AirLink GX400 for AT&T HSPA+

User Guide

2140712
Rev 1.0

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 GX400 are used in a normal manner with a well-constructed network, the Sierra Wireless AirLink GX400 should not be used in situations where failure to transmit or receive data could result in personal hazard or risk 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 GX400, or for failure of the Sierra Wireless AirLink GX400 to transmit or receive such data.

Safety and Hazards

Do not operate the Sierra Wireless AirLink GX400 in areas where blasting is in progress, near medical equipment, near life support equipment, or near any equipment which may be susceptible to any form of radio interference. In such areas, the Sierra Wireless AirLink GX400 **MUST BE POWERED OFF**. The Sierra Wireless AirLink GX400 can transmit signals that could interfere with this equipment.

Do not operate the Sierra Wireless AirLink AirLink GX400 in any aircraft, whether the aircraft is on the ground or in flight. In aircraft, the Sierra Wireless AirLink GX400 **MUST BE POWERED OFF**. When operating, the Sierra Wireless AirLink GX400 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 GX400 may be used at this time.

The driver or operator of any vehicle should not operate the Sierra Wireless AirLink GX400 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 offense.

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

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Revision History

Revision number	Release date	Changes
1.0	December 2011	GX400 for AT&T HSPA+ User Guide created and initially released.

Contents

1: Introduction to the AirLink GX400

The AirLink GX400 is a compact, intelligent, fully-featured mobile communications platform with serial, Ethernet, and USB peripheral connections. Expanded I/O functionality in the power connector includes one digital I/O and one low power timer enable input allowing remote instrumentation possibilities.

Its high-precision GPS receiver, coupled with the richly embedded intelligence provided by ALEOS™ technology, make the AirLink GX400 the perfect choice for a broad set of applications requiring superior remote management capabilities.

Figure 1-1: AirLink GX400

ALEOS, the embedded core technology of the Sierra Wireless AirLink product, simplifies the installation, operation, and maintenance of any deployment, 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

POWERED BY: ALEOS™

Figure 1-2: Powered by ALEOS

ACEware™

A wireless solution is not complete until you have the 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) and Windows-based applications (ACEview and 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 further information.

Note: ACEview requires the Microsoft .NET Framework v. 2.0 and Microsoft Windows 98, Windows 2000, Windows XP, or later operating systems. 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.

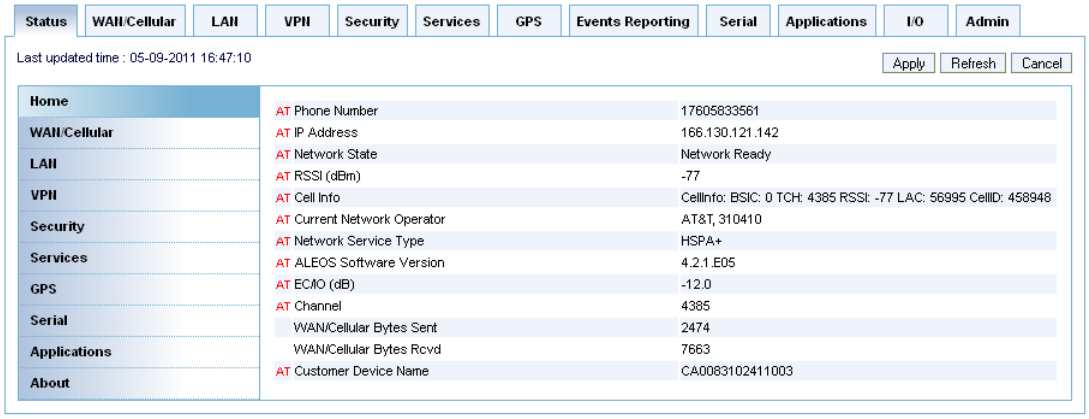


Figure 1-4: ACEmanager

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.

Connecting to AT&T

The GX400 uses AT&T as an ISP (Internet Service Provider) to connect you to the Internet.

Steps of a Connection

1. When your AirLink GX400 is powered on, it automatically searches for cellular service using HSPA+.
2. Your AirLink GX400 establishes a communications link to the AT&T network with the radio module.
3. When your AirLink GX400 has received its IP address from AT&T, a connection to the Internet or the cellular network is also available for computers or other devices connected directly to the AirLink GX400.

The AirLink GX400 will perform routing for all internet traffic to and from the computers or other end devices.

With the AirLink GX400 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 AirLink GX400 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 AirLink GX400 might not always receive the same address each time it connects with AT&T.
- Static addresses are permanently assigned to a particular account and will always be used whenever your AirLink GX400 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 AT&T includes a dynamic IP address and you need a static IP, please consult your AT&T Representative for more information about changing your account for static IP support.*

If you need to contact your AirLink GX400, a device connected to the AirLink GX400, or a host system using the AirLink GX400 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 AirLink GX400 using TCP/IP, the IP address given to your modem by AT&T 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 (as with frame relay).*

Communication

Many of the GSM Networks have been expanded to HSPA+.

HSPA+

HSPA+ (High-Speed Packet Access +) is an enhanced version of HSPA cellular technology defined by the 3rd Generation Partnership Project (3GPP) Release 7 UMTS specification for Mobile Terminated Equipment. Using improved modulation schemes and refined data communications protocols, HSPA+ permits increased data rates. Theoretical speeds are 5.76 Mbits/s uplink and 21.1 Mbits/s downlink.

HSPA (High-Speed Packet Access) is a cellular technology which most closely resembles a broadband synchronous connection. The upload and download speeds are maximized to provide a faster throughput, reaching speeds up to 2.0 Mbit/s for the uplink and 7.2 Mbit/s for the downlink.

HSPA+ falls back to HSPA, UMTS, EDGE, or GPRS (in order of precedence). This feature allows you to have seamless connectivity no matter where your AirLink GX400 is.

UMTS

UMTS (Universal Mobile Telecommunications System) supports up to 1920 kbit/s data transfer rates, although most users can expect performance up to 384 kbit/s. A UMTS network uses a pair of 5 MHz channels, one in the 1900 MHz range for uplink and one in the 2100 MHz range for downlink.

EDGE

EDGE (Enhanced Data rates for GSM Evolution) provides end-to-end packet data services with an enhanced connectivity building on GPRS technology and using the established GSM networks. EDGE provides higher transmission rates and better transmission quality for data than GPRS. EDGE can carry data at speeds typically up to 384 kbit/s in packet mode.

