

Pivotal Echo 5G Boost Installation Manual

(ESBoost-n261)

Version 2022.1



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Safety and Regulatory Information

This manual should be read and used as a guideline for properly installing and operating the Echo 5G Boost device. This manual may be changed for system improvement, standardization, and other technical reasons without prior notice. Updated manuals are available at: <https://pivotalcommware.com/Echo5GUserManual.pdf>.

For questions on the manual or their content, contact support@pivotalcommware.com.

FCC Signal Booster User Information

WARNING. This is not a CONSUMER device. This device may not be sold at retail. You **MUST** have an FCC LICENSE or express consent of an FCC Licensee (or express consent of your service provider) to operate this device. Antennas must be installed at least 20 cm (8 inches) from any person. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

FCC Part 15 Information for User

Echo 5G Boost (Model: ESBoost-n261) Outdoor Unit (ODU) and Indoor Unit (IDU) – FCC ID: **2AUVU-ESB261**.

- The device contains FCC IDs: **2AUVU-UBR410M** and **Z64-WL18SBMOD**

The Echo 5G Boost system is sold as a system and shall only be operated as a system, with both the Outdoor and Indoor units installed on low-E glass. Neither can be operated standalone, as both units are required for operation.

Pursuant to part §15.21 of CFR Title 47, you are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment to an outlet on a circuit different from that which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

FCC Radiation Exposure Statement

To ensure the safety of users, the FCC has established criteria for the amount of radio frequency energy various products may produce depending on their intended usage. This product has been evaluated to comply with the FCC’s exposure criteria. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The installation of the Echo unit should allow at least **20 centimeters** between the device and persons to be in compliance with FCC RF exposure guidelines.

Use only Pivotal Commware approved power supplies and accessories that are specifically designed for your Echo 5G Boost device.

Intellectual Property

All Intellectual Property, as defined below, owned by or which is otherwise the property of Pivotal Commware, Inc. (“Pivotal”) or its respective suppliers relating to the Pivotal device, i.e., Pivotal Echo 5G Boost, including but not limited to, accessories, parts, or software relating thereto (the “Echo 5G Boost”), is proprietary to Pivotal and protected under federal laws, state laws, and international treaty provisions. “Intellectual Property” means any Pivotal (or where applicable, Pivotal’s supplier’s) intellectual property including, but not limited to, inventions (patentable or unpatentable), patents, trade secrets, copyrights, software, computer programs, and related documentation and other works of authorship. You may not infringe or otherwise violate the rights secured by the Intellectual Property. Moreover, you agree that you will not (and will not attempt to) modify, prepare derivative works of, reverse engineer, decompile, disassemble, or otherwise attempt to create source code from the software. No title to or ownership in the Intellectual Property is transferred to you. All applicable rights of the Intellectual Property shall remain with Pivotal and its suppliers.

Disclaimer of Warranties; Exclusion of Liability

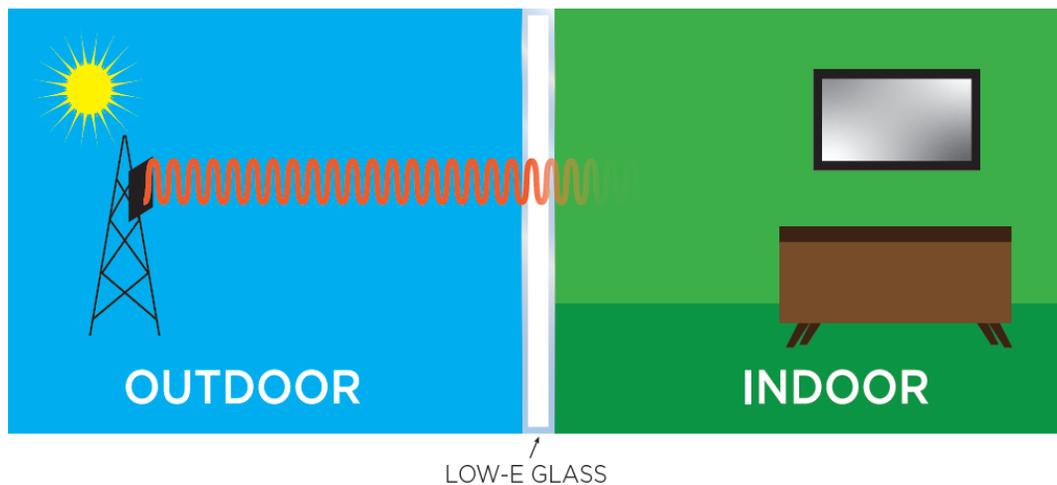
This document provides an introduction to features, functions, setup, and operation of Pivotal Commware’s Echo 5G Boost. For more information, refer to the [Warranty Information](#).

