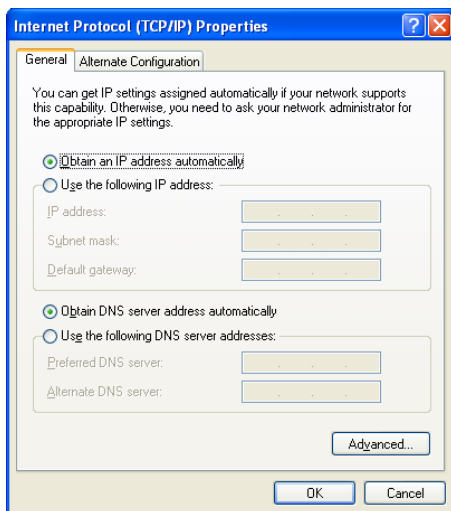
The PC must be set up to obtain its network address from the ZyWAN-G9 for this test. After initial configuration of the ZyWAN-G9, the PC can be changed back to its normal network settings.

To configure the network as mentioned previously, complete the following steps:

1. In the Windows Start menu, select Control Panel>Network Connections. Look at the properties of the *Local Area Connection*.



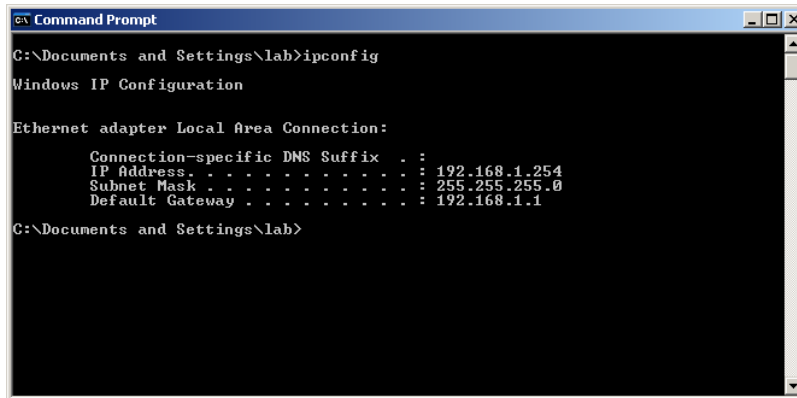
2. Open the properties for the *Internet Protocol (TCP/IP)*. Select the **Obtain an IP address automatically** and **Obtain DNS Server address automatically** checkboxes as shown in the following screen capture.



3. Record the existing settings, then make the changes to obtain the IP address and DNS server automatically.
4. Click **OK** to close the *Local Area Connection* properties, and reboot the PC if prompted to do so.

The PC automatically obtains its address from the ZyWAN-G9. To check the address, complete the following steps:

1. In the Windows Start menu, select Accessories>Command Prompt. The Command Prompt window is displayed.
2. Enter the command `ipconfig`. Under *Local Area Connection*, the address is 192.168.1.x, where x is a number between 2 and 254.



```
C:\Documents and Settings\lab>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

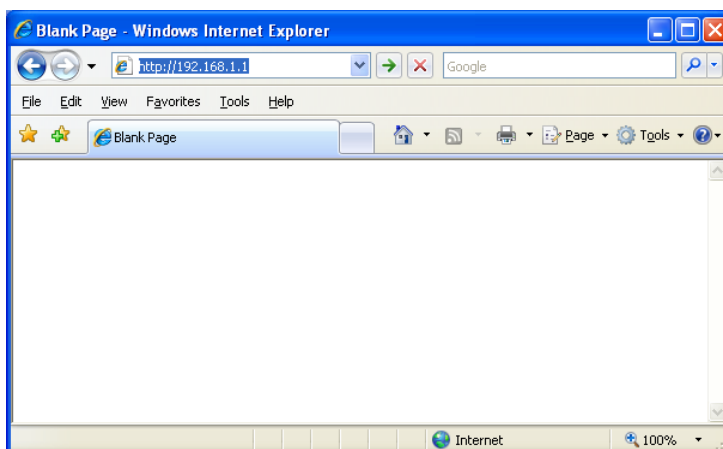
    Connection-specific DNS Suffix  . : 
    IP Address. . . . .               : 192.168.1.254
    Subnet Mask . . . . .             : 255.255.255.0
    Default Gateway . . . . .         : 192.168.1.1

C:\Documents and Settings\lab>
```

4. Browse ZyWAN Configuration Page

To browse the ZyWAN configuration page, complete the following steps:

1. Open a Web browser and enter the address `http://192.168.1.1` into the address bar.



A dialog box is displayed asking for the username and password.

2. Enter your username and password. The default username is `arcom` and default password is `arcom`. The ZyWAN-G9 configuration page is displayed. See [Chapter 1 Web Configuration Page](#) on page 42, for further instructions on configuration.

Initial Connection Over a Network

An alternate way to start the ZyWAN-G9 and to perform an initial configuration is to connect it to an existing network which also contains the configuration computer (PC).



Note:

Ethernet port '0' is used in this section, which typically comes configured to obtain its address automatically from a network using DHCP. In some cases, the ZyWAN-G9 may come factory loaded with different user settings. These instructions may or may not apply, depending on the customer configuration.

To connect the ZyWAN to an existing network which also contains the configuration computer, complete the following instructions:

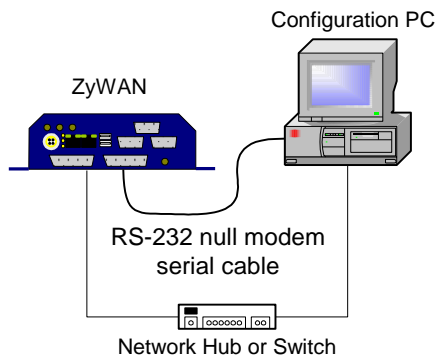
1. Connect ZyWAN-G9 to an existing Ethernet network and to the PC serial port.
2. Apply power to the ZyWAN-G9.
3. Determine ZyWAN-G9 network address.
4. Configure the ZyWAN-G9 via its Web page.

The following sections provide detailed explanations of these actions.

1. Connect ZyWAN to the Network

To connect ZyWAN to the network, complete the following steps:

1. Connect the null modem serial cable from the PC to COM1 of the ZyWAN-G9.
2. Connect the ZyWAN-G9 network port labelled '0' to an existing network, using a standard 10base-T Ethernet cable as shown in the following diagram.



Note:

The PC must exist on the same network. Consult a network administrator for assistance, if necessary.

2. Apply Power

Connect the power supply to a wall outlet and to the 4-position power connector on the ZyWAN-G9. See [Power Connector](#) on page 17 for the power input socket pin configuration details.

3. Determine ZyWAN Network Address (DHCP)

Port 0 on the ZyWAN-G9 is typically set to acquire its address automatically using DHCP. Since the address is dynamically assigned, the ZyWAN-G9 address must be determined before it can be configured.

One way to check the ZyWAN-G9 network address is to use a crossover (null modem) serial cable between the PC and the ZyWAN-G9. The null modem cable can be purchased from Eurotech, or it may be obtained from an electronics supply store.

**Tip:**

If your network administrator can determine the DHCP assigned address after the ZyWAN-G9 starts up, the serial cable is not needed. Skip to 4. Browse ZyWAN Configuration Page on page 35.

To determine the ZyWAN network address (DHCP), complete the following steps:

1. Use PuTTY or HyperTerminal to establish communication to the ZyWAN-G9 on COM1 at 115,200 baud. See [Setting Up Software](#) on page 25, for help with this step.
2. If the ZyWAN-G9 is already started, press the **Enter** key to get a login prompt. The default login is `root` and the default password is `arcom` (case-sensitive).
3. After logging into the ZyWAN-G9, type the command `ifconfig eth0` at the command prompt. The current network address which has been assigned to the ZyWAN-G9 by the network is displayed.

```
root@ZyWanMast root# ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 00:80:66:04:2E:DA
          inet addr:10.11.5.13  Bcast:10.11.255.255  Mask:255.255.0.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:656687 errors:0 dropped:0 overruns:0 frame:0
          TX packets:22707 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:47320227 (45.1 MiB)  TX bytes:10527457 (10.0 MiB)
          Interrupt:46 Base address:0xa000
```

**Note:**

If the `ifconfig` command does not show an `inet addr` address, it may be that the network does not have a DHCP server or that security policies prohibit the ZyWAN-G9 from obtaining its address. A temporary address can be manually set if necessary by issuing the following command:

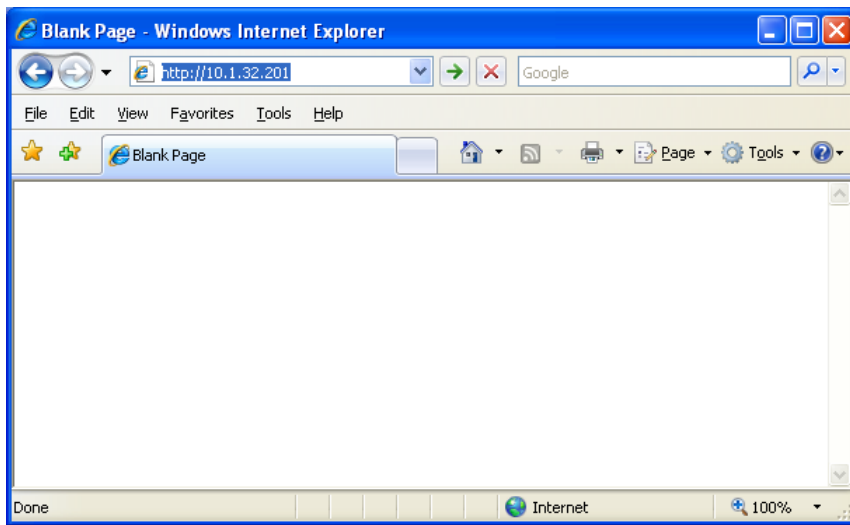
```
ifconfig eth0 ip_address netmask subnet
```

where `ip_address` is the actual address on the network, and `subnet` is the subnet mask in dotted notation (such as 255.255.0.0).

4. Browse ZyWAN Configuration Page

To browse the ZyWAN configuration page, complete the following steps:

1. Open a Web browser and enter the address of the ZyWAN-G9 into the address bar.



A dialog box is displayed asking for the username and password.

2. Enter your username and password. The default username is `arcom` and default password is `arcom`. The ZyWAN-G9 configuration page is displayed. See [Chapter 1 Web Configuration Page](#) on page 42, for further instructions on configuration.

Troubleshooting Connection Problems

If the Web configuration page does not come up with the instructions given in the last two sections, there are several things which can be done to troubleshoot connection problems.

Unable to Load Web Page

If the Web configuration page fails to load, the following are common reasons why this might happen.

1. Due to network configuration, the computer making the connection may not be able to reach the ZyWAN-G9. Check connection to the Web page by doing a ping command (see [Ping the ZyWAN](#), on page 37). However, if trying to connect over the Internet/cellular connection, a ping may fail because it is blocked by the cellular network. In this case, try making an SSH connection with the PuTTY application (see [SSH Client, Terminal Program \(PuTTY\)](#) on page 26 for help installing PuTTY), because the SSH connection should work if a connection can be made to the ZyWAN-G9.
2. Over the Sprint network in the United States, it may be that port 80 is blocked. In the Web browser, try entering the full HTTPS address of the ZyWAN-G9 (https://ip_address/cgi-bin/php/main.php, where *ip_address* is the address of the ZyWAN-G9), which may work to load the Web page.

Ping the ZyWAN

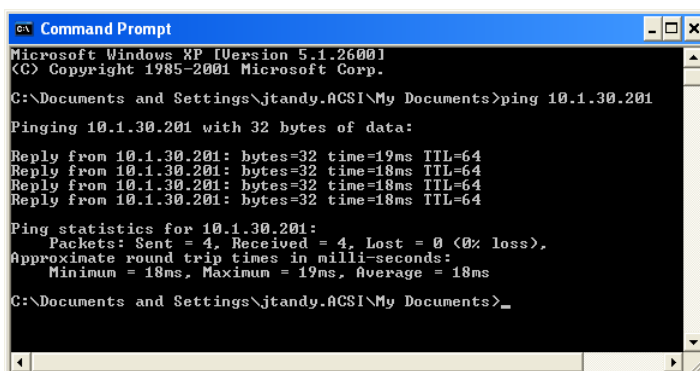
To ping the ZyWAN, complete the following steps:

1. In the Windows Start menu, select Accessories>Command Prompt. The Command Prompt window is displayed.
2. Type the command:

```
ping address
```

where *address* is the numeric address of the ZyWAN-G9.

A diagnostic message is sent to the ZyWAN-G9 to check communication. If successful, the Ping response receives the following reply.



```
Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\jtandy.ACSI\My Documents>ping 10.1.30.201

Pinging 10.1.30.201 with 32 bytes of data:

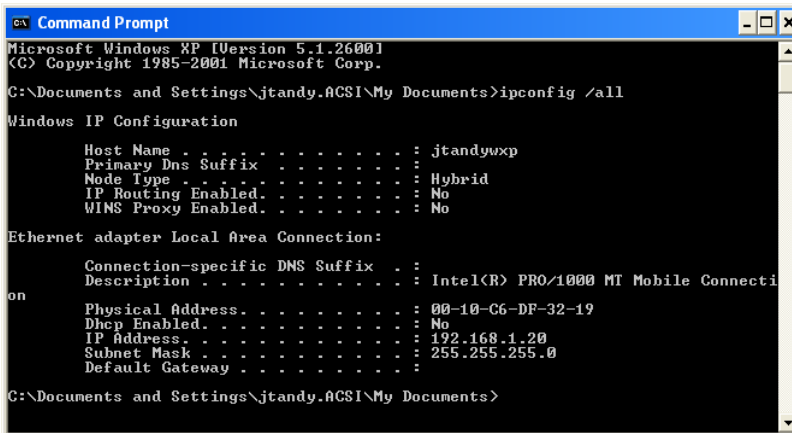
Reply from 10.1.30.201: bytes=32 time=19ms TTL=64
Reply from 10.1.30.201: bytes=32 time=18ms TTL=64
Reply from 10.1.30.201: bytes=32 time=18ms TTL=64
Reply from 10.1.30.201: bytes=32 time=18ms TTL=64

Ping statistics for 10.1.30.201:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 18ms, Maximum = 19ms, Average = 18ms

C:\Documents and Settings\jtandy.ACSI\My Documents>_
```

Check the PC's Network Configuration

To check the PC's network configuration, type the command `ipconfig /all` in the *Command Prompt* window. The network interface of the PC is displayed.



```

ca Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\jtandy.ACSI\My Documents>ipconfig /all

Windows IP Configuration

    Host Name . . . . . : jtandywqx
    Primary Dns Suffix . . . . . :
    Node Type . . . . . : Hybrid
    IP Routing Enabled. . . . . : No
    WINS Proxy Enabled. . . . . : No

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix . :
    Description . . . . . : Intel(R) PRO/1000 MT Mobile Connecti
on
    Physical Address. . . . . : 00-10-C6-DF-32-19
    Dhcp Enabled. . . . . : No
    IP Address. . . . . : 192.168.1.20
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

C:\Documents and Settings\jtandy.ACSI\My Documents>

```

If using the ZyWAN-G9 as a DHCP Server to the PC:

- Make sure the PC *Dhcp Enabled* is set to *Yes*.
- Make sure that the PC has been given a proper address from the ZyWAN-G9, according to how it's configured.

If using the PC in a fixed address mode, check the address and make sure that it is compatible with the address and subnet necessary to communicate on the network or direct to the ZyWAN-G9, depending on the test being performed.

If the ZyWAN-G9 is acting as a DHCP Server to the PC and is configured to serve the DNS addresses, these are displayed in the `ipconfig` settings.

Using ZyWAN COM1 for Diagnostics

When using a null modem serial cable connected to COM1, as described in [Initial Connection Over a Network](#) on page 34, several commands can be issued to the ZyWAN-G9 to diagnose network configuration or operation.

To check network configuration or availability, use the command

```
ipconfig
```

To set a temporary network address on an interface, use the command:

```
ipconfig interface ip_address netmask subnet
```

where *interface* is the network name (eth0, eth1, eth2), *ip_address* is the actual address on the network, and *subnet* is the subnet mask in dotted notation (such as 255.255.0.0).

To send a diagnostic message to another device on a network, use the command:

```
ping address
```

where *address* is the numeric or named address of another device. Press **Ctrl-C** to stop the ping.

To check the route table of the ZyWAN-G9, use the command:

```
route -n
```

To make a TCP/IP connection to a port on a device, use the command

```
nc ip_address ip_port
```

where *ip_address* is the device address on the network or 127.0.0.1 for the ZyWAN-G9 itself, and *ip_port* is the network port.

Check with Network Administrator

If you are still unable to get the ZyWAN-G9 to connect to an existing network, check with a network administrator for additional support.

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PART 2: SOFTWARE CONFIGURATION

Chapter 1 Web Configuration Page

Web Page Login

Configuration of the ZyWAN-G9 is done using a Web browser, either Internet Explorer, Mozilla Firefox or Google Chrome. Other Web browsers have not been tested but may also be compatible with the ZyWAN-G9 configuration Web page. This section gives detailed explanations of each configuration parameter. Some typical configuration examples are given later in this manual (page 106).

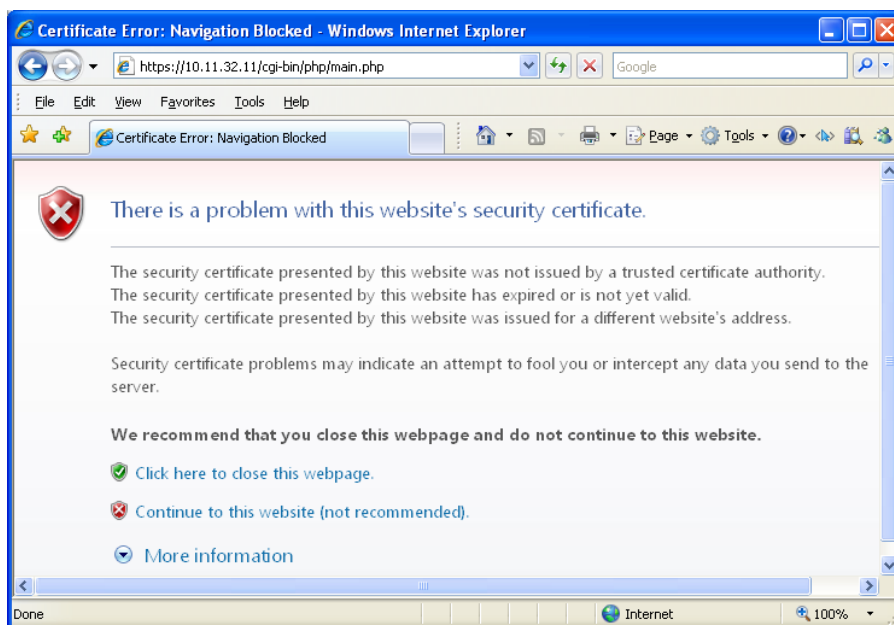
Make sure the ZyWAN-G9 is connected to the network. To log on to a web page, complete the following steps:

1. Enter 'http://' followed by the correct IP address. If the ZyWAN-G9 has never been configured, see [Initial Connection with Single PC](#) on page 30 or [Initial Connection Over a Network](#) on page 34. For instance, typically the default Web address on Ethernet port 1 is <http://192.168.1.1>.

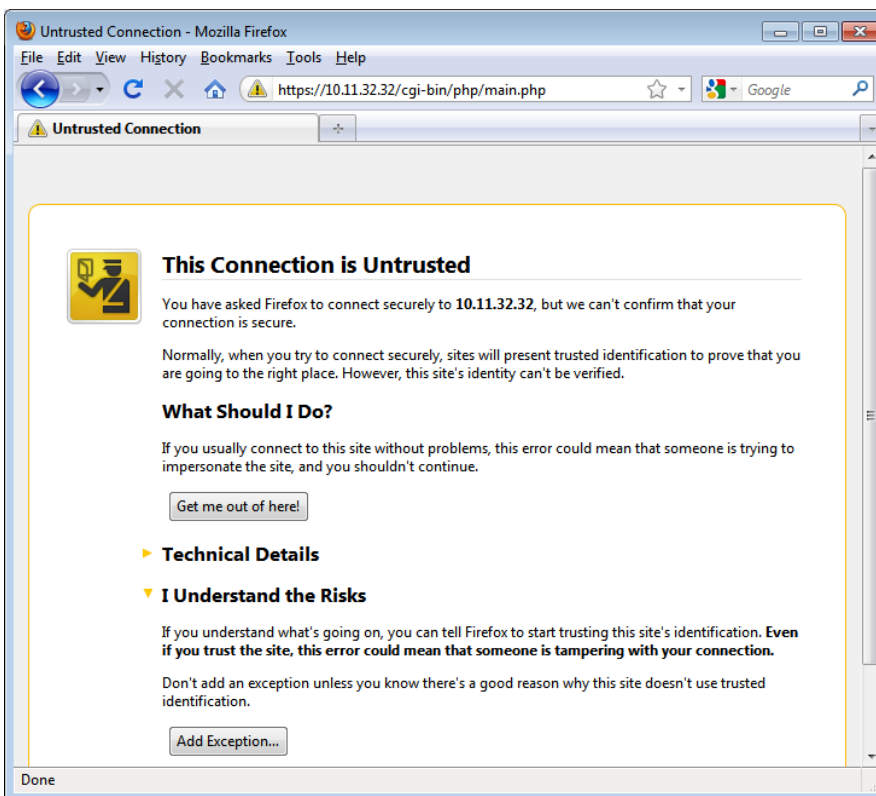
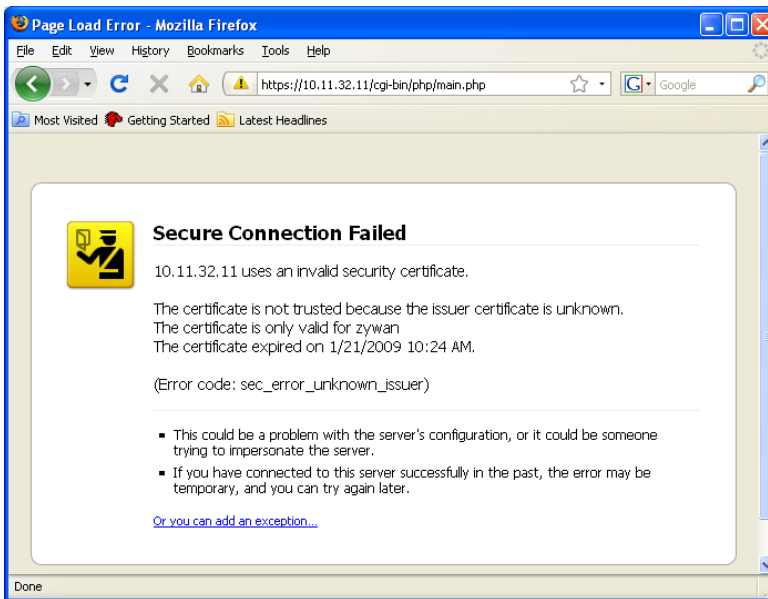
If the ZyWAN-G9 has been configured for a different network configuration, its current numeric IP address should be used. The Web configuration page may be accessed via any available network (cellular, WiFi, Ethernet), unless Web access for that network interface has been blocked by a network firewall.

2. By default, the ZyWAN-G9 uses HTTPS for secure transfer of configuration data. The browser will display a warning about the certificate.

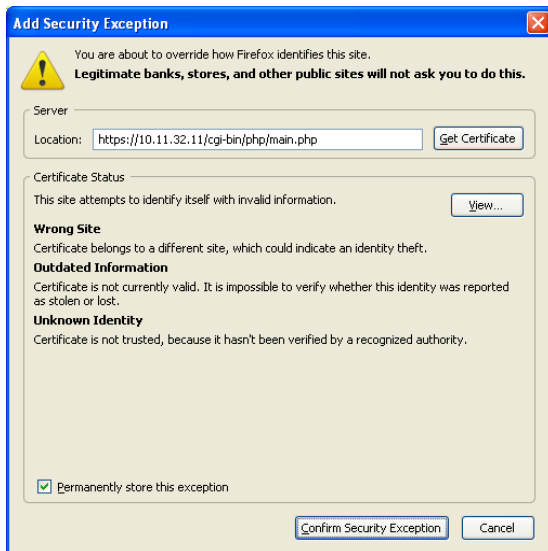
To continue past the security warning in Internet Explorer, click on the message **Continue to this website**.



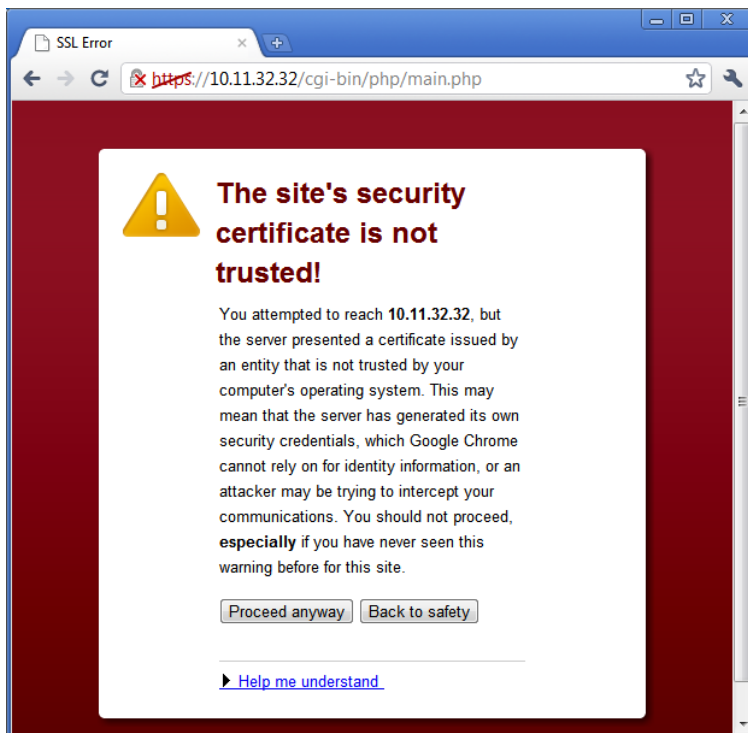
To continue past the security warning in Mozilla Firefox version 3, click “**I Understand the Risks**” or “**Or you can add an exception...**”. Then click “**Add Exception**”.



