AirLink PinPoint X

User Guide

SIERRA

WIRELESS

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 PinPoint X are used in a normal manner with a well-constructed network, the Sierra Wireless AirLink PinPoint 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 PinPoint X, or for failure of the Sierra Wireless AirLink PinPoint X to transmit or receive such data.

Safety and Hazards

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

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

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

The driver or operator of any vehicle should not operate the Sierra Wireless AirLink PinPoint 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
D459,303				

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5,568,483	5,600,754	5,657,420	5,659,569	5,710,7845,778,338

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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

1: Introduction to the PinPoint X

The PinPoint X is a compact, intelligent and fully-featured mobile communications platform with multiple peripheral connections including serial, Ethernet and USB. Expanded I/O functionality in a separate connector includes four digital inputs, four analog inputs and two relay outputs unleashing extensive remote instrumentation possibilities.

Its high-precision 50-channel GPS receiver coupled with the rich embedded intelligence provided by ALEOS™ technology make PinPoint X the perfect choice for a broad set of mobile enterprise, public safety, fleet management and AVL solutions.

Figure 1-1: Sierra Wireless AirLink PinPoint 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
- Real-Time GPS Reporting
- GPS Store and Forward
- 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 PinPoint X activity which you can then send to Sierra Wireless support or erase the current configuration completely.
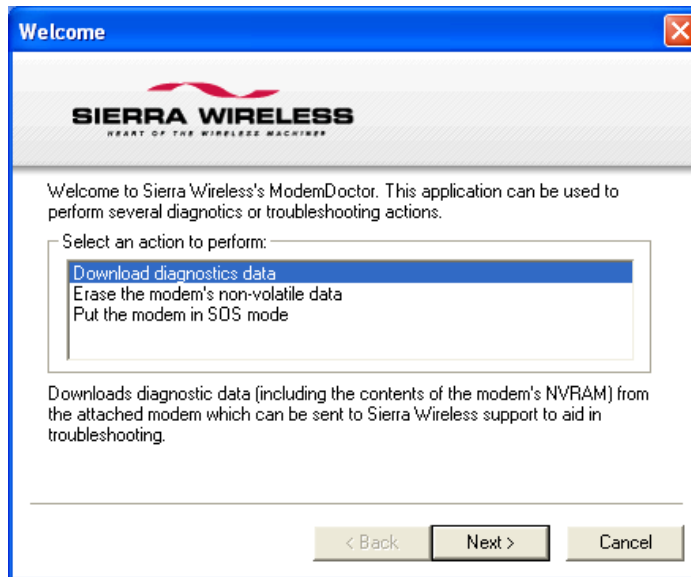

Figure 1-6: Modem Doctor

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. Passsword is the fault password.

3. Press Erase. The modem will then reset.

Note: If you erase the fatory defaults will be restored. USBnet is the factory default port.
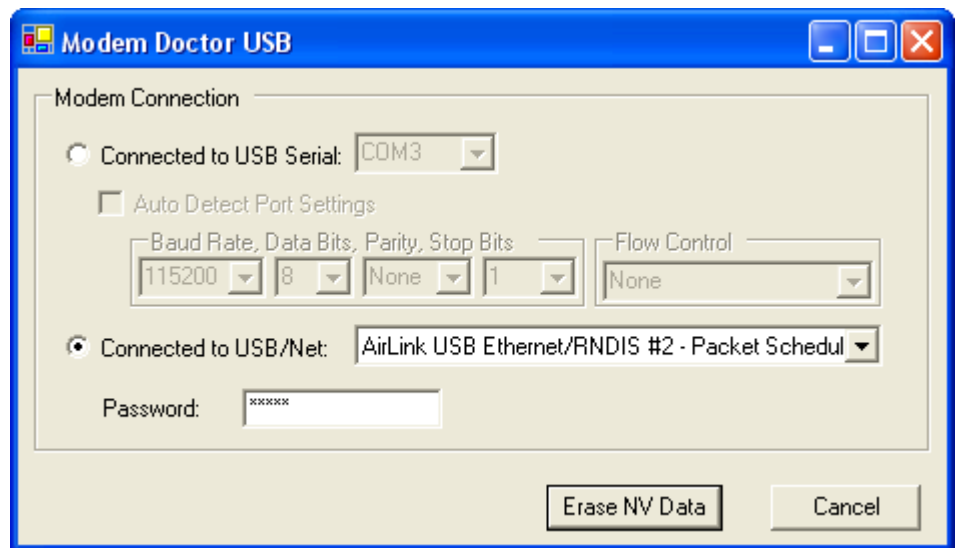
Figure 1-7: Modem Doctor: USB connection

