



# AirLink Raven XE

## User Guide



**SIERRA**  
WIRELESS

20080616  
Rev 2.0



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## Important Notice

Due to the nature of wireless communications, 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 damage of any kind 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.

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*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.*

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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 offence.

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6,653,979	6,697,030	6,785,830	6,845,249	6,847,8306,876,6976,879,5856,886,049
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	Hours:	5:00 AM to 5:00 PM Pacific Time, Monday to Friday, except US Holidays
	E-mail:	<a href="mailto:support@sierrawireless.com">support@sierrawireless.com</a>
Sales Desk:	Phone:	1-510-624-4200 1-604-232-1488
	Hours:	8:00 AM to 5:00 PM Pacific Time
	E-mail:	<a href="mailto:MobileandM2Msales@sierrawireless.com">MobileandM2Msales@sierrawireless.com</a>

Post:	Sierra Wireless America 39677 Eureka Drive Newark, CA USA 94560  Sierra Wireless 13811 Wireless Way Richmond, BC Canada V6V 3A4
Fax:	1-510-624-4299 1-604-231-1109
Web:	<a href="http://www.sierrawireless.com">www.sierrawireless.com</a>

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

[www.sierrawireless.com](http://www.sierrawireless.com)

## 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.





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# 1: Introduction to the Raven XE

- ACEware™
- Connecting to your cellular provider
- EV-DO
- Connection methods
- Networking
- Applications
- Software
- Documentation

The Raven XE is an intelligent wireless gateway, powered by ALEOS™, 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.

Powered by ALEOS™, Raven XE modems are designed to maintain a reliable, consistent network connection. Class I Divison 2 certified as nonincendive 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: Sierra Wireless AirLink Raven XE

ALEOS, the embedded core technology of the Sierra Wireless AirLink products simplifies installation, operation and maintenance of any solution, 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), Windows-based applications (ACEview and Modem Doctor), and a web-hosted application (ACenet). You can download the applications and their user guides from the Sierra Wireless AirLink Solutions web site: <http://www.sierrawireless.com/support>. Contact your dealer or Sierra Wireless representative for any further information.

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*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/>.*

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## 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.

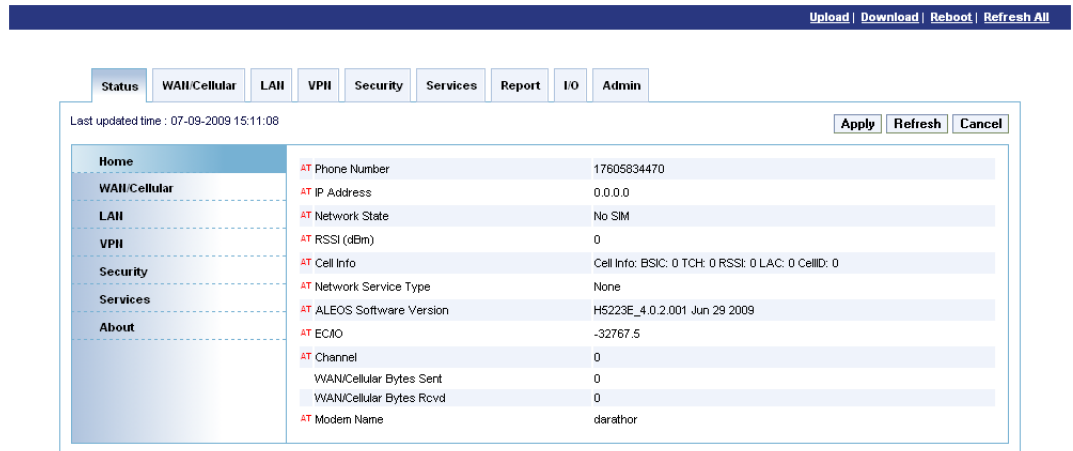


Figure 1-4: ACEmanager

## Simplified Deployment

ACEmanager provides the ability to remotely set up and configure your Sierra Wireless AirLink products. 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.

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**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 PRL.



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.

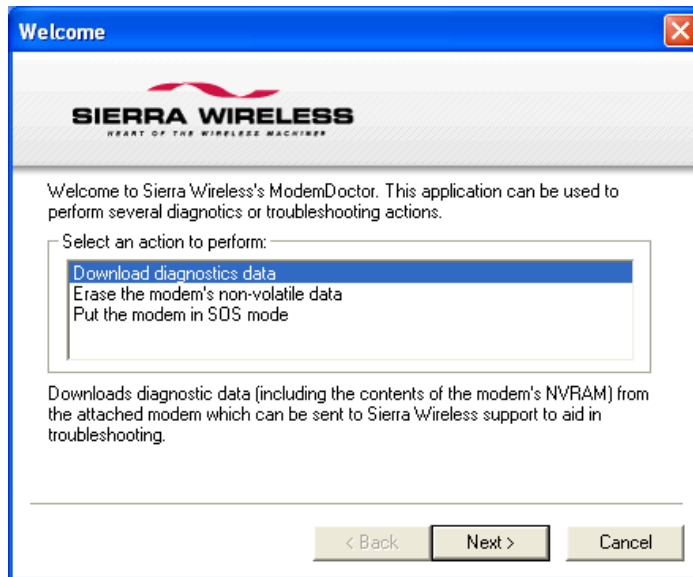


Figure 1-6: Modem Doctor

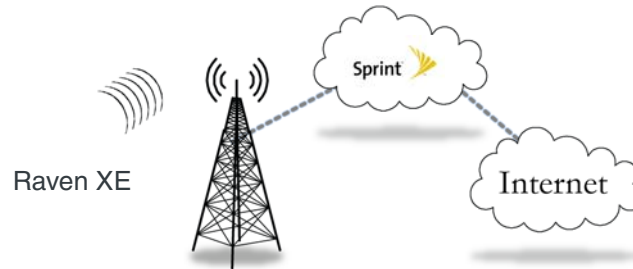
## Connecting to your cellular provider

The Raven XE uses your cellular provider 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 your cellular provider network, also called registering on the network, and receives an IP address.