Then in the following dialog box in Mozilla Firefox, click **Get Certificate** and **Confirm Security Exception**.



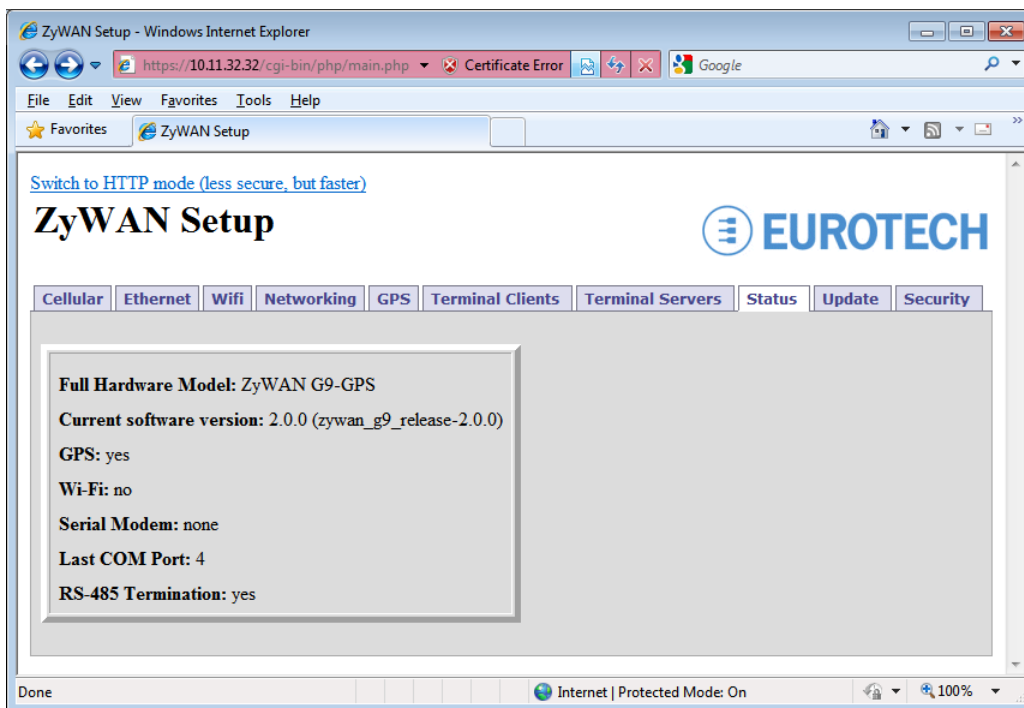
To continue past the security warning in Google Chrome, click **Proceed Anyway**.



3. Enter your login details when prompted. The default username is `arcom` and default password is `arcom`.



After logging in, the configuration page is displayed, as show in the following screen capture.



The tabs across the top (Cellular, Ethernet, etc.) identify each section or page of the configuration. The current settings for any page are read from the ZyWAN-G9 whenever a tab is clicked. Clicking on the tab of a page that is currently displayed reloads the existing configuration.

Switching Between HTTP and HTTPS

By default, the ZyWAN-G9 uses Secure HTTP (HTTPS) for displaying its Web pages. This uses network IP port 443 and encrypts the data transferred between the computer and the ZyWAN-G9. This can be switched to standard HTTP (unencrypted, IP port 80) by clicking on the link at the top, *Switch to HTTP mode (less secure, but faster)*. The address URL changes to http://ip_address/cgi-bin/php/main2.php.

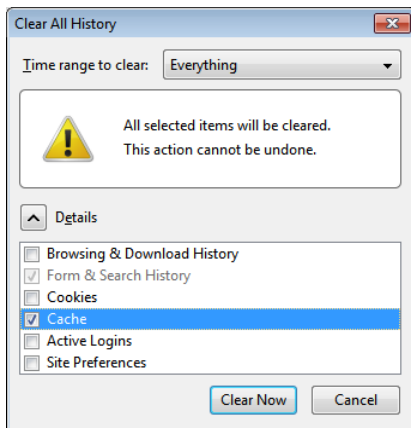
Switch back to HTTPS by clicking on the link *Switch to HTTPS mode (more secure, but slower)*. The address URL will change back to http://ip_address/cgi-bin/php/main.php.

Clearing the Browser Cache

**Note:**

Web browsers (Internet Explorer, Firefox) can store cached copies of downloaded Web pages. If unexpected results occur in displaying the Web configuration, it may be due to the browser caching a copy of the files that control the Web interface. To correct this error, delete *Temporary Internet Files*, close all instances of the Web browser, and then re-open the ZyWAN-G9 Web page. The following section describes this procedure.

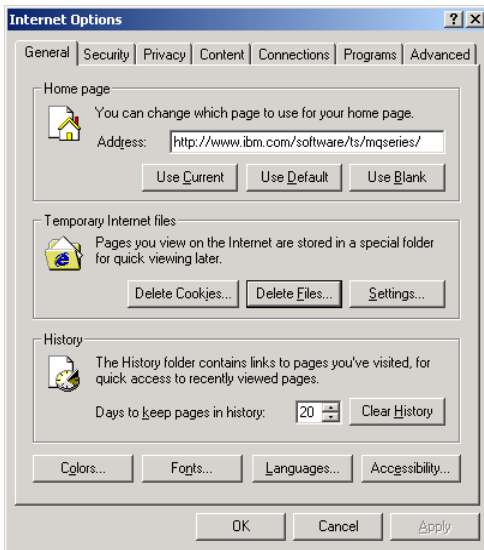
To clear the browser cache in Mozilla Firefox, select Tools>Clear Recent History. Make sure the *Cache* box is checked, and then click the **Clear Now** button.



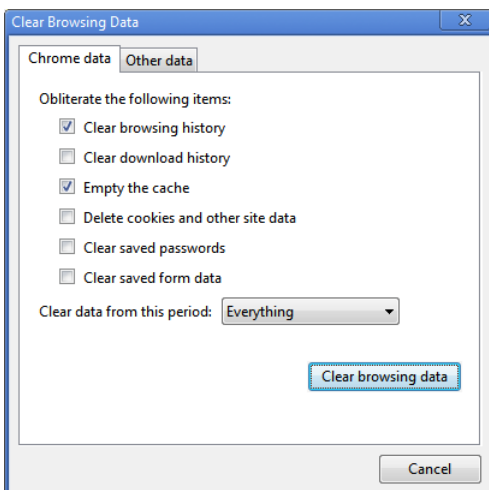
To clear the browser cache in Internet Explorer version 8 or 7, select Tools>Internet Options, and then click the **Delete...** button under *Browsing history*. Click the **Delete** or **Delete files...** button to clear “Temporary Internet files.”



To clear the browser cache in Internet Explorer version 6, select Tools>Internet Options, and then click the **Delete Files...** button.



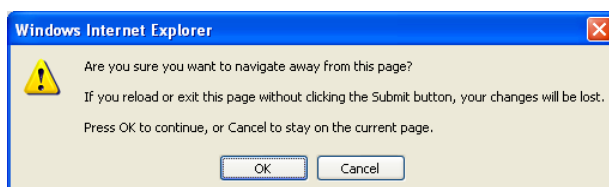
To clear the browser cache in Google Chrome, click the wrench icon on the browser toolbar. Select **Tools, Clear browsing data**. Select “Clear browsing history” and “Empty the cache”, and choose the period “Everything,” then click **Clear browsing data**.

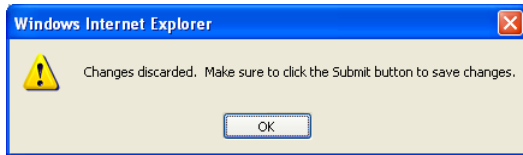


Changing a Configuration

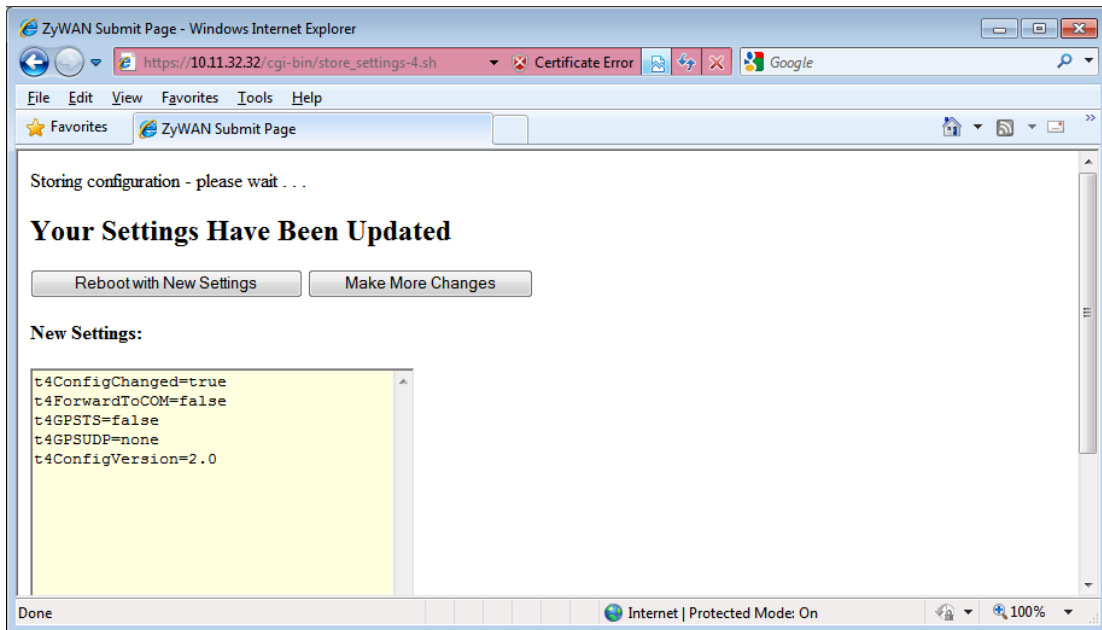
The following sections describe the configuration details for each Web page. To make changes on any page of the configuration, complete the following steps:

1. Changes must be submitted, or they will be lost. If you make changes without submitting, one of the following error messages will be displayed before closing the browser, moving to another page, or clicking on another tab:





2. Click on any tab or close the browser. Enter the changes you want to make, and then click the **Submit New Configuration** button. For all the tabs except the Cellular and WiFi, the configuration properties and values are displayed in a box with the heading *New Settings*.



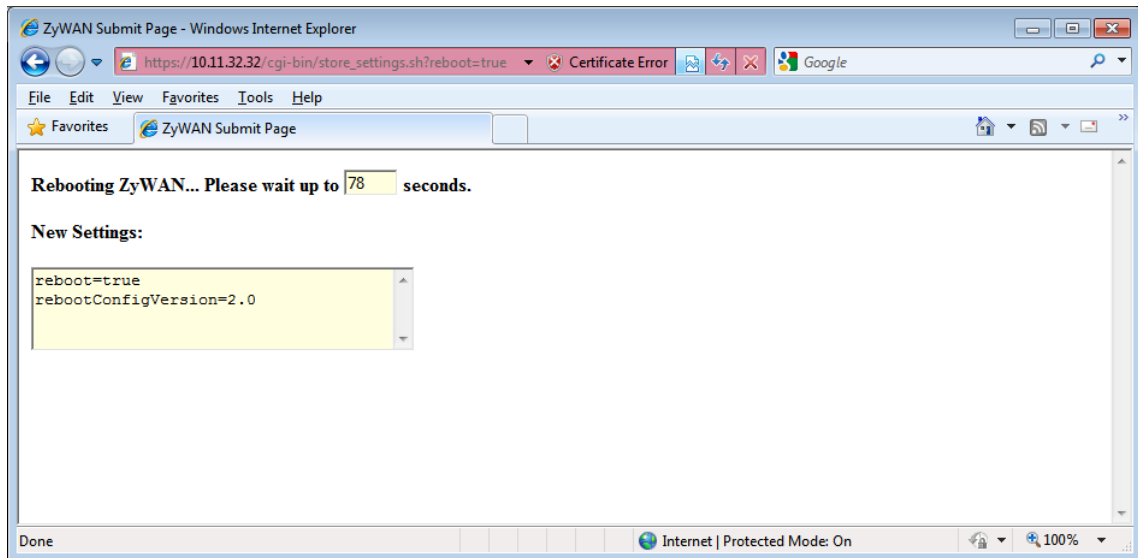
3. If there are more changes to be made on a different page of the configuration, click the **Make More Changes** button. The tab is displayed again so that another page may be selected and modified.



Important:

If the ZyWAN-G9 is not rebooted after all changes have been made, some settings will not take effect until the next reboot.

4. For the Cellular and WiFi pages, clicking the **Submit Modem Configuration** or **Submit WiFi Configuration** buttons stores the property values somewhat differently but still in the permanent memory of the ZyWAN-G9. It does not display the page with “Your Settings Have Been Updated,” but instead displays a dialog box when the properties have been submitted.
5. After all changes have been made, click the **Reboot with New Settings** button after submitting changes on a tab. The ZyWAN-G9 then reboots so that the changes can take effect. The ZyWAN-G9 shuts down and restarts, which may take over a minute. The Web page automatically attempts to reload at the same IP address after 90 seconds.

**Tip:**

Even if no new changes have been made, the ZyWAN-G9 may be rebooted via the Web page by clicking the **Submit New Configuration** button on any tab except the Cellular or WiFi, then clicking the **Reboot with New Settings** button.

Using Default Gateway, DHCP, and DNS

The ZyWAN-G9 provides two Ethernet (eth0, eth1), WiFi (eth2), and cellular (ppp0, ppp1) interfaces. Each of these interfaces can potentially have a Default Gateway address, DHCP, and DNS server addresses. One of these interfaces will be made the default route to reach addresses that are not otherwise available on its local networks.

Configuration Options

The Ethernet interfaces can be configured to be a DHCP client on an existing network (the *Use Dhcp Client?* option set to *Yes*). The WiFi interface can be configured in similar manner (in “managed mode”). In this case, it is likely that the ZyWAN-G9 will obtain a Default Gateway and DNS server from the network to which it is attached.

Static IP addresses may also be configured. This allows the Ethernet or WiFi to be configured with a Default Gateway and one or two DNS Server addresses for the interface. These items may be left blank if there is no server available or if it does not make sense to include them in the configuration.

When configured with a static IP address, the Ethernet interface may be configured to *Run DHCP Server*. This will allow the ZyWAN-G9 to assign an IP address to other devices on the network. The WiFi interface in “master” mode defaults to static IP and also provides a DHCP server to wireless clients.

Default Route

The ZyWAN-G9 will make one of its interfaces the default route based on the configuration and the availability of each network. The order of preference for the default route is:

- Ethernet 0 (eth0)
- Ethernet 1 (eth1)
- WiFi (eth2)
- Cellular (ppp0, ppp1)

The first interface which has a Default Gateway (static configuration in Web page, or obtained dynamically from a DHCP server) will be the one used for the ZyWAN-G9's default gateway. If the Ethernet cable is unplugged or the WiFi is unavailable, the list of interfaces is checked again, and the first available interface will be selected dynamically as the default route, in order of preference.

This means, for instance, that if an application requires the cellular network to be the default gateway for network traffic, any Default Gateway (configured explicitly in the ZyWAN-G9 Web configuration or obtained from a DHCP server) will interfere with the intended operation. Therefore, care needs to be taken to avoid this situation. For instance, this may require disabling or setting the Ethernet and WiFi to static IP addresses without the Default Gateway (leaving it blank), to allow the PPP interface to become the default gateway.

DHCP Server and NAT

If either the Ethernet or WiFi (master mode) is running as a DHCP server, then the ZyWAN-G9 will respond to any client device on the network that requests an IP address. The ZyWAN-G9 will assign the device an address in accordance with the list of addresses specified in the ZyWAN-G9 Web configuration. The client device will use the ZyWAN-G9's network address as its Default Gateway. Thus, if the ZyWAN-G9 is used on a local network where another DHCP server is already running, the *Run DHCP Server* option should generally be set to *No*.

The *Open Ports* section on the *Networking* page must include UDP port 67 to allow DHCP traffic to the ZyWAN-G9.

The ZyWAN-G9 is able to act as a gateway, but in order to route traffic from one interface to another, there must also be a NAT entry configured on the *Networking* page to route from the source network to the destination network.

DNS Server

As a DHCP Server, the ZyWAN-G9 also acts as a DNS server, responding to client devices' requests to resolve named addresses (URL or FQDN) into numeric addresses. The ZyWAN-G9 acts as a DNS proxy, so that any DNS requests from the client device are passed to one of the DNS servers known to the ZyWAN-G9, and the resulting IP address is returned to the client device.

In order to resolve DNS addresses, the ZyWAN-G9 needs to know the location of one or more DNS server(s). It obtains the list of these servers in the same way as it obtains its default route, either statically configured or obtained dynamically. On whichever interface is currently the default route (eth0, eth1, eth2, ppp0, ppp1, etc.), the DNS servers may be obtained from that network or statically defined in the Web configuration. This list of address(es) is used by the DNS proxy.

The *Open Ports* section on the *Networking* page must include UDP port 53, to allow the ZyWAN-G9 to receive DNS requests.

Chapter 2 System Status

The following diagram shows the *Status* tab.



Status Web Page

The *Status* tab includes several items which show the hardware and software configuration of the ZyWAN-G9. The hardware configuration is done in factory setup and is provided here for information. Cellular modem status information is given on the *Cellular* tab (see [Get Cellular Status](#) on page 58).

The following table lists the fields and options offered on the *Status* tab.

FIELD/OPTION	EXPLANATION
Full Hardware Model	The <i>Full Hardware Model</i> gives the model number of the ZyWAN-G9, based on the types of options that were included from the factory. See ZyWAN-G9 Model Numbers on page 10, for information on the ZyWAN-G9 model numbers based on hardware configuration.
Current software version	The <i>Current software version</i> gives the current installed version of ZyWAN-G9 software. The full release name such as zywan_g9_release-2.0.0 indicates the standard production release of ZyWAN-G9, or it may indicate a customer-specific release. The numeric version (such as 2.0.0) indicates the major, minor and sub-minor version number within the standard or customer-specific release family.
GPS	This option indicates whether or not GPS hardware is installed.
Wi-Fi	This option indicates whether or not an 802.11 WiFi module is installed.
Serial Modem	This option indicates whether a serial modem (iDEN) is included in the hardware model.
Last COM Port	This option indicates what is the last available COM port on the ZyWAN-G9, which is used in all other configuration menus where a selection of COM ports is allowed. Typically this is <i>COM4</i> .
RS-485 Termination	This option indicates whether the RS-485 port includes a built-in termination resistor.

Chapter 3 Cellular Configuration

The *Cellular* properties, and therefore the ZyWAN-G9 model, are determined in part by what model of cellular modem is installed. This is factory option that must be specified at the time of purchase. See [Chapter 2 System Status](#) on page 52 to find out the ZyWAN-G9 hardware model. The options for ZyWAN-G9 model and cellular modem are listed in the following table.

ZyWAN BASE MODEL	CELLULAR MODEM
ZyWAN-G9	No factory-installed cellular modem
ZyWAN-G9-EvDO	Sierra Wireless MC5727, factory-installed
ZyWAN-G9-HSDPA	Sierra Wireless MC8790, factory-installed
ZyWAN-G9-iDEN	Motorola iO270, factory-installed

On the *Cellular* tab, the items for each modem must be configured in order to enable the cellular data connection. After setting all the *Cellular* properties, click the **Submit Modem Configuration** button before switching to a new tab or closing the window.



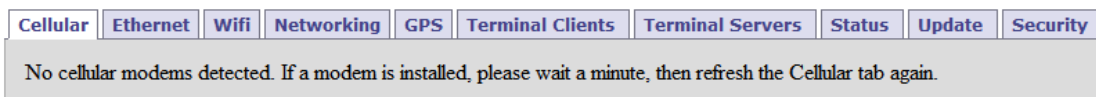
Note:

Changes made to the *Cellular* configuration page take effect immediately after submitting changes, without requiring a reboot.

The table below indicates which of the following sections of this document should be used for configuring each of the supported modems. The available options are different depending on the modem being configured.

CONFIGURATION HEADING / PAGE	CELLULAR MODEM(S)
ZyWAN-EVDO Configuration , page 54	Sierra Wireless MC5727 Novatel MC760 Sierra Wireless USB598/T598
ZyWAN-HSDPA , page 55	Sierra Wireless MC8790 Sierra Wireless USBConnect Shockwave (USB308) Sierra Wireless C885 Sierra Wireless C888 Sierra Wireless C889
ZyWAN-iDEN , page 56	Motorola iO270

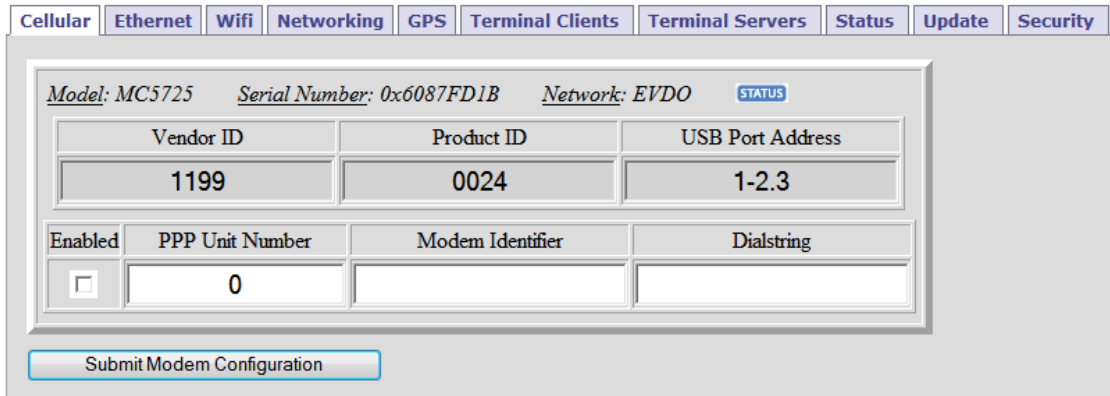
During startup or when there are no modems detected, selecting the *Cellular* tab will indicate this situation.



Try clicking on the Cellular tab again to refresh the screen. Once the system has recognized the presence of the modem and established communication with it, the appropriate configuration options will appear.

ZyWAN-EVDO Configuration

The following screen capture shows the *Cellular* tab on the ZyWAN-G9 with an EVDO modem.



The following options may be configured to configure for an EVDO cellular network.

OPTION	EXPLANATION
Enabled	Check this box to enable the modem to be used for a PPP network session. This box is unchecked by default.
PPP Unit Number	If there is more than one cellular modem installed, this field indicates the order of preference for the modem connections, starting from zero. If the ZyWAN is unable to connect to a network with one modem, it will use the next higher number. This number also becomes part of the internal network name (for instance, a PPP Unit Number of zero creates an interface 'ppp0').
Modem Identifier	This is a required text string to uniquely identify each modem in the configuration. It may be used, for instance, to identify which cellular carrier is used (Sprint, AT&T, etc.). The following characters may not be used: `) " / and \
Dialstring	This field sets the modem dial string that is used when the ZyWAN-G9 initiates its connection to the PPP network. This is optional, as the dial string is pre-programmed for all supported modems; however, it is provided in case it's necessary to set differently in some cases.

In addition, each modem configuration displays the following non-configurable information:

OPTION	EXPLANATION
Model	Modem model, as reported by the modem. (Note that the MC5727 modem reports itself as MC5725.)
Serial Number	Modem ESN (electronic serial number), as reported by the modem.
Network	Which network type is supported by this modem (EVDO, HSDPA, iDEN).
STATUS button	Display status of the modem and cellular network (see Get Cellular Status on page 58 for details).
Vendor ID	Numeric ID of the modem vendor, as reported by the modem.
Product ID	Modem Product ID, as reported by the modem.
USB Port Address	ZyWAN-G9 internal USB port designation where the modem is plugged in.

EVDO modem modules contain the account activation information stored in the modem rather than on a removable SIM card. Generally it is the responsibility of the customer to contact the cellular service provider to set up a billing account for data services being used by the modem. The modem must then be activated on the given network provider. If the modem has not yet been activated on the network, the ZyWAN-G9 will automatically attempt three times on startup to activate the modem. If successful, it will then make a data connection using PPP. If unsuccessful, reboot the ZyWAN-G9 and/or contact the service provider for assistance.

ZyWAN-HSDPA Configuration

The following screen capture shows the *Cellular* tab on the ZyWAN-G9 with an HSDPA modem.

The following options may be configured to configure for an HSDPA cellular network.

