FORTRESS™
TECHNOLOGIES

Fortress Security System

ES820
Vehicle Mesh Point

Hardware Guide

Fortress ES820 Vehicle 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 RECIEVER 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 RADIOTV 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.

THIS DEVICE HAS BEEN DESIGNED TO OPERATE WITH THE ANTENNAS HAVING A MAXIMUM GAIN OF 9 DB. ANTENNAS HAVING A GAIN GREATER THAN 9 DB ARE STRICTLY PROHIBITED FOR USE WITH THIS DEVICE. THE REQUIRED ANTENNA IMPEDANCE IS 50 OHMS.

OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION OF THE DEVICE.

TO REDUCE POTENTIAL RADIO INTERFERENCE TO OTHER USERS, THE ANTENNA TYPE AND ITS GAIN SHOULD BE SO CHOSEN THAT THE EQUIVALENT ISOTROPICALLY RADIATED POWER (E.I.R.P.) IS NOT MORE THAN THAT PERMITTED FOR SUCCESSFUL COMMUNICATION.

ICES-003 STATEMENT:

THIS CLASS B DIGITAL APPARATUS COMPLIES WITH CANADIAN ICES-003.

CET APPAREIL NUMÉRIQUE DE LA CLASSE B EST CONFORME À LA NORME NMB-003 DU CANADA.

ANTENNA RESTRICTIONS

THIS DEVICE HAS BEEN DESIGNED TO HAVE A MAXIMUM GAIN OF 9 DBI. ANTENNAS HAVING A GAIN GREATER THAN 9 DBI ARE STRICTLY PROHIBITED FOR USE WITH THIS DEVICE. THE REQUIRED ANTENNA IMPEDANCE IS 50 OHMS. THIS PRODUCT IS NOT CAPABLE OF OPERATING IN THE 5600MHZ – 5650MHZ RANGE.

THIS PRODUCT MUST BE OPERATED NO CLOSER THAN 20CM TO THE HUMAN BODY.

Table of Contents

3
LEDs and Pushbutton Operation 7

4
Specifications 9

Chapter 1
Overview

1.1 This Document

This user guide covers preparing and installing the ES820 Fortress hardware. It also describes the LED indicators and recessed 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:

◆ *ES520 Deployable Mesh Point Hardware Guide*
◆ *ES440 Infrastructure Mesh Point Hardware Guide*
◆ *ES210 Tactical Mesh Point Hardware Guide*
◆ *FC-X Inline Network Encryptor Hardware Guide*

1.2   The ES820

The Fortress ES820 Vehicle Mesh Point is a full-featured Fortress network device, providing strong data encryption and Multi-factor Authentication™, including native RADIUS authentication, to users and devices on the network it secures.

The ES820 contains two radios:

◆ *Radio 1* is 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.

◆ The standard equipment *Radio 2* is a high-power radio fixed on the 802.11a band, with an option for 802.11n capability.

The ES820's radios can function as a wireless access point (AP), providing secure WLAN connectivity to wireless devices within range, and as a wireless bridge or node in a mesh network.

1.2.1   Shipped Parts

Included in each ES820 Vehicle Mesh Point shipment:

◆ one ES820 Mesh Point

◆ one universal AC-to-48V DC power adapter (P/N D38999/26FA9-98SN)

◆ AC power cord

◆ software CD, including:

  ❖ ES820 Mesh Point software package

  ❖ Fortress and standard SNMP MIBs

  ❖ RADIUS dictionary file with Fortress Vendor-Specific Attributes for administrative authentication

  ❖ ES820 Mesh Point user guides and latest release notes

◆ optional ES820 cable harness

Chapter 2
Installation

2.1 Preparation

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 Mesh Point only within the operating specifications given in Section 4.1.2, 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. When installing an external antenna, take extreme care not to come into contact with such circuits as they can cause serious injury or death. Avoid metal ladders wherever possible. For proper installation and grounding, refer to national and/or local codes (WSNFPA 70 or, Canadian Electrical Code 54).

◆ *Indoor/Outdoor Siting:* All interconnected equipment connected to the Mesh Point must be contained within the same building, including the interconnected equipment's associated LAN connections.

◆ *Ambient Temperature:* The temperature of the environment in which the Mesh Point operates should not exceed the maximum (158º F/70º C) or drop below the minimum (-40º F/-40º C) operating temperatures.