3. When your Raven XE has received its IP address from your cellular provider, 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 end device.

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 your cellular provider.
- 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 your cellular provider includes a dynamic IP address and you need a static IP, please consult your cellular provider Representative for more information about changing your account for static IP support.*

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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 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, the IP address given to your modem by your cellular provider 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).*

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## 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 your Raven XE will fall back to 1x when EV-DO is not available.

Sierra Wireless is certified with your cellular provider, 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 a Ethernet (RJ45) on a computer. When connected to a USB or Ethernet port, the Raven XE behaves like a network card.

## USB

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.

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 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.

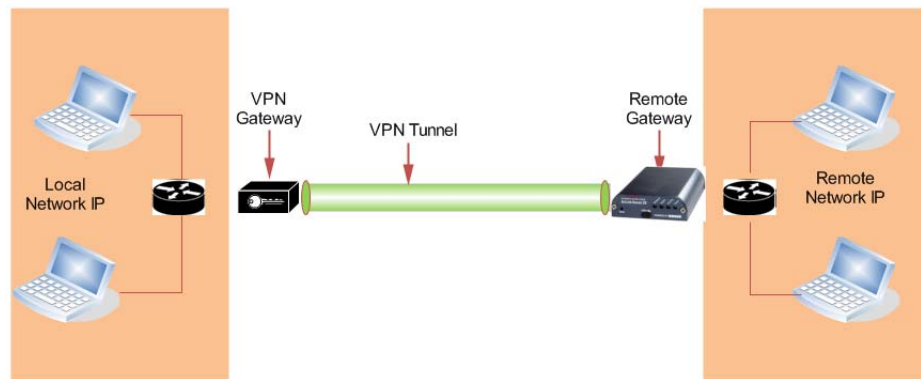


Figure 1-7: IPsec Architecture

## 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 Sierra Wireless AirLink's modem's new software feature provided via ACEmanager, that allows the users to generate reports from the events that take place. 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, also 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 radio module and controller board when the Raven XE was assembled. As new versions of the software and firmware are released, they are posted at [www.sierrawireless.com](http://www.sierrawireless.com).



## Documentation

This *Raven XE 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.
- 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
<b>ALEOS User Guide</b>	This document discusses software configuration in ACEmanager and explains all the ALEOS features.
<b>ACEview User Guide</b>	This document explains the use of this utility tools which is used to view and monitor the connection state of a Sierra Wireless AirLink device.
<b>ACEnet User Guide</b>	This document explains the use of ACEnet services for remote management of Sierra Wireless AirLink device.



## 2: Specifications

- Power Connector

### Features and Benefits

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

### Technology

- CDMA EV-DO Revision A  
With Fallback to:
  - CDMA 1xRTT
  - CDMA IS-95

### 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 (Typical/Max) 110/265 mA
- Idle 80 mA
- Input Current 75 mA to 265 mA
- Input Voltage 9 - 28V DC

### Standards/Approvals

- Carrier specific approvals

- RoHS
- FCC
- Industry Canada
- This apparatus is suitable for use in Class I, Division 2, Groups A, B, C, D or unclassified or non-hazardous locations.

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

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

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## Host Interfaces

- Ethernet: 10BaseT RJ-45
- USB Type B 5 Pin mini
- Antenna Connection:
  - Cellular - 50 Ohm SMA
  - Receive Diversity - 50 Ohm SMA
  - I/O Ports: 2

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**Warning:** *The antenna should be installed no closer than 20 cm from the human body. It is one of the RSS-102 requirements for devices not requiring SAR.*

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## Dimensions

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

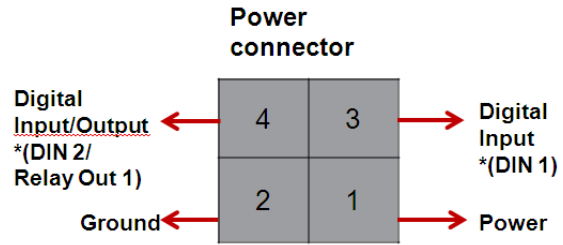
## Application Interfaces

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

## LED Indicators

- Network
- Signal
- Activity
- Power
- Reset Button

## Power Connector



\* Configuration terminology in ACEmanager

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

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

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

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## 3: Activating your Raven XE on your cellular provider

- [OMA-DM](#)
- [Hands Free Activation \(HFA\)](#)
- [Activating Raven XE](#)
- [Verifying USB connection](#)
- [Configuring through ACEmanager](#)
- [Activating Using AT Commands](#)

This chapter provides step-by-step directions for activating your Raven XE on your cellular provider's network.

### OMA-DM

Raven XE is an embedded router solution that supports Network Initiated (NI) OMA-DM Device Configuration (DC) and PRL Updates (PRL) on the Sprint network. The Raven XE firmware registers notifications with the MC5727 radio module for OMA-DM NI alerts and session state and processes them appropriately. The alert response instructs the radio module to immediately process the NI OMA-DM command. When the OMA-DM session state is IDLE, Raven XE records the session type and session result code and then re-establishes the data connection.

### Hands Free Activation (HFA)

Raven XE automatically detects the radio module installed during system startup. If the radio module is CDMA technology, Raven XE will check the current provisioning state and if necessary execute HFA. For devices that have previously been provisioned the HFA routine is bypassed.