OPTION	EXPLANATION
Enabled	Check this box to enable the modem to be used for a PPP network session. This box is unchecked by default.
PPP Unit Number	If there is more than one cellular modem installed, this field indicates the order of preference for the modem connections, starting from zero. If the ZyWAN is unable to connect to a network with one modem, it will use the next higher number. This number also becomes part of the internal network name (for instance, a PPP Unit Number of zero creates an interface 'ppp0').
Modem Identifier	This is a required text string to uniquely identify each modem in the configuration. It may be used, for instance, to identify which cellular carrier is used (Sprint, AT&T, etc.). The following characters may not be used: `) " / and \
Dialstring	This field sets the modem dial string that is used when the ZyWAN-G9 initiates its connection to the PPP network. This is optional, as the dial string is pre-programmed for all supported modems; however, it is provided in case it's necessary to set differently in some cases.
APN	Enter the APN (Access Point Name) of the cellular provider's data connection. This is supplied by the cellular provider.
Auth Type	Enter the Authentication type used by the cellular provider. Available types are: None, Pap, and Chap.

If the *Auth Type* is set to *Pap* or *Chap*, the following fields are available.

FIELD	EXPLANATION
Username	Enter the username required to log on to the APN of the cellular provider.
Password	Enter the password required to log on to the APN of the cellular provider.

In addition, each modem configuration displays the following non-configurable information:

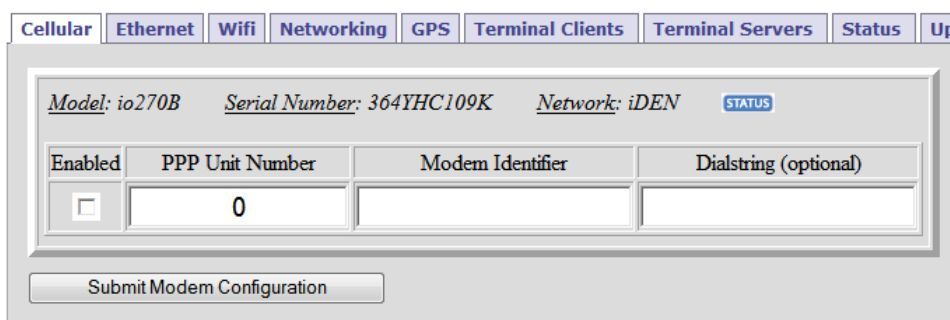
OPTION	EXPLANATION
Model	Modem model, as reported by the modem.
Serial Number	Modem ESN (electronic serial number), as reported by the modem.
Network	Which network type is supported by this modem (EVDO, HSDPA, iDEN).
STATUS button	Display status of the modem and cellular network (see Get Cellular Status on page 58 for details).

Vendor ID	Numeric ID of the modem vendor, as reported by the modem.
Product ID	Modem Product ID, as reported by the modem.
USB Port Address	ZyWAN-G9 internal USB port designation where the modem is plugged in.

HSDPA modem modules contain the account information on a removable SIM card. Generally it is the responsibility of the customer to contact the cellular service provide to set up a billing account for data services being used by the modem. The cellular provider will supply an APN address to be used by the ZyWAN-G9 for data services. Once the account has been activated, the SIM card must be installed in the ZyWAN-G9 (MC8790) or in the pluggable USB cellular modem before putting the system into service. See [Installing SIM card](#) on page 20.

ZyWAN-iDEN Configuration

The following screen capture shows the *Cellular* tab on the ZyWAN-G9 with an iDEN modem.



The following options may be configured to configure for an iDEN cellular network.

OPTION	EXPLANATION
Enabled	Check this box to enable the modem to be used for a PPP network session. This box is unchecked by default.
PPP Unit Number	If there is more than one cellular modem installed, this field indicates the order of preference for the modem connections, starting from zero. If the ZyWAN is unable to connect to a network with one modem, it will use the next higher number. This number also becomes part of the internal network name (for instance, a PPP Unit Number of zero creates an interface 'ppp0').
Modem Identifier	This is a required text string to uniquely identify each modem in the configuration. It may be used, for instance, to identify which cellular carrier is used (Sprint, AT&T, etc.). The following characters may not be used: ` `) " / and \
Dialstring	This field sets the modem dial string that is used when the ZyWAN-G9 initiates its connection to the PPP network. This is optional, as the dial string is pre-programmed for all supported modems; however, it is provided in case it's necessary to set differently in some cases.


In addition, each modem configuration displays the following non-configurable information:

OPTION	EXPLANATION
Model	Modem model, as reported by the modem.
Serial Number	Modem ESN (electronic serial number), as reported by the modem.
Network	Which network type is supported by this modem (EVDO, HSDPA, iDEN).
STATUS button	Display status of the modem and cellular network (see Get Cellular Status on page 58 for details).

iDEN modem modules contain the account information on a removable SIM card. Generally it is the responsibility of the customer to contact the cellular service provide to set up a billing account for data

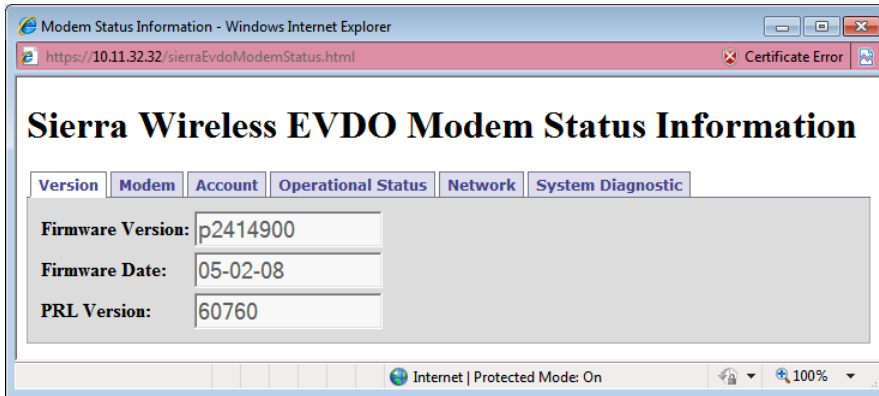
services being used by the modem. Once the account has been activated, the SIM card must be installed in the ZyWAN-G9 before putting the system into service. See [Installing SIM card](#) on page 20.

Get Cellular Status

The ZyWAN-G9 Web configuration page provides modem status and diagnostic information. Open the *Cellular* tab and locate the correct modem configuration section. If there is more than one modem, each section is identified with a modem Model, Serial Number, and Network type. Click the Status button  to open a window showing the modem status for the cellular module. See the following sub-sections for examples and an explanation of the status fields and their meanings.

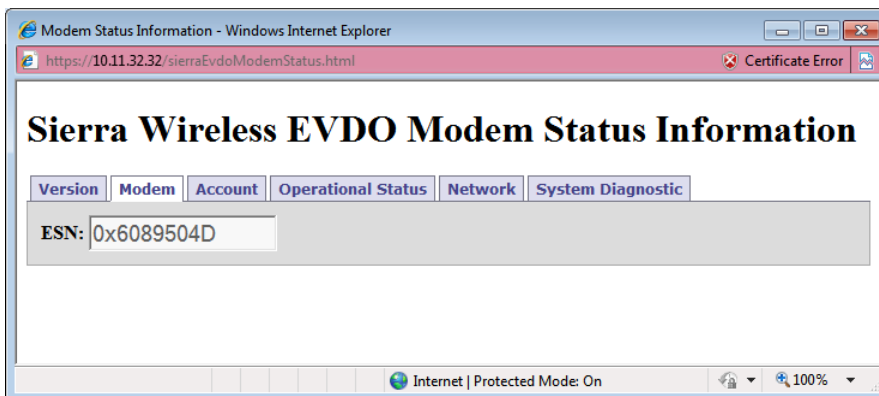
Sierra Wireless EVDO Modem Status

Click the *Version* tab to show version details on the EVDO cellular module.



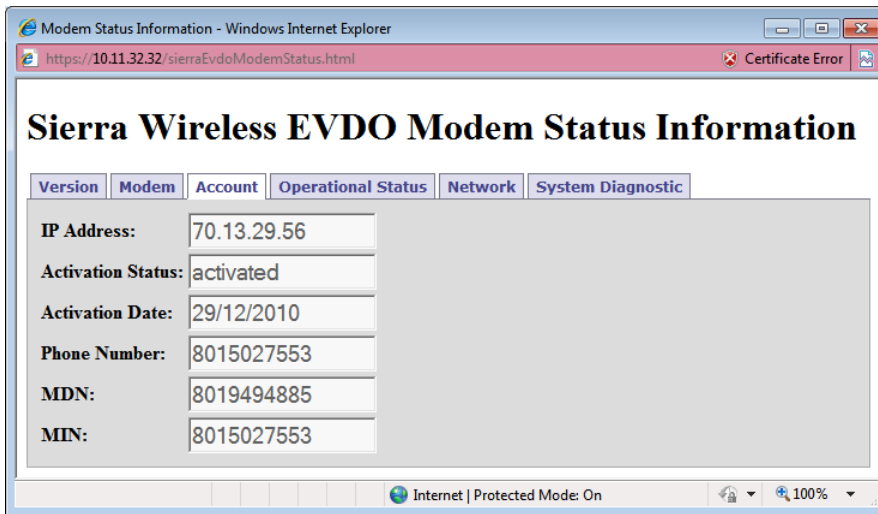
FIELD/OPTION	EXPLANATION
	Version Information
Firmware Version	Firmware version in cellular module
Firmware Date	Date of firmware version in cellular module
PRL Version	Version of the PRL (Preferred Roaming List) stored in the cellular module

Click the *Modem* tab to show modem settings for the EVDO cellular module.



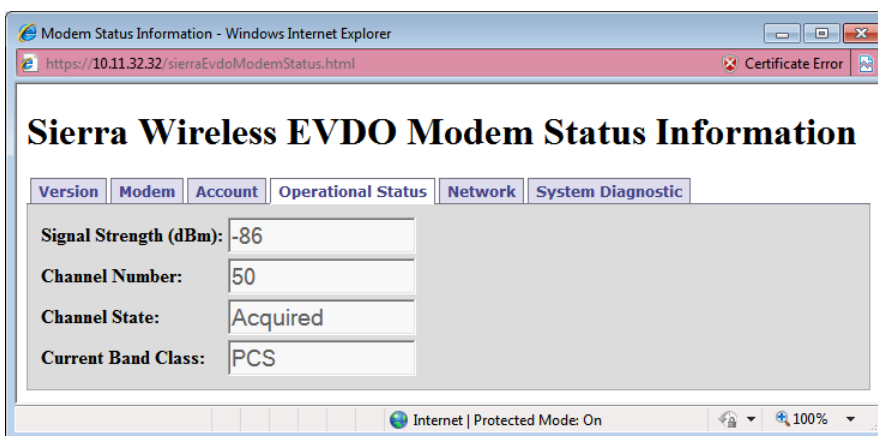
FIELD/OPTION	EXPLANATION
	Modem Information
ESN	ESN (electronic serial number) of cellular module

Click the *Account* tab to show account details for the EVDO cellular module.



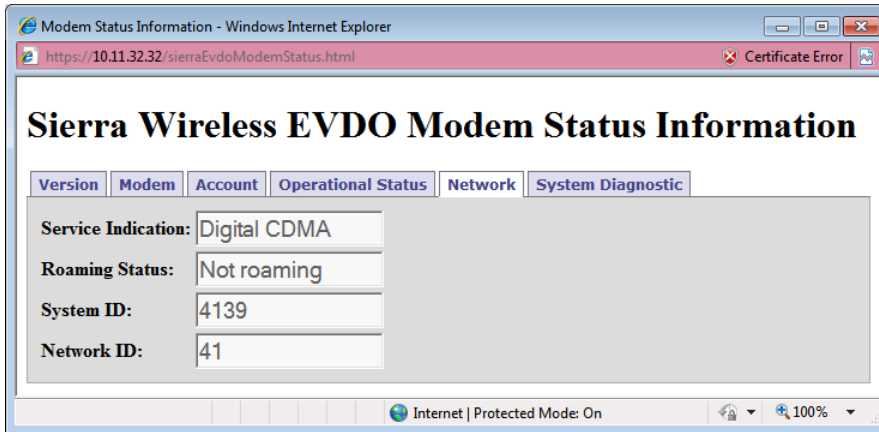
FIELD/OPTION	EXPLANATION
	Account Information
IP Address	Public IP address assigned by the cellular data network, if it has successfully connected.
Activation Status	Status of whether the account is activated or not. If the Activation Status does not say "activated", there may be a problem with the modem activation that will require contacting the cellular provider.
Activation Date	Date that the cellular module was provisioned and activated on the network
Phone Number	Telephone number of the cellular module
MDN	MDN (Mobile Directory Number) of the cellular module
MIN	MIN (Mobile Station Identification Number) of the cellular module

Click the *Operational Status* tab to show current operational details, such as the EVDO cellular signal strength.



FIELD/OPTION	EXPLANATION
	Operational Status Information
Signal Strength	Received signal strength (RSSI), in dBm. If the signal strength is 0 or a large negative number (larger than about -100), the signal strength is not good and may not be able to maintain a reliable connection.
Channel Number	Current 1xRTT active channel number or zero if digital service is not available
Channel State	Current 1xRTT channel acquisition state with possible states of acquired, not acquired, and scanning for channel
Current Band Class	Current tuning band of the modem (cellular or PCS)

Click the *Network* tab to show information about the EVDO cellular network.

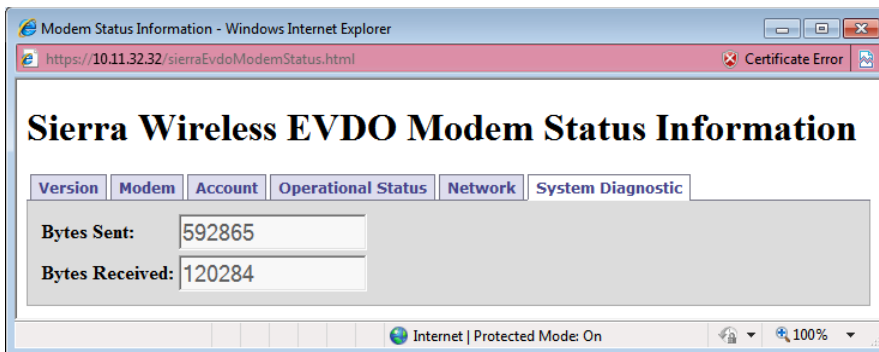


FIELD/OPTION	EXPLANATION
	Network Information
Service Indication	Which type of service is currently available to the modem (No service, Digital CDMA, or GPS service)
Roaming Status	Status of whether roaming is available (Not roaming, Roaming with guaranteed SIDs, Roaming without guaranteed SIDs)
System ID	Current system identifier (SID) of the network providing service
Network ID	Current network identifier (NID) of the station providing service

The SID and NID identify the network providing cellular service. The following table gives some combinations of ID numbers associated with certain several EVDO networks. This is provided for reference only, and is not an exhaustive list.

SID	NID	NETWORK
0	65535	Sprint (United States)
4139	41	Bell Mobility (Canada)
41	65535	Verizon (United States)

Click the *System Diagnostic* tab to show diagnostic data for the EVDO cellular module.

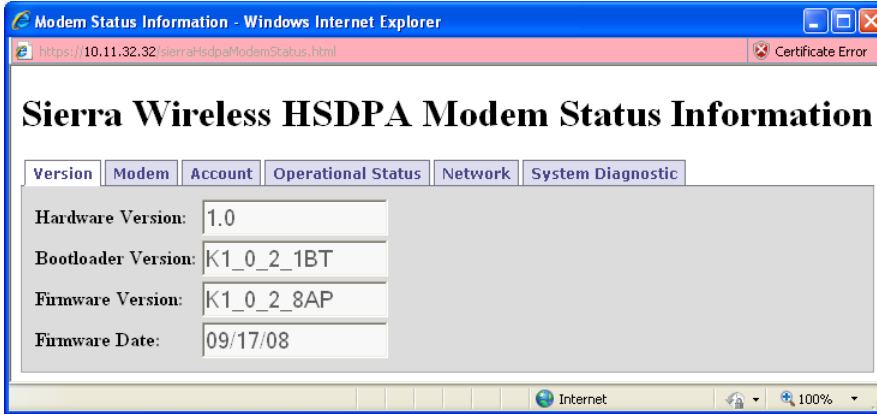


FIELD/OPTION	EXPLANATION
	System Diagnostic Information
Bytes Sent / Bytes Received	Shows bytes of data sent and received on the cellular data session.

Sierra Wireless HSDPA Modem Status

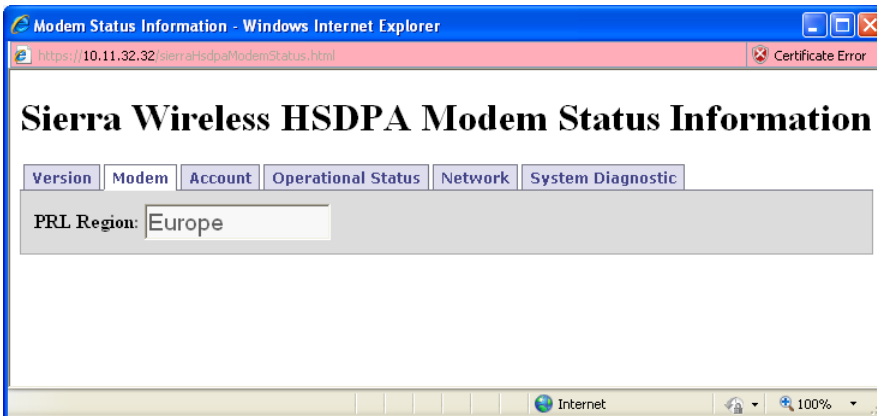
Sierra Wireless cellular modems with HSDPA technology (MC8790, Compass 888, etc.) will display the following status information.

Click the *Version* tab to show modem version details on the HSDPA cellular module.



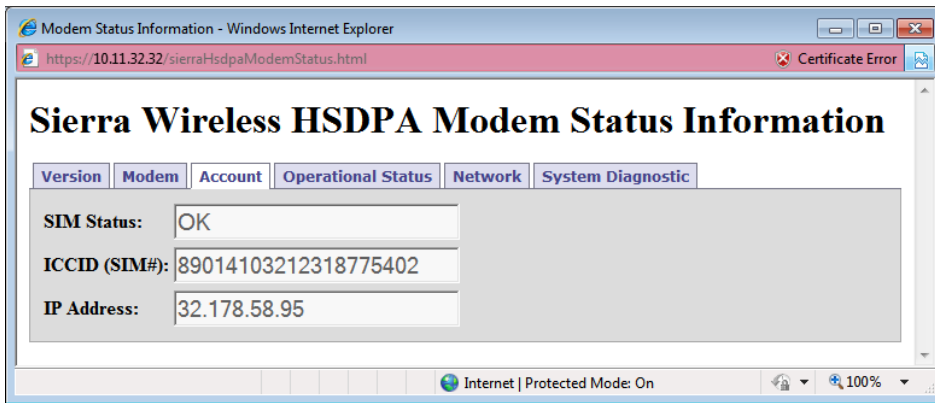
FIELD/OPTION	EXPLANATION
	Version Information
Hardware Version	Hardware version of cellular module
Bootloader Version	Bootloader version of cellular module
Firmware Version	Firmware version in cellular module
Firmware Date	Date of firmware version in cellular module

Click the *Modem* tab to show modem settings for the HSDPA cellular module.



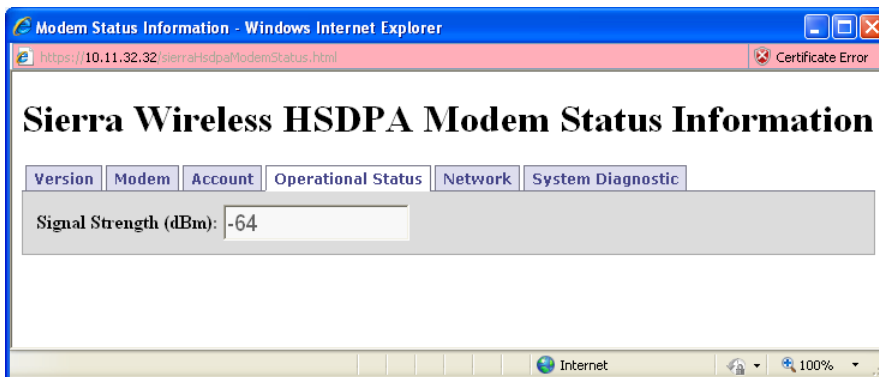
FIELD/OPTION	EXPLANATION
	Modem Information
PRL Region	Preferred Roaming List, programmed in the modem as a factory option.

Click the *Account* tab to show account details for the HSDPA cellular module.



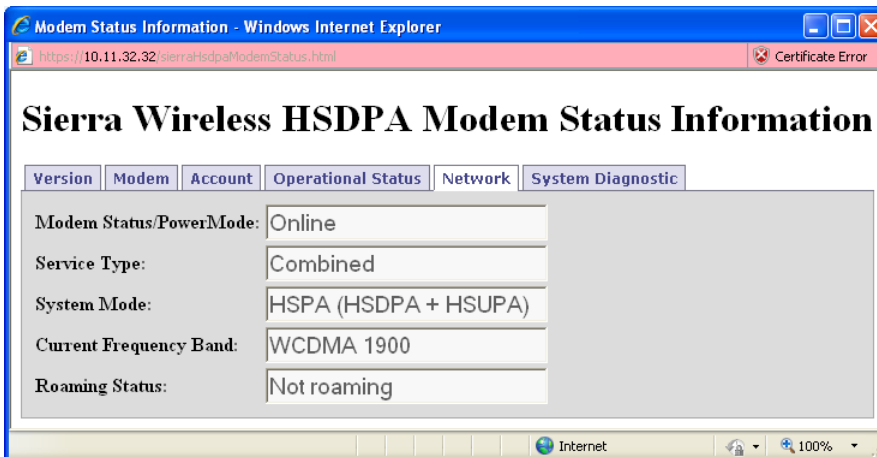
FIELD/OPTION	EXPLANATION
	Account Information
SIM Status	Ability of the modem to read SIM card. If there is no SIM card installed, it will say "removed".
ICCID	Integrated Circuit Card ID of the installed SIM card (SIM card number).
IP Address	IP address obtained on cellular network, if it has successfully connected.

Click the *Operational Status* tab to show current operational details, such as the HSDPA cellular signal strength.



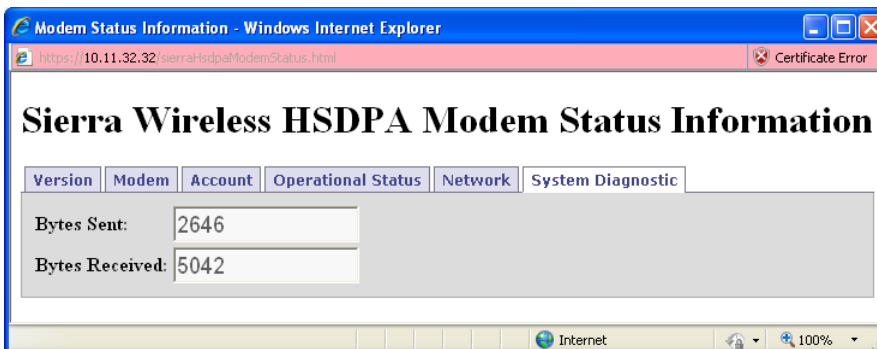
FIELD/OPTION	EXPLANATION
	Operational Status Information
Signal Strength (dBm)	Received signal strength (RSSI), in dBm. If the signal strength is 0 or a large negative number (larger than about -100), the signal strength is not good and may not be able to maintain a reliable connection.

Click the *Network* tab to show information about the HSDPA cellular network.



FIELD/OPTION	EXPLANATION
	Network Information
Modem Status/Power Mode	Online/offline status of the modem
Service Type	Circuit-switched, GPRS service, or combined.
System Mode	Current cellular network topology (GPRS, EDGE, UMTS, HSDPA, HSUPA)
Current Frequency Band	Current frequency band of wireless spectrum being used
Roaming Status	Roaming status indicator

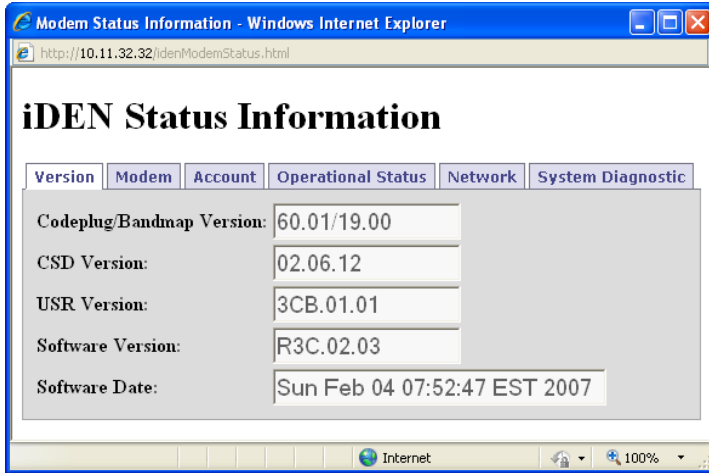
Click the *System Diagnostic* tab to show additional diagnostic information.



FIELD/OPTION	EXPLANATION
	Network Information
Bytes Sent / Bytes Received	Shows bytes of data sent and received on the cellular data session.