Overview of Echo 5G Boost

Why is Low-E Glass a Challenge?

Low-e glass or low-emissivity glass has a thin coating between two or three panes of glass to reflect energy and keep temperatures in your home or enterprise consistent. This is good news for saving energy, but bad news for acquiring a mmWave 5G signal. The losses from low-e glass can be as high as 50 dB. When the signal arrives indoors it has been attenuated significantly due to the difficulties penetrating low-e glass.

Estimates of the number of U.S. households and businesses with low-e glass are 25% and 35%, respectively. But recently, [says the Department of Energy¹](#), more than 50% of window sales in the commercial market and 80% of the sales in the residential market incorporate low-E coatings.

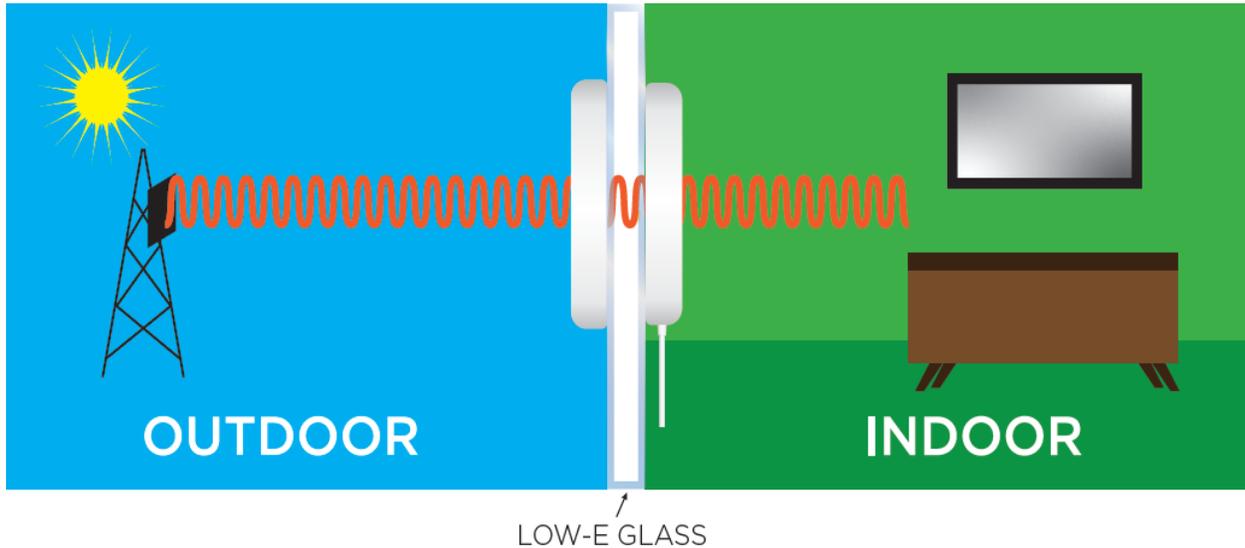


¹ EERE Success Story—Energy-Efficient Windows are Saving Americans Billions of Dollars, <https://www.energy.gov/eere/success-stories/articles/eere-success-story-energy-efficient-windows-are-saving-americans>

How does Echo 5G Boost Solve Low-E Glass?

Echo 5G outdoor units use Pivotal's patented Holographic Beam Forming® technology to acquire the 5G mmWave signal, amplify it, and transmit it indoors through the low-e glass.

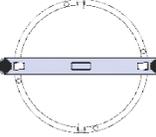
By adding an Indoor Boost Unit, that low signal can be captured, amplified, and flooded indoors to extend the range of the gNB and provide gigabit speed coverage.



Installation & Setup

The Echo 5G Boost is designed to be easily installed. The following material provides guidance to perform a typical installation. Subsequent sections offer additional assistance if needed.

