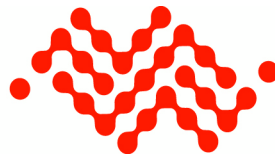




Raven XE for Verizon

User Guide



SIERRA
WIRELESS™

20080616
Rev 4.0

Important Notice

Due to the nature of wireless communications, the transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors), or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless AirLink Raven XE are used in a normal manner with a well-constructed network, the Sierra Wireless AirLink Raven XE should not be used in situations where failure to transmit or receive data could result in personal hazard or risk to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless AirLink Raven XE, or for failure of the Sierra Wireless AirLink Raven XE to transmit or receive such data.

Safety and Hazards

Do not operate the Sierra Wireless AirLink Raven XE in areas where blasting is in progress, near medical or life support equipment, or near any equipment which may be susceptible to any form of radio interference. In such areas, the Sierra Wireless AirLink Raven XE **MUST BE POWERED OFF**. The Sierra Wireless AirLink Raven XE can transmit signals that could interfere with this equipment.

Do not operate the Sierra Wireless AirLink Raven XE in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless AirLink Raven XE **MUST BE POWERED OFF**. When operating, the Sierra Wireless AirLink Raven XE can transmit signals that could interfere with various onboard systems.

Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Sierra Wireless AirLink Raven XE may be used at this time.

The driver or operator of any vehicle should not operate the Sierra Wireless AirLink Raven XE while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offense.

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Website:	www.sierrawireless.com	

Consult our website for up-to-date product descriptions, documentation, application notes, firmware upgrades, troubleshooting tips, and press releases.

Revision History

Revision number	Release date	Changes
1.x	Q2:2009	Raven XE documentation created and revised.
2.x	Q1:2010	Raven XE documentation revised and updated with new features and enhancements. ALEOS User Guide, which covers the configuration of the device information, is now a separate guide.
3.0	May 2011	Raven XE documentation revised with updated Preface section and minor content and document format corrections. Raven XE module refreshed from MC5727 to MC5728.
4.0	April 2012	Raven XE documentation revised with miscellaneous changes to the Preface and updated Figures (5-2 through 5-4) and the Digital Input/Output table in Chapter 5.



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1: Introduction to the Raven XE

- ACEware™
- Connecting to Verizon Wireless
- EV-DO
- Connection Methods
- Networking
- Applications
- Software
- Documentation

The Raven XE is an intelligent wireless gateway, powered by ALEOS™ embedded intelligence, and optimal for providing primary or backup network connectivity for any high-reliability/ high-availability applications.

The Raven XE is the perfect solution for any device with an Ethernet connection that requires pervasive connectivity including PCs, routers, network equipment and POS/ATMs as well as commercial automation equipment.

Raven XE modems are designed to maintain a reliable, consistent network connection. Class I Division 2 certified as non-incendiary equipment, the Raven Series is ideally suited for use in hazardous environments.

Key applications include utilities, manufacturing, automation, oil and gas, ethernet-based SCADA, telemetry, Homeland Security, and asset monitoring.



Figure 1-1: Raven XE

ALEOS, the embedded core technology of the Sierra Wireless AirLink product, simplifies installation, operation and maintenance of any deployment, and provides an always-on, always-aware intelligent connection for mission-critical applications.

ALEOS enables:

- Persistent Network Connectivity
- Over-The-Air (OTA) Upgrades
- Wireless Optimized TCP/IP
- Real-Time Notification
- Packet Level Diagnostics
- Device Management & Control
- Protocol Spoofing



Figure 1-2: Powered by ALEOS

ACEware™

A wireless solution is not complete until you have software tools to manage the devices monitoring your valuable equipment. Using the AirLink Control Environment (ACE), ACEWare is the device management and monitoring application suite for Sierra Wireless AirLink devices powered by ALEOS.



Figure 1-3: ACEware Logo

The ACEware suite encompasses an application internal to the firmware (ACEmanager) and the Windows-based applications ACEview, Modem Doctor, ACEnet, and AirLink Management Services (AMS). You can download the ACEview and Modem Doctor applications, and the ACEmanager, ACEnet, ACEview, and ALEOS user guides, from the Sierra Wireless AirLink Solutions website (<http://www.sierrawireless.com/support>). Contact your dealer or Sierra Wireless representative for any further information.

Note: ACEview requires the Microsoft .NET Framework v. 2.0 and Microsoft Windows 98, Windows 2000, Windows XP, or later. You can obtain the Microsoft .NET Framework from Microsoft at: <http://www.microsoft.com/>.

ACEmanager

ACEmanager, the AceWare remote configuration and monitoring tool, simplifies deployment and provides extensive monitoring, control, and management capabilities. ACEmanager gives you the power to monitor and control your Sierra Wireless AirLink communications platforms in real-time.

Last updated time: 04-27-2011 09:07:50

Home	AT Phone Number	5106735137
WAN/Cellular	AT IP Address	75.208.141.149
LAN/WiFi	AT Network State	Network Ready
VPII	AT RSSI (dBm)	-89
Security	AT Network Operator	Verizon
Services	AT Network Service Type	1X, EV-DO Rev.A
GPS	AT ALEOS Software Version	MP_597W4.0.9.004 Apr 21 2011
Serial	AT ECIO (dB)	-5.5
Applications	AT Channel	1175
About	WAN/Cellular Bytes Sent	304911
	WAN/Cellular Bytes Rcvd	74734
	AT Device Name	billybob

Figure 1-4: ACEmanager

Simplified Deployment

ACEmanager provides the ability to remotely set up and configure your Sierra Wireless AirLink devices. Remote device setup and configuration reduces the deployment timeline of your wireless solution and provides a quicker path to ROI.

Templates allow you to easily configure devices in your fleet with identical settings, ensuring a simple, accurate deployment.

Monitor and Control

ACEmanager allows an administrator to remotely monitor a modem's status, health and configuration settings. The user interface displays signal strength, cell site information, byte counters and error conditions, enabling you to pinpoint any issues and troubleshoot immediately.

ACEmanager enables remote configuration and parameter settings to be changed or reset instantly over the air, change a device's port configuration, IP address settings, GPS settings, and much more. After configuring one modem, use the template feature to copy that device configuration to other devices.

Tip: Configuration steps and examples in this guide use ACEmanager.

ACEview

ACEview is an efficient status and connection monitoring application with a low-profile, easy to read interface. In ACEview, you can also update the PRL (Protocol Roaming List) on a device.

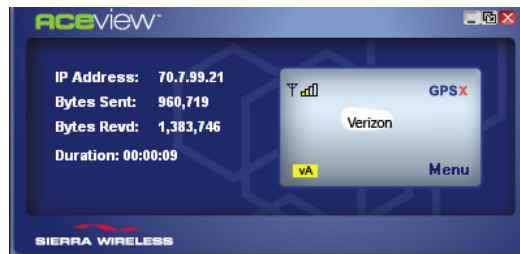


Figure 1-5: ACEview

Modem Doctor

Modem Doctor and Modem Doctor USB is a troubleshooting and diagnostics utility. This utility will allow you to get a log file of the Raven XE activity which you can then send to Sierra Wireless Support or erase the current configuration completely.