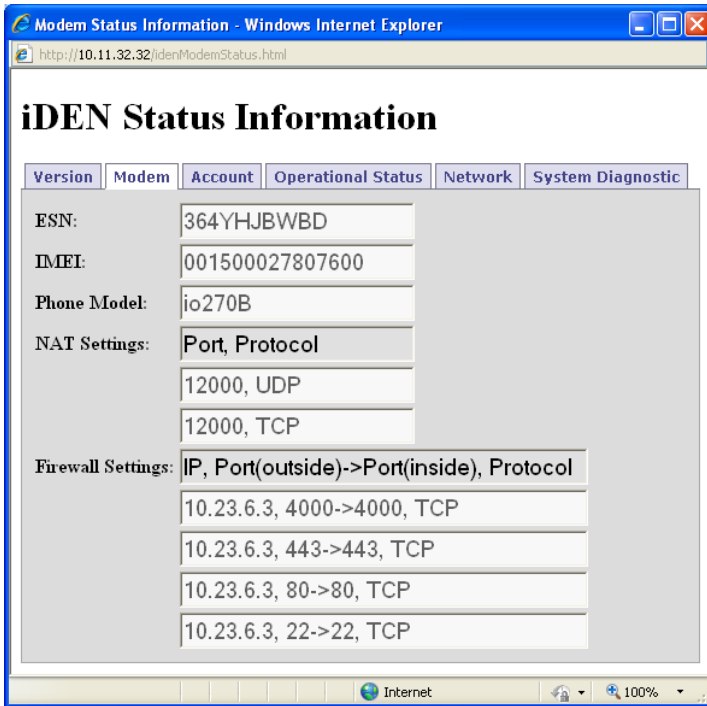
iDEN Modem Status

Click the *Version* tab to show version details on the iDEN cellular module.



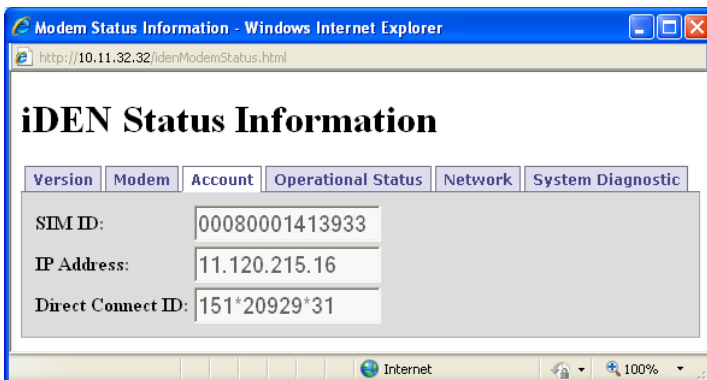
FIELD/OPTION	EXPLANATION
	Version Information
Codeplug/Bandmap Version	Codeplug and bandmap version loaded in iO270 cellular module, in the format AA.BB/CC.DD, where AA.BB is the codeplug revision, and CC.DD is the bandmap revision. The bandmap revision is important, and indicates which cellular network the modem has been factory-configured to operate on. Examples: 19.00 – Nextel/Telus, 1A.00 – SouthernLinc, 1D.00 SoLinc/Nextel FF.00 – may indicate any custom bandmap configuration
CSD Version	CSD version, in the format EE.FF.GG, where EE is the bandmap version (type), FF is the structure version, and GG is the data version
USR Version	USR version, in the format HHc.JJ.KK, where HH is product identifier, c is sub ID, JJ is carrier ID, and KK is USR file version number
Software Version	iO270 software version, in the format cLL.MM.NN, where c is the load type, LL is the product identifier, and MM.NN is the revision
Software Date	Release date of Software Version

Click the *Modem* tab to show modem settings for the iDEN cellular module.



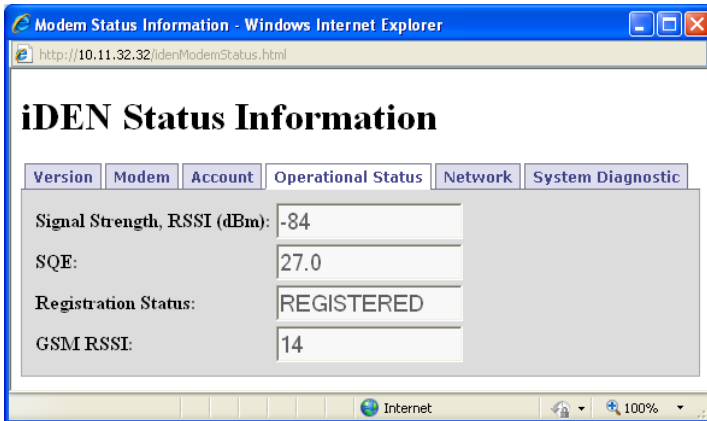
FIELD/OPTION	EXPLANATION
	Modem Information
ESN	ESN (electronic serial number) of iO270 cellular module
IMEI	IMEI (International Mobile Equipment Identifier) of the cellular module
Phone Model	Model name of the cellular module
NAT Settings	NAT settings in the iO270 cellular module cause outgoing packets to change their source port. This setting allows some packets to retain their original source port, using the specified protocol (TCP,UDP).
Firewall Settings	The iO270 cellular module provides a network firewall for incoming connections. Any port to which a connection must be made from the cellular network must have a port opened in the firewall, for a specified protocol (TCP, UDP). The ZyWAN-G9 opens ports 443, 80, and 22 (TCP) by default, plus any ports which are listed in the <i>Networking</i> page of its configuration (see page 76).

Click the *Account* tab to show account details for the iDEN cellular module.



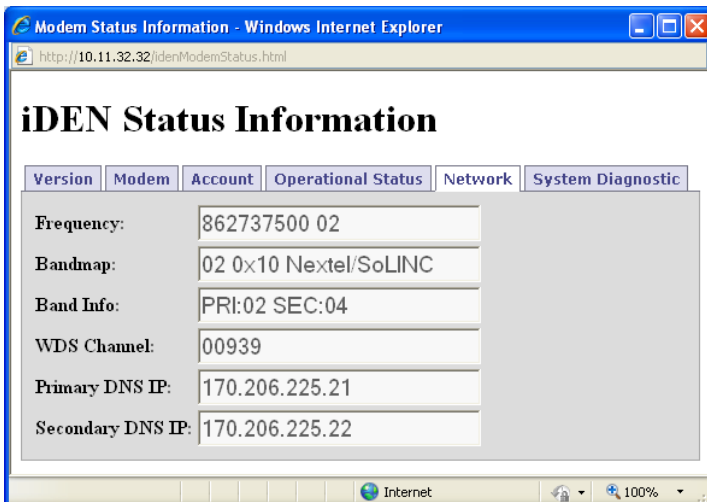
FIELD/OPTION	EXPLANATION
	Account Information
SIM ID	SIM card number. If there is no SIM card, or the SIM card is not being read properly, it will show as all zeros.
IP Address	IP address, if the cellular module is able to connect to the network
Direct Connect ID	Direct Connect ID (Push-to-Talk number) programmed in the SIM card

Click the *Operational Status* tab to show current operational details, such as the iDEN cellular signal strength.



FIELD/OPTION	EXPLANATION
	Operational Status Information
Signal Strength, RSSI	Received signal strength of iDEN signal, in dBm. An RSSI of 0 or -127 indicates that the modem is not registered on a cell tower.
SQE	iDEN cellular signal quality indication (SQE, higher number is better)
Registration Status	Status whether the cellular module is registered on the cellular network
GSM RSSI	Received signal strength of GSM carrier, 0-31 (31 is best)

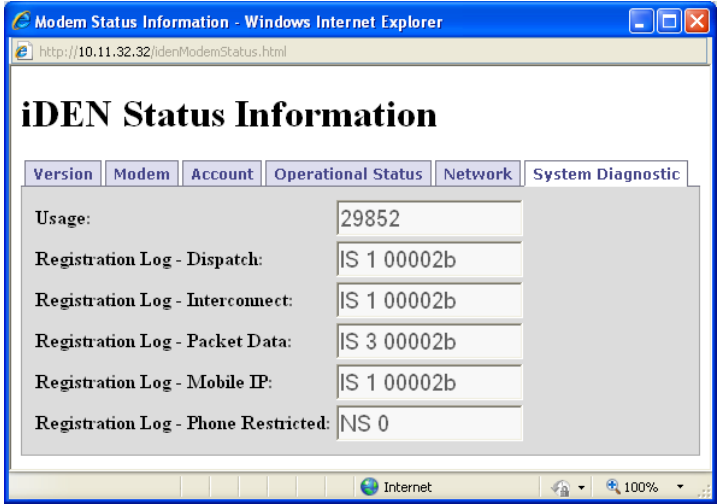
Click the *Network* tab to show information about the iDEN cellular network.



FIELD/OPTION	EXPLANATION
	Network Information
Frequency	Current frequency (in Hz) and frequency band to which the iO270 cellular module is connected
Bandmap	Bandmap information being used by the iO270
Band Info	Primary and secondary bands in use in the iO270
WDS Channel	Channel number of wireless data system (WDS)

Primary DNS IP	Addresses of DNS server provided by the cellular network
Secondary DNS IP	

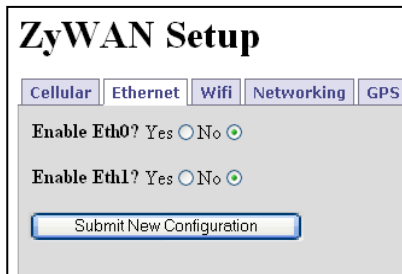
Click the *System Diagnostic* tab to show diagnostic data for the iDEN cellular module.



FIELD/OPTION	EXPLANATION
	System Diagnostic Information
Usage	The total sum of minutes used for dispatch, interconnect and circuit data calls on an iDEN network
Registration Log – Dispatch, Interconnect, Packet Data, Mobile IP, & Phone Restricted	Registration log of various services in the iQ270 cellular module. These are normally only of value in cases of problems in cellular registration, and if so these numbers can be reported to the cellular provider for diagnosis.

Chapter 4 Ethernet configuration

The following screen capture shows the *Ethernet* tab.



The following items must be configured in order to enable one or both of the Ethernet network connections.

Enable Eth0/Eth1

Select *Yes* to enable the first and/or second Ethernet ports available on the ZyWAN-G9. When the Ethernet port is enabled, the options may be configured as described in the following sections.

After setting all the Ethernet properties, click the **Submit New Configuration** button before switching to a new tab or closing the window.

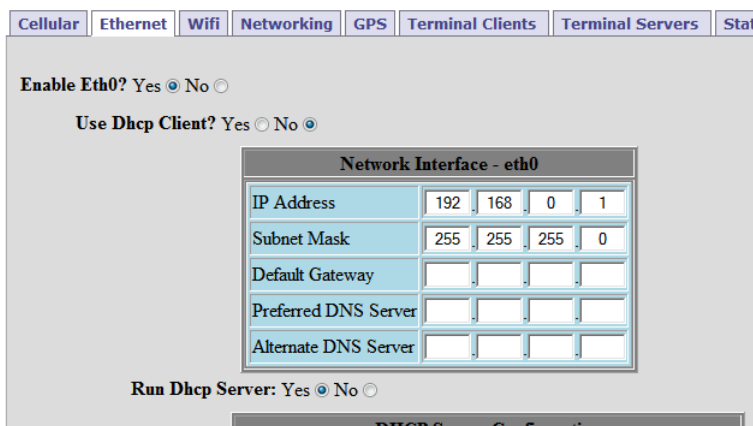
DHCP Client

If *Use Dhcp Client?* is set to *Yes*, the ZyWAN-G9 acts as a DHCP client to automatically obtain its Ethernet network address settings from a server on the LAN. Otherwise, set this parameter to *No* in order to configure specific TCP/IP addresses.

Fixed Address

When the option *Use Dhcp Client?* is set to *No*, static IP addresses can be configured for the Ethernet interface.

ZyWAN Setup



The following table lists the fields available in the *Ethernet* tab if *Use Dhcp Client?* is set to *No*.

FIELD/OPTION	EXPLANATION
IP Address	Enter the specific numeric address for ZyWAN-G9. Each of the four fields must be a number between 1 and 255.
Subnet Mask	Enter the subnet mask for this Ethernet network. Each of the four fields must be a number between 0 and 255.
Default Gateway	Enter the numeric address of the default gateway for this network, if this interface should be used as the default route. Each of the four fields must be a number between 1 and 255. If this interface is not the default route, leave the <i>Default Gateway</i> blank.
Preferred DNS Server Alternate DNS Server	Enter the DNS server addresses. Each of the four fields must be a number between 1 and 255. If DNS is not needed or the server is unavailable, the DNS address may be left blank.
Run DHCP Server	This option is used when the ZyWAN-G9 is to act as a DHCP server on the Ethernet network, assigning network addresses to other devices. Set this to <i>No</i> if this option is not used.

Run DHCP Server

To enable the DHCP server on the Ethernet interface, set *Run Dhcp Server* to *Yes*. This should generally not be used if there is another DHCP server already on the same network.

Enable Eth1? Yes No

Use Dhcp Client? Yes No

Network Interface - eth1				
IP Address	192	168	0	1
Subnet Mask	255	255	255	0
Default Gateway				
Preferred DNS Server				
Alternate DNS Server				

Run Dhcp Server: Yes No

DHCP Server Configuration				
Default Lease Time	7200			
Subnet Mask	255	255	255	0
Range From	192	168	0	10
Range To	192	168	0	20

The following table lists the fields and options available in the *Ethernet* tab if *Run Dhcp Server* is set to Yes.

FIELD/OPTION	EXPLANATION
Default Lease Time	Enter the default lease time (in seconds) for the assigned DHCP lease to expire. The default time is the time assigned if the client does not request a specific lease time.
Subnet Mask	Enter the subnet mask defining the range of network addresses to be assigned by this DHCP server. Each of the four fields must be a number between 0 and 255.
Range From	Enter the numeric address of the lowest DHCP address to be assigned by this DHCP server. Each of the four fields must be a number between 1 and 254.
Range To	Enter the numeric address of the highest DHCP address to be assigned by this DHCP server. Each of the four fields must be a number between 1 and 254, greater than the Range From.

**Note:**

If the *Run Dhcp Server* option is set to Yes, then UDP port 67 must be included in the *Open Ports* section of the *Networking* page.

In order to act as a DNS server, UDP port 53 must be included in the *Open Ports* section of the *Networking* page.

Chapter 5 WiFi configuration

To configure the WiFi (802.11) settings, the ZyWAN-G9 must have a WiFi module installed. Click on the *Wifi* tab to set the operational properties of the WiFi module.

The screenshot shows the 'Ubiquiti Ministation2 Configuration' interface. At the top, there are tabs for Cellular, Ethernet, Wifi, Networking, GPS, Terminal Clients, and Terminal Servers. The 'Wifi' tab is selected. The main configuration area includes:

- Wireless Mode:** A dropdown menu set to 'Managed (Station)'.
- Network Mode:** A dropdown menu set to 'Bridge'.
- Use Dhcp Client?:** Radio buttons for 'Yes' and 'No', with 'No' selected.
- Bridge Management Interface:** A section containing two IP address fields: 'ZyWAN Link-Local IP' (169.254.0.1) and 'Bridge Link-Local IP' (169.254.0.2).
- SSID:** A text field containing 'ZyWAN_G9'.
- Tx Power (dBm):** A text field containing '20'.
- Security Type:** A dropdown menu set to 'No Security'.
- Security Key:** An empty text field.
- Submit New Configuration:** A button at the bottom.

Select the mode of operation for the 802.11 network connection.

FIELD/OPTION	EXPLANATION
Wireless Mode	<p>Select the mode of operation of the 802.11 module. Options are: <i>ad-hoc</i>, <i>managed</i>, <i>master</i>, and <i>Disabled</i>. A brief description of these modes is given next.</p> <p><i>Managed (Station):</i> ZyWAN-G9 connects to an 802.11 Access Point on a network.</p> <p><i>Master (Access Point):</i> ZyWAN-G9 acts as the wireless router/access point to other network devices.</p>

The internal WiFi module is always set to bridge mode, and the *Bridge Management Interface* settings are shown for technical information only.

Depending on the choice of Managed or Access Point mode, different options are available as described in the following sections. After setting all the *WiFi* properties, click the **Submit New Configuration** button before switching to a new tab or closing the window.



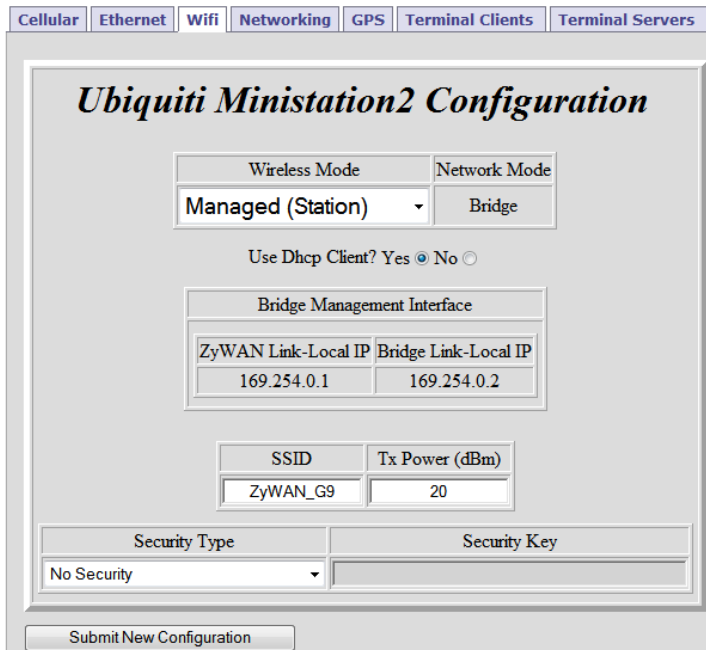
Note:

Changes made to the *WiFi* configuration page take effect immediately after submitting changes, without requiring a reboot.

If you are connected to the ZyWAN-G9 WiFi while making configuration changes, the WiFi connection will be lost while the settings are implemented. Be aware that if you are making significant changes, such as changing the WiFi mode or IP address, it is possible to lose communication with the ZyWAN-G9 entirely over WiFi after submitting changes.

Managed Mode

When the *Wireless Mode* is set to Managed, the following options are configurable.



FIELD/OPTION	EXPLANATION
SSID	Enter the network name (domain ID) which is to be used for this wireless network. Enter an SSID of <i>any</i> (case-sensitive) to allow roaming in managed or ad-hoc modes.
TX Power	Select the transmit power (10 – 26 dBm). Be aware that certain countries require the maximum 802.11 transmit power to be limited at a level below 26dBm. Compliance with local regulations is the responsibility of the user.
Security Type	Select the type of encryption required by the access point: <i>No Security</i> , <i>WEP (Wired Equivalent Privacy)</i> , <i>WPA (WiFi Protected Access)</i> , and <i>WPA2</i> . WPA2 is the most secure wireless standard.
Security Key	<p>If <i>WEP</i> is chosen for the <i>Security Type</i>, the Security Key must be entered as one of the following:</p> <ul style="list-style-type: none"> * 5-character alphanumeric or 10-character hexadecimal string (40-bit encryption) * 13-character alphanumeric or 26-character hexadecimal value (104-bit encryption), or * 16-character alphanumeric or 32-character hexadecimal value (128-bit encryption). <p>If <i>WPA</i> or <i>WPA2</i> is chosen for the <i>Security Type</i>, the Security Key must be entered as an 8 to 63 character alphanumeric string, or a 64-character hexadecimal value (256-bit encryption).</p> <p>When entered as hexadecimal, all characters must be numbers, or letters between A and F (upper or lowercase).</p>

DHCP Client

If *Use Dhcp Client?* is set to *Yes*, the ZyWAN-G9 acts as a DHCP client to automatically obtain its WiFi network address settings from a server on the WiFi network. This will actually obtain two IP addresses, one for the ZyWAN-G9 and another for the internal WiFi module (bridge).

Fixed Address

When the option *Use Dhcp Client?* is set to *No*, static IP addresses can be configured for the WiFi interface. The table below lists the field and options available in this mode.

Use Dhcp Client? Yes No

Network Interface - eth2

IP Address				Subnet Mask			
192	168	3	1	255	255	255	0

Default Gateway	Preferred DNS Server	Alternate DNS Server

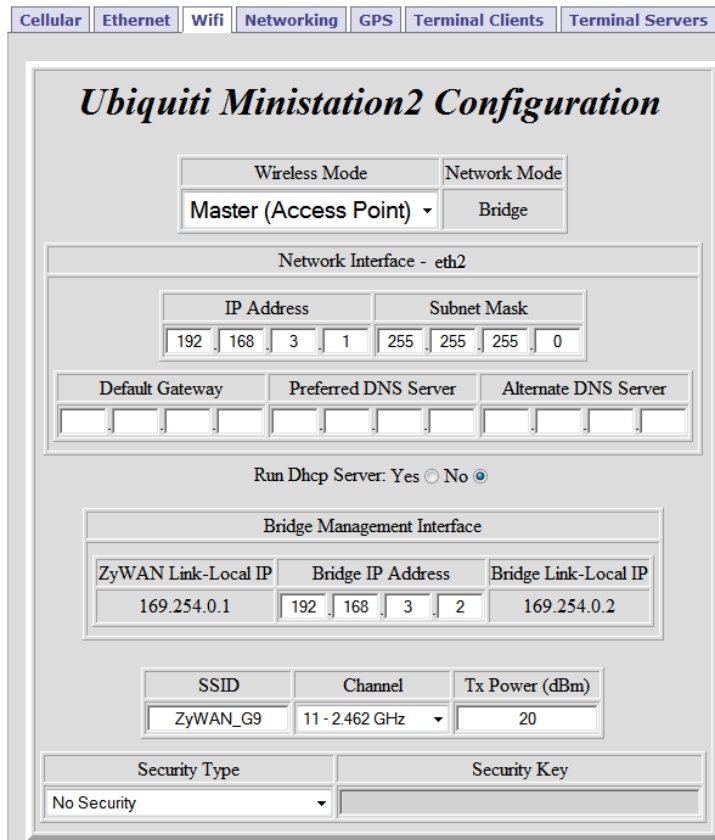
Bridge Management Interface

ZyWAN Link-Local IP	Bridge IP Address	Bridge Link-Local IP
169.254.0.1	192 168 3 2	169.254.0.2

FIELD/OPTION	EXPLANATION
Network Interface	This is the network interface name (normally 'eth2') for the WiFi interface. This may need to be entered as part of the configuration on the Networking page (see Chapter 6 Networking configuration on page 76).
IP Address	Enter the specific numeric address for ZyWAN-G9 on the wireless network. Each of the four fields must be a number between 1 and 255.
Subnet Mask	Enter the subnet mask for this WiFi network. Each of the four fields must be a number between 0 and 255.
Default Gateway	Enter the numeric address of the default gateway for this network, if this interface should be used as the default route. Each of the four fields must be a number between 1 and 255. If this interface is not the default route, leave the <i>Default Gateway</i> blank.
Preferred DNS Server Alternate DNS Server	Enter the DNS server addresses from which to obtain DNS name resolution. Each of the four fields must be a number between 1 and 255. If DNS is not needed or the server is unavailable, the DNS address may be left blank.
Bridge IP Address	The internal WiFi module has its own address on the wireless network, in addition to the ZyWAN-G9 address. Set the bridge IP to another unused address on the local WiFi network.

Access Point Mode

When the *Wireless Mode* is set to Master (Access Point), the following options are configurable.



The screenshot shows the 'Ubiquiti Ministation2 Configuration' web interface. At the top, there are tabs for Cellular, Ethernet, Wifi, Networking, GPS, Terminal Clients, and Terminal Servers. The 'Wifi' tab is selected. The main configuration area includes:

- Wireless Mode:** Master (Access Point) (dropdown)
- Network Mode:** Bridge
- Network Interface - eth2:**
 - IP Address:** 192, 168, 3, 1
 - Subnet Mask:** 255, 255, 255, 0
 - Default Gateway:** (empty)
 - Preferred DNS Server:** (empty)
 - Alternate DNS Server:** (empty)
 - Run Dhcp Server:** Yes No
- Bridge Management Interface:**
 - ZyWAN Link-Local IP:** 169.254.0.1
 - Bridge IP Address:** 192, 168, 3, 2
 - Bridge Link-Local IP:** 169.254.0.2
- Wireless Settings:**
 - SSID:** ZyWAN_G9
 - Channel:** 11 - 2.462 GHz (dropdown)
 - Tx Power (dBm):** 20
- Security:**
 - Security Type:** No Security (dropdown)
 - Security Key:** (empty)

FIELD/OPTION	EXPLANATION
Network Interface	This is the network interface name (normally 'eth2') for the WiFi interface. This may need to be entered as part of the configuration on the Networking page (see Chapter 6 Networking configuration on page 76).
IP Address	Enter the specific numeric address for ZyWAN-G9 on the wireless network. Each of the four fields must be a number between 1 and 255.
Subnet Mask	Enter the subnet mask for this WiFi network. Each of the four fields must be a number between 0 and 255.
Default Gateway	Enter the numeric address of the default gateway for this network, if this interface should be used as the default route. Each of the four fields must be a number between 1 and 255. Normally in Master mode, this field should be left blank.
Preferred DNS Server Alternate DNS Server	When running a DHCP Server, the ZyWAN-G9 will always pass its WiFi address to DHCP clients as DNS proxy. In some cases it may be necessary to include one or two additional hard-coded DNS server addresses that will be passed to DHCP clients, and if so one or both sets of the DNS Server fields can be entered. If not left blank, each of the four fields must be a number between 1 and 255.
Bridge IP Address	The internal WiFi module has its own address on the wireless network, in addition to the ZyWAN-G9 address. Set the bridge IP to another unused address on the local WiFi network.
SSID	Enter the network name (domain ID) which is to be used for this wireless network. Enter an SSID of <i>any</i> (case-sensitive) to allow roaming in managed or ad-hoc modes.
Channel	Select the frequency (channel) to use for the wireless network. Typically the channels used in the United States are 1, 6, and 11.
TX Power	Select the transmit power (10 – 26 dBm). Be aware that certain countries require 802.11 transmit power to be limited at a level below 26dBm. Compliance with local regulations is the responsibility of the user.
Security Type	Select the type of encryption required by the access point: <i>No Security</i> , <i>WEP (Wired Equivalent Privacy)</i> , <i>WPA (WiFi Protected Access)</i> , and <i>WPA2</i> . WPA2 is the most secure wireless standard.

