



AirLink Raven X

User Guide



SIERRA
WIRELESS

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Rev 2.0

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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.

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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
6,968,171	6,985,757	7,023,878	7,053,843	7,106,5697,145,2677,200,512D442,170
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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.



Contents

Introduction to the Raven X	1
ACEmanager	2
Simplified Deployment	3
Monitor and Control	3
ACEview	3
Modem Doctor	4
Modem Doctor USB	4
Connecting to your cellular Network	5
Steps of a connection:	5
Dynamic vs. Static IP Addresses	6
EV-DO	6
Security	7
Connection methods	7
USB	7
Virtual serial port	7
Networking	7
IPSec	7
GRE	8
Applications	8
Events Reporting	8
Software	9
Documentation	9
Tools and Reference Documents	9

Specifications	11
Features and Benefits	11
Technology	11
Bands	11
Environmental	11
Power Consumption: (@12V DC)	11
Standards/Approvals	12
Host Interfaces	12
Dimensions	12
Application Interfaces	12
LED Indicators	12
Interface Port Pin-Outs	13
Serial Port	13
Power Connector	13
Activating your Raven X on your cellular Network	15
Setup Wizard	15
Activating Using AT Commands	25
Using Direct Commands to the Internal Hardware	26
Activating the Modem	26
Private Networking	27
Hardware Installation of the Raven X	29
.....	30
Connecting to Power	30
Connecting to a Computer or other Device	31
Indicator Lights	31
Light Patterns	32
Mounting	33

1: Introduction to the Raven X

- [Connecting to your cellular Network](#)
- [EV-DO](#)
- [Connection methods](#)
- [Networking](#)
- [Applications](#)
- [Software](#)
- [Documentation](#)

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.

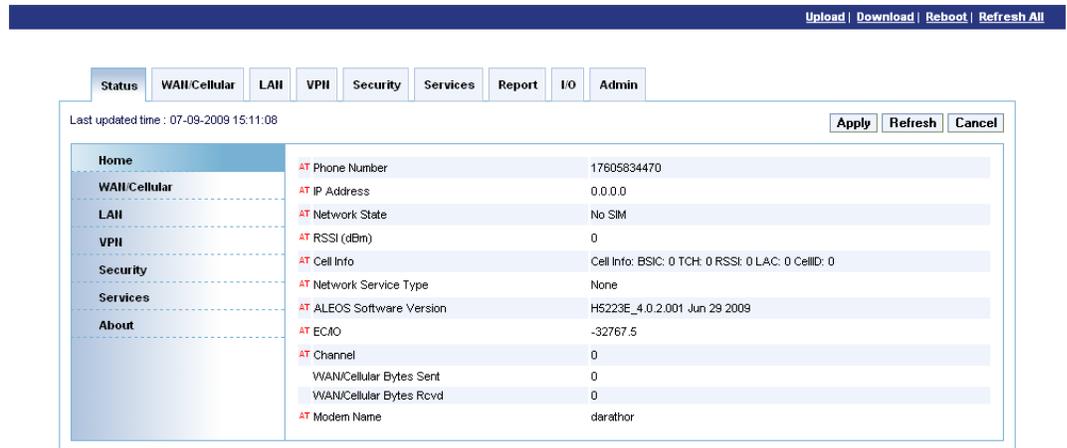


Figure 1-4: ACEmanager

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.

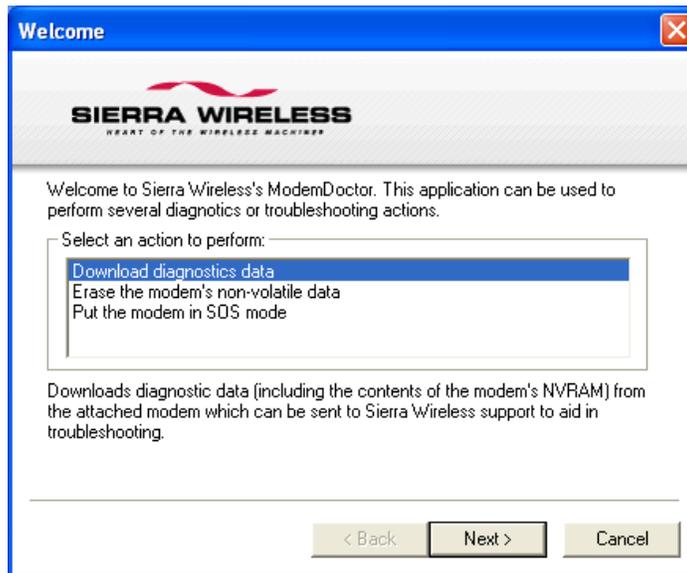


Figure 1-6: Modem Doctor

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 "0" 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.

