



AirLink Raven X

User Guide



SIERRA
WIRELESS

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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 X are used in a normal manner with a well-constructed network, the Sierra Wireless AirLink Raven X 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 X, or for failure of the Sierra Wireless AirLink Raven X 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 X may be used at this time.

The driver or operator of any vehicle should not operate the Sierra Wireless AirLink Raven X 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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| 6,191,741 | 6,199,168 | 6,339,405 | 6,359,591 | 6,400,3366,516,2046,561,8516,643,501 |
| 6,653,979 | 6,697,030 | 6,785,830 | 6,845,249 | 6,847,8306,876,6976,879,5856,886,049 |
| 6,968,171 | 6,985,757 | 7,023,878 | 7,053,843 | 7,106,5697,145,2677,200,512D442,170 |
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Contact Information

| | | |
|---------------|---------|--|
| Support Desk: | Phone: | 1-877-231-1144 |
| | Hours: | 5:00 AM to 5:00 PM Pacific Time, Monday to Friday, except US Holidays |
| | E-mail: | support@sierrawireless.com |
| Sales Desk: | Phone: | 1-510-624-4200 1-604-232-1488 |
| | Hours: | 8:00 AM to 5:00 PM Pacific Time |
| | E-mail: | MobileandM2Msales@sierrawireless.com |

| | |
|-------|---|
| 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: | www.sierrawireless.com |

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

www.sierrawireless.com

Revision History

| Revision number | Release date | Changes |
|-----------------|--------------|--|
| 1.x | Q2: 2009 | Guide updated with ALEOS Release 4.0 content. |
| 2.x | Q1: 2010 | User Guide rebranded to current corporate standards. |

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>> 1: Introduction to the Raven X

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The Raven X is equipped with a robust ARM9 processor and embedded ALEOS™ technology to optimize performance on today's high speed data networks. The high-speed interface and 3G-optimized architecture make the Raven X ideal for various commercial mobile or portable network connectivity applications. Embedded machine protocols make it equally suited for remote industrial and M2M deployments.

Key applications for the Raven X include wireless networking, retail/POS, vending/kiosks, multimedia and remote monitoring and control.



Figure 1-1: Sierra Wireless AirLink Raven X

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
- Extensive Machine Protocols
- Packet Level Diagnostics
- Device Management & Control
- Protocol Spoofing



Figure 1-2: Powered by ALEOS

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.

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.

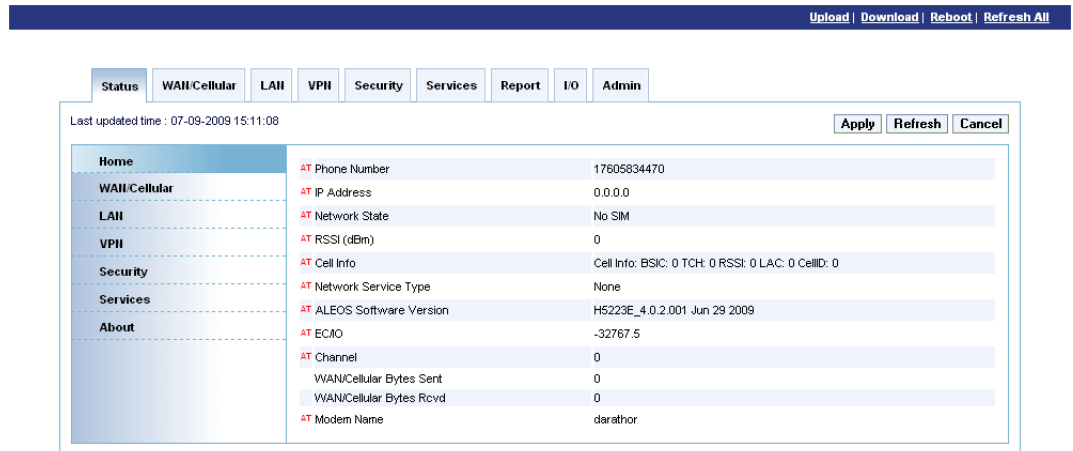


Figure 1-4: ACEmanager

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.

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 X activity which you can then send to Sierra Wireless support or erase the current configuration completely.



Figure 1-6: Modem Doctor

Modem Doctor USB

1. Open the ModemDoctorUSB.exe.
2. Select any one option.

Note: If you are using USB port as serial, then USB device is set to "o" and if you are using the default option then the USB device is set to "1".

The available port is automatically detected. Password is the fault password.

3. Press Erase. The modem will then reset.

Note: If you erase the factory defaults will be restored. USBnet is the factory default port.