Connecting to your cellular provider

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

Steps of a connection:

1. When your PinPoint X is powered on, it automatically searches for cellular service using CDMA-based cellular technology.
2. Your PinPoint X 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 PinPoint X 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 PinPoint X.

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

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

If you need to contact your PinPoint X, a device connected to the PinPoint X, or a host system using the PinPoint 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 PinPoint X 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).*

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 PinPoint X 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 PinPoint X to a USB or a Ethernet (RJ45) on a computer. When connected to a USB or Ethernet port, the PinPoint X behaves like a network card.

USB

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

Virtual serial port

The PinPoint 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.
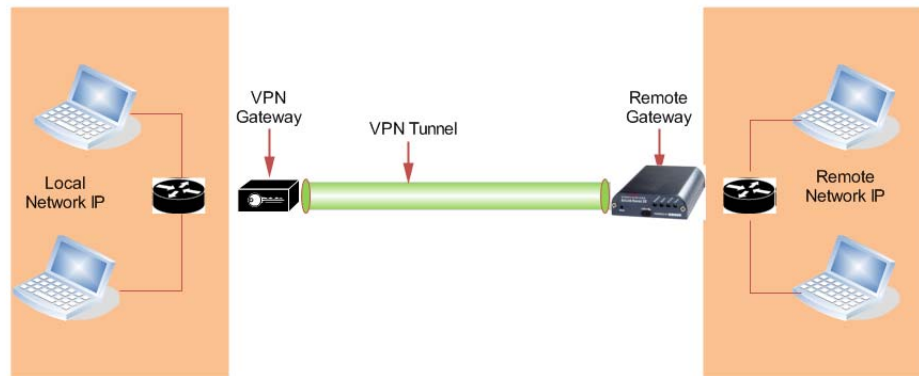
Figure 1-8: IPSec Architecture

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 PinPoint X modem comes with the following software:

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

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

Documentation

This *PinPoint X User Guide* describes how to:

- Install the PinPoint X hardware.
- Connect the radio antennas.
- Connect a notebook computer and other input/output (I/O) devices.
- Interpret the LEDs on the PinPoint 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

Features and Benefits

- Embedded Intelligence
- Low Power Consumption
- High-Speed Processor
- High-Speed 2-way Data
- Multiple Interfaces, I/O Port
- High-Sensitivity GPS Receiver
- Persistent Network Connectivity
- Remote Management and Configuration
- Extensive Vehicle Telemetry
- Integrated with 3rd Party Tracking Applications
- Rugged for Extreme Environments

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) 316/340 mA
- Idle 166 mA
- Low Power Mode 54 mA
- Input Voltage 9 - 28V DC

Standards/Approvals

- Carrier specific approvals
- FCC
- Industry Canada

Host Interfaces

- Ethernet: 10/100 Mbps RJ-45
- USB Type B
- RS-232: DB-9 DCE (300-230400 baud)
- I/O: 4 Digital, 4 Analog, 2 Relay
- Antenna Connection:
    - Primary Cellular - 50 Ohm TNC
    - Receive Diversity - 50 Ohm SMA
    - GPS - 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