System Components

	<p>Echo 5G Boost ODU (1)</p> <p>Outdoor unit (ODU) with HBF antenna and RF front-end functions:</p> <ul style="list-style-type: none"> • Conveys wireless data between user devices and nearby base station
	<p>Echo 5G Boost IDU (1)</p> <p>Indoor unit (IDU): Transmits power through low-e glass</p>
	<p>ODU Mounting Ring (with pre-attached level)</p> <p>Mounts the ring on the window that the ODU locks into, and levels unit.</p>
	<p>Booster Alignment Ring</p> <p>Aligns Indoor Unit indoors with Outdoor Unit outdoors.</p>
	<p>Power Adapter (1)</p> <p>Provides power from wall outlet to Indoor Unit</p>
	<p>OUTSIDE Cleaning Wipes (1)</p> <p>For cleaning the OUTSIDE of the window ONLY to ensure a good bond between the Outdoor Unit and the window.</p>



INSIDE Cleaning Wipes (1)

For cleaning the **INSIDE** of the window **ONLY** to ensure a good bond between the Indoor Booster Unit and the window.



Removal Tool (1)

To remove the mounting ring and adhesive if necessary.



Quick Start Guide (1)

Easy instructions for installation and commissioning.

Choosing a Location for your Echo 5G Boost

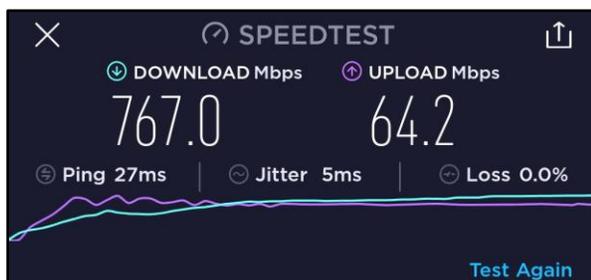
The window you choose for your Echo 5G Boost must:

- Be on the **ground** floor (2m or less from the floor)
- Receive quality 5G reception
- Have an outlet within **10 feet** of the mounting location indoors for plugging in the Indoor Unit

Finding the Best Window for Reception

Identify the window with the best 5G reception by downloading the SpeedTest app from your app store, turning off your phone's wi-fi, opening the app, and selecting 'Go.'

IMPORTANT: You must perform the speed test **OUTDOORS** as you will not get a good signal through low-e glass.



Pre-Installation Cleaning

IMPORTANT: There are two wipes packets, one for the **INDOOR** glass (white packet) and one for the **OUTDOOR** glass (gray packet). See below for images of each packet. Make sure you use the **CORRECT** wipes packet when cleaning the glass.



Clean the window glass according to the instructions below (also found on the back of the gray outdoor wipes packet):

Wipe Instructions

- [1]** Wipe glass vertically and then horizontally to ensure complete coverage. Be sure pad is wetting the glass surface.
- [2]** While glass surface is still wet, wipe dry with a clean dry cloth or paper towel.
 - a. Note: make sure the glass is fully dry before installing either unit.
- [3]** Apply the item(s) to be bonded within thirty minutes.

Installing the Outdoor Unit (ODU) and Indoor Booster Unit (IDU)

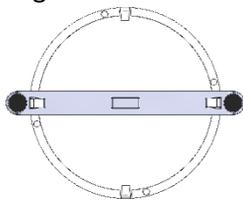
Make sure you have carefully [selected a good window](#) and performed the [required glass cleaning](#) before installing your Echo 5G Boost.

Before you Begin

- Write down the serial number on the Quick Start Guide. The serial number is found on the bottom of the **OUTDOOR UNIT**. **DO NOT** use the serial number from the indoor unit.
- You will be moving back and forth **OUTSIDE** and **INSIDE** to install your Echo 5G Boost. Make sure you are installing on the correct side of the window for each step.
- **DO NOT** install the Echo 5G Boost above the ground floor.
- Ensure the mounting adhesive and window stay dry throughout the mounting process.

GO OUTSIDE

[1] Bring:

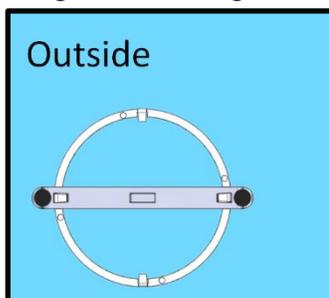


ODU Mounting Ring



Outdoor wipes (if you have not already cleaned the window)

[2] Remove the adhesive backing from the ODU ring and use the level to attach it to the window. Ensure the bracket is level by using the leveling tool. Press and hold firm, running your fingers along the entire ring for **30 seconds**.

