

PinPoint CDMA

User Guide

Version 1.0

AirLink Communications, Inc.

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WARNING

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter and must not have a gain exceeding 2 dBi

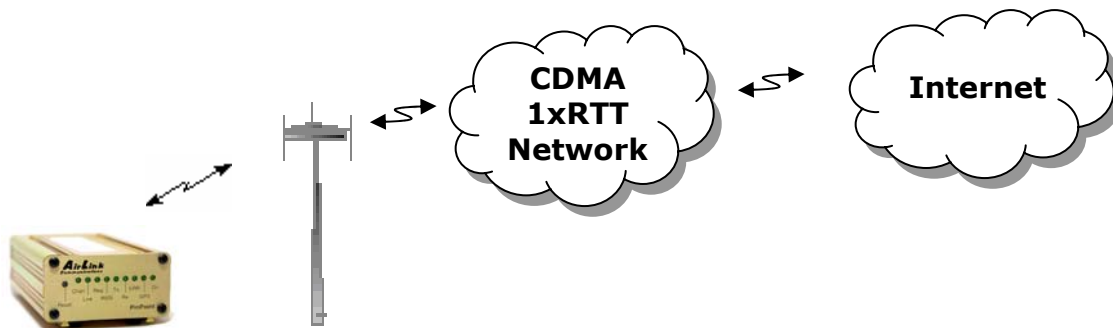
1 Introduction

This manual covers information for first-time setup and configuration of your AirLink PinPoint CDMA modem, as well as technical details on this modem. The PinPoint is a combination of a CDMA modem and GPS tracking unit. The CDMA modem allows the PinPoint to report its GPS location to the AirLink Tracking System main console or to custom applications. The modem may be remotely configured to report at different time or distance parameters. The PinPoint is also capable of having its firmware upgraded wirelessly, rendering it unnecessary to physically connect to the modem to upgrade it.

The AirLink CDMA modem is designed to operate in CDMA networks. Two services are available in the CDMA networks: 1xRTT, a packet switched connection, and IS-95B, a circuit switched connection. The PinPoint CDMA primarily uses 1xRTT connections to transmit and receive data.

1.1 CDMA2000 1X

The AirLink CDMA modem provides data capability into the packet service offered with CDMA2000 1X (1xRTT) technology. CDMA2000 1X offers higher speed data operations than are available with IS-95 service. IS-95 is limited to 14.4 kbps. 1X service uses a fundamental channel at 9600 bps and can add supplemental channels when needed to boost speed to as high as 153.6 kbps on the downlink (network to modem) and 76.8 kbps on the uplink (modem to network).



1.2 Product Overview

The AirLink PinPoint CDMA is a rugged, full duplex 1xRTT CDMA modem that provides wireless transport capabilities for fixed and mobile applications. CDMA is an efficient and secure wireless technology that works well for fixed or mobile applications.

The PinPoint's rugged form factor is ideal for industrial and commercial applications that require real-time communications. The PinPoint provides wireless data communications for a variety of applications, such as fleet management, public safety, ambulance, traffic control, home delivery, transit arrival systems and more.



Front of PinPoint 9612



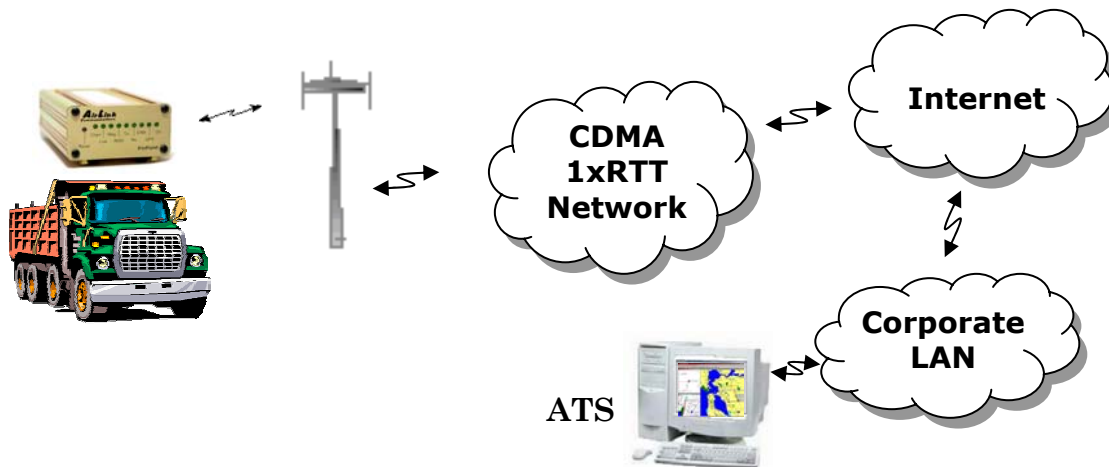
Back of PinPoint 9612

2 Network Connection

The AirLink PinPoint CDMA will be capable of offering multiple network connection options. As of January 2003, the PinPoint CDMA will only use 1xRTT. Circuit switched and SMS will follow later.

2.1 Internet (TCP/IP) Connections via 1xRTT

When using the PinPoint CDMA, remote access to is done via a PPP (TCP/IP) connection to the CDMA network. The CDMA carrier actually provides Internet connectivity, and, therefore, it becomes the ISP for that session. Applications such as web browsing, email, FTP, etc should work as they would normally.



NOTE: Connections to Internet are provided by carrier.

Corporate network connections are unique and not provided as part of service.

3 Windows 2000 Setup for 1xRTT Communications

This section describes the setup of Windows to enable communications over the CDMA 1xRTT network. Windows 2000 is used as the example because it the one Windows OS revision that carries the most similarity to both Windows 98 as well as WinXP.

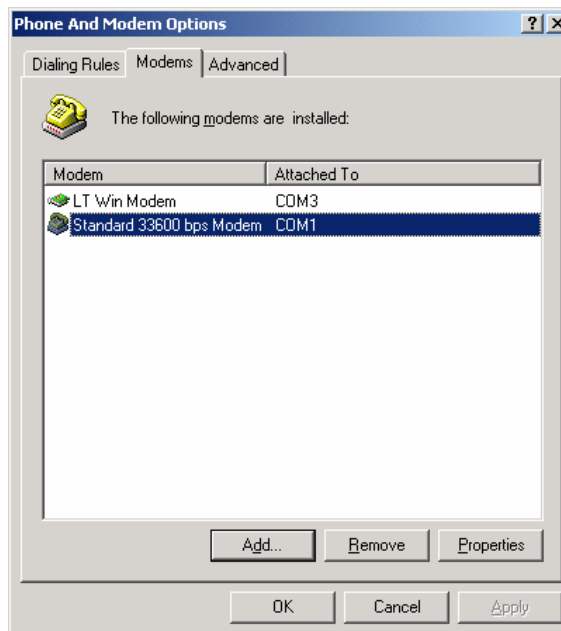
3.1 Windows 2000 Modem Configuration

3.1.1 Prepare the Modem for Installation

- Connect the modem to the computer with the DB9 cable
- Plug in the AC adapter, connect the antenna(s) and power on the modem
- Obtain administrator privileges on your system.
If you do not know how, check with your system administrator

3.1.2 Adding the Modem

- Select Start> Settings> Control Pane> Phone and Modems Options
- You should see be in the Phone And Modem Options dialog box. Select the Modems tab
- Select Add.
- Check "Don't detect my modem..." and select Next
- Select (Standard Modem Types) from the Manufacturers and then select Standard 33600 bps Modem under "Models."



- Select Next
- Check Selected Ports, then select the COM port the modem is connected to and select Next

- Select Finish to exit the "Install New Modem" wizard
- You should see the modem added to the correct COM port
- To set the modem speed on the driver, highlight the modem driver and select Properties.
- Ensure the "Maximum Port Speed" is set to 115200, which is the default value of the PinPoint CDMA.
- Select OK to exit.

3.2 Windows 2000 PPP Configuration

This section describes how to setup a Windows 2000 Professional Dial-up connection using an AirLink PinPoint CDMA Modem. The connection uses PPP to communicate to the modem and gain access the Internet.

Before you start, you need the following:

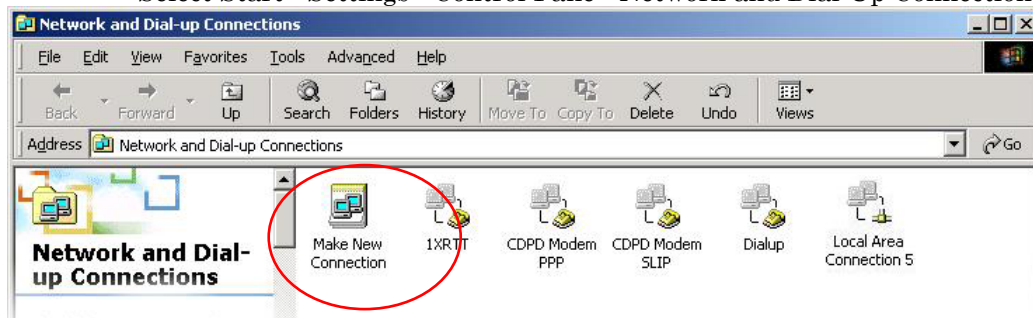
- **Administrator** privileges to the computer you are configuring or access granted by an administrator on the network to add/remove devices to your computer.
- A 1xRTT user account, password, and access number (obtained from your CDMA Service Provider).
- Windows COM Port and modem set up for a Standard 33600 Modem (See previous sections)
- No other program is to be running that is using the serial (COM) port that your modem is attached to.