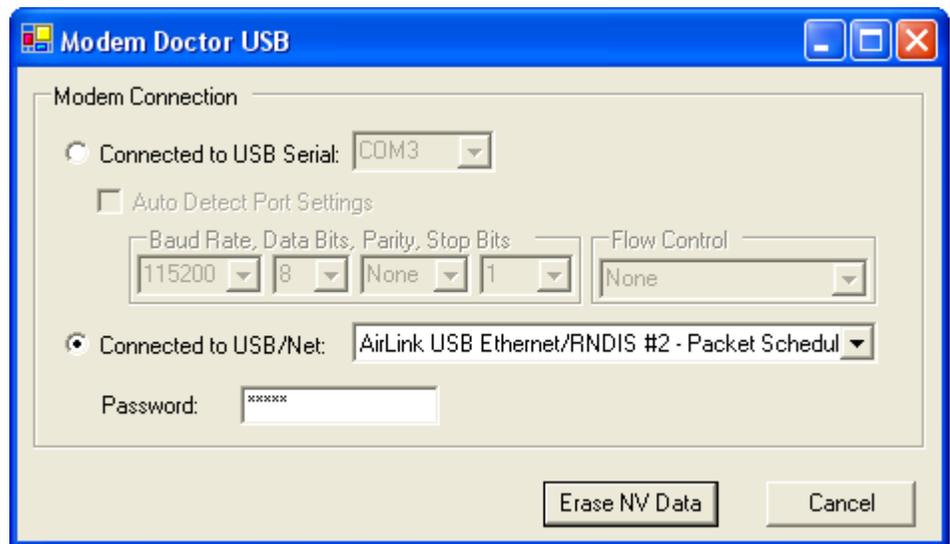


Figure 1-7: Modem Doctor: USB connection

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.

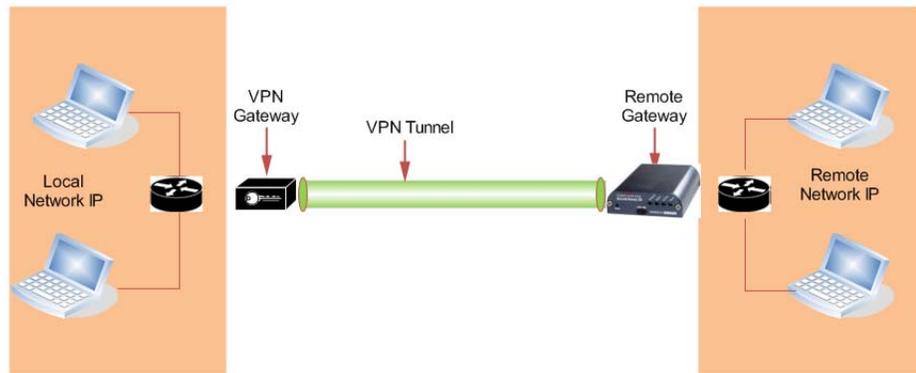


Figure 1-8: IPSec Architecture

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

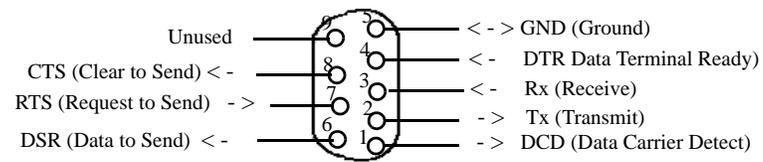


Figure 2-1: Serial Port Diagram: Female DB-9 DCE (not to scale)

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

Power Connector

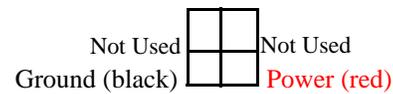


Figure 2-2: Power Connector (not to scale)

3: Activating your Raven X on your cellular Network

- Setup Wizard
- Activating Using AT Commands

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

Setup Wizard

You can find the Setup Wizard installation on the CD which came with your Raven X or on the Sierra Wireless website: <http://www.sierrawireless.com/support/AirLink/default.aspx>. Use only the Setup Wizard for your cellular Network for best results.

