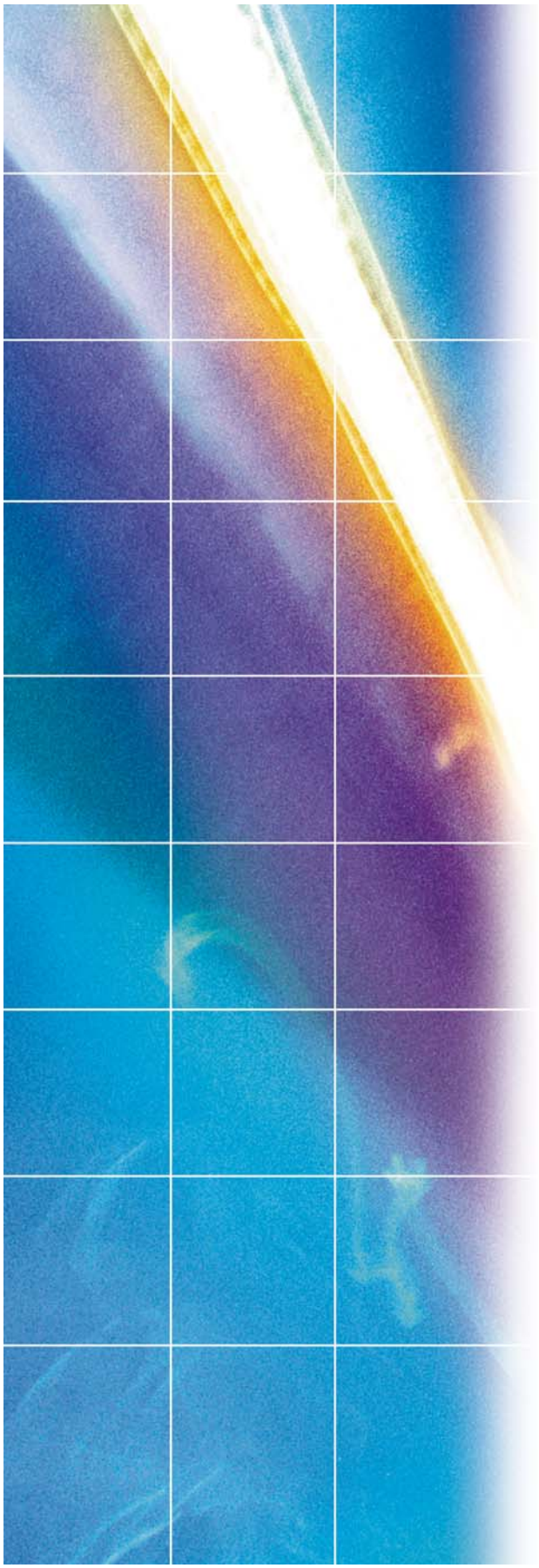

FORTRESS™ TECHNOLOGIES

Fortress Security System

ES210
Tactical Mesh Point

Hardware Guide

www.fortresstech.com

009-00027-00r2

Fortress ES210 Tactical Mesh Point [rev.2]

IMPORTANT FCC INFORMATION

The Federal Communications Commission has released Office of Engineering and Technology Laboratory Division Knowledge Database (KDB) 44399, which refines the definition of Dynamic Frequency Selection (DFS) support. Since this device has the ability to use frequencies covered by DFS, KDB 443999 must be followed. It is published in full on the FCC web site: https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?switch=P&id=41732

In order to support FCC KDB 443999, Fortress has limited the use of certain frequencies within the 5400–5725 MHz range. Specifically, the frequencies defined by the FCC as being of primary interest are those in the 5600–5650 MHz range, which correspond to 802.11a channels 120, 124, and 128. In order to comply with the KDB 443999, these channels have been removed from use, or *notched*. Notched channels are unavailable for use on this device.

KDB 44399 provides additional restrictions on the use of channels within 30 MHz of notched channels when the device is within 35 km of a Terminal Doppler Weather Radar (TDWR) installation. Affected channels 116, 132, and 136 serve as a *guard* of 30 MHz around the critical notched frequencies. Guard frequencies are unavailable for use on this device by default. The FCC allows these channels to be used, however, as long as the device is not within 35 km of a TDWR installation, as described in this excerpt of KDB 443999:

> Any installation of either a master or a client device within 35 km of a TDWR location shall be separated by at least 30 MHz (center-to-center) from the TDWR operating frequency.
>
> In some instances it is possible that a device may be within 35 km of multiple TDWRs. In this case the device must ensure that it avoids operation within 30 MHz for each of the TDWRs. This requirement applies even if the master is outside the 35 km radius but communicates with outdoor clients which may be within the 35 km radius of the TDWRs.
>
> The requirement for ensuring 30 MHz frequency separation is based on the best information available to date. If interference is not eliminated, a distance limitation based on line-of-sight from TDWR will need to be used.

Please refer to the original KDB 443999 as posted on the FCC web site for the complete text.

In order to enable channels 116, 132, and/or 136, please contact Fortress to obtain a special license. This license will be issued after it is confirmed that the installation is not within 30 MHz and 35 km of registered TDWR sites. The following table (provided by the FCC in KDB 443999 published on 10/14/2010) describes the locations of TDWR sites, as well as the frequencies at which these sites operate:

TDWR Location Information				FREQUENCY	TERRAIN ELEVATION (MSL) [ft]	ANTENNA HEIGHT ABOVE TERRAIN [ft]
STATE	CITY	LONGITUDE	LATITUDE			
AZ	PHOENIX	W 112 09 46	N 33 25 14	5610 MHz	1024	64
CO	DENVER	W 104 31 35	N 39 43 39	5615 MHz	5643	64
FL	FT LAUDERDALE	W 080 20 39	N 26 08 36	5645 MHz	7	113
FL	MIAMI	W 080 29 28	N 25 45 27	5605 MHz	10	113
FL	ORLANDO	W 081 19 33	N 28 20 37	5640 MHz	72	97
FL	TAMPA	W 082 31 04	N 27 51 35	5620 MHz	14	80
FL	WEST PALM BEACH	W 080 16 23	N 26 41 17	5615 MHz	20	113
GA	ATLANTA	W 084 15 44	N 33 38 48	5615 MHz	962	113
IL	MCCOOK	W 087 51 31	N 41 47 50	5615 MHz	646	97
IL	CRESTWOOD	W 087 43 47	N 41 39 05	5645 MHz	663	113
IN	INDIANAPOLIS	W 086 26 08	N 39 38 14	5605 MHz	751	97
KS	WICHITA	W 097 26 13	N 37 30 26	5603 MHz	1270	80
KY	COVINGTON CINCINNATI	W 084 34 48	N 38 53 53	5610 MHz	942	97
KY	LOUISVILLE	W 085 36 38	N 38 02 45	5646 MHz	617	113
LA	NEW ORLEANS	W 090 24 11	N 30 01 18	5645 MHz	2	97
MA	BOSTON	W 070 56 01	N 42 09 30	5610 MHz	151	113
MD	BRANDYWINE	W 076 50 42	N 38 41 43	5635 MHz	233	113
MD	BENFIELD	W 076 37 48	N 39 05 23	5645 MHz	184	113
MD	CLINTON	W 076 57 43	N 38 45 32	5615 MHz	249	97
MI	DETROIT	W 083 30 54	N 42 06 40	5615 MHz	656	113
MN	MINNEAPOLIS	W 092 55 58	N 44 52 17	5610 MHz	1040	80
MO	KANSAS CITY	W 094 44 31	N 39 29 55	5605 MHz	1040	64
MO	SAINT LOUIS	W 090 29 21	N 38 48 20	5610 MHz	551	97
MS	DESOTO COUNTY	W 089 59 33	N 34 53 45	5610 MHz	371	113
NC	CHARLOTTE	W 080 53 06	N 35 20 14	5608 MHz	757	113
NC	RALEIGH DURHAM	W 078 41 50	N 36 00 07	5647 MHz	400	113
NJ	WOODBRIDGE	W 074 16 13	N 40 35 37	5620 MHz	19	113
NJ	PENNSAUKEN	W 075 04 12	N 39 56 57	5610 MHz	39	113
NV	LAS VEGAS	W 115 00 26	N 36 08 37	5645 MHz	1995	64
NY	FLOYD BENNETT FIELD	W 073 52 49	N 40 35 20	5647 MHz	8	97
OH	DAYTON	W 084 07 23	N 40 01 19	5640 MHz	922	97
OH	CLEVELAND	W 082 00 28	N 41 17 23	5645 MHz	817	113
OH	COLUMBUS	W 082 42 55	N 40 00 20	5605 MHz	1037	113
OK	AERO. CTR TDWR #1	W 097 37 31	N 35 24 19	5610 MHz	1285	80
OK	AERO. CTR TDWR #2	W 097 37 43	N 35 23 34	5620 MHz	1293	97
OK	TULSA	W 095 49 34	N 36 04 14	5605 MHz	712	113
OK	OKLAHOMA CITY	W 097 30 36	N 35 16 34	5603 MHz	1195	64
PA	HANOVER	W 080 29 10	N 40 30 05	5615 MHz	1266	113
PR	SAN JUAN	W 066 10 46	N 18 28 26	5610 MHz	59	113
TN	NASHVILLE	W 086 39 42	N 35 58 47	5605 MHz	722	97
TX	HOUSTON INTERCONTL	W 095 34 01	N 30 03 54	5605 MHz	154	97

In addition, the FCC recommends that all operators and installers register with the WISPA database used by government agencies to quickly find devices that may be causing interference and notify their owners/operators to shut them down. This registration is not required, but Fortress strongly recommends that all systems be registered, as described in this excerpt of KDB 44399:

> A voluntary WISPA sponsored database has been developed that allows operators and installers to register the location information of the UNII devices operating outdoors in the 5470 – 5725 MHz band within 35 km of any TDWR location (see http://www.spectrumbridge.com/udia/home.aspx). This database may be used by government agencies in order to expedite resolution of any interference to TDWRs.

KDB 443999 further specifies that the requirements of KDB 594280 must also be met. KDB 594280 is published in full on the FCC web site: https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?switch=P&id=39498. This device meets KDB 594280 by not allowing any configuration options to be made such that the device could be taken out of compliance. There is no ability for the user to change country codes or to select power levels that would take the device out of compliance.

For customers such as the U.S. military or others willing to produce evidence that particular devices will be used only outside of the United States, a special license can be obtained from Fortress that will allow those devices the option of selecting a different, non-U.S. country code. Fortress creates such licenses only for those customers who offer proof of non-U.S. device usage, and licenses are specific to particular devices and are not transferrable. Devices having such a license should NOT be considered to be compliant with FCC regulatory requirements. Please contact Fortress with questions about these special licences.

Only software that has been signed by Fortress using the Fortress private key can be loaded onto a Fortress device, thus insuring that no software other than that which is controlled and signed by Fortress can by loaded onto the device.

FCC EMISSIONS COMPLIANCE STATEMENT

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 THE RECEIVER.
- CONNECT THE EQUIPMENT INTO AN OUTLET ON A CIRCUIT DIFFERENT FROM THAT TO WHICH THE REC I EVER IS CONNECTED.

- CONSULT THE DEALER OR AN EXPERIENCED RADIO/TV TECHNICIAN FOR HELP.

YOU MAY ALSO FIND HELPFUL THE FOLLOWING BOOKLET, PREPARED BY THE FCC: “HOW TO IDENTIFY AND RESOLVE RADIO-TV INTERFERENCE PROBLEMS.” THIS BOOKLET IS AVAILABLE FROM THE U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402

CHANGES AND MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER OR REGISTRANT OF THIS EQUIPMENT CAN VOID YOUR AUTHORITY TO OPERATE THIS EQUIPMENT UNDER FEDERAL COMMUNICATIONS COMMISSION RULES.

IN ORDER TO MAINTAIN COMPLIANCE WITH FCC REGULATIONS, SHIELDED CABLES MUST BE USED WITH THIS EQUIPMENT. OPERATION WITH NON-APPROVED EQUIPMENT OR UNSHIELDED CABLES IS LIKELY TO RESULT IN INTERFERENCE TO RADIO AND TELEVISION RECEPTION.

ANTENNA RESTRICTIONS

THIS DEVICE HAS BEEN DESIGNED TO OPERATE WITH ANTENNAS THAT HAVE A MAXIMUM GAIN OF 5 dBi. ANTENNAS HAVING A GAIN GREATER THAN 5 dBi ARE STRICTLY PROHIBITED FOR USE WITH THIS DEVICE. THE REQUIRED ANTENNA IMPEDANCE IS 50 OHMS.

Table of Contents

Chapter 1
Overview

1.1 This Document

This user guide covers preparing and installing the ES210 Fortress Mesh Point hardware. It also describes the LED indicators and push button operation, and provides specifications. Other Fortress hardware devices are covered in separate hardware guides, one for each Mesh Point (or Network Encryptor) model.

Fortress Mesh Point user guidance is intended for professional system and network administrators and assumes that its users have a level of technical expertise consistent with these roles.

Side notes throughout this document are intended to alert you to particular kinds of information, as visually indicated by their icons. Examples appear to the right of this section, in descending order of urgency.

