FORTRESS™
TECHNOLOGIES

ES440
Secure Wireless Bridge

Hardware Guide

Fortress ES440 Secure Wireless Bridge [rev.2]

FCC EMISSIONS COMPLIANCE
AND INDUSTRY CANADA STATEMENTS

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.

IN ADDITION, USERS SHOULD ALSO BE CAUTIONED TO TAKE NOTE THAT HIGH POWER RADARS ARE ALLOCATED AS PRIMARY USERS (MEANING THEY HAVE PRIORITY) OF 5250-5350 MHZ AND 5650-5850 MHZ AND THESE RADARS COULD CAUSE INTERFERENCE AND/OR DAMAGE TO LE-LAN DEVICES.

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.

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.

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

1 Port Locations

The ES440 Bridge's power inlet, serial connector, Ethernet connectors and USB port are located on the front panel, shown below.
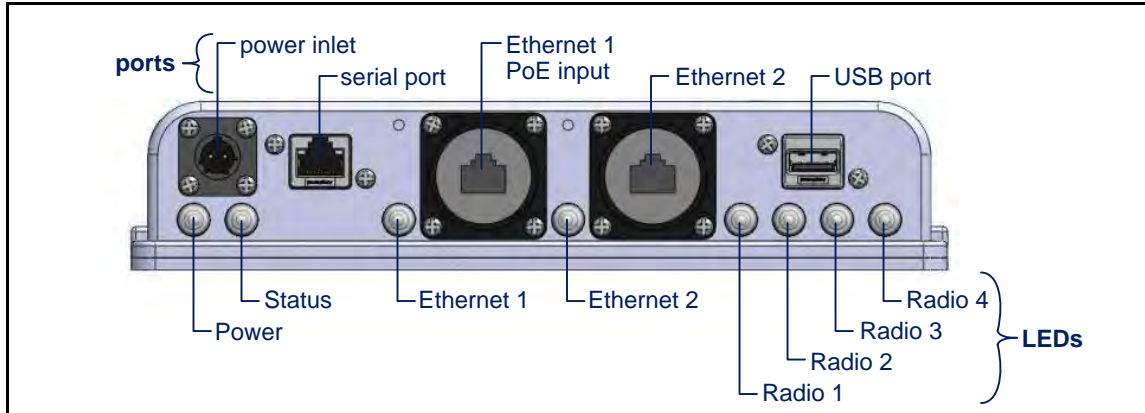

Figure 1 **ES440 Front-Panel Port and LED Locations**

All ES440 front-panel ports are protected by captive covers, shown in Figure 2. Unused ports should remain covered to protect against dust and other debris. Covered or uncovered, all ES440 ports are waterproof.

NOTE: The ES440 is also known as Fortress's *ES440 Infrastructure Mesh Point,* although *Bridge* is used throughout ES440 user guidance.
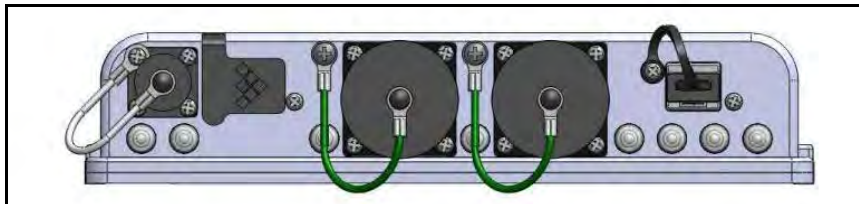
Figure 2 **ES440 Front Panel with Port Covers**

Four antenna connectors are situated on the ES440 back panel, corresponding to the ES440's internal radios, as shown below.

Figure 3 **ES440 Back-Panel Antenna Connectors and Recessed Button**

The recessed button used to restore the running configuration to factory defaults (Section 4) is also located on the back panel, beneath a protective screw cap.

CAUTION: The back-panel screw cap must be installed in order for the ES440 to be watertight.

2 Powering Options

The ES440 Bridge can be powered by standard AC or PoE (Power over Ethernet).

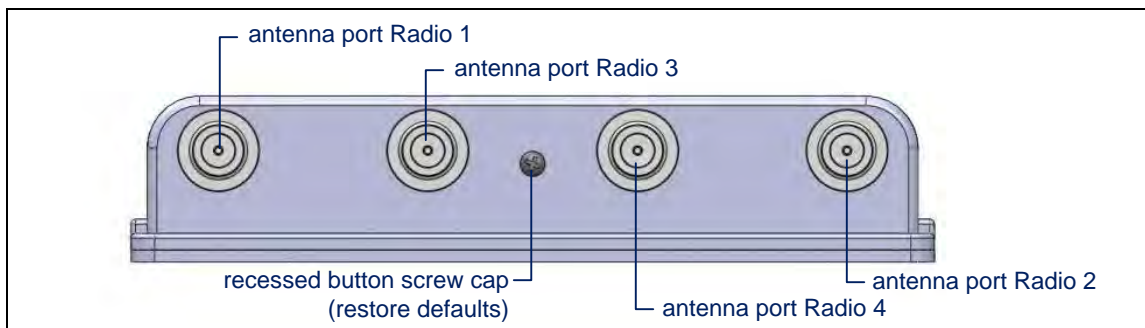To power the ES440 with standard AC, plug the included AC adapter into a properly rated AC outlet and connect the adapter to the ES440's power inlet (refer to Figure 1) with the cable provided.