◆ *Circuit Overloading:* The ES820 version Mesh Point includes an internal 48V resettable fuse.

◆ *Powering:* The Mesh Point can be direct powered by the 3-pin power adapter.

◆ *Grounding:* Ground the ES820 by mounting it with direct contact to the vehicle chassis.

◆ *Radio Frequency:* The Mesh Point's internal radios conform 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 antennas while the unit is transmitting or receiving.

❖ To safeguard Mesh Point transmitting circuitry, relocate the Mesh Point and its antennas 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: If the Mesh Point connects to outside-mounted antennas, failure to provide a low resistive earth ground can result in migration of voltage from lightning or line surges onto the premises wiring, which can cause electric shock and/or fire within the building or structure.

2.1.2 Port Locations

The ES820 Mesh Point's power inlet, input/output control connector, and antenna ports are located on the back panel, shown below.
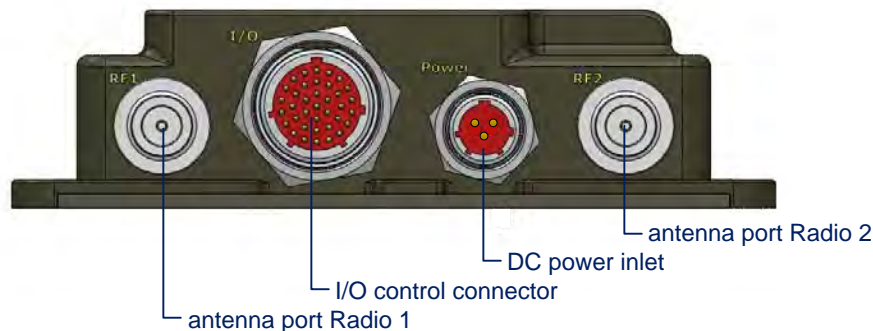

antenna port Radio 2
DC power inlet
I/O control connector
antenna port Radio 1

Figure 2.1. ES820 Back-Panel Port Locations

2.1.3 ES820 Cable Harness

The ES820 Cable Harness is an optional cable that attaches to the I/O control connector, and has four connectors - Ethernet 1, Ethernet 2, Serial and USB.
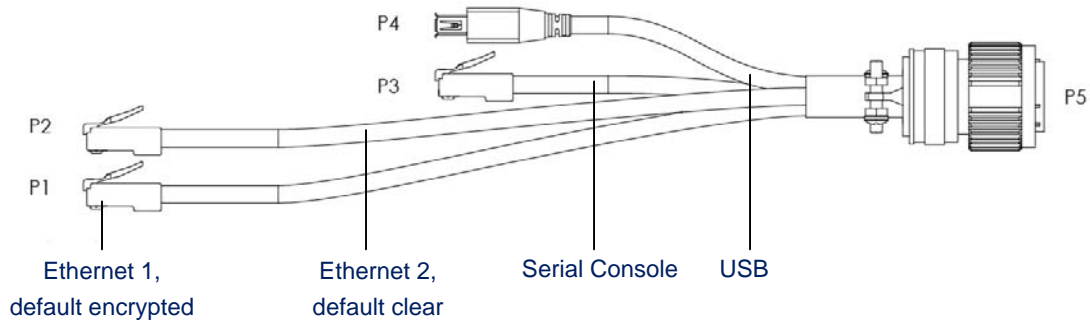

Figure 2.2. **ES820 Cable Harness**

This cable can connect the Mesh Point to a computer or switch on the wired LAN for initial configuration, prior to being integrated into a vehicle, and can connect to multiple devices simultaneously.

2.2 Connecting the ES820

The ES820 can be connected temporarily for preconfiguration of 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 ES820 Mesh Point for preconfiguration.

1   Position the Mesh Point so that it operates only within its safe temperature range.

2   Connect the Mesh Point's DC power inlet (see Figure 2.1) to an external power source.

3   Connect an ES820 cable harness to the 37-pin I/O control connector (labeled I/O on the back panel), and use the RJ45 connector labeled P2 (Ethernet 2) to connect the Mesh Point to a computer or switch on the wired LAN.

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

2.2.2 Connections for Deployment

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

1 If the Mesh Point will be located in a vehicle, to avoid additional grounding requirements, it is recommended that the ES820 be mounted with direct contact to the vehicle chassis.