WARNING: can cause physical injury or death and/or severely damage your equipment.

CAUTION: can corrupt your network, your data or an intended result.

NOTE: may assist you in executing the task, e.g. a convenient software feature or notice of something to keep in mind.

1.1.1 Related Documents

Each Fortress hardware series runs the same Fortress software, and differences between ES and FC series software are minor. Fortress software user guidance covers all current Fortress hardware platforms.

Fortress Mesh Point software guides include:

- *Mesh Point and Network Encryptor Software GUI Guide*
- *Mesh Point and Network Encryptor Software CLI Guide*
- *Mesh Point and Network Encryptor Software Auto Config Guide*

In addition to this guide, the Fortress hardware guides include:

- *ES440 Infrastructure Mesh Point Hardware Guide*
- *ES520 Deployable Mesh Point Hardware Guide*
- *ES820 Vehicle Mesh Point Hardware Guide*
- *FC-X Inline Network Encryptor Hardware Guide*

1.2 The ES210

The Fortress ES210 Tactical Mesh Point is a full-featured Fortress network device, providing strong data encryption and Multi-factor Authentication™, including native RADIUS (Remote Authentication Dial-In User Service) authentication, to users and devices on the network it secures.

The ES210 Mesh Point is equipped with a dual-band 802.11a/b/g/n radio that can be configured to use either the 802.11b/g band or the 802.11a band, with an option for 802.11n capability in either band. It can function simultaneously as a wireless access point (AP), providing secure connectivity to wireless devices within range, and as a wireless bridge or a node in a mesh network.

1.2.1 Shipped and Optional Parts

Each shipment includes:

- one ES210 Tactical Mesh Point
- one 7.4V lithium ion polymer battery
- one standard AC/DC power supply (*part #* **16282-2SG-315**)
- protective caps for all connector ports
- software CD, including:
  - ES210 Mesh Point software package
  - Fortress and standard SNMP MIBs
  - RADIUS dictionary file with Fortress Vendor-Specific Attributes for administrative authentication
  - ES210 Mesh Point user guides and release notes

Optionally, you can purchase a universal Mounting Kit for the ES210 (*part #* **381-00005-01**).

Chapter 2
Installation

2.1 Preparation

Before using or charging an ES210 battery, review the initial installation and charging information in Section 1.1.

Before proceeding with installation, review the safety information in Section 2.1.1 below.

2.1.1 Safety Requirements

To prevent damage to the product and ensure your personal safety, operate the ES210 Tactical Mesh Point only within the operating specifications given in Section 4.1.3, and carefully follow these guidelines:

- ***General:*** This equipment must be installed by qualified service personnel according to the applicable installation codes. Do not locate the Mesh Point or antennas near power lines or power circuits.
- ***Transportation:*** The carton is marked with a *Lithium-Ion* label, per Department of Transportation (DOT) requirements. The unit is shipped with batteries installed in the device.
- ***Indoor/Outdoor Siting:*** All interconnected equipment connected to the indoor/outdoor Mesh Point must be contained within the same building, including the interconnected equipment's associated LAN (local area network) connections.

  In outdoor environments, the Tactical Mesh Point should not be mounted outside a home, school, or other public area where the general population has access to it.
- ***Ambient Temperature:*** The temperature of the environment in which the Mesh Point operates should not drop below the minimum (14º F/-10º C) or exceed the maximum (140º F/ 60º C) operating temperatures.

WARNING: To avoid the risk of severe electrical shock, never remove part of the ES210's chassis other than the battery cover and serial port cap, as directed in this guide. There are no user-serviceable parts inside. Refer all hardware servicing to Fortress Technical Support.

- ***Powering:*** The Mesh Point is powered by a 9-30 V DC external power source and/or a 7.4V lithium ion polymer rechargeable battery. The wall-mounted (12 V @ 2A) power supply simultaneously powers and charges the ES210 Mesh Point, at a normal load of 6 W (16 W max. during charging).
- ***Battery:*** The 7.4V lithium ion battery cartridge contains safety devices that protect the 2S (2 Series) cells from abuse and is keyed to install only in the correct orientation.
- ***Circuit Overloading:*** The Mesh Point includes an internal resettable fuse on its 9-30V power input. Do not exceed 30V or the unit can be damaged.
- ***Lightning/Electrostatic Protection:*** The unit has limited isolation protection. When attaching external antennas in an outdoor environment, follow best practices for safety including the use of in-line lightning arrestors.
- ***Waterproofing:*** The Mesh Point has an IP67 rating when antennas or protective caps are properly installed.
- ***Cabling:*** Cables must be installed in accordance with NEC Article 725 and 800, and all requirements must be met in relation to clearances with power lines and lighting conductors. All cabling must be category 5e per TIA/EIA-568-B.2.
- ***Radio Frequency:*** The Mesh Point's internal radio conforms to the FCC's safety standard for human exposure to RF electromagnetic energy, provided that you follow these guidelines:
  - Do not touch or move the antenna while the unit is transmitting or receiving.
  - To safeguard Mesh Point transmitting circuitry, relocate the Mesh Point and its antenna only when the Mesh Point is powered off.
  - When the Mesh Point is transmitting, do not hold it so that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes.
  - Antennas must be installed to provide a separation of at least 20 cm (7.9") from all persons and any co-located antenna or transmitter.
  - Regarding use in specific environments: *• Do not operate near unshielded blasting caps or in an explosive environment. • Limit use in a hazardous location to the constraints imposed by the location's safety director. • Abide by the rules of the Federal Aviation Administration for the use of wireless devices on airplanes. • Restrict the use of wireless devices in hospitals to the limits set forth by each hospital.*

WARNING: The Mesh Point also contains a 3V (7 year) lithium battery for time-keeping purposes. It is ***not*** intended to be operator- or user-replaceable. To avoid risk of personal injury (and voiding of the Mesh Point's warranty), refer all hardware servicing to Fortress Technical Support.

2.1.2 Battery Use and Maintenance

The ES210 Mesh Point is equipped with a 7.4 volt, 4 amp-hours (29 watt-hours), lithium ion polymer battery. The battery can power 5–8 hours of Mesh Point operation, depending on the specific power requirements of your deployment. It is specified to operate for at least 500 charge cycles.

CAUTION: To ensure optimal performance, the battery should be fully charged before its initial use.

When the Mesh Point is powered on and is not receiving external power, battery power is automatically switched on. The Mesh Point will automatically power off five minutes after reaching a *Low Battery* condition (below 6.3 volts), if external power is not supplied first. A *Low Battery* condition is indicated by the top-panel **Battery** LED slowly flashing green (complete **Battery** LED indications are described in Section 3.1.1).