Security Key	<p>If WEP is chosen for the Security Type, the Security Key must be entered as one of the following:</p> <ul style="list-style-type: none"> * 5-character alphanumeric or 10-character hexadecimal string (40-bit encryption) * 13-character alphanumeric or 26-character hexadecimal value (104-bit encryption), or * 16-character alphanumeric or 32-character hexadecimal value (128-bit encryption). <p>If WPA or WPA2 is chosen for the Security Type, the Security Key must be entered as an 8 to 63 character alphanumeric string, or a 64-character hexadecimal value (256-bit encryption).</p> <p>When entered as hexadecimal, all characters must be numbers, or letters between A and F (upper or lowercase).</p>
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DHCP Server

If Run DHCP Server is set to Yes, the DHCP Server Configuration table is displayed.

The following table lists the fields and options available in the DHCP Server Configuration table.

FIELD/OPTION	EXPLANATION
Default Lease Time	Enter the <i>Default Lease Time</i> (in seconds) for the assigned DHCP lease to expire. The default time is the time assigned if the client does not request a specific lease time.
Subnet Mask	Enter the <i>Subnet Mask</i> defining the range of network addresses to be assigned by this DHCP server. Each of the four fields must be a number between 0 and 255.
Range From	Enter the numeric address of the lowest DHCP address to be assigned by this DHCP server. Each of the four fields must be a number between 1 and 254.
Range To	Enter the numeric address of the highest DHCP address to be assigned by this DHCP server. Each of the four fields must be a number between 1 and 254, greater than the <i>Range From</i> .

Note:

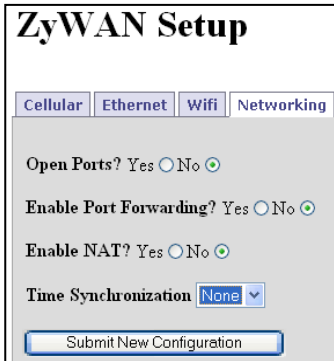


If the *Run Dhcp Server* option is set to Yes, then UDP port 67 must be included in the *Open Ports* section of the *Networking* page.

In order to act as a DNS server, UDP port 53 must be included in the *Open Ports* section of the *Networking* page.

Chapter 6 Networking configuration

The following screen capture shows the *Networking* tab.



The screenshot shows the ZyWAN Setup interface with the Networking tab selected. The settings are as follows:

Setting	Value
Open Ports?	Yes <input type="radio"/> No <input checked="" type="radio"/>
Enable Port Forwarding?	Yes <input type="radio"/> No <input checked="" type="radio"/>
Enable NAT?	Yes <input type="radio"/> No <input checked="" type="radio"/>
Time Synchronization	None

Submit New Configuration

The following items must be configured in order to enable open ports, port forwarding, network address translation, or NTP services.

Open Ports

Select Yes if you wish to open the ZyWAN-G9 firewall to inbound TCP or UDP connections. This applies to any traffic from other devices that terminates at the ZyWAN-G9, not port forward or NAT traffic.

Note:

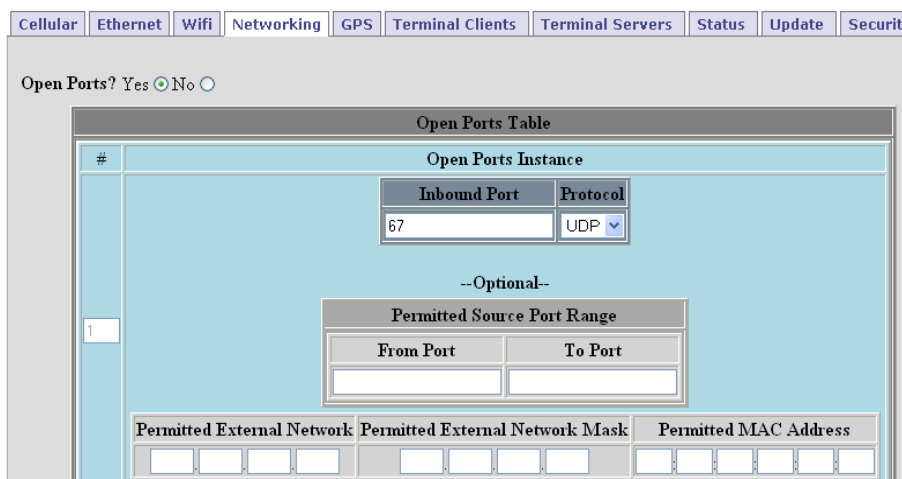
The *Open Ports* section must include UDP port 67 if *DHCP Server* is used for Ethernet or WiFi. UDP port 53 must be included if *Pass DNS Servers to DHCP Clients* is set to Yes for Ethernet (or *Use DNS Proxy* for WiFi).



Any configured ports on the *Terminal Server* page, GPS UDP, or GPS Terminal Server ports will also need to have those ports configured in the *Open Ports* page. If not, the firewall will block those connections.

On the ZyWAN-iDEN models, the IO270 modem firewall is limited to 35 open ports which can be added based on the ZyWAN configuration, plus the ports 22, 80 and 443 which are added by default.

The following screen capture shows the *Networking* tab if *Open Ports* is set to *Yes*.



Note: Changes made to the *Open Ports*, *Port Forwarding* and *NAT* portions of the *Networking* page take effect immediately after submitting changes, without requiring a reboot.

The following table lists the buttons available.

BUTTON	EXPLANATION
Insert Row#	Each of the table rows is numbered. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row needs to be filled in with all data required.
Delete Row#	In order to delete a row in the table, enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

The following table lists the fields available in the *Networking* tab if *Open Ports* is set to *Yes*.

FIELD	EXPLANATION
Inbound Port	Enter the port number of the incoming connection. Port numbers must be a number between 1 and 65535.
Protocol	Enter the protocol of the incoming port (TCP or UDP).
Optional fields:	The following optional fields configure the firewall to filter allowed incoming connections to the ZyWAN-G9.
Permitted Source Port Range	Enter the range of source port numbers allowed for the incoming connection. Normally source ports are randomly assigned, so this field should only be used when the source port is specified.
Permitted External Network	Enter the numeric IP address, or range of addresses, which is the source of the connection to the ZyWAN-G9. Each of the four fields must be a number between 0 and 255. For instance, entering an IP address network of 172.16.11.0 limits incoming connections from addresses 172.16.11.1 through 172.16.11.255.
Permitted External Network Mask	Enter the subnet mask for the <i>Permitted External Network</i> . Each of the four fields must be a number between 0 and 255.
Permitted MAC Address	Enter the MAC address, in hexadecimal format, of a specific computer which is allowed to make a connection to the configured <i>Inbound Port</i> .

Enable Port Forwarding

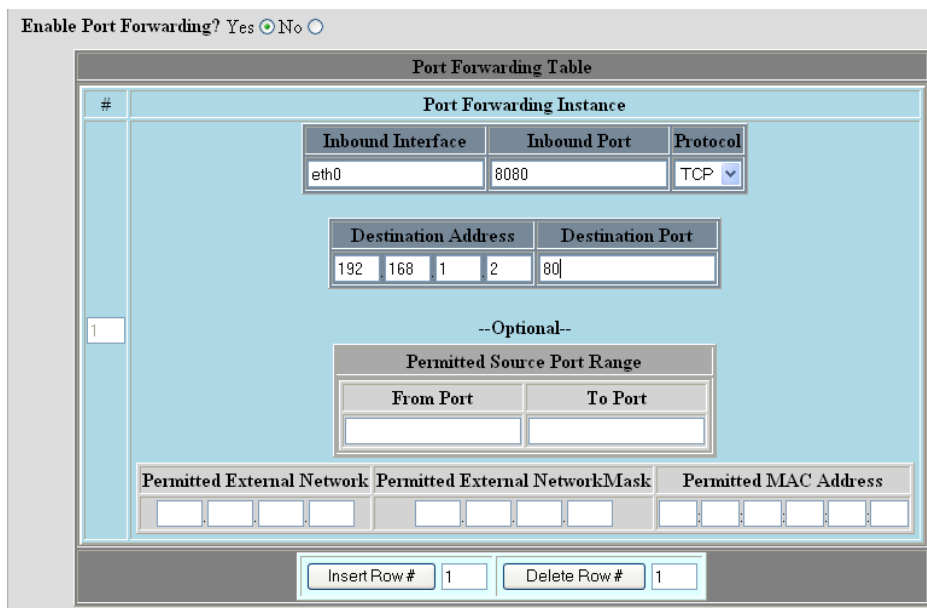
Select Yes if you wish to forward individual IP ports. If a host connection comes in on one network interface at a given port, its communication is redirected to the IP address and port number on another of the ZyWAN-G9 interfaces.



Note:

When forwarding a port number from one interface to another, there must usually also be a NAT rule created on the *Networking* page, from the local IP network to the external (public) interface.

The following screen capture shows the *Networking* tab if *Enable Port Forwarding* is set to *Yes*.




Note:

Changes made to the *Open Ports*, *Port Forwarding* and *NAT* portions of the *Networking* page take effect immediately after submitting changes, without requiring a reboot.

The following table lists the buttons available.

BUTTON	EXPLANATION
Insert Row#	Each of the table rows is numbered. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row needs to be filled in with all data required.
Delete Row#	In order to delete a row in the table, enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

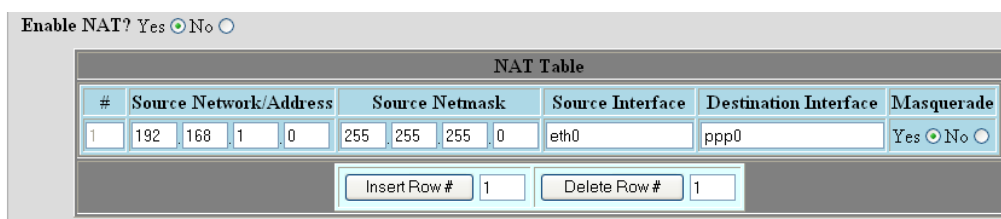
The following table lists the fields available in the *Networking* tab if *Enable Port Forwarding* is set to *Yes*.

FIELD	EXPLANATION
Inbound Interface	Enter the name of the network interface on which to monitor the incoming connection to an IP port, such as <i>eth0</i> or <i>ppp0</i> . See Understanding Network Interfaces on page 22 for a description of the available interfaces on the ZyWAN-G9.
Inbound Port	Enter the port number of the incoming connection. Port numbers must be a number between 1 and 65535.
Destination Address	Enter the numeric IP address to which the network traffic is redirected. Each of the four fields must be a number between 1 and 255.
Destination Port	Enter the destination port number to which the network traffic is redirected. Port numbers must be a number between 1 and 65535.
Optional fields:	The following optional fields configure the firewall to filter allowed incoming connections to the ZyWAN-G9.
Permitted Source Port Range	Enter the range of source port numbers allowed for the incoming connection. Normally source ports are randomly assigned, so this field should only be used when the source port is specified.
Permitted External Network	Enter the numeric IP address, or range of addresses, which is the source of the connection to the ZyWAN-G9. Each of the four fields must be a number between 0 and 255. For instance, entering an IP address network of 172.16.11.0 limits incoming connections from addresses 172.16.11.1 through 172.16.11.255.
Permitted External Network Mask	Enter the subnet mask for the <i>Permitted External Network</i> . Each of the four fields must be a number between 0 and 255.
Permitted MAC Address	Enter the MAC address, in hexadecimal format, of a specific computer which is allowed to make a connection to the configured <i>Inbound Port</i> .

Enable NAT

Select *Yes* if you wish to enable Network Address Translation, also referred to as IP Masquerading. This allows devices on one interface of the ZyWAN-G9 ('internal' side) to access the network on a second interface ('external' side), typically to allow devices to connect to the Internet via a single external IP address. The ZyWAN-G9 re-writes the source and/or destination Internet addresses in a packet as they pass through, so that they appears on the external side as from a single IP address, but on the internal side there may be multiple addresses which are hidden from the external network. NAT keeps track of outbound TCP connections and distributes incoming packets to the correct machine.

The following screen capture shows the *Nat Table* if *Enable NAT* is set to *Yes*.



The following table lists the buttons available.

BUTTON	EXPLANATION
Insert Row#	Each of the table rows is numbered. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row needs to be filled in with all data required.
Delete Row#	In order to delete a row in the table, enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

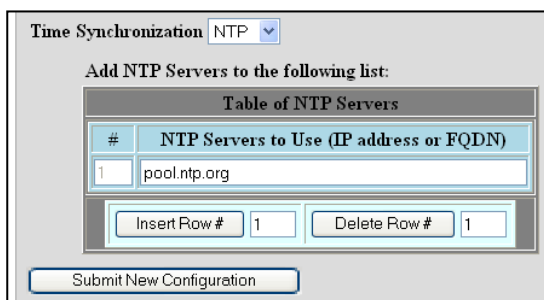
The following table lists the fields available in the *Nat Table* if *Enable NAT* is set to *Yes*.

FIELD	EXPLANATION
Source Network / Address	Enter the numeric IP address, or range of addresses, which the ZyWAN-G9

	translates from the source (internal) network. Each of the four fields must be a number between 0 and 255. For instance, entering an IP address network of 172.16.11.0 translates all addresses from 172.16.11.1 through 172.16.11.255.
Source Netmask	Enter the subnet mask for the <i>Source Network/Address</i> . Each of the four fields must be a number between 0 and 255.
Source Interface	Enter the name of the network interface which contains the source network (above).
Destination Interface	Enter the name of the network interface which is the destination (external) side of the network address translation. The public IP address on that interface has already been defined in the <i>Ethernet</i> or <i>WiFi</i> sections of the configuration, or it might be assigned by the cellular provider as part of the data services activation on that network. The interface names must be entered such as <i>eth0</i> or <i>ppp0</i> . See Understanding Network Interfaces on page 22 for a description of the available interfaces on the ZyWAN-G9.
Masquerade	The normal setting for <i>Masquerade</i> is Yes, providing forwarding and Network Address Translation between the two interfaces. There may be rare cases where this should be set to <i>No</i> , which retains the internal forwarding of packets between the two interfaces, but disables the network address translation.

Time Synchronization

Select the method of synchronizing the internal clock of the ZyWAN-G9. Available options are: *None*, *GPS*, and *NTP*. The GPS option allows the time to be acquired from the GPS receiver (if installed). The NTP (Network Time Protocol) updates the clock using NTP protocol from a network server. The following screen capture shows the *Table of NTP Servers* table available if *Time Synchronization* is set to *NTP*.



The following table lists the buttons available.

BUTTON	EXPLANATION
Insert Row#	Each of the table rows is numbered. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row needs to be filled in with all data required.
Delete Row#	In order to delete a row in the table, enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

Note:

If the clock is not retained after loss of power, it may either be that the battery link on the main circuit board is not fitted or that the coin cell battery has failed and needs to be replaced.

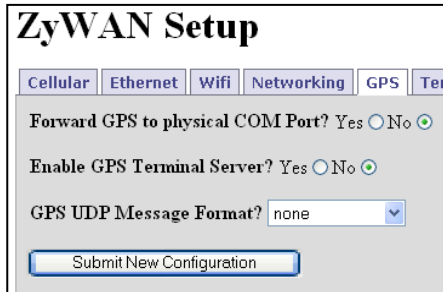
The following table lists the fields available in *Table of NTP Servers* if *Time Synchronization* is set to *NTP*.

FIELD	EXPLANATION
NTP Servers to Use (IP address or FQDN)	<p>Enter either the numeric address or named address (Fully Qualified Domain Name, FQDN) of an NTP server to use for synchronizing the system date and time. Insert additional rows if more NTP servers are desired.</p> <p>The best time server to use is one available on a local network, if available. This avoids using public Internet resources and gives more accurate time. The second best option is to use a time server which is located on the Internet somewhere close (small roundtrip time). Otherwise, some possible addresses are: 0.pool.ntp.org, 1.pool.ntp.org, and 2.pool.ntp.org (these addresses point to three randomly assigned servers, which change every hour), or simply pool.ntp.org.</p>

After setting all the properties, click the **Submit New Configuration** button before switching to a new tab or closing the window.

Chapter 7 GPS configuration

The following screen capture shows the *GPS* tab.



GPS (Global Positioning System) data is gathered from the GPS receiver using the standard NMEA protocol and may be redirected to either a serial or TCP port. See the NMEA Web site (www.nmea.org) for more information on the NMEA protocol standard. The GPS data may also be cached and delivered to a server in another format using the UDP protocol.

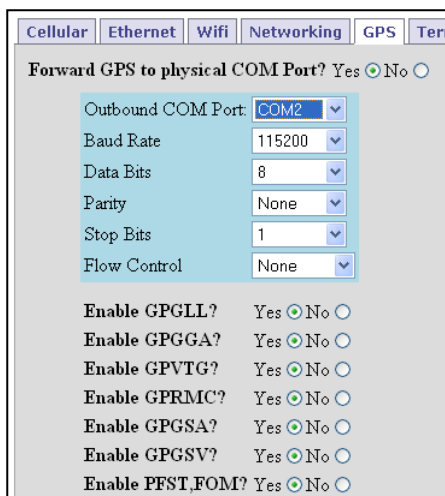
The following table lists the options that may be configured to enable the collection and distribution of GPS data.

OPTION	EXPLANATION
Forward GPS to physical COM Port?	Select <i>Yes</i> for this item to send GPS data to a physical serial port on the ZyWAN-G9 in <i>NMEA format</i> . See page 83.
Enable GPS Terminal Server?	Select <i>Yes</i> to enable a terminal server on the ZyWAN-G9, which allows a host to connect and obtain streaming GPS data over a network connection in <i>NMEA format</i> . See page 83.
GPS UDP Message Format?	Select a data format to enable the ZyWAN-G9 to send GPS data over a network connection using UDP protocol. Available options are <i>None</i> , <i>Arcom Format</i> , and <i>ActSoft Format</i> . See page 84. When selecting the <i>ActSoft Format</i> , the server address is sent to a Comet Tracker server by Actsoft™ Inc. (www.actsoft.com). When selecting the <i>Arcom Format</i> , a server is required which is able to handle the Arcom GPS data format. See Arcom Format for GPS Messages (UDP) on page 86 for further details.

After setting all the properties, click the **Submit New Configuration** button before switching to a new tab or closing the window.

Forward GPS to Physical COM Port

The following screen capture shows the *GPS* tab if *Forward GPS to Physical COM Port* is set to *Yes*.



The following table lists the options offered.

OPTION	EXPLANATION
Outbound COM Port	Select the serial COM port to which the GPS data is sent. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> Important: Make sure this COM port is not configured for another service in the ZyWAN-G9. Otherwise, both services may conflict for the port and not operate correctly. </div>
Baud Rate	Select the baud rate to use for the serial GPS output. Baud rate options range from 1200 to 115,200 bps.
Data Bits	Select the number of data bits to use for the serial GPS output. Options are 5, 6, 7, and 8.
Parity	Select the parity to use for the serial GPS output. Options are <i>None</i> , <i>Odd</i> , <i>Even</i> , <i>Mark</i> , <i>Space</i> .
Stop Bits	Select the number of stop bits to use for the serial GPS output. Options are 1, 1.5, and 2.
Flow Ctrl	Select whether to use hardware flow control for the serial GPS output. Options are <i>None</i> , and <i>RTS/CTS</i> (hardware flow control).

The *Enable* options determine which NMEA messages are sent through the COM port. The following table describes these options.

OPTION	EXPLANATION
Enable GPGLL?	Select <i>Yes</i> to enable the <i>GPGLL</i> message in the NMEA data stream.
Enable GPGGA?	Select <i>Yes</i> to enable the <i>GPGGA</i> message in the NMEA data stream.
Enable GPVTG?	Select <i>Yes</i> to enable the <i>GPVTG</i> message in the NMEA data stream.
Enable GPRMC?	Select <i>Yes</i> to enable the <i>GPRMC</i> message in the NMEA data stream.
Enable GPGSA?	Select <i>Yes</i> to enable the <i>GPGSA</i> message in the NMEA data stream.
Enable GPGSV?	Select <i>Yes</i> to enable the <i>GPGSV</i> message in the NMEA data stream.
Enable PFST,FOM?	Select <i>Yes</i> to enable the <i>PFST</i> and <i>FOM</i> messages in the NMEA data stream.

Enable GPS Terminal Server

The following screen capture shows the window if *Enable GPS Terminal Server?* is set to *Yes*.

Enable GPS Terminal Server? Yes No

TCP Port To Listen On:

Maximum Number of Connections Allowed:

Enable GPGLL? Yes No

Enable GPGGA? Yes No

Enable GPVTG? Yes No

Enable GPRMC? Yes No

Enable GPGSA? Yes No

Enable GPGSV? Yes No

Enable PFST,FOM? Yes No



Note:

If the GPS Terminal Server is configured here, it must also be included as a TCP port in the *Open Ports* section of the *Networking* page, so the firewall will allow connections to be made to the ZyWAN-G9.

The following table lists the fields offered if *Enable GPS Terminal Server?* is set to *Yes*.


FIELD	EXPLANATION
TCP Port To Listen On:	Enter the port number to use for the terminal server which delivers GPS data to a host. Port numbers must be an unused port number between 1 and 65535.
Maximum Number of Connections Allowed:	Enter the maximum number (between 1 and 8) of simultaneous host connections which are allowed to connect to the ZyWAN-G9 to receive streaming GPS data.

The *Enable* options determine which NMEA messages are sent through the network port. The following table describes these options.

OPTION	EXPLANATION
Enable GPGLL?	Select <i>Yes</i> to enable the <i>GPGLL</i> message in the NMEA data stream.
Enable GPGGA?	Select <i>Yes</i> to enable the <i>GPGGA</i> message in the NMEA data stream.
Enable GPVTG?	Select <i>Yes</i> to enable the <i>GPVTG</i> message in the NMEA data stream.
Enable GPRMC?	Select <i>Yes</i> to enable the <i>GPRMC</i> message in the NMEA data stream.
Enable GPGSA?	Select <i>Yes</i> to enable the <i>GPGSA</i> message in the NMEA data stream.
Enable GPGSV?	Select <i>Yes</i> to enable the <i>GPGSV</i> message in the NMEA data stream.
Enable PFST,FOM?	Select <i>Yes</i> to enable the <i>PFST</i> and <i>FOM</i> messages in the NMEA data stream.

GPS UDP Message Format

The following screen capture shows the window if *GPS UDP Message Format?* is set to *Arcom Format* or *ActSoft Format*.

GPS UDP MessageFormats? 

Server IP Address:

Server Port Number:

Request Interval:

Send Threshold:

Unit ID:

Enable Cache? Yes No





Note:

If the *GPS UDP* option is configured here, its UDP server port must also be included in the *Open Ports* section of the *Networking* page as UDP, so the firewall will allow acknowledgements to be sent back to the ZyWAN-G9. This is required for the *Actsoft*

Format mode, and for Arcom Format where the *Enable Cache* option is set to Yes.

The following table lists the fields and options offered.

FIELD/OPTION	EXPLANATION
Server IP Address:	Enter the numeric IP address or fully qualified domain name (FQDN) to which the UDP packets are sent containing GPS data. This is the address of the host computer, which must be available on the network (such as the Internet) to receive this data. Each of the four fields must be a number between 1 and 255. If the ActSoft Format is used, this IP address should generally be <code>gps.cometracker.com</code> .
Server Port Number:	Enter the destination port number on the host computer which receives the GPS data over UDP. Port numbers must be a number between 1 and 65535. If the ActSoft Format is used, the port number should generally be 8502.
Request Interval:	Enter the interval (in seconds) for how often the GPS data is obtained from the GPS receiver. Range is 1 to 65535 seconds for the Arcom mode, 30 to 65535 for ActSoft mode. Multiple GPS positions can be collected and buffered, to be sent all together as determined by the <i>Send Threshold</i> , in order to reduce the network traffic.
Send Threshold:	Enter the <i>Send Threshold</i> as a number between 1 and 19. The <i>Send Threshold</i> is a numeric value which indicates how many GPS positions should be sent in one position message. The position message will not be sent until the specified number of GPS positions have been obtained from the GPS receiver.
Unit ID:	<p>Enter a unique 10-character unit ID which identifies the GPS data from this ZyWAN-G9 when reported to a host computer. This allows the host computer to have unique identifiers for data coming from multiple remote units.</p> <p>When using the <i>Actsoft Format</i>, this <i>Unit ID</i> must be a unique 10-character serial number to identify this device in the Actsoft system.</p> <p>For ZyWAN-G9-iDEN: The <i>Unit ID</i> reported to ActSoft must be the 10-character modem serial number.</p> <p>For all other models: The <i>Unit ID</i> is a unique 10-character serial number, with format to be specified by ActSoft.</p> <hr/> <p> Warning: It is essential to observe that this <i>Unit ID</i> field is entered correctly. If not and if duplicate ID's are reporting from any other device, both remote devices may suffer loss of data and an interruption of GPS reporting service.</p> <hr/>
Enable Cache?	<p>Select Yes to enable caching of GPS data. When caching is enabled, the ZyWAN-G9 stores 100 positions in non-volatile memory. After this cache is filled, the oldest positions are discarded. Once the network connection is re-established, positions in the cache will transmitt in a first-in, first-out order. This is the only option for ActSoft mode, and the option is not available to set to <i>No</i>.</p> <p>When <i>Enable Cache?</i> is set to <i>Yes</i>, a UDP acknowledgement is required from the host computer, which allows the ZyWAN-G9 to verify the data has been received. If the UDP acknowledgement is not received, the data points begin to be cached.</p> <hr/> <p> The <i>Enable Cache?</i> option requires that the ZyWAN-G9 network address must be accessible to the host computer, since the host must initiate a one-way UDP acknowledgement message to the ZyWAN-G9. If the acknowledgement is not received (due to network problems, etc.), the ZyWAN-G9 caches the GPS points based on the Request Interval and Send Threshold parameters (above) and continues trying to send the next point every 10 seconds.</p>

When *Enable Cache?* is set to *No* (Arcom format only), a UDP acknowledgement is not required. The ZyWAN-G9 simply sends out the GPS points when it can and does not store them locally. If the host computer does not receive the position message, those positions are lost.