When EDGE is not available, your AirLink GX400 will fall-back to GPRS for the connection to AT&T to provide continued connectivity.

GPRS

General Packet Radio Service (GPRS) is packet-switched with many users sharing the same transmission channel, but only transmitting when they have data to send. This means that the total available bandwidth can be immediately dedicated to those users who are actually sending at any given moment, providing higher utilization where users only send or receive data intermittently. GPRS provides speeds of 30–70 kbps with bursts up to 170 kbps.

Connection Methods

You can connect the AirLink GX400 to a USB or an Ethernet (RJ45) port on a computer. When connected to one of these ports, the AirLink GX400 behaves like a network card.

USB

The AirLink GX400 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 AirLink GX400 and connect directly to your computer for best throughput.

Virtual Serial Port

The AirLink GX400 supports one virtual serial port over USB. This VSP can be used 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.

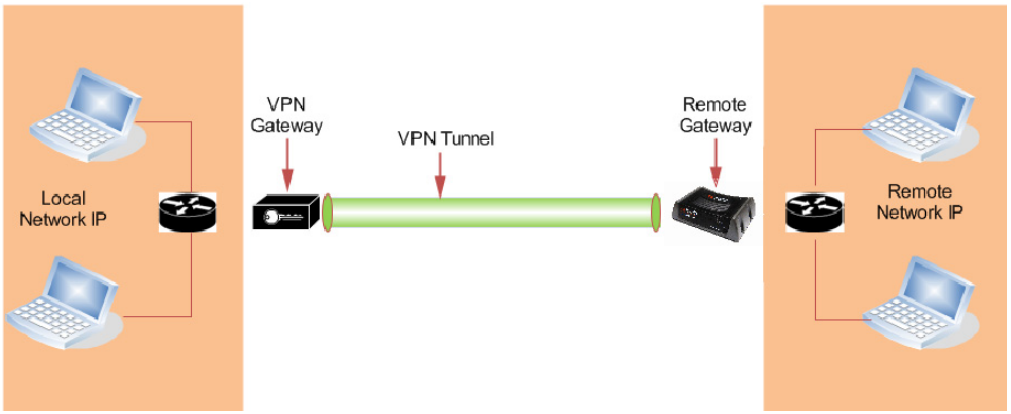


Figure 1-5: IPsec Architecture

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 the AirLink modem's new software feature provided via ACEmanager. It 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 AirLink GX400 modem comes with the following software:

- ACEview, the Windows-based software for the AirLink GX400 which allows you to monitor your connections.
- The driver that forms the interface between the AirLink GX400 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 AirLink GX400 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 AirLink GX400 and one on the radio module.

  The firmware was loaded into the radio module and controller board when the AirLink GX400 was assembled. As new versions of the software and firmware are released, they are posted at www.sierrawireless.com.

Documentation

This *AirLink GX400 HSPA+ for AT&T User Guide* describes how to:

- Install the AirLink GX400 hardware.
- Connect the radio antennas.
- Connect a notebook computer and other input/output (I/O) devices.
- Interpret the LEDs on the AirLink GX400 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.

Software Documentation

Refer to the ALEOS User Guide for further details related to device configuration and management. Chapters in this user guide explain the ACEmanager parameters and provide relevant configuration detail, including user scenarios for certain sections in the user guide.

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 tool 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 the remote management of Sierra Wireless AirLink devices.

2: Specifications

Features and Benefits

- Powered by ALEOS
- Embedded Intelligence
- Connection Management
- IPsec/VPN Firewall
- LBS & Events reporting Engines
- ACEware interface
- Remote Management and Configuration
- Ethernet, Serial, USB OTG (On-The-Go)
- One Digital I/O, one low power timer enable input
- Multiple Interfaces, I/O Port
- RX Diversity (3G)
- Hardware expansion options (IESM)

Technology

- HSPA+

  With Fallback to:
  - HSPA
  - UMTS
  - EDGE
  - GPRS (MS-12)
  - GSM

Bands

- Five-band for WCDMA/HSPA+
  - 800/850/900/1900/2100 MHz
- Five-band receive diversity
  - 800/850/900/1900/2100 MHz
- Quad Band GSM/GPRS
  - 850/900/1800/1900 MHz

Environmental

- Operating Temperature:
  - -30° to 70° Celsius
- Storage Temperature:
  - -40° to 85° Celsius

Power Consumption: (@12V DC)

- Transmit/Receive (Typical/Max) 190/430 mA
- Idle 145 mA
- Low Power Mode <50 mA
- Input Voltage 9 - 36V DC

Standards/Approvals

- Carrier specific approvals
- CE
- FCC
- RoHS Compliant
- Industry Canada
- Mil-Spec 810-F Certified
- Class 1 Div 2 Certified
- e-Mark
- IP 64

Host Interfaces

- Ethernet: 10/100 Mbps RJ-45
- USB “micro A/B” locking
- RS-232: DB-9 DCE (300-230400 baud)
- I/O: one on power connector
- Antenna Connection:
  - Primary Cellular - 50 Ohm SMA
  - Receive Diversity - 50 Ohm SMA
  - GPS - 50 Ohm SMA

Warning: *Antennas must not be installed closer than 20 cm from people.*

Dimensions

- 143mm x 96mm x 44 (5.5 in x 3.8 in x 1.7 in)
- 397 grams (14 oz)

Supported Protocols

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

LED Indicators

- Network
- Signal
- Activity
- Power

Interface Port Pin-Outs

Serial Port

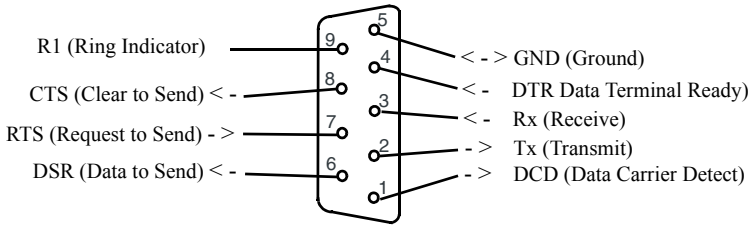


Figure 2-1: Serial Port Diagram: Female DB9 DCE (not to scale)

