AirLink LX40

Hardware User Guide

SIERRA WIRELESS®

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

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Warning: *EXPLOSION HAZARD–DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS.*

Avertrissement: *RISQUE D'EXPLOSION-NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOURS TENSION, A MOINES QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.*

Warning: *DO NOT USE THE USB CONNECTOR IN A HAZARDOUS AREA.*

Avertrissement: *NE PAS UTILISER DE CONNECTEUR USB DANS LES ENVIRONNEMENTS DANGEREUX.*

Warning: *DO NOT USE THE RESET BUTTON IN A HAZARDOUS AREA.*

Avertrissement: *NE PAS UTILISER LE BOUTON DE RESET DANS UN ENVIRONNEMENT DANGEREUX.*

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Contents

1: Introduction to the LX40

This hardware user guide is for the Sierra Wireless® AirLink® LX40 LTE Router. Features and specifications described in this user guide apply to all variants of the LX40 unless otherwise noted.

The AirLink LX40 is designed for Commercial and Enterprise LTE network connectivity.

LX40 provides purpose-built, secure, reliable, managed Cellular LTE networking in building automation, digital signage, taxis, ATMs, kiosks and point-of-sale terminals.

As part of the AirLink Essential series, the LX40 is designed to meet the environmental and performance requirements of these applications, while delivering superior reliability and uninterrupted operation in fixed, indoor and protected outdoor environments.

LX40 is available with optional Wi-Fi and rated for shock and vibration. It offers Dual Band 802.11ac Wi-Fi.

The LX40 comes in LTE Cat 4 regional variants, and a Global LPWA (Low-Power Wide Area) variant offering LTE-M/NB-IoT for applications where low data rates, enhanced cellular coverage and global deployment is required.

Key Features

- LTE Cat-4 and Cat-M1/NB1 (LX40 variants)
- 2.4/5 GHz 802.11ac Wi-Fi (Wi-Fi models only)
- Gigabit Ethernet port (LAN/WAN)
- 1 configurable GPIO
- Power over Ethernet (IEEE 802.3af)
- USB 2.0 Micro-B Connector

For information on configuring these features, refer to the ALEOS Software Configuration User Guide.

Description

(See Connect the Antennas on page 16.)
Cellular Antenna Connector

Wi-Fi Antenna Connector*

Diversity Antenna Connector

LEDs (See LED Behavior on page 29.)

Network Signal Activity Power

USB

DC Power

Reset

Ethernet

Diversity Wi-Fi Cellular

*Wi-Fi model

USB 2.0 Micro-AB Port
(See USB on page 36.)

Power Connector
(See page 17.)

Reset button
(See page 32.)

Grounding screw
(See page 11.)

RJ-45 Ethernet Port
(See Ethernet on page 36.)

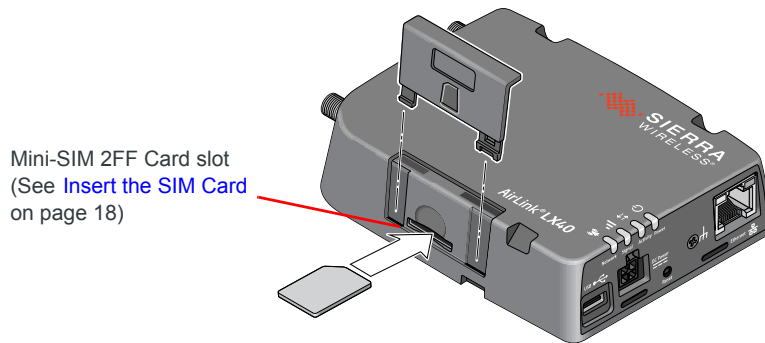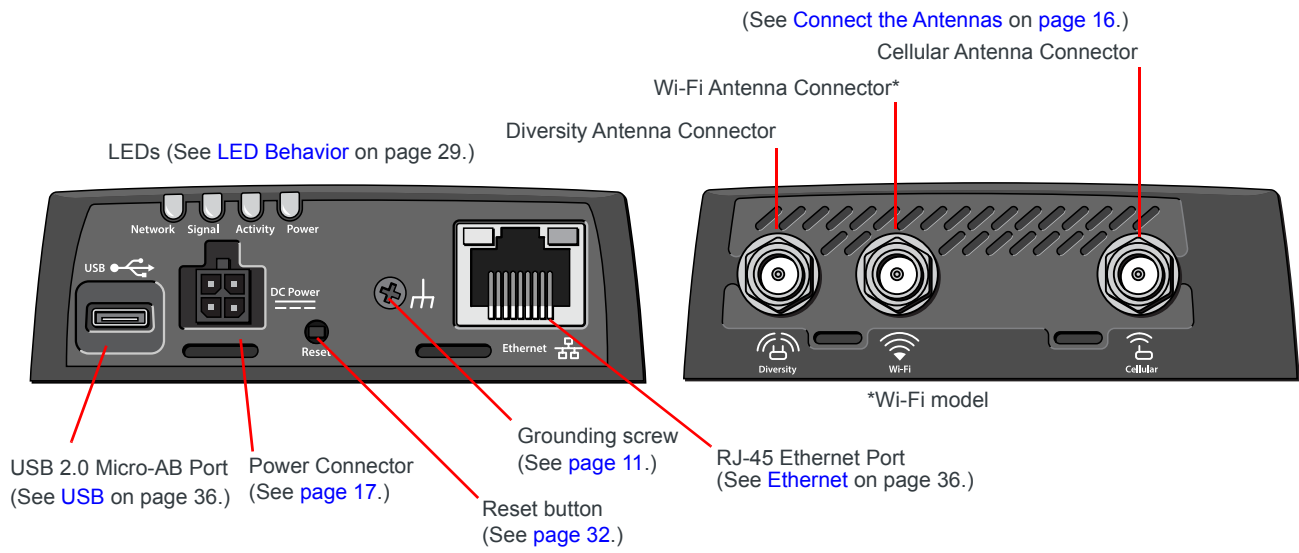Mini-SIM 2FF Card slot
(See Insert the SIM Card
on page 18)

Figure 1-1: LX40 Connectors, LEDs and SIM Card Holder

Sample Power Consumption Scenarios

Table 1-1: Power Consumption Scenarios

Scenario	Radio	Ethernet	USB	Wi-Fi	Power[a]
Standby Mode	—	—	—	—	20 mW (1.7 mA)
Ethernet (10 BaseT)	Idle Attached	10 BaseT Full duplex	Disabled	Disabled	700 mW (58.3 mA)
Ethernet (100 BaseT)	Idle Attached	100 BaseT Full duplex	Disabled	Disabled	750 mW (62.5 mA)
Ethernet (GigE)	Idle Attached	1000 BaseT Full duplex	Disabled	Disabled	1000 mW (83.3 mA)
Wi-Fi AP 5GHz	Idle Attached	Disabled	Disabled	Enabled (idle)	1100 mW (91.6 mA)
Typical Use (non-Wi-Fi)	Attached and connected (20 dBm)	100 BaseT Full duplex	Enabled Idle	Disabled	3250 mW (270.8 mA)
Typical Use (Wi-Fi)	Attached and connected (20 dBm)	100 BaseT Full duplex	Enabled Idle	Enabled (idle)	3700 mW (308.3 mA)
Maximum Power (non-Wi-Fi)	Attached and connected (23 dBm)	Enabled (1000 BaseT full duplex with Auto negotiation as speed setting)	Enabled (pinging)	Disabled	5250 mW (437.5 mA)
Maximum Power (Wi-Fi)	Attached and connected (23 dBm)	Enabled (1000 BaseT full duplex running with Auto negotiation as speed setting)	Enabled (pinging)	Enabled (1000 BaseT full duplex running)	6250 mW (520.8 mA) 7500 mW (PoE)
Inrush Current	1 A @ 12 V (Averaged over 100 µs)				

a. Power consumption was measured at 12 V unless noted.

Accessories

The following items come with the LX40 router:
• DC power cable
• Quick Start Guide

The following items can be ordered separately from Sierra Wireless:
• Universal AC power adapter (part number 2000579)
  · Voltage input: 100–240 VAC
  · Current output: 1.5 A

Warranty

The LX40 comes with a 3-year warranty, and has an optional 2-year warranty extension.

2: Installation and Startup

This chapter shows how to connect, install and start the AirLink LX40. It also describes the front panel LEDs, and I/O functionality.

Note: Field wiring and connections in hazardous locations must be connected as per the wiring methods requirement for Class 2 circuits mentioned in the National Electric Code and the Canadian Electric Code.

Note: The LX40 Series gateway installation must be done by a qualified technician.

Tools and Materials Required

- Power supply—AC or DC (DC power cable is supplied by Sierra Wireless)
  - Not required if using Power over Ethernet
- A SIM card (provided by your mobile network operator)
- Small slot-head screwdriver (to remove SIM door)
- Computer with Ethernet cable
- LTE MIMO antennas—Main and Diversity
  - Diversity antenna not required for CatM1/NB-IoT
- Wi-Fi antenna (LX40 Wi-Fi model only)

Installation Overview

The steps for a typical installation are:

1. Insert the SIM card—page 11.
2. Mount and ground the LX40 chassis—page 11.
3. Connect the antennas—page 16.
4. Connect the data cables—page 17.
5. Connect the power—page 17.
6. Check the router operation—page 28.
7. Configure the software—page 31.

The following sections describe these steps in detail. Read these sections carefully before performing the installation.

Warning: *The default ACEmanager password is printed on the device label. You should always change the default password after logging in to ACEmanager. However, if the unit must be reset to factory default settings, your custom password may also be reset to default (depending on the Reset Mode configured in ACEmanager). Before installation, please record the default password and store it in a secure place. See also Reset the LX40 to Factory Default Settings on page 32.*

Note: Depending on where you are installing the LX40, you may want to mount the router before connecting the antenna, cables and power.

Step 1—Insert the SIM Card

If the SIM card has not already been installed, insert the SIM card into the router before connecting any external equipment or power to the router.

To install the SIM card:

1. Remove the SIM card cover. Press the tab with a screwdriver while sliding the cover upwards.
2. Orient the SIM card as shown in Figure 2-1 (with the gold contacts facing down).
3. Gently slide the SIM card into the slot until it clicks into place.

    To remove the SIM card, press the SIM card in, and release it. Gently grip the SIM card and pull it out.
4. Replace the SIM card cover.