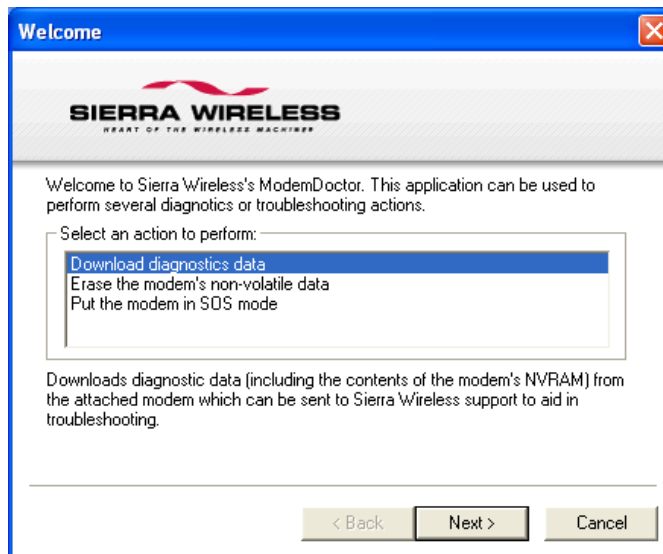


Figure 1-6: Modem Doctor

Connecting to Verizon Wireless

The Raven XE uses Verizon Wireless as an ISP (Internet Service Provider) to connect you to the Internet.

Steps of a Connection:

1. When your Raven XE is powered on, it automatically searches for cellular service using CDMA-based cellular technology.
2. Your Raven XE establishes a PPP (Point to Point Protocol or “dial” up connection) link to the Verizon network, also called registering on the network, and receives an IP address.
3. When your Raven XE has received its IP address from Verizon, a connection to the Internet or the cellular network is also available for computers or other devices connected directly to the Raven XE.



The Raven XE will perform routing for all internet traffic to and from the computers or other host devices.

With the Raven XE in Ethernet Public mode, only one device connected to the Ethernet port will receive the public IP address which is the one provided by the cellular network. In Ethernet Private mode, with a hub or switch connected to the Ethernet port, the Raven XE will provide NAT for a range of computers or other devices connected to the switch or hub and Internet access to all of them.

Dynamic vs. Static IP Addresses

There are two types of addresses on networks: dynamic and static.

- Dynamic addresses are assigned on a “need to have” basis. Your Raven XE might not always receive the same address each time it connects with Verizon.
- Static addresses are permanently assigned to a particular account and will always be used whenever your Raven XE connects to the Internet. The IP address will not be given to anyone else.

Most ISPs (cellular included) use dynamic IP addresses rather than static IP addresses since it allows them to reuse a smaller number of IP addresses for a large number of customers. A dynamic IP address is suitable for many common Internet uses, such as web browsing, looking up data on another computer system, or other client functions (such as data only being sent out or only being received after an initial request).

Tip: *If your account with Verizon includes a dynamic IP address and you need a static IP, please consult your Verizon Wireless Representative for more information about changing your account for static IP support.*

If you need to contact your Raven XE, a device connected to the Raven XE, or a host system using the Raven XE from the Internet, you need to have a known IP (such as one which is static) or domain name (an IP address which is converted by a DNS server into a word based name). If you have a dynamic IP address for your modem, you can use a Dynamic DNS service (such as Sierra Wireless’s IP Manager) to translate your IP address into to a domain name.

Caution: *If you want to connect remotely to your Raven XE using TCP/IP or UDP/IP, the IP address given to your modem by Verizon cannot be a private or internal IP address (such as a special private network) unless you are on the same network or inside that network’s firewall (such as with frame relay).*

EV-DO

CDMA (Code Division Multiple Access) is the underlying digital radio network technology used by many cellular providers across the globe and is prevalent in North America. To provide backward compatibility and seamless connections in a wider range of locations, Sierra Wireless EV-DO products (e.g., your Raven XE) will fall back to 1x when EV-DO is not available.

Sierra Wireless is certified with Verizon, a prominent North American 1x and EV-DO carrier.

EV-DO revision A is an enhancement on the original revision 0 adding expanded upload capabilities and a more robust connection overall. In addition to increasing the downlink speed, revision A also increases the uplink speed. In addition, it is backwards compatible and automatically connects with existing and broadly deployed EV-DO Rev. 0 and 1x networks ensuring reliable and pervasive connectivity.

Security

1x data transmissions are highly secure. Originally developed based upon the “spread spectrum” pioneered by the US Department of Defense, security in CDMA technologies is obtained by spreading the digital information contained in a particular signal of interest over multiple coded paths, over a much greater bandwidth than the original signal.

Connection Methods

You can connect the Raven XE to a USB or an Ethernet (RJ45) port on a computer. When connected to a USB or Ethernet port, the Raven XE behaves like a network card.

USB Port

The Raven XE is equipped with a USB port which increases the methods by which you can send and receive data. The USB port can be set to work as either a virtual Ethernet port or a virtual serial port. A driver installation is required to use the USB port in either mode. USB drivers can be downloaded from the Sierra Wireless AirLink Solutions web site: <http://www.sierrawireless.com/support>.

It is recommended that you use a USB 2.0 cable with your Raven XE and connect directly to your computer for best throughput.

Virtual Serial Port

The Raven XE supports one virtual serial port (VSP) over USB. This VSP can be used, for example, to send AT commands, or to run many serial-based applications such as HyperTerminal®.

Networking

IPsec

The IP protocol that drives the Internet is inherently insecure. Internet Protocol Security (IPsec), which is a standards-based protocol, secures communications of IP packets over public networks.

IPsec is a common network layer security control and is used to create a virtual private network (VPN).

The advantages of the IPsec feature includes:

- **Data Protection:** Data Content Confidentiality allows users to protect their data from any unauthorized view, because the data is encrypted (encryption algorithms are used).
- **Access Control:** Access Control implies a security service that prevents unauthorized use of a Security Gateway, a network behind a gateway or bandwidth on that network.
- **Data Origin Authentication:** Data Origin Authentication verifies the actual sender, thus eliminating the possibility of forging the actual sender's identification by a third-party.
- **Data Integrity:** Data Integrity Authentication allows both ends of the communication channel to confirm that the original data sent has been received as transmitted, without being tampered with in transit. This is achieved by using authentication algorithms and their outputs.

The IPsec architecture model includes the Sierra Wireless AirLink gateway as a remote gateway at one end communicating, through a VPN tunnel, with a VPN gateway at the other end. The remote gateway is connected to a Remote network and the VPN is connected to the Local network. The communication of data is secure through the IPsec protocols.

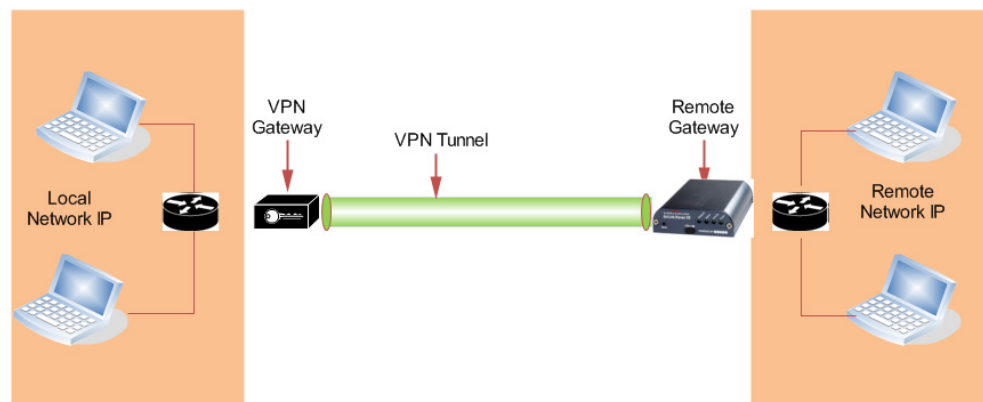


Figure 1-7: IPsec Architecture

GRE

GRE (Generic Routing Encapsulation) tunnel is used to carry non-IP packets through an IP Network. Non-IP packets, that are send over the GRE tunnel, need to be first encapsulated. Hence, ALEOS is used to configure and encapsulate non-IP packets and transmit over IP through the GRE tunnel.

Applications

Events Reporting

Events Reporting is a Sierra Wireless AirLink modem software feature, provided via ACEmanager, that allows users to generate reports from the events that take place. The Event Reporting Protocol is an intuitive embedded protocol, which automatically formats the messages based on an event trigger. The messages generated are then reported to the remote server.