- 162mm x 40mm x 109mm
- 612 grams

Application Interfaces

- TCP/IP, UDP/IP, DHCP, HTTP, SNMP, SMTP, SMS, MSCI, NMEA, TAIP, GPS, and more

LED Indicators

- Network
- Signal
- Activity
- GPS
- Power

Interface Port Pin-Outs

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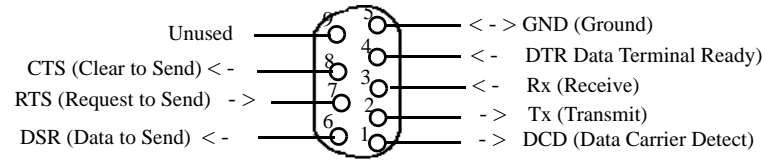
Figure 2-1: Serial Port Diagram: Female DB-9 DCE (not to scale)

Note: The Pin-Out diagram shows external view looking at PinPoint X connector in front face-plate of device. Pin 1 is lower right.
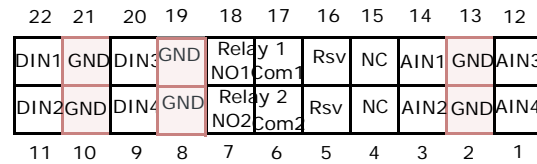
Figure 2-2: PinPoint X I/O Port Diagram (not to scale)

1. Analog Input 4	**12.** Analog Input 3
2. Analog Ground	**13.** Analog Ground
3. Analog Input 2	**14.** Analog Input 1
4. No Connect	**15.** No Connect
5. Reserved for future use	**16.** Reserved for future use
6. Com2 (for use with #7)	**17.** Com1 (for use with #18)
7. Normal Open Relay	**18.** Normal Open Relay
8. GND	**19.** GND
9. Digital Input 4	**20.** Digital Input 3
10. Ground	**21.** Ground
11. Digital Input 2	**22.** Digital Input 1

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

Power Connector

Not Used | 4 | 3 | Ignition Sense (white)

Ground (black) | 2 | 1 | Power (red)

Figure 2-3: Power Connector (not to scale)

3: Activating your PinPoint X on your cellular provider

- Activating Using AT Commands

This chapter provides step-by-step directions for activating your PinPoint X on your cellular provider's network.
"

Activating Using AT Commands

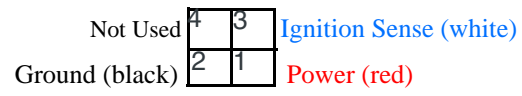An alternate method to configure and activate your PinPoint X is by using AT commands sent directly to the modem with a terminal application. (Refer to the troubleshooting section). This method is recommended only in situations where the Setup Wizard is not available and/or when the configuration for the PinPoint X is unusual.

Caution: *It is not possible to activate the PinPoint 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. 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.

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 PinPoint X **4**

- 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 PinPoint 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 PinPoint 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 PinPoint X can withstand.*

Figure 4-1: PinPoint 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 PinPoint X will work with most cellular antennas with a TNC or SMA (diversity only) connectors. Connect the primary antenna or primary RF cable directly to the antenna connector on the back of the PinPoint 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 PinPoint 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.*

GPS Antenna

Your PinPoint X will work with most standard active GPS antennas. Connect the GPS antenna or cable directly to the threaded SMA connector.

Mount the GPS Antenna in the vehicle. The less the cable is wrapped and bound together, the better it will perform. Place it on the roof, or on the dash, or rear panel where it has a good view of the sky (greater than a 90 angle view of the sky).