NOTE: If you have an existing LAN connection, then this dial-up connection to your CDMA modem may **interfere** with your existing connection. Once the connection is initiated it will take over as the "default route" for the majority of your LAN traffic, specifically Internet access. It's recommended to disconnect your LAN connection before using a PPP connection with your AirLink modem.

If however you want the two connections to co-exist, you can de-select "Use default gateway on remote network" (described later) and you can use the **route** command to setup routing through the modem properly. Go to a Command Prompt and type **route /?** to find out more, or talk to your administrator.

Now that the modem has been added, the Dial-up connection must be created.

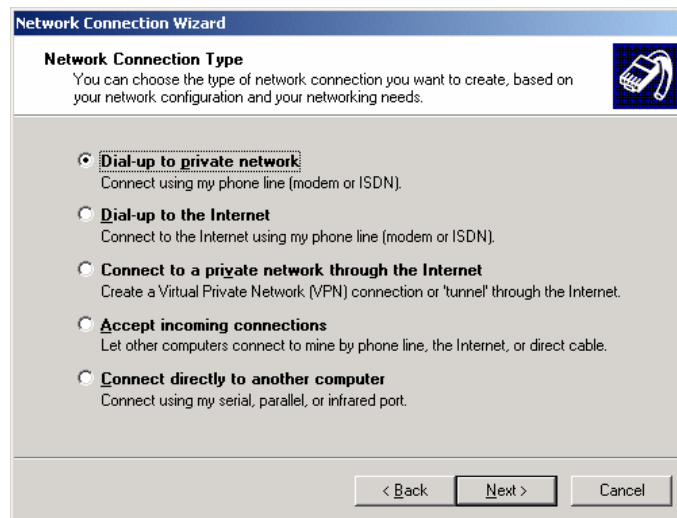
- Select Start> Settings> Control Pane> Network and Dial-Up Connections



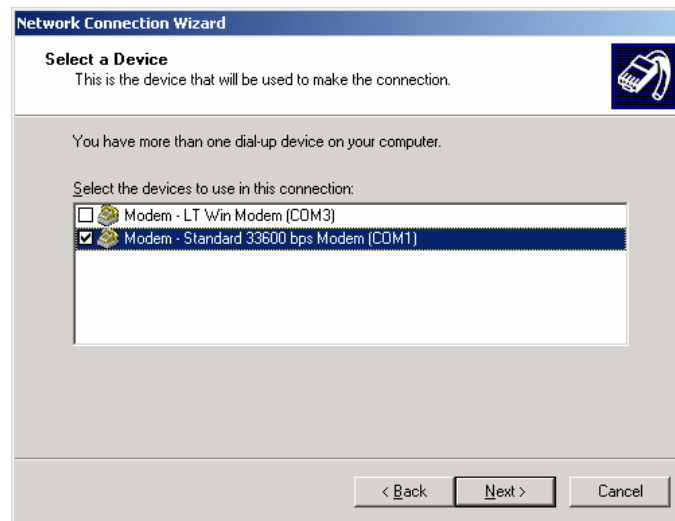
- Double-click on "Make New Connection".
- When the Connection Wizard starts - select **Next**



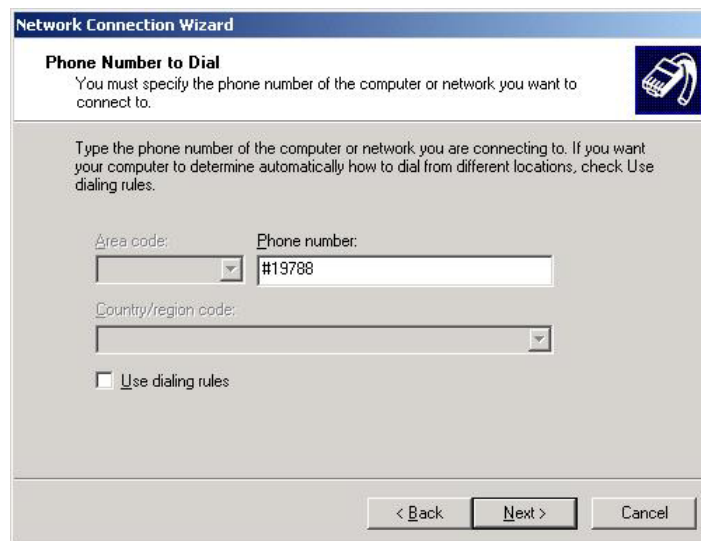
Select Dial-up to Private Network



- If the modem is installed already, check the box next to “**Modem – Standard 33600bps**”



- Select **Next**
- Enter the 1xRTT Access number (**#19788**)

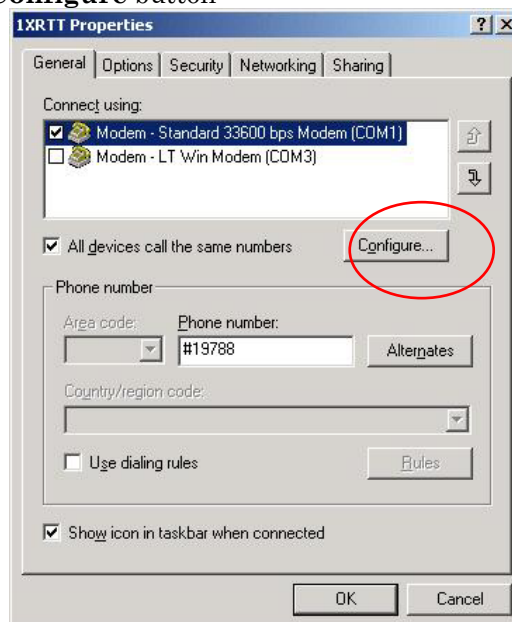


- Select **Next**
- Select whether you want **all users** or just yourself to have access to this connection.
- Select **Next**
- Enter **1xRTT** for the name of the connection. If you want to add an icon for this connection on the desktop, check "**Add a shortcut to my desktop**"
- Select **Finish** to exit the "Network Connection Wizard."
- The "**Connect 1xRTT**" dialog box should come up next.
- Enter the User name and Password provided by the CDMA Service Provider
- Select **Properties**



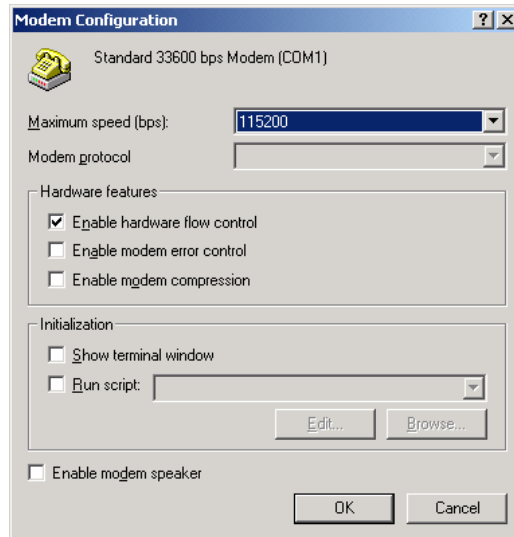
You now need to change some settings so that you can browse websites, send and receive email, etc.

- Examine the **General** Tab settings
- “**Connect Using**” should have a check next to “**Modem – Standard 33600bps Modem (COMx)**”
- “**Phone number**” (The 1xRTT Access Number provided by the carrier)
- Uncheck “**Use dialing rules**” and check “**Show icon in taskbar when connected**”
- Select the **Configure** button

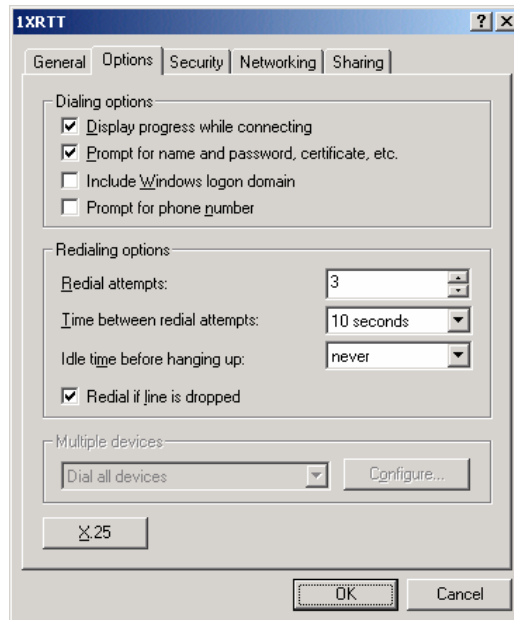


- Maximum Speed: 115200
- Check Enable hardware flow control

- Uncheck all other options
- Select OK



- Select **Options** tab

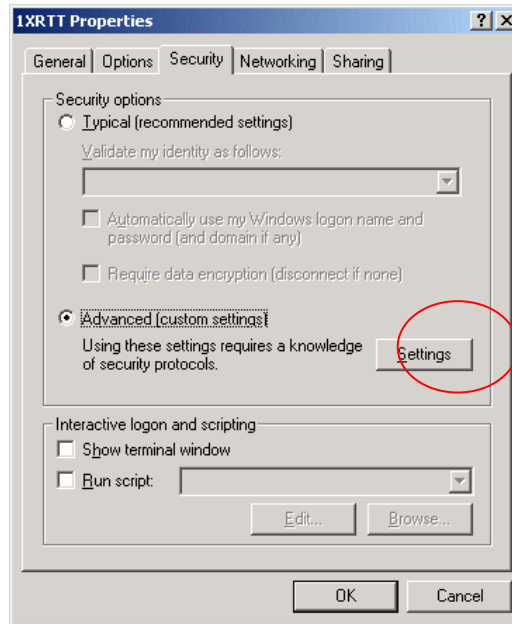


- Check or Uncheck options at your application requires.
- Set the Redialing options that will meet your needs.