Note the orientation of notched corner for proper SIM card alignment.
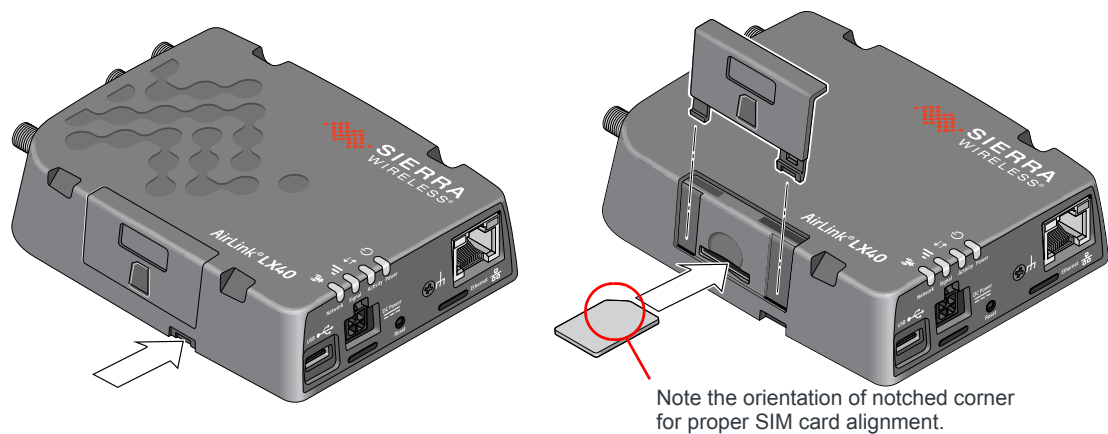
Figure 2-1: Installing the SIM Card

Step 2—Mount and Ground the LX40 Chassis

You can mount the LX40 on a flat surface, and secure it using a mounting bracket (see Flat Mount on page 13). If you are installing the LX40 in a high-vibration environment, you can further secure the LX40 to the mounting bracket using nylon cable ties.

Mount the router where:

*   There is easy access for attaching the cables
*   Cables will not be constricted, close to high amperages or exposed to extreme temperatures

- The front panel LEDs are easily visible
- There is adequate airflow
- It is away from direct exposure to the elements, such as sun, rain, dust, etc.
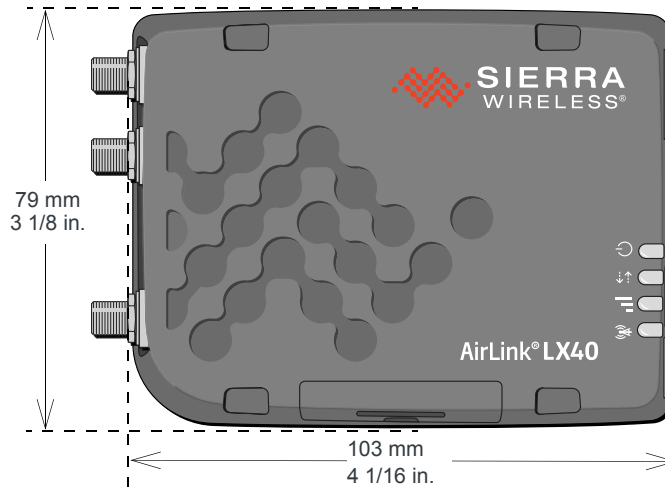

Figure 2-2: Mounting and Grounding the LX40

Grounding the LX40

Sierra Wireless strongly recommends that you always ground the chassis using the grounding point shown in Figure 2-3.

For DC installations (with a fixed "system" ground reference), Sierra Wireless recommends grounding the LX40 chassis to this system ground reference.

To ensure a good grounding reference, connect one end of a short 18 AWG or larger gauge wire with a ring terminal connector to the ground terminal on the LX40 and connect the other end to your main grounding point.

The ground terminal comes with an M2.5 × 6 mm screw. You can use a longer M2.5 screw if the terminal connector on your ground wire requires one.

Note: Do not overtighten the grounding screw. Tighten to a maximum torque of 0.4 kg/cm.
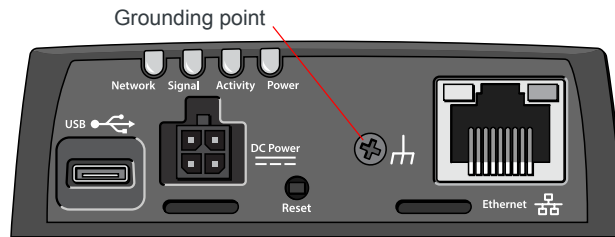

Figure 2-3: Ground connector

Flat Mount

To mount the LX40 permanently to any surface or if you are mounting the LX40 on a DIN rail, order an LX40 mounting bracket kit (P/N 6001221) from Sierra Wireless. The kit contains:

- Mounting bracket
- DIN rail clip (35 mm EN 50022) (see DIN Rail Mount on page 15)
- Screws for attaching the DIN rail clip to the mounting bracket

To mount the LX40 on a flat surface:

1. Attach the bracket to the mounting surface, using the attachment points shown in Figure 2-4.

Holes are Ø 4.3 mm (M4 compatible; use hardware appropriate for your mounting surface)
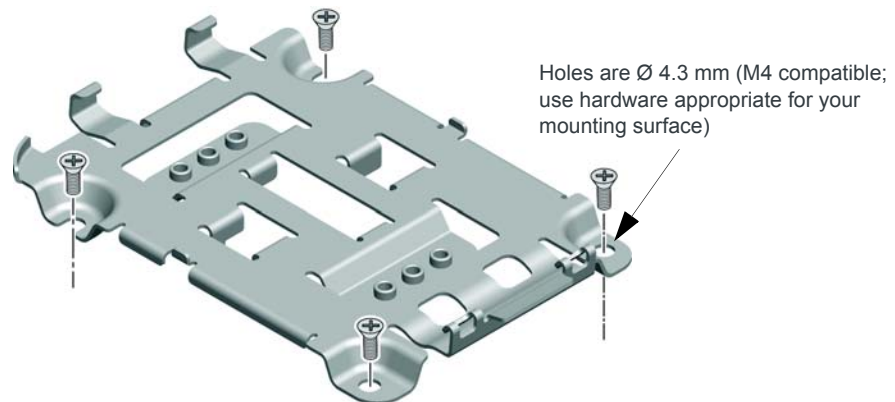
Figure 2-4: Mounting Bracket, showing attachment points

2. Snap the LX40 onto the bracket (see Figure 2-5 on page 14).

   a. Angle the LX40 with the antenna connectors downwards, and fit the bracket clasps against the indentations on the end of the LX40. The raised edge of the bracket should match the rounded corner of the LX40.

   b. Bring the other end of the LX40 down onto the bracket and snap it into place. The bracket clasps should fit into the indentations on the end of the LX40.

Notches for cable ties

Step a: Attach antenna end

Step b: Snap other end into place.

Press the tab to disengage the clasps if removing the LX40.

Raised edge
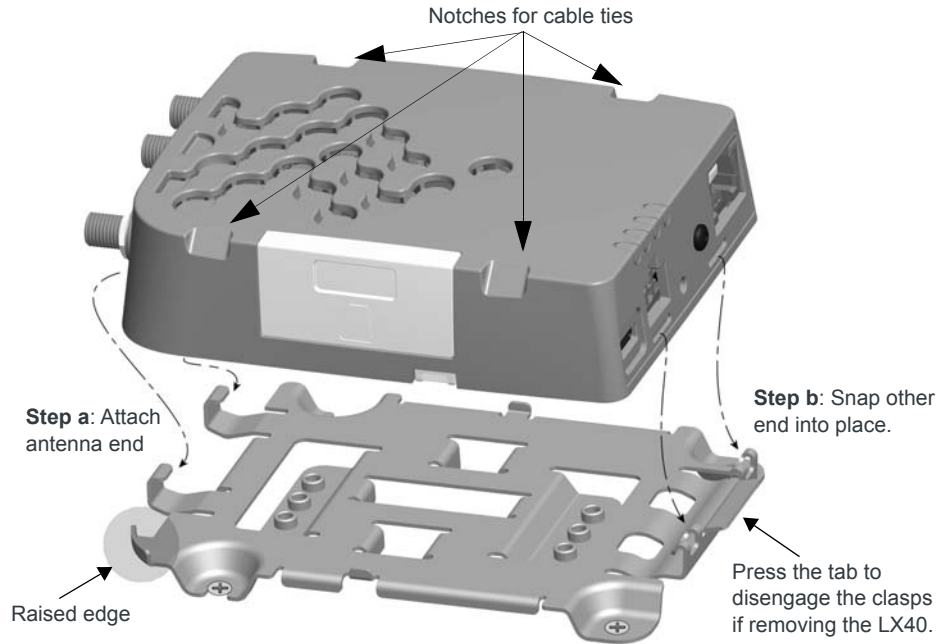
Figure 2-5: Attaching the LX40 to the bracket

Mounting in a High Vibration Environment

Note: If you are mounting the LX40 in a high vibration area, Sierra Wireless strongly recommends using two nylon cable ties to secure the LX40 on the bracket.

1. Thread the ties beneath the bracket.
2. Wrap the ties around the LX40, using the notches in the LX40 casing (see Figure 2-5) to align the ties.
3. Tighten and secure the ties around the LX40 and trim off the excess length of the ties.

DIN Rail Mount

You can mount the LX40 on a DIN rail in a vertical orientation, with the antenna connectors pointing up or down.

Note: The DIN rail mounting clip should only be used on a horizontally-mounted DIN rail.