Note: The Setup Wizard requires the Microsoft .NET framework v. 1.1 and Microsoft Windows 98, Windows 2000, Windows XP, or later. You can obtain .NET from Microsoft: <http://www.microsoft.com>.

Note: If you are setting modem for circuit switched mode, please test your connection to ensure your network account has been set up correctly.

1. Starting the Setup Wizard
 - a. Connect the Raven X to your computer using an Ethernet cable or a serial cable USB cable.
 - b. Connect the power adapter and antenna to your Raven X.
 - c. Install the Setup Wizard by running your cellular NetworkSetupWizard.exe and follow the prompts.
 - d. Run the Setup Wizard from the Windows Start menu.

Start>All Programs>AirLink Communications>Setup Wizard>Setup Wizard



Figure 3-1: Setup Wizard

- e. Click *Next* to start the Wizard process.

2. Connecting to the Modem

If you connected your Raven X to the port on your computer, select *Connected to an Ethernet/USB Port* and use the drop down menu to select the Ethernet adapter or USB/net connection on your computer to which the modem is connected (most computers only have one adapter which will be selected for you). The default password for the modem is entered for you. Click *Next*.

Note: If you want to use USB with the Setup Wizard you will need to first install the driver, refer to Installing the USB driver section in this Chapter.

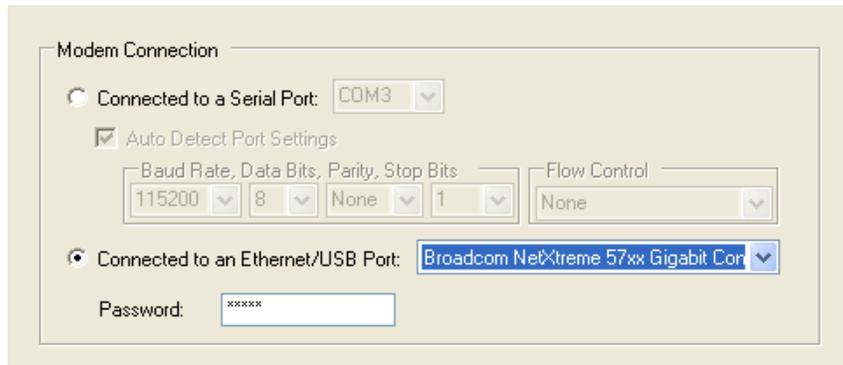


Figure 3-2: Setup Wizard : Ethernet Connection/USB Connection



Figure 3-3: Ethernet Port

Tip: If the Setup Wizard is unable to detect the Raven X, check the green link LED on the Ethernet port of the modem to see if it is lit to indicate an Ethernet connection with your computer. If you do not see this light or if your computer shows a "Network Cable Unplugged" message or icon, try a different Ethernet cable.

OR

If you connected your Raven X to the serial port on your computer, select *Connected to a Serial Port*, check Auto Detect Port Settings or select the port from the drop down menu. Click *Next*.

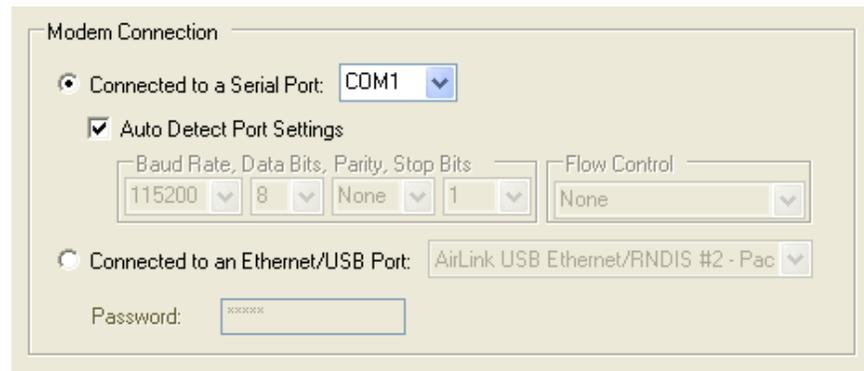


Figure 3-4: Setup Wizard : Serial Connection

Note: You cannot activate with serial and would need USB/net to use set up wizard.

After the Setup Wizard connects to your Raven X, the details for your specific model will be displayed. If the incorrect model is displayed, your Raven X so the Wizard can attempt to connect again. Click *Next*.