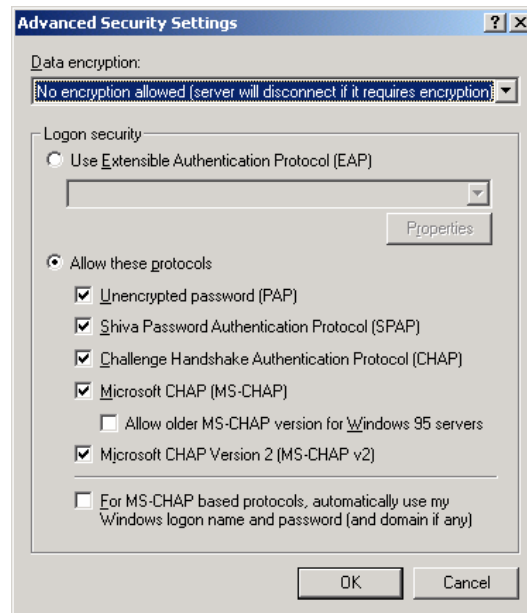
*Note: The options shown here should work for most applications.
Consult your Network Administrator for more help on connection options.*

- Select **Security** tab

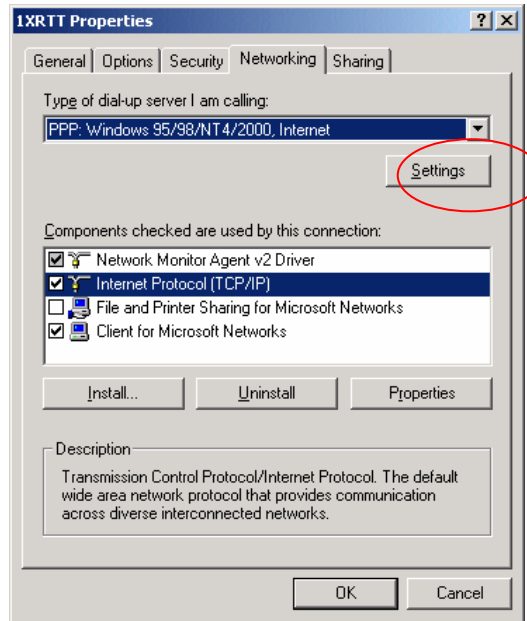
- Select “Advanced (custom settings)”



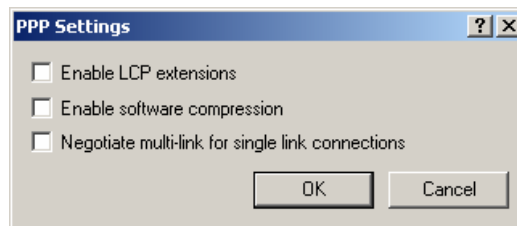
- Set Data encryption to "No encryption (server will disconnect if it requires encryption)"
- For Logon Security check "Allow these protocols"
- Unencrypted password (PAP)
- Shiva Password Authentication Protocol (SPAP)
- Challenge Handshake Authentication Protocol (CHAP)
- Microsoft CHAP (MS-CHAP) (Do not check "Allow older MS-CHAP for W95 servers")
- Microsoft CHAP Version 2 (MS-CHAP v2)
- Select OK



- Select Networking tab
- Type of dial-up server should show “PPP: Windows 95/98/NT 4/2000, Internet”

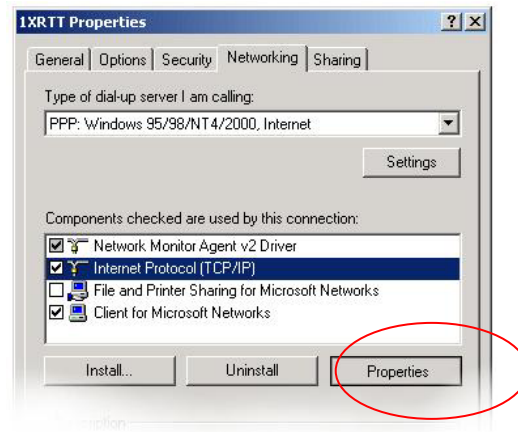


- Select **Settings** button
- Uncheck **Enable LCP extensions**, **Enable Software Compression** and **Negotiate multi-link for single link connections**



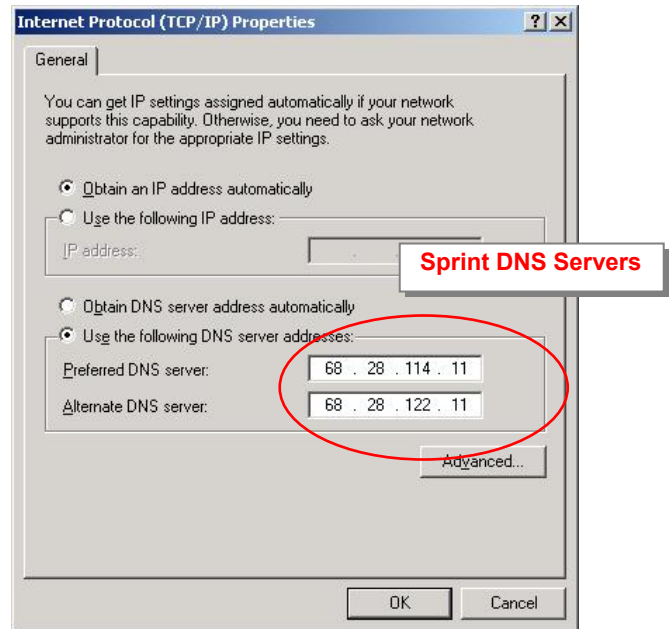
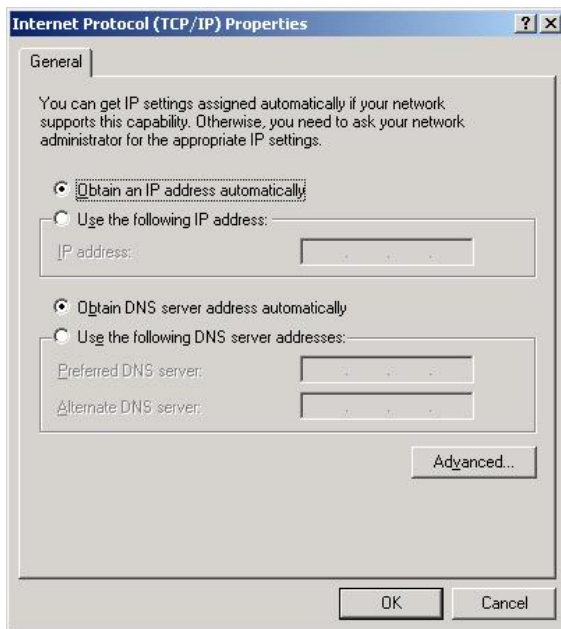
- Select **OK**

- In the Components section of the Networking tab, **Internet Protocol (TCP/IP)** should be checked
- Select Internet Protocol (TCP/IP) and then select Properties

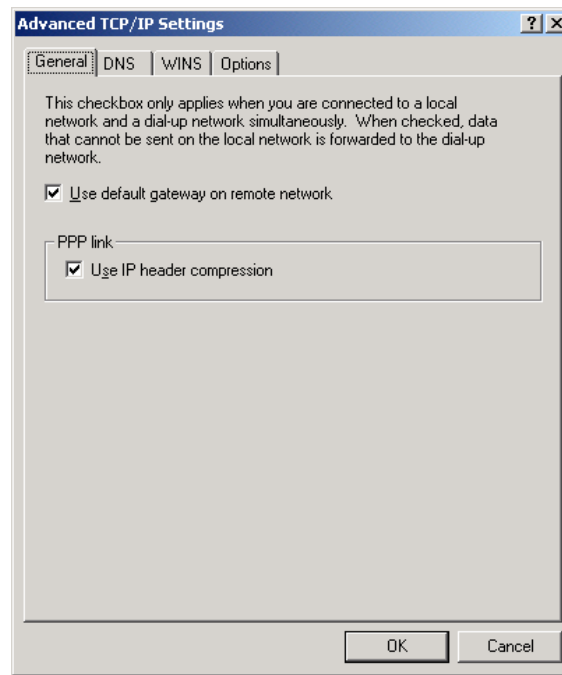


- "Obtain an IP address automatically" should be checked.