2.1.2.1 Installing the Battery

The ES210 battery ships, partially charged, with the unit. You must install it before you can charge or use the battery.

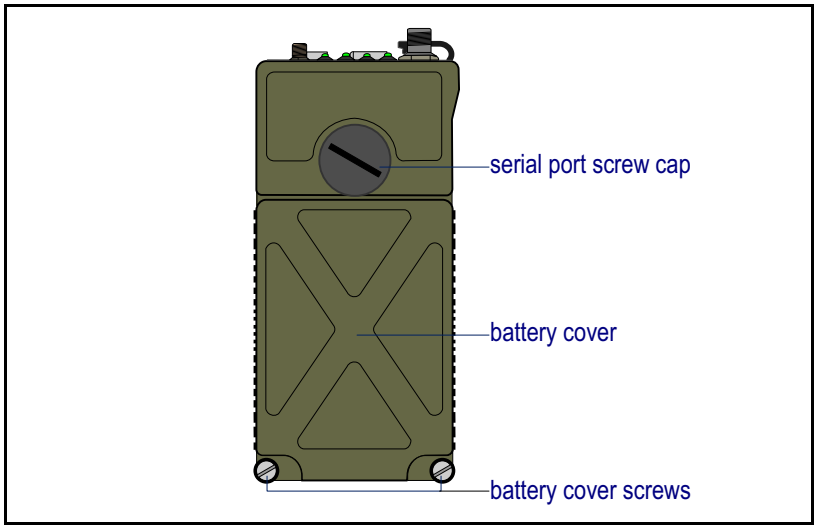

Figure 2.1. ES210 Battery Cover with Screws and Serial Port Cap

To install the battery for the first time:

1. Unscrew the ES210 battery cover screws and lift the battery cover (Figure 2.1).
2. Orient the battery so that the contacts are at the bottom and facing back, with the corner cut situated on the lower right.
3. Seat the battery squarely in the ES210 battery compartment.
4. Replace the battery cover and retighten the cover screws.
5. Connect the Mesh Point's **DC Power** input to the power adapter that shipped with the Mesh Point, and connect the adapter to a properly rated AC power outlet.
6. Permit the battery to fully charge, as indicated by a solid green **Battery** LED, before using it for the first time. (Complete LED indications are described in Section 3.1.1.)

NOTE: The battery is keyed to install in only the correct orientation.

NOTE: The **Battery** LED will not provide a charge indication when the Mesh Point is powered off.

Once the battery compartment is closed, you can power up and operate the Mesh Point while the battery is charging.

2.1.2.2 Battery Charging and Power Requirements

The ES210 Mesh Point can operate normally while the battery is charging. The battery charges up to 8.2 volts in a maximum of 2.2 hours, with a maximum power consumption of 16 watts (during simultaneous charging and operation). The ES210 will auto-charge whether power is on or off (Section 3.2.1).

The wall-mounted power supply provides 12 volts at 2 amps input current to simultaneously power and charge the ES210 Mesh Point.

Charge the battery at a maximum input current of 1.78 amps. Do not exceed 30 volts on the Mesh Point's 9-28V power supply.

For safety, the Mesh Point prevents the battery from charging when the temperature is outside the acceptable charging range:

- 32º–113ºF (0º–45ºC) when the Mesh Point is powered off
- 23º–104º F (-5º–40ºC) when the Mesh Point is powered on

For maximum life, charge the battery at about 20º C (68º F).

2.1.2.3 Battery Storage and Longevity

For maximum life, store the battery, half charged, at about 20º C (68º F).

Fully charged batteries lose less than 10% of their charge when stored for six months at 73º F(23º C); less than 20% when stored for three months at 113º F (45º C).

To prolong battery life:

- Charge the battery early and often. However, if is not used for a long time, store it at a half charge level.
- Do not routinely "deep-cycle" the battery (frequently discharge fully and recharge it).
- Keep the battery cool, ideally in a refrigerator. High temperatures (as found in a closed car, for instance) cause lithium-ion batteries to degrade much more rapidly than if not so exposed. In harsh thermal environments, consider removing the battery when it is not in use and storing it in a cool place so that it is not affected by the heat.
- Do not freeze the battery. Most lithium ion battery electrolytes freeze at approximately -40º F/C.

2.1.2.4 Replacing the Battery

If you need to obtain a replacement for the ES210 Mesh Point battery, contact your Fortress Technologies representative.

1 Power the Mesh Point down by depressing the **Power Off** button on the right side of the chassis. If external power is in use, disconnect the Mesh Point from the power source.

2 Unscrew the battery cover screws and lift the battery cover (Figure 2.1).

3 Remove the existing battery.

4 Fully seat the replacement battery in the compartment in the correct orientation: contacts at the bottom and facing back (into the compartment), corner notch situated on the lower right.

5 Replace the battery cover and retighten the cover screws.

6 If the replacement battery has previously been in service (in the current or another ES210), skip the rest of this procedure.

or

If the replacement battery has never been used, connect the Mesh Point's **DC Power** input to the power adapter that shipped with the Mesh Point, and connect the adapter to a properly rated AC power outlet.

7 Permit the new battery to fully charge, as indicated by a solid green **Battery** LED, before using it for the first time. (Complete LED indications are described in Section 3.1.1.)

Once the battery compartment is closed, you can power up and operate the Mesh Point while the battery is charging.

NOTE: The **Battery** LED will not provide a charge indication when the Mesh Point is powered off.

2.1.3 Port Locations

The ES210 Mesh Point's power inlet and Ethernet and antenna ports, along with the LED indicators, are located on the top panel, shown below.