Software

The Raven XE modem comes with the following software:

- AceView, the software for the Raven XE which allows you to monitor your connections.
- The driver that forms the interface between the Raven XE and your Windows operating system when using USB virtual Ethernet or USB virtual serial.
- The firmware that is stored in non-volatile memory and includes ACEmanager.

The Raven XE has an embedded radio module made by Sierra Wireless, Inc. There are two firmware programs on the device—one stored on the controller board of the Raven XE and one on the radio module.

The firmware was loaded into the controller board and radio module when the Raven XE was assembled. As new versions of the software and firmware are released, they are posted at www.sierrawireless.com.

Note: The radio module firmware is not updatable; only ALEOS-level firmware can be updated.

Documentation

This *User Guide* describes how to:

- Install the Raven XE hardware.
- Connect the radio antennas.
- Connect a notebook computer and other input/output (I/O) devices.
- Install the software.
- Interpret the LEDs on the Raven XE and the indicators in the AceView software.

This *User Guide* is provided as a PDF (Portable Document Format) file on the installation CD or from the Sierra Wireless support website.

Tools and Reference Documents

User Guide	Description
ALEOS User Guide	This document discusses software configuration in ACEmanager and explains all the ALEOS features.
ACEview User Guide	This document explains the utility tools which are used to view and monitor the connection state of Sierra Wireless AirLink devices.
ACEnet User Guide	This document explains the use of ACEnet services for the remote management of Sierra Wireless AirLink devices.

2: Specifications

- [Power Connector](#)

Features and Benefits

- Embedded Intelligence
- Low Power Consumption
- Compact Size
- Rugged Aluminum Case
- High-Speed Processor (ARM 9)
- High-Speed 2-way Data
- 10/100 Mbps Ethernet Port
- Persistent Network Connectivity
- Remote Management and Configuration
- Class1 Div 2 Certified
- Remote Management and Configuration

Technology

CDMS EV-DO Rev. A with fallback to:

- CDMA IS-95)
- CDMA 1xRTT

Bands

- 800 MHz cellular
- 1900 MHz PCS

Environmental

- Operating Temperature:
 - -30° to 70° Celsius
- Storage Temperature:
 - -40° to 85° Celsius

Power Consumption: (@12V DC)

- Transmit/Receive (Typical/Max) 120/230 mA
- Idle 55 mA
- Input Voltage 7 - 28 VDC

Standards/Approvals

- Carrier specific approvals
- RoHS
- FCC
- Industry Canada
- Mil-Spec 810-F Certified
- This apparatus is suitable for use in Class1, Division 2, Groups A, B, C, D, or unclassified or non-hazardous locations.



Warning: *Explosion Hazard - Substitution of any components may impair suitability for Class 1, Division 2.*

Note: In consideration of EU regulations, this device is classified as Class A device for use in commercial environments.

Host Interfaces

- Ethernet: 10BaseT RJ-45
- USB Type B5 Pin mini
- Antenna Connection:
 - Primary Cellular - 50 Ohm SMA
 - Receive Diversity - 50 Ohm SMA
 - I/O Ports: 2



Warning: *The antenna must be installed to provide a separation distance of at least 20 cm from all persons. It is one of the RSS-102 requirements for devices not requiring SAR.*

Dimensions

- 75 mm x 27 mm x 103 mm
- 185 grams

Application Interfaces

- TCP/IP, UDP/IP, DHCP, HTTP, SNMP, SMTP, SMS, MSCI, Binary, Modbus, and more

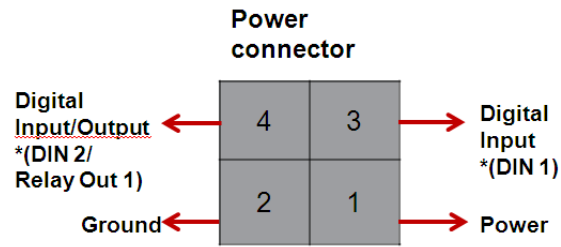
LED Indicators

- Network
- Signal
- Activity
- Power

Controls

- Reset button

Power Connector



* Configuration terminology in ACEmanager

Figure 2-1: Power Connector (not to scale)



Warning: Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Note: Raven XE I/O Port 4 is software configurable.

3: Activating Your Raven XE on Verizon

- [Automatic Activation](#)
- [Activating the Raven XE](#)
- [Updating Raven XE Firmware](#)
- [Verifying the USB Connection](#)
- [Configuring Through ACEmanager](#)

This chapter provides step-by-step instructions for activating the Raven XE on the Verizon Wireless network.

Automatic Activation

One of the special features of your Raven XE for Verizon is the ability to activate itself automatically. When you first power on the Raven XE, it will check to see if it has been activated with account data. If it finds that it has not yet been activated, the Raven XE will attempt to retrieve the account data from the Verizon network using Over-the-Air Service Provisioning (OTASP). If the device has been previously provisioned, it will not complete the OTASP process and manual activation will be required using the Re-Activation button under the WAN/Cellular tab in ACEmanager.

Caution: *You need to have an account with Verizon before you attempt automatic activation. If you have not ordered an account from Verizon for your Raven XE, it will not activate.*

Activating the Raven XE

To activate the Raven XE:

1. Attach the antenna to your Raven XE.
2. Plug the Raven XE power cable into a power source.
3. Connect your computer to the Raven XE with an Ethernet cable.
4. While the Network and Power LEDs blink, the Raven XE is attempting to download its account information. Observe the LEDs as indicated in the Indicator Lights section of this user guide. The download process may take a minute or two for the Raven XE to initialize and go on the air.

Caution: *Do not move your Raven XE while it is being programmed.*

When the Network, Signal, and Activity LEDs blink, one at a time and in order, your Raven XE has successfully completed OTASP and is registered on the Verizon network.

Updating Raven XE Firmware

For installing the latest firmware version (.exe file), you can go to the Sierra Wireless website: <http://www.sierrawireless.com/support>.

For the updater tool to execute, please install the USB drivers available on the website before executing the .exe file.

Tip: Copy the *USB Serial Driver.inf* file to your desktop, and then power up the Raven XE and connect the USB. Install from a specific location and point to this .inf file. For detailed instructions on installing USB drivers, please refer to the *USB Application Note*.

1. Connect the Raven XE to your computer using an Ethernet cable or a USB cable.
2. Connect the power adapter and antennas to your Raven XE.
 - a. A Sierra Wireless firmware update welcome screen appears. Click Next.



Figure 3-1: Launch Screen

- b. Choose the interface you want to program the modem through and click on Next.

The default interface Ethernet Private is also in a different subnet from the other connection types.

