

Installing the Low Power Base Station

Broadband Wireless Access System

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The Low Power Base Station must be professionally installed to ensure that all regulatory requirements are met. These include but are not limited to: local building and safety codes, National Electrical Code, and the FCC rules and regulations.

The NextNet Wireless Low Power Base Station is a fixed product that operates as a point-to-point wireless data link. As such, this product is only authorized to operate as manufactured by NextNet Wireless and cannot be modified to operate in any other manner. Installers must ensure that this product complies with the FCC rules. Modifications to this product would be in violation of the FCC rules detailed in 47CFR15.247(b)(3)(iii) which states: Fixed, point-to-point operation, as used in paragraphs (b)(3)(i) and (b)(3)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations.

WARNING: This equipment has been tested and found to comply with the FCC guidelines as found in 47CFR1.1310 for Radio Frequency Radiation Exposure Limits as detailed below. A minimum of 36 centimeters or 14 inches of separation between the base station antenna and all persons must be maintained.

Radio Frequency Radiation Exposure Limits (FCC Rules 47CFR1.1310)

TABLE 1. Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field-strength (V/m)	Magnetic field-strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500	—	—	f/300	6
1500-100,000	—	—	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	.2	30
300-1500	—	—	f/1500	30
1500-100,000	—	—	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure.

Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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 or commercial 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 equipment not expressly approved by NextNet Wireless could void the user's authority to operate this product.

TABLE 2. Technical Information

Frequency band	2400-2483 MHz TX/RX
Transmitting power	Up to 0.5 watts
Number of channels	13
Frequency stability	±1.0 ppm
Channel bandwidth	6 MHz
Operating voltage	120 VAC nominal
Modulation	Orthogonal Frequency Division Multiplex
Transmission	Time Division Duplex/Time Division Multiplex

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Welcome

This document describes how to install and use the Expedience low power base station (LPB). The LPB provides wireless high-speed Internet access to CPEs installed at your subscribers' sites.

This document is intended for use by professional equipment installers. Service providers should not attempt to install the LPB.

This guide describes how to install the low power base station (LPB). It explains:

- How the LPB cables connect the device to your network
- How to install the LPB into the mounting bracket
- How to install the LPB on a pole.

LPB product overview

The LPB maintains contact with CPEs at your subscribers' sites. The LPB integrates the transceiver, modem, and a 90 degree antenna into one device. The LPB is designed to be mounted on a pole.

The LPB operates in the ISM frequency band (2400-2483.5 MHz).

Under typical configurations, the LPB covers an approximate radius of 2 to 3 miles, with a 5 mile maximum. If desired, network access providers can configure their base stations to cover a maximum radius of 20 miles. To cover up to 20 miles, the network access provider enables the extended range feature.

Before you begin

This section describes items the installer must gather and things to consider before beginning the LPB installation.

Additional material required for installation

- Switches for the site and the backbone.
- Ground wire of sufficient length to run between the LPB and a ground rod.
 - It is recommended that the ground wire be an 8 AWG, solid aluminum or copper wire.
 - It is recommended that the ground rod used be 8 feet (2.5 m) copper. Note that most buildings have an existing ground rod outside, at the main power connection site. If desired, you can install a rod into the ground outside the building.
- Anti-seize compound to be applied to the stainless steel screws that hold the LPB to the mounting bracket.

Before you begin

Before you install LPBs:

- It is recommended that you assign a name to the LPB. For more information refer to the NNOS User Guide.
- It is also a good idea to configure the base station with channel, VLAN, power, and other parameters, as described in the guide “NNOS User Guide.”

Installation overview

This section provides an overview of the tasks you will perform when installing LPBs.