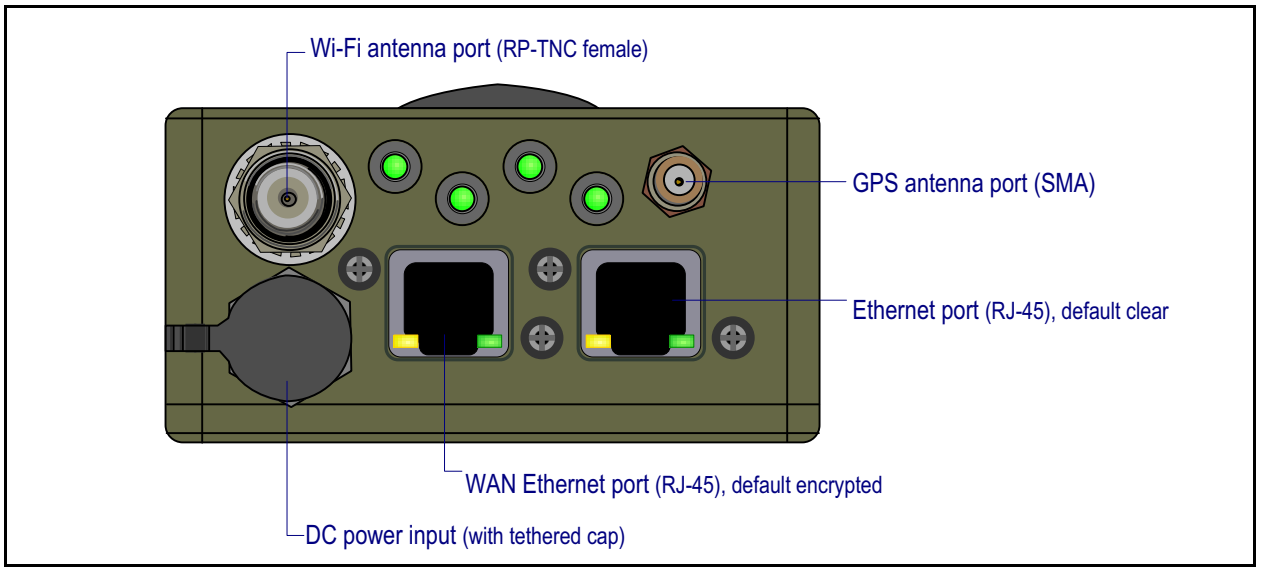

Figure 2.2. ES210 Mesh Point Port Locations

By default, *Fortress Security* (a.k.a. encryption) is enabled on the **WAN** port and disabled on the **Ethernet** port. These and other port settings are user configurable (see the *Software GUI Guide*).

The Mesh Point's serial console port is located under the screw cap on the front of the chassis, above the battery compartment, as shown in Figure 2.1.

To access the port, use a screwdriver or similarly shaped object (such as a key) to loosen the cap and then unscrew it. Be sure to replace and tighten the cap securely when the port is not in use. Refer to the *Software CLI Guide* for serial port settings.

2.2 Connecting the ES210

The ES210 can be connected temporarily to preconfigure the Mesh Point software and then permanently for deployment.

2.2.1 Connections for Preconfiguration

Mesh Point software should be configured in advance of deployment. This section provides instructions for temporarily connecting the ES210 Mesh Point for preconfiguration.

If the Mesh Point will be powered with the battery, first follow the instructions in Section 2.1.2.1.

1. Position the Mesh Point so that it operates only within its safe temperature range (14º–140º F/⁻10º–60º C).
2. If you are powering the Mesh Point with the internal battery, install and fully charge the battery according to the instructions in Section 2.1.2.1.

   or

   If you are powering the Mesh Point only through the **DC Power** input, connect it to the power adapter that shipped with the Mesh Point, and connect the adapter to a properly rated AC power outlet.
3. Connect the Mesh Point's **Ethernet** port to a computer or switch on the wired LAN.
4. Power the Mesh Point on by depressing and holding for five seconds the lower **Power On** button on the left side of the chassis.

CAUTION: To ensure optimal performance, the battery should be fully charged before its initial use.

To complete the configuration, refer to the *Software GUI Guide* or the *Software CLI Guide* for instructions on Logging On, Licensing, and Configuring the Mesh Point.

2.2.2 Connections for Deployment

The section provides instructions for connecting the ES210 for deployment after you have preconfigured the Mesh Point software.

Review the *Radio Frequency Safety Requirements* (Section 2.1.1) before installing or operating the Mesh Point radio.

1. If the deployed Mesh Point will be powered with the internal battery and you have not yet done so, fully charge the battery according to the instructions in Section 2.1.2.1.

   or

   If you are powering the Mesh Point only through the **DC Power** input, connect it to the power adapter that shipped with the Mesh Point, and connect the adapter to a properly rated AC power outlet.

2. If the Mesh Point's internal radio will be used, connect an omnidirectional antenna with a *maximum* gain of 5 dBi to the Wi-Fi antenna port.
3. If the Mesh Point's GPS function will be used, connect an antenna to the GPS antenna port.
4. If the Mesh Point will be connected over Ethernet to a wired LAN or to a remote device, connect the clear (by default) **Ethernet** port to a switch on the wired LAN or to the remote device.

WARNING: To comply with FCC regulations, antennas must be professionally installed and the installer is responsible for ensuring compliance with FCC limits.

NOTE: Third party antennas are subject to local regulatory requirements. For outdoor installations, they must be waterproof.

2.3 Mounting the ES210

The ES210 Mesh Point can be worn or carried by a person on foot, or it can be mounted on a vehicle or in a fixed position.

An ES210 Universal Mounting Kit for the ES210 Mesh Point is optionally available from Fortress Technologies. The same kit permits you to mount the ES210 on a mast, fix it to a flat surface, or attach it magnetically to a smooth metal surface.

Mount the Mesh Point only where it will operate only within its safe temperature range: 14º–140º F (⁻10º–60º C).

Regardless of how the ES210 will be mounted, you must prepare the mounting bracket before attaching the ES210 to the bracket. Follow the instructions appropriate for your deployment.

2.3.1 Magnetic Mounting

If you will be mounting the ES210 magnetically, first attach the magnets to the feet on the bracket.