Power Connector

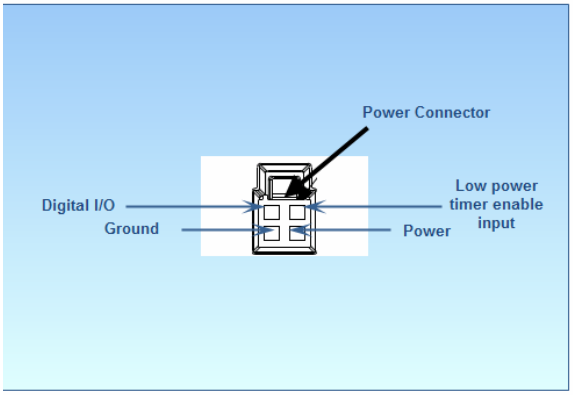


Figure 2-2: DC Power Connector at Rear of GX400 (not to scale)

Table 2-1: GX440 I/O Power Connector Pin-outs

Name	Pin	Description	Type
VCC	1	Main supply for device	PWR
GND	2	Main device GND for reference	PWR
LPS	3	Low power mode enable input	I
DIGIO	4	Digital input/output	I/O

Table 2-2: GX440 Digital I/O Specifications

Pin	Name	Specification	Param	Min	Type	Max	Units
4	Dig I/O (Input)	Input low state voltage	VIL	-0.5	0	1.2	V
		Input high state voltage range	VIH	1.3	3.3	30	V
		Input leakage current (3.3 VDC IN	IIN	----	58	----	μA
	Typical application input source is a dry switch contact to ground. Pin includes an internal 56K ohm pull up to 3.3 VDC.						
	Dig I/O (Output)	Open drain drive to ground	Idc	----	150	200	mA
		Maximum open circuit voltage applied	Voc	----	3.3	30	V
	Typical application is to drive a relay coil to ground.						

3: Installing and Activating the AirLink GX400

This chapter provides step-by-step directions for activating your AirLink GX400 on AT&T's network.

The AirLink GX400 should be mounted in a position that provides easy access for all cabling. Cables should not be bent, constricted, in close proximity to high amperage, or exposed to extreme temperatures. The LEDs on the front and top panel should be visible for ease of operational verification. Ensure that there is adequate airflow around the device, and that it is kept free from direct exposure to such environmental elements as the sun, rain, dust, etc.

Figure 3-1: AirLink GX400 front and back plates

Physical Interfaces

The AirLink GX400 has the following physical interfaces and connection methods:

- Primary Cellular - 50 Ohm SMA
- Receive Diversity - 50 Ohm SMA
- GPS - 50 Ohm SMA
- USB OTG Micro A/B locking
- 1 Ethernet port
- 1 serial port

Requirements

1. Cellular account from AT&T.
2. Software:
   - **ACEmanager** - Graphical interface for configuring/managing the GX400.
   - A terminal application (e.g., Microsoft HyperTerminal).
3. Hardware:
   - Ethernet cable -10/100 fast Ethernet interface for management, software downloads/upgrades and data communication.
   - Serial cable - A serial console port is available for initial product configurations and debug.
   - USB cable Type "A" to micro type "B" (could be locking)

Note: The USB port cannot configure the device until a driver is installed on the connecting computer.

   - Power adapter and a power source - You will need a power supply and power source for the device.

Note: The AC power adapter for the GX400 has a different pin-out than previous AirLink devices. This AC power adapter MUST be used or the GX400 will not operate properly.

   - PC or laptop - To configure the device, you will need a computer with an available Ethernet, serial, or USB port.

Refer to the ACEmanager User Guide for more details on configuration via Ethernet, serial, and USB.

Activating the AirLink GX400

To activate your device, follow the instructions below:

1. Connect the needed antennas to the AirLink GX400 -See Connecting the Antennas on page 28.
2. Remove the GX400's decorative cover by removing the four retaining screws with a 5/64" or 2 mm Allen wrench. Insert a SIM card into the tray. Replace the screws and cover.
3. Plug the power cable to the power connector on the back panel of the AirLink GX400 - See Connecting to Power on page 29.
4. Connect your computer to the AirLink GX400 with an Ethernet, serial, or USB cable - See Connecting to a Computer or Other Device on page 31.
5. Observe the LEDs - See LED Operation on page 32.

Wait 60-90 seconds for the AirLink GX400 to initialize and go on the air.

Updating AirLink GX400 Firmware

Install the latest firmware version (.exe file) from ACEmanager using the Firmware link.

Confirming IP Address

Check the IP Address in your Local Area Connection window. The IP Address in the window in Figure 3-2 is for a USB/net connection.

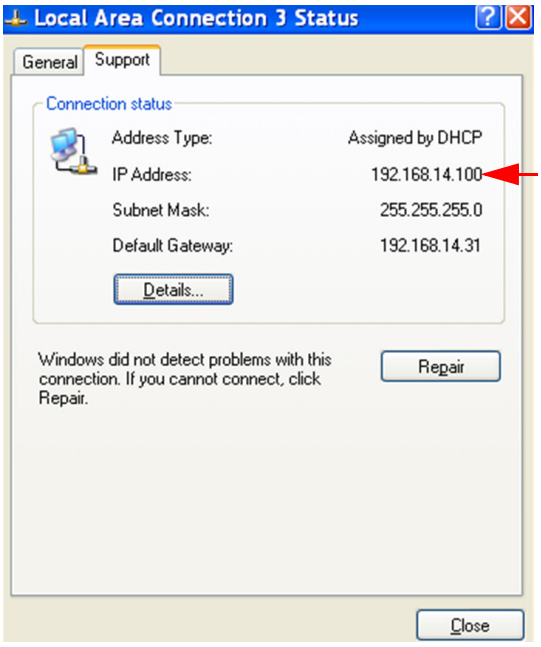


Figure 3-2: Confirm IP Address

Configuring Through ACEmanager

ACEmanager is a free utility. Follow the steps below to connect to ACEmanager and begin configuring the device.

- Ensure that the AirLink GX400 is properly connected to allow access to the ACEmanager user interface.
- Go to: http://192.168.13.31:9191 the first time you connect to ACEmanager.