Ensure spring clip is at the bottom

To mount the LX40 with antenna connectors pointing down, rotate the DIN clip 180 degrees before attaching.
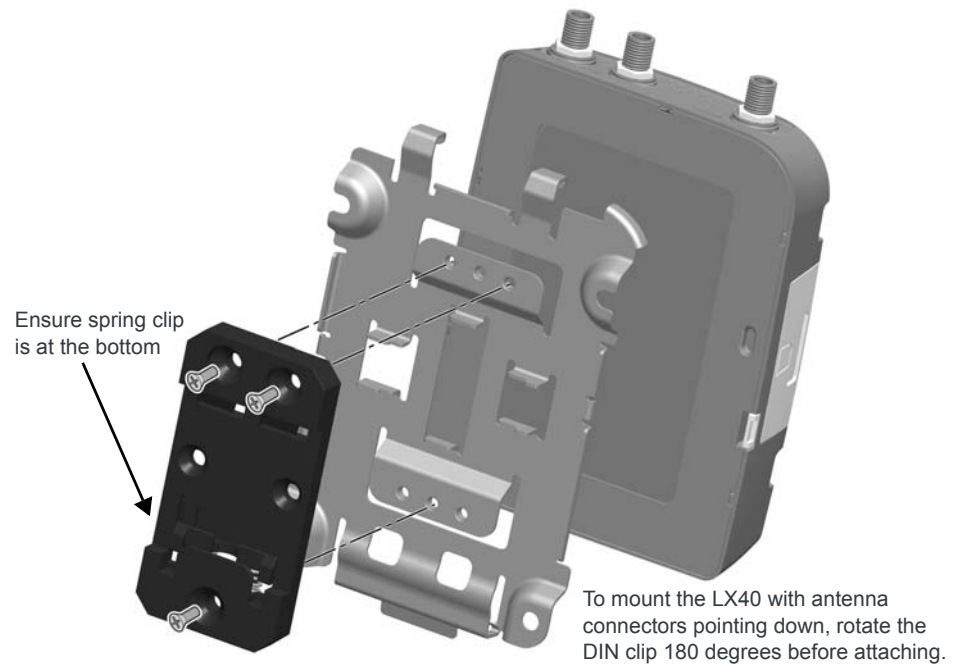
Figure 2-6: Attaching the DIN Rail Mounting Clip

To attach the LX40 to a horizontally mounted DIN rail:

Note: Before installing the LX40 in its final location, you may want to install the SIM card (see page 11), attach antennas (see page 16), power up the device (see page 17) and test the network connectivity (see page 28). After a successful test, you can remove cables and antennas and proceed with the procedure below.

1. Secure the LX40 in the mounting bracket, as described on page 13.

2. Use the screws provided to attach the DIN clip to the bracket. Attach the clip in the direction to achieve the desired position for the LX40. In the final orientation, the spring clip should be at the bottom. Torque the screws to a maximum of 1.1 N-m (10 in-lb.).

3. Attach the DIN rail clip to a horizontal DIN rail, with the spring clip at the bottom.

Step 3—Connect the Antennas

Warning: *This router is not intended for use close to the human body. Antennas should be at least 8 inches (20 cm) away from the operator.*

The LX40 has two SMA female antenna connectors:

- Cellular antenna connector: Primary receive and transmit antenna connector
- Cellular Diversity antenna connector: LTE MIMO and 3G Diversity

The AirLink LX40 with Wi-Fi also has:

- One reverse polarity SMA male connector for the Wi-Fi antenna.
  Sierra Wireless recommends cabling out the antenna.
  The LX40 supports 2.4 GHz (2400–2500 MHz) and 5GHz
  (4900–5900 MHz) Wi-Fi bands. See Wi-Fi Channels Supported on page 39
  for more information.

For regulatory requirements concerning antennas, see Maximum Antenna Gain on page 48.

Note: The antenna should not exceed the maximum gain specified in RF Exposure on page 48. In more complex installations (such as those requiring long lengths of cable and/ or multiple connections), you must follow the maximum dBi gain guidelines specified by the radio communications regulations of the Federal Communications Commission (FCC), Industry Canada, or your country's regulatory body.

To install the antennas:

Note: Take extra care when attaching the antennas to the SMA connectors. Finger tight (approximately 0.6– 0.8 Nm 5–7 in-lb.) is suffi- cient and the max torque should not go beyond 1.1 Nm (10 in-lb.).

1. Connect the cellular antenna to the SMA cellular antenna connector.

   Mount the cellular antenna so there is at least 20 cm between the antenna and the user or bystander.

2. Connect a second antenna to the SMA diversity antenna connector.

   For 3G networks, the second antenna operates as a diversity antenna, provid- ing a second receive path.

   For 4G networks, the second antenna operates as a MIMO antenna, providing a second receive path and a second transmit path.

3. For Wi-Fi-capable routers, connect the Wi-Fi antenna to the SMA Wi-Fi connector.

Note: If the antennas are located away from the router, keep the cables as short as possible to prevent the loss of antenna gain. Route the cables so that they are protected from damage and will not be snagged or pulled on. There should be no binding or sharp corners in the cable routing. Excess cabling should be bundled and tied off. Make sure the cables are secured so their weight will not loosen the connectors from the router over time.
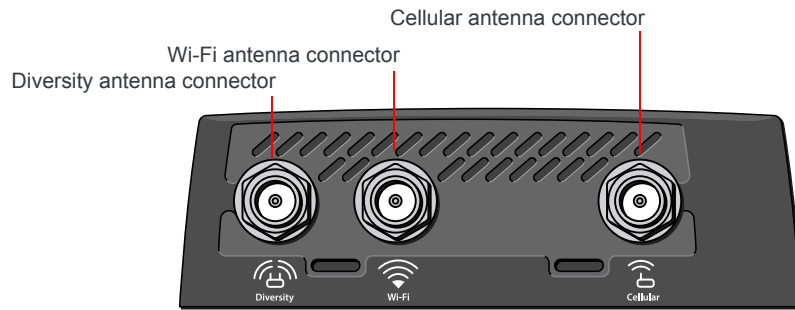
Figure 2-7: Antenna Connectors

Recommended Antenna Separation

The recommended antenna separation is related to the band frequency/wavelength. To accommodate the shortest frequency/longest wavelength band supported by the LX40, Sierra Wireless recommends a minimum antenna separation of 214 mm for best results, and if necessary, a separation of 107 mm for acceptable results.

Table 2-1: Frequency/Wavelength Range and Recommended Antenna Separation for the AirLink LX40

Service	Wavelength Range for LX40	Frequency (MHz)	Wavelength (λ) (mm)	Best Antenna Separation (mm) (1/2 λ)	Good Antenna Separation (mm) (1/4 λ)
LTE	Longest λ	700	428	214	107
LTE	Shortest λ	2600	115	58	29

Step 4—Connect the Data Cables

The LX40 has the following ports for connecting data cables:

- USB (Micro-AB)
- Ethernet (RJ-45)—Use a Cat 5e or Cat 6 Ethernet cable

Step 5—Connect the Power

The AirLink LX40 comes with a 3 meter (10 ft.) DC power cable. You can also purchase an optional AC adapter.

The LX40 can also use Power over Ethernet. An Ethernet cable connected to a compatible[1] network switch or router can supply power to the LX40. No connection to the LX40 power connector (see Figure 2-8 on page 19) is required.

Warning: *Electrical installations are potentially dangerous and should be performed by personnel thoroughly trained in safe electrical wiring procedures.*

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1. The LX40 is a 802.3af Powered Device

The LX40 supports an operating voltage of 7 V–36 V, but because low voltage standby mode is enabled by default, you must supply more than 9 V at startup.

In cases where both PoE and DC power are connected, PoE will power the LX40 when DC voltage is below 20 V.

If you want to operate the router at a lower voltage, you can change the low voltage standby settings once the router is up and running. For more information, refer to the ALEOS Software Configuration User Guide (Services chapter).
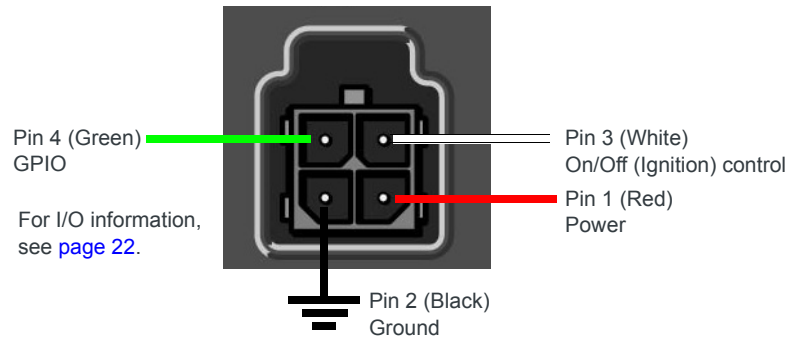
Cable Strain Relief

Sierra Wireless recommends using cable strain relief for installations in high-vibration environments.

Place the cable strain relief within 200 mm (8 in.) of the LX40 to reduce the mass of cable supported by the power connector under vibration. Ideally, the strain relief mounting for the DC cable should be attached to the same object as the LX40, so both the router and cable vibrate together. The strain relief should be mounted such that it does not apply additional stress on the power connector. The cable should not be taut and should not pull the power connector at an angle.

Fusing

For DC installations, Sierra Wireless recommends fusing the power input using a 4 A, fast blow fuse on the V_{in} line, recommended to have no more than ±10% de-rating over the operating temperature range.

Power Connector on the LX40

Pin 4 (Green)
GPIO

For I/O information,
see page 22.

Pin 3 (White)
On/Off (Ignition) control

Pin 1 (Red)
Power

Pin 2 (Black)
Ground

For more information, see wiring diagrams on page 20.

Figure 2-8: DC Power Cable Connections (Colors indicate DC cable wire colors)

Table 2-2: Power Connector Pin and DC Cable Wires

Pin	Name	DC Cable Wire Color	Description	Type
1	Power	Red	Main power supply for device *Note: If you want to turn the LX40 on/off using a control line, Sierra Wireless strongly recommends that you connect the On/Off control line to Pin 3 and apply continuous power on Pin 1.*	PWR
2	Ground	Black	Main device ground	PWR
3	On/Off control	White	For installations where the LX40 is to be turned on/off, use the white wire connected to Pin 3 in the DC cable. The LX40 is off when this pin is either open-circuit or grounded, and on when this pin is connected to power. The LX40 should not be turned off by simply disconnecting the power. Pin 3 can be connected to an external switch. *Note: If you do not connect pin 3 to a switch, you MUST connect it to the positive terminal of your power supply or battery. If you are using a Sierra Wireless AC adapter, the connection is inside the cable.* *Note: When the LX40 is using PoE, On/Off control is ignored.*	I
4	GPIO	Green	User configurable digital input/output or analog voltage sensing input. Connect to switch, relay or external device. For more information, see Step 6—I/O Configuration on page 22 and refer to the ALEOS Software Configuration User Guide.	I/O

Wiring Diagrams

If you do not use the AC power adapter to power the LX40, you can wire the supplied DC cable to your power supply. You have various options for wiring power to the LX40, depending on your application.

Note: If using PoE as a power source, connections to the 4-pin power connector are not required.