Arcom Format for GPS Messages (UDP)

When using the *Arcom Format* for GPS data, the position message is transmitted using the User Datagram Protocol (UDP). If caching is enabled, the ZyWAN-G9 waits a minimum of 10 seconds to receive an acknowledgement message after transmission of a position message. If a response message is received that does not contain the characters *ACK* or no message is received within the timeout period, the position message is retransmitted. This process continues indefinitely. The *ACK* must be 3 ASCII characters (0x41 0x43 0x4B).

The position message is defined next. The first 12 bytes are a header, followed by 19-byte portions containing the timestamp and position information. The number of these 19-byte portions is determined by the *Send Threshold* parameter. All data is in binary big-endian format, unless otherwise specified.

Message header:

som(1)	snum(10)	npos(1)
--------	----------	---------

Position data (repeated):

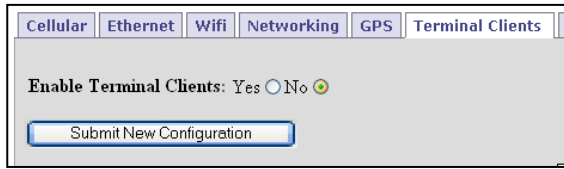
sval(1)	time(4)	stat(1)	sats(1)	lat(4)	lon(4)	psrc(1)	speed(1)	head(2)
---------	---------	---------	---------	--------	--------	---------	----------	---------

The following table describes the fields of the position message.

FIELD	BYTES	DESCRIPTION
som	1	This field indicates the start of message and is always set to 0x7E.
snum	10	This field contains the unit serial number in ASCII left justified and null(0) filled to the right.
npos	1	This field gives the number of positions in this message.
sval	1	The field contains the sequence value for each position transmitted. The sequence value for the first position transmitted is 0. The sequence value is incremented by 1 for each subsequent position transmitted. Since this value is only one byte, the maximum sequence value is 255.
time	4	This field contains the UTC timestamp of the GPS position and its value is in seconds since 1/1/1970.
stat	1	<p>This field contains a code representing status of the position from the GPS receiver. In addition, bits 5-7 are used as flags for other conditions.</p> <p><i>Status Codes:</i></p> <p>Bit 0: Condition: No response from GPS receiver. Bit 1: Condition: Error in response from GPS receiver. Bit 2: Condition: Good position response from GSP receiver Bit 3,4: unused</p> <p><i>Flag Bits:</i></p> <p>Bit 5: UTC TIME FLAG – This bit must be set to indicate that the TIMETAG represents UTC time. Bit 6: OVERFLOW FLAG – This bit is set to indicate that this position, after being added to the store and forward cache, caused an existing position in the store and forward cache to be deleted. Bit 7: FIRST POSITION FLAG – This bit is set to indicate that this is the first position to be transmitted after the device was powered on. For all subsequent positions, this bit must be cleared.</p>
sats	1	This field contains the number of satellites currently being tracked.
lat	4	This field contains the latitude of the position in 1/100,000 minutes. For example, the 'North 26 Degrees 8.767840 Minutes' is represented as $(26 * 60 * 100000 + 8.767840 * 100000) = 156876784$.
lon	4	This field contains the longitude of the position in 1/100,000 minutes. For example, the 'WEST 80 Degrees 15.222400 Minutes' is represented as $-(80 * 60 * 100000 + 15.222400 * 100000) = -481522240$.
psrc	1	This field contains ASCII 'G'(0x47) if this is a valid GPS position. Otherwise, it contains ASCII 'N'(0x4E).
speed	1	This field contains the speed in miles per hour.
head	2	This field contains the heading in degrees.

Chapter 8 Terminal Clients

The following screen capture shows the *Terminal Clients* tab.



The Terminal Client makes an outbound TCP/IP connection to a remote server, allowing pass-through communication with a local serial port. Its serial port also provides AT command emulation to act similar to a dial modem.

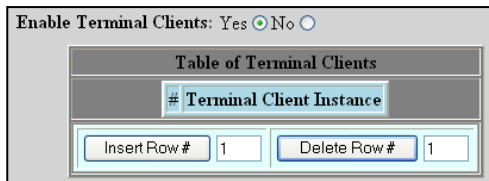
After setting all the *Terminal Clients* properties, click the **Submit New Configuration** button before switching to a new tab or closing the window.



Note:

Changes made to the *Terminal Clients* page take effect immediately after submitting changes without requiring a reboot.

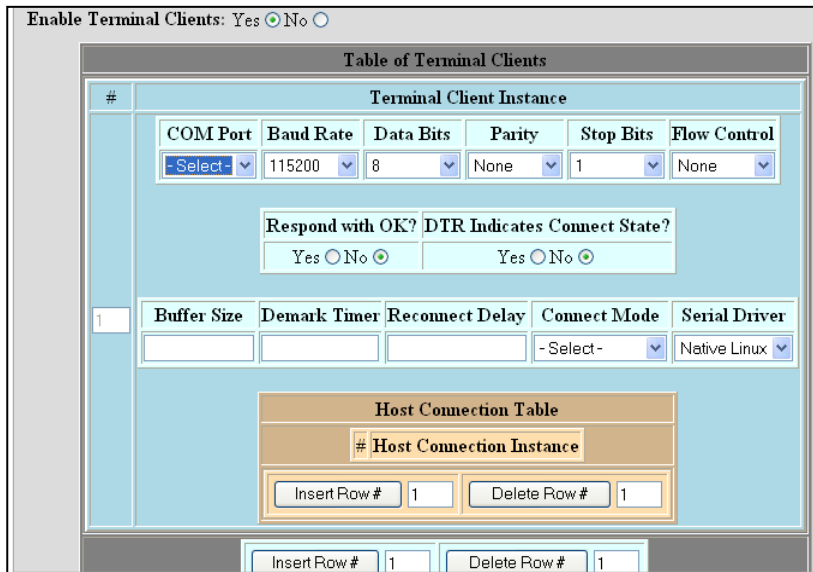
To allow one or more Terminal Client services to be configured, set *Enable Terminal Clients* to *Yes*. The *Table of Terminal Clients* is displayed, as shown in the following screen capture.




The following table lists the buttons available.

BUTTON	EXPLANATION
Insert Row#	Each of the Terminal Clients exists as a large set of properties in a numbered table row. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row must be filled in with all data required. Note that this table can get very large, with inner tables on each Terminal Client table row. When adding or deleting a Terminal Client configuration, make sure to click the Insert Row# or Delete Row# buttons at the very bottom of the main table.
Delete Row#	In order to delete a Terminal Client configuration (a row in the main table), enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

The following screen capture shows a Table of Terminal Clients containing the *Terminal Client* configuration.



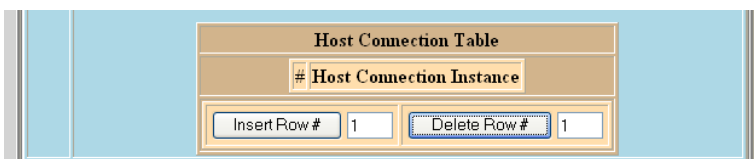
The following table lists the fields and options that are available and that must be set for each configured *Terminal Client* configuration.

FIELD/OPTION	EXPLANATION
COM Port	Select the serial COM port to which the Terminal Client data is sent. <div style="border: 1px solid black; padding: 5px; width: fit-content;">  <p>Important: Make sure this COM port is not configured for another service in the ZyWAN-G9. Otherwise, both services may conflict for the port and not operate correctly.</p> </div>
Baud Rate	Select the baud rate to use for the Terminal Client port. Baud rate options range from 1200 to 115,200 bps.
Data Bits	Select the number of data bits to use for the Terminal Client port. Options are 5, 6, 7, and 8.
Parity	Select the parity to use for the Terminal Client port. Options are <i>None</i> , <i>Odd</i> , <i>Even</i> , <i>Mark</i> , <i>Space</i> .
Stop Bits	Select the number of stop bits to use for the Terminal Client port. Options are 1, 1.5, and 2.
Flow Ctrl	Select whether to use hardware flow control for the Terminal Client port. Options are <i>None</i> , and <i>RTS/CTS</i> (hardware flow control).
Respond with OK?	Choose whether an OK message is sent in response to AT commands entered at the Terminal Client serial port. The OK response is similar to the way in which a modem responds to a computer over its serial port.
DTR Indicates Connect State	Specify whether DTR indicates the IP connection state. If set to Yes, the serial port's DTR output is asserted to a positive voltage when the IP connection is established, and is de-asserted when the IP connection is lost. This is meant to operate similar to a Carrier Detect (CD) output from a dial modem, which is asserted after a data connection is established.
Buffer Size	Enter the maximum number of data bytes (between 1 and 4095) which are allowed in an IP packet. The actual amount may be less if the <i>Demark Timer</i> times out before the serial buffer is full. This <i>Buffer Size</i> works both ways –network originated packets are sent to the serial port in blocks of bytes, and data coming in the serial port are broken into network packets of the configured number of bytes.
Demark Timer	Enter the maximum time (in milliseconds, between 10 and 30000) the ZyWAN-G9 waits for non-activity on the serial port before sending whatever serial data has been received.
Reconnect Delay	Enter the length of time (in seconds, between 1 and 65535) the Terminal

FIELD/OPTION	EXPLANATION
	Client waits before attempting to re-establish a lost connection with the server, if the connection has been dropped for any reason. This option only applies when the <i>Connect Mode</i> is set to <i>Continuously</i> .
Connect Mode	<p>Choose the connection mode. The options available are:</p> <p><i>Continuously</i>: Connect automatically upon system restart or upon either device dropping the IP connection. There must be only one Host Connection row, and its <i>Matching Dial String</i> field must be left empty.</p> <p><i>Any Data</i>: Connect only when data is received from a serial device connected to the COM Port. There must be only one Host Connection row, and its <i>Matching Dial String</i> field must be left empty.</p> <p><i>ATDT String</i>: Connect only if an <i>ATDT####</i> message is received on the serial port, where <i>####</i> is some alphanumeric string. There may be many Host Connection rows configured under this Terminal Client, with their <i>Dial String</i> set to unique <i>ATDT####</i> values. The ATDT mode acts as a modem emulator, whereby each ATDT dial sequence initiates a connection to an IP address. Until a matching dial string is received, the ZyWAN-G9 does not make an outbound Terminal Client connection. See <i>Matching Dial String</i> for more details.</p> <p><i>Use DCD Pin</i>: Connect if the Data Carrier Detect (DCD) input signal on the serial port is raised to a positive RS-232 voltage. This must be used with an RS-232 port and does not apply when COM3 uses the RS-485 hardware option. There must be only one Host Connection row, and its <i>Matching Dial String</i> field must be left empty.</p> <p><i>ATDT or DCD</i>: Connect if either <i>ATDT####</i> message is received or if the Data Carrier Detect (DCD) signal on the serial port is asserted. If the ATDT message is received, it is compared against the <i>Matching Dial String</i> in the Host Connection rows to find which IP address to use for connection. If the DCD is received, the ZyWAN-G9 is connected to the IP address of the first Host Connection row with an empty field for the <i>Matching Dial String</i>.</p>
Serial Driver	Select whether to use the Native Linux (ttyS) serial driver or the ACSCOMM Eurotech driver. The ACSCOMM option allows for half-duplex RS-485 communication, and it can provide better handling of hardware flow control if needed.

Host Connection Table

The *Host Connection Table* is part of the Terminal Client configuration, as shown in the following screen capture.



At least one row must be configured in the *Host Connection Table* for it to work properly.



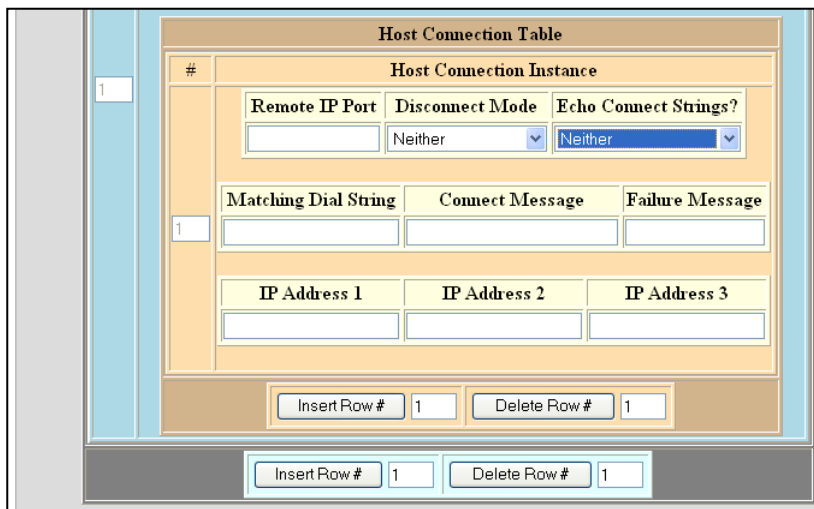
Note:

When adding or deleting rows of a *Host Connection Table*, make sure to click the **Insert Row#** or **Delete Row#** buttons within the brown section of the Terminal Client, not the buttons at the very bottom of the main table.

The following table lists the buttons available in the *Host Connection Table*.

BUTTON	EXPLANATION
Insert Row#	Each row of the <i>Host Connection Table</i> exists as a set of properties in a numbered table row within the Terminal Client configuration. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row must be filled in with all data required.
Delete Row#	In order to delete a row of the <i>Host Connection Table</i> , enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

The following screen capture shows the *Host Connection Table*.

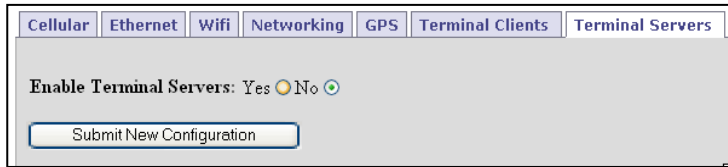


The following table lists the fields and options available for each row of the *Host Connection Table*. Multiple rows may be added if necessary:

FIELD/OPTION	EXPLANATION
Remote IP Port	Enter the port number (between 1 and 65535) to which the Terminal Client connects. The same port number is used to attempt connections to each of the three IP Addresses, if configured. There is no option to connect to different port numbers for each address in the Host Connection row.
Disconnect Mode	Select when to disconnect from the remote address. In any case of a session disconnect, the <i>Connect Mode</i> (above) determines how a reconnection occurs. Options available are: <i>On +++</i> : Disconnect if three characters +++ (and no more than three) are received on the serial port within the <i>Demark Time</i> . This emulates the modem attention string often used prior to hanging up a dial connection. <i>On Dropped DCD</i> : Disconnect when the Data Carrier Detect (DCD) input on the serial port goes to a low (inactive) state. <i>Either</i> : Disconnect either on receiving +++ at the serial port or on an inactive serial DCD line. <i>Neither</i> : Never disconnect from the remote server. Connections may still be lost due to the remote side dropping its connection or due to network interruptions.
Echo Connect Strings?	Choose whether to echo all commands. The options are: <i>To Async</i> : Echo the Connect Message and Failure Message to the serial port after a connection attempt or after the Terminal Client disconnects. <i>To Async and Socket</i> : Echo the <i>Connect Message</i> and <i>Failure Message</i> to the serial port and to the remote server after a connection attempt or after the Terminal Client disconnects. <i>Neither</i> : Do not echo the strings to the serial or TCP port.
Matching Dial String	Enter the ATDT string that is used to make a connection if the <i>Connect Mode</i> option is set to <i>ATDT</i> or <i>ATDT</i> or <i>DCD</i> . Otherwise, this field must be left empty. If used, the string must always start with the letters <i>ATDT</i> and be followed by some unique text (uppercase/lowercase text is treated identically, and spaces are ignored). For instance, the Host Connection rows may contain <i>Matching Dial Strings</i> of <i>ATDT1</i> , <i>ATDT555-1212</i> , <i>ATDTDIAL</i> . When any of these strings is received on the serial port, the ZyWAN-G9 attempts to connect to the first configured IP address of its Host Connection row.
Connect Message	Enter a text message (such as "CONNECT") sent to the network and/or serial port when a network connection is established to the remote address. This text is only sent when the <i>Echo Connect Strings?</i> is set to something other than <i>Neither</i> . This option emulates a modem's option to echo a connect message to a dialing computer. This field may be left blank if no message is desired.
Failure Message	Enter a text message (such as "NO CARRIER") sent to the network and/or serial port when the Terminal Client disconnects from a network connection and to the serial port when a connection attempt fails. This text is only sent when the <i>Echo Connect Strings?</i> is set to something other than <i>Neither</i> . This option emulates a modem's option to echo a fail message to a dialing computer. This field may be left blank if no message is desired.
IP Address 1, IP Address 2, IP Address 3	Enter the IP address or fully qualified domain name (URL or FQDN) to which the Terminal Client connects.

Chapter 9 Terminal Servers

The following screen capture shows the *Terminal Servers* tab.



The Terminal Server sets up a listening port for inbound TCP/IP connection, allowing communication directly to a local serial port.

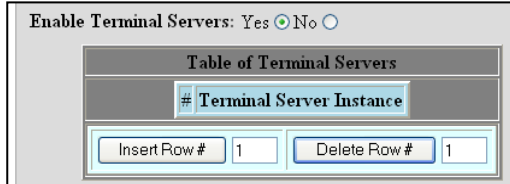
After setting all the Terminal Server properties, click the **Submit New Configuration** button before switching to a new tab or closing the window.



Note:

Changes made to the *Terminal Server* page take effect immediately after submitting changes without requiring a reboot.

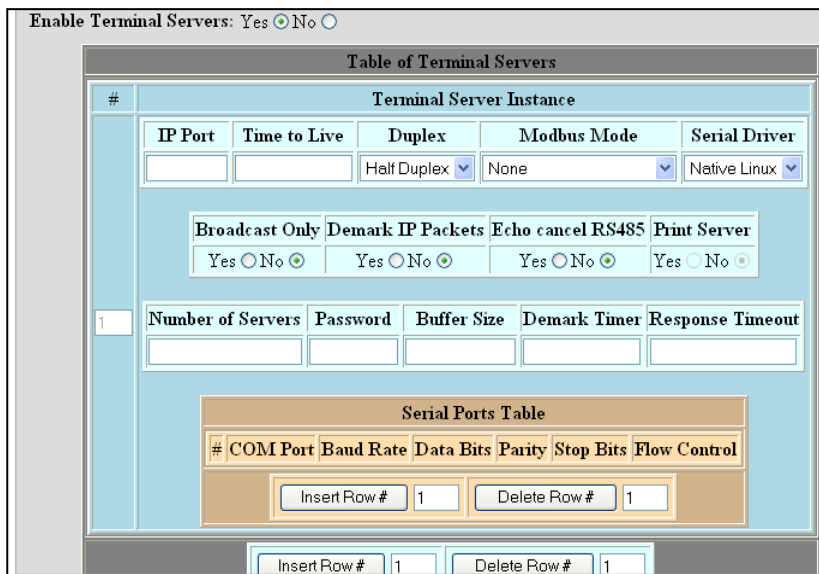
To allow one or more Terminal Server services to be configured, set *Enable Terminal Servers* to *Yes*. This makes the items shown in the following screen capture available in the *Table of Terminal Servers*.



The following table lists the buttons available in the *Table of Terminal Servers*.

BUTTON	EXPLANATION
Insert Row#	Each of the Terminal Servers exists as a large set of properties in a numbered table row. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row must be filled in with all data required.
Delete Row#	In order to delete a Terminal Server configuration (a row in the table), enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

The following screen capture shows the *Table of Terminal Servers*.



Note:

Any Terminal Server (TCP) ports configured here must also be included in the *Open Ports* section of the *Networking* page, so the firewall will allow connections to be made to the ZyWAN-G9.

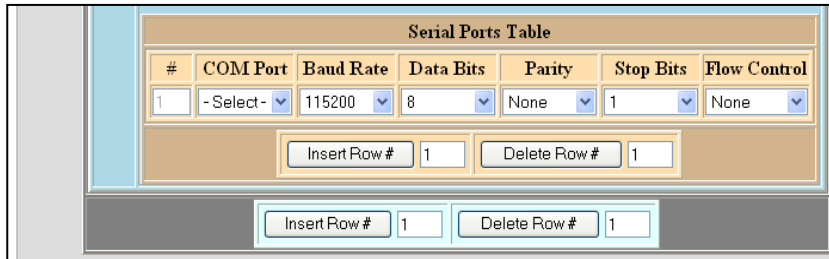
The following table lists the fields and options that are available and that must be set for each configured *Terminal Server* configuration.

FIELD/OPTION	EXPLANATION
IP Port	Enter the IP port number (between 1 and 65535) to be used on the ZyWAN-G9 for incoming TCP/IP connections from a network client application. The IP address to which the client connects may be any valid address configured for the ZyWAN-G9 on any interface.
Time to Live	Enter the <i>Time To Live</i> for the connection (in seconds). This is the maximum time of no activity from the network-connected client, before the ZyWAN-G9 closes the Terminal Server connection. The range for <i>Time To Live</i> is 1 to 65535 seconds. (Setting the value to zero (0) will cause the Terminal Server to never shut down upon no activity, which is not recommended.)
Duplex	Select the duplex mode for the Terminal Server. This selects a mode of operation for handling bi-directional communication with a serial device. <i>Full Duplex:</i> This mode is designed for unsolicited data from serial devices, full bi-directional communication, or any serial protocol which may send large or multiple responses to a request. In this mode, the Terminal Server is always able to receive data on both the serial and network ports, as long as a client is connected to the <i>IP Port</i> . <i>Half Duplex:</i> This mode is designed for simple request-response networks, especially where serial port sharing with another Terminal Server may be required. After a request is received from the network and sent to the serial port, one response is expected (with a number of bytes less than the <i>Buffer Size</i>). After data is transmitted to the serial port and the <i>Response Timer</i> times out with no data or after one response is received and returned to the network client, the Terminal Server does not read any more serial data until the next request.

FIELD/OPTION	EXPLANATION
Modbus Mode	<p>Select the mode of operation, if Modbus protocol translation is required. Modbus protocol translation is only needed if the network client is sending <i>Open Modbus/IP</i> protocol requests. Translation is not needed for other types of data or if the standard serial Modbus (ASCII or RTU) is encapsulated within the TCP/IP requests. Options available are:</p> <p><i>None</i>: This is the normal option for most applications.</p> <p><i>Open Modbus to ASCII</i>: Converts Open Modbus/IP protocol requests to serial Modbus ASCII protocol, and converts the ASCII response to an Open Modbus/IP response.</p> <p><i>Open Modbus to RTU</i>: Converts Open Modbus/IP protocol requests to serial Modbus RTU (Binary) protocol, and converts the RTU response to an Open Modbus/IP response.</p>
Serial Driver	Select whether to use the Native Linux (ttyS) serial driver or the ACSCOMM driver. The ACSCOMM allows for half-duplex RS-485 communication and can provide somewhat better handling of hardware flow control if required.
Broadcast Only	Select Yes to only send to the serial port. This option allows the network computer to send data to the serial port without waiting for a response. The <i>Response Timeout</i> and <i>Duplex</i> mode are ignored.
Demark IP Packets	If a large network packet is sent to the ZyWAN-G9 and gets broken up over the network, the fragments can sometimes arrive at slightly different times. Each packet is sent to the serial port, but if the time difference is too great, the serial device may not react properly. Set this value to Yes to allow delayed IP packets to be put together before sending to the serial port. The value for <i>Demark Timer</i> is used to specify the time to wait for additional IP data. Set this value to No if this feature is not needed.
Echo Cancel RS-485	This option is used when the internal (COM4) or an external RS-485 converter is used in half-duplex mode. Set this option to Yes to block the reception of echo bytes on the serial port which get echoed back from the RS-485 device.
Print Server	<p>This option is used when the Terminal Server is used as a print server to a serial printer. Setting this option to Yes causes the Terminal Server to operate in <i>Print Server</i> mode. The Terminal Server absorbs as much IP data as it can within the available memory and sends data to the serial port until it is all delivered, regardless of whether the host disconnects.</p> <p>When this option is set to No (default mode), if a host disconnects and data is still in the Terminal Server buffer, the remaining data is discarded and will not be sent to the serial port.</p>
Number of Servers	<p>Enter the number of simultaneous clients which can connect to this Terminal Server simultaneously. Values must be between 1 and 8.</p> <p>If this is set to 1, the Terminal Server is pre-emptive. This means that if a second client connects to the port, an already-connected client is disconnected.</p> <p>With <i>Number of Servers</i> set to 2 or greater, any further connections are blocked when the number of simultaneous connections have been made.</p>
Password	Enter a non-blank field as a password for the Terminal Server, if desired. The password must be no longer than 15 characters. When this is set, making a connection to the Terminal Server port returns a prompt for 'Password'. If the correct password (case-sensitive) is not entered within a minute, the connection is dropped.
Buffer Size	Enter the maximum number of bytes (between 1 and 4095) which are allowed in a response to a network client. (The actual number of bytes sent may be less if the <i>Demark</i> timer times out before the serial buffer is full.)
Demark Timer	Enter the maximum time (in milliseconds, between 10 and 30000) the ZyWAN-G9 waits for inactivity on the serial port before sending a response to the network client, if at least one byte has been received.
Response Timeout	<p>This option only applies if the <i>Duplex</i> option is set to <i>Half Duplex</i>. Otherwise, this field is ignored.</p> <p>Enter the <i>Response Timeout</i> (in milliseconds, between 10 and 30000). For simple request-response networks (half-duplex), the request from a network client is sent to the serial port. If no serial response is received within the <i>Response Timeout</i>, the Terminal Server does not read any more serial data until the next request and the serial port is released.</p>

Serial Ports Table

The *Serial Ports Table* is part of the Terminal Server configuration as shown in the following screen capture.