Table 3-1: Factory Defaults

Interface	Raven XE	Connected Device
Ethernet Private default	192.168.13.31*	192.168.13.100
USB/NET	192.168.14.31	192.168.14.100
DUN	192.168.15.31	192.168.15.100

*can be changed via ACEmanager

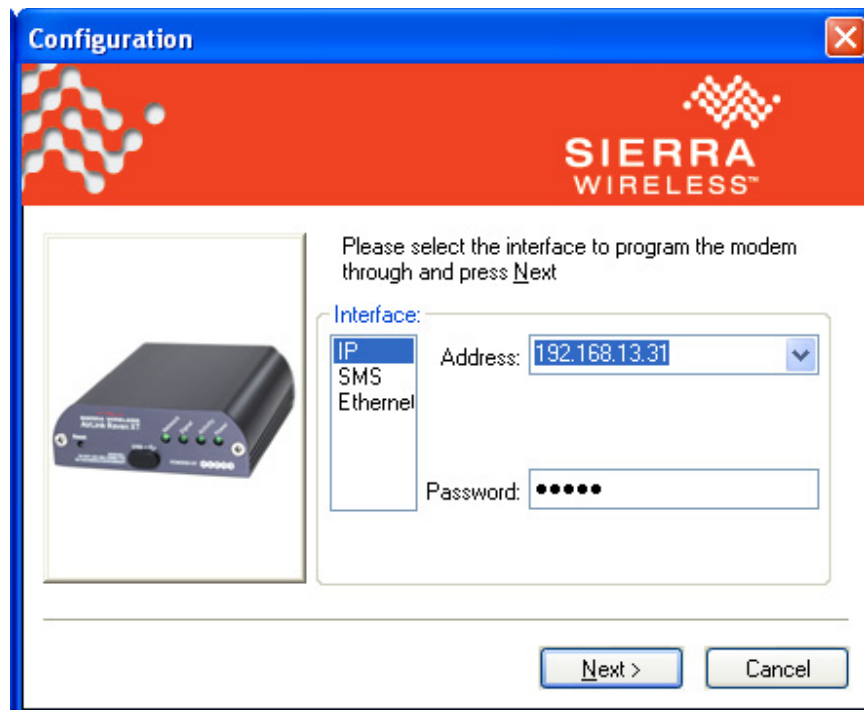


Figure 3-2: Configuration: Interface selection

- c. The next screen will prompt you to reset the modem manually. Click on Next after resetting the modem manually.

Installation begins and can take up to a few minutes. Once the installation is complete, you will get a confirmation screen.

Verifying the USB Connection

Verify that your USB is connected as USB/net by checking the Network Connections window in your computer.

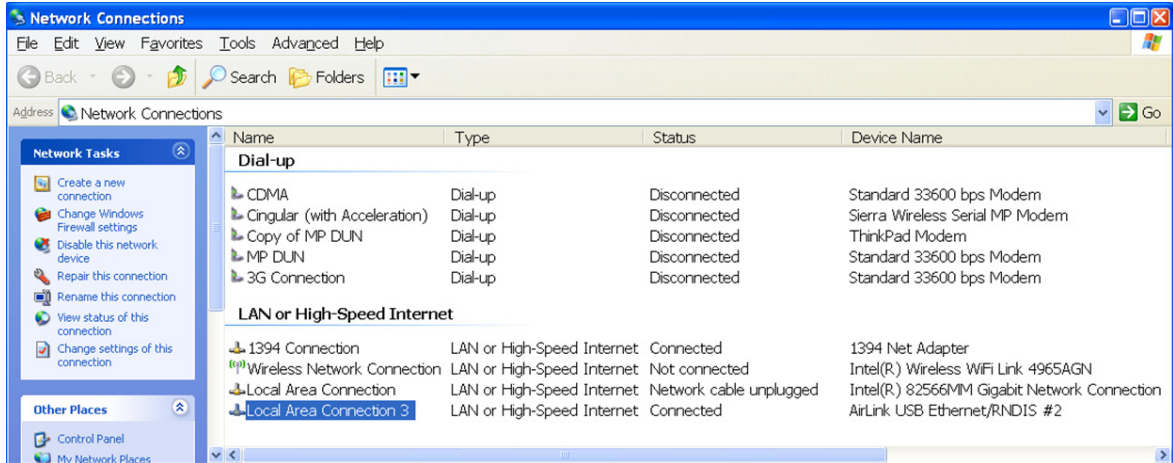


Figure 3-3: Verify USB Connection

Confirming IP Address

Check the IP Address in your Local Area Connection window.

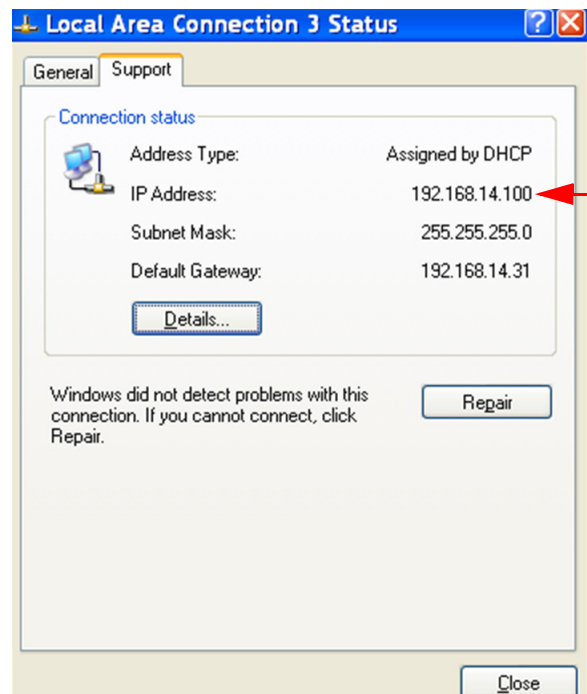


Figure 3-4: Confirm IP Address

Configuring Through ACEmanager

ACEmanager is a utility that is provided with your AirLink device at no additional cost. Follow the below steps to connect to ACEmanager for configuring the modem.

- Ensure Raven XE connectivity to access ACEmanager.
- Go to: <http://192.168.13.31:9191> the first time you connect to ACEmanager.

4: Installation of the Raven XE

- Connecting to Power
- Connecting to a Computer or Other Device
- Indicator Lights
- Mounting

Note: During installation, verify that the cables are secure but do not bear any additional weight that could loosen the connector from the unit.

Your Raven XE should be mounted in a position that allows easy access for the cables so they are not bent, constricted, in close proximity to high amperage, or exposed to extreme temperatures. The LEDs on the front panel should be visible for ease of operational verification. You should ensure that there is adequate airflow around the modem but that it is kept free from direct exposure to the elements, such as sun, rain, dust, etc.

Caution: *The Raven XE is in a hardened case and designed for use in industrial and extreme environments. However, unless you are using cables expressly designed for such environments, they can fail if exposed to the same conditions the Raven XE can withstand.*

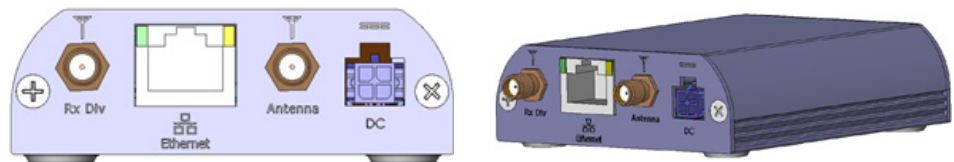


Figure 4-1: Raven XE Connectors

Note: At least 20 cm separation distance between the antenna and the user must be maintained at all times.

The antennas selected should not exceed a maximum gain of 5 dBi under standard installation configuration. In more complex installations (e.g., those requiring long lengths of cable and/or multiple connections), it is imperative that the installer follow maximum dBi gain guidelines in accordance with the radio communications regulations of the Federal Communications Commission (FCC), Industry Canada, or your country’s regulatory body (if used outside the US).

The Raven XE works with most PCS cellular antennas with a SMA connector that works in the high and low frequencies of the cellular technology of your modem. Connect the primary antenna or primary RF cable directly to the antenna connector on the Raven XE back panel.

Tip: When using a cable to an antenna placed away from the modem, minimize the length of your cable. All gain from a more advantageous antenna placement can be lost with a long cable to the modem.

Note: Use of receive diversity for EV-DO is optional. Data transmission and reception may be adversely affected if it is not used.

To provide for diversity in the signal reception, connect the second antenna to the second antenna port (SMA, labeled Rx Div ANT2) on the back of the Raven XE.

Caution: If you are not using a diversity antenna, you should disable the receive diversity option. In ACEmanager, in the WAN/Cellular group, configure RX Diversity

Connecting to Power

The Raven XE digital I/O port consists of a 4 pin power connector, which includes two digital I/O ports. Port 4 is software configurable, while port 3 is Digital Input only and not software configurable.