Basic Installation with DC Power

For installations using DC power, connect the wires as shown in the figure below. You can configure Low voltage disconnect to force the router into Standby mode when the voltage is low. Voltage is monitored on Pin 1 (red wire).
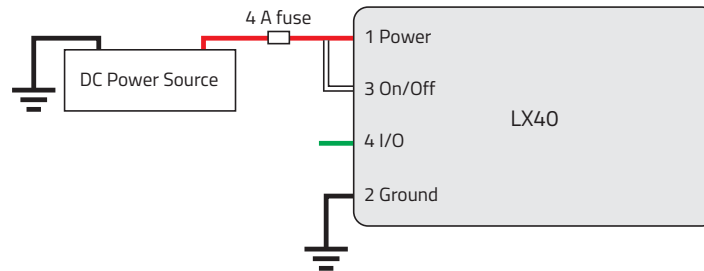

Figure 2-9: Fixed Installation without I/O

- Pin 1 (Power)—Use the red wire in the DC cable to connect Pin 1 to the power source. Include a 4 A, fast blow fuse, recommended to have no more than ±10% de-rating over the operating temperature range, in the input power line. Sierra Wireless recommends using a continuous (unswitched) DC power source.
- Pin 2 (Ground)—Use the black wire in the DC cable to connect Pin 2 to ground. See also Step 2—Mount and Ground the LX40 Chassis on page 11.
- Pin 3 (On/Off control)—Connected to power

Basic Installation with I/O Input Triggered by Standby Mode

If you want to use the I/O to monitor an external device such as a motion detector, remote solar panel, or a remote camera, refer to Figure 2-10. You can configure the I/O line to wake the router up for a configured length of time, and use low voltage disconnect to put the router in Standby mode if the voltage falls below a configured value.
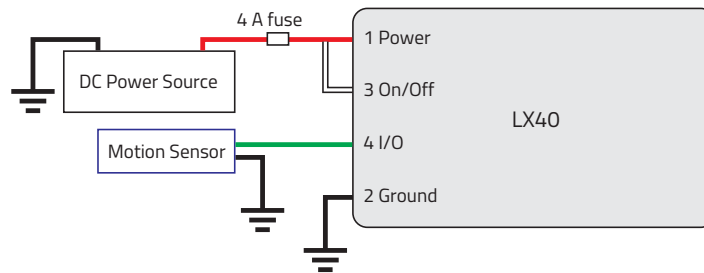
Figure 2-10: Fixed Installation with I/O

- Pin 1 (Power)—Use the red wire in the DC cable to connect Pin 1 to the power source. Include a 4 A, fast blow fuse, recommended to have no more than ±10% de-rating over the operating temperature range, in the input power line. Sierra Wireless recommends using a continuous (unswitched) DC power source.
- Pin 2 (Ground)—Use the black wire in the DC cable to connect Pin 2 to ground. See also Step 2—Mount and Ground the LX40 Chassis on page 11.
- Pin 3 (On/Off control)—Connected to power
- Pin 4 (GPIO)—Use the green wire for I/O configurations. See Step 6—I/O Configuration on page 22.

Step 6—I/O Configuration

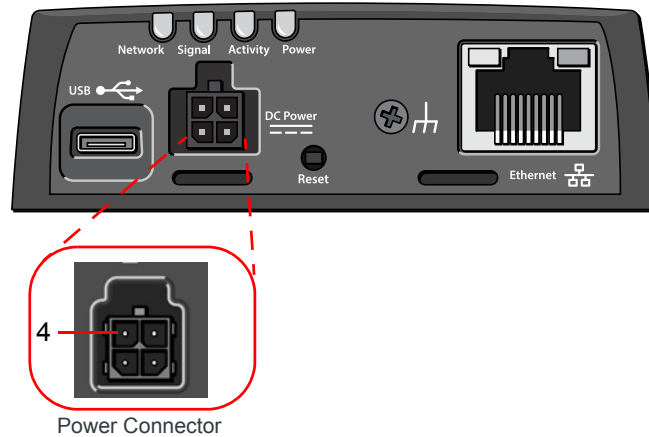You can use Pin 4 on the LX40 power connector for I/O configuration.

Figure 2-11: I/O Pin-out for the LX40 Power Connector

You can use the I/O pin as:

- Pulse counter
  (See Table 2-3 on page 23 and Figure 2-12 on page 23.)
- Digital input
  (See Table 2-3 on page 23 and Figure 2-13 on page 24.)
- High side pull-up/dry contact switch input
  (See Table 2-5 on page 25 and Figure 2-14 on page 25.)
- Analog input
  (See Table 2-6 on page 26 and Figure 2-15 on page 26.)
- Low side current sink
  (See Table 2-7 on page 27 and Figure 2-17 on page 27.)
- Digital outputs/open drain
  (See Table 2-8 on page 28 and Figure 2-18 on page 28.)

For more information, refer to the ALEOS Software Configuration User Guide.

Note: You can configure the GPIO Pin 4 in ACEmanager or ALMS to trigger standby mode, to sink current, or to pull up the voltage. If you are using the I/O line to trigger standby mode, you cannot configure it to sink current or pull up the voltage. Likewise, if you are using the I/O line to either sink current or pull up the voltage, you cannot use it to trigger standby mode.

Note: During bootup, the I/O settings remain in their default state: the internal pull-up resistor is disabled, and output current sink switch is open. After bootup, any custom I/O settings are applied. This may take approximately 30 seconds after the gateway is restarted or powered on.

You can use the I/O pin in conjunction with events reporting to configure the LX40 to send a report when the state of the monitored router changes, for example when a switch is opened or closed. For more information, refer to the ALEOS Software Configuration User Guide (Events Reporting chapter).

Pulse Counter

You can use the green wire to connect Pin 4 to a pulse counter. The digital pulse counter is not available in Standby mode.
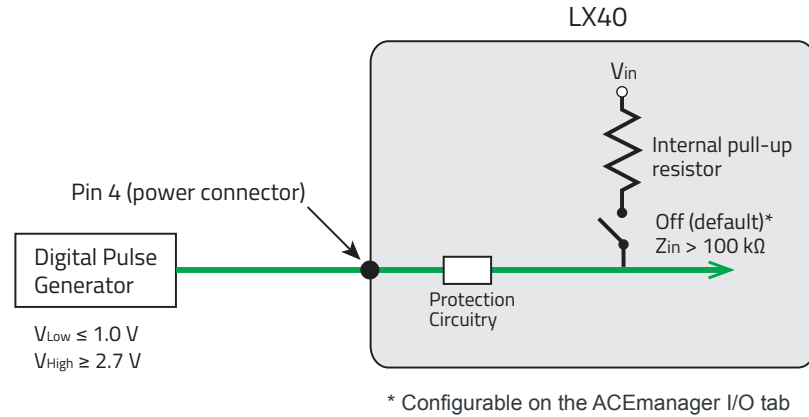
Figure 2-12: Digital Input / Pulse Counter

Maximum frequency: 140 Hz

Duty cycle: 20%–80%

Note: Values may vary, depending on signal noise.

Table 2-3: Pulse Counter

Pull-up	State	Minimum	Typical	Maximum
Off	Low	—	—	1.0 V
	High	2.7 V	—	V_{in}

Digital Input

You can use the green wire to connect Pin 4 to a digital input to detect the state of a switch, or to monitor an external device such as a motion detector, a remote solar panel, or a remote camera. Digital input can also be used with the standby timer.

The primary digital input of Pin 4 on the power connector can be used to wake the router from standby.

Figure 2-13: Digital Input

Table 2-4: Digital Input

Pull-up	State	Minimum	Typical	Maximum
Off	Low	—	—	1.0 V
	High	2.7 V	—	V_{in}

High Side Pull-up / Dry Contact Switch Input

You can use the green wire to connect Pin 4 to a dry contact switch. The dry contact switch is not available in Standby mode.

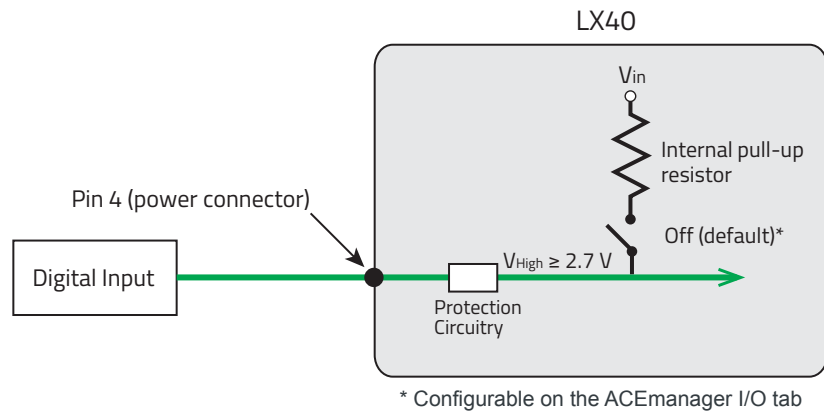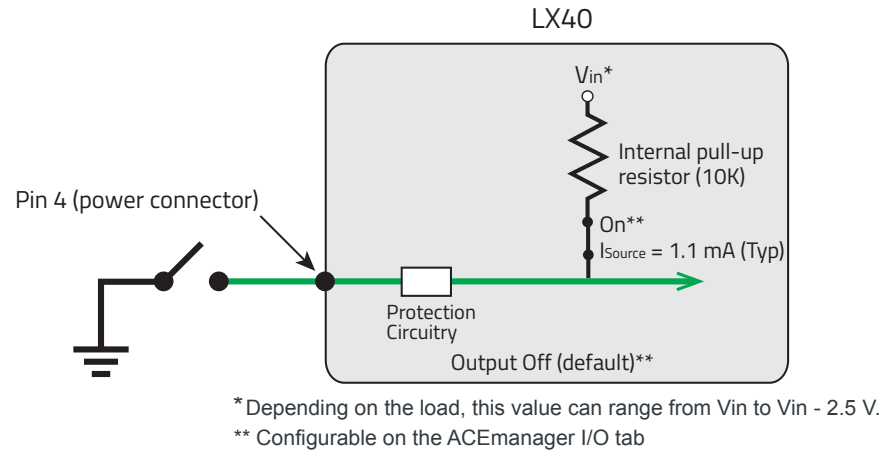*Depending on the load, this value can range from Vin to Vin - 2.5 V.

** Configurable on the ACEmanager I/O tab

Figure 2-14: High Side Pull-up / Dry Contact Switch Input

Table 2-5: High Side Pull-up / Dry Contact Switch Input

	Minimum	Typical	Maximum	Comments
Source Current	0.6 mA V_{in} = 7 V	1.1 mA V_{in} = 12 V	3.5 mA V_{in} = 36 V	Maximum current the voltage output can provide (depends on V_{in})
V_{out}	V_{in} - 2.5 V	—	V_{in}	The voltage on Pin 4 when the high side pull-up is enabled (depends on V_{in} and power consumption)

Analog Input

You can connect Pin 4 on the power connector to an analog sensor. As an analog input (voltage sensing pin), the router monitors voltage changes in small increments. This allows you to monitor equipment that reports status as an analog voltage.