2 Connect low-loss coaxial cables to the N-type connectors on the ES820.

3 Run the coaxial cables to the external vehicle antennas, and connect them to the external antennas.

4 Connect the Mesh Point's DC power inlet to the power source(s) it will use.

5 Verify that the Power and Status LEDs illuminate, as well as the appropriate LEDs for all connected ports and enabled radio(s).

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

CAUTION: The FCC requires co-located radio antennas to be at least 7.9" apart. The Mesh Point's antenna connectors are only 5" apart. Avoid directly mounting two antennas to the Mesh Point's rear-panel connectors.

Chapter 3
LEDs and Pushbutton Operation

3.1 Front-Panel LED Indicators

The ES820 Mesh Point's front panel features six system LEDs.
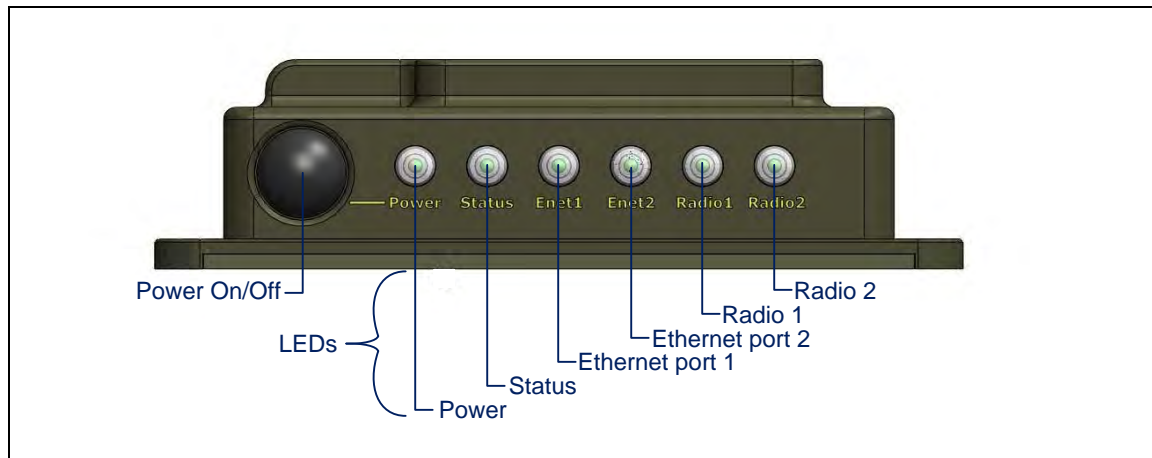

Figure 3.1. ES820 Front-Panel Power Control and LEDs

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.

Status *can exhibit:*

◆ *intermittent green* - Cleartext is passing on an encrypted port.

Ethernet1 *and* **Ethernet2** *can exhibit:*

◆ *solid green* - Link has been established.

◆ *intermittent green* - Traffic is passing on the port.

Radio1 *and* **Radio2** *can exhibit:*

◆ *solid green* - Radio is on.

◆ *intermittent green* - Radio is passing traffic.

◆ *off* - Radio is off or Mesh Point's *RF Kill* function is enabled.

color	behavior	Power	Status	Enet1/Enet2	Radio1/Radio2
green	*solid*	normal operation	-	link established	radio ON
	slow flash	booting	-	-	-
	intermittent	-	cleartext on encrypted port	passing traffic	passing traffic
	off	powered OFF	-	-	radio OFF *or* RF Kill enabled

3.2   Pushbutton Operation

3.2.1   Powering the Mesh Point On and Off

The single front-panel button powers the ES820 Mesh Point ON and OFF.

◆ If the Mesh Point is off, press the **Power** button 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** button to turn it off.

The **Power** LED will go dark.

The power button is tied to pin 33 on the Mesh Point's 37-pin I/O connector, which is a power control line. Both switches must be OFF to power the ES820 off.

3.2.2   Pushbutton Rebooting

Reboot (hard boot) the ES820 by powering it off and back on again (described above).