To install the lower power base station:

- 1** Attach the mounting bracket to pole.
- 2** Install the LPB inside the mounting bracket.
- 3** Connect the LPB cable harness to the connector on the back of the LPB.
- 4** If you are using more than one LPB, connect the GPS daisychain cable to the to next LPB in the cell.
- 5** If necessary, adjust the slide bracket to provide the necessary downward tilt.
- 6** Ground the LPB.
- 7** Run the LPB power/Ethernet cable to your equipment room.
- 8** Plug the power/Ethernet cable into the data line protector.
- 9** Properly ground the data line protector, by using the grounding cable provided with the data line protector.
- 10** Plug a jumper cable into the other end of the data line protector. Plug the jumper cable to the appropriate jack on the power supply.
- 11** Plug one end of an Ethernet cable into the other connector on the power supply.
- 12** Plug the other end of the Ethernet cable into the switch.
- 13** Power on the LPB, by plugging in the power supply.

For further information about these tasks, refer to the sections in this chapter.

Cabling overview

Figure 1 illustrates how cables connect the cell site.

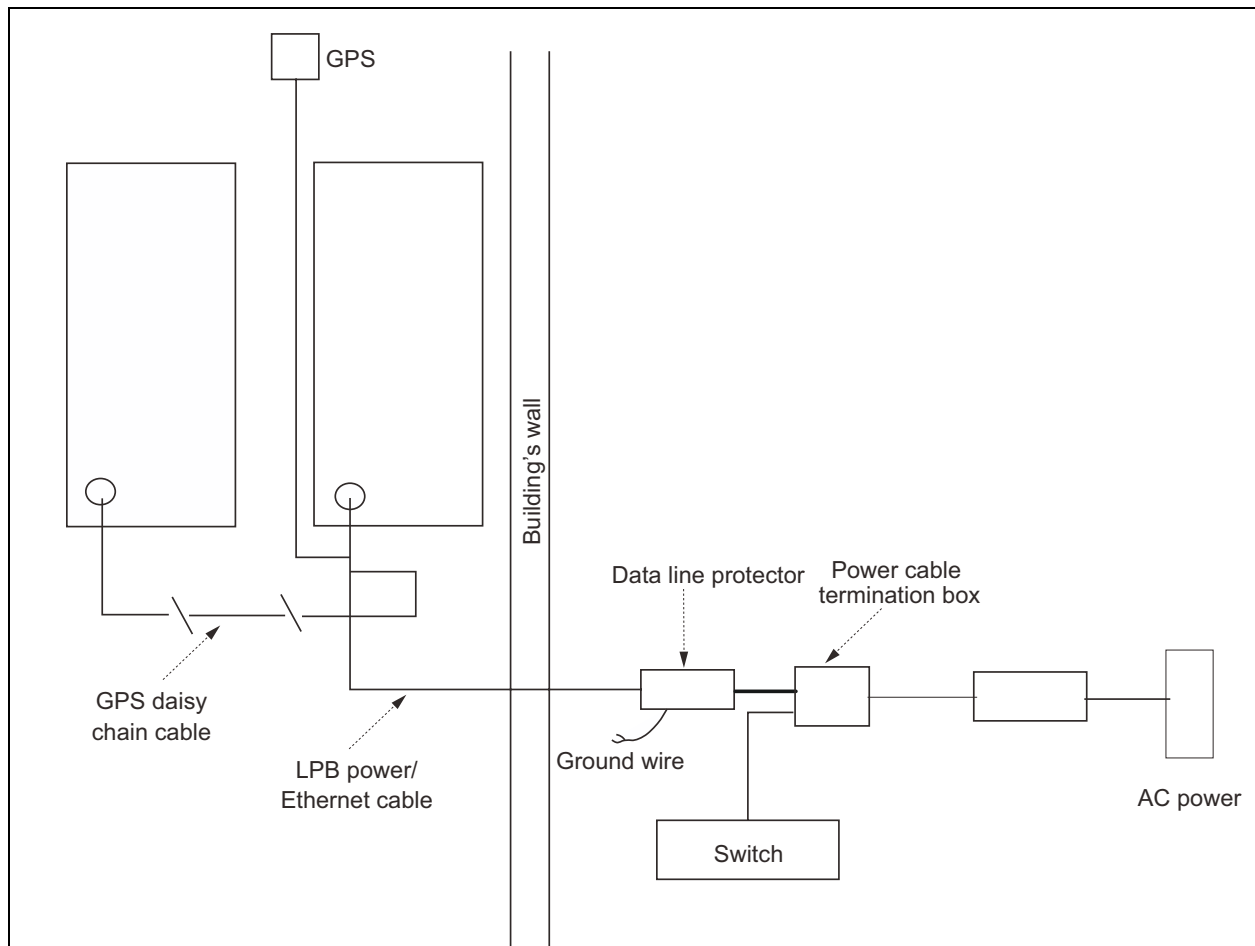


Figure 1 LPB cabling diagram

Attaching the LPB to a tower or pole

You can use clamps to mount the bracket to a tower or pole. Figure 2 shows the clamps wrapped around a pole and screwed to the mounting bracket.