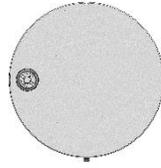


GO INSIDE

[3] Bring:



Booster alignment ring

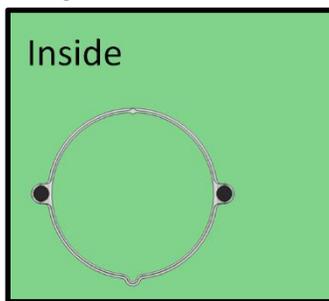


Indoor Unit (Booster)



Indoor wipes (if you have not already cleaned the window)

[4] Use the magnets on the Booster alignment ring to align with the ring outside with the groove facing **DOWN**.



[5] Remove the adhesive backing and place the Booster in the center of the alignment ring with the dial on the **LEFT** and the power jack fitting into the groove at the bottom. Press firm all along the unit and hold for **30 seconds**. Remove the Booster alignment ring when finished by pressing the booster against the window with your thumbs and sliding the ring over and off the Booster with your fingers.



GO OUTSIDE

[6] Bring:

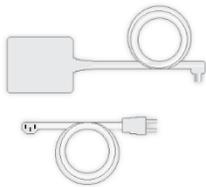


Outdoor Unit

[7] Remove the leveling tool and mount the ODU on the ring. Align the ODU on the ring such that the tab is in the top left corner. The ODU will go on the ring at a slight counterclockwise angle and rotate clockwise until the tab at the top snaps into place.

GO INSIDE

[8] Bring:



Adapter and power cable

[9] Plug the Booster in when finished.
a. **Note:** Unplug the IDU before moving or realigning either unit.

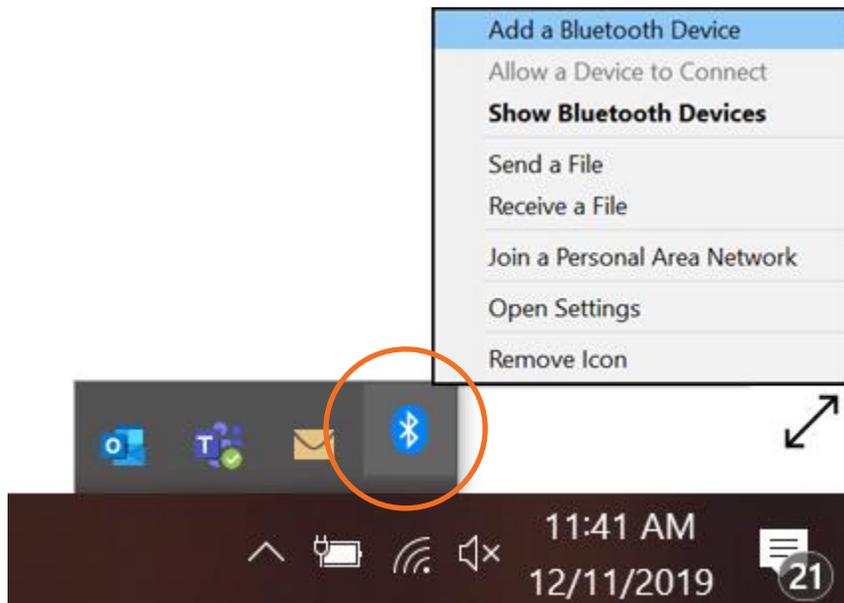
Connecting to Echo 5G Boost

You will activate the Echo 5G Boost using the Echo Manager web interface. To do this, you must first establish a wireless Bluetooth connection to the Echo 5G Boost from your [laptop](#) or [smartphone](#).