Normally, DNS server addresses are provided during PPP negotiations. If it is necessary for you to enter DNS entries, check/enable "Use the following DNS server addresses" and put in the proper addresses. (See your carrier or network admin for details)



- Select the **Advanced** button
- Check **Use default gateway on remote network** and **Use IP header compression**

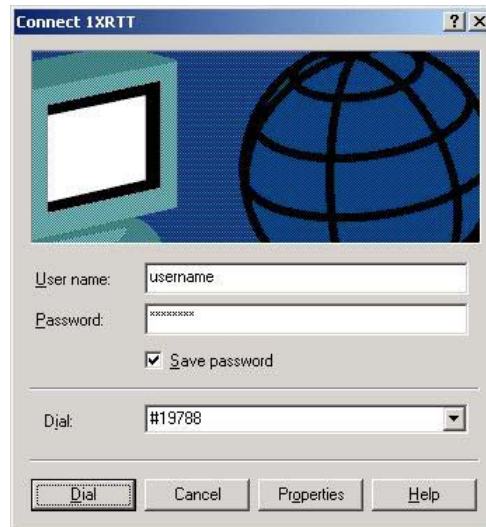


- Select **OK**
- Leave the options in the Sharing tab unchecked
- Select **OK**

3.3 Making a 1xRTT Data Connection

This section shows what to expect when dialing a 1xRTT data connection.

- Go to Network and Dial-Up Connections and double-click on the 1xRTT icon



- Enter the user name and password provided by the carrier for the account.
- Click on DIAL. If you have enabled the connection progress display, you will see the connection being made.



Once connected, you will see the connection status displayed in the bottom right corner in the Task Bar.



4 Low-power Mode

A PinPoint CDMA can be configured to enter a low power mode in order to conserve a vehicle's battery. The PinPoint can power down when the voltage to the modem drops below a configured threshold (caused by the vehicle being turned off), or when DTR changes (usually a contact or voltage controlled by the key switch, signaling when the vehicle is turned off).

Note that when the PinPoint CDMA is in low power mode, neither the GPS module nor the modem is powered. After a power cycle or reset, the low power controls are ignored for 5 minutes in case the timers are short.

The options are set using AT commands.

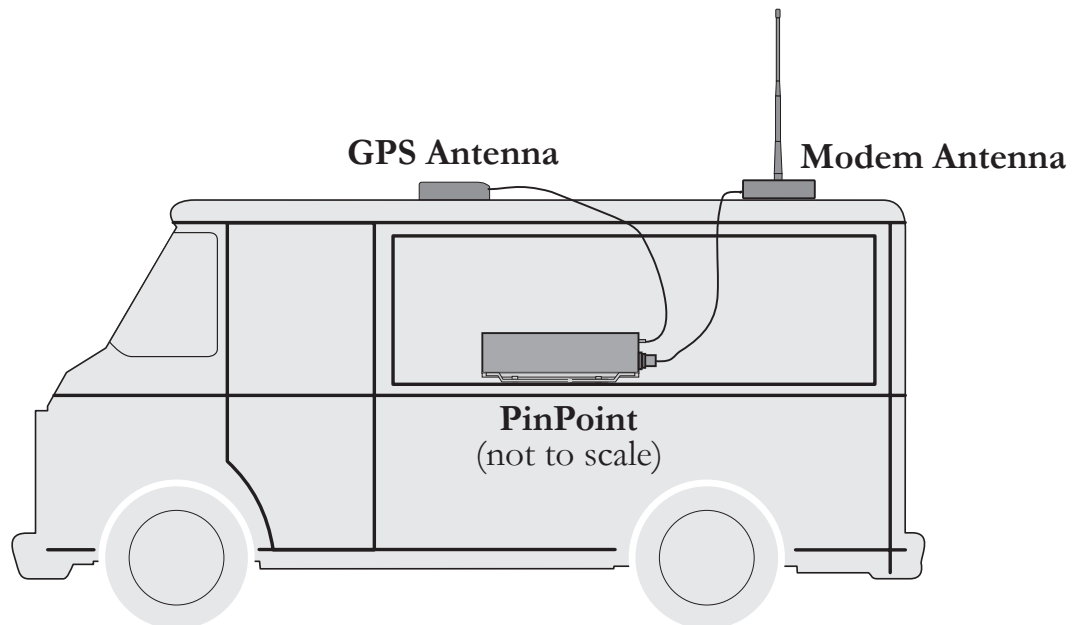
VLTG Voltage Power Policy	This setting controls the low voltage threshold used to put the PinPoint into low power mode. It is measured in tenths of a volt. For example, if you want the modem to enter low power mode when the input voltage falls below 13.0 volts, this should be set to: 130 <u>Recommended value:</u> 130 (for 13.0 volts) NOTE: Be VERY careful changing this setting. Ensure the modem is close by when enabling this parameter, because it may power down within 5 minutes.
PTMR Powerdown Timer	This is the Power down timer. It specifies the length of time in minutes after a DTR event or voltage drops below the threshold, before the modem actually enters the low power mode. If DTRP and VLTG are set to 0, this setting does nothing. <u>Recommended value:</u> 15 (for 15 minutes) Note: There is always a minimum of 1 minute between a power down event and actual shutdown (to give the modem time to prepare), so entering '0' (zero) will not power down the modem immediately, but after one minute.
DTRP DTR Power Policy	This allows the modems power mode to be controlled by the state of the DTR [Data Terminal Ready] signal. 0 = Ignore this feature. 1 = Low power when DTR is low. 2 = Low power when DTR is high.

5 PinPoint Vehicle Installation

5.1 Overview

Installing a PinPoint in a vehicle consists of:

- Choosing a location in the vehicle for the PinPoint
- Mounting the PinPoint
- Hooking up power to the PinPoint
- Routing the cables through the vehicle
- Positioning the antennas for good reception
- Connecting and securing cables to the PinPoint

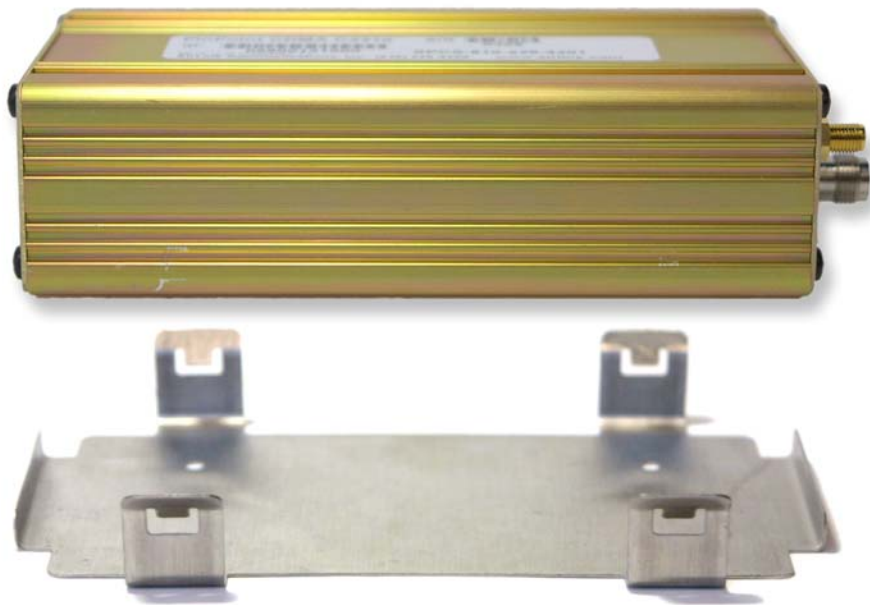


Note: Keep all cable lengths as short as possible during installation. Route the cables in such a way so they are protected and will not cause interference. Bundle and tie excess amounts if needed.

5.2 Mounting the PinPoint

First locate a place in the vehicle where the PinPoint will go. Make sure the PinPoint will be away from direct exposure to the elements (sun, rain, etc.). Possible locations are: in a trunk where luggage or other items won't hit it, in the console, or behind the seats in pickup trucks. Ensure the location is secure and will not put the PinPoint in the way of anything.

1. Mount the PinPoint on the provided bracket.



2. Connect the PinPoint's power cable to a **fused** 12 or 24 VDC power source. (*Note: PinPoint will draw less than 1/2 Amp at 12V.*)
3. Mount the CDMA Antenna and route the cable to the PinPoint location. Make sure any excess cable is tie-wrapped and not in the way of any luggage, passengers, or anything else.

5.3 Installing the Antennas

There are three options for an antenna:

- magnetic roof-mount
- through glass-mount
- permanent mount

1. 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 -- see Figure 2).