Connecting the Antennas

Warning: *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 4.55 dBi in Cellular Band and 2.85 dBi in PCS band under any standard installation configuration. In more complex installations (such as those requiring long lengths of cable and/or multiple connections), it is 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 AirLink GX400 will work with most cellular antennas with an SMA connector. Connect the primary antenna or primary RF cable directly to the antenna connector on the back of the AirLink GX400.

Tip: *When using a cable to an antenna placed away from the device, minimize the length of your cable. All gain from a more advantageous antenna placement can be lost with a long cable to the device.*

GPS Antenna

The AirLink GX400 will work with most standard active GPS antennas. Connect the GPS antenna or cable directly to the threaded SMA connector.

If mounting the GX400 in a vehicle, the less the cable is wrapped and bound together, the better it will perform. Place it on the roof, on the dash, or on a rear panel where it has a greater than 90° angle view of the sky.

There are three antenna mount options:

- Magnetic roof-mount
- Through glass-mount
- Permanent mount

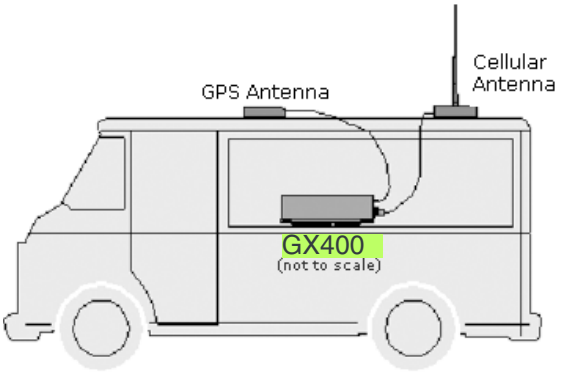


Figure 3-3: GPS Antenna Placement for a Vehicle

Connecting to Power

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

Warning: *Explosion Hazard - When the device is located in a combustible atmosphere, do not connect or disconnect the AirLink GX400 unless power has been switched off.*

With the appropriate power adapter, the AirLink GX400 can be used with either DC or AC power. DC cables and AC power adapters are available as optional accessories in addition to the one included with your AirLink GX400. The AC power adapter for the GX400 has a different pin-out than previous AirLink devices. This AC power adapter MUST be used or the GX400 will not operate properly

Warning: *When using an AC to DC adapter, ambient temperature should not exceed 40 ^{0}C.*

If the AirLink GX400 is used in a vehicle or battery-powered application, the red wire should be connected to battery power and the black wire to ground. The white low-power timer enable input wire must be connected to either unswitched or switched power for the GX400 to operate. The AC adapter accessory for the GX400 has power on two pins: main power and low-power timer enable. See the "Power Modes and Information" section in Chapter 5 for additional information on the various low-power modes available when using the GX400.

The battery cable used for a car, truck, or other mobile connection must be less than 3 meters in length.

The GX400 has an internal polysilicon circuit breaker and reverse polarity protection.I

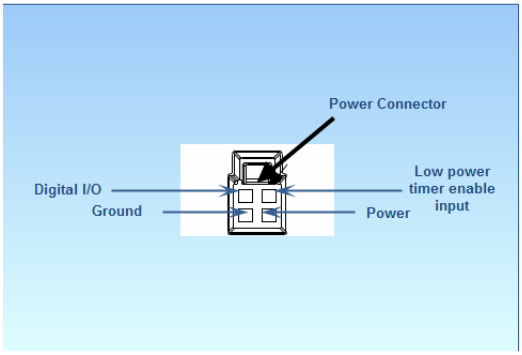


Figure 3-4: AirLink GX400 Power Connector

Warning: *Explosion Hazard - When the device is located in a combustible atmosphere, do not connect or disconnect the AirLink GX400 unless power has been switched off.*

Connecting to a Computer or Other Device

The AirLink AirLink GX400 can be connected to the computer through an Ethernet, serial, or USB connection.

Ethernet

Figure 3-5: Ethernet cable

The Ethernet port is a standard RJ-45 connector; two LEDs indicate link and activity. The left LED blinks yellow during activity, and the right LED is green for 100 Mbps and orange for 10 Mbps. The Ethernet port of the AirLink GX400 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 AirLink GX400 is auto-sensing, and it will auto-detect the speed of the connecting device for 100baseTX or 10baseT.

Serial Port

Figure 3-6: Serial cable

The serial port of your AirLink GX400 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 device or null device cable. All local GPS (UDP encapsulated) reports will come over the Ethernet connection. The serial port is available for both initial product configurations and debugging.

USB OTG Port

Figure 3-7: USB Micro-A connector cable

The CPU OTG port operates in device mode; when the port is unused, the AirLink GX400 operates in device mode. If a Micro-B plug is inserted into the port, AirLink GX400 operates as a self-powered device: it will not draw any current from the USB. If a Micro-A plug is inserted, the AirLink GX400 can operate in host mode and supply power to the device that is plugged into. At this time, however, USB host capability is a future ALEOS enhancement.

Your AirLink GX400's high-speed (480 Mbps) USB 2.0 port can be directly connected to computers or other devices using a standard USB 2.0 cable. If the computer or device you are connecting or the cable is not rated for high-speed, the device will communicate at a reduced speed to match.

When it is connected to a computer in device mode, the USB port should be seen as either a COM port or Ethernet port after the applicable driver is installed and configuration has been enabled. The port is, by default, a virtual Ethernet port.

LED Operation

Four LEDs are visible from the front and top of the AirLink GX400. Labeled (from left to right) Network, Signal, Activity, and Power, each LED can display one of three colors: green, yellow, or red.

Caution: *If you need to reset the device configuration using the reset button, hold the button depressed until the LEDs start cycling yellow, and then the button may be released.*

LED operation is as follows:

- Off - No activity
- Green - Full function
- Yellow - Limited Function
- Red - Not functional
- Blinking - Where needed, blinking is used to indicate altered functionality.