3. Selecting Tasks

After the Wizard detects your Raven X, you will be offered a menu of Setup tasks. Choose the tasks you need from those displayed.



Figure 3-5: Setup Wizard : Task Menu

- **Update ALEOS Firmware:** Check the Sierra Wireless server for the latest ALEOS firmware.
- **Activate Modem:** Configure your Raven X to connect on the your cellular Network network.
- **Setup Data Link:** Change the network parameters for your modem, Data Link accounts ONLY. This optional step can be done as a part of the activation process or it can be done separately after the modem has been activated.
- **Test Modem Setup:** Verify your Raven X is properly configured and connecting on the your cellular Network network.
- **Setup a DUN Connection:** Create a Dial-Up Networking entry for local connection. This part of the setup is only needed if you will be using your Raven X to connect directly from a computer to the Internet or other network.

Click *Next* when you have selected your desired options.

Note: Based on your selections, you may not need to do all of the following Wizard steps.

Note: Follow this step, only if Update Aleos option has been selected in the task menu checkbox

On occasion, Sierra Wireless releases updates to the firmware for your modem. These updates can include new features as well as bug fixes. To make sure your modem is at optimal performance, it is recommended to *Check for Updates* and *Update Now* if an update is found.

Note: While checking for ALEOS Firmware updates, the Setup Wizard uses the Internet connection on your computer to connect to the Sierra Wireless server. Your Raven X is not connected to the wireless network for this process. If you are using Ethernet to activate your Product Name and need to remove the Ethernet cable from your modem to connect to your usual Internet connection to Check for Updates, be sure to reconnect the Raven X before you select Update Now.

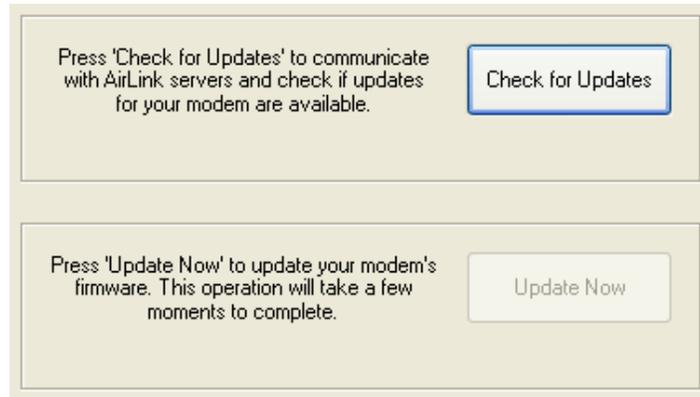


Figure 3-6: ALEOS Update

Tip: You can download current ALEOS firmware from the Sierra Wireless web site and install it separately.

Click *Next* when you are finished updating or if you choose not to update.

4. Activate Modem

The steps and data required to activate your Raven X on the your cellular Network network varies depending on the model. The Wizard is designed to support older models as well as those currently shipping

To configure or provision your modem to work on the your cellular Network network, you will need device activation information provided by your cellular Network.

Fill in the requested information and click *Next* on each screen.

- **MSL** - Master Subsidy Lock or Activation Code to unlock the internal hardware of your Raven X. This code is provided by your cellular Network.

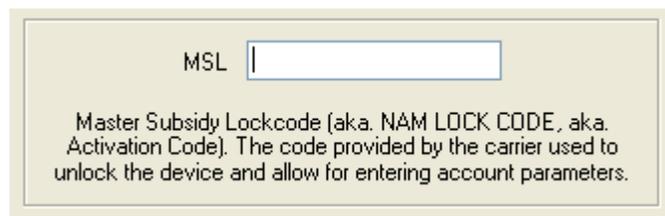


Figure 3-7: Setup Wizard : MSL

- **MDN** - The phone number of your cellular account.
- **MIN** or **MSID** - The identification number for your cellular account.

Caution: Your MDN and MIN or MSID may be different. You need to enter both numbers for activation to succeed.

MDN

Mobile Directory Number
The ten digit phone number provided by the carrier.
This is the number known to the outside world.

MIN/MSID

Mobile Identification Number/Mobile Subscriber ID
The ten digit number assigned by the carrier for
internal use only. May be the same as MDN.

Figure 3-8: Setup Wizard MDN and MIN/MSID

- **Static IP** - If you have a cellular account with a static IP address, check this box if it is displayed.