There are three options for antenna mounts:
*   Magnetic roof-mount
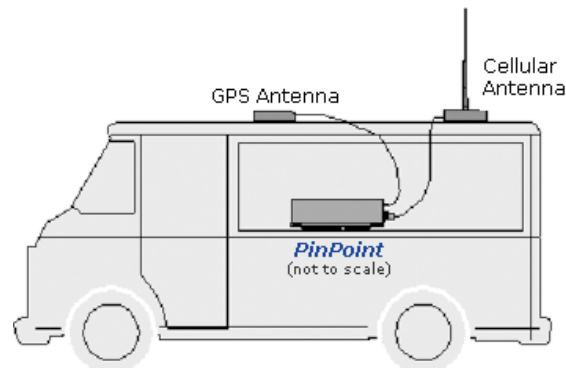*   Through glass-mount
*   Permanent mount

Figure 4-2: GPS Antenna Placement for a Vehicle

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 ^{0}C.*

Your PinPoint 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 PinPoint 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.

The PinPoint X has an internal polysilicon circuit breaker that opens at 0.5 to 1.0 amps of current.

If you wish to use the Standby Ignition Sense (SISE) feature of your PinPoint X, the white wire of the three wire DC power cable should be used to connect to your ignition. When SISE is enabled in the modem and the ignition sense connector is wired to your vehicle, the ignition sense will provide a link to the modem to enable it to enter a low-power, standby mode when your vehicle is turned off and power up more quickly when the ignition is started.
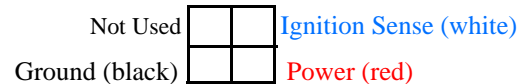
Not Used | | | Ignition Sense (white)

Ground (black) | | | Power (red)

Figure 4-3: Ignition Sense power connector

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 4-4: Ethernet

The Ethernet port of your PinPoint 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 PinPoint 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 4-5: Serial

The serial port of your PinPoint 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.

Figure 4-6: USB

Your PinPoint X'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 PinPoint X 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 PinPoint X has a standard B connector.

Figure 4-7: I/O

Your PinPoint X also has an I/O port with digital inputs, analog inputs, and relay outputs which can be connected to external devices.

The I/O port can use an optional I/O harness available through Sierra Wireless.