### Activating Raven XE

To activate your Raven XE, follow the instructions below:

1. Connect the Raven XE with antennas.
2. Plug the power cable to the power connector on the back panel of the Raven XE.
3. Connect your computer to the Raven XE with an ethernet cable.

4. Observe the LEDs, as indicated in Chapter 4, [Indicator Lights](#) section.

Wait approximately 30 seconds, to allow the Raven XE to initialize and go over the air.

## 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. Then power up the Raven XE and connect USB. Install from specific location and point to this .inf file. For detailed instructions on installing the USB drivers, please refer to *Universal Serial Bus 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 on Next.

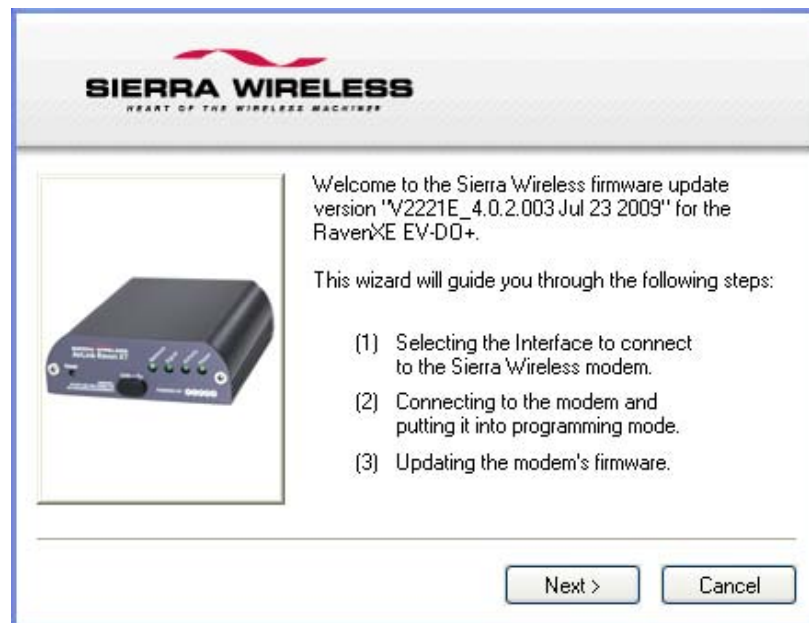


Figure 3-1: Launch Screen

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

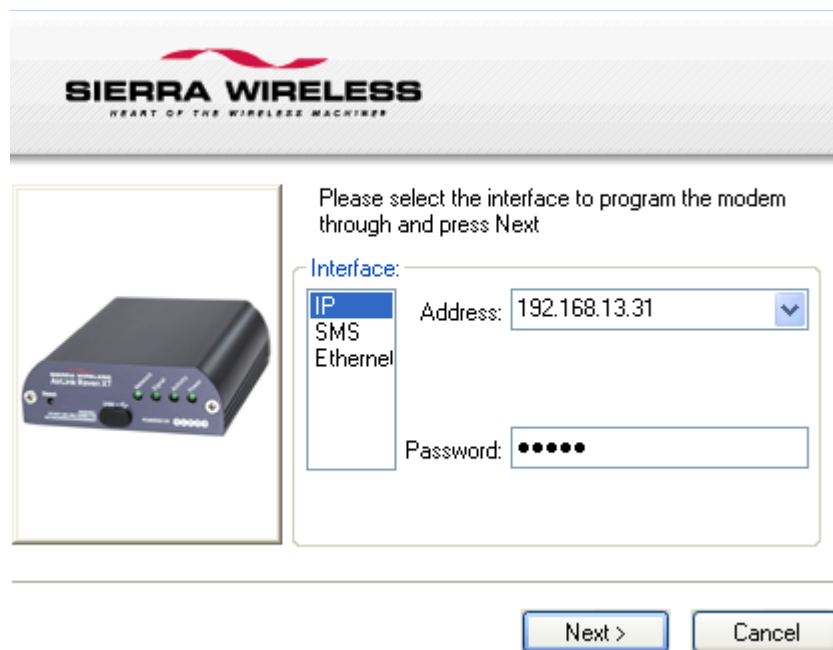
The default private for Ethernet is also in a different subnet from the other connection types.



**Table 3-1: Factory Defaults**

Interface	Raven XE	Connected Device
<b>Ethernet Private default</b>	192.168.13.31*	192.168.13.100
<b>USB/NET</b>	192.168.14.31	192.168.14.100
<b>DUN</b>	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 USB connection

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

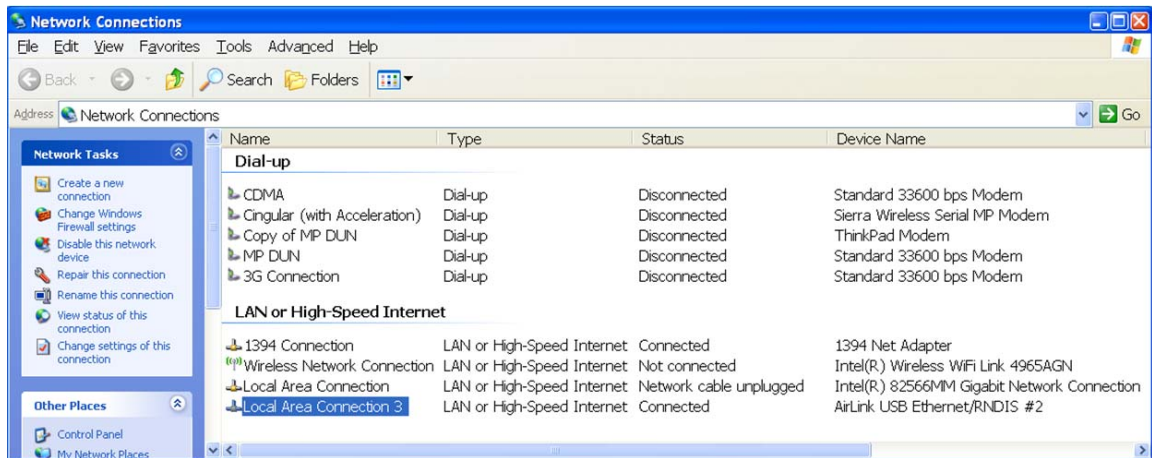


Figure 3-3: Verify USB Connection

## Confirming IP Address

Check the IP Address in your Local Area Connection window.