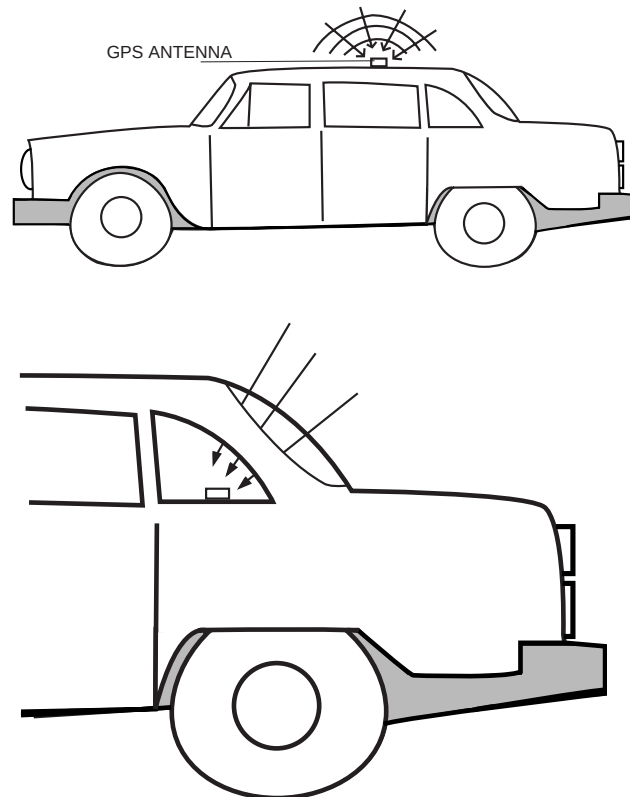


Figure 2 – Optimum GPS antenna positioning on a vehicle

2. Connect the GPS Antenna into the PinPoint's rear panel.
3. Connect the CDMA Cellular Antenna to the PinPoint's TNC connector.
4. Plug in the power connector into the power receptacle on the PinPoint's rear panel.

Note: The green power light should be on at this point.

6 Using AT Commands

This document is a reference for using AT commands with the AirLink PinPoint CDMA modems.

Terminal Emulation - To communicate with the modem using AT commands, you need to have an ASCII terminal emulation program running on a PC (default in Windows is HyperTerminal). If you use HyperTerminal, set it to "Direct to COMx" (where x is the COM port the modem is connected to by serial cable), *instead* of using a specific modem driver like "Standard 33600 modem."

The terminal emulation program should be configured to operate at 115000 baud, 8 data bits, no parity, and one stop bit (115000, 8N1), and use Hardware Flow Control.

Power On - With the cable connected and the terminal emulation configured, power the modem on. The **ON** LED should illuminate. On the terminal emulation screen, you should see a some characters appear. Send the modem a generic AT command to see if it is responding properly. (See next item for details).

Sample AT Commands

Here is an example of entering AT commands, changing some settings, saving and resetting the modem. (Note that any command you are unsure of is explained in *The AT Commands* section.)

Type **AT** and press Enter <enter>.

AT<enter>

You should get a response of "0" or "OK".

To turn on echo and verbose modes, type the following:

ATE1V1<enter>

You should see an "OK" response if Verbose Mode was properly activated (V1)

If you should see a "0" response, your modem is in Terse Mode and the V1 command did not adhere.

Try ATV1 again by itself if that happens. You should see an "OK" response now.

To set the baud rate slower, (like 115200), type the following:

AT+IPR=115200,8N1<enter>

You should get an "OK" (if in Verbose Mode)

Note:

HyperTerm needs to be disconnected and reconnected after each baud rate change to have it take effect.

6.1 Terminology

In this section the following terminology is used:

Host:	This is the computer or terminal that is attached to the serial port of the PinPoint. Also known as the DTE.
Modem:	The PinPoint CDMA. The DCE to the host.
OEM Modem:	The embedded communications module, a Sierra SB555.
Server:	A computer to which a PinPoint 9612 is communicating wirelessly.

6.2 PinPoint Serial Communication Modes

The PinPoint can be in one of six serial communication modes with the attached Host:

AT:	The modem accepts and responds to standard, Hayes-style AT commands. This mode is the default.
PPP:	Modem is using PPP to communicate with the Host.
PassThru:	Direct connection to internal OEM Modem.
UDP PAD:	Any data received on the serial port is assembled into UDP packets and send to the connection's associated IP and Port (described later). Any responses received from the associated IP and port destined for the modem's Device Port are unwrapped and sent out the serial port.
TCP PAD:	Any data received on the serial port is packaged into TCP messages and sent to the associated connection's IP and Port (described later). Any data received from the TCP peer is unwrapped and sent out the serial port.
SLIP:	Modem is using SLIP to communicate with the Host.

The default state is AT mode. If the modem is in any of the other modes, AT mode can be re-entered by either deactivating DTR (if **Ignore DTR**, **S211**, is not set), issuing the +++ escape sequence (if **Disable AT Escape**, **DAE**, is not set), or power cycling the modem.

The modem can be programmed to enter one of the other modes automatically on power up. This is done using the **Startup Mode Default (MD)** AT command. If this setting is non-zero, the modem will enter the specified mode after 5 seconds. If you want to cancel this behavior, the **ATMD0** AT command can be used before the 5-second timeout expires.

The modes are described in more detail in the following sections.

6.2.1 AT Mode

AT commands are used to configure the modem, command it to do something, or query a setting.

AT commands must always be terminated by **<CR>** (ASCII character 0x0D).

If **E=1** (Echo On), the AT command (including the terminating **<CR>**) will be output before any responses defined in the next section.

Response Framing

Two settings affect the format of AT command output: **V (Verbose)** and **Q (Quiet)**.

If **Q=1** (Quiet On), no result codes are output whatsoever, so there is no response generated by a (non query) command. If **Q=0** (Quiet Off), result codes are output. The format of this output is then affected by the **Verbose** setting.

If Quiet mode is off, the result code is affected as follows: For **V=1** (Verbose mode), the textual result code is surrounded by **<CR><LF>** and any AT query response is also surrounded by **<CR><LF>**; for **V=0**, (Terse mode), a numeric result code is output with a single trailing **<CR>** (no **<LF>** is output), while any AT query response is followed by **<CR><LF>** (there is no preceding output).

For example, possible output to the AT command “**AT<CR>**” (assuming quiet mode is not on) is:

0**<CR>** - if V=0

<CR><LF>OK<CR><LF> - if V=1

6.2.2 PPP Mode

In PPP mode, the modem acts as a PPP server, providing an IP address, and DNS servers (if available) to the Host.

PPP mode is entered by using the “**AT\APPP**” command. It can also be entered by issuing a Dial TCP to 10.0.0.1 (e.g. **ATDT10.0.0.1**) or entering the “**CLIENT**” command. At this point the modem assumes that the host will start PPP negotiation.

The IP received by the host in the resulting negotiation will either be a private (non-routable) IP or a public (network-routable) IP provided by the OEM Modem’s network, depending on the settings of **S300**. The value of this IP can be determined beforehand by querying **S110**.

Using a private IP insulates the PPP client from changes in IP addresses of the underlying network, as the AirLink modem will perform basic NAT-like address translation on all packets. However, if a public IP address is being used, any changes in the IP (as determined by the underlying communications network) will result in the PPP link to the host being disconnected, requiring the host to reinitiate it.

The host can exit PPP mode by deactivating DTR (if **S211=0**) or issuing the **+++** AT escape sequence.

Note that DTR needs to be asserted (or **S211=1**) by the host before PPP mode can be entered.

6.2.3 PassThru Mode

In PassThru mode, all serial traffic is sent directly between the internal OEM Modem and the host. In this mode, the AirLink modem does not behave normally. This mode can be used to configure OEM Modem-specific settings (e.g., for provisioning, etc.)

Issuing the “AT\APASSTHRU” enters this mode. The modem responds with `CONNECT`, at which point a direct connection to the modem is established. Note that some OEM Modems requires upwards of 20 seconds before AT commands can be entered, so be patient if there seems to be no response to AT commands.

This mode can only be exited by power cycling the modem.

6.2.4 UDP PAD Mode

When the modem is in UDP PAD (Packet Assembly and Disassembly) Mode, all characters received on the serial port are assembled into UDP packets and sent to the mode’s remote IP address/port, and any packets received from the same IP/port--destined for the modem’s Device Port (see ***DPORT**)--are disassembled and dumped onto the serial line.

A UDP *connection* (there isn’t really a connection because UDP is connectionless) is initiated by one of the following methods:

- Using the Dial UDP (DP) AT command (e.g., `ATDTP192.168.3.23/3456`); or
- Setting the Startup Mode Default (MD) to 3 (UDP) so that UDP mode is entered automatically when the modem powers up. All packets will be sent to the IP/port specified in `S53`, and you must make sure that the default connect mode in `S53` is set to “P” (UDP).
- UDP auto answer is enabled (`S82=2`), an incoming UDP packet is received by an IP address matching that in `S53` and/or allow any IP is set (`AIP=1`), and the modem is in AT mode or isn’t connected while in UDP or TCP modes.

UDP packet assembly is affected by the values of **S50** (PAD Forwarding Timeout) and **S51** (PAD Forwarding Character). **S50** specifies (in tenths of seconds) an interval of time for which to collect characters before they are forwarded; **S51** (if non-zero) specifies the ASCII code of a character that needs to appear in the data before a packet is sent.

The host can exit UDP mode by deactivating DTR (if **S211=0**) or issuing the `+++` AT escape sequence.

Note that DTR needs to be asserted (or **S211=1**) by the host before UDP mode can be entered.