This I/O port handles external input and output events. An external device can send digital input to the modem, through the digital I/O port.

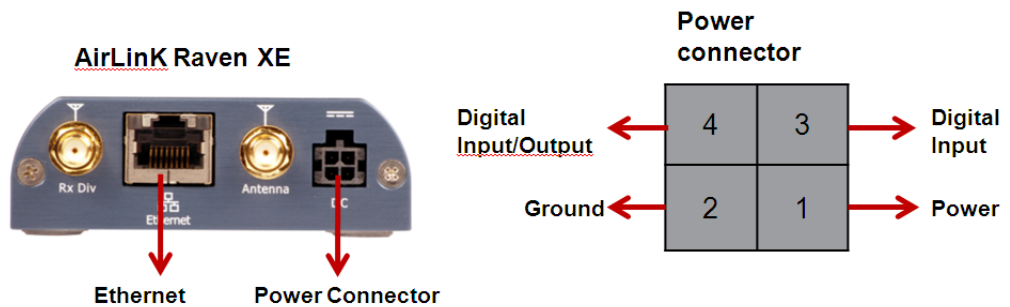


Figure 4-2: Digital I/O Port: Power Connector



Warning: Risk of electric shock: Only use the supply voltages listed in this user guide.



Warning: The operating temperature range of the 12V AC power adapter is 0° - 40° C. This range is less than the operating temperature range of the Raven XE. For deployments in more extreme temperatures, use the optional DC power cable rather than the AC power adapter.

The Raven XE, with the appropriate power adapter, can be used with either DC or AC power. DC cables and AC adapters are available as optional accessories in addition to the one included with your Raven XE.

Note: When using a DC power source (such as a solar cell), Sierra Wireless recommends placing a fuse (1-2 Amp) on the line close to the power source to protect your power source from possible surges due to shorts or other line issues.

The DC power cable positive lead should be connected to the battery or power source positive terminal. The power cable negative lead should be connected to the battery or power source negative terminal.

Tip: The DC power cable has a white wire lead in addition to the power positive and negative. This is for a feature not present in the Raven line modems. In the Raven XE, the white wire lead has no function and can be ignored.

Warning: Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Connecting to a Computer or Other Device

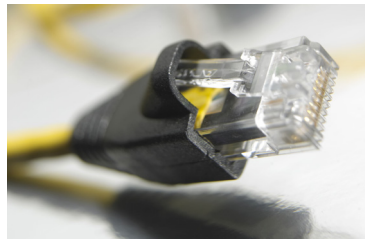


Figure 4-3: Ethernet

The Ethernet port of your Raven XE can be connected directly to a computer or other Ethernet device with either a cross-over cable or a straight-through cable. The Ethernet port on the Raven XE is auto-sensing and connects at 100baseTX. If you are connecting the modem to a hub or switch you should use a straight through cable or use the uplink port on the hub or switch with a cross-over cable.

Tip: On some computers, the TCP receive window may be set to 16 KB. To optimize the throughput of your Raven XE, it is recommended that you change the TCP window to 128 KB to 256 KB using a TCP Optimizer.



Figure 4-4: USB

The Raven XE's full-speed (12 Mb) USB 2.0 port can be connected directly to most computers or other devices using a standard full-speed USB 2.0 cable. If the computer or device you are connecting to or the cable is not rated for full-speed, the modem will communicate at a reduced speed to match. The Raven XE functions as a device and not as a host.

When it is connected to a computer, the USB port should be seen as a COM port or an Ethernet port after the applicable driver is installed.

The Raven XE has a standard mini-B connector.

Warning: *The USB port can only be used in a non-hazardous environment.*

Indicator Lights

When your Raven XE is connected to power and an antenna, there is a specific pattern to the lights to indicate its operation mode.

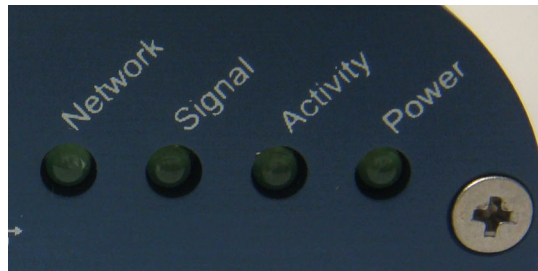


Figure 4-5: Raven XE Indicator lights

- **Network** - When lit solid, indicates a successful connection to the cellular network with an IP address given and a channel acquired. A tri-mode LED, Network blinks slowly while searching for cellular service, blinks faster once it finds cellular service and is attempting to authenticate on the cellular network, and finally is solid when the device is authenticated on the cellular network and is provided an IP address by the cellular network.
- **Signal** - Light shows the signal strength and may be nearly solid (strong signal) or flashing (weaker signal). A slow flash indicates a very weak signal.

Table 4-1: RSSI LED Ranges

RSSI/Signal LED Status	Ranges of RSSI (dBm)
On Solid	Equal to or stronger than -69
Fast Blink	-70 to -79
Normal blink	-80 to -89
Slow Blink	-90 to -99
Extinguished	Equal to or weaker than -100

- **Activity** - Lights will flash as data is transferred to and from the Raven XE on the remote network.
- **Power** - Power LED on indicates that the power adapter is connected and the Raven XE is receiving power.
- **Reset Button** (left side of the Raven XE) - Reset has two functions. If it is quickly depressed and released, the modem will simply power cycle the internal hardware. If, however, the reset is depressed and held for several seconds (count approximately 30 seconds, and wait for the power light to go off after the light pattern stops), the ALEOS configuration settings will return to the factory defaults.

Caution: *If you reset the modem configuration using the Reset button, you may have to reconfigure your APN.*

LED Light Patterns

The LEDs on the front of the modem will respond in different patterns to indicate modem states.

- **Normal** - Each LED, mentioned above, is lit as applicable.
- **Start up** - The LEDs will cycle from left to right.
- **Configuration Reset** - The LEDs will cycle left to right and then right to left 4 times.
- **Authentication Failure** - The Network, Signal, and Activity LEDs blink every 2 seconds.
- **Data Retry** - The Network, Signal, and Activity LEDs blink every 3 seconds.
- **OTASP** - The Network, Signal, and Activity LEDs blink, one at a time, in order.

Mounting

An optional accessory for your Raven XE is a mounting bracket kit. The bracket is designed to snugly cradle the modem and hold it in place where you need it. You can use a strap around the bracket and modem for extra security. The bracket can be attached to a stationary location using #6 screws with the mounting hole diameter approximately 0.15".

Bracket installation instructions are as follows:

1. Mount the bracket using number 6 screws. Each bracket has two mounting holes, and at least one screw is required to mount each bracket.
2. Position the Raven XE between the alignment ears.
3. Engage the top groove in the body of Raven XE with the two tabs.
4. Push on far side of Raven XE in center so that it touches side of Bracket.
5. Press down and release when the upper groove on the far side of Raven XE aligns with the tabs.
6. Release to complete installation in to mounting bracket.

To remove, press on the two edges of the modem and the brackets as in the diagram provided below. By doing this, the modem will snap out of the mounting bracket.