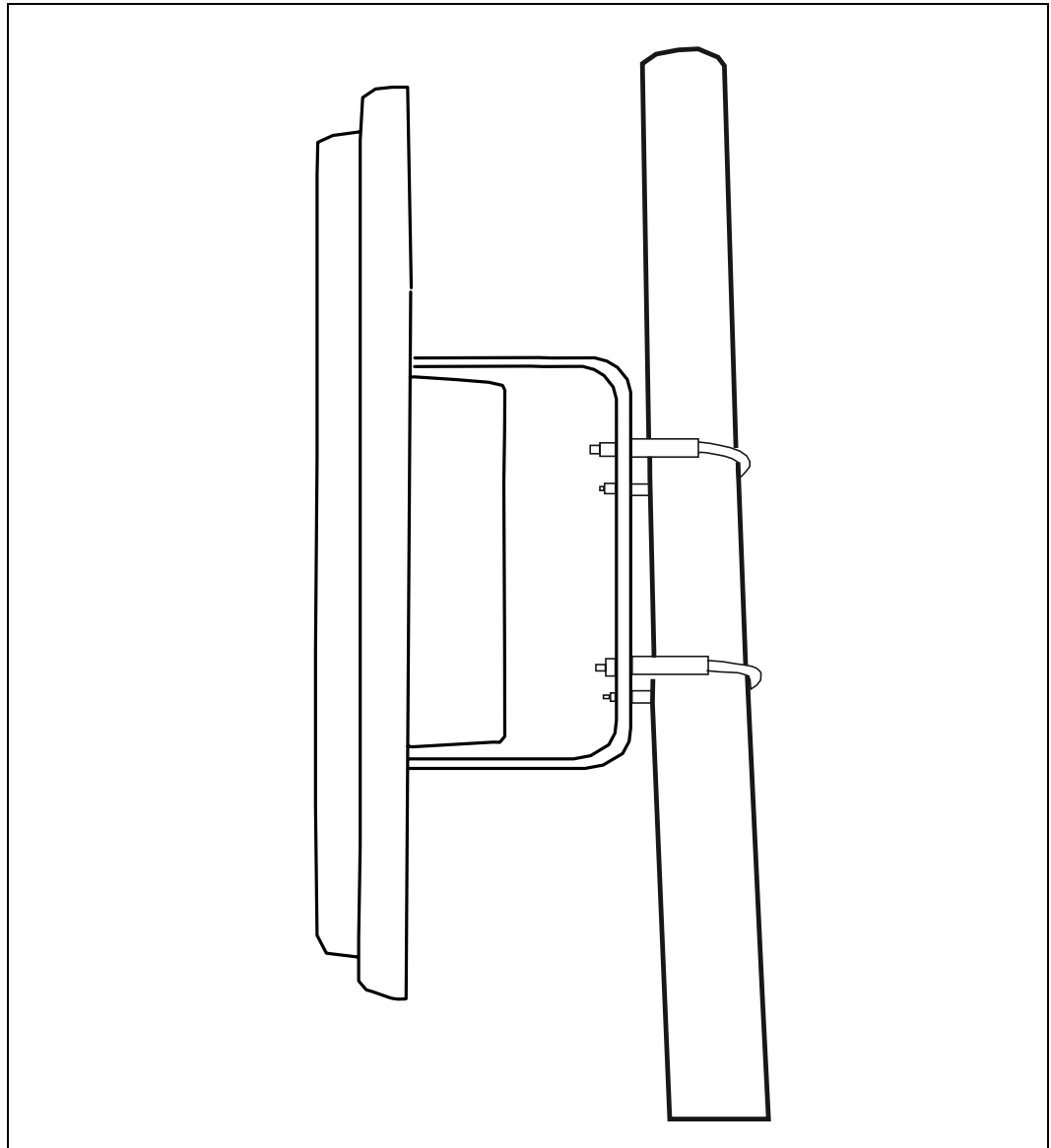


Figure 2 Mounting bracket and LPB mounted on pole

Note: You can also use the mounting bracket that ships with the OSU to attach the LPB to a wall.

Two u-clamps on the back of the mounting bracket and 4 bolts hold the mounting bracket on a pole or tower. The bracket, like the LPB itself, must be installed vertically.

To install the mounting bracket on a pole:

- 1** Slide the u-clamps on the back of the mounting bracket around the pole.
- 2** Insert the bolts through the openings in the back of the mounting bracket.
- 3** Screw the bolts into the u-clamps.

Installing the LPB inside the mounting bracket

The LPB must be installed vertically. The LPB has a peg on the top, and a peg on the bottom. The upper and lower pegs snap into the mounting bracket's peg holes.

In addition to the pegs on the LPB, screws hold the LPB securely inside the mounting bracket.

Slots in the mounting bracket allow you to tilt the LPB's internal antenna from 0 to 7 degrees.

Setting the LPB inside the mounting bracket

You must install the LPB vertically. To install the LPB in the mounting bracket:

- 1** On the bottom arm of the mounting bracket, snap the LPB's peg into the peg hole.
- 2** On the top arm of the mounting bracket, snap the LPB's upper peg into the adjustment arch.

To accommodate the height of the peg, you may need to lift the mounting bracket's edge up slightly.

- 3** Two sets of screw assemblies attach the top of the LPB to the mounting bracket. For the top of the mounting bracket, assemble the screw (coated with anti-seize compound), split lock washer and flat washer as shown in Figure 3.