6.2.5 UDP Submodes

UDP PAD mode supports the submodes Modbus, Reliable UDP, and Multicast UDP.

UDP Auto Answer

UDP auto answer (**S82=2**) is equivalent to what was previously called UDP half-open mode. When set, and in AT mode, it will automatically establish a UDP “connection”

to the IP address (bound by the value **S53** and/or **AIP**) from which a UDP packet was received. This “connection” will be terminated once the UDP auto answer timeout (**S83**) occurs, and the modem will return to AT mode. This behavior is identical to that in the non-NGE modems.

UDP auto answer also now works when in UDP (**MD3**) and TCP (**MD4**) modes. If we are in UDP mode, and we don’t have a current “connection”, a new “connection” will be established with the IP address (bound by the value **S53** and/or **AIP**) from which a UDP packet is received. When the UDP auto answer timeout (**S83**) occurs, the modem returns to a non-connected UDP mode, which allows a new “connection” to be established. Any data that is received from the host port when there is no connection will result in a “connection” being established with the address specified in **S53**, and any data being forwarded to this address until the UDP auto answer timeout occurs. If the connect to last UDP setting (***UDPLAST=1**) is active, the address in **S53** will be changed to reflect the address of the last answered “connection” so that when new data is received over the host port in a non-connected state, a “connection” will be re-established with the last address. This behavior is the same as Hybrid2 (**MD6**) mode.

UDP auto answer in TCP (**MD4**) mode works the same as in UDP (**MD3**) mode, except instead of returning to non-connected UDP mode when the UDP auto answer timeout occurs, the modem returns to TCP mode.

6.2.6 TCP PAD Mode

TCP PAD (Packet Assembly and Disassembly) Mode is similar to UDP, except that a real TCP connection is made to the remote IP/port.

A TCP *connection* is established by one of the following methods:

- Using the Dial TCP (**DT**) AT command (e.g., `ATDT192.168.3.23/3456`); or
- Setting the Startup Mode Default (**MD**) to 4 (TCP) so that TCP mode is entered automatically when the modem powers up (assuming the remote computer responds to the TCP connection request). All packets will be sent to the IP/port specified in **S53**, and you must make sure that the default connect mode in **S53** is set to “T” (TCP).
- TCP auto answer is enabled (**S0=1 | 2**), a TCP connection request is received, and the modem is in AT mode or isn’t connected while in UDP or TCP modes.

The value of **S7** (TCP Connection Timeout) specifies the number of seconds to wait for a successful TCP connection to be established. If a connection has not been successfully established before the timeout occurs, `ERROR/BUSY` is returned. TCP PAD mode is affected by **S50** and **S51**, like UDP Mode. It is also affected by the values in **TCPT** and **TCPS** (serial idle timeout for TCP connection before it’s dropped)

The host can exit TCP mode by deactivating DTR (if **S211=0**) or issuing the `+++` AT escape sequence.

Note that DTR needs to be asserted (or **S211=1**) by the host before TCP mode can be entered.

6.2.7 TCP Auto Answer

TCP auto answer (**S0=1|2**) also allows a TCP connection to be “answered” when in UDP mode with UDP auto answer on and there is no current UDP “connection”. This functionality is the same as the answering of a TCP connection while in Hybrid modes.

6.2.8 Hybrid Modes

The hybrid modes from the pre-ALEOS days (MD=5, 6) are no longer implemented as special, unique modes. Now that UDP auto answer (UDP half-open, S82=2) can be enabled in conjunction with UDP PAD mode (MD3), effectively this is the same as MD5 and MD6 previously accomplished. Setting MD5 and MD6 are still supported, but not recommended, since all they do is set several settings as described below.

The settings to accomplish hybrid modes:

AT Setting	Hybrid (MD5)	Hybrid2 (MD6)
MD	3	3
S82	2	2
S0	1	1
*UDPLAST	0	1

6.2.9 SLIP Mode

SLIP mode is entered by using the “AT\ASLIP” command. As in PPP Mode, the IP address that the host assumes is affected by the setting of **S300**. SLIP does not negotiate the IP with the host, so before making a SLIP connection, the host SLIP driver must be configured to use the IP specified by querying **S110**.

The host can exit SLIP mode by deactivating DTR (if **S211=0**) or issuing the +++ AT escape sequence.

Note that DTR needs to be asserted (or **S211=1**) by the host before SLIP mode can be entered.

6.3 AT Command Reference

Command	Description	Effective
+++	AT Escape sequence (not preceded by AT). If modem is in a mode other than AT, this sequence causes the modem to re-enter AT mode. There must be 1 second of idle time on the serial port before and after the sequence. Note that the “+” is ASCII character 0x2B. NOTE: The detection of this sequence is disabled if DAE=1	Immediately
A/	Re-execute last command.	Immediately
AIP=n [?]	n = 0: Allow only the IP specified in S53 to connect when UDP auto answer is enabled (S82=1). n = 1: Allow any incoming IP to connect when UDP auto answer is enabled (S82=1). Still subject to any Friends filters that may be defined	

Command	Description	Effective
D [<i>method</i>][<i>d.d.d.d</i>][/ <i>ppppp</i>]	Dial a connection to a remote IP and Port using either UDP, TCP, or Telnet. <i>method</i> = - P – Establish a UDP connection - T – Establish a TCP connection - N – Establish a Telnet connection <i>d.d.d.d</i> = IP address to establish connection to <i>ppppp</i> = IP port to establish connection to Examples: ATD – Dial (establish) default connection per S53 ATDP<i>nnn.nnn.nnn.nnn</i>[/<i>ppppp</i>] - Dial (establish) UDP connection to the specified IP address/port. If the method, IP address, or port is omitted, the values from S53 are used. If a telnet connection is requested (N) and the port is not supplied, port 23 will be used instead of the value from S53. To end the connection, issue the +++ escape sequence or drop the DTR line (if Ignore DTR S211=0) NOTE: The <i>source</i> port of the connection is the Device Port (set by S110 or *DPORT)	Immediately
DAE =n [?]	Disable AT Escape Sequence detection n = 0: Enable +++ AT escape sequence detection. n = 1: Disable +++ AT escape sequence detection.	
DTRP =n [?]	Set or query the DTR power policy. n = 0: Ignore DTR for power control n = 1: Low power mode when DTR is low n = 2: Low power mode when DTR is high	
En	Toggle AT command echo mode. n = 0: Echo Off n = 1: Echo On.	Immediately
FM =n [?]	Friends Mode – Only allow specified IPs to access the modem n = 0: Disable Friends mode n = 1: Enable Friends mode – Only <i>friends</i> can contact us (see below); packets from other IP addresses are ignored.	Immediately

Command	Description	Effective
F n=d.d.d.d [?]	Friends mode IP address n = Friends list index [1 – 10] d.d.d.d = IP address to be allowed to access the modem 255 = allow any number 0-255 Example: 166.129.2.255 allows access by all IPs in the range 166.129.2.0—166.129.2.255.	Immediately
H	This command does nothing but does not cause an error either.	Immediately
HOR =n [?]	Half-Open Response – In UDP auto answer (half-open) mode: n = 0: No response codes when UDP session is initiated n = 1: RING CONNECT response codes sent out serial link before the data from the first UDP packet. <u>Note:</u> Quiet Mode must be Off.	
I [0]	Returns the product name.	Immediately
I 1	Returns AirLink modem's firmware version, hardware ID, and copyright.	Immediately
I 2	Returns the OEM Modem's firmware version and relevant hardware ID	Immediately
I 3	Returns the OEM Modem's unique ID	Immediately
M	This command does nothing but does not cause an error either.	Immediately
MD hh [?]	Set or query the modem's default power-up mode hh (hex byte) = 00 – normal (AT command) mode 01 – SLIP mode 02 – PPP mode 03 – UDP mode (address/port is in S53) 04 – TCP mode (address/port is in S53) When the modem is power-cycled, it enters the mode specified by this command, after 5 seconds. If the mode is 1 or 3, on startup, typing ATMD0 within (about) 5 seconds changes the mode to normal. Otherwise, it enters SLIP or UDP mode and no longer responds to AT commands.	5 seconds
OPRG =n [?]	Enables/disables over-the-air programming of the modem. n = 0: Disables over-the-air programming. n = 1: Enables over-the-air programming.	Immediately

Command	Description	Effective
PING d.d.d.d[,n]	Ping the specified IP address. Sends a single ping, returns either OK or ERROR depending on result. Times out in 10 seconds. If n is provided, it specifies the amount of data to send with the ping. If n is not provided, the default, 50 bytes is used.	Immediately
PTMR =n [?]	Number of minutes after one of the allowed powerdown events (VTLG or DTRP) happens until we actually powerdown. If DTRP and VLTG are both zero, this setting means nothing. NOTE 1: There is always a minimum of 1 minute between powerdown event and actual shutdown (to give the modem time to prepare); entering zero will not powerdown the modem immediately, but after one minute. NOTE 2: In the first 5 minutes after modem powers up for the first time, powerdown events are ignored--this is to give the user a window where bad configurations can be fixed.	Immediately
Qn [?]	Set or query the AT quiet-mode setting. n = 0: Off (Default) n = 1: Quiet-mode on.	Immediately
S0 =n [?]	This register determines how a modem responds to an incoming TCP connection request. The modem remains in AT Command mode until a connection request is received. DTR must be asserted or Ignore DTR must be set for a successful TCP connection The modem will send a "RING" string to the host. A "CONNECT" sent to the host indicates acknowledgement of the connection [ACK]. n = 0: Off (Default) n = 1: On n = 2: Use Telnet server mode on TCP connections	Immediately
S7 =n [?]	Specifies the number of seconds to wait for a TCP connection to be established when dialing out.	
S23 =<speed>,<databits> <parity><stop bits> [?]	Query or set serial line parameters: <speed> = [1200 2400 4800 9600 19200 38400 57600 115200 230400] <databits> = [7 8] <parity> = [O=Odd E=Even N=None M=Mark] <stopbits> = [1 1.5 2] Example: AT S23=19200,8N1 (sets modem to 19200, etc.) NOTE: MUST be 8 data bits for PPP mode. The settings take affect after reset.	Reset