Chapter 4
Specifications

4.1   Hardware Specifications

4.1.1   Physical Specifications

form factor:	vehicle mountable, light weight, and rugged
dimensions:	1.75" H x 6.62" W x 6.75" D (4.44cm×16.8cm×17.15cm)
weight:	2 lbs, 8 oz (1.13 kg)
power supply:	+10 to +30 VDC 48 VDC accepted via PoE
connections:	two N-type radio antenna ports (female): one 48 V DC power input port one I/O port for Ethernet 1&2, USB and Serial interfaces, LED Indicator lines (Power, Status, Ethernet 1&2, Radio 1&2), and Control Lines (Power, RF Kill, Black-Out, Reset, Zeroize)
radio:	Radio1: 802.11a/b/g/n Radio 2: high power 802.11a/n
indicators:	system LEDs: **Power**, **Status**, **Enet1**, **Enet2**, **Radio1**, **Radio2**
controls:	Power button

4.1.2   Environmental Specifications

power draw:	8W Maximum
maximum heat dissipation:	20 BTU
cooling:	Convection Cooled
operating temperature:	-40C to +70C -40F to +158F
operating relative humidity (non-condensing):	5 - 95%
storage temperature:	-40C to +70C -40F to +158F

4.1.3 Compliance and Standards

emissions:	CE, FCC, ETSI, MIL STD 464A, MIL STD 461F
immunity:	MIL STD 461F
vibration:	MIL STD 810G

The Fortress ES820 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   37-Pin Input/Output Connector

The connector on the rear panel of the ES820 provides all non-radio input/output for the unit. In order to connect to the ES820, a cable with a matching connector must be made, using the required connector type:
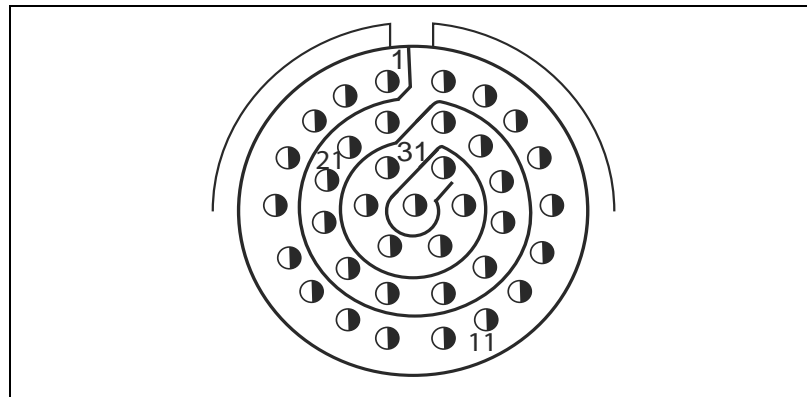

Figure 4.1.   MIL-DTL-38999 Series III TV Shell/Insert 15-35 (socket)

Table 4.1 defines the pin-out required for the ES820 cable connector. Most definitions are standard (ex., Ethernet, serial, and USB). Five pins are unique to the ES820:

◆ **Power** (pin 33 - active lo) - powers the ES820 on and off. When this pin is toggled lo, the unit is permitted to power up and boot. The switch state is tied to the chassis ON/OFF switch: both switches must be OFF to turn the unit off. Tie this pin to a toggle switch.

◆ **Blackout** (pin 24 - active lo) - controls blackout mode, which turns all chassis LEDs OFF. When this pin is held lo, all of the LEDs on the box are dark at all times. When the pin is not held lo, LEDs revert to normal operation. This pin would commonly be tied to a toggle switch.

◆ **RF Kill** (pin 22 - active lo) - controls the RF Kill feature, which turns all radio transmission OFF. When this pin is held lo, all RF emissions are suppressed. When the pin is not held lo, radios revert to normal operation, as defined by the current configuration of the ES820. This pin would commonly be tied to a toggle switch.

◆ **Reset** (pin 23 - active on falling edge) - reboots the box. Resetting is equivalent to power cycling the ES820. The reset function is immediate: all current operations are stopped and the ES820 restarts from the initial power-on state. This pin would commonly be tied to a push button.

◆ **Zeroize** (pin 32 - active on rising edge) - restores the configuration to factory defaults. This pin activates on the rising edge of the signal. The zeroize function is immediate when the ES820 is powered on. If the ES820 is powered off when the zeroize is pressed, the function is executed as soon as power is applied. This pin would commonly be tied to a push button.

The 37-pin connector provides support for six LEDs, five controls, two Ethernet ports, one USB port, and one RS232 COM port.