Caution: *If you do not have a static IP account and check the Static IP box, you may not be able to activate your Raven X or register on the your cellular Network network.*

The Wizard will check the signal strength of your Raven X (RSSI). Click Next to begin the activation process.

Note: The process may take a few minutes. Progress information will display across the bottom.

Ready to provision the modem using the values listed below. Please verify them and click 'Next' to proceed...

ESN	603F0987
MSL	123456
MDN	4151234567
MIN	5101234567

RSSI

Signal strength is sufficient to provision this modem.

Figure 3-9: Setup Wizard : Signal Test

Tip: *If you have low signal, you may encounter difficulties activating your modem. Try a different location or a different antenna to increase your signal if it is -90 or lower (yellow to red bar).*

5. Test Modem Setup

Your connection of your Raven X to the Internet is tested using the your cellular Network cellular network.

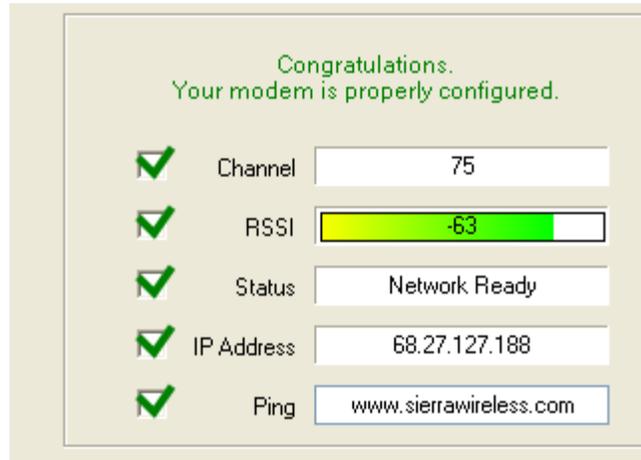


Figure 3-10: Setup Wizard: Connection Test

Green checks in the boxes indicate the tests were successful and your Raven X is functioning properly. At this point your modem is configured and activated to work on the your cellular Network network.

Note: These tests, depending on the strength of your signal, may take a few minutes. Initially, while the tests are being performed, there may be red Xs in the boxes. The Status line will give an indication of the progress of the connection process.

If Test Modem Settings shows the status of your modem is “Data Connection Failed - Waiting for Retry”, “No Service”, “No Carrier”, “Network Negotiation Failed”, “Network Authentication Failed”, “Modem Not Registered”, or the Reg Net light on the modem is not lit, double-check your device activation information and return to the Activate Modem step to reconfigure your Raven X.

6. Data Link Configuration

Note: These screens will only be displayed if Private Networking Data Link is selected.

Private Networking Data Link is a special account configuration that provides a more secure connection for your Raven X and often provides a static IP with authentication on an exclusive server. Consult your your cellular Network representative for details about Private Networking Data Link if it’s something you need for your account.

Before you start the configuration for Private Networking, Data Link, the connection to the network may be checked.

Caution: *Ensure the Raven X has been activated before you proceed with the Private Networking Data Link steps. Configuring Private Networking Data Link before the Raven X has been activated can prevent successful activation.*

Fill in the requested information and click *Next* on each screen.

- **Network Access Identifier (NAI)** - Fill in the fields for NAI. The NAI should be in the form of an email address.



Figure 3-11: Setup Wizard : Data Link - NAI

- The Primary Home Agent (**Primary HA**) and Secondary Home Agent (**Secondary HA**) are the network servers responsible for IP addressing and routing. Fill in the information, as applicable.

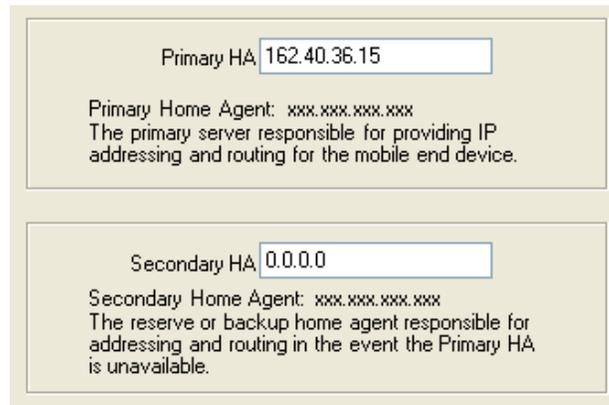


Figure 3-12: Setup Wizard : Primary and Secondary HA

- **HA SPI** and **AAA SPI**, required for authentication on the Primary and Secondary Home Agents, is provided by Alltel.