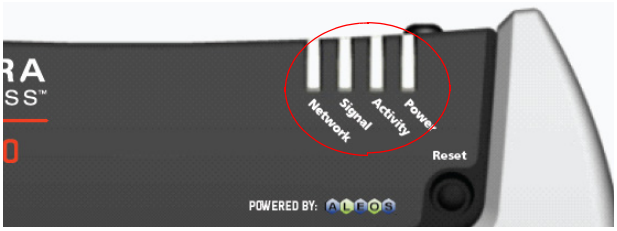


Figure 3-8: AirLink GX400 Indicator lights

- **Network LED**:
  - Green - On the network
  - Flashing Green - Roaming
  - Yellow - Found service, attempting to connect
  - Flashing Yellow - Link down
  - Red - No data connection available.
- **Signal LED** - 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.
  - Green - Good signal
  - Yellow - Marginal signal
  - Red - Bad signal
  - Flashing Red - No signal.
- **Activity LED** - Pulse green on packet transmit/receive on radio link. Otherwise, LED is off.
- **Power LED**:
  - Off - No power (or above 36V or below 7.5V)
  - Red - System not operational
  - Green - Normal operation
  - Green, Occasional Yellow - GPS Lock
  - Yellow - Low power mode or system booting.

Light Patterns

The LEDs on the front of the device respond with different light patterns to indicate specific device states.

- **Normal** - Each LED is lit as applicable.
- **Start up** and **Device Reboot** - All LEDS simultaneously cycle red, yellow, and green at the start. Various light patterns continue until the Power LED turns yellow and then green, and the Network LED flashes yellow, changes to a solid yellow, and finallt turns green, to indicate an active device.
- **Radio Passthrough** (**H/W**) - Network LED is a solid red.
- **Factory Reset** - All LEDs flash yellow after the Reset button is pressed for 7 - 8 seconds and released. Returns the device's software settings to the factory default state.
- **Data Retry, Failed Auth,** and **Retrying** - The Network LED blinks red every 3 seconds.

Reset Button

The **Reset** button, located on the right front side of the AirLink GX400, has two primary functions:

1. Powers up or reboots the device: Briefly press in, and release.
2. Returns the device's ALEOS configuration settings to their factory defaults: Press in and hold for 7 - 8 seconds until all LEDs are flashing yellow.

Mounting an AirLink GX400

The GX400 can be mounted almost anywhere using the device's recessed mounting ears. An optional mounting kit (with mounting adapter plate) is also available when replacing a PinPoint X device.

Mounting Hardware

All GX400s are shipped with a Hardware Mounting Kit (P/N 1202162) that contains four #8 sheet metal/wood-type screws and four internal lock washers. Figure 3-9 is a diagram (with dimensions) of the GX400's mounting base.

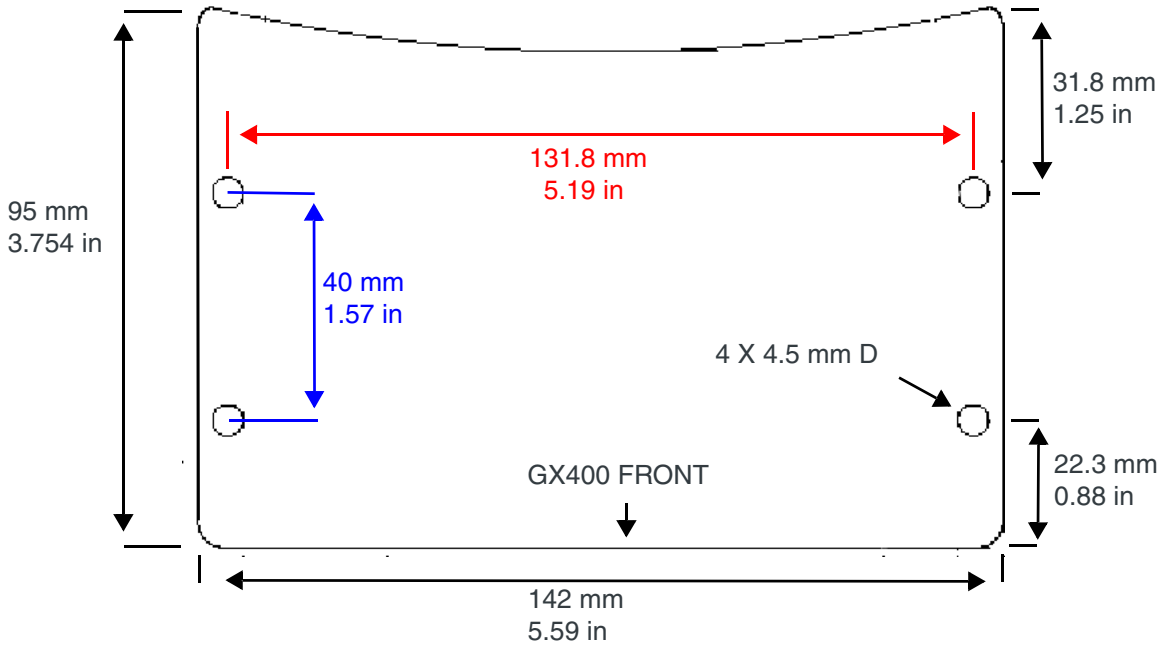


Figure 3-9: Diagram of the GX400 Base (Not to scale)

To mount the GX400:

1. Place the GX400 in the exact position where the unit is to be secured.
2. Using a pencil or applicable writing tool, outline the four mounting ear holes on the mount surface.

3. Remove the GX400, and drill a small “starter” hole at the center of each outlined hole.
4. Replace the GX400 to its mounting position, insert all four screws (with washers attached) through the recessed mounting ears, and tighten the screws until they are hand tight and secure.

Mounting Adapter Plate

An optional Mounting Bracket Kit (P/N 1202404) is available from Sierra Wireless for mounting the GX400 when replacing a PinPoint X device. The GX400 Mounting Bracket Kit includes:

- One adapter plate
- Four #8 sheet metal/wood-type screws
- Four internal lock washers

The adapter plate is designed to reuse the mounting holes of a PinPoint X for a GX400 installation. The adapter plate is attached to a stationary location, and the GX400 is attached to the adapter plate.