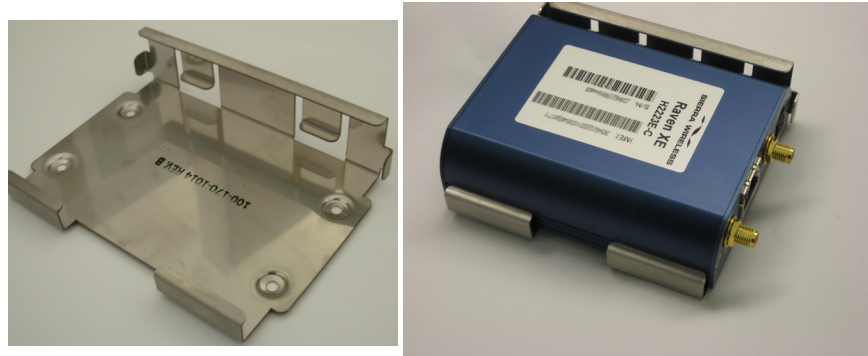


Figure 4-6: Optional Mounting Bracket

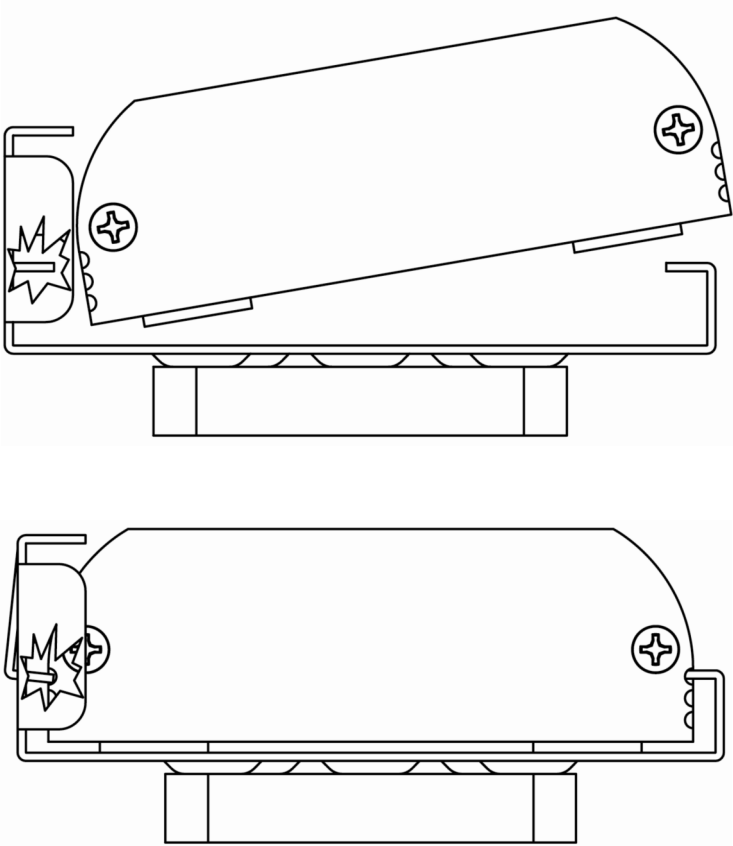


Figure 4-7: Mounting bracket installation

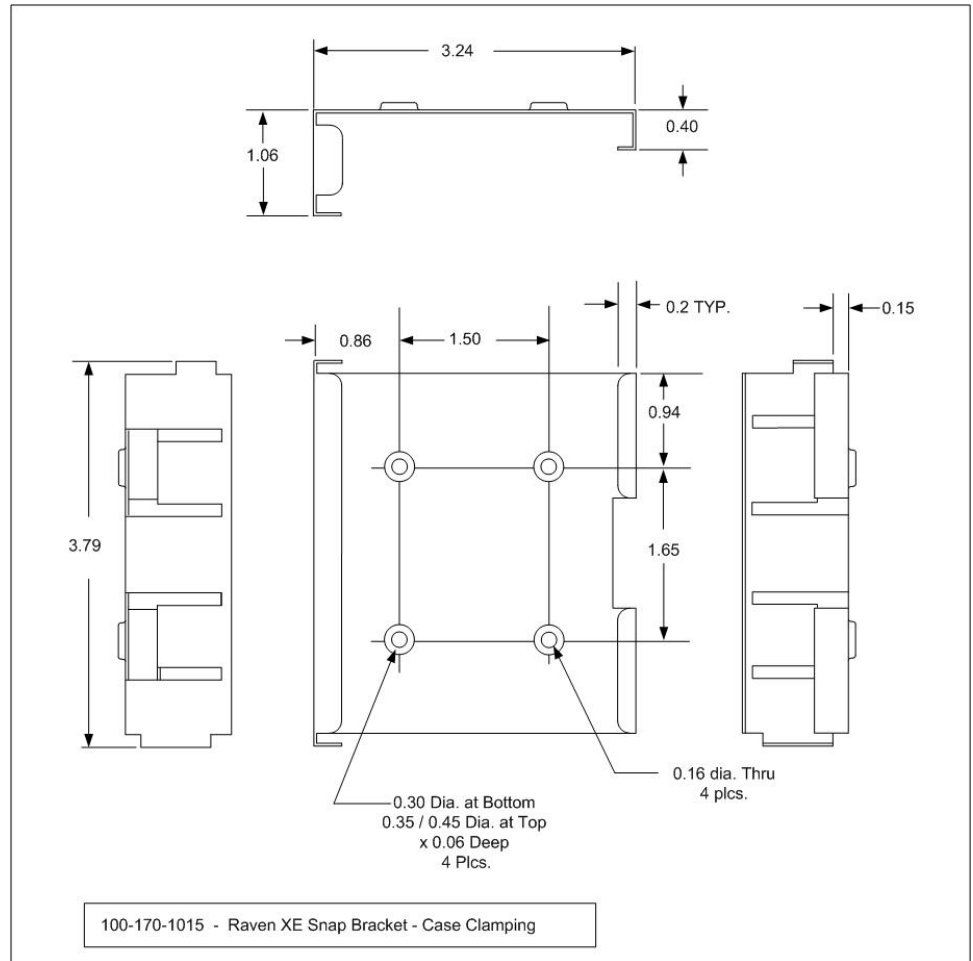


Figure 4-8: 100-170-1015: Mounting Bracket for Raven XE

5: Inputs, Relay Outputs, and Power Status

- Capturing External Events Using Inputs

The Raven XE has special features for use in an M2M environment. The Raven XE can be configured to monitor the input, respond to specific types of events, and even trigger a digital output. These features can be configured to meet your needs.

Capturing External Events Using Inputs

While using a special power cable with I/O, the Raven XE is equipped with an I/O interface for use in instrumentation applications. This includes one digital input and one digital output which can be connected to sensors and switches to monitor status and remotely control equipment.

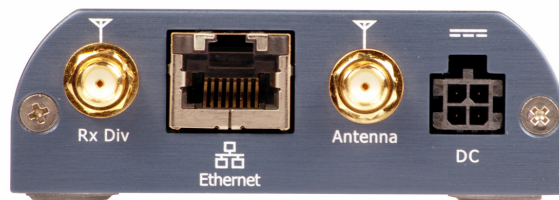


Figure 5-1: Raven XE Back Connections

Digital Input

By measuring contact closures on switches, the digital input(s) can report an open or closed state. Digital input(s) can be wired to the two ground signals via a switch. When the switch is open, the input will read “OPEN”. When the switch is closed and the input is connected to ground, the input will read “CLOSED”.

Digital Input → Contact Closure

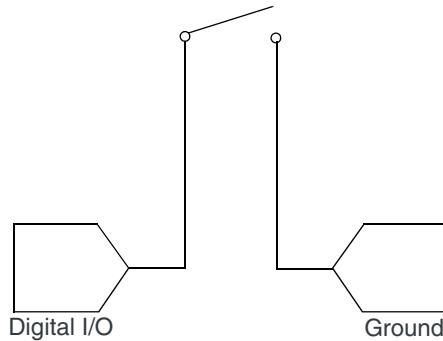


Figure 5-2: Digital Input Contact Closure

Examples of using the input with a switch to ground are:

- When a door or other latch is opened or closed.
- When counting pulses or other electronic events.
- When a gauge reaches a certain point.
- When a container fills or empties.
- When a switch or valve is opened or closed.
- When the tow bar is raised or lowered.
- When connected to a sensor, the level of fuel in a vehicle.
- When the trunk of a vehicle is opened or closed.
- When the ignition is turned on or off.