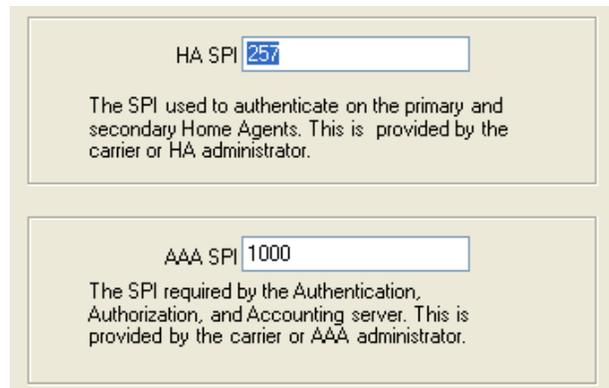


Figure 3-13: Setup Wizard : SPI

- **HA Shared Secret Password** is used for both Home Agent's. This may be filled in for you with a password created for your Raven X for the your cellular Network network.

- The **AAA/Vision Password** is required by the Authentication, Authorization and Accounting server. This may be filled in for you with default for your cellular Network.

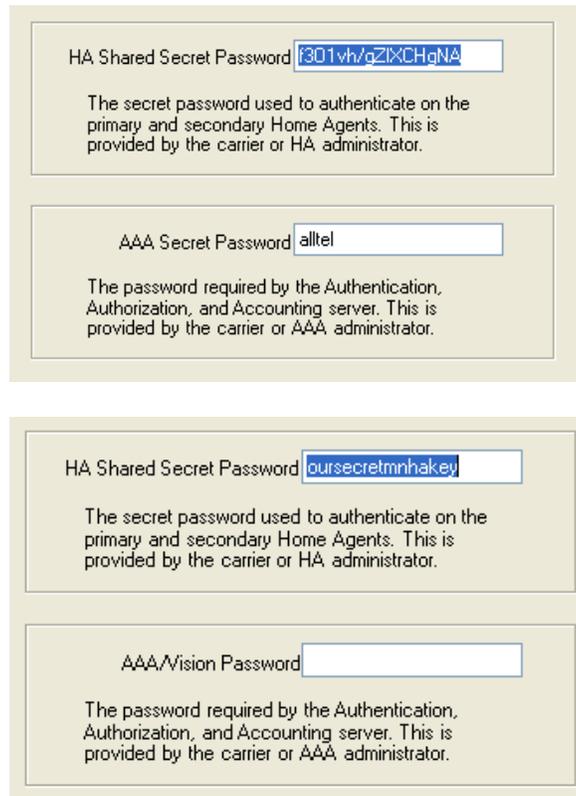


Figure 3-14: Setup Wizard : Passwords

When the Private Networking Data Link configuration is completed, the connection to the network will be tested again.

7. Optional: Setting up a DUN Connection

Note: Using DUN, the speed of the connection is the limited to the connection between the modem and the computer. This may be less than the total bandwidth available with EV-DO HSDPA.

Dial-up Networking (DUN) allows a computer or other device to use the serial port on a Raven X to connect to the Internet or private network just like an analog modem using a standard phone line. The Setup Wizard will install a driver for the Raven X and set up the connection between your computer and the Raven X. You will need to have administrator access on the computer for this section of the installation.

If you already have other modems installed on your computer, they will be listed on the Sierra Wireless AirLink Modem Installation screen. If you have other modems installed on your computer using the same serial port, they may conflict. As long as you do not intend to use them, you can Remove other modems using this menu.

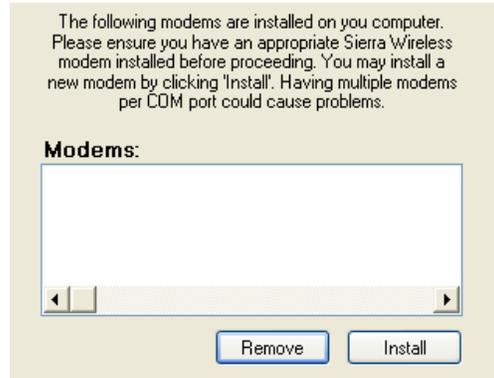


Figure 3-15: Setup Wizard : DUN driver

- a. Select *Install* to begin adding the driver for the Raven X to your computer.