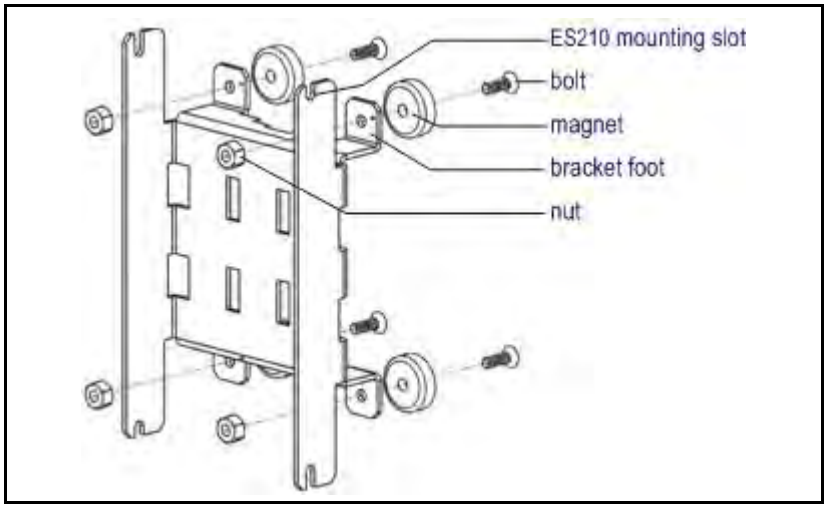

Figure 2.3. Attaching Magnets to the Mounting Bracket

1. Identify four, each, of the magnets, bolts and nuts included in the mounting kit (pictured above).
2. Position a magnet with its flat side against the outer face of one of the feet on the mounting bracket and the bolt holes in the magnet and bracket foot aligned. When tightened, the head of the bolt should fit into the depression on one side of the magnet.
3. Thread a bolt through the magnet and bracket foot and secure the magnet to the bracket with a nut, tightening the nut firmly with a 11/32" hex driver and a #2 Phillips driver.
4. Repeat steps 2 and 3 for the remaining three magnets and bracket feet.
5. Attach the ES210 to the mounting bracket:
   - With two (of the four included) mounting screws partially screwed into the top corners of the chassis, hang the ES210 by the shafts of these screws on the upper ES210 mounting slots in the bracket.
   - Install the remaining two mounting screws through the lower mounting slots in the bracket and into the bottom corners of the ES210 chassis.
   - Tighten all four mounting screws with a ¼" hex driver or flat screwdriver.
6. Mount the ES210-bracket assembly by placing the magnetized feet of the bracket against a steel or iron surface.

2.3.2 Mast Mounting

The ES210 Universal Mounting Kit accommodates masts from 1" to 3.5" in diameter.

If you will be mounting the ES210 on a mast, first attach the mast clamps to the mounting bracket.

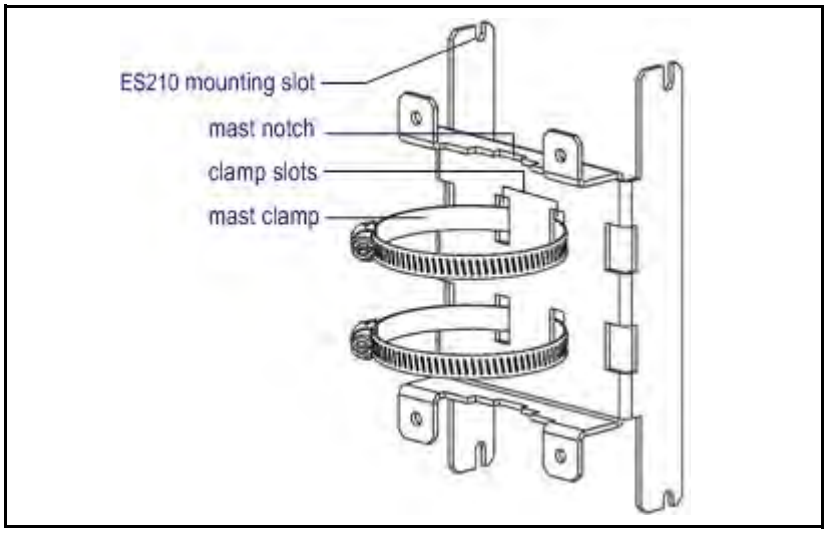

Figure 2.4. Attaching Mast Clamps to the Mounting Bracket

1. Identify the two mast clamps included in the mounting kit (pictured above).
2. Guide one end of a mast clamp through two parallel clamp slots in the bracket so that the open loop in the clamp and its captive screw fastener are on the same side of the mounting bracket as the bracket's mast notches (as shown).
3. Repeat Step 2 for the second mast clamp.
4. Attach the ES210 to the mounting bracket:
   - With two (of the four included) mounting screws partially screwed into the top corners of the chassis, hang the ES210 by the shafts of these screws on the upper ES210 mounting slots in the bracket.
   - Install the remaining two mounting screws through the lower mounting slots in the bracket and into the bottom corners of the ES210 chassis.
   - Tighten all four mounting screws with a ¼" hex driver or flat screwdriver.
5. Mount the ES210 bracket assembly by fitting a mast through the mast clamps and, using a flathead screwdriver, tightening the clamps' captive screw fasteners until the mast notches in the bracket are clamped tight against the mast.

2.3.3 Non-Magnetic Surface Mounting

If you will be mounting the ES210 on a non-magnetic surface, mount the bracket first, then attach the ES210 to the bracket.

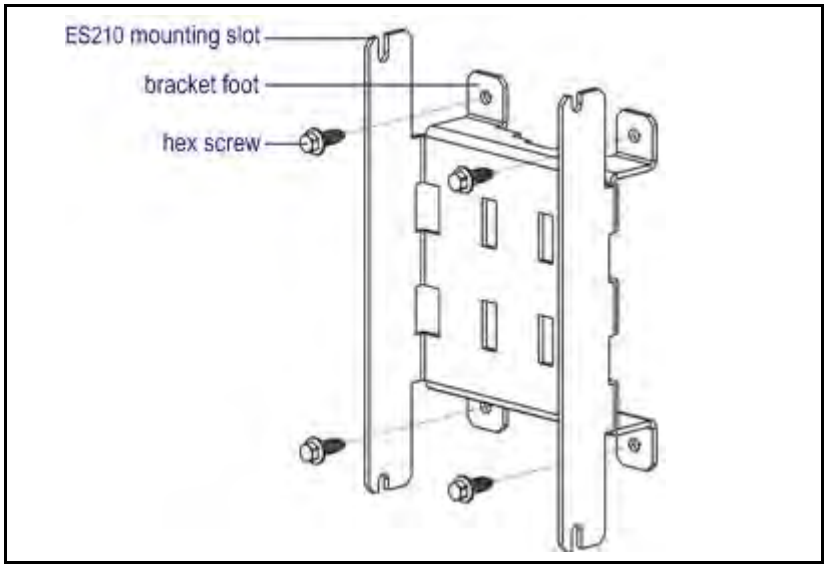

Figure 2.5. Surface Mounting the Bracket before Attaching the ES210

1. Obtain four #10 fasteners appropriate to the mounting surface.
2. Position the bracket where you want to mount it, with the bracket feet flat against the mounting surface, and mark the position of the holes in all four feet.
3. If necessary, prepare the mounting surface by drilling holes and, if appropriate, installing wall anchors at the mounting positions you have marked.
4. Align the holes in the feet of the mounting bracket with the prepared mounting positions and secure the bracket to the surface with the four #10 fasteners.
5. Attach the ES210 to the mounting bracket:
   - With two (of the four included) mounting screws partially screwed into the top corners of the chassis, hang the ES210 by the shafts of these screws on the upper ES210 mounting slots in the bracket.
   - Install the remaining two mounting screws through the lower mounting slots in the bracket and into the bottom corners of the ES210 chassis.
   - Tighten all four mounting screws with a ¼" hex driver or flat screwdriver.

Chapter 3
LEDs and Pushbutton Operation

3.1 Top-Panel Indicators

The ES210 Mesh Point's top panel features four system LEDs (**Power**, **Battery**, **Radio**, **Crypto**,) and a pair of **Link** and **Activity** LEDs for each of the ES210's two Ethernet ports.