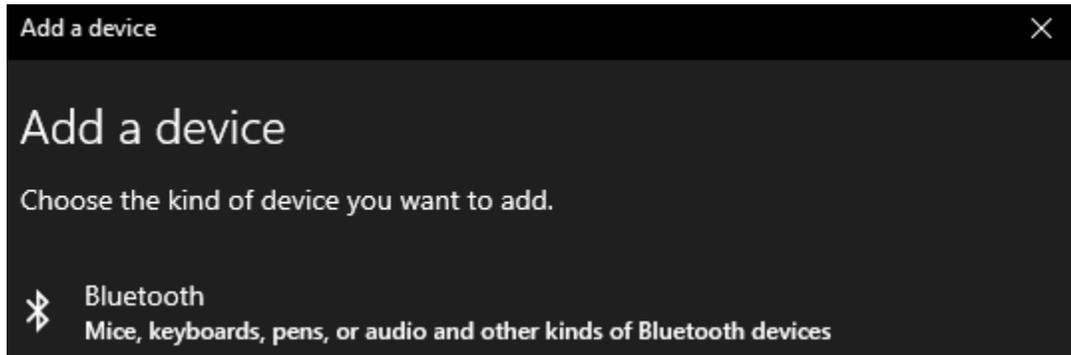
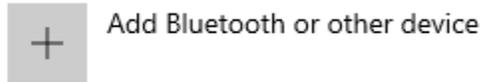
Your laptop/smartphone and the Echo 5G Boost will communicate via Bluetooth. (Specifically, they communicate via IP over a Bluetooth connection). Once connected, you will need to keep your laptop or smartphone within **10 feet** of the Echo 5G Boost unit until you are finished with activation.

Connect to the Echo 5G Boost via Bluetooth with a Laptop

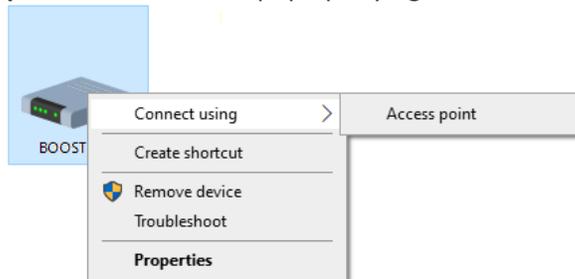
- [1] Power on the Echo 5G Boost so the laptop can discover it as a nearby Bluetooth device by plugging it in.
- [2] **Right click** on the **Bluetooth icon** in the lower right of your home screen and select **Add a Bluetooth Device**.



- [3] Select **Add Bluetooth or other device**, then select **Bluetooth** as the type of device. The Echo 5G Boost will be displayed by “Booster” and the last 3 digits of the serial number, e.g. *Booster716*. Select the **Echo 5G Boost**, then select **Add**.

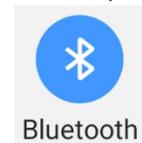


- [4] Right click the **Bluetooth icon** again and select **Join a Personal Area Network**. You will see the Echo 5G Boost as a device here. Right click the **Echo 5G Boost** and select **Connect using > Access point**. A window will pop up saying *Connection Successful*.

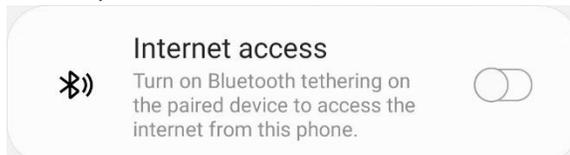


Add the Echo 5G Boost as a Recognized Device via Smartphone

- [1] Turn your phone to airplane mode.
[2] Turn on your phone’s **Bluetooth** if it is not already on.

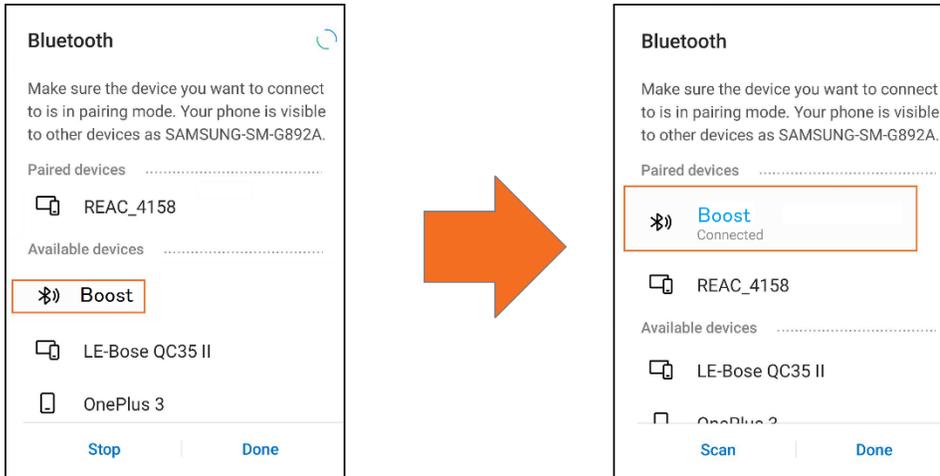


- [3] You may also need to turn on **Bluetooth tethering** in your phone’s *Bluetooth settings*.