Indicator Lights

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

Figure 4-8: PinPoint 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.
- **GPS** - Indicates a GPS fix. When lit, the PinPoint X has GPS coordinates to report.
- **Power** - Indicates the power adapter is connected and there is power getting to the PinPoint X.
- The **Reset button** (on the left side of the PinPoint 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 PinPoint X 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.
- **PassThru mode** - Network and Signal LEDs will blink in tandem. The Activity LED will blink when transmitting or receiving data.
- **SOS** - The Network Channel and Service Err or Service LEDs will blink alternate to each other.
- **Low Power** - All LEDs will be off except the power LED which will blink every 3 seconds.
- **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 PinPoint X will allow you to secure your modem nearly anywhere, quickly and easily, without the need for a separate bracket.
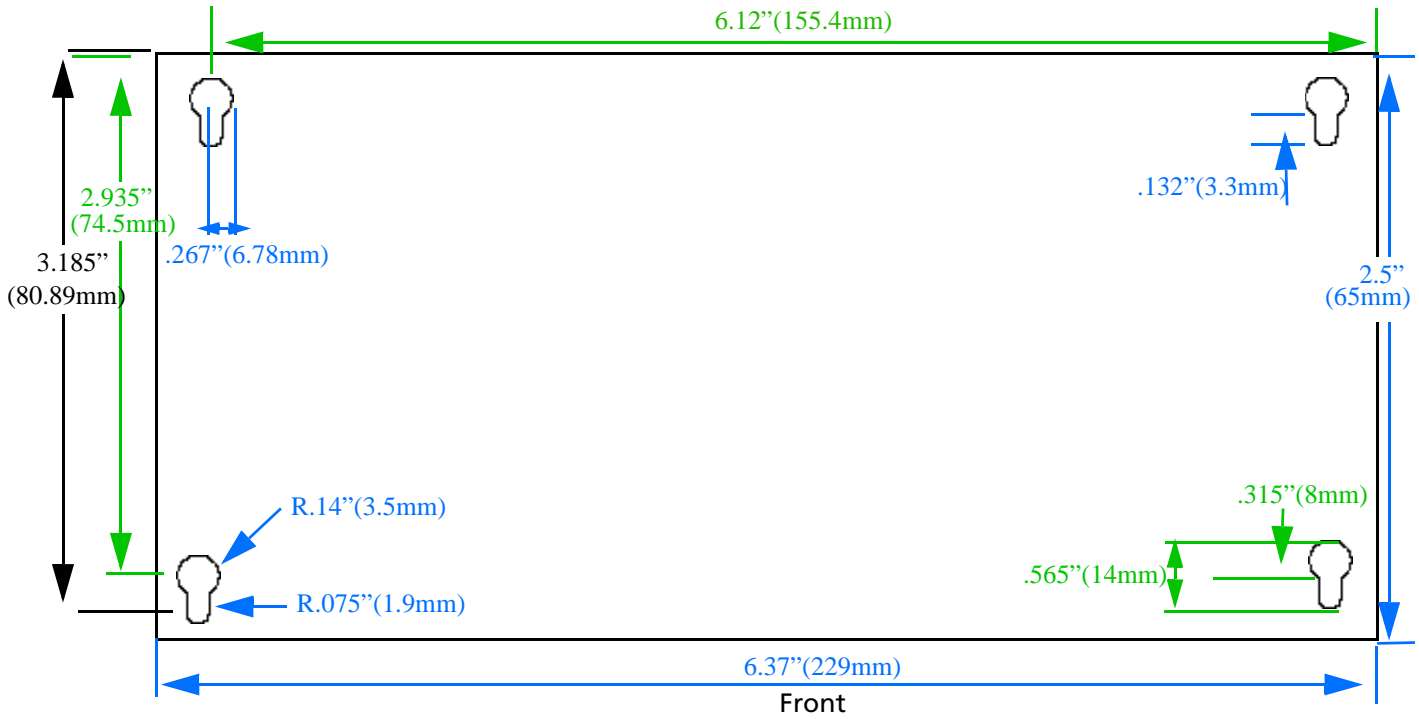

Figure 4-9: Diagram of the PinPoint X base

5: Inputs, Relay Outputs, and Power Status

- Capturing External Events
- Power Modes and Information

The PinPoint X has special features for use in a mobile environment. The PinPoint X can be configured to monitor the input, respond to specific types of events, and even trigger a digital output. The PinPoint X can also be configured to change its power mode in order to conserve power. These features can be configured to your needs.

Capturing External Events

The PinPoint X is equipped with an I/O port interface which includes 4 digital inputs, 4 analog inputs, and 2 relay outputs. These may be connected to sensors and switches to monitor vehicle status and remotely control equipment.

Figure 5-1: PinPoint X I/O port

Analog Inputs

The analog inputs will report a specific voltage ranging from 0 to 30 in increments of 0.03 volts. This allows a fine degree of monitoring for a scaling device.

- Monitoring a voltage or power usage.
- Monitoring an oscilloscope.
- Monitoring temperature.
- Monitoring an incremental gauge.
- Monitoring an internal fan.
- Monitoring a vehicle payload.
- Monitoring the elevation of a tow bar.
- Monitoring a vehicle's battery use.
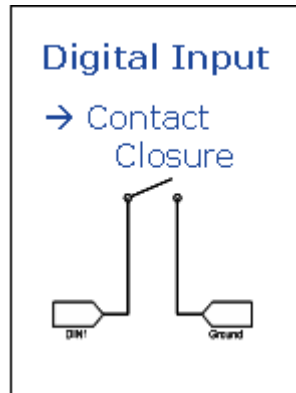
Digital Inputs

Figure 5-2: Digital Input Contact Closure

By measuring contact closures on switches, the digital inputs can report a simple open or closed state. Each of the four digital inputs 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".