The pin detects inputs of 0.5−5 V or 0.5−10 V referenced to ground. When used with a sensor to transform values into voltages, the pin can monitor measurements such as temperatures, sensors, or input voltage.

Using ACEmanager, you can select the range of voltage to be monitored to be 0−5 V or 0−10 V. For low input voltages, 0−5 V provides better accuracy.
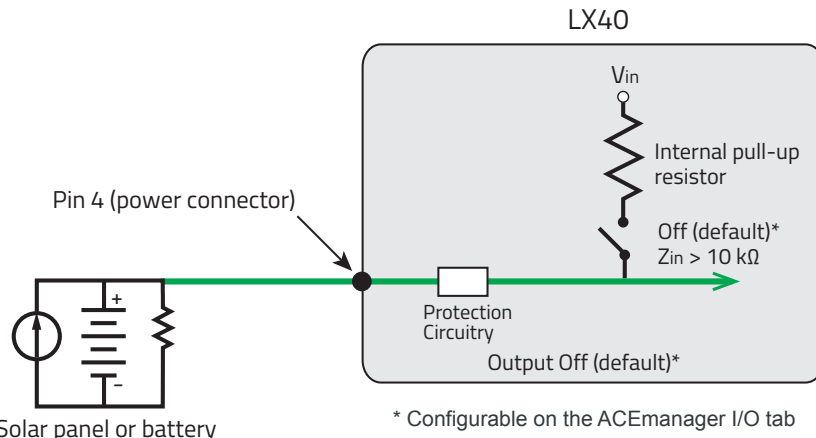
Figure 2-15: Analog Input

Table 2-6: Analog Input

Pull-up		Minimum	Typical	Maximum
Off	**Analog Input Range**	0.5 V	—	5 V, 10 V (configurable)
	Analog Input Accuracy	-1.5%	0.50%	1.5%

Data sampling is handled by a dedicated microprocessor. In order to filter noisy signals, twenty measurements are taken over a 250 ms interval. The measurements are averaged to generate a sample. If the change since the last sample is significant, a notification is sent to the CPU for updating the current value displayed in the user interface and for use by Events Reporting.

Changes are considered significant if the change is 200 mV or more (when the range of monitored voltage is 0–5 V) or 350 mV or more (when the range of monitored voltage is 0–10 V). If there has not been a significant change to the parameter being monitored, the CPU reads a sample every 2.5 minutes, which detects small changes.
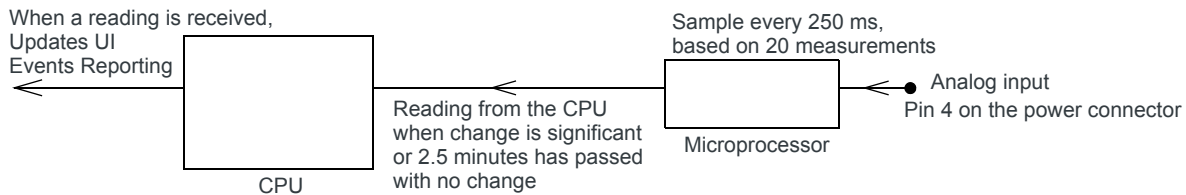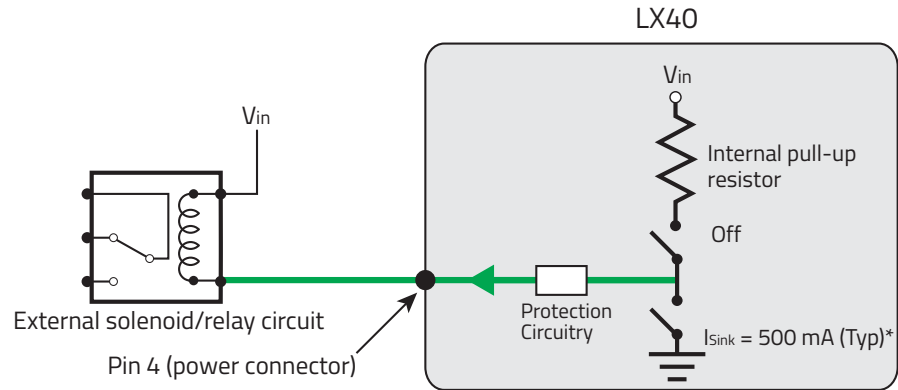

Figure 2-16: Analog Input Sampling and Reading

Note: The same method is used to sample the input voltage and the internal board temperature for Events Reporting. The significant changes are 300 mV for the input voltage and 1 ºC for the board temperature.

Low Side Current Sink Output

You can use Pin 4 as a low side current sink; for example, to drive a relay.

* See Table 2-7 on page 27 for more details.

Figure 2-17: Low Side Current Sink

Table 2-7: Low Side Current Sink

Pull-up	State	Minimum	Typical	Maximum	Comments
Off	On	300 mA	500 mA	850 mA	I_Typical = 25°C I_Min = 65°C I_Max = -30°C
Off	Off	—	0 mA	—	V_{in} = 12

Note: The router protection circuitry has a high-impedance (~200 kΩ) path to ground. If Pin 4 is connected to 12 V, there will be a small current flow (~100 µA) into Pin 4 during bootup. This flow is countered when the internal pull-up resistor (10 kΩ) becomes active after bootup. Depending on your application, you may need to install an external pull-up resistor (10 kΩ) in order to nullify the small input current flow for the first 30 seconds during bootup.

Digital Output/Open Drain

Digital output/open drain, used to drive an external digital input, for example, is available using Pin 4 on the power connector.
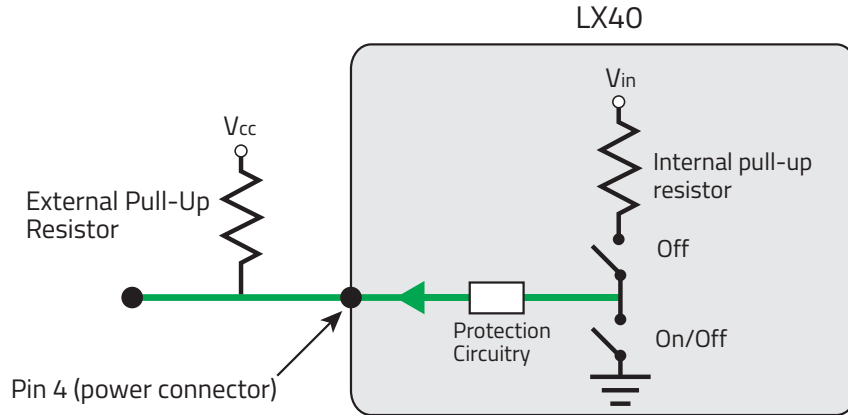

Figure 2-18: Digital Output/Open Drain

Table 2-8: Digital Output /Open Drain

Pull-up	State	Minimum	Typical	Maximum	Comments
Off	Off	Open Circuit	—	—	—
	Active Low	—	—	0.5 V	5 mA, ≤ 5 V

Step 7—Check the Router Operation

1. When power is supplied to the AirLink LX40 router, it powers up automatically, as indicated by the flashing LEDs. If it does not turn on, ensure that the:

- Power connector is plugged in and supplying voltage greater than 9 VDC.

Note: Although the LX40 operates in the range 7–36 VDC, low voltage standby mode is enabled by default. In order to avoid the router powering on in standby mode, ensure that it is supplied with more than 9 VDC at startup. (You can change the low voltage standby mode settings once the router is operational. If the Power LED is red, the router is in standby mode.)

- On/Off control (pin 3) is connected to the battery or power source (see Step 5—Connect the Power on page 17 for details).

LED Behavior

Table 2-9: LED Behavior

LED	Color / Pattern	Description
Power ⏻	**Off**	No power, or input voltage ≥ 36 VDC or ≤ 7 VDC
	Solid Green	Power is present.
	Solid Red	Standby mode If you want to operate the router using less than 9 V, change the Low Voltage Standby settings (In ACEmanager, see Services > Power Management). *Note: You can configure the Power LED to flash slowly or turn off during Low Voltage Standby mode. In ACEmanager, see Services > Power Management.*
	Solid Amber	Entering low power mode or system low level boot.
	Flashing Green	When you press the Reset button for less than 5 seconds, flashing green indicates when to release the reset button to reboot the router.
	Flashing Red	When you press the Reset button for 5–20 seconds, flashing red indicates when to release the Reset button to reset the router to the factory default settings.
	Flashing Amber	When you press the Reset button for more than 20 seconds, flashing amber indicates when to release the Reset button to enter Recovery mode. (See Recovery Mode on page 33.)
Activity ← ·· ··→	**Flashing Green**	Traffic is being transmitted or received over the WAN interface.
	Flashing Red	Traffic is being transmitted or received over the serial port. This behavior only appears if the LX40 is configured to display it.
	Flashing Amber	Traffic is being transmitted or received over both the WAN interface and the serial port. This behavior only appears if the LX40 is configured to display it.
Signal ▂▃▄	**Solid Green**	Good signal (equivalent to 3–5 bars)
	Solid Amber	Fair signal (equivalent to 2 bars)
	Flashing Amber	Poor signal (equivalent to 1 bar) If possible, Sierra Wireless recommends moving the router to a location with a better signal.
	Flashing Red	Inadequate (equivalent to 0 bars) Sierra Wireless recommends moving the router to a location with a better signal.