[4] Activate the Bluetooth connection and tap the **Echo 5G Boost** to pair and connect. It will be displayed by “Booster” and the last 3 digits of the serial number, e.g. *Booster716*.

- a. (Android phones): In the Bluetooth settings you may need to toggle **Internet Access** off and **on** again for the Echo 5G Boost to appear.



Commissioning the Echo 5G Boost

The Echo Web Interface is the same whether it is on a Smartphone browser or laptop browser.

Connecting to Echo 5G Boost via Web Browser

[1] Navigate to web address **10.0.0.1** on your phone's web browser. If this page does not load, you may first need to clear your browser cache.

- a. If you have trouble accessing 10.0.0.1, toggle your phone into **airplane mode**. (You may have to reconnect to Bluetooth after doing this.)



[2] Enter the **last six digits of your Echo 5G Boost's serial number** as your password. The serial number can be found on the bottom of the Outdoor Unit. Then select **Submit**.

- a. **IMPORTANT:** The Indoor Booster Unit has a different serial number. DO NOT use the Booster serial number.



Serial number shown on bottom of ODU

[10] The Echo 5G Boost will search for active beams. Once the search is complete the Boost will make the top beam the default beam.



Figure 1. Searching for beams

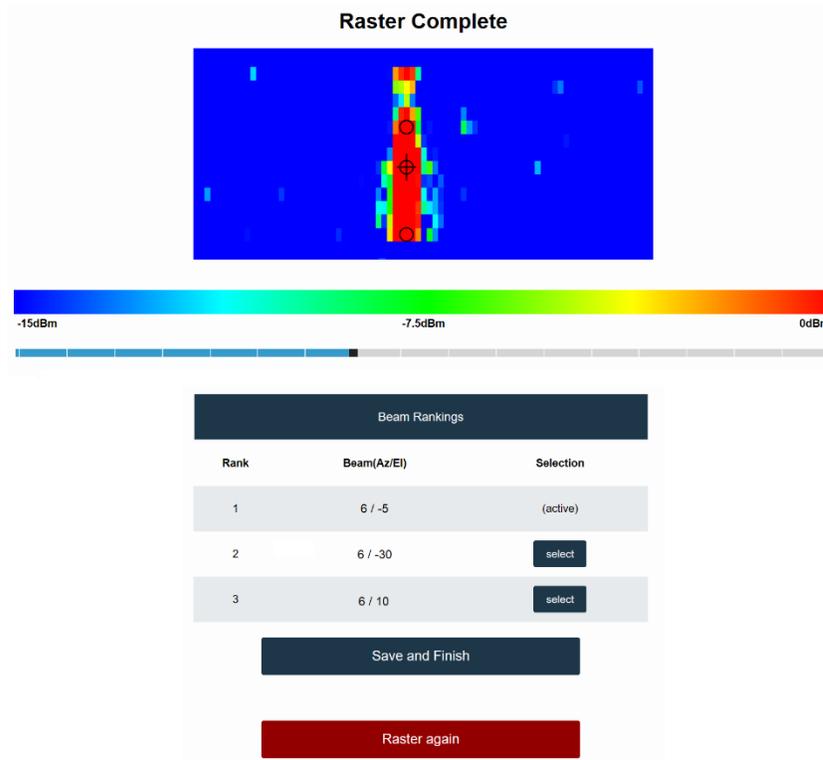


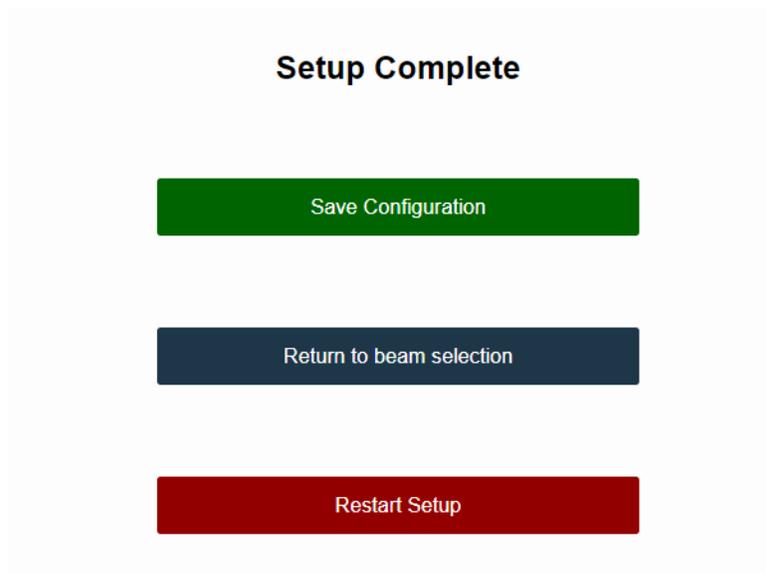
Figure 2. Beam scan result with ranked beams