At least one row must be configured in the *Serial Ports Table* for the Terminal Server to work properly.




Note:

When adding or deleting rows of a *Serial Ports Table*, make sure to click the **Insert Row#** or **Delete Row#** buttons within the rown section of the *Serial Ports Table*, not the buttons at the very bottom of the main table.

The following table lists the buttons available in the *Serial Ports Table*.

BUTTON	EXPLANATION
Insert Row#	Each row of the <i>Serial Ports Table</i> contains the definition of a serial port to use for this Terminal Server configuration. One Terminal Server may send data received from the network client to multiple serial ports simultaneously. In order to insert a row in the table, enter a number in the box between 1 and one greater than the highest number of rows. Then click the Insert Row# button to insert a blank row. This row must be filled in with all data required.
Delete Row#	In order to delete a row of the <i>Serial Ports Table</i> , enter a number in the box between 1 and the highest number of rows. Then click the Delete Row# button to delete the row. Once a row is deleted, it cannot be restored without inserting a row and entering the data again.

The following table lists the options available for the *Serial Ports Table*. At least one row of the *Serial Ports Table* is required for the Terminal Server to operate.

FIELD/OPTION	EXPLANATION
COM Port	<p>Select the serial COM port to which the Terminal Server data is sent.</p> <hr/> <div style="display: flex; align-items: center;">  <div> <p>Important: Make sure this COM port is not configured for another service in the ZyWAN-G9. Otherwise, both services may conflict for the port and not operate correctly.</p> <p>It is possible in some applications to configure two Terminal Servers to use the same COM port. In order for this to work, the <i>Demark</i> option must be set to <i>Half Duplex</i> or <i>Broadcast</i>. In <i>Half Duplex</i> mode, the clients connecting to each port may need to wait much longer for a response, since the <i>Demark</i> and <i>Response Timeout</i> times for all connections are observed, in the order that the requests are received from each client.</p> </div> </div> <hr/>
Baud Rate	Select the baud rate to use for the Terminal Server port. Baud rate options range from 1200 to 115,200 bps.
Data Bits	Select the number of data bits to use for the Terminal Server port. Options are 5, 6, 7, and 8.
Parity	Select the parity to use for the Terminal Server port. Options are <i>None</i> , <i>Odd</i> , <i>Even</i> , <i>Mark</i> , <i>Space</i> .
Stop Bits	Select the number of stop bits to use for the Terminal Server port. Options are 1, 1.5, and 2.
Flow Control	Select whether to use hardware flow control for the Terminal Server port. Options are <i>None</i> , and <i>RTS/CTS</i> (hardware flow control).

Chapter 10 Update

The following screen capture shows the *Update* tab.



The screenshot shows the 'ZyWAN Setup' web interface. At the top, there is a navigation menu with tabs for Cellular, Ethernet, Wifi, Networking, GPS, Terminal Clients, Terminal Servers, Status, and Update. The 'Update' tab is selected. Below the menu, there is a text input field labeled 'Update URL:'. Underneath the input field are two buttons: 'Update ZyWAN' and 'Check Update Status'.

The *Update* tab on the Web interface provides one method to update the ZyWAN-G9 firmware to a later version. See the later section, [Updating Using WinSCP](#) on page 100, for another recommended method of updating, especially for systems where the default network is a cellular or private network.



Warning:

The update process may take a significant amount of time, possibly several minutes, depending on the size and number of updates that have to occur. Do not remove power or perform a Linux command line 'reboot' until the updates have completed.

In some cases, the ZyWAN-G9 will be required to reboot automatically in the middle of its update process. If this occurs, it will continue installing additional files after the reboot. Do not reboot the ZyWAN-G9 or remove power while software updates are installing, or else unpredictable results may occur.

Updating Via the Web Interface

In the *Update URL* field, enter the network address URL (Uniform Resource Locator) from which an update file may be downloaded. The address must be accessible through the default network interface of the ZyWAN-G9 and must point to a file server location containing update files for the ZyWAN-G9. Some examples of addresses which could be used are:

http://network_address/pathname (HTTP download from **ip_address** which must be an HTTP server, with the files existing in **pathname**)
--ftp-user=**username** --ftp-password=**password** ftp://ip_address/somepath (for FTP download from **ip_address/somepath**, using **username** and **password**)

If the *Update URL* field is left blank, the following default URL address will be used:

http://files.eurotech-inc.com/ESF/product_updates/eurotech/zywan_g9



Note:

The default URL address listed above should only be used with a standard ZyWAN-G9 software version, because only the main branch of “standard” releases is stored in that location. Standard G9 will have a “Current Software Version” on the *Status* page with a name something like: ZyWAN-G9_release-x.y.z

Customer-specific software releases will have a differently named software version, and may have entirely different sets of update files. Therefore, trying to apply the standard ZyWAN-G9 updates to customer-specific systems is likely to cause unpredictable results. Take care to enter an appropriate *Update URL* before clicking the **Update ZyWAN** button.

The server location must contain the latest versions of the ZyWAN-G9 software release files, such as:

zywan_g9_releases.txt

ZyWAN-G9-update-**x.y.z**.star

When the **Update Zywan** button is pressed, the files are downloaded and installed. After the update is complete, the ZyWAN-G9 will be rebooted automatically if needed.

If more than one update is available at the update site, all updates will occur in numerical order, one after the other. This may require some time to complete, and may require multiple reboots in between updates. The **Check Update Status** button may be clicked whenever the ZyWAN-G9 is available on a network address, to check on the status of an in-progress update. A prominent warning message will also be given on the *Status* and *Update* tabs, to warn the user that a software update has started but not yet completed.



Note:

If the ZyWAN-G9 is rebooted in the middle of an update, there is a possibility that software corruption of the file system can occur. Make sure the update process is finished before removing power or rebooting.

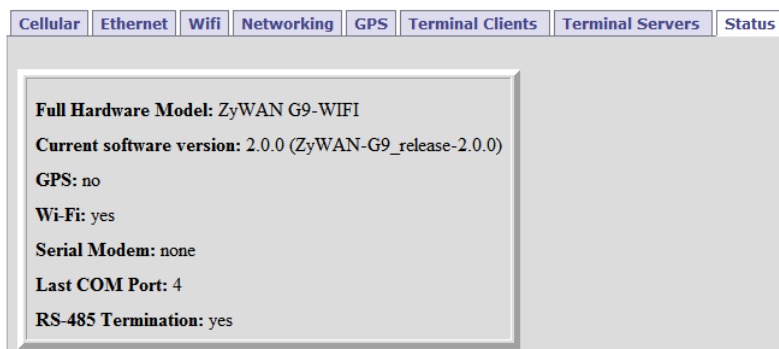
Updating Using WinSCP

Some version updates for ZyWAN-G9 could be fairly large. For this reason, it may not be recommended to use the *Update Web* interface described in the previous section, because of the cost or length of time required to load files over a cellular network. There may also be cases where the ZyWAN-G9 cannot connect to an update site because of limitations on its network access.

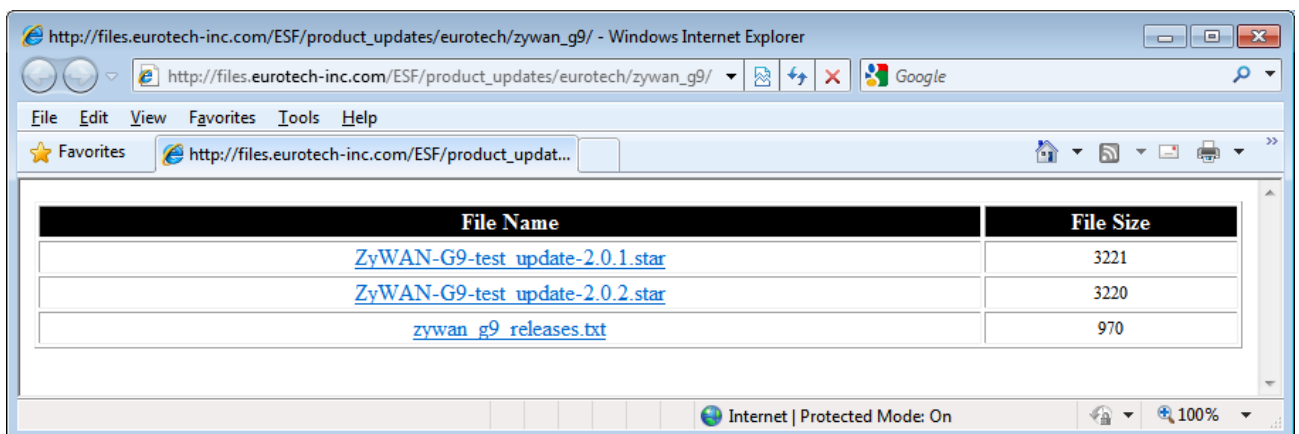
The following method describes how to load the ZyWAN-G9 update files locally over Ethernet or WiFi and to install them manually.

See the section [SFTP/SCP Client \(WinSCP\)](#) on page 28 for information on installing the WinSCP file transfer program. This program provides a free and secure means of loading the required files, although other programs may be used which support the SFTP or SCP protocols.

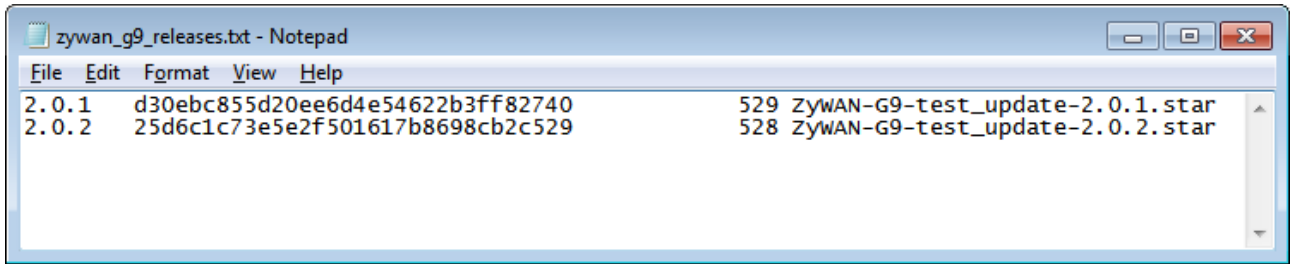
Determine the current software revision by viewing the *Status* tab of the ZyWAN-G9 Web configuration page. The following screen capture shows an example indicating a ZyWAN-G9 at software revision level 2.0.0.



The required files can be obtained upon request from Eurotech, or they may be downloaded from http://files.eurotech-inc.com/ESF/product_updates/eurotech/zywan_g9 (standard releases only, not customer-specific).



From this Web site, download the “zywan_g9_releases.txt file”. This file lists all sequential release files for the standard ZyWAN-G9 product. A typical example is shown below (note, this is a sample only, not the actual release list).

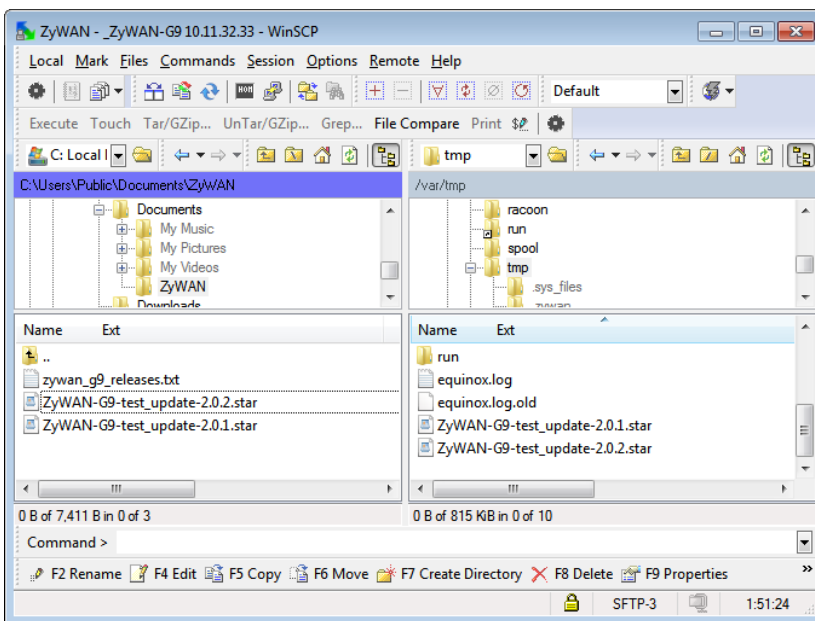


Then download all the listed “.star” files that have higher numbered revisions above the current version number of the ZyWAN-G9 being upgraded.

If you are installing updates to a customer-specific ZyWAN-G9 instead of the standard platform, contact Eurotech to obtain the list of the correct .star file updates for the system.

Installing Updates Individually

Use WinSCP to connect to the ZyWAN-G9, and browse to its /tmp/ (or /var/tmp/) folder. Download all the needed .star files to the ZyWAN-G9 as shown in the following screen capture.



After the files are loaded, connect to the ZyWAN-G9 using PuTTY or HyperTerminal on the COM1 diagnostics port, or using PuTTY over the network. See the section [Setting Up Software](#) on page 25, for help setting up HyperTerminal or PuTTY.

From the ZyWAN-G9 command line, issue the following commands:

```
cd /tmp
touch update.log
tail update.log & (Notice the ampersand '&' at the end.)
sh ZyWAN-G9-test_update-2.0.1.star (Use appropriate filename)
sh ZyWAN-G9-test_update-2.0.2.star (Repeat for all .star files to be installed)
```

A series of diagnostic messages will be displayed. If any of the .star update files requires a system reboot, it will restart automatically. After the reboot, the remaining .star files will need to be loaded into /tmp/ again, and repeat the above commands to install them.

Once the updates have been applied, the system version can be verified on the Web configuration *Status* page, or by typing the command:

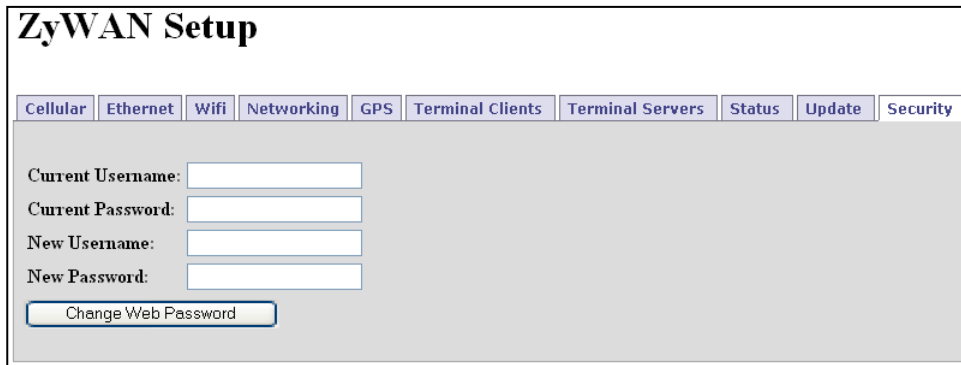
```
ls /etc/esf
```

The response should give the version as part of an .xml filename, something like:

```
ZyWAN-G9_release-2.0.2.xml
```

Chapter 11 Security

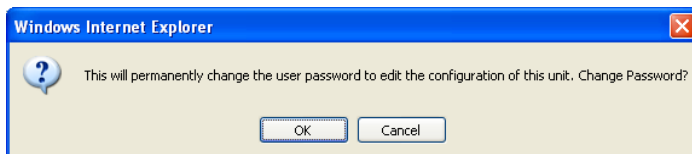
The following screen capture shows the *Security* tab.



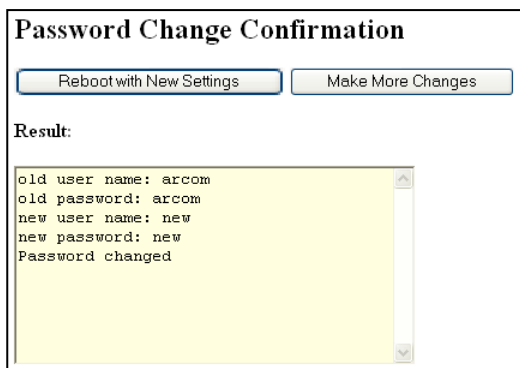
The *Security* tab provides an option to change the ZyWAN-G9 Web configuration password. The following table lists the fields available in this tab.

FIELD/OPTION	EXPLANATION
Current Username	Enter the current username for logging into the Web configuration page.
Current Password	Enter the current password.
New Username	Enter a new username for logging into the Web configuration page.
New Password	Enter a new password.

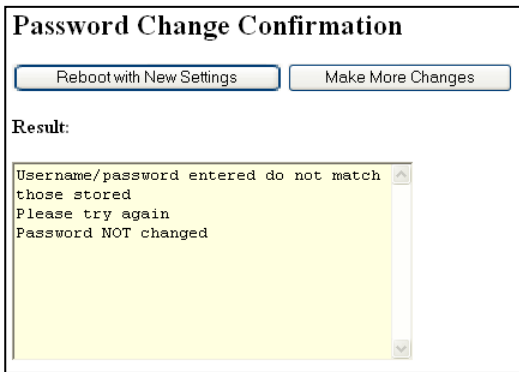
After entering these values, click the **Change Web Password** button. A prompt will confirm whether to change the password, as shown in the following screen capture.



If the current username and password have been entered correctly, a confirmation will be displayed, as shown in the following screen capture.



Otherwise, a negative confirmation will indicate that the change password operation was not successful. The following screen capture illustrates this case.



Chapter 12 Backing Up Configurations

The Web configuration page is the main way to implement configuration changes on the ZyWAN-G9. However, it may be useful to be able to copy configuration files from the ZyWAN-G9, either to install on a multiple devices or to save for archive purposes. This section describes the process of retrieving configuration files from the ZyWAN and loading them onto a different ZyWAN-G9.

Saving Configuration Files

Once the configurations have been set and tested on a ZyWAN-G9, log on to the administrative account (typically 'root') using either Windows HyperTerminal or PuTTY. See the section [Setting Up Software](#) on page 25, for help setting up HyperTerminal or PuTTY.

Issue the following commands:

```
/usr/local/bin/config-pack.sh
```

or

```
/usr/local/bin/config-pack.sh /directory
```

This will create a file `ZywanConfig.tgz` in either the local directory, or the specified `/directory`. The file contains all the unit property files, which are all the properties set through the Web configuration page. Use WinSCP to upload this file from the ZyWAN-G9 to a computer. This file can be stored for archiving purposes or for transfer to a different device.

Restoring Configuration Files

In order to load these `.properties` files to another ZyWAN-G9, copy the file `ZywanConfig.tgz` to some `directory`, such as `/tmp/`. Then issue the following command:

```
/usr/local/bin/config-unpack.sh /directory/ZywanConfig.tgz
```

or change to the directory where the file is stored and issue the command:

```
/usr/local/bin/config-unpack.sh
```

This will extract the files and install the new configuration. The modified `reboot.properties` file will cause the ZyWAN-G9 to reboot automatically. After the reboot, it should have the same configuration as the original device from which the configuration was taken. If there are unit-specific configuration changes (such as IP addresses, WiFi information, ActSoft/Arcom GPS unit names, etc.), these must be configured after the reboot.

PART 3: CONFIGURATION EXAMPLES

Introduction

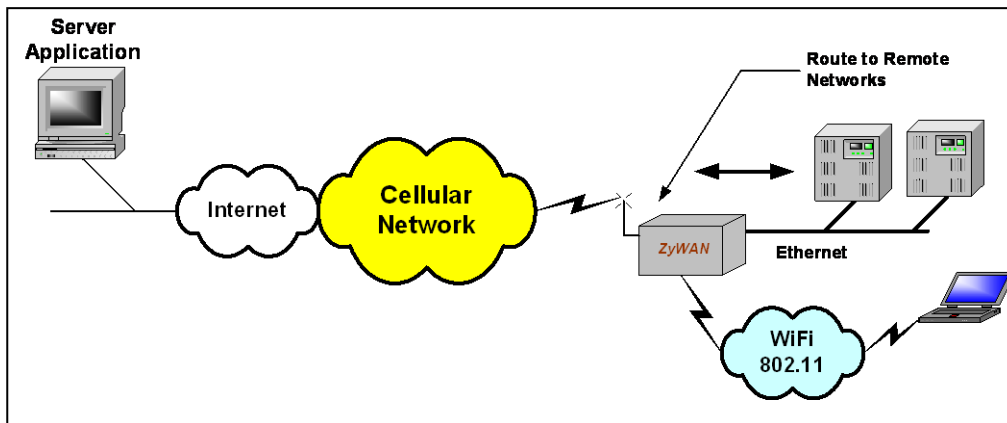
This section provides examples of a few common ways the ZyWAN-G9 can be configured to achieve various custom applications. Detailed information is given for each configuration example. These examples illustrate some of the basic ZyWAN-G9 features. The actual implementation may vary with customer requirements.

The configurations described in this section are only a subset of the functionality of the ZyWAN-G9. Many other configurations are possible that are not represented by the examples included in this section.

Configuration Example 1: Network Router

The Network Router configuration example illustrates the following features of the ZyWAN-G9:

- Cellular Internet connection
- Local Ethernet LAN connection
- Wireless (WiFi) 802.11 network connection (access point)
- Allowing Ethernet or WiFi devices on the network to connect to the Internet via cellular, using the ZyWAN-G9 as a gateway (NAT)



The following table lists the network settings used in this example.

SETTING	DETAILS
Cellular	The DNS servers passed to other computer will be obtained from the cellular network.
Ethernet (eth1)	192.168.1.1, subnet 255.255.255.0 ZyWAN-G9 will be the default gateway and DNS server to devices on its Ethernet network, assigning them addresses 192.168.1.10 through 192.168.1.200.
WiFi	192.168.3.1, subnet 255.255.255.0 WiFi will act as an access point ("master" mode) with SSID 'zywan'. ZyWAN-G9 will be the default gateway and DNS server to devices on the WiFi network, assigning them addresses 192.168.3.10 through 192.168.3.200.
Networking	UDP ports 67 and 53 (DHCP and DNS) are allowed in the ZyWAN-G9 firewall, and NAT is configured for eth1 and eth2.

The next sections provide detailed descriptions including Web configuration pages for each setting.

Cellular Setup

The cellular page will depend on the model of ZyWAN-G9 and the network provider.

Ethernet Setup

Do not configure the Default Gateway and DNS Server addresses because these addresses will override the cellular network. If configured, the Default Gateway address will be the ZyWAN-G9's default route, and the ZyWAN will obtain its public DNS servers from that network.

The following screen capture shows the *Ethernet* configuration page.

Enable Eth1? Yes No

Use Dhcp Client? Yes No

Network Interface - eth1				
IP Address	192	168	1	1
Subnet Mask	255	255	255	0
Default Gateway				
Preferred DNS Server				
Alternate DNS Server				

Run Dhcp Server: Yes No

DHCP Server Configuration				
Default Lease Time	7200			
Subnet Mask	255	255	255	0
Range From	192	168	1	10
Range To	192	168	1	200

WiFi Setup

Do not configure the Default Gateway or DNS Server addresses because these addresses will override the cellular network. If configured, the Default Gateway address will be the ZyWAN-G9's default route, and the ZyWAN will obtain its public DNS servers from that network. The SSID, frequency, signal strength, and WEP/WPA need to be configured as desired.

The following screen capture shows the *WiFi* configuration page.