Table 2-9: LED Behavior

LED	Color/Pattern	Description
	Note: The quality of the signal strength is measured using the appropriate parameters for the radio technology in use.	
Network	**Solid Green**	Connected to an LTE network
	Solid Amber	Connected to a 3G or 2G network
	Flashing Green	Connecting to the network
	Flashing Green (3 sec. on/1 sec. off)	WAN over Wi-Fi (LX40 is in Wi-Fi client mode)
	Flashing Red	No network available
	Flashing Red/Amber	Network Operator Switching is enabled, but the router is unable to locate the required firmware. For more information, refer to the ALEOS Software Configuration User Guide (Admin chapter).
ALL	**Green LED chase**	Radio module reconfiguration/firmware update or Network Operator Switching is in progress
	Amber LED chase	ALEOS software update is in progress
	Solid Amber	ALEOS software update complete
	Red LED chase	Recovery mode

Ethernet LEDs

The connector has two LEDs that indicate speed and activity. When looking into the connector:

- Activity—The right LED indicates the link status:
  - Solid—Link
  - Blinking Amber—Activity
  - Off—No link
- Connection Speed—The left LED indicates the Ethernet connection speed:
  - Solid Green—1000 Mbps (Gigabit)
  - Off—10/100 Mbps

Step 8—Configure the Software

You can configure the ALEOS software on the LX40 using:

- ACEmanager (browser-based application)
- AirLink Management Service (cloud-based application)
- AirLink Mobility Manager (unified software platform deployed in the enterprise data center)
- AT Commands

Configuring with ACEmanager

To access ACEmanager:

1. Connect a laptop to the router with an Ethernet cable.

2. Launch your web browser and go to **http://192.168.13.31:9191**.

Note: It takes the router from 1 to 2 minutes to respond after power up.
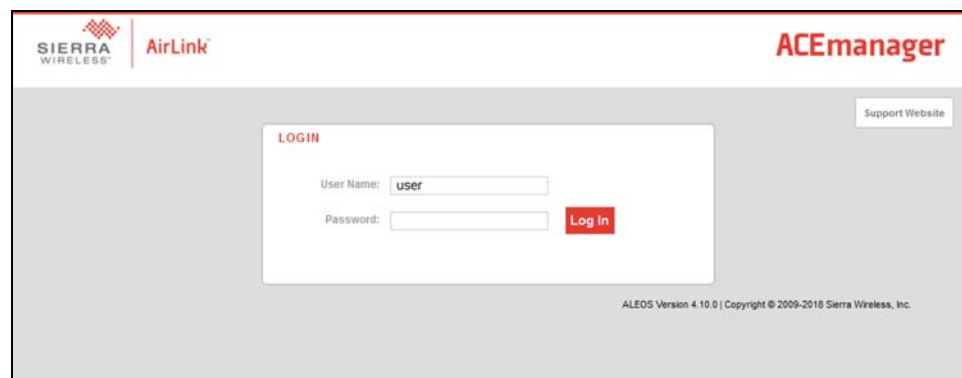
Figure 2-19: ACEmanager login window

3. Enter the default password (printed on the device label) and click Log In.

Note: For system security, ensure that you change the default password as soon as possible.

4. Refer to the ALEOS Software Configuration User Guide for information on how to use ACEmanager to configure your LX40.

Configuring with AirLink Management Service

AirLink Management Service (ALMS) allows remote management of all your routers from one user interface.

Some of its features include:

- Centralized, remote monitoring for all your AirLink routers
- Continuous status monitoring of important health data such as signal strength
- Location monitoring, including world map views

- Complete ALEOS reporting and configuration, including historical views of ALEOS information
- Configure individual routers or use templates to perform batch configurations of your AirLink routers
- Single-click over-the-air firmware updates to all your routers
- Compatible with all carriers or mobile network operators

To get started, either call your AirLink reseller or visit:
www.sierrawireless.com/ALMS

Configuring with AMM

AirLink Mobility Manager (AMM) is a Network Management solution that enables simplified management, control and monitoring of connected AirLink routers. AMM is a licensed, unified software platform deployed in the enterprise data center. It enables:

- Mobile network and asset management
- Over-the-air registration, configuration and software updates
- Consolidated network view of an entire fleet, in-field applications and mobile assets, using a virtual dashboard to monitor, report, manage, and trouble-shoot all mobile resources as required.

If you require a network management solution deployed in your data center, contact your Sierra Wireless sales representative for a demonstration of the AMM capabilities.

Configuring with AT Commands

For a complete list of AT commands, refer to the ALEOS Software Configuration User Guide.

Reboot the LX40

To reboot the LX40, either:

- On the router, use a tool such as a paper clip or small screwdriver to press the Reset button for less than 5 seconds. (Release the button when the Power LED flashes green.) The reset button is recessed approximately 5 mm (1/4 inch), which prevents casual use of a pen for resetting the router. The Reset button is small, so ensure that the tool fully contacts the button.
- In ACEmanager, click the Reboot button on the toolbar.

Reset the LX40 to Factory Default Settings

To reset the router to the factory default settings:

- In ACEmanager, go to Admin > Advanced and click the Reset to Factory Default button.

Note: When you use ACEmanager to reset the router to the factory default settings, some settings such the user password, network ID, network password, custom APNs, low voltage standby are preserved by default. However, you can configure the LX40 Reset Mode to reset all values, including the user password. For more details, refer to the ALEOS Software Configuration User Guide (Admin chapter).

–Or–

*   On the router, press the Reset button for between 5 and 20 seconds.
    (Release the button when the Power LED flashes red.)
    Once the LEDs resume their normal operating behavior, the reset is complete.

Warning: *Using the Reset button as described above resets **all** settings to default, including the user password, no matter what Reset Mode you have configured in ACEmanager. The Reset button can be disabled in ACEmanager if required. Before installation, please record the default password on the device label and store it in a secure place.*

Recovery Mode

If the router fails to boot properly, it automatically enters recovery mode, or, if the router is unresponsive to ACEmanager input and AT commands, you can manually put the router into recovery mode.

Recovery mode enables you to update the ALEOS software and return the router to working order. (For details, refer to the ALEOS Software Configuration User Guide—Configuring your router chapter.)

To enter Recovery mode manually:

*   On the router, press the Reset button for more than 20 seconds. (Release the button when the Power LED flashes amber.)

To recover the router:

*   Update ALEOS using the Recovery mode interface. Once the new ALEOS version is successfully uploaded and installed, the router reboots and exits recovery mode. When the process is complete, the ACEmanager login screen appears.

Note: After the recovery, you need to reload the radio module firmware store and templates.

To exit Recovery mode, if it has been inadvertently entered, do one of the following:

*   Press the reset button on the router to reboot it.
*   Click the Reboot button on the Recovery screen.
*   Wait 10 minutes. If no action is taken within 10 minutes of the device entering Recovery mode (for example, if the Recovery screen has not been loaded by the web browser), it automatically reboots and exits Recovery mode.

For more information, refer to the ALEOS Software Configuration User Guide (Gateway Configuration chapter).

3: Specifications

This chapter describes the LX40 router specifications.

Certification and Interoperability

Note: All certifications listed below are pending. Some are in progress; others are planned.

Emissions/Immunity	• FCC • Industry Canada
Safety	• CB Scheme • UL 60950
Industry Certification for Vehicles	• ISO7637-2 • SAE J1455 (Shock & Vibration)
Environmental Compliance	• RoHS 2011/65/EU (RoHS 2) • WEEE • REACH
GSM/HSPA+ Certifications	• PTCRB • GCF-CC • RED

Mobile Network Operator Certification

Note: Certifications listed below are pending. Some are in progress; others are planned.

- Verizon Wireless
- AT&T
- T-Mobile USA
- Rogers[1]
- Bell Mobility[1]
- Telus[1]

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1. Certification planned

Network Technology

LTE and HSPA

For a list of supported bands, see Table 3-3 on page 40 and Table 3-4 on page 40.

Environmental Testing

Test Method	Category	Description
MIL-STD-810G, Test method 514.6	Vibration	Frequency range: 5 Hz–500 Hz Spectrum level: 2.24G on all axes for 8 hours/axis Operating mode: powered on
MIL-STD-810G, Test method 516.6, Procedure 1	Mechanical Shock	Half-sine 40G, 15–23 ms, (+/-X, +/-Y, +/-Z directions, 10 times per axis) Operating mode: powered on
MIL-STD-810G, Test methods 501.5, 502.5	Temperature	Rugged category: -30 °C to 65 °C 2-hour soak each temp high/low 3 cycles ramp <= 3 °C/minute Operating mode: powered on
MIL-STD-810G, Test methods 501.5, 502.5	Temperature	Rugged category: -40 °C to 85 °C 2-hour soak each temp high/low 50 cycles ramp <= 3 °C/minute Operating mode: unpowered
MIL-STD-810G, Test method 507.5	Humidity	10 × 48-hour cycles: • Before starting cycles, condition to 23 °C and 50% relative humidity for 24 hours • 2-hour ramp to 60 °C (90% humidity), hold 6 hours • 8-hour ramp down to 30 °C (85% to 90% relative humidity), hold 8 hours • After finishing cycles, condition to 23 °C and 50% relative humidity for one hour Operating mode: powered on
IEC 61000-4-2	Electrostatic Discharge	+/-2 kV, +/-4 kV, +/-6 kV, +/-8 kV (Contact and Air) +/-15 kV (Air at antenna connector) Operating mode: powered on
IEC 60068-2-32	Free Fall Test	1 m drop height 6 drops onto concrete, 2 per axis: X, Y, Z Operating mode: unpowered

Test Method	Category	Description
IEC 60068-2-70 Part 2, Test Xb	Marking	The markings are rubbed with water for 10 cycles, then with lubricating oil for 10 cycles. Operating mode: unpowered
ISTA 2A 2001, test categories 1, 4, 5, & 6	Package	In shipping packaging. Cargo vibration and drop test.

Host Interfaces

Antenna connectors	• On all units:
	  • Cellular SMA
	  • SMA Diversity
	• On units with Wi-Fi option:
	  • One RP SMA Wi-Fi

USB	*Note: Do not use the USB port in a potentially explosive environment.*
	
	• USB 2.0 Micro-AB connector complies with USB Version 2.0 for high speed operation
	• Can be configured to operate in one of two modes:
	  • Virtual Ethernet Port: The LX40 behaves as if the PC were connected to an Ethernet port, allowing access to the Internet and the LX40's internal web server. This is the default setting.
	  • Virtual Serial Port: The LX40 behaves as if it was connected to a standard serial port. The primary use of this interface is for the AT command line interface of ALEOS and for diagnostic access to the radio module.
	  By default, the USB port is configured as a virtual Ethernet port.
	• A Windows driver must be installed on the PC in order to support USB use. The drivers are available for download on Sierra Wireless' support web site: source.sierrawireless.com/resources/airlink/software_down-loads/airlink_usb_driver/
	• The ALEOS Software Configuration User Guide contains the details of USB mode configuration and driver installation.
	• Sierra Wireless recommends you:
	  • Use a USB 2.0 cable
	  • Connect directly to your computer for best throughput.

Ethernet	• 10/100/1000 Base-T RJ-45 Ethernet • Auto-crossover support • Auto-negotiation detects the speed of the connecting device

SIM Card Interface

The LX40 has one 6-pin SIM socket for a mini-SIM (2FF) SIM card, operated at 1.8 V/3.3 V. This interface is compliant with the applicable 3GPP standards for USIM.