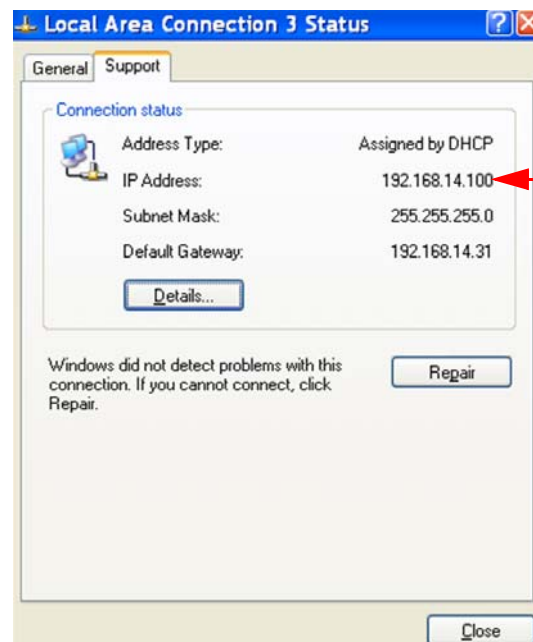


Figure 3-4: Confirm IP Address

## Configuring through ACEmanager

ACEmanager is a free utility. Follow the steps below 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.

## Activating Using AT Commands

An alternate method to configure and activate your Raven XE is by using AT commands sent directly to the modem with a terminal application.

---

**Caution:** *It is not possible to activate the Raven XE using either ACEmanager or AceNet.*

---

1. Set telnet timeout in to 20 minutes.
2. Save the telnet setting.
3. Enter the user name of your account (NAI). The user name is usually expressed as an email address with phone number of the account (example, 1234567@carrier.com). This information should be provided by your carrier. You may not need this step.

**AT\*NETUID=[NAI]**

4. Enter the password of your account. This information should be provided by your carrier. You may not need this step.

**AT\*NETPW=[password]**

5. Verify ALEOS has established communication to the internal hardware.
6. Enter the activation command appropriate for your type of account. The SID and NID are optional and only required if your account type uses them.
  - If you have the same number for the MIN and MDN or MSID:

**AT\*PROVISION=MSL,MDN[,SID,NID]**

- If you have the different numbers for the MIN and MDN or MSID:

**AT\*PROVISION2=MSL,MDN,MIN/MSID[,SID,NID]**

## Using Direct Commands to the Internal Hardware

Use only if the ALEOS method is unsuccessful.

### Activating the Modem

1. Put modem into passthru mode to by-pass ALEOS. This will allow direct communication with the wireless module for programming. Entering passthru will take 10-15 seconds and will return an 'OK' when it is complete.

**AT\APASSTHRU**

2. Verify you are in Passthru mode.

**AT!STATUS**

3. Unlock the module.

**AT~NAMLCK=MSL**

4. Set the MDN and MSID.

**AT~NAMVAL=0,MDN,MSID,0,65535**

5. Verify the settings are what you intended to enter.

**AT~NAMVAL?0**

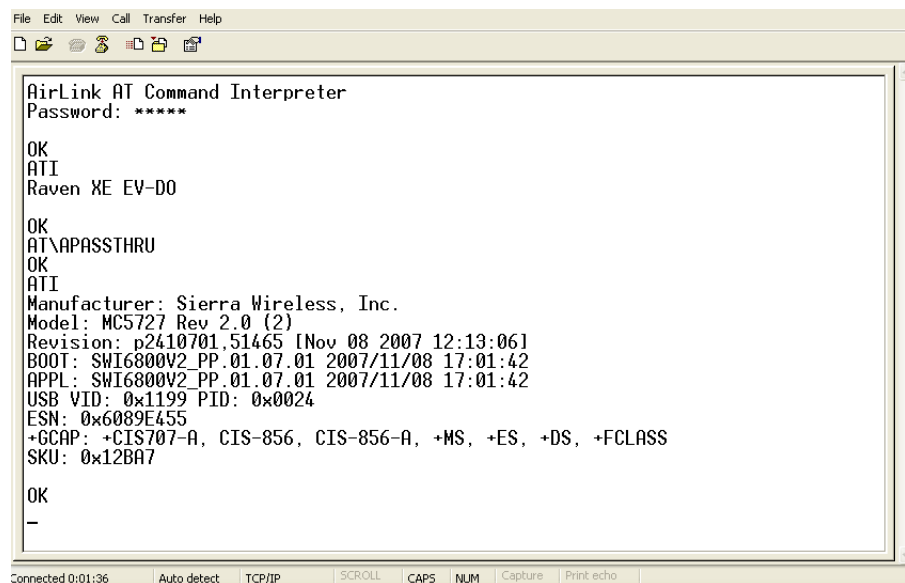
6. Reset the module.