- [11]** The dial on the Indoor Unit turns in incremented steps. Turn the dial counterclockwise step by step until the LED on the Booster turns **red**. Then turn the dial clockwise step by step until the LED turns **green**. Then turn the dial clockwise **1 more step**.



Note the directions on the dial for increasing gain (counter-clockwise) or decreasing gain (clockwise).

- [12] Select **Save and Finish**.
- [13] Select **Save Configuration** on the *Setup Complete* screen.



Echo 5G Boost Settings (Details)

- [1] If you select Details, you can view the Azimuth (Az) and Elevation (El) along with other details of the Echo 5G Boost’s alignment in either dB or raw format. You can also manually set the Azimuth and Elevation if your connection is weak using the heatmap below the details to identify strong signal sources (which will appear in yellow, orange, or red (strongest)).

Setup Complete

Azimuth: Elevation:

Uplink

VPOL UL dB: HPOL UL dB:

Downlink

VPOL DL dB: HPOL DL dB:

Switch to Raw

Submit

Save and Exit

DL VPOL: -15.2 dBm
DL HPOL: -15.1 dBm
UL VPOL: -21.8 dBm
UL HPOL: -19.0 dBm

Heat Map

Min: -10 Max: 0

Setup Complete

Azimuth: Elevation:

Uplink

VPOL UL 1: HPOL UL 1:

VPOL UL 2: HPOL UL 2:

VPOL UL 4: HPOL UL 4:

Downlink

VPOL DL 1: HPOL DL 1:

VPOL DL 2: HPOL DL 2:

VPOL DL 4: HPOL DL 4:

Switch to dB

Submit

Save and Exit

DL VPOL: -15.2 dBm
DL HPOL: -15.1 dBm
UL VPOL: -21.8 dBm
UL HPOL: -19.0 dBm

Heat Map

Min: -10 Max: 0

Setting Azimuth or Elevation Manually

The *Manual Setup* tab provides access to beam-pointing (Az, El) control in degrees.

Azimuth can be adjusted in 2-degree increments and decrements, and Elevation in 5-degree increments. The inputs are bounded from -35 degrees to +35 degrees in Elevation and -76 degrees to +76 degrees in Azimuth. You can begin with an initial setting of 0 for both Az and El.

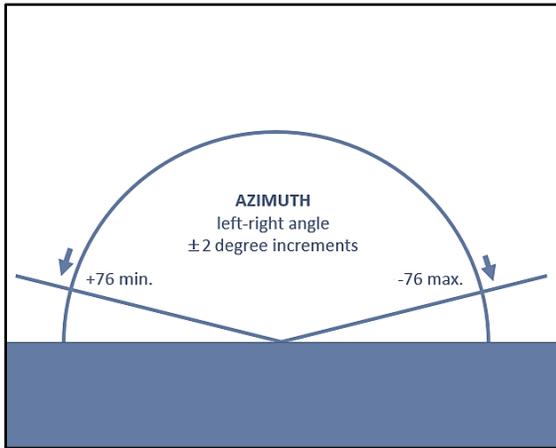


Figure 3: "Top-down view" of azimuth settings range
"Side view" of elevation settings range