NOTE: There are no LED indications in a Mesh Point in blackout mode (see Section 3.2.2).

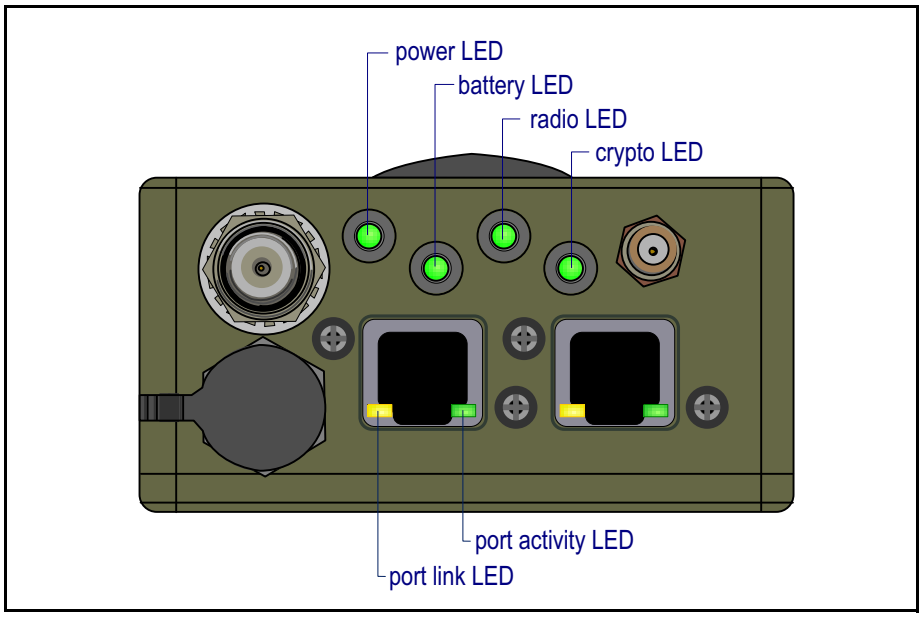

Figure 3.1. Fortress ES210 Mesh Point LED Indicators

3.1.1 System LEDs

Power *can exhibit:*

- *solid green* - Mesh Point is powered on and operating normally.
- *off* - Mesh Point is powered off.
- *slow-flash green* - Mesh Point is booting.
- *fast-flash green* - Battery was removed after Mesh Point became operational.

when powered by AC,* Battery *can exhibit:

- *solid green* - Battery is fully charged.
- *off* - Battery is charging.

when powered by battery,* Battery *can exhibit:

- *slow-flash green* - *Low Battery* condition (below 6.3 V): the Mesh Point will automatically power down five minutes after *Low Battery* is first signaled (if external power is not supplied first).
- *off* - Mesh Point is powered off.

Radio *can exhibit:*

- *solid green* - Radio is on.
- *intermittent green* - Mesh Point's radio is passing traffic.
- *off* - Radio is off or Mesh Point's *RF Kill* function is enabled.

Crypto *can exhibit:*

- The **Crypto** LED is reserved for a future function on the Mesh Point.

NOTE: The battery will not charge when the temperature is outside the acceptable charging range: 32º–113ºF (0º–45ºC) when the Mesh Point is powered off; 23º–104º F (-5º–40ºC) when powered on.

		Power	Battery		Radio	Crypto
color	**behavior**		*AC powered*	*w/out AC power*		
green	*solid*	normal operation	fully charged		radio on	n/a
	slow flash	booting	-	low battery	-	
	fast flash	battery removed during operation	-	-	-	
	intermittent	-	-	-	passing traffic	
off		unit off	charging	unit off	radio off *or* RF kill activated	

3.1.2 Port LEDs

The ES210 Mesh Point's top-panel Ethernet ports are equipped with link (**lnk**) and activity (**Act**) LEDs.

Lnk *can exhibit:*

- *solid green* - A link has been established for the port.
- *off* - The port is not connected.

Act *can exhibit:*

- *intermittent green* - Traffic is passing on the link.
- *off* - Traffic is not passing on the link.

3.2 Pushbutton Operation

The ES210 Mesh Point is equipped with three push buttons.

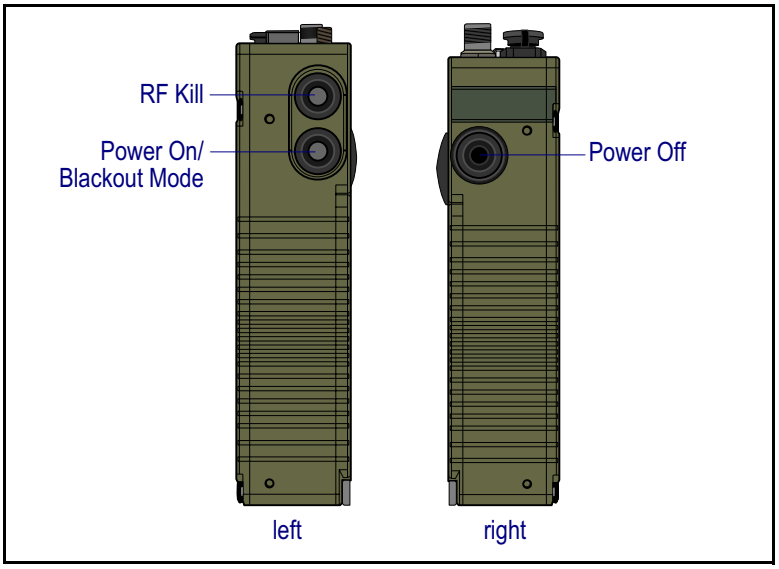

Figure 3.2. ES210 Push Buttons

3.2.1 Powering the Mesh Point On and Off

When the ES210 Mesh Point is powered off, the lower button on the left side of the chassis powers it on. The single button on the right side of the chassis powers it off.

- If the Mesh Point is off, press and hold the **Power On** button for five seconds to turn it on.

  The **Power** LED will slow-flash green while the Mesh Point boots, then light solid green for normal operation.

or

- If the Mesh Point is on, press the **Power Off** button to turn it off.

  The **Power** LED will go dark.

NOTE: If the Mesh Point's internal temperature reaches 176ºF (80ºC) it powers itself off. If you power it up before the Mesh Point has cooled, it will again shutdown.

NOTE: If the Mesh Point is running and the **Power On** button is pushed and held, it toggles *Blackout Mode* so the Mesh Point appears to be powered off. If the unit has batteries, this condition will drain the batteries.