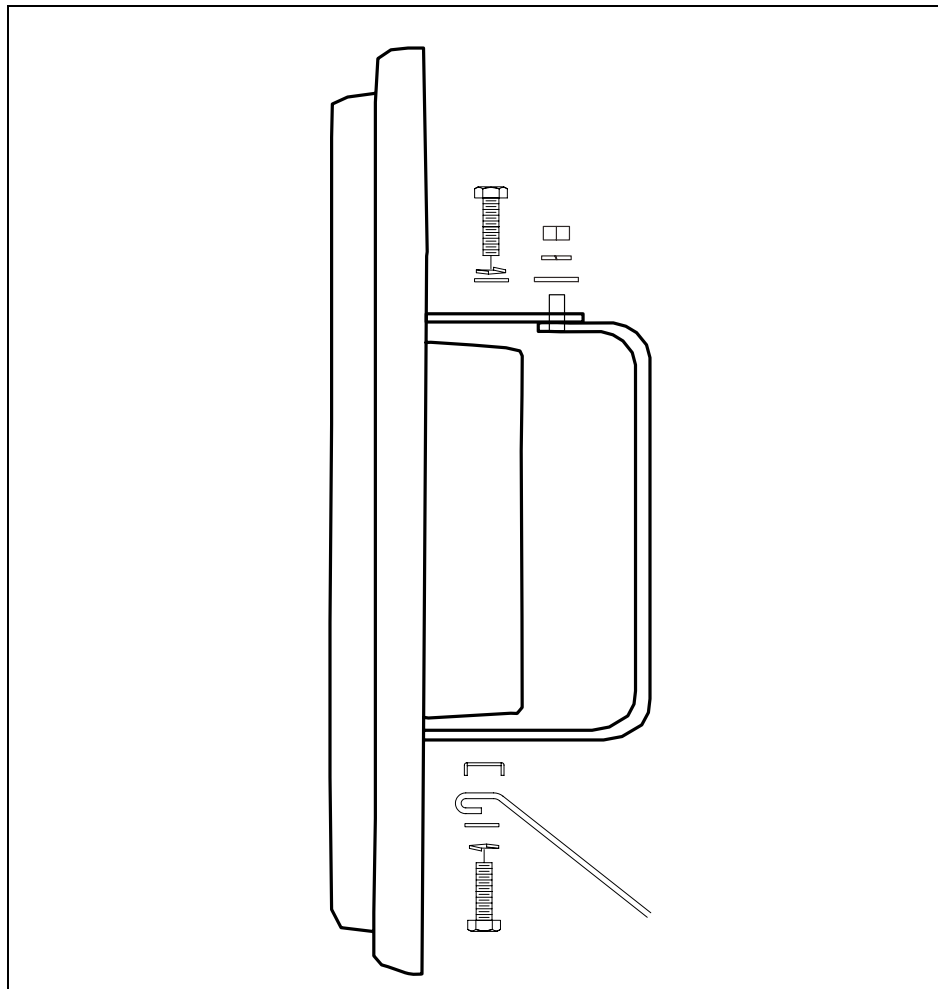


Figure 3 Mounting bracket screw assembly

- 4** Two sets of screw assemblies attach the bottom of the LPB to the mounting bracket. For the bottom of the mounting bracket, assemble the screw (coated with anti-seize compound), split lock washer, flat washer, ground wire, and double-tab washer, as shown in Figure 3.

Let the ground wire dangle to the ground.

- 5** Tighten the screw inserted through the upper bracket and into the LPB in order to hold the LPB in place.
- 6** On the bottom arm of the mounting bracket, tighten the bolt on the bottom of the LPB.
- 7** If you need to tilt the LPB's internal antenna, loosen the screws in the adjustment arch, then realign the screws with the degree of tilt you desire. The degrees (0 through 7) are marked on the mounting bracket.
- 8** Plug in the circular end of the LPB communication cable in the bottom of the LPB.

Connecting the cable harness to the LPB

The cable harness plugs into the lower corner of the LPB.

Figure 4 shows the connector and describes the function of the pins in the connector.