• 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.

Relay Outputs

As an electronic switch which can be opened or closed (Normally Open relay), a relay can be used to transmit an action to another device by signalling to that other device an "on" or "off". As a Normally Open relay, the circuit of the relay is disconnected (open) unless it is active. When the relay is active, the circuit is connected (closed).

• Setting off an alarm or siren.

• Triggering a process to start on another device.

• Opening or closing a valve or switch.

• Locking or unlocking a door.

• Turning a light on or off.

• Opening the vehicle's trunk or doors.

Tip: *The relays are only capable of switching small loads. If you need a stronger signal, such as to open a door lock, you can connect the PinPoint X's relay to a stronger solenoid relay which has enough power to cause the desired effect.*

Connecting devices to the I/O Port

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

You can purchase an optional I/O Wiring Harness for the PinPoint X which can be used to attach devices to the I/O port. The harness has pre-wired leads to allow you to customize your own connections. The wires are paired and color-coded.
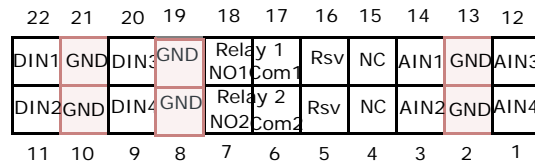

Figure 5-3: PinPoint X I/O Port Diagram (not to scale)

Table 5-1: PinPoint X I/O Port Pin-out

1.	Analog Input 4	**12.**	Analog Input 3
2.	Analog Ground	**13.**	Analog Ground
3.	Analog Input 2	**14.**	Analog Input 1
4.	No Connect	**15.**	No Connect
5.	Reserved for future use	**16.**	Reserved for future use
6.	Com2 (for use with #7)	**17.**	Com1 (for use with #18)
7.	Normal Open Relay	**18.**	Normal Open Relay
8.	GND	**19.**	GND
9.	Digital Input 4	**20.**	Digital Input 3
10.	Ground	**21.**	Ground
11.	Digital Input 2	**22.**	Digital Input 1

Figure 5-4: I/O Wiring Harness, AirLink part number 120-140-1014

Locking Tab

22	21	20	19	18	17	16	15	14	13	12
O/W	Bl/Br	O/Bl	none	G/Bl	G/W	none	none	V/W	Bl/W	V/Bl
O/G	Bl/G	O/R	none	Y/Bl	Y/W	none	none	V/G	Bl/R	V/R
11	10	9	8	7	6	5	4	3	2	1

Figure 5-5: Color Corospondance to connection points

Table 5-2: Wiring Color Corospondance

1. Violet/Red	12. Violet/Black
2. Black/Red	13. Black/White
3. Violet/Green	14. Violet/White
4. none	15. none
5. none	16. none
6. Yellow/White	17. Green/White
7. Yellow/Black	18. Green/Black
8. none	19. none
9. Orange/Red	20. Orange/Black
10. Black/Green	21. Black/Brown
11. Orange/Green	22. Orange/White

Note: The Pin-Out diagram shows external view looking at PinPoint X connector in front face-plate of device. Pin 1 is lower right.

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

Analog Inputs

Connect a wiring lead to an analog input (AIN) at 1, 3, 12 or 14, and the nearest ground at 2 or 13.

Digital Inputs

Connect a wiring lead to a digital input (DIN) at 9, 11, 20, or 22, and the nearest ground at 8, 10, 19, or 21, as applicable.

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

Relay Outputs

Connect the circuit leads to one of the two relay pairs at 6 and 7 or at 17 and 18.

Monitoring and Setting the I/O

You can monitor the status of both the digital and analog inputs using ACEmanager or AT Commands and also with special reports sent using RAP. In ACEmanager, select the I/O group.

You can monitor the status of the relays or set them using ACEmanager, I/O group, or AT Commands.