3.2.1.1 Pushbutton Rebooting

Reboot (hard boot) the ES210 by powering it off and back on again (described above).

3.2.2 Pushbutton Blackout Mode Operation

When the ES210 Mesh Point is powered on, the lower button on the left side of the chassis turns the Mesh Point's top-panel LEDs off and on (*Blackout Mode*, **Enabled/Disabled**).

The default blackout mode setting is **Disabled**, in which state the Mesh Point's top-panel LEDs illuminate to indicate various conditions. (LED behaviors and their associated meanings are covered in Section 3.1.) Enabling blackout mode turns all top-panel LEDs off.

If *Blackout Mode* is **Disabled**, the actions below will enable it. If the setting is **Enabled**, the same steps will disable it.

1. Press the lower button on the left side of the chassis.
2. Hold it down for five seconds.
3. Release the button.

The new setting persists over reboots and upgrades, just as when changed through the Mesh Point GUI or CLI.

NOTE: You can also change the *Blackout Mode* setting in the Mesh Point GUI (see the *Software GUI Guide*) or in the Mesh Point CLI (see the *Software CLI Guide*).

3.2.3 Pushbutton RF Kill Operation

The upper button on the left side of the chassis toggles the Mesh Point's *RF Kill* function.

The default *RF Kill* setting is **Disabled**, in which state the Mesh Point receives and transmits radio frequency signals normally.

Enabling *RF Kill* turns the Mesh Point's internal radio off. When *RF Kill* is enabled, the top-panel **Radio** LED lights solid green to indicate that radio operation has been suspended.

If *RF Kill* is **Disabled**, the actions below will enable it. If the setting is **Enabled**, the same steps will disable it.

1. Press the upper button on the left side of the chassis.
2. Hold it down for five seconds.
3. Release the button.

The new setting persists over reboots and upgrades, just as when changed through the Mesh Point GUI or CLI.

NOTE: You can also change the *RF Kill* setting in the Mesh Point GUI (see the *Software GUI Guide*).

3.2.4 Pushbutton Restoring Defaults

To restore the Mesh Point's configuration settings to their factory-default values:

1. Simultaneously press the upper and lower buttons on the left side of the Mesh Point chassis.
2. Hold them down for at least ten seconds.
3. Release both buttons.

After you have successfully initiated the restore operation, the Mesh Point will reboot automatically.

After booting, the Mesh Point LEDs will resume normal operation and all configuration settings, including the IP address of the Mesh Point's management interface will be at their factory-default values.

NOTE: You can also restore the Mesh Point's factory default settings from the Mesh Point GUI (see the *Software GUI Guide*) and the Mesh Point CLI (see the *Software CLI Guide*).

Chapter 4
Specifications

4.1 Hardware Specifications

4.1.1 Physical Specifications

form factor:	compact, wearable, mountable
dimensions:	7" H x 3.3" W x 1.7" D (17.8 cm × 8.4 cm × 4.3 cm, approx.)
weight:	2.1 lbs. (.95 kg, approx.)
power supply:	9-30 V DC input (w/ internal resettable fuse) 7.4 V removable/rechargeable lithium ion polymer battery (optional)
connections:	two waterproof RJ-45 10/100 Mbps Ethernet ports with auto-MDIX one cylindrical 3-pin serial port one RP-TNC antenna port (female) one SMA antenna port for GPS receiver (female, passive or active) one weatherized 9-30V DC power input port with tethered cap
radio:	802.11a/b/g/n
indicators:	four top-panel system LEDs (Green/Amber): **Power**, **Battery**, **Radio**, **Crypto** two pairs integrated port **Link** and **Activity** LEDs
controls:	three push buttons (usable wearing gloves)

4.1.2 Battery Specifications

capacity:		7.4 V (nominal); 4 Ah (29 Wh)
cells:		2 Series lithium ion polymer
charging:	input	up to 8.2V at 1.78 input current maximum (.45 capacity)
	max. time	3 hrs
	temperature	32º–113º F (0º–45º C) when unit is powered off 23º–104º F (-5º–40ºC) when unit is powered on
storage:		6 mos. at 73º F(23º C) < 10% capacity loss 3 mos. at 113º F (45º C) < 20% capacity loss
replacement:		500 charge cycles minimum

4.1.3 Environmental Specifications

power draw:	6 W (charging) 16 W maximum (operating while charging)
maximum heat dissipation:	20.5 BTU/hr
cooling:	convection
operating temperature:	14º–140º F (-10º–60º C)
operating relative humidity (non-condensing):	5%–95%
storage temperature:	14º–140º F (-10º–60º C)

If the Mesh Point's internal temperature reaches 176ºF (80ºC) it powers itself off. If you power it up before the Mesh Point has cooled, it will again shutdown.

4.1.4 Compliance and Standards

emissions:	FCC Class A, part C; MIL-STD 461F
immunity:	MIL-STD 461F
vibration:	MIL-STD 810G

The Fortress ES210 is certified by the Wi-Fi Alliance® for the following standards:

IEEE:	802.11a/b/g
security:	WPA™, WPA2™—Personal and Enterprise
EAP types:	EAP-TLS, EAP-TTLS/MSCHAPv2, PEAPv0/EAP-MSCHAPv2, PEAPv1/EAP-GTC, EAP-SIM, EAP-AKA, EAP-FAST

4.2 DB9-to-3-pin Console Port Adapter

A DB9-to-3-pin cylindrical adapter is required in order to connect the Mesh Point's **Console** port to a DB9 terminal connection.

Table 4.1 shows the adapter pin-outs.

Table 4.1. DB9-to-3-pin Cylindrical Adapter Pin-Outs

Description	cylindrical pin	DB9 pin	standard color
Ground	1	5	red
Tx	2	2	black
Rx	3	3	white or green

4.3 2-Pin DC Input Connector

The Mesh Point uses a 2-pin connector to input power.

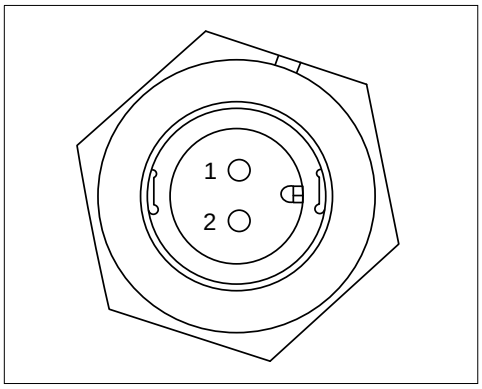

Figure 4.1. 2-pin Power Connector Pins

Table 4.2 shows the power connector pin-outs.

Table 4.2. ES210 DC Power Connector Pin-Outs

pin	signal
1	+9 to 30 VDC
2	Ground

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