Mechanical Specifications

For mechanical drawings, dimensions, and weight, see Mechanical Specifications on page 46.

- Housing—The LX40 is made of rugged injection-molded plastic.
- RoHS2—The LX40 complies with the Restriction of Hazardous Substances Directive 2011/65/EU (RoHS2). This directive restricts the use of hazardous materials in the manufacture of various types of electronic and electrical equipment.

Screw Torque Settings

Antennas: Finger tight (5–7 in-lb) is sufficient. The max torque should not go beyond 1.1 N-m (10 in-lb).

Operating Voltage

By default, the router is configured to enter Standby mode at 9 V. If you want to operate the router at less than 9 volts, power it on using at least 9 V, launch ACEmanager, go to Services > Power Management and adjust the Standby mode settings.

The maximum ripple voltage to guarantee analog input accuracy must be 100 mVpp.

Power Specifications

Power over Ethernet: 13 W, Type 1 Power Device, compatible with IEEE 802.3af.

Table C-1: DC Power Supply Specifications

Pin	Name	Specification	Parameter	Minimum	Maximum
1	VCC	Voltage range	VCC	7 V	36 V

Table C-2: On/Off Control Specifications

Pin	Name	Current Sink	Specification	Parameter	Minimum	Maximum
3	On/Off control, Ignition Sense (Input only)	240 kΩ	Input low state voltage (maximum)	V_{IL}	—	1.0 V
			Input high state voltage (minimum guaranteed)	V_{IH}	2.5 V	V_{in}

*Note: If you do not connect this pin to the ignition, you **MUST** connect it to the positive terminal of your power supply or battery. The device looks for a qualified voltage on this pin as part of the power up sequence. If it doesn't see it, the device will not turn on. If you are using a Sierra Wireless AC power adapter, the connection is inside the cable.*

Note: The Pin 3 connection for On/Off control is not required when using PoE.

Protocols

- Network: TCP/IP, UDP/IP, DNS
- Routing: NAT, Host Port Routing, DHCP, PPPoE, VLAN, VRRP, Reliable Static Route
- Applications: SMS, Telnet/SSH, Reverse Telnet, SMTP, SNMP, SNTP

Wi-Fi Performance

Technology	Frequency	MIMO	20 MHz[a]	40 MHz[a]	80 MHz[a]
802.11n	2.4 GHz	1 × 1	72 Mbps		
	5 GHz	1 × 1	100 Mbps	150 Mbps	
802.11ac	5 GHz	1 × 1	87 Mbps	200 Mbps	433 Mbps

a. Theoretical maximum performance. Actual data rates vary.

Wi-Fi Channels Supported

2.4 GHz	1 - 2.412 GHz 2 - 2.417 GHz 3 - 2.422 GHz 4 - 2.427 GHz 5 - 2.432 GHz 6 - 2.437 GHz 7 - 2.442 GHz 8 - 2.447 GHz 9 - 2.452 GHz 10 - 2.457 GHz 11 - 2.462 GHz
5 GHz	Ch. 36 (5.180 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 40 (5.200 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 44 (5.220 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 48 (5.240 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 149 (5.745 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 153 (5.765 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 157 (5.786 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 161 (5.805 GHz) 20 MHz, 20/40 MHz, 80 MHz Ch. 165 (5.825 GHz) 20 MHz

Radio Frequency Bands

To determine which radio module your gateway has, refer to the label on the bottom of the gateway, or in ACEmanager, go to Status > About, and check the Radio Module Type field.

Note: All carrier radio module firmware support indicated in Table 3-3, Table 3-4, Table 3-5, Table 3-6 and Table 3-7 is provisional.

Table 3-3: LX40 Radio Module WP7601 North America and EMEA

Radio Technology	Module Firmware	Band	Frequencies
	Verizon Wireless		
LTE	✔	Band 4	Tx: 1710–1755 MHz Rx: 2110–2155 MHz
	✔	Band 13	Tx: 777–787 MHz Rx: 746–756 MHz

Table 3-4: LX40 Radio Module WP7603 North America

Radio Technology	Module Firmware		Band	Frequencies
	Generic	AT&T		
LTE	✔	✔	Band 2	Tx: 1850–1910 MHz Rx: 1930–1990 MHz
	✔	✔	Band 4	Tx: 1710–1755 MHz Rx: 2110–2155 MHz
	✔	✔	Band 5	Tx: 824–849 MHz Rx: 869–894 MHz
	✔	✔	Band 12	Tx: 699–716 MHz Rx: 729–746 MHz
WCDMA	✔	✔	Band 2	Tx: 1850–1910 MHz Rx: 1930–1990 MHz
	✔	✔	Band 4	Tx: 1710–1755 MHz Rx: 2110–2155 MHz
	✔	✔	Band 5	Tx: 824–849 MHz Rx: 869–894 MHz

Table 3-5: LX40 Radio Module WP7607 EMEA

Radio Technology	Module Firmware Generic	Band	Frequencies
LTE	✔	Band 1	Tx: 1920–1980 MHz Rx: 2110–2170 MHz
	✔	Band 3	Tx: 1710–1785 MHz Rx: 1805–1880 MHz
	✔	Band 7	Tx: 2500–2570 MHz Rx: 2620–2690 MHz
	✔	Band 8	Tx: 880–915 MHz Rx: 925–960 MHz
	✔	Band 20	Tx: 832–862 MHz Rx: 791–821 MHz
	✔	Band 28	Tx: 703–748 MHz Rx: 758–803 MHz
WCDMA	✔	Band 1	Tx: 1920–1980 MHz Rx: 2110–2170 MHz
	✔	Band 8	Tx: 880–915 MHz Rx: 925–960 MHz
GSM/GPRS/ EDGE	✔	E-GSM 900	Tx: 880–915 MHz Rx: 925–960 MHz
	✔	DCS 1800	Tx: 1710–1785 MHz Rx: 1805–1880 MHz

Table 3-6: LX40 Radio Module WP7609 Australia and New Zealand

Radio Technology	Module Firmware		Band	Frequencies
	Generic			
LTE	✔		Band 1	Tx: 1920−1980 MHz Rx: 2110−2170 MHz
	✔		Band 3	Tx: 1710−1785 MHz Rx: 1805−1880 MHz
	✔		Band 5	Tx: 824−849 MHz Rx: 869−894 MHz
	✔		Band 7	Tx: 2500−2570 MHz Rx: 2620−2690 MHz
	✔		Band 8	Tx: 880−915 MHz Rx: 925−960 MHz
	✔		Band 28	Tx: 703−748 MHz Rx: 758−803 MHz
WCDMA	✔		Band 1	Tx: 1920−1980 MHz Rx: 2110−2170 MHz
	✔		Band 5	Tx: 824−849 MHz Rx: 869−894 MHz
	✔		Band 8	Tx: 880−915 MHz Rx: 925−960 MHz

Table 3-7: LX40 Radio Module WP7702 Worldwide

Radio Technology	Module Firmware		Band	Frequencies
	Generic			
LTE	✔		Band 1	Tx: 1920−1980 MHz Rx: 2110−2170 MHz
	✔		Band 2	Tx: 1850−1910 MHz Rx: 1930−1990 MHz
	✔		Band 3	Tx: 1710−1785 MHz Rx: 1805−1880 MHz
	✔		Band 4	Tx: 1710−1755 MHz Rx: 2110−2155 MHz
	✔		Band 5	Tx: 824−849 MHz Rx: 869−894 MHz

Table 3-7: LX40 Radio Module WP7702 Worldwide

Radio Technology	Module Firmware	Band	Frequencies
	Generic		
	✔	Band 8	Tx: 880–915 MHz Rx: 925–960 MHz
	✔	Band 12	Tx: 699–716 MHz Rx: 729–746 MHz
	✔	Band 13	Tx: 777–787 MHz Rx: 746–756 MHz
	✔	Band 17	Tx: 704–716 MHz Rx: 734–746 MHz
	✔	Band 18	Tx: 815–830 MHz Rx: 860–875 MHz
	✔	Band 19	Tx: 830–845 MHz Rx: 875–890 MHz
	✔	Band 20	Tx: 832–862 MHz Rx: 791–821 MHz
	✔	Band 26	Tx: 814–849 MHz Rx: 859–894 MHz
	✔	Band 28	Tx: 703–748 MHz Rx: 758–803 MHz
GSM/GPRS	✔	GSM 850	Tx: 824–849 MHz Rx: 869–894 MHz
	✔	E-GSM 900	Tx: 880–915 MHz Rx: 925–960 MHz
	✔	DCS 1800	Tx: 1710–1785 MHz Rx: 1805–1880 MHz
	✔	PCS 1900	Tx: 1850–1910 MHz Rx: 1930–1990 MHz

Radio Module Conducted Transmit Power

The following tables provide radio module conducted transmit power specifications. The radio module type is printed on the label on the bottom of the router and is available in ACEmanager (Status > About).

Table 3-8: Radio Module WP7601 Conducted Transmit Power

Band	Conducted Tx Power (dBm)	Notes
LTE		
Bands 4, 13	+23±1	Connectorized (Class 3)

Table 3-9: Radio Module WP7603 Conducted Transmit Power

Band	Conducted Tx Power (dBm)	Notes
LTE		
Bands 2, 4, 5, 12	+23±1	Connectorized (Class 3)
WCDMA		
Band 2 Band 4 Band 5 (UMTS 850 12.2 kbps)	+23±1	Connectorized (Class 3)

Table 3-10: Radio Module WP7607 Conducted Transmit Power

Band	Conducted Tx Power (dBm)	Notes
LTE		
Bands 1, 3, 7, 8, 20, 28	+23±1	Connectorized (Class 3)
WCDMA		
Bands 1, 8	+23±1	Connectorized (Class 3)
GSM/GPRS/EDGE		
E-GSM 900	+33±1	GMSK mode (Class 4)
	+27±1	8PSK mode (Class E2)
DCS 1800	+30±1	GMSK mode (Class 1)
	+26±1	8PSK mode (Class E2)

**Table 3-11: Radio Module WP7609 Conducted Transmit Power**

Band	Conducted Tx Power (dBm)	Notes
LTE		
Bands 1, 3, 5, 7, 8, 28	+23±1	Connectorized (Class 3)
WCDMA		
Bands 1, 5, 8	+23±1	Connectorized (Class 3)

Table 3-12: Radio Module WP7702 Conducted Transmit Power

Band	Conducted Tx Power (dBm)	Notes
LTE		
Bands 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 26, 28	+23±1	Connectorized (Class 3)
GSM/GPRS/EDGE		
GSM 850	+32±1	GMSK mode (Class 4)
	+27±1	8PSK mode (Class E2)
E-GSM 900	+32±1	GMSK mode (Class 4)
	+27±1	8PSK mode (Class E2)
DCS 1800	+29±1	GMSK mode (Class 1)
	+26±1	8PSK mode (Class E2)
PCS 1900	+29±1	GMSK mode (Class 1)
	+26±1	8PSK mode (Class E2)

Mechanical Specifications

Front view

25 mm
(1 in.)
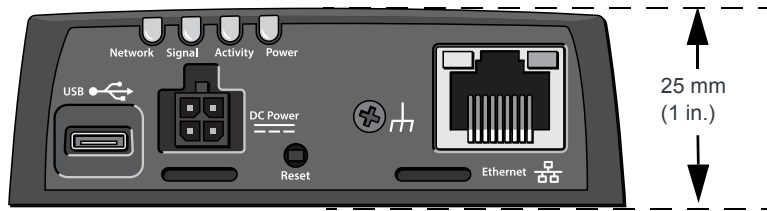
Weight: 0.76 kg (1.68 lb.)