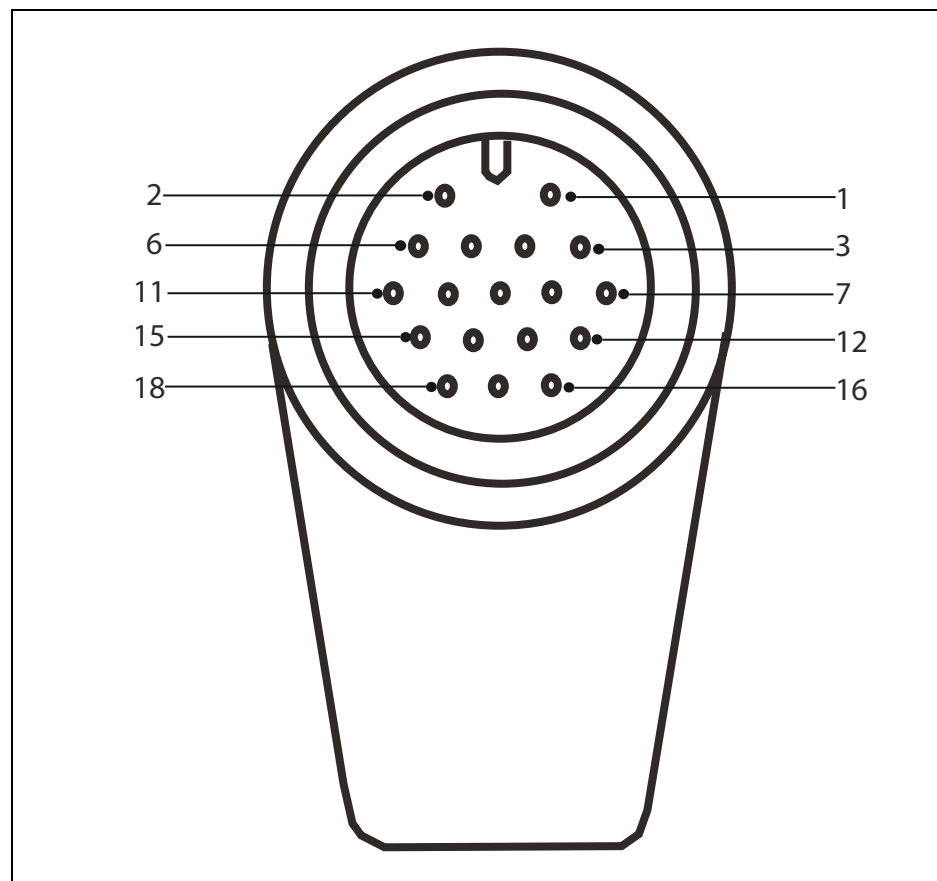


Figure 4 LPB connector

Table 1 describes the LPB connector's pins.

Table 1 Wiring diagram for LPB connector

Pin number	Purpose
1	ENRX+
2	ENRX-
3	ENTX-
4	GND
5	GND
6	-1 PPS
7	ENTX+
8	GND
9	GND
10	GND
11	+1 PPS
12	+19.5 V
13	+19.5 V
14	GND

Table 1 Wiring diagram for LPB connector

Pin number	Purpose
15	-422DATA
16	+19.5 V
17	GPS_V+
18	+422DATA

Connecting the GPS unit to the base station

This section provides you with GPS equipment mounting tips. It also explains how to connect the GPS to the LPB and how to daisy chain other base stations in the cell so that they can receive GPS information.

Most Expedience system deployments use multiple base stations, at multiple cell sites. As such, these service providers must use a global positioning system (GPS) device to set the date on the LPBs.

If you are using multiple base stations at multiple cell sites, you need one GPS device per cell. You then directly connect one base station within that cell to the GPS device. Next, the other base stations are connected to each other, using a daisy chain wiring scheme, so that all base stations in the cell can receive a GPS signal.

You can choose the length of the cable that connects the base station to the GPS receiver.

Note: If you are not deploying multiple base stations at multiple cell sites, you can set up one LPB to provide a time signal to the other base stations in the cell site. For more information about how to configure an LPB to supply a time pulse to other LPBs in a cell, refer to the NNOS User's Guide.