Ubiquiti Ministation2 Configuration

Wireless Mode: Network Mode

Master (Access Point) | Bridge

Network Interface - usb0				
IP Address	192	168	3	1
Subnet Mask	255	255	255	0
Default Gateway				
Preferred DNS Server				
Alternate DNS Server				

Run Dhcp Server: Yes No

DHCP Server Configuration				
Default Lease Time	7200			
Subnet Mask	255	255	255	0
Range From	192	168	3	10
Range To	192	168	3	200

Bridge Management Interface

ZyWAN Link-Local IP 169.254.0.1	Bridge IP Address 192 . 168 . 3 . 2	Bridge Link-Local IP 169.254.0.2
------------------------------------	--	-------------------------------------

SSID ZyWAN_G9	Channel 1 - 2.412 GHz	Tx Power (dBm) 26
------------------	--------------------------	----------------------

Security Type Wi-Fi Protected Access (WPA2)	Security Key Enter your WPA security key
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Networking Setup

Port 67 (UDP) is required for the ZyWAN-G9 to act as a Default Gateway to other devices, and port 53 (UDP) is required for it to act as a DNS server. The NAT entries allow devices on each network to route through the ZyWAN-G9 to reach the cellular network (ppp0 interface).

The following screen capture shows portions of the *Networking* configuration page.

Open Ports? Yes No

Open Ports Table

#	Open Ports Instance																
1	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <tr> <th style="width: 60%;">Inbound Port</th> <th style="width: 40%;">Protocol</th> </tr> <tr> <td style="text-align: center;">67</td> <td style="text-align: center;">UDP</td> </tr> </table> <p style="text-align: center; margin: 5px 0;">--Optional--</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <tr> <th colspan="2" style="text-align: center;">Permitted Source Port Range</th> </tr> <tr> <th style="width: 50%;">From Port</th> <th style="width: 50%;">To Port</th> </tr> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%;">Permitted External Network</th> <th style="width: 33%;">Permitted External Network Mask</th> <th style="width: 33%;">Permitted MAC Address</th> </tr> <tr> <td style="height: 20px;"></td> <td style="height: 20px;"></td> <td style="height: 20px;"></td> </tr> </table>	Inbound Port	Protocol	67	UDP	Permitted Source Port Range		From Port	To Port			Permitted External Network	Permitted External Network Mask	Permitted MAC Address			
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Inbound Port	Protocol																
53	UDP																
Permitted Source Port Range																	
From Port	To Port																
Permitted External Network	Permitted External Network Mask	Permitted MAC Address															

Enable Port Forwarding? Yes No

Enable NAT? Yes No

NAT Table

#	Source Network/Address	Source Netmask	Source Interface	Destination Interface	Masquerade
1	192 . 168 . 1 . 0	255 . 255 . 255 . 0	eth1	ppp0	Yes <input checked="" type="radio"/> No <input type="radio"/>
2	192 . 168 . 3 . 0	255 . 255 . 255 . 0	eth2	ppp0	Yes <input checked="" type="radio"/> No <input type="radio"/>

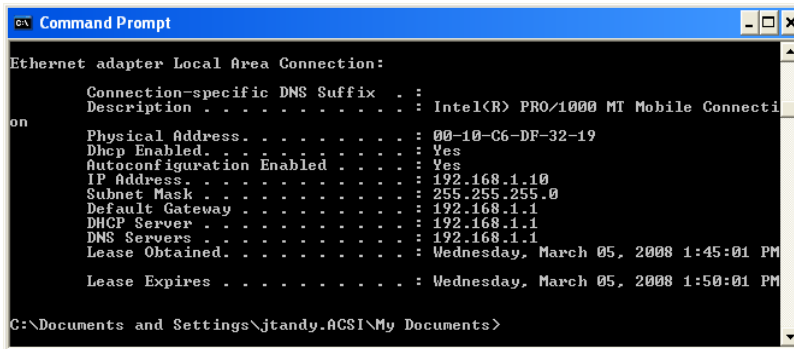
110

110150-4002A

Checking Out Example 1

The following screen captures show diagnostic information on checking the operation of this Network Router configuration. A computer is connected to the Ethernet 1 port on the ZyWAN-G9 and is set to automatically obtain an IP address and DNS. The screen captures show the output of `ipconfig /all` on a computer running the Windows operating system.

The computer has obtained its address (192.168.1.10) from the ZyWAN-G9, and the ZyWAN-G9 is its Default Gateway, DHCP Server, and DNS Server.



```

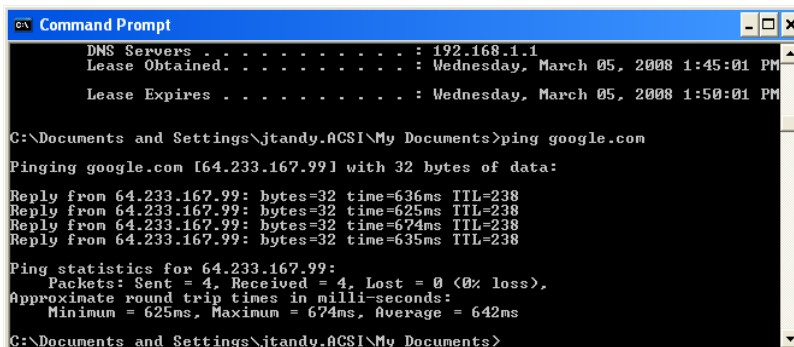
Command Prompt

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    Description . . . . . : Intel(R) PRO/1000 MT Mobile Connecti
on
    Physical Address. . . . . : 00-10-C6-DF-32-19
    Dhcp Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    IP Address . . . . . : 192.168.1.10
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1
    DHCP Server . . . . . : 192.168.1.1
    DNS Servers . . . . . : 192.168.1.1
    Lease Obtained. . . . . : Wednesday, March 05, 2008 1:45:01 PM
    Lease Expires . . . . . : Wednesday, March 05, 2008 1:50:01 PM

C:\Documents and Settings\jtandy.ACSI\My Documents>
  
```

The computer can ping `google.com`, using the public cellular network both to resolve the URL with DNS and to route the network traffic between `eth1` and `eth2`. The same can be done by connecting the computer to the ZyWAN-G9 using the WiFi interface.



```

Command Prompt

    DNS Servers . . . . . : 192.168.1.1
    Lease Obtained. . . . . : Wednesday, March 05, 2008 1:45:01 PM
    Lease Expires . . . . . : Wednesday, March 05, 2008 1:50:01 PM

C:\Documents and Settings\jtandy.ACSI\My Documents>ping google.com

Pinging google.com [64.233.167.99] with 32 bytes of data:

Reply from 64.233.167.99: bytes=32 time=636ms TTL=238
Reply from 64.233.167.99: bytes=32 time=625ms TTL=238
Reply from 64.233.167.99: bytes=32 time=674ms TTL=238
Reply from 64.233.167.99: bytes=32 time=635ms TTL=238

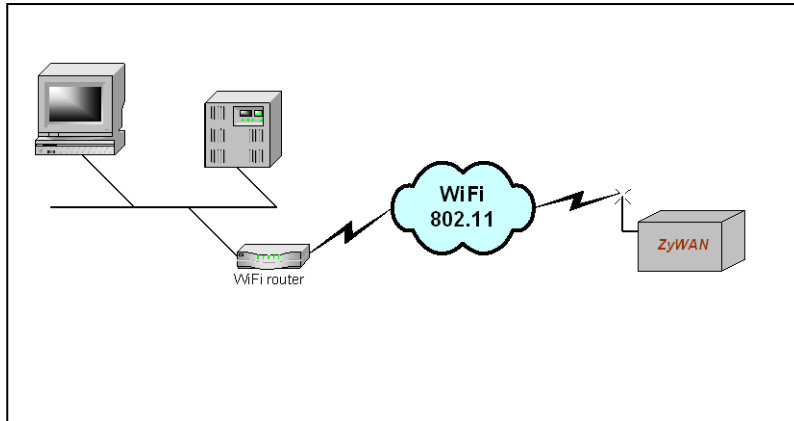
Ping statistics for 64.233.167.99:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 625ms, Maximum = 674ms, Average = 642ms

C:\Documents and Settings\jtandy.ACSI\My Documents>
  
```

Configuration Example 2: WiFi Client

The WiFi Client configuration example illustrates the following features of the ZyWAN-G9:

- Ability of the ZyWAN-G9 to connect to a WiFi network using an access point or wireless router



The following table lists the network settings used in this example, which is only a partial configuration to illustrate the WiFi network.

SETTING	DETAILS
WiFi	ZyWAN-G9 is a client on a host network using a wireless access point, using static IP addressing. WiFi in managed mode may use DHCP instead to automatically acquire an address from the host network. A WEP password may also be configured (currently WPA is not supported).

The next section provides a detailed description including the Web configuration page for this setting.

WiFi Setup

In this example, the ZyWAN-G9 network address is configured to 10.41.32.20, with network settings to match the host network (subnet 255.255.0.0, default gateway 10.41.30.1, DNS server 10.41.30.2). The bridge IP is set to another unique address on the network (10.41.32.21). The access point has the SSID name 'wirelesshub'.

Ubiquiti Ministation2 Configuration

Wireless Mode	Network Mode
Managed (Station) ▾	Bridge

Use Dhcp Client? Yes No

Network Interface - usb0

IP Address	Subnet Mask
10 . 41 . 32 . 20	255 . 255 . 0 . 0

Default Gateway	Preferred DNS Server	Alternate DNS Server
10 . 41 . 30 . 1	10 . 41 . 30 . 2	

Bridge Management Interface

ZyWAN Link-Local IP	Bridge IP Address	Bridge Link-Local IP
169.254.0.1	10 . 41 . 32 . 21	169.254.0.2

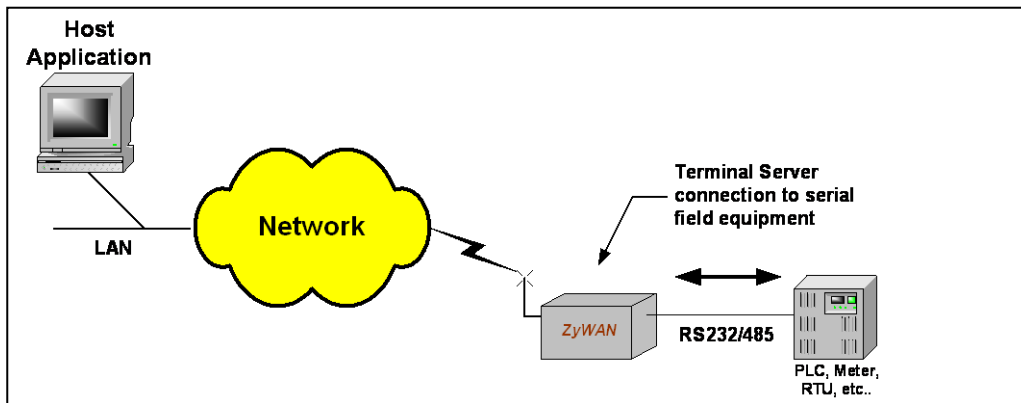
SSID	Tx Power (dBm)
wirelesshub	20

Security Type	Security Key
No Security ▾	

Configuration Example 3: Terminal Server

The Terminal Server configuration example illustrates the following features of the ZyWAN-G9:

- Terminal Server for IP to serial conversion, allowing host applications to communicate with a local serial device



The following table lists the network settings used in this example, which is only a partial configuration to illustrate the Terminal Server network.

SETTING	DETAILS
Terminal Server	IP port 4000 will be set up as a Terminal Server, which will redirect data to the COM2 port.
Networking	Open port 4000 in ZyWAN-G9 firewall. This must be included explicitly in <i>Networking</i> for any Terminal Server port configured.

The next sections provide detailed descriptions including the Web configuration pages for each setting.

Terminal Server Setup

This Terminal Server configuration uses *Full Duplex* mode, which allows full bi-directional communication. This example also shows the use of COM2 (RS-232) at a baud rate of 19,200, which must be set correctly for the application. If RS-485 is needed (on an appropriate model of ZyWAN-G9), use COM3 with *Flow Control* set to *RTS/CTS* and *Echo cancel RS485* set to *Yes*. See [Chapter 9 Terminal Servers](#) on page 93 for more details on other Terminal Server options.

The following screen capture shows the *Terminal Servers* configuration page.

Networking Setup

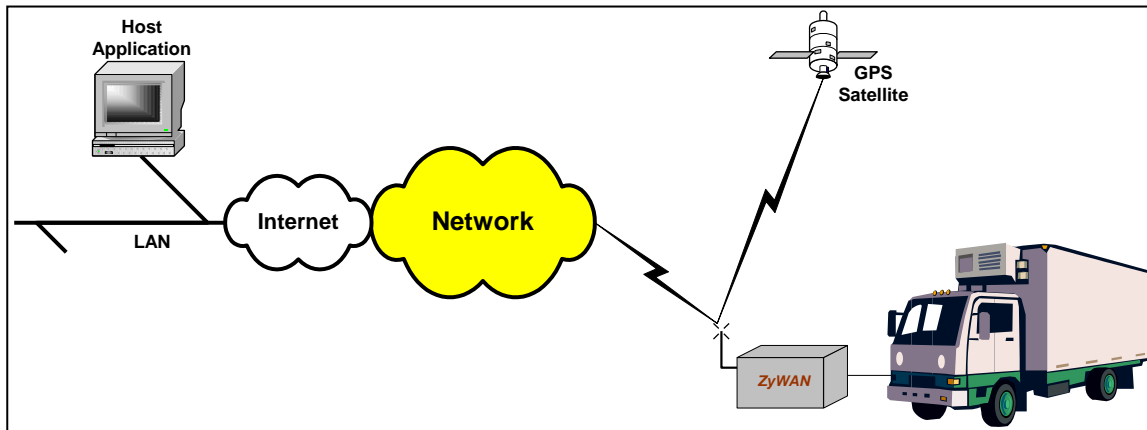
Port 4000 (TCP) must be opened in the firewall to allow external connections to be made to the Terminal Server.

The following screen capture shows the *Networking* configuration page.

Configuration Example 4: GPS interface

The GPS Interface configuration example illustrates the following features of the ZyWAN-G9:

- Remotely obtaining the GPS location of a mobile ZyWAN-G9
- Communicating the position of the ZyWAN-G9 to serial field equipment



The following table lists the network settings used in this example.

SETTING	DETAILS
Cellular	This example uses the cellular network to transmit GPS locations to a remote server.
GPS	GPS data is obtained from the GPS module (on appropriate model of ZyWAN-G9). This data is sent automatically to a remote network server and is available via Terminal Server connection to the ZyWAN-G9.
Networking	Networking configuration allows access to GPS Terminal Server port.

The next sections provide detailed descriptions including the Web configuration pages for each setting.

Cellular Setup

The cellular page will depend on the model of ZyWAN-G9 and the network provider. The inbound TCP connection to obtain GPS data requires the cellular account to have a static, public IP address.

GPS Setup

The GPS Terminal Server allows incoming TCP connections to be made to the ZyWAN-G9 to obtain raw NMEA data from the GPS module. The desired NMEA messages may be enabled. This NMEA data may also be sent to a local COM port.

The *ActSoft* or *Arcom format UDP* option allows the ZyWAN-G9 to send formatted GPS reports on a regular basis to an external server.

The following screen capture shows the GPS configuration page.

Cellular Ethernet Wifi Networking GPS Terminal Clients Terminal S

Forward GPS to physical COM Port? Yes No

Enable GPS Terminal Server? Yes No

TCP Port To Listen On:

Maximum Number of Connections Allowed:

Enable GPGLL? Yes No

Enable GPGGA? Yes No

Enable GPVTG? Yes No

Enable GPRMC? Yes No

Enable GPGSA? Yes No

Enable GPGSV? Yes No

Enable PFST,FOM? Yes No

GPS UDP Message Formats? ActSoft Format

Server IP Address:

Server Port Number:

Request Interval:

Send Threshold:

Unit ID:

Networking Setup

The portions of the *Networking* configuration page shown are used to enable inbound connections to the Terminal Server port 5000 (TCP). The NTP setting allows the ZyWAN-G9 to obtain the correct system time, so GPS reports sent with UDP will contain the correct timestamp.

Cellular Ethernet Wifi Networking GPS Terminal Clients Terminal Servers Status Update Security

Open Ports? Yes No

Open Ports Table																	
#	Open Ports Instance																
1	<table border="1"> <thead> <tr> <th>Inbound Port</th> <th>Protocol</th> </tr> </thead> <tbody> <tr> <td><input type="text" value="5000"/></td> <td><input type="button" value="v"/></td> </tr> </tbody> </table> <p>--Optional--</p> <table border="1"> <thead> <tr> <th colspan="2">Permitted Source Port Range</th> </tr> <tr> <th>From Port</th> <th>To Port</th> </tr> </thead> <tbody> <tr> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Permitted External Network</th> <th>Permitted External Network Mask</th> <th>Permitted MAC Address</th> </tr> </thead> <tbody> <tr> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </tbody> </table>	Inbound Port	Protocol	<input type="text" value="5000"/>	<input type="button" value="v"/>	Permitted Source Port Range		From Port	To Port	<input type="text"/>	<input type="text"/>	Permitted External Network	Permitted External Network Mask	Permitted MAC Address	<input type="text"/>	<input type="text"/>	<input type="text"/>
Inbound Port	Protocol																
<input type="text" value="5000"/>	<input type="button" value="v"/>																
Permitted Source Port Range																	
From Port	To Port																
<input type="text"/>	<input type="text"/>																
Permitted External Network	Permitted External Network Mask	Permitted MAC Address															
<input type="text"/>	<input type="text"/>	<input type="text"/>															

Time Synchronization

Add NTP Servers to the following list:

Table of NTP Servers	
#	NTP Servers to Use (IP address or FQDN)
1	<input type="text" value="pool.ntp.org"/>

Appendix

A.1. Mechanical Specifications

Mechanical Characteristics

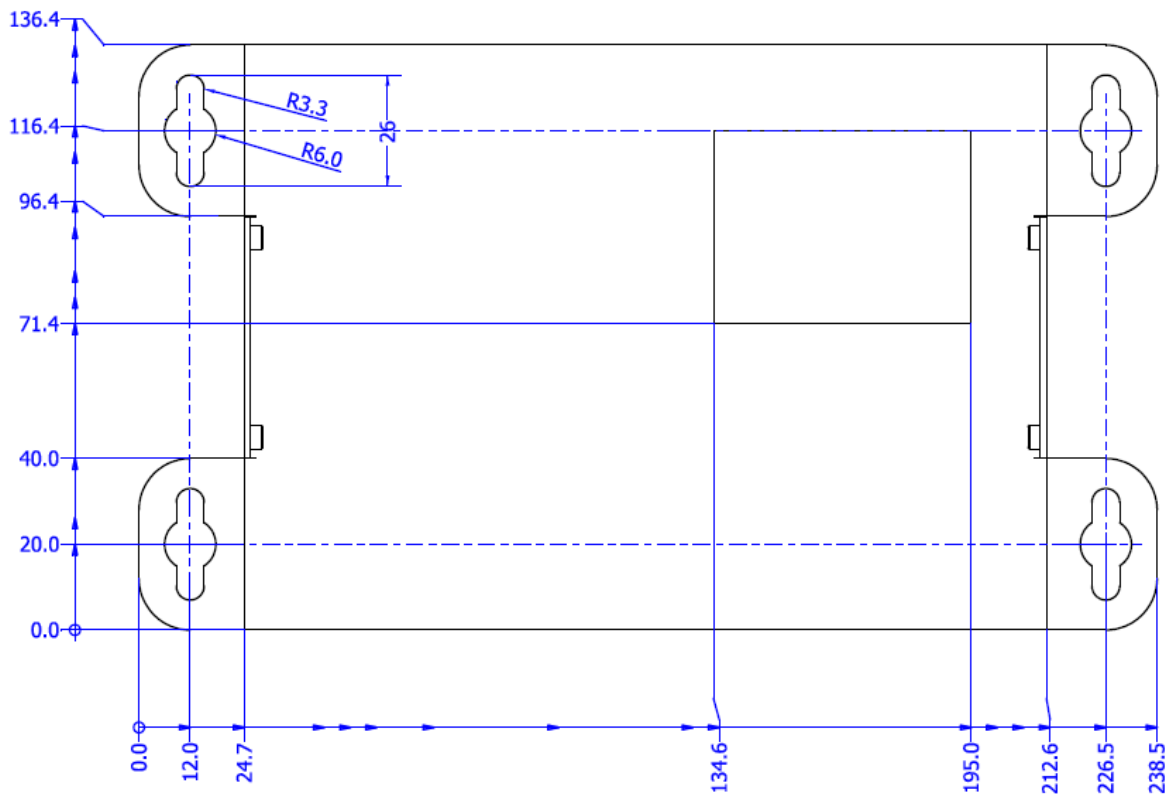
The electrical circuitry of the ZyWAN-G9 is contained in a sturdy aluminium enclosure consisting of a base and lid. The following table lists the ZyWAN-G9 mechanical characteristics.

Dimension	
Length	141 mm (9.4 in.)
Width	238.5 mm (5.6 in.)
Height	65 mm (2.5 in.)
Weight	1.25 kg (2.75 lbs) approx. (may vary based on optional hardware)

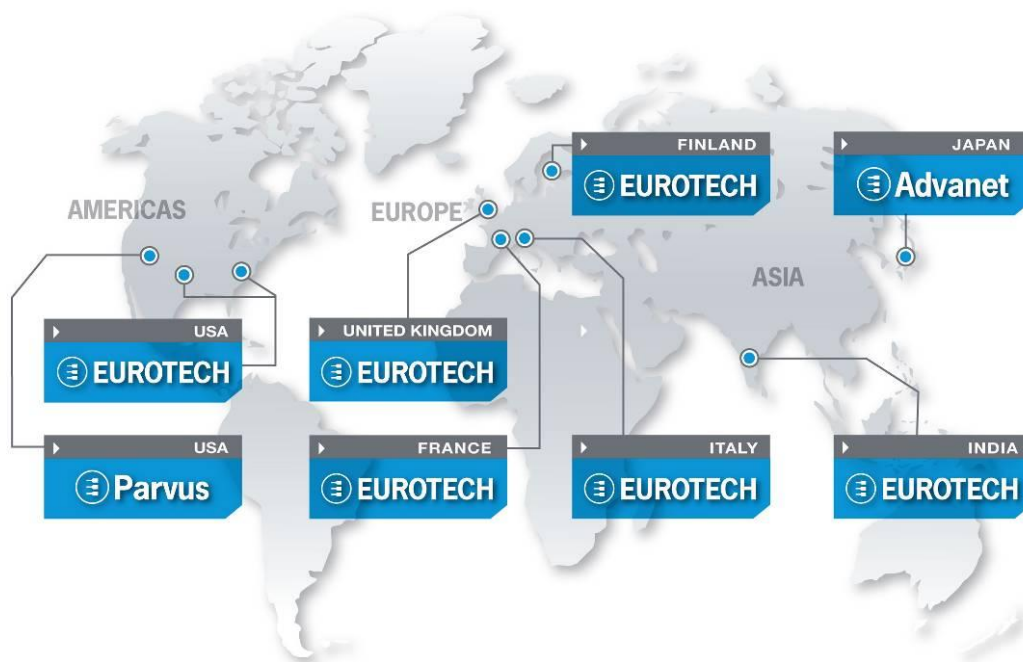
Mounting Details

The mechanical dimensions of the ZyWAN-G9 are shown next (all dimensions are shown in millimeters). When the unit is mounted, there must be sufficient space to connect the cables. Antennas must be located in an area where there will be adequate exposure to RF signals. For GPS, this generally means the GPS antenna must have line of sight to a wide area the sky in order to receive signals from multiple positioning satellites.

Mounting Dimensions of Base



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Toll free +1 888.941.2224
 Tel. +1 301.490.4007
 Fax +1 301.490.4582
 E-mail: sales.us@eurotech.com
 E-mail: support.us@eurotech.com
 Web: www.eurotech-inc.com

PARVUS

Tel. +1 800.483.3152
 Fax +1 801.483.1523
 E-mail: sales@parvus.com
 E-mail: tsupport@parvus.com
 Web: www.parvus.com

EUROPE

Italy

EUROTECH

Tel. +39 0433.485.411
 Fax +39 0433.485.499
 E-mail: sales.it@eurotech.com
 E-mail: support.it@eurotech.com
 Web: www.eurotech.com

United Kingdom

EUROTECH

Tel. +44 (0) 1223.403410
 Fax +44 (0) 1223.410457
 E-mail: sales.uk@eurotech.com
 E-mail: support.uk@eurotech.com
 Web: www.eurotech.com

France

EUROTECH

Tel. +33 04.72.89.00.90
 Fax +33 04.78.70.08.24
 E-mail: sales.fr@eurotech.com
 E-mail: support.fr@eurotech.com
 Web: www.eurotech.com

Finland

EUROTECH

Tel. +358 9.477.888.0
 Fax +358 9.477.888.99
 E-mail: sales.fi@eurotech.com
 E-mail: support.fi@eurotech.com
 Web: www.eurotech.com

ASIA

Japan

ADVANET

Tel. +81 86.245.2861
 Fax +81 86.245.2860
 E-mail: sales@advanet.co.jp
 E-mail: tsupport@advanet.co.jp
 Web: www.advanet.co.jp

India

EUROTECH

Tel. +91 80.43.35.71.17
 E-mail: sales.in@eurotech.com
 E-mail: support.in@eurotech.com
 Web: www.eurotech.com

To find your nearest contact refer to: www.eurotech.com/contacts



www.eurotech.com

EUROTECH HEADQUARTERS

Via Fratelli Solari 3/a

33020 Amaro (Udine) – ITALY

Phone: +39 0433.485.411

Fax: +39 0433.485.499

For full contact details go to: www.eurotech.com/contacts