Top view

AirLink® LX40

79 mm
(3 1/8 in.)

103 mm (4 1/16 in.)

111 mm (4 3/8 in.)
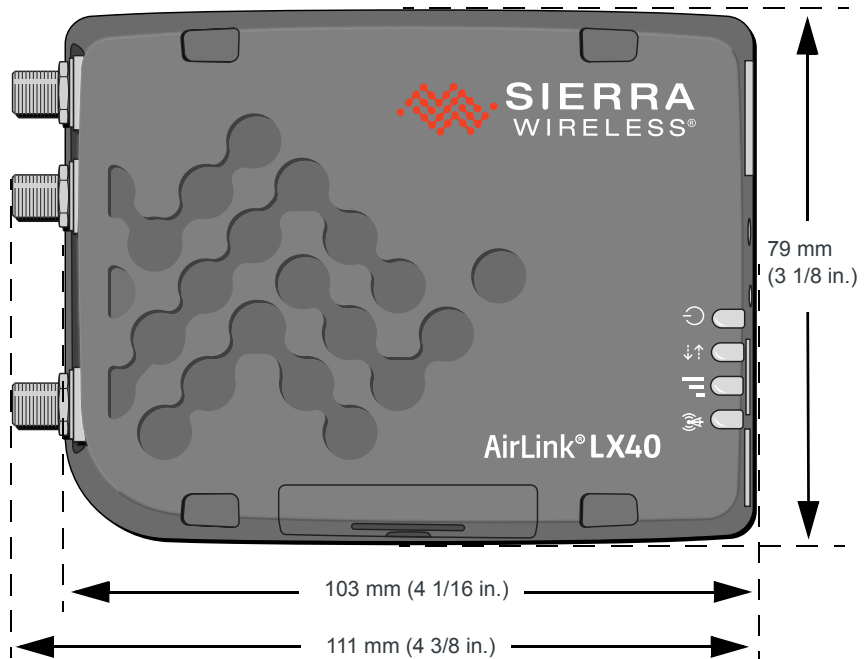
Figure 3-1: LX40 Mechanical Specifications

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Important Information for North American Users

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is 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 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/TV technician for help.*

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

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 from the antenna and the user's body.

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

To comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain must not exceed the specifications listed below for the device used.

Maximum Antenna Gain

The antenna gain must not exceed the limits and configurations shown in the following tables:

Table 4-1: WP7601 Maximum Antenna Gain

Device	Frequency Band	FCC ID/IC Number N7NWP76A 2417C-WP76A Maximum Antenna Gain (dBi)
AirLink LX40	4	6
	13	6

Table 4-2: WP7603 Maximum Antenna Gain

Device	Frequency Band	FCC ID/IC Number N7NWP76C 2417C-WP76C Maximum Antenna Gain (dBi)
AirLink LX40	2	6
	4	6
	5	6
	12	6

Table 4-3: WP7607/7609 Maximum Antenna Gain

Device	Frequency Band	FCC ID/IC Number N7NWP76C 2417C-WP76C Maximum Antenna Gain (dBi)
AirLink LX40	1	Must not exceed antenna gains due to RF exposure and ERP/EIRP limits, as listed in the module's FCC grant.
	3	
	7	
	8	
	20	
	28	

Table 4-4: WP7702 Antenna Gain Specifications

Device	Frequency Band	FCC ID/IC Number N7NWP77B 2417C-WP77B Maximum antenna gain (dBi)	
		Standalone	Collocated[a]
AirLink LX40	2	9	8
	4[b]	6	6
	5	7	6
	12	6	6
	13	6	6
	17[c]	6	6
	26	7	6
	GSM 850	4	3
	PCS 1900	3	3

a. Antenna gain limit when module collocated with Wi-Fi/Wimax/BT radios
b. B4—CAT-M1 only
c. B17—CAT-NB1 only

Table 4-5: WP76XX/WP7702 Collocated Radio Transmitter Specifications

Device	Technology	Frequency (MHz)	EIRP Limit (dBm)
AirLink LX40	WLAN	2400−2500	25
		5150−5850	27

WEEE Notice

If you purchased your AirLink LX40 in Europe, please return it to your dealer or supplier at the end of its life. WEEE products may be recognized by their wheeled bin label on the product label.

⟫ | A: Accessories

DC Power Cable (Black Connector)

Table A-1: DC Power Cable

DC Power Cable	
Part Number	2000522
Product Release	2016

Components:

①   1 UL2464 20 AWG × 4 core cable

②   4 Molex female crimp terminals /AWG 20-24, 250V, 5 A max, phosphor bronze tin-plated (part number 43030-0001)

③   1 Molex male 2×2P Ph: 3.0 mm housing, 250V, 5 A max, PA65 black UL94V-O (part number 43025-0408)

Power connector housing   Warning label   ① 3048 mm (10 ft.) core cable

WARNING: Do not connect or disconnect when energized in hazardous environments.

Power connector (end view)

3   4
1   2

② Female crimp terminals

Pin	Wire color	Open
1	Red	
2	Black	
3	White	
4	Green	

Power connector housing (side view)

③ Male housing
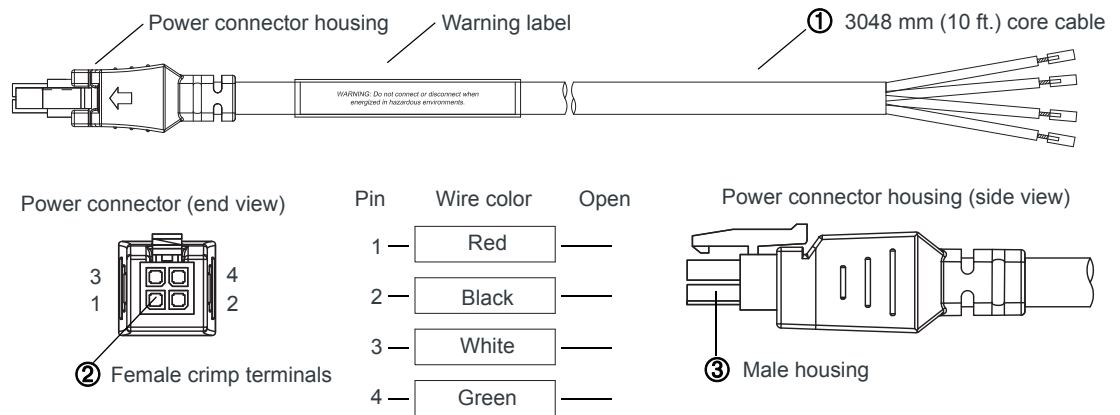
Figure A-1: DC Cable Specifications

AC Power Adapter (Black Connector)

Table A-2: AC Power Adapter

AC Power Adapter	
Part Number	2000579
Product Release	2016

AC Power Adapter Input

Table A-3: Input Specifications

	Minimum	**Typical**	**Maximum**
Input			
Input Voltage	90 VAC	100−240 VAC	264 VAC
Input Frequency	47 Hz	50/60 Hz	63 Hz
Note: Input voltage range is 90 VAC to 264 VAC. *Maximum input current is 500 mA at 100−240 VAC.* *Inrush current will not exceed 75 A at 100−240 VAC input and maximum load from a cold start at 25°C.*			

AC Power Adapter Output

Table A-4: AC Power Adapter Output Specifications

	Minimum	**Typical**	**Maximum**	**Test conditions**
Output Voltage	11.4 VDC	12.0 VDC	12.6 VDC	0 ~ 1.5 A loading

AC Power Adapter Environmental Specifications

Table A-5: AC Power Adapter Environmental Specifications

Operating	
Operating Temperature	0°C ~ 40°C (operates normally)
Relative Humidity	10% ~ 90%
Altitude	Sea level to 2,000 meters
Vibration	1.0 mm, 10–55 Hz, 15 minutes per cycle for each axis (X, Y, Z)
Non-operating	
Storage Temperature	-30°C ~ 70°C
Relative Humidity	10% ~ 90%
Vibration and Shock	MIL-STD-810D, method 514

AC Power Adapter Reliability and Quality Control

AC Power Adapter MTBF

When the power supply is operating within the limits of this specification, the MTBF is at least 200,000 hours at 25°C (MIL-HDBK-217F).

AC Power Adapter Safety Standards

The power supply is certified with the following international regulatory standards:

Table A-6: AC Power Adapter Safety standards

Regulatory Agency	Country or Region	Certified	Standard
UL	USA	Approved	UL60950-1
GS	Europe	Approved	EN60950-1
CE	Europe	Approved	EN60950-1
SAA	Australia	Approved	AS/NZS 60950
CCC	China	Approved	GB4943
CUL	Canada	Approved	CSA C22.2 NO.60950-1

AC Power Adapter EMC Standards

The power supply meets the radiated and conducted emission requirements for EN55022, FCC Part 15, Class B, GB9254.

AC Power Adapter Hazardous Substances

- EU Directive 2011/65/EU "RoHS"
- EU Directive 2012/19/EU "WEEE"
- REACH

AC Power Adapter Energy Efficiency

The AC adapter complies with International Efficiency Levels, as shown in Table A-7.

Table A-7: AC Adapter Energy Efficiency

Supplied Input	No-load Power Consumption	Average Active Mode Efficiency	International Efficiency Level
115 VAC, 60 Hz	Less than 0.1 W	Greater than 85%	VI
230 VAC, 50 Hz	Less than 0.3 W	Greater than 80.4%	V

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