Table 4.1. ES820 37-Pin I/O Connector Pin-Outs

pin	signal	dir	description
1	GND	-	USB pin 4 Ground
2	USB D+	Bi	USB Data+ pin3, twisted pair+
3	USB D-	Bi	USB Data- pin2, twisted pair-
4	USB Vcc	-	USB pin1 Vcc (5V), up to 200mA
5	Enet2 Link/Act LED	Out	LED2-, active Lo (8mA @2V diode)
6	Radio2 LED	Out	LED3-, active Lo (8mA @2V diode)
7	Radio1 LED	Out	LED4-, active Lo (8mA @2V diode)
8	Status LED	Out	LED5- active Lo (8mA @2V diode)
9	Power LED	Out	LED6- active Lo (8mA @2V diode)
10	LED Power	-	3.3V through 10 ohms, 48 mA max, 330mA shorted; Connect to the six LED+ pins
11	Enet2 D-	-	Enet 2- RJ45 pin 7 Cat5 twisted pair4
12	Enet2 RX-	In	Enet 2- RJ45 pin 6 Cat5 twisted pair2
13	Enet2 TX+	Out	Enet 2- RJ45 pin 1 Cat5 twisted pair1
14	Enet2 TX-	Out	Enet 2- RJ45 pin 2 Cat5 twisted pair1
15	Enet1 D-	-	Enet 1- RJ45 pin 7 Cat5 twisted pair4
16	Enet1 RX-	In	Enet 1- RJ45 pin 6 Cat5 twisted pair2
17	Enet1 RX+	In	Enet 1- RJ45 pin 3 Cat5 twisted pair2
18	Enet1 TX-	Out	Enet 1- RJ45 pin 2 Cat5 twisted pair1
19	GND	-	COM, RS232 Ground (Monitor Port)
20	COM TXD	Out	COM, RS232 Xmt (Monitor Port)

Table 4.1. ES820 37-Pin I/O Connector Pin-Outs

pin	signal	dir	description
21	Enet1 Link/Act LED	Out	LED1, active Lo (8mA @2V diode)
22	RF Kill_n (Toggle)	In	SW1, RFKILL, active Lo
23	Reset_n (PB)	In	SW3, Reset, active on falling edge
24	Blackout_n (Toggle)	In	SW5, Blackout, active Lo
25	Enet2 D+	-	Enet 2- RJ45 pin 8 Cat5 twisted pair4
26	Enet2 RX+	In	Enet 2- RJ45 pin 3 Cat5 twisted pair2
27	Enet2 C+	-	Enet 2- RJ45 pin 4 Cat5 twisted pair3
28	Enet1 D+	-	Enet 1- RJ45 pin 8 Cat5 twisted pair4
29	Enet1 C-	-	Enet 1- RJ45 pin 5 Cat5 twisted pair3
30	Enet1 TX+	Out	Enet 1- RJ45 pin 1 Cat5 twisted pair1
31	COM RXD	In	COM, RS232 Rcv (Monitor Port)
32	Zeroize (PB)	In	SW2, Zeroize, active on rising edge
33	Power_n (Toggle)	In	SW4, Power on, active Lo
34	Enet2 C-	-	Enet 2- RJ45 pin 5 Cat5 twisted pair3
35	GND	-	Ground
36	Enet1 C+	-	Enet 1- RJ45 pin 4 Cat5 twisted pair3
37	GND	-	Ground

4.3   3-Pin DC Input Connector

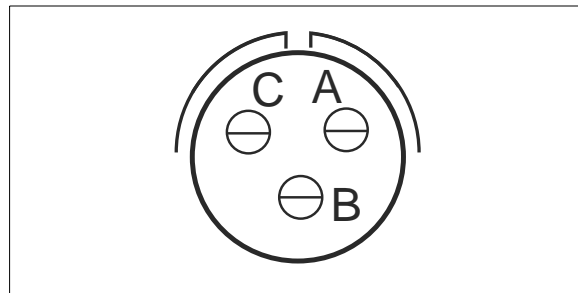The Mesh Point uses a 3-pin connector to input power.

Figure 4.2.   D38999/26FA9-98SN 3-pin Power Connector Pins

Table 4.2 shows the power connector pin-outs.

Table 4.2. ES820 DC Power Connector Pin-Outs

pin	signal
A	+10 to 30 VDC
B	N/C
C	GND

Index