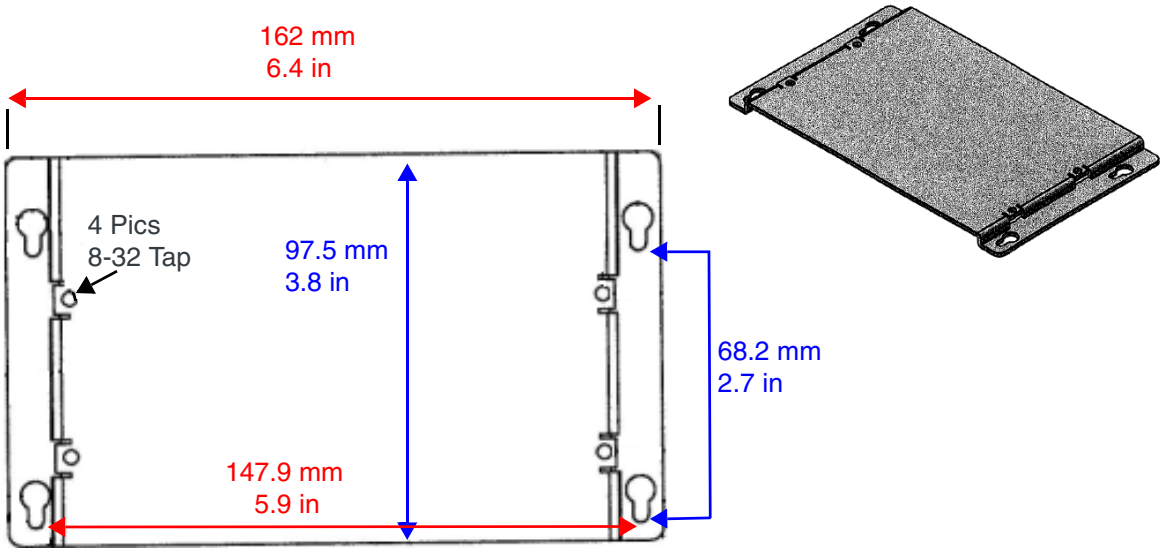


Figure 3-10: GX400 Adapter Plate and Dimensional Diagram (Not to scale)

Installation steps for the GX400 with adapter plate are as follows:

1. Position the adapter plate in the exact place where the PinPoint X was previously secured.

Note: When the adapter plate is correctly positioned, the small end of the keyhole mounting hole will be on top.

Tip: *To ensure stability and a secure GX400 mount , we highly recommend that all four mounting screws be used in the adapter plate installation.*

2. Insert all four screws (with washers attached) through the recessed mounting ears and the raised adapter plate mounting holes. Tighten the screws until they are hand tight but secure.
3. Connect your power cable, serial or Ethernet cable, and all antennas to the device's interface ports.

4: Configuring the AirLink GX400

The AirLink GX400, with its ALEOS embedded firmware, is a highly configurable device.

Configure the AirLink GX400 through one of two options:

1. Use the configuration and management applications of the AceWare suite, or
2. Use a terminal emulator application such as HyperTerminal, PuTTY, etc.

ACEmanager

To get an expanded view of all ACEmanager features, refer to the ACEmanager Configuration Guide and the ALEOS User Guide.

ACEmanager is a free utility. Follow the steps below to connect to ACEmanager to configure the GX400:

- Ensure AirLink GX400 connectivity for accessing ACEmanager
- Go to: *http://192.168.13.31:9191* the first time you connect to ACEmanager.

A full listing of all the configuration commands for your gateway are in the ALEOS User Guide.

Using a Terminal Application with AT Commands

You can access and configure your AirLink GX400 using Microsoft HyperTerminal, PuTTY, or a similar terminal emulator application. The following directions are for HyperTerminal which is part of a standard installation of Windows XP.

1. Choose a name and icon for your connection
   a. Choose a name for your connection, such as *AirLink GX400* or *Sierra Wireless AirLink Solutions*. The name and icon are only for your own reference so you can find the connection at a later date.

Tip: *If you want to have a connection saved for both local and remote usage, it is recommended that the connection name reflect the connection type, e.g., AirLink GX400 local.*

   b. Select *OK*.
2. At the Connect To window, using USB or serial:
   a. Select *COM1*, or the COM port to which the gateway is connected, for the “Connect using” option.

Figure 4-1: Connect To window

b. Change or verify the settings when the COM1 Properties window appears:

- Bits per Second: 115200 (default)
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: Hardware (or None).

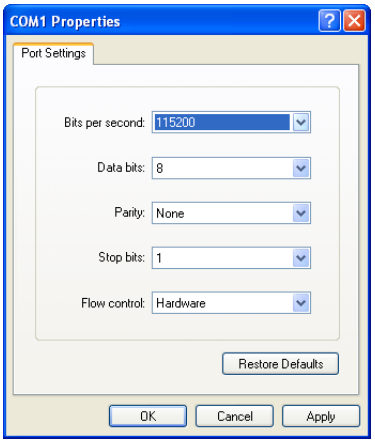


Figure 4-2: Port Settings on COM1 Properties

Tip: *If you have configured the AirLink GX400 for settings different than the defaults for Bits per second, Data bits, Parity, and/or Stop bits, you will need to use your changed settings.*

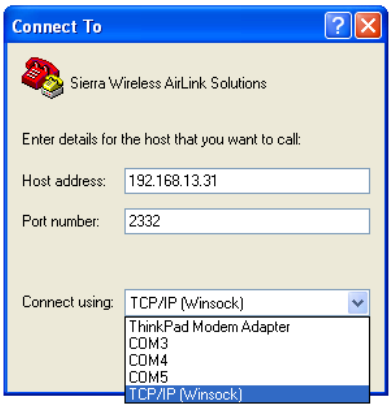
c. Select *OK*.

If using Telnet with either Ethernet or USB/net:

d. Select *TCP/IP (Winsock)* for “Connect using”.

e. Type in *192.168.13.31* for the Host address.

f. Change the “Port number” to *2332*.



g. Select *OK*.

3. You are now connected.

Connecting with Telnet will prompt for a password.