**AT!RESET**

7. Press the reset button on the front of the modem. When the modem restarts, it should register on the network.

## PassThru mode through AT Command

Issuing the “**AT\APASSTHRU**” from a terminal emulation enters the PassThru mode. The modem responds with OK, at which point a direct connection to the internal hardware is established.



```
File Edit View Call Transfer Help
AirLink AT Command Interpreter
Password: *****
OK
ATI
Raven XE EV-D0
OK
AT\APASSTHRU
OK
ATI
Manufacturer: Sierra Wireless, Inc.
Model: MC5727 Rev 2.0 (2)
Revision: p2410701.51465 [Nov 08 2007 12:13:06]
BOOT: SWI6800V2_PP.01.07.01 2007/11/08 17:01:42
APPL: SWI6800V2_PP.01.07.01 2007/11/08 17:01:42
USB VID: 0x1199 PID: 0x0024
ESN: 0x6089E455
+GCAP: +CIS707-A, CIS-856, CIS-856-A, +MS, +ES, +DS, +FCLASS
SKU: 0x12BA7
OK
-
```

Figure 3-5: PassThru mode

---

**Tip:** *PassThru can only be exited by resetting or power-cycling the modem. This mode cannot be entered via a remote Telnet session.*

---

You can configure a string of AT commands to be sent to the Raven XE when it enters PassThru and other PassThru settings.

PassThru Mode allows only specific AT commands. Some ALEOS commands will be unavailable when the Raven XE is in PassThru mode. The commands usable also depend heavily on the modem model number (found on the label on the top of the Raven XE).

---

*Note: Some internal hardware requires upwards of 20 seconds before AT commands can be entered, so be patient if there seems to be no response to AT commands.*

---

## 4: Hardware Installation of the Raven XE

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

*Note: During installation, please be sure 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.*

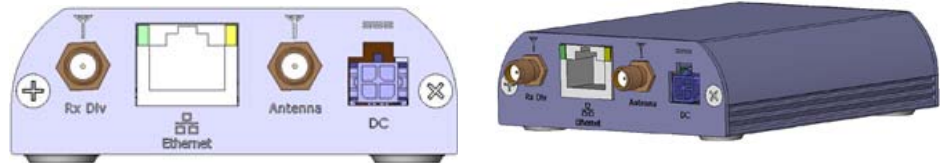


Figure 4-1: Raven XE Connectors

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

Antennas selected should not exceed a maximum gain of 5 dBi under standard installation configuration. In more complex installations (such as those requiring long lengths of cable and/or multiple connections), it's 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).

Your Raven XE will work 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 back of the Raven XE.

**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.

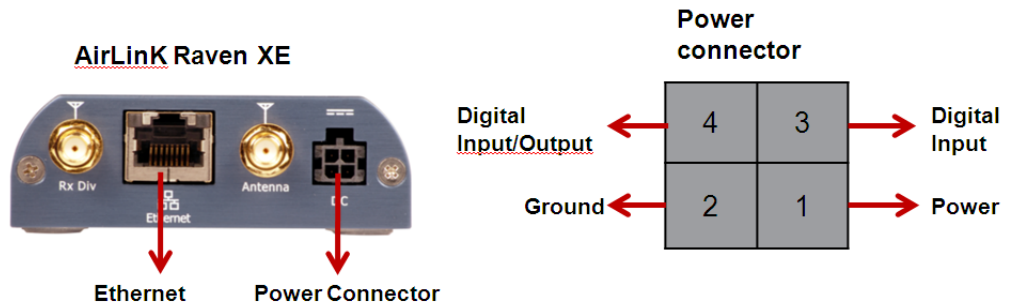


Figure 4-2: Digital I/O Port: Power Connector



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



**Warning:** When using AC to DC adapter the ambient temperature should not exceed 40°C.

Your Raven XE can be used with either DC or AC, with the appropriate power adapter. 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 kbytes. To optimize the throughput of your Raven XE, it is recommended that you change the TCP window to 128 kbytes to 256 kbytes using a TCP Optimizer.*

---



Figure 4-4: USB

Your Raven XE’s full-speed (12 Mbit) 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 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, not a host.

When it is connected to a computer, the USB port should be seen as a COM port or 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** - Indicates a successful connection to the cellular network with an IP address given and a channel acquired.
- **Signal** - Light shows the strength of the signal and may be nearly solid (strong signal) or flashing (weaker signal). A slow flash indicates a very weak signal.

### 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** - Indicates the power adapter is connected and there is power getting to the Raven XE.
- The **Reset button** (on the left side of the Raven XE) 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 need to reactivate your Raven XE with your cellular provider.*

---

## 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.

## Mounting

An optional accessory for your Raven XE is a mounting kit, which includes a bracket. 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 0.150".

The instructions to bracket installation is following:

1. Mount the bracket using number 6 screws. There are two holes each, to fasten screws, and minimum of one hole each end is required for mounting bracket.
2. Position Raven XE between Alignment ears.
3. Engage top groove in body of Raven XE with 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 upper groove on far side of Raven XE, aligns with tabs.
6. Release to complete installation in to mounting bracket.