GPS equipment mounting tips

You must use the NextNet Wireless supplied GPS system to supply a time synchronization signal to the base stations in a cell. You cannot use a GPS from another manufacturer.

The GPS does not ship with mounting accessories. You can obtain these accessories from many suppliers around the world, especially distributors of marine products.

Follow these tips when mounting the GPS:

- Mount the GPS unit on a threaded pipe or pole.
- The GPS mounting socket accepts a 1.0000 x 14 straight thread. It is recommended that the pole/pipe you use be 1.000 inch.
- Secure the pipe or pole to the building or other support structure.
- Ensure at least half of the sky is clearly visible to the unit.
- Expose the unit to the southern portion of the sky. GPS satellites move generally from the southwest to the northeast.

Connecting the GPS unit to the LPB and daisy chaining other LPBs in cell

One GPS unit can support numerous LPBs in the same cell.

- 1** When you connect the cable harness into the back of the LPB, the GPS unit is able to receive its power from the base station. The GPS device uses 18 volts DC at 150 milliamperes.
- 2** So that the remaining LPBs in the cell can receive a GPS signal, connect an LPB adjacent to the LPB you just connected to the GPS unit.

Continue to use the daisy chain wiring scheme to connect the remaining LPBs, until all of the LPBs within the cell are connected to each other.

On the last LPB in the daisy chain, connect the load termination on the open GPS connection.