Command	Description	Effective
S50 =n [?]	Set or query data forwarding idle timeout. n = tenths of seconds. <i>(Used in UDP or TCP mode)</i>	
S51 =n [?]	Set or query PAD data forwarding character. n = 0: no forwarding character n = other: ASCII code of character that causes data to be forwarded. <i>(Only for UDP or TCP mode.)</i>	
S53 = <i>[method]</i> d.d.d.d/ <i>[ppppp]</i> [?]	Set or query Destination IP address, port, and method. These are used as defaults for the D (Dial) AT command. <i>method</i> = P – UDP T – TCP N – Telnet <i>d.d.d.d</i> = IP address <i>ppppp</i> = the port address	Immediately
S60 =n [?]	Telnet Echo Mode [n = 0–2] n = 0: No Echo n = 1: Local Echo (Default) n = 2: Remote Echo	
S82 =n [?]	Enables UDP auto answer (half-open) mode. n = 0: Normal mode n = 2: Enable UDP auto answer mode.	
S83 =n [?]	Set or query UDP auto answer idle timeout. If no data is sent or received before the timeout occurs, the current UDP “connection” will be terminated, allowing other IPs to “connect”. While “connected” packets from other IPs will be discarded (unless *UALL is set). n = 0: No idle timeout (Default). n = 1-255: Timeout in seconds.	
S110 =d.d.d.d/ <i>[ppppp]</i> [?]	Query IP address and port, or simply sets the modem’s Device Port . Since the IP address is determined from the 1xRTT network, any specified address will be ignored. This command can be used to determine the resulting IP address that will get negotiated if a PPP connection is to be established. <i>d.d.d.d</i> = IP address <i>ppppp</i> = port number NOTE: See also *DPORT	Immediately

Command	Description	Effective
S211 =n [?]	Ignore DTR. For applications or situations where hardware control of the modem is not possible, the modem can be configured to ignore DTR. When Ignore DTR is enabled, the modem operates as if the DTR signal is always asserted. n=0 [default]: Use hardware DTR. n=1: Ignore DTR. n=3: Ignore DTR and assert DSR. This value is deprecated, and it recommended to use &S to control the DSR instead. When this value is set to 3, &S will automatically be set to 0.	DTR – Immediately DSR – Mode or network coverage change.
S221 =n [?]	Connect Delay [n = 0 – 255] n = number of seconds to delay the “CONNECT” response upon establishing a TCP connection OR n = number of tenths of seconds to delay outputting ENQ on the serial port after the CONNECT when the ENQ feature is enabled [see *ENQ]	Immediately
S300 =n [?]	Set or query whether a private or public (network) IP is to be used when the Host initiates a PPP connection to the modem. n = 0 [default]: Public (network) IP Mode: When the Host initiates a PPP connection, the host will be given the public IP that was obtained from the OEM Modem. If the network issues a new IP, the PPP connection will be closed (since the IP has changed) and has to be re-initiated. n = 1: Private IP Mode: When the Host initiates a PPP connection, the host will be given the IP address specified in S301. The modem will then perform NAT-like address translation, which shields the Host from network IP changes.	
S301 =d.d.d.d [?]	Set or query the private IP address that is to be negotiated by the PPP connection if S300 =1.	
S302 =d.d.d.d [?]	Set or query the IP address that can be used to directly contact the modem once a PPP connection is established. If this value is not specified, 192.168.13.31 will be used. NOTE: This is not normally used nor needed by user applications.	
TCPS =n [?]	TCP connection timeout (TCPT) units. n = 0: TCPT specifies minutes. n = 1: TCPT specifies seconds.	

Command	Description	Effective
TCPT =n [?]	TCP connection timeout. Specifies a time interval upon which if there is no in or outbound traffic through a TCP connection, the connection will be terminated. This value only affects the TCP connection in TCP PAD mode. n = minutes (if TCPS=0) or seconds (if TCPS=1)	
V n [?]	Set or query Command Response Mode. n = 0: Terse (numeric) command responses n = 1: Verbose command responses (Default).	Immediately
VLTG =n [?]	Set or query the voltage power policy. n = 0: Ignore voltage for power control n = low power voltage threshold in tenths of volts. Example: ATVLTG=126 would power down the modem if the voltage goes below 12.6V.	
X n [?]	Extended Call Progress Result mode. n = 0: turn off extended result codes (Default) n = 1: turn on result codes only if S210=1. This adds the text 19200 to the CONNECT response.	Immediately
Z	Reset the modem. NOTE: This command does nothing if *DATZ =1.	Immediately
&C n [?]	Set DCD mode. Currently DCD mirrors the DSR, so any attempt to set this feature will be ignored. Querying it will simply return the value for &S , since DCD is mirroring DSR. n = 0: Always assert DSR n = 1: Assert DCD when in a data mode (UDP, TCP, PPP, or SLIP) (Default). n = 2: Assert DCD when the modem has network coverage.	Mode or network coverage change
&D n [?]	Set DTR mode. n = 0: Ignore DTR (same as S211=1) n = 2: Use hardware DTR (same as S211=0) S211 can also be used to query.	Reset
&L <speed>,<databits> <parity><stop bits>	Set serial line parameters: <speed> = [1200 2400 4800 9600 19200 38400 57600 115200 230400] <databits> = [7 8] <parity> = [O=Odd E=Even N=None M=Mark] <stopbits> = [1 1.5 2] Example: AT&L19200,8N1 (sets modem to 19200, etc.) NOTE: MUST be 8 databits for PPP mode	Reset

Command	Description	Effective
&Sn [?]	Set DSR mode. n = 0: Always assert DSR n = 1: Assert DSR when in a data mode (UDP, TCP, PPP, or SLIP) (Default). n = 2: Assert DSR when the modem has network coverage. Note: Although deprecated, S211 can also be used to request that DSR is always asserted. If S211 is set to 3 and &S is changed to a non-zero value, S211 will be changed to 1.	Mode or network coverage change
&V	View active profile (the contents of the registers)	Immediately
&W	Writes all changed modem settings. If this command is not issued, any modified values will revert back to their previous values at modem reset.	Immediately
&Z	This command does nothing but does not cause an error either.	Immediately
\ACEPW=new123	Change the Ace password to a new value. Password is case sensitive. Default value is 12345 Example: AT\ACEPW=new123	Immediately
\APASSTHRU	Set modem operation to pass through mode. This will pass any characters received on the serial port directly to the internal OEM Modem and output any characters from the internal OEM Modem out the serial port. This allows direct access/configuration of the OEM Modem. Once this mode is entered, the unit must be physically reset to return to normal operation. NOTE: It may take some time for the OEM Modem to respond after CONNECT is output. In addition, this mode is not available through the remote AT telnet server.	Immediately
\APPP	Set modem operation to PPP mode. The modem expects the Host to start PPP negotiation.	Immediately
\ASLIP	Set modem operation to SLIP mode.	Immediately
\Qn [?]	Set or query the serial port flow control setting. n = 0: No flow control is being used n = 2: RTS/CTS hardware flow control is being used n = 4: Transparent software flow control. Uses escaped XON and XOFF for flow control. XON and XOFF characters in data stream are escaped with the @ character (0x40). @ in data is sent as @@.	Reset

Command	Description	Effective
*CTSE =n [?]	Clear To Send Enable n = 0: Disabled (Default). n = 1: Enable assertion of CTS. This feature asserts CTS when there is no network connection. Note: Flow control (AT\Q) will override this indication, so if you want to use CTS to indicate no network coverage, flow control has to be off (AT\Q0). RS232 voltage levels: Positive = Network coverage, Negative = no coverage.	Immediately (if flow control off)
*DATE =[mm/dd/yyyy],[hh:mm:ss] [?]	Sets and queries the clock in the unit. Either the date and time can be specified, or simply one of the two can be specified in which case the unspecified value will remain unchanged. The date and time are always specified in UTC (Universally Coordinated Time) and, as such, the hours are specified in 24-hours format. Note that if the product has a GPS (i.e. PinPoints), the GPS will be used to set the time, in which case any date/time specified will be ignored.	Immediately
*DATZ =n [?]	n = 0: Normal Reset (Default). n = 1: Disable Reset on ATZ.	Immediately
*DNS n=d.d.d.d	Sets the DNS addresses to be returned during PPP negotiation. If the underlying communications network provides DNS addresses, they replace those specified by this command. *DNS1 and *DNS2 are valid.	
*DPORT =n [?]	Sets or queries the modem's Device Port. Valid values are 0-65535.	Immediately
*DU =n [?]	Dial UDP Always – Whether the dial command always uses UDP. n = 0: dial a normal connection [default] n = 1: dial UDP always, even when using ATDT NOTE: When this parameter is set you <i>cannot</i> establish a TCP PAD connection.	Immediately
*ENQ =n [?]	Outputs an ENQ [0x05] after the TCP CONNECT delayed by the Delay Connect Response time [S221]. n = 0: Disabled (Default). n = 1: Enables ENQ on CONNECT.	
*NETCHAN ?	Returns the current active channel number.	