Digital Output

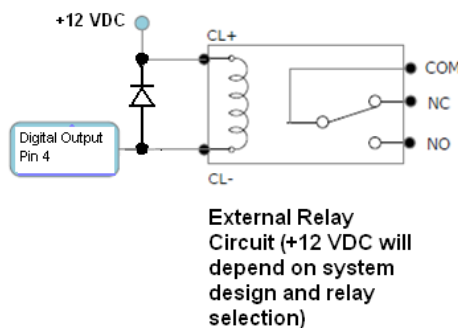


Figure 5-3: Sample Digital Output Relay Drive Circuit

Connecting Devices to the IO Port

Note: Before you install the Raven XE in its final location, be sure to cover all exposed wiring.



You can purchase an optional I/O Power Cable for the Raven XE which can be used to attach devices to the combination I/O port and power connector. The harness has pre-wired leads to allow you to customize your own connections. The wires are paired and color-coded.

Warning: *Risk of electric shock: Only use the supply voltages listed in this user guide.*

Digital Input/Output	
Pin 3/4	
DIN1, DIN2/Output 1	
Function	Input
V Input “High” Range	2.0 to VCC+1 VDC
V Input “Low” Range	-0.3 to 1.5 VDC
Internal Pullup (no connection)	3.3 VDC)
Function	Output
IOOUT	+/-50 mA
VOHmin (IOH - 16 mA)	2.4 V
VOHmin (IOH - 24 mA)	2.3 V
VOLmax (IOL - 24 mA)	0.55 V

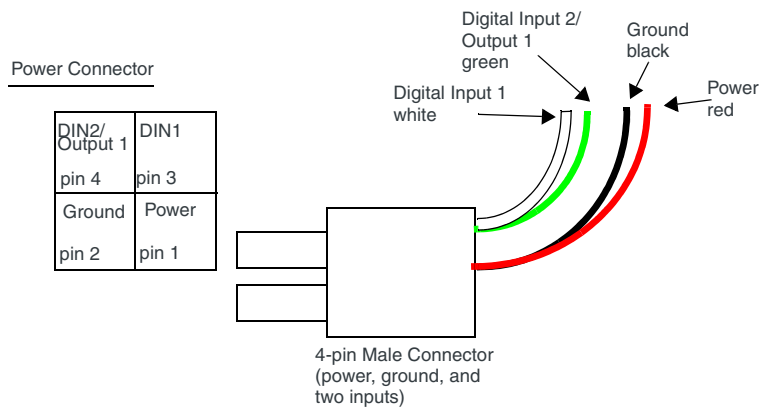


Figure 5-4: Power Connector Diagram

Caution: *Never apply voltage to the Digital Inputs. The inputs can only be switched open or closed to ground.*

Monitoring the Input and Output

You can monitor the status of the digital inputs using ACEmanager, AT Commands, or with special reports sent by email, SMS, or other Event Reporting report types. In ACEmanager, select the I/O tab.

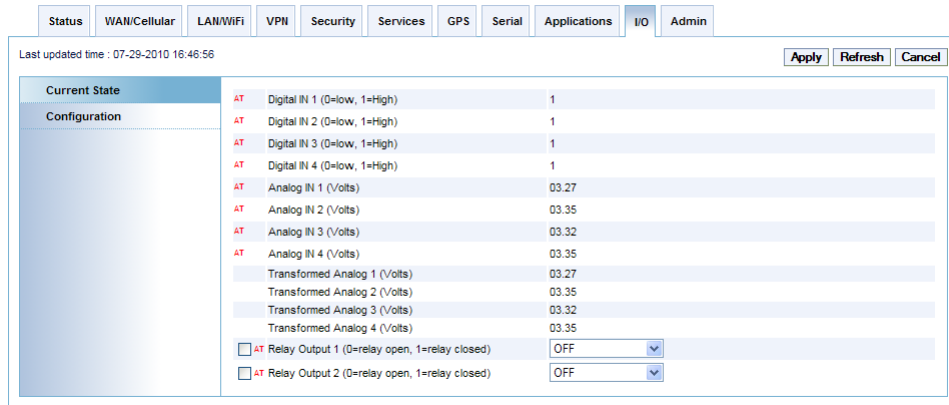


Figure 5-5: ACEmanager: I/O State

Note: Refer to the ALEOS 4.0.9 User Guide for configuring Raven XE I/O in ACEmanager.

6: Connecting the Raven XE

- [ACEmanager](#)
- [Using a Terminal Application with AT Commands](#)
- [AT Commands](#)

The Raven XE, with its ALEOS embedded firmware, is a highly configurable device.

There are two ways to configure your Raven XE. You can use the configuration and management applications of the AceWare suite or you can use a terminal emulator application such as HyperTerminal, PuTTY, or many others.

ACEmanager

To get a more expanded view of the other ACEmanager features, refer to the ACEmanager User Guide and the ALEOS 4.0.9 Configuration User Guide.

A full listing of all the configuration commands for your modem are in [Chapter 6](#).

Using a Terminal Application with AT Commands

You can access and configure your Raven XE using Microsoft HyperTerminal, PuTTY, or a similar terminal emulator application. The following directions are for HyperTerminal which is part of a standard installation of Windows XP.

1. Choose a name and icon for your connection. Choose a name for your connection, such as *Raven XE* or *Sierra Wireless AirLink Solutions*. The name and icon are only for your own reference so you can find the connection at a later date.

Tip: *If you want to have a connection saved for both local and remote usage, it is recommended that the connection name reflect the connection type, e.g., Raven XE local.*

- a. Select OK.
2. At the Connect To window, using USB or serial:
 - a. Select *COM1*, or the COM port to which the gateway is connected, for the "Connect using" option.

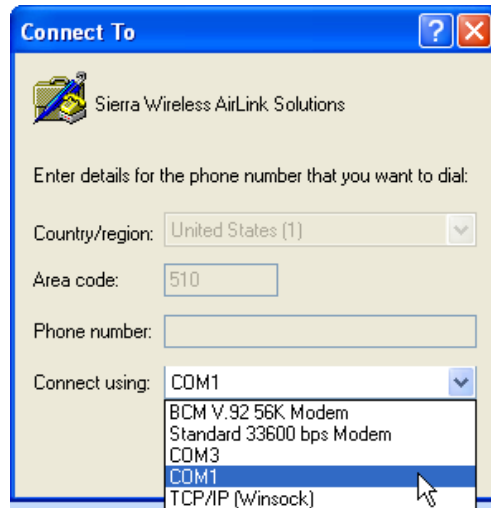


Figure 6-1: Connect To window

- b. Change or verify the settings when the COM1 Properties window appears:
 - Bits per Second: 115200 (default)
 - Data Bits: 8
 - Parity: None
 - Stop Bits: 1
 - Flow Control: Hardware.

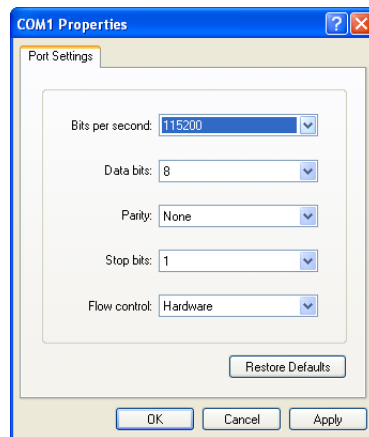


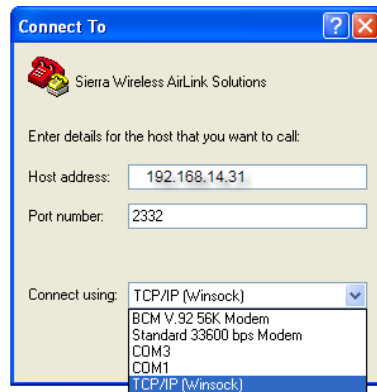
Figure 6-2: Port Settings at COM1 Properties

Tip: If you have configured the Raven XE for settings different than the defaults for Bits per second, Data bits, Parity, and/or Stop bits, you will need to use your changed settings.