GPS connectors

Figure 5 displays the front view of the connectors on the GPS

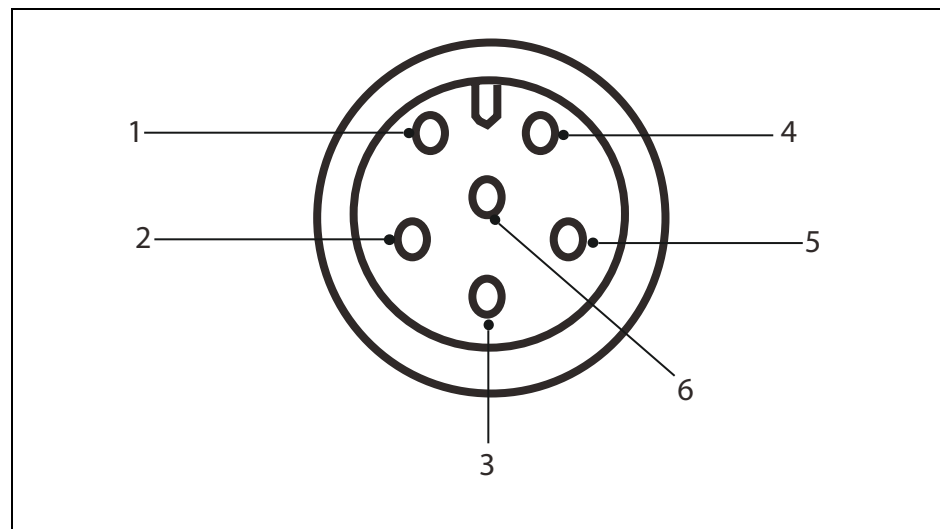


Figure 5 GPS connectors

Table 2 lists the purpose of the pins that fit into the connector.

Table 2 GPS connector pins

Pin number	Purpose
1	+1 PPS
2	-1 PPS
3	+422 data
4	-422 data
5	GPS V+
6	GND

Powering the LPB

After you have run the cable from the LPB into the appropriate building, provide power to the LPB.

To provide power to the LPB:

- 1 Plug the LPB communication cable running from the LPB into the end of the data line protector which is labelled as unprotected. Figure 6 illustrates the data line protector.

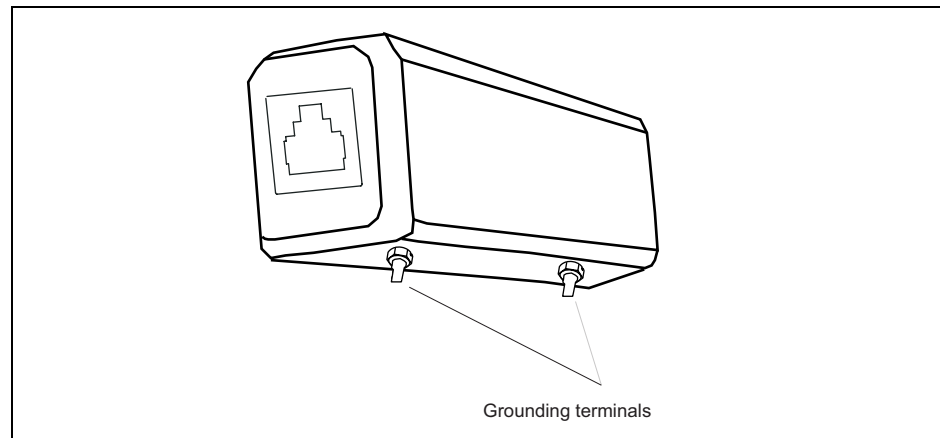


Figure 6 Data line protector

Note: One side of the data line protector is marked “protected side” and the other side is marked “unprotected side”. The protected side plugs to the direction of the power supply. The unprotected side plugs to the direction of the LPB.

- 2 Use the ground cable provided with the data line protector to properly ground it. You can use either ground terminal on the data line protector.
- 3 Plug a jumper cable into the end of the data line protector that is labelled as protected. Insert the other end of the jumper cable into the power supply, in the jack labelled “OSU/Power.”
- 4 Plug the power supply cord into a power source. The LPB uses standard AC power.

Grounding the LPB

- 1** Connect the ground wire from the LPB to the ground rod in the ground next to the building.
- 2** Attach all wires to the building by using electrical staples. Use drip loops as needed.

Connecting to the backbone network

Typically, an LPB connects to a level 2 switch. The switch controls the base station data traffic to and from the backbone network.

Connect the switch to the backhaul network using the appropriate cabling.

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