Command	Description	Effective
*NETIP?	Query the current public (network) IP address of the modem. This is the IP address that was obtained from the embedded OEM Modem, and is the address to which packets can be sent in order to contact the modem from the Internet. NOTE: This could be 0.0.0.0 if there is no current network IP	
*NETPHONE?	Query the device's phone number, if applicable.	
*NETPW=pw [?]	The password that is needed to login to the remote network, if necessary.	
*NETRSSI?	Returns the current RSSI of the modem as a negative dBm value.	
*NETSTATE?	Query the current network state. Will get one of the following strings: - Connecting To Network The modem is in the process of trying to connect to the network; - Network Authentication Fail Authentication to the network has failed. Either *NETUID and *NETPW need to be updated, or for some reason the network refuses to allow the modem to connect; - Network Negotiation Fail Network connection negotiation failed. This is usually temporary and often clears up during a subsequent attempt; - Network Ready Modem is connected to the network and ready to send data; - Network Dormant Modem is connected to the network, but the link is dormant. It will be woken up when data is sent; - No Service There is no network service (e.g., no CDPD, or no 1xRTT); - Hardware Reset The OEM modem is being reset. This is temporary.	
*NETUID=uid [?]	The login that is needed to login to the remote network, if necessary.	

Command	Description	Effective
*TPORT=ppppp [?]	Sets or queries the port used for the AT Telnet server. Valid values are 0-65535. If 0 is specified, the AT Telnet server will be disabled. The default value is 2332.	Reset
*UALL=n [?]	Accepts UDP data from any IP address when a UDP “connection” is active. If there currently is not a UDP “connection”, the data will be discarded unless UDP auto answer is enabled and the IP matches S53 or AIP is set. n = 0: Only accept UDP data from the currently “connected” IP address (Default). n = 1: Accept UDP data from all IP addresses when “connected”.	
*UDPLAST=n [?]	If enabled, sets S53 to the last accepted IP address through UDP auto answer. This can be used in conjunction with MD3 so that when there is no “connection”, new host data will cause a connection to be restored to the last IP accepted through UDP auto answer. n = 0: Do not remember the last accepted IP through UDP auto answer. (Default). n = 1: Set S53 to the last accepted IP.	
*USD=n [?]	Delays a received UDP packet by a specified interval before sending it out to the serial port. n = 0: No UDP packet delay (Default). n = 1-255: Delay in 100ms units, from 100 ms to 25.5 sec.	

6.3.1 PinPoint Specific AT Commands

The AT commands in this Section are specific to the AirLink PinPoint.

Command	Description	Effective
*DEVICEID=n [?]	Sets or queries the 64-bit Device ID that is used by the PinPoint to identify itself to the server. The default is a value that depends on the underlying communications technology being used.	
*DEVICEIDX=n [?]	Same as *DEVICEID except entry of the 64-bit Device ID is in hexadecimal.	
*PPDEVID=0 1 [?]	Whether or not the PinPoint should include the 64-bit device ID in its GPS reports. Valid values are 0 or 1.	
*PPIP=ipAddr [?] or ATSIP=ipAddr [?]	PinPoint Server IP Address = IP address where GPS reports are sent. Example: <code>ATSIP=192.100.100.100</code> NOTE: Also see ATSP	Immediately
*PPDIST=n [?] or ATSD=n [?]	GPS Report Distance Interval in 100 Meter Units Range n = 1-65535, 0 = Disabled	Immediately
*PPPORT=n [?] or ATSP=n [?]	Port where GPS reports are sent. Possible value: nnnnn = 0 – 65535 NOTE: Also see ATSIP.	Immediately
*PPTIME=n [?] or ATST=n [?] or #TU=n [?]	GPS Report Time Interval Range n = 1 – 65535 Seconds, 0 = Disabled NOTE: Also see TSV	Immediately
*PPTSV=n [?] TSV=n [?]	Timer for Stationary Vehicles. n = [0--255]: Time interval in minutes that the PinPoint will send in reports when it is stationary. For example, if ATST=10, the PinPoint will send in reports at least every 10 secs while it is moving; however, while it is stopped, it will slow the reports down to this TSV value. A zero value disables TSV.	Immediately
*GPSR=n [?]	GPS report type. See RAP	
*ODOM=0 1 [?]	Whether or not odometer reporting is turned on	
GPSn	Send NMEA GPS strings out serial link. ATGPS will cause the NMEA GGA, RMC, and VTG GPS strings to output to the serial port one time. ATGPS1 will cause these strings to be sent out the serial link once per second <i>forever</i> . ATGPS0 will stop the feed.	Immediately
SNF=n [?]	Set or query “Store and Forward” of GPS reports n = 0: Disable Store and Forward n = 1: Enable Store and Forward (default)	Immediately

Command	Description	Effective
	Store and Forward will cause GPS reports to be stored up if the PinPoint goes out of CDPD coverage. Once the vehicle is in coverage the GPS reports will be sent en masse to the server.	
*SNFB=n [?]	Store and Forward Behavior. See RAP.	
*SNFM=n [?]	Store and Forward Min Reports. See RAP.	
*SNFR=0 1 [?]	Whether or not Store and Forward reliability is enabled	
#IG=n [?]	Set or query GPS initialization timer. n = seconds. Time in seconds to wait for GPS acquisition before transmitting at high rates.	
#U	Immediately issue GPS report to programmed server IP and port	

7 Technical Specifications

7.1 Quick Look:

- Support for CDMA2000 1X today
- Coming: Support for IS-95 Circuit Switched CDMA and SMS
- Dual-band support for both 800 MHz cellular and 1.9 GHz PCS bands
- Rugged aluminum case

7.2 Physical Characteristics:

- Weight: < 2 lb.
- Size: 3.3" wide x 2" high x 6.8" long
- RF Antenna Connector: 50 Ohm TNC
- Serial Interface: RS232 DB-9F

7.3 Power Specifications:

- Advanced Power Management features
- Input Voltage: 10 VDC to 28 VDC
- Input Current: 20 mA to 350 mA
- Typical Transmit/Receive: 300ma at 12VDC
- Dormant connection [idle for 10-20 seconds] 150 ma at 12 VDC
- Low power mode: 20 mA at 12 VDC

7.4 Environmental:

- Operating ranges: -30°C to +75°C*
- (<10%duty cycle limit above 60 °C)
- Humidity: 5%-95%Non-condensing

A thermistor inside the modem (monitored by the modem CPU firmware) causes flow control to be activated should the internal temperature reach 75°C (167°F) as measured at the radio. Flow control is released when the temperature falls below 75. Should the temperature of the radio reach 80°C (176°F), the modem terminates the connection in order to protect components and avoid drifting outside radio specifications.

7.5 Status LED Display:

- Channel [Chan] LED
Flashing = Searching for a channel
On = Found a channel
- Link LED
Off = No 1x or CDMA service
On = 1x or CDMA service is available on this channel
- Registration (REG) LED:
Off = No PPP link
On = PPP link is established and have an IP address.
- Transmit (TX) LED:
Off = Not transmitting
On = Transmitting (on RF)
- Receive (RX) LED:
Off = No incoming data
On = Receive data (on host)
- GPS LED
Off = No GPS fix
On = Have GPS fix
- Power (PWR):
Off = Power off
On = Power on

7.6 RF Features:

- 224 mW RF output (+23.5 dBm)
- Full duplex transceiver
- Dual-band support for both 800 MHz cellular and 1.9 GHz PCS bands
- Data rates up to 153.6 kbps (forward channel) and 76.8 kbps (reverse channel)

7.7 Application Interface Features:

- RS232, 1200 bps to 115.2 kbps
- AT Commands, PPP, SLIP, UDP, TCP

7.8 CDMA and Cellular Standards:

- Adheres to CDMA authentication as specified in CDMA2000 1X
- CDMA2000 1X Release 0 (plus ballot resolution version of addendum)
- CDG1, 2, and 3 for CDMA2000 1X
- IS-95B: Mobile Station-Base Station Compatibility
- Standard for Wideband Spread Spectrum Cellular Systems
- IS-98C and D: Recommended Minimum Performance
- Standards for Dual-Mode Spread Spectrum Mobile Stations
- Telecommunications Systems Bulletin (TSB2000): Capabilities Requirements Mapping for CDMA2000 Standards (TIA/EIA/TSB2000)

7.9 GPS Module

- Model: U-Blox TIM-CJ
- L1 Frequency 1575.42 MHz
- 12 Channels
- Active GPS Antenna 5V