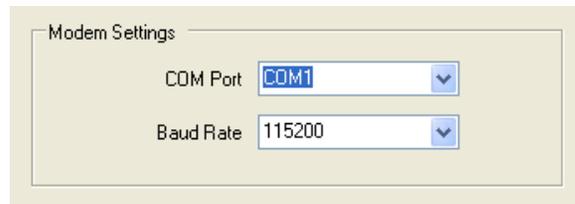


Figure 3-16: Setup Wizard : DUN settings

- b. The COM port and speed should match the settings of the Raven X and where it will be connected (default settings will be pre-entered).
- c. Select *Next* to begin the driver installation.
- d. You will see a confirmation box from Microsoft Windows to specify if you wish to install this driver on your computer. Select *Continue Anyway* to install the driver.
- e. When the driver is installed, you will return to the Modem installation screen. The Raven X should now be listed (in addition to any other modem installed on your computer).
- f. Click *Next* to continue to install the DUN configuration.



Figure 3-17: Setup Wizard : DUN connections

If you already have a DUN connection installed for a different modem, it will be listed on the Dial-up Networking Connection screen.

- g. Select *Add* to create a new connection for the Raven X.

The screenshot shows a 'Setup Wizard : DUN settings' window. It has two sections. The top section contains a 'Modem' dropdown menu with 'Sierra Wireless Modem (COM1@)' selected and a 'Phone Number' dropdown menu with '10001' selected. The bottom section contains two empty text input fields labeled 'User Name' and 'Password'.

Figure 3-18: Setup Wizard : DUN settings

- h. From the drop down menu, select *Sierra Wireless modem*.
- i. The defaults for the phone number, user name and password will already be entered.
- j. Select *Next* to begin the install.



Figure 3-19: Setup Wizard : DUN

At the completion of the DUN installation, you will return to the Dial-up Networking Connection screen. The AirLink modem should now be listed as a connection.

Your modem is now ready to be used as a DUN device for any applications on your computer needing a network connection. If you have DUN installed for more than one modem, you will need to specify in your application which DUN to use. Unless it is the only DUN, your Raven X may not be the one your computer sees as a default.

Activating Using AT Commands

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

Caution: *It is not possible to activate the Raven X 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. Set telnet timeout in to 20 minutes.

AT*TELNETTIMEOUT=20

2. Save the telnet setting.

AT&W

3. Verify ALEOS has established communication to the internal hardware.

ATI3

4. 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]

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

AT*NETPW=[password]

6. 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

7. Verify you are in Passthru mode.

AT!STATUS

8. Unlock the module.

AT~NAMLCK=MSL

9. Set the MDN and MSID.

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

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

AT~NAMVAL?0

11. Reset the module.**AT!RESET**

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

Private Networking

Note: Please activate the modem first, before following the Private Networking steps.

Note: These AT commands are only needed if your cellular account supports Private Networking. Not all of the parameters are required. Please check with your carrier, which parameters need to be set.

- 1. Put modem into passthru mode.**

AT\APASSTHRU

- 2. Verify you are in Passthru mode.**

AT!STATUS

- 3. Set the NAI.**

AT\$QCMIPNAI=[NAI],1

- 4. Set the IP address of the primary home agent.**

AT\$QCMIPPHA=[PHA_IP],1

- 5. Set the IP address of the secondary home agent.**

AT\$QCMIPSHA=[SHA_IP],1

- 6. Set the home agent shared secret key.**

AT\$QCMIPMHSS=oursecretmnhakey,1

- 7. Set the AAA shared secret key.**

AT\$QCMIPMASS=[AAA_Key],1

- 8. Enable reverse tunneling.**

AT\$QCMIPRT=1,1

- 9. Enter the SPI to authenticate on the primary and secondary Home Agents. This is provided by your carrier or HA administrator.**

AT\$QCMIPMHSPI

- 10. Enter the SPI required by the Authentication, Authorization and Accounting server. This is provided by your carrier or AAA administrator.**

AT\$QCMIPMASPI

4: Hardware Installation of the Raven X

- 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 X 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 X 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 X can withstand.*



Figure 4-1: Raven X Connectors

Note: This device is not intended for use within close proximity of the human body. Antenna installation should provide for at least a 20 CM separation from the operator.

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 X will work with most cellular antennas with a SMA connector. Connect the primary antenna or primary RF cable directly to the antenna connector on the back of the Raven X.