To power the ES440 over Ethernet, connect Ethernet 1 (see Figure 1) to a remote standard 802.11af PoE midspan adapter or endspan source.

CAUTION: Never plug the ES440 into an AC adapter other than the adapter that ships with the unit (or a replacement obtained from Fortress). Using the wrong AC adapter can damage the ES440.

3 LED Indicators

The ES440 features eight LEDs on the front panel (shown in Figure 1).

Power *can exhibit:*

◆ *solid green* - Bridge is powered on and operating normally.

◆ *off* - Bridge is powered off.

◆ *slow-flash green* - Bridge 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, **Radio2**, **Radio3** *and* **Radio4** *can exhibit:*

◆ *solid green* - Radio is on.

◆ *intermittent green* - Radio is passing traffic.

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

color	behavior	Power	Status	Ethernet1/ Ethernet2	Radio1/Radio2/ Radio3/Radio4
green	*solid*	normal operation	-	link established	radio ON
	slow flash	booting	-	-	-
	fast flash	-	-	-	-
	intermittent	-	cleartext on encrypted port	passing traffic	passing traffic
	off	powered OFF	-	-	radio OFF *or* RF Kill enabled

4   Chassis Control

The single recessed button on the ES440 back panel (Figure 3) returns the ES440 Bridge to the factory default configuration.

The button is covered by a screw cap that you must remove, in order to access the button. ***You must replace the screw cap, in order to maintain the watertight integrity of the ES440 chassis.***

To restore default settings, depress and hold the button for 10 seconds. All current configuration information on the running boot partition will be lost.

5   Radios

The ES440 Bridge contains four radios:

Radio 1 -   802.11a/b/g/n radio
Radio 2 -
Radio 3 -   } high power 802.11a/n radios
Radio 4 -

The antenna ports on the ES440 back panel correspond to these radio numbers as shown in Figure 3.

The four LEDs in the lower right corner of the ES440 front panel correspond to the radios as shown in Figure 1.

6   RJ45-to-DB9 Serial Port Adapter

An RJ45-to-DB9 adapter (included with each Bridge) is required in order to connect the Bridge's serial port to a DB9 terminal connection.

Figure 4 shows the pin numbers for the two connectors. With the RJ45 connector facing you and oriented with the tab receptacle up, pins are numbered from right to left, as shown. With the DB9 connector facing you and oriented with the wide side up, pins are numbered from right to left, top to bottom.
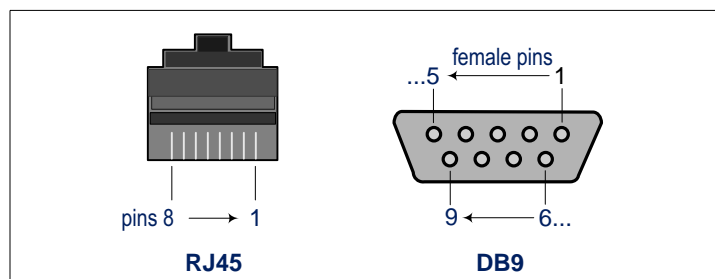

female pins

...5 ← 1

pins 8 → 1   9 ← 6...

RJ45   **DB9**

Figure 4   **RJ45 and DB9 Pin Numbering**

Table 1 shows the adapter pin-outs.

Table 1.   RJ45-to-DBP Adapter Pin-Outs

RJ45 pin	DB9 pin	standard color
1	8	grey
2	6	brown
3	2	yellow
4	5	green
5	-	red
6	3	black
7	4	orange
8	7	blue

7   2-Pin DC Input Connector

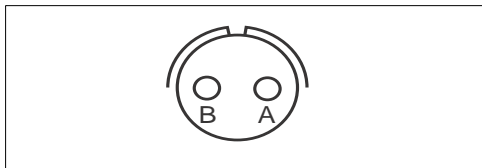The ES440 Bridge uses a 2-pin connector to input power.

Figure 5   2-pin Power Connector Pins

Table 2 shows the power connector pin-outs.

Table 2.   ES440 DC Power Connector Pin-Outs

pin	signal
A	+9 to 30 VDC
B	GND

8   Dimensions and Weight

dimension	inches	centimeters
height	1.75	4.5
width	8.5	21.6
depth	8.5	21.6

The ES440 weighs 4 lbs (1.8 kg).