Getting Immediate Reports Using RAP

You can set up the PinPoint X to report immediately report the state of an input when it changes by using *PPFLUSHONEVT. You will also need *PPINPUTEVT, input event reports, enabled and a server configured for your RAP reports. These settings are in the PinPoint group in ACEmanager.

Power Modes and Information

The PinPoint X can be configured to switch power modes in response to specific events, such as when the voltage to the modem drops below a configured threshold or when the DTR changes, in order to conserve a vehicle's battery life. The stand-by state, low-power mode, will prevent the modem from draining the battery while allowing the modem to quickly power up to regular operation when it is needed.

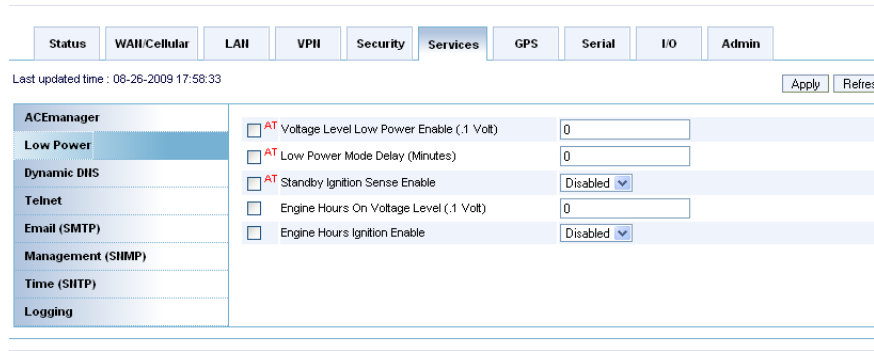You can configure Low Power mode using ACEmanager.

Figure 5-6: ACEmanager : Low Power

Wiring the PinPoint X for

When the Standby Ignition Sense is enabled and the ignition sense connector is wired to your vehicle, the ignition sense will provide a link to the modem to enable it to enter a low-power using standby mode.

The white wire of the three wire connector should be used to connect to your ignition.
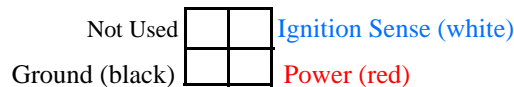

Not Used — Ignition Sense (white)

Ground (black) — Power (red)

Figure 5-7: Ignition Sense Power Connector

Power Effect on Modem State

Once the transition from powered on to standby, low-power mode starts, the modem will change state to AT mode. This results in the current mode being gracefully terminated. For the brief period when the modem is preparing for low-power mode, the modem will remain in AT mode. At that time, it won't auto-answer, ATD will fail, etc. Once low-power mode is entered, the modem will then discard any data received on the host port.

When the modem is woken from low-power mode, the same behavior occurs as upon power on. The modem starts in AT mode, and then after 5 seconds will enter the default start-up mode as it is configured for the modem.

Monitoring Power-In Voltage

The current status of the power-in voltage can be monitored in ACEmanager.

6: Regulatory Information

Federal Communications Commission Notice (FCC United States)

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

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

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

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

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/television technician for help
- This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions:

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

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

Industry Canada

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

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

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes:

1. ce dispositif peut ne pas causer l'interférence nocive, et

2. ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

Antenna Considerations

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

*   RSS-102 "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)"

*   RSS-129 "800 Mhz Dual-Mode CDMA Cellular Telephones"

*   RSS-132e "Cellular Telephones Employing New Technologies Operating in the Bands 824-849 Mhz and 869-894 Mhz"

*   RSS-133 r1 "2 GHz Personal Communications Services"

RF Exposure

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

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

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

EU

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

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

C E 0682

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

Sierra Wireless

39677 Eureka Drive

Newark, CA

USA   94560

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

WEEE Notice

If you purchased PinPoint X in Europe, please return it to your dealer or supplier at the end of its life. WEEE products may be recognised by their wheeled bin label on the product label.