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

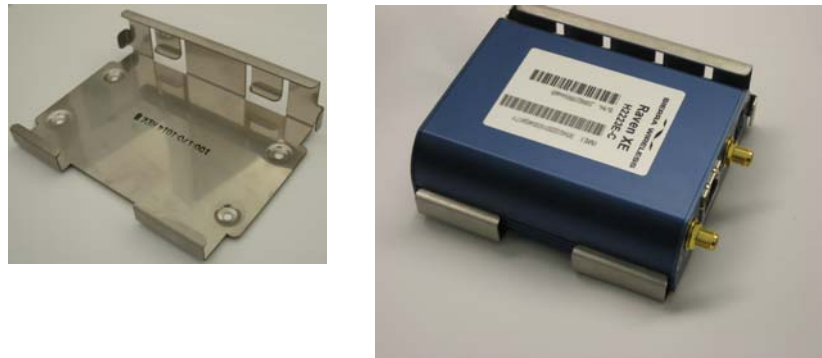


Figure 4-6: Optional Mounting Bracket

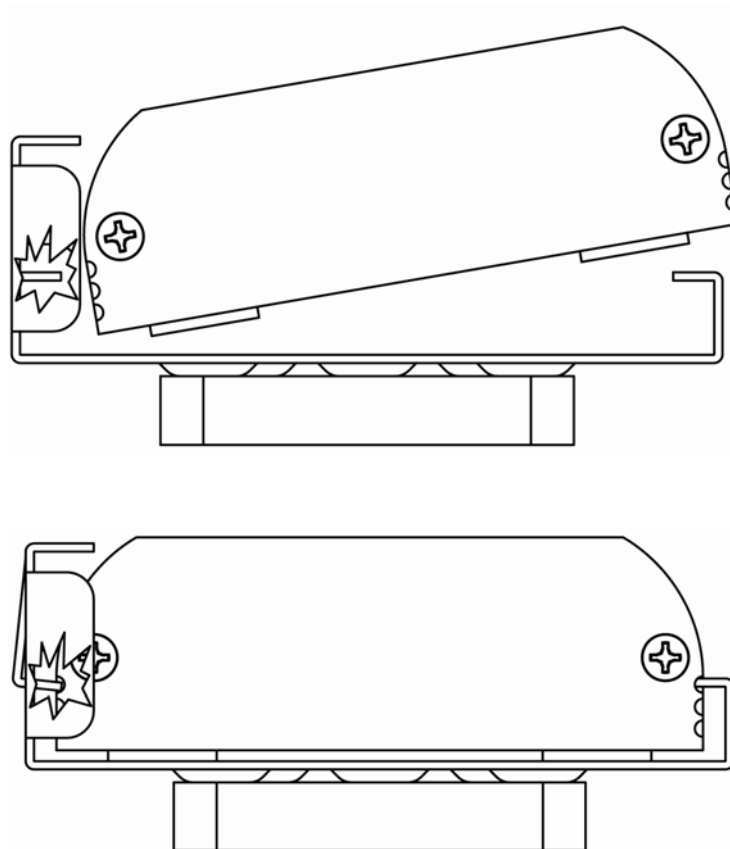


Figure 4-7: Mounting bracket installation

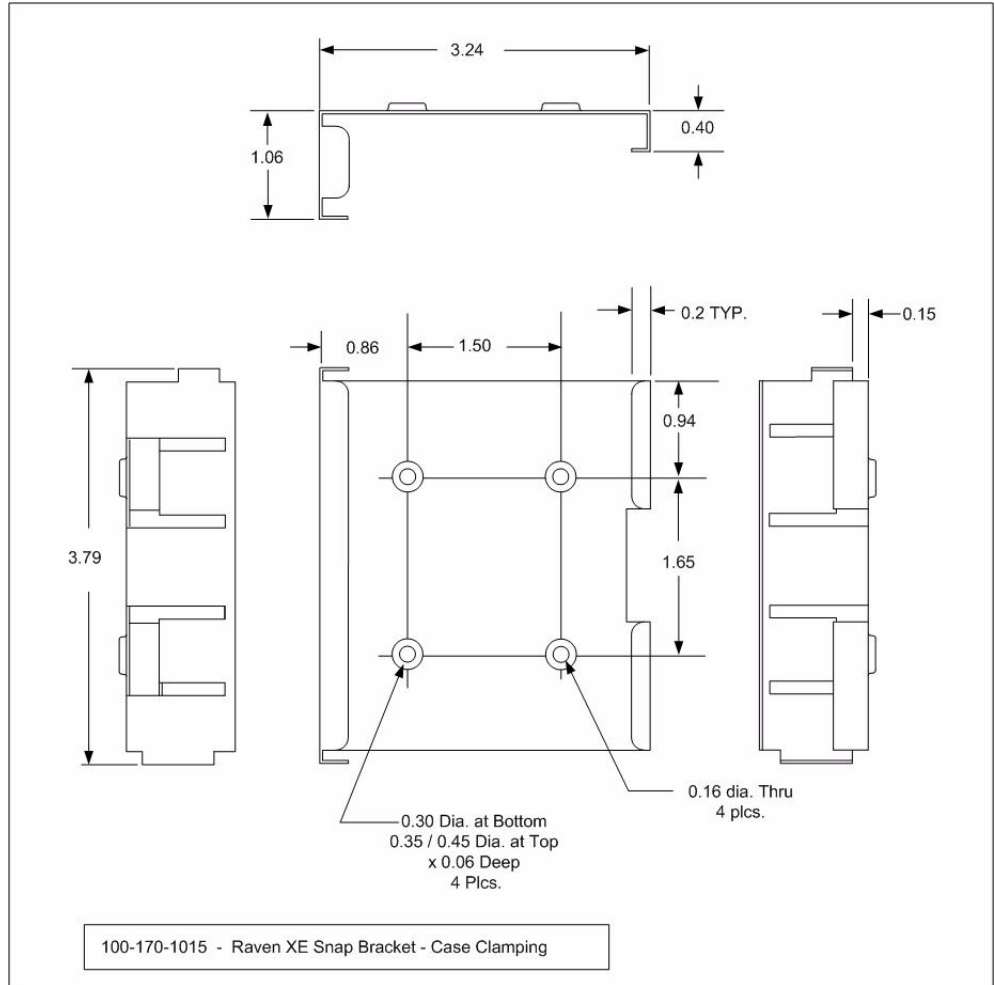


Figure 4-8: 100-170-1015 : Mounting Bracket for Raven XE



## 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 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 1 digital input and 1 programmable I/O which can be connected, to sensors and switches to monitor status and remotely control equipment.