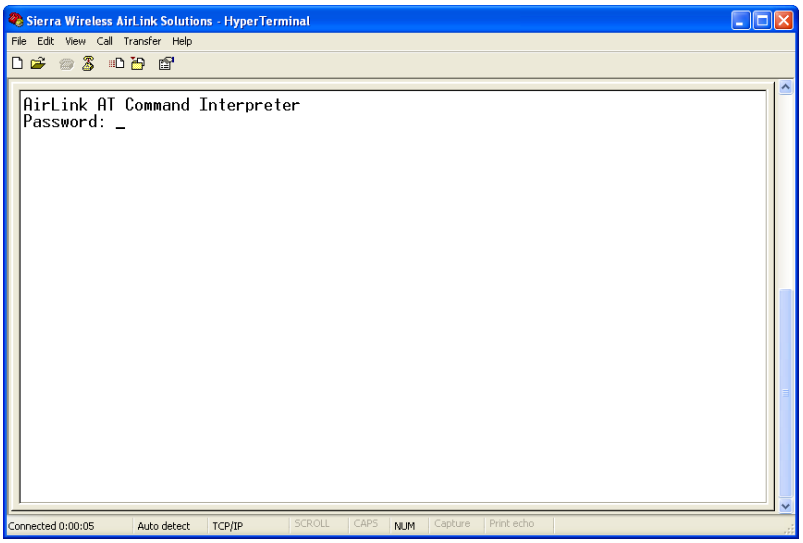


Figure 4-3: HyperTerminal: TCP/IP connected

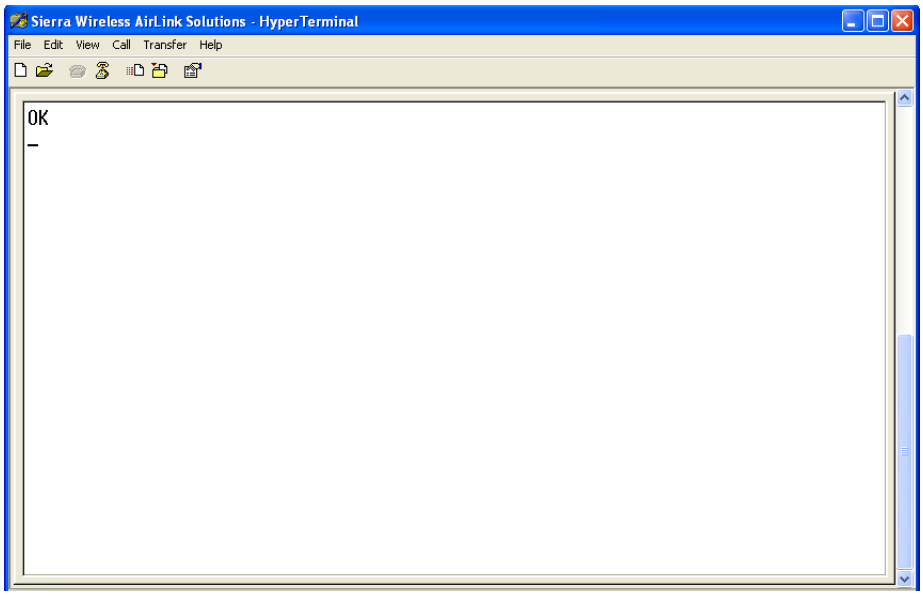


Figure 4-4: HyperTerminal: connected

a. If you are prompted for a password, enter the default password *12345*.

Tip: *You will not be prompted for a password if you connect using a COM port.*

b. Type *AT*, and press *Enter*. You should get a reply of “OK” or “0”.

c. To see what you are typing as you type it, you will need to turn on the echo and verbose mode. Type *ATE1V1,* and press *Enter*.

d. If you get a reply of “OK”, then you entered the command successfully. If you get a reply of “0” or “ERROR”, try entering the command again.

AT Commands

Note: A full listing of supported AT Commands may be found in the ALEOS Configuration User Guide.

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

- For most commands, when you are entering them using a terminal connection, you will need to preface the command with AT (exceptions are noted), i.e., *ATA* which is listed as *A*.
- Some commands have specific parameters while other commands will take whatever you type.
- Required variable parameters are denoted with italicized text, example, D*n*. The *n* is variable.
- Acceptable parameters and/or specific formats are listed with each command.

- Most commands with parameters can be entered with ? to read the current value (for example, *AT&D?* will respond with “2” if the default has not been changed).
- Optional parameters are denoted with square brackets [ ].
- AT Commands are not case sensitive. A capital “E” is the same as a lower-case “e”.
- When you are using a terminal connection, if you enter a command which is recognized by the AirLink GX400, it will respond with “OK”. If the command is not recognized, the response will be “ERROR”.
- Those commands applicable only to certain model numbers of the AirLink GX400 will be noted.

Caution: *Symbols listed with commands, such as *****, **/**, **&**, or **?**, are part of the command and must be included. Commands with symbols other than * may require PassThru mode.*

5: Inputs, Relay Outputs, and Power Status

The AirLink GX400 can be configured to monitor the input, respond to specific types of events, and even trigger digital output. The device 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 AirLink GX400 is equipped with an I/O port interface which includes 1 low power timer enable input and 1 digital I/O. These may be connected to sensors and switches to monitor status and remotely control equipment.

AirLink GX400 board supports a low power timer enable input pin and a digital I/O pin which are connected to the CPU processor. The I/O signal comes in from the power connector, through a *PolySwitch* resettable fuse, and ties into the CPU pins with protection circuitry.

Digital Input

Digital Input can be used in two different modes: the switch mode or the voltage sensing mode.

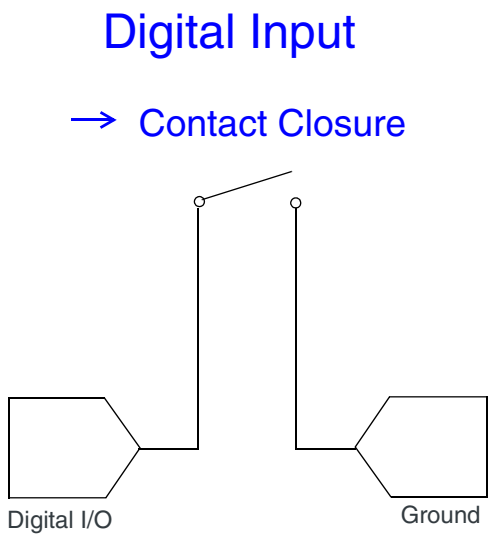


Figure 5-1: Digital Input Contact Closure

The switch mode senses contact closures. The digital input can report either an open or closed state, and can be wired to a ground signal via a switch. When the switch is open, the input reads “3.3V”. When the switch is closed, the input reads “OV”.

Examples of using the input with a switch to ground:

- When a door or other latch is opened or closed
- Counting pulses or other electronic events
- When a gauge reaches a certain point
- When a container fills or empties
- When a switch or valve is opened or closed
- When the tow bar is raised or lowered
- Connected to a sensor, the level of fuel in a vehicle
- When the trunk of a vehicle is opened or closed
- When the ignition is turned on or off.