- c. Select OK.

IF using Ethernet:

- d. Select *TCP/IP (Winsock)* for “Connect using”.
- e. Enter the Raven XE’s internal IP address in the Host Address field.
- f. Change the “Port number” to 2332.



g. Select OK.

3. You are now connected

Connecting on USB/net will prompt for a password.

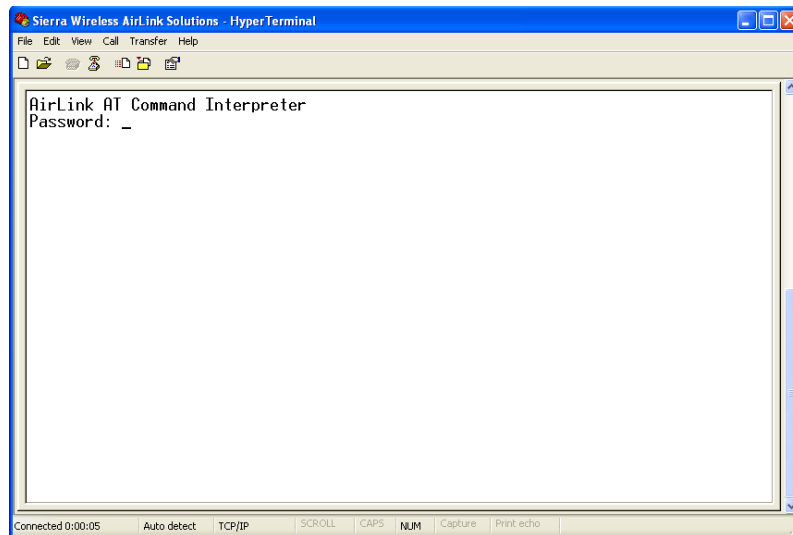


Figure 6-3: HyperTerminal : TCP/IP connected

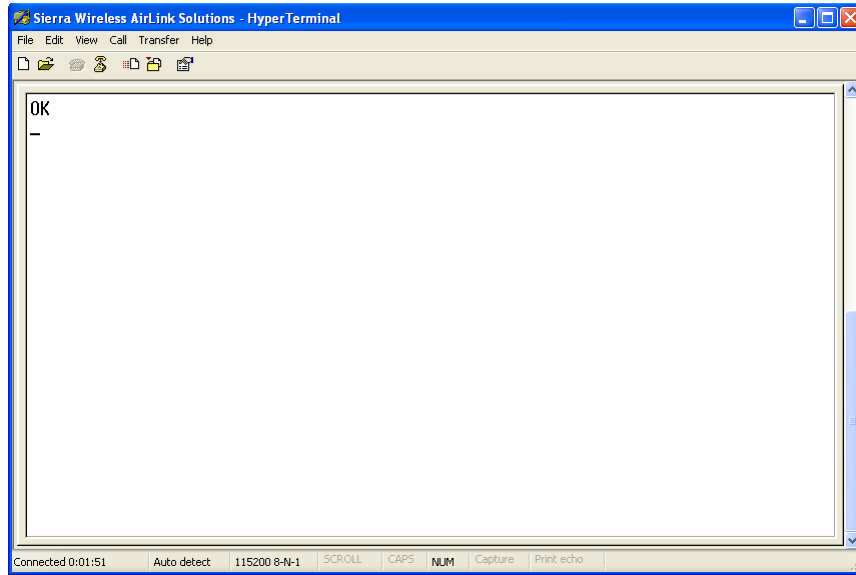


Figure 6-4: HyperTerminal : connected

- a. If you are prompted for a password, enter the default password 12345.

Tip: You will not be prompted for a password if you connect using a COM port.

- b. Type `AT` and press *Enter*. You should get a reply of “OK” or “0”.
- c. To see what you are typing as you type it, you will need to turn on the echo and verbose mode. Type `ATE1V1`, and press *Enter*.
- d. If you get a reply of “OK”, then you entered the command successfully. If you get a reply of “0” or “ERROR”, try entering the command again.

AT Commands

When using a terminal application, you will need to manually type in each command.

- For most commands, when you are entering them from a terminal connection, you will need to preface the command with AT (exceptions are noted), i.e., *ATA* which is listed as *A*.
- Some commands have specific parameters, while other commands will accept whatever is typed.
- Required variable parameters are denoted with italicized text, example, *Dn*. The *n* is variable.
- Acceptable parameters and/or specific formats are listed with each command.
- Most commands with parameters can be entered with ? to read the current value. For example, *AT&D?* will respond with "2" if the default has not been change.
- Optional parameters are denoted with square brackets [].
- AT Commands are not case sensitive. A capital "E" is the same as a lower-case "e".
- When you are using a terminal connection, if you enter a command which is recognized by the Raven XE, it will respond with "OK". If the command is not recognized, the response will be "ERROR".
- Those commands applicable only to certain model numbers of the Raven XE will be noted.

Caution: *Symbols listed with commands, such as *, /, &, or ?, are part of the command and must be included. Commands with symbols other than * may require PassThru mode.*

7: Regulatory Information

7

Federal Communications Commission (FCC) Notice - United States)

Electronic devices, including computers and wireless modems, generate RF energy incidental to their intended function and are therefore subject to FCC rules and regulations.

This equipment has been tested to, and found to be within the acceptable limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

This equipment generates radio frequency energy and is designed for use in accordance with the manufacturer's user manual. However, there is no guarantee that interference will not occur in any particular installation.

If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/television technician for help
- This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions:
 1. This device may not cause harmful interference.
 2. This device must accept any interference received, including interference that may cause undesired operation.



Warning: Changes or modifications to this device not expressly approved by Sierra Wireless could void the user's authority to operate this equipment.

Industry Canada

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Antenna Considerations

Although the antenna model(s) used with these devices meet(s) the Industry Canada Radio Frequency requirements, it is possible that the future customers may swap them for different ones without network provider's knowledge and approval. Such customers must be made aware of, and follow, the Radio Frequency requirements applied in this Technical Approval:

- RSS-102 "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)"
- RSS-129 "800 Mhz Dual-Mode CDMA Cellular Telephones"
- RSS-132e "Cellular Telephones Employing New Technologies Operating in the Bands 824-849 Mhz and 869-894 Mhz"
- RSS-133 r1 "2 GHz Personal Communications Services"

RF Exposure

In accordance with FCC/IC requirements of human exposure to radiofrequency fields, the radiating element shall be installed such that a minimum separation distance of 20cm should be maintained from the antenna and the user's body .



Warning: *This product is only to be installed by qualified personnel!*

To comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain must not exceed 5 dBi in the Cellular band and 4 dBi in the PCS band.

EU

Note: At least 20 cm separation distance between the antenna and the user must be maintained at all times.

Sierra Wireless hereby declares that the Raven XE devices conform to all the essential requirements of Directive 1999/5/EC.

Products are marked with a CE and notified body number as shown here:

CE 0682

The Declaration of Conformity made under Directive 1999/5/EC is available for viewing at the following location in the EU community.

Sierra Wireless (UK), Limited
Suite 5, the Hub
Fowler Avenue
Farnborough Business Park
Farnborough, United Kingdom GU14 7JP

The device is a Class A device for use in commercial environment.

WEEE Notice



If you purchased a Raven XE in Europe, please make sure that the device is collected separately from general domestic waste at the end of its life. WEEE (Waste of Electric and Electronic Equipment) products may be recognised by their wheeled bin label on the product label.