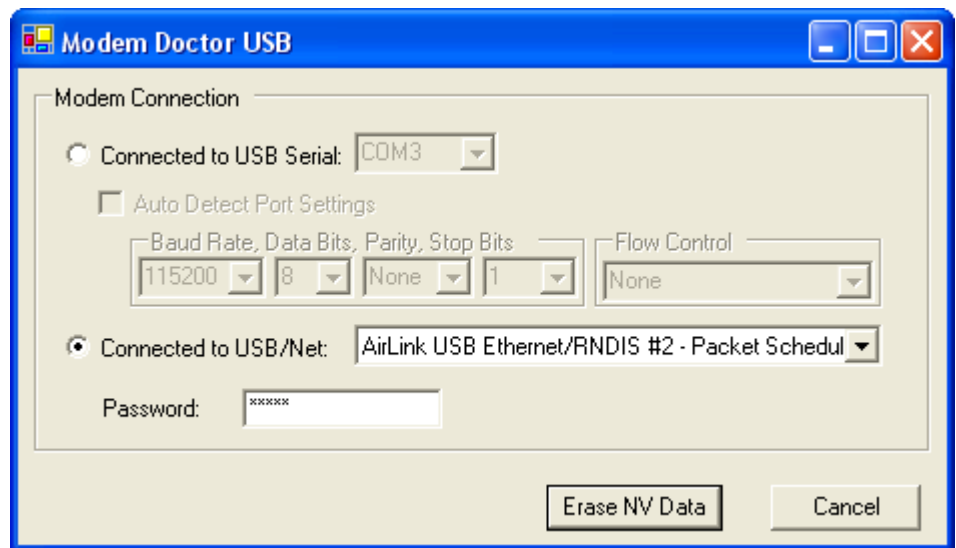


Figure 1-7: Modem Doctor: USB connection

Connecting to your cellular Network

The Raven X uses your cellular Network as an ISP (Internet Service Provider) to connect you to the Internet.

Steps of a connection:

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

The Raven X will perform routing for all internet traffic to and from the computers or other end device.

With the Raven X 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 X 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 X might not always receive the same address each time it connects with your cellular Network.
- Static addresses are permanently assigned to a particular account and will always be used whenever your Raven X 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 Network includes a dynamic IP address and you need a static IP, please consult your cellular Network Representative for more information about changing your account for static IP support.*

If you need to contact your Raven X, a device connected to the Raven X, or a host system using the Raven X 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 X using TCP/IP, the IP address given to your modem by your cellular Network 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 your Raven X will fall back to 1x when EV-DO is not available.

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

USB

The Raven X 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 X and connect directly to your computer for best throughput.

Virtual serial port

The Raven X 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.

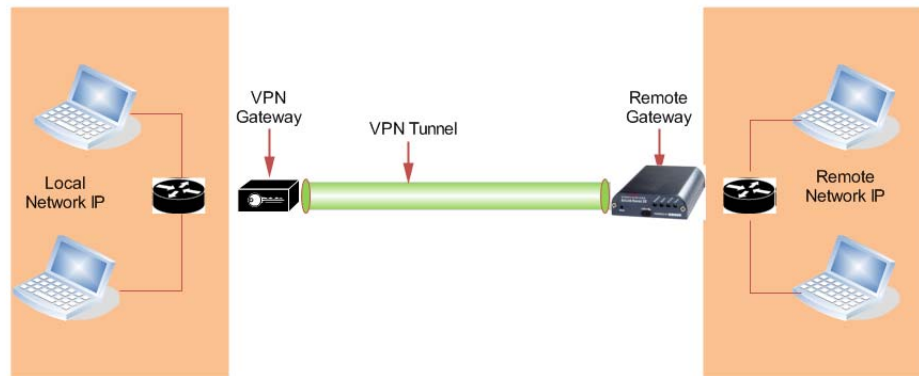


Figure 1-8: IPSec Architecture

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 X modem comes with the following software:

- AceView, the software for the Raven X which allows you to monitor your connections.
- The driver that forms the interface between the Raven X 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 X 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 X and one on the radio module.

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

Documentation

This *Raven X User Guide* describes how to:

- Install the Raven X hardware.
- Connect the radio antennas.
- Connect a notebook computer and other input/output (I/O) devices.
- Interpret the LEDs on the Raven X 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 use of this utility tools which is used to view and monitor the connection state of a Sierra Wireless AirLink device. |
| ACEnet User Guide | This document explains the use of ACEnet services for remote management of Sierra Wireless AirLink device. |

>> 2: Specifications

- Interface Port Pin-Outs
- Power Connector

Features and Benefits

- Embedded Intelligence
- Low Power Consumption
- High-Speed Processor
- High-Speed 2-way Data
- Ethernet and Serial Port
- Machine Protocols
- Persistent Network Connectivity
- Remote Management and Configuration
- Class I Div 2 Certified

Technology

- CDMA EV-DO Revision A
With Fallback to:
 - CDMA 1x EV-DO (Revision 0)
 - 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/Receive (Typical/Max) 239/270 mA
- Idle 104 mA
- Dormant 85 mA
- Input Voltage 9 - 28V DC

Standards/Approvals

- Carrier specific approvals
- 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.

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

Host Interfaces

- Ethernet: 10/100 Mbps RJ-45
- RS-232: DB-9 DCE (300-230400 baud)
- Antenna Connection:
 - Primary Cellular - 50 Ohm SMA
 - Receive Diversity - 50 Ohm SMA

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.*

Dimensions

- 143mm x 37mm x 75mm
- 317 grams

Application Interfaces

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

LED Indicators

- Network
- Signal
- Activity
- Power

Interface Port Pin-Outs

Serial Port

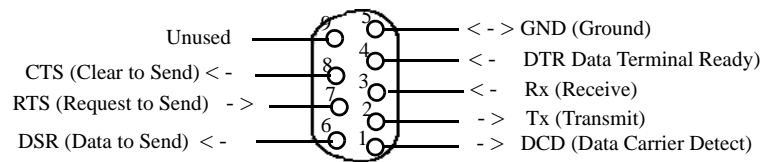


Figure 2-1: Serial Port Diagram: Female DB-9 DCE (not to scale)

The relay contacts are rated for 30 Vdc max and 500mA max

Power Connector

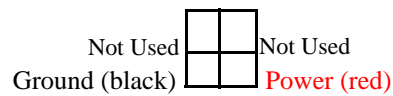


Figure 2-2: Power Connector (not to scale)