Digital Output

Digital Output of open collector design is capable of driving an external device such as a pull-up resistor or relay. (For example, a relay could be connected between the output pin and an external voltage.) The voltage on the relay cannot exceed 30V. The digital output pin can handle up to 150mA.

Examples of using the digital output with an external relay or pull-up resistor:

- 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. Inputs
- Turning a light on or off
- Opening the vehicle's trunk or doors.

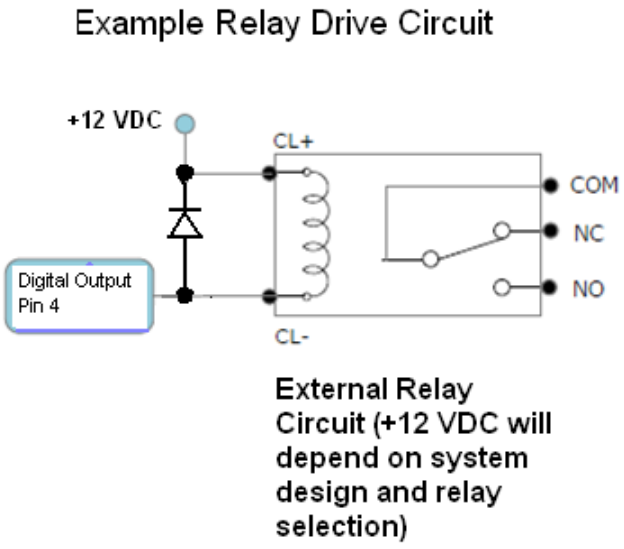


Figure 5-2: Digital Output

Power Modes and Information

AirLink GX400 low power modes can be configured using ACEmanager (Default: no power modes). You can switch power modes in response to specific events, such as when the voltage to the device drops below a configured threshold or when ignition is turned off, in order to conserve battery life. The standby state, low power mode, will prevent the device from draining the battery while allowing the device to quickly power up to regular operation when it is needed.

The GX400 has two main power states when low power mode is enabled in ACEmanager and whether the low power mode input signal is low or high:

1. When the low power mode input line goes low (tied to switched power), it can be used to completely power down the GX400 (Off, 0mA) after the programmable timer expires or the input voltage falls below a programmable threshold
2. If low power mode input is kept on (tied to unswitched main power), it can go from a full power state (180mA - 300mA) to low power mode (35mA) using either the programmable timer or when the main input voltage drops below the programmable threshold. In addition, the GX400 can be set to wake up at a periodic interval with a user-defined duration if it is desired to send a message at the same time every day.

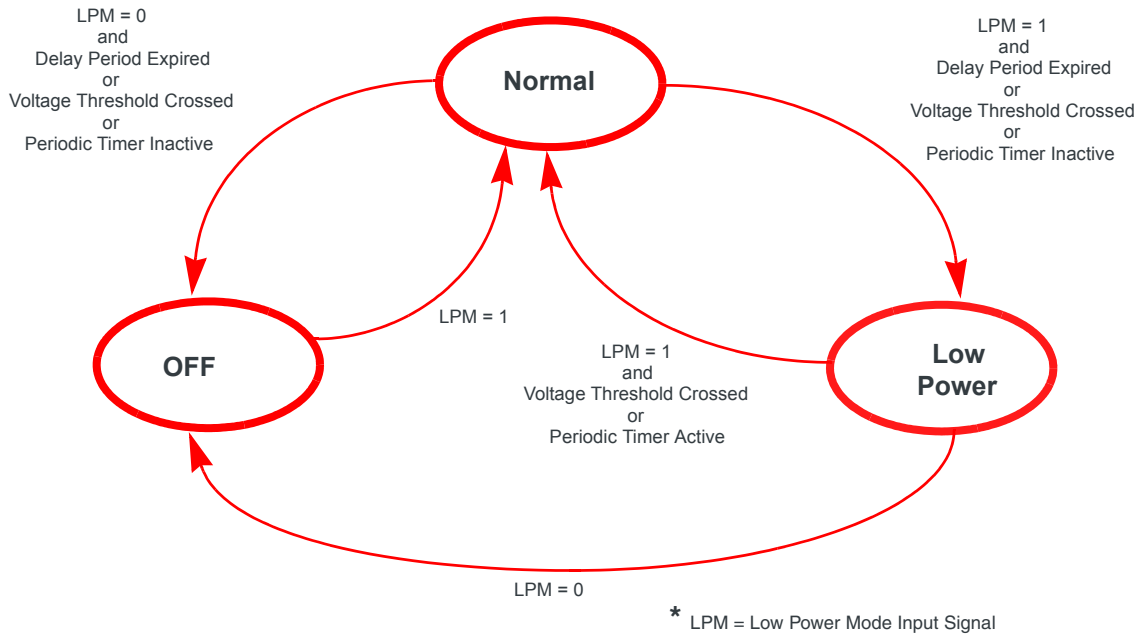


Figure 5-3: Low Power Mode Diagram

Power Effect on Device State

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

When the device is activated from the low-power mode, the same activity occurs as power on. The device starts in AT mode, and after 5 seconds will enter the default start-up mode as it is configured for the device.

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 devices, 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 device.

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.

Antenna Considerations

Although the antenna model(s) used with these devices meet(s) the Industry Canada Radio Frequency requirements, it is possible that future customers may swap them for different ones without the 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 radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20 cm should be maintained between 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 4.55 dBi in the Cellular band and 32.85 dBi in the PCS band.

Warning: *A minimum separation distance of 20 cm must be maintained between the antenna(s) used for this transmitter and all personnel.*

EU Regulatory

Sierra Wireless hereby declares that the AirLink GX400 devices conform to all the essential requirements of Directive 1999/5/EC. This equipment has been tested to and found to be within the acceptable limits for a Class A device.

Products are marked with a CE and notified body number.

CE 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 (UK), Limited
Suite 5, the Hub
Fowler Avenue
Farnborough Business Park
Farnborough, United Kingdom GU14 7JP

WEEE Notice

If you purchased AirLink GX400 in Europe, please make sure that the device is collected separately from general domestic waste at the end of its life. WEEE (Waste of Electric and Electronic Equipment) products may be recognized by their wheeled bin label on the product label.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