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) on the back of the Raven X.

Caution: *If you are not using a diversity antenna, you should disable the receive diversity option. In Ace Manager in the 1x/EV-DO group, configure *EVDODIVERSITY.*

Connecting to Power



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 X 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 X.

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 X, 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

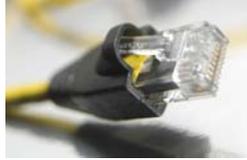


Figure 4-2: Ethernet

The Ethernet port of your Raven X 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 X is auto-sensing and will auto-detect the speed of the connecting device for 100baseTX or 10baseT. 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.



Figure 4-3: Serial

The serial port of your Raven X can be connected directly to most computers or other devices using a standard straight through cable. If you have a DCE device, you will need a null modem or null modem cable.

Indicator Lights

When solid, Raven X indicates a successful connection. When your Raven X is connected to power and an antenna, there is a specific pattern to the lights to indicate its operation mode.



Figure 4-4: Raven X 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 PinPoint modem on the remote network.
- **Service** - Indicates when the connection is EV-DO. Unlit indicates 1x.
- **Power** - Indicates the power adapter is connected and there is power getting to the Raven X.
- The **Reset button** (on the left side of the Raven X) 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 10 slowly, 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 X with your cellular Network.*

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.
- **PassThru mode** - Network and Signal LEDs will blink in tandem. The Activity LED will blink when transmitting or receiving data.
- **SOS** - The Network and Service Err or Service LEDs will blink alternate to each other.
- **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.
- **Invalid MAC Address or Ethernet Initiation Fail** - The Service LED will blink.

Mounting

The integrated mounting with keyhole screw mounts on the Raven X will allow you to secure your modem nearly anywhere, quickly and easily, without the need for a separate bracket.

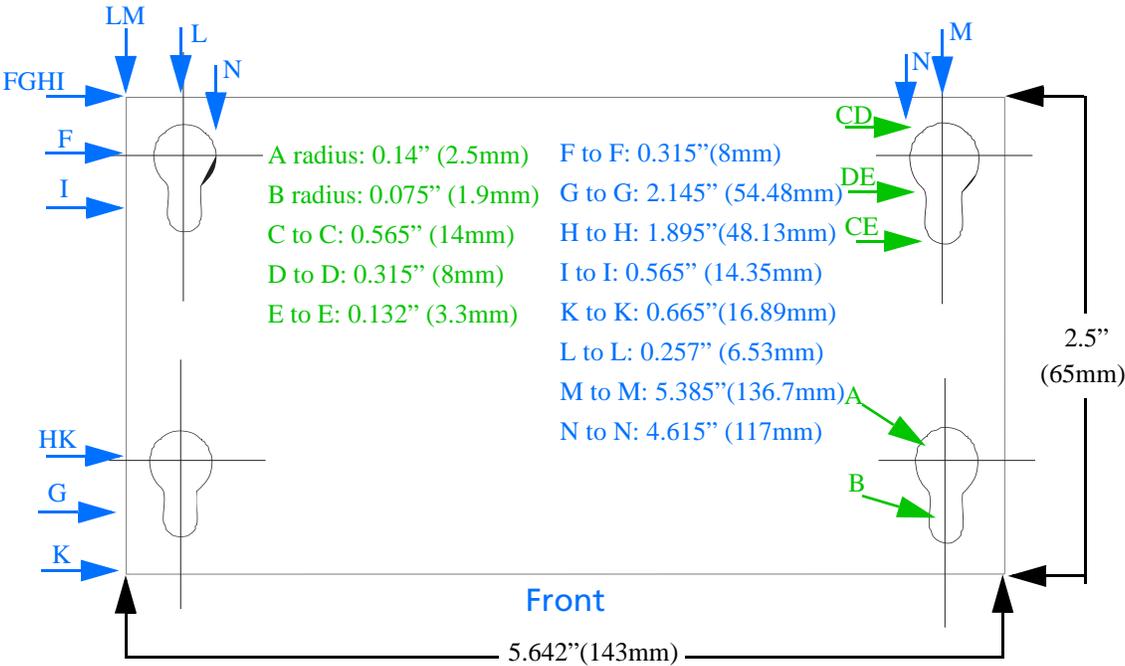


Figure 4-5: Diagram of the Raven X base



SIERRA
WIRELESS