Figure 5-1: Raven XE

### Digital Input

By measuring contact closures on switches, the digital input(s) can report a simple 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".

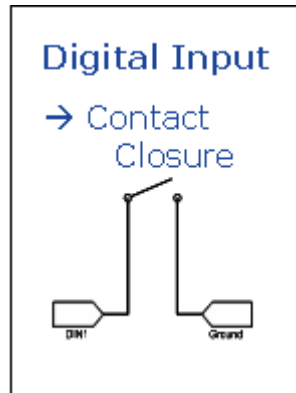


Figure 5-2: Digital Input Contact Closure

- When a door or other latch is opened or closed.
- 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.
- 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

Example Relay Drive Circuit

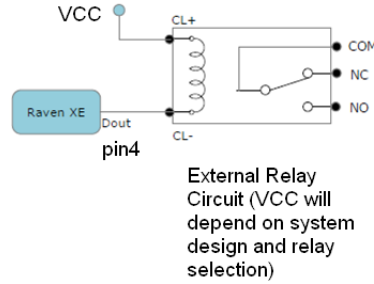


Figure 5-3: Digital Output

## 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	Digital Input/Output
<b>Input Specs(Over temp)</b>		
	<b>Pin 3</b>	Pin 4
<b>Function</b>	Input	Output Only
<b>Max VDC</b>	3.3V	3.3V
<b>V Positive VDC</b>	1.3 to 2.2VDC	1.3 to 2.2VDC
<b>V negative VDC</b>	0.6 to 1.2 VDC	0.6 TO 1.5VDC
<b>Hysteresis VDC</b>	0.4 to 1.2VDC	0.4 to 1.2VDC
<b>Internal Pullup</b>	52kohm to 3.3VDC	(no pull on pin 4)
<b>Output Specs (Over temp)</b>		
<b>Function</b>	Input Only	Output
<b>IOUT</b>		±50mA
<b>VOHmin (IOH - 16 mA)</b>		2.4V

	Digital Input	Digital Input/Output
VOHmin (IOH - 24 mA)		2.3V
VOLmax(IOL 24mA)		0.55V

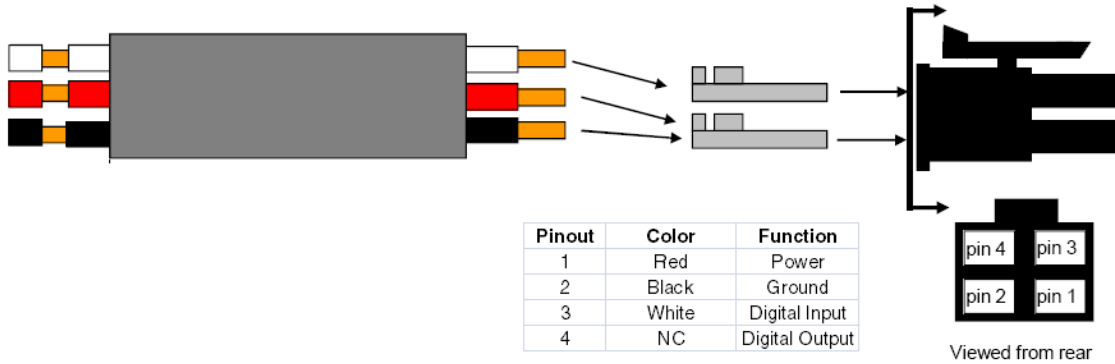


Figure 5-4: Power Connector Diagram

**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 report types using Event Reporting. In ACEmanager, select the I/O group.

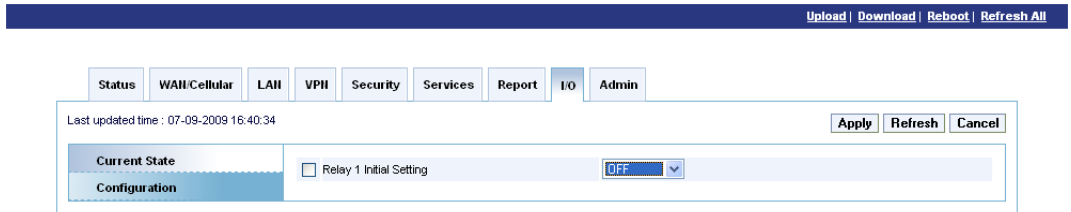


Figure 5-5: ACEmanager : I/O

**Note:** Please refer to the ALEOS User Guide for configuring Raven XE I/O in ACEmanager.



## 6: Connecting the Raven XE

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

With ALEOS as its “brain”, the Raven XE is a highly configurable device.

To configure your Raven XE, you have two options. 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 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 a terminal application such as Microsoft HyperTerminal, PuTTY, or similar. 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
  - a. 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, it is recommended the connection name reflect the connection type, i.e. Raven XE local.*

---

- b. Select OK.

- c.

2. Connect to

Using USB/Serial:

- a. Select *COM1*, or the comport to which the modem is connected, for the “Connect Using”.

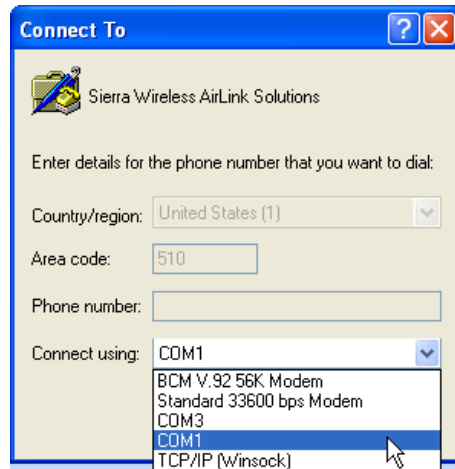


Figure 6-1: Connect To

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

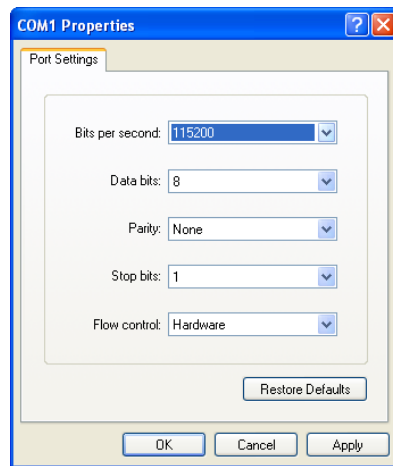


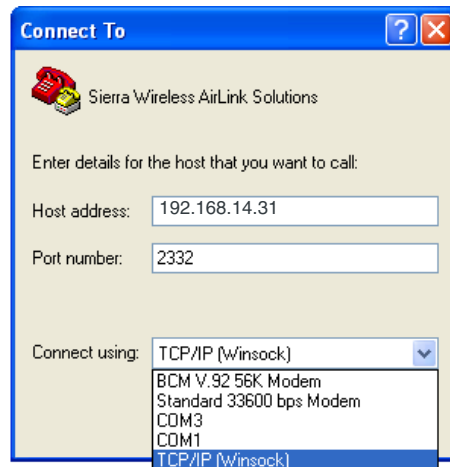
Figure 6-2: Port Settings

**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.

Using Ethernet:

- d.** Select *TCP/IP (Winsock)* for “Connect Using”.
- e.** Type in *192.169.14.31* for Host Address.
- f.** Change the “Port Number” to *2332*.



g. Select OK.

### 3. Connected

Connecting on USB/net will prompt for password.

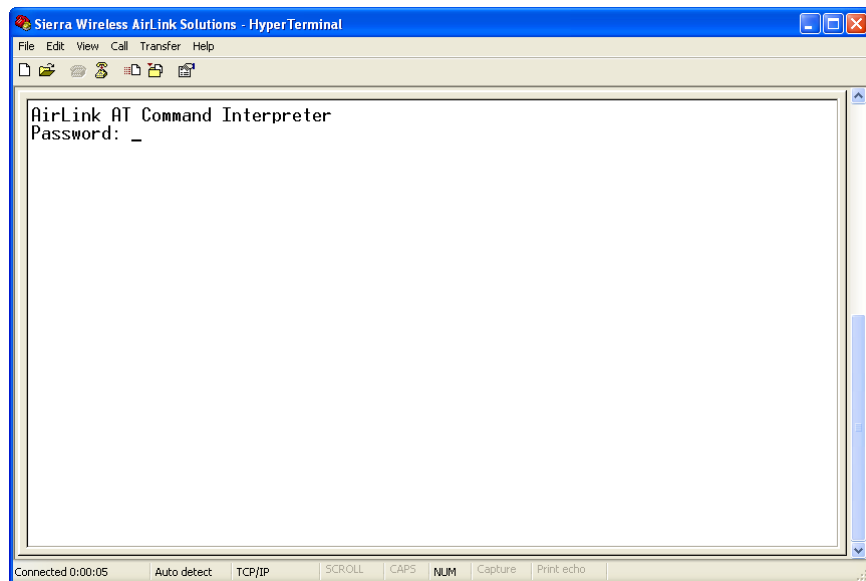


Figure 6-3: HyperTerminal : TCP/IP connected

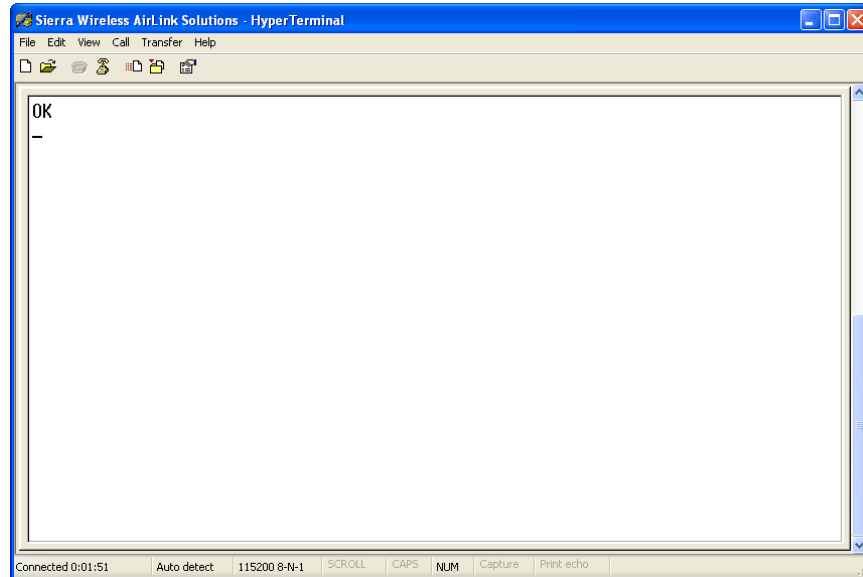


Figure 6-4: HyperTerminal : connected

- a. If you are prompted for a password, enter *12345* (default password).

---

**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 Command

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

- For most commands, when you are entering them using 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 take whatever you type.
- 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 changed).

- 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.*

---





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