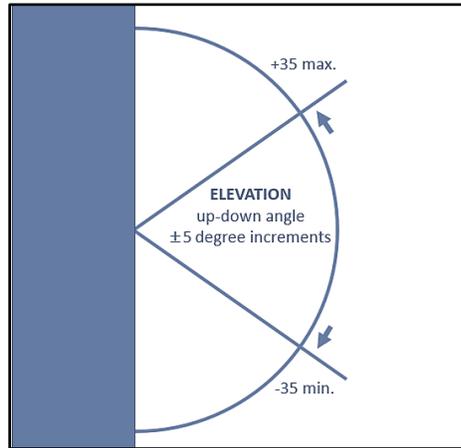


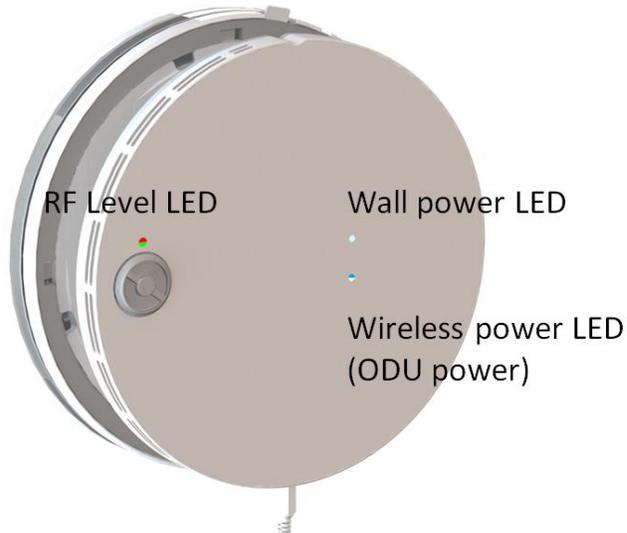
Figure 4: "Top-down view" of azimuth settings range
"Side view" of elevation settings range

Appendix A – Echo 5G Boost Technical Specifications

Pivotal Echo 5G Boost	Specifications
Frequency of operation	27.5 to 28.35 GHz
HBF az scan envelope	+/-76°
HBF el scan envelope	+/-35°
HBF antenna gain (donor side)	17 dB
HPBW towards gNB - azimuth	5°
HPBW towards gNB - elevation	20°
HBF scan loss	6 dB at 76°
Static antenna (service side)	7 dB
HPBW towards CPE/UE - azimuth	120°
HPBW towards CPE/UE - elevation	60°
Gain tunable range - DL	30 dB
Gain tunable range - UL	30 dB
Max electronic gain - DL	55 dB
Max electronic gain - UL	55 dB
Max EIRP - DL	28.5 dBm
Max EIRP - UL	25.5 dBm
Min noise figure - DL	5 dB
Min noise figure - UL	5 dB
In-band ripple (per 100 MHz channel)	2 dB
Operating Temperature	ODU: -30 to 45° C IDU: 0 to 45° C
Dimensions	ODU: 8.25" diameter circle x 1.2" IDU: 8" diameter circle x 0.75"
Weight RF ODU	2.3 lbs.
Weight IDU	1.5 lbs.
IP Rating	IP54 for ODU; IP31 for IDU
Support Glass Type	Low-e dual and triple pane glass
Mounting	ODU: Adhesive, VHB IDU: Gecko tape™
Max. Power Consumption	40 Watts (from outlet)
Power Method	AC adapter for IDU and wireless power magnetically induced for ODU
Configuration Management Interface	Bluetooth® and LTE CAT M1
Activation	Automated
Certifications	FCC, UL
Maximum Donor Range (to gNB)	3,000 ft
Maximum Indoor Range (to CPE/UE)	100 ft+

Appendix B – Troubleshooting & Support

Indicator Lights Overview



What the IDU Indicator Light Displays Mean

Overview

The LED conditions directly below convey the general status of the unit to the end user. If the user encounters a blinking red Wireless Power LED, they should review the next section: Full LED Behavior Table.

RF Level LED

- **Solid green** – Gain added by booster is adequate
- **Solid red** – IDU gain exceeded, turn down the unit gain – clockwise on the dial (yes, clockwise)

Wall power LED

- **Off** – Unit not receiving power from adapter / wall
- **Solid blue** – wall power present

Wireless power LED

- /● **Blinking green** – Establishing wireless power link to ODU
- **Solid green** – Wireless power link good
- /● **Blinking red** – Contact [Pivotal Support](#).
- **Solid red** – Problem establishing wireless power, likely due to missing or misaligned ODU

Clearing a Red RF Level LED

If the RF Level LED returns to red after having been green after completing commissioning, perform the following steps to clear the error:

1. Run a speed test on 5G within the service area of the Echo 5G Boost
2. Adjust the gain dial clockwise (down) until the LED turns green. Then turn it one more step clockwise.

FAQ / Troubleshooting

What do I do if I have trouble accessing 10.0.0.1?

You may need to clear your browser cache, set your phone to airplane mode, or both.

What if the Echo 5G Boost is not transmitting?

Power the Echo 5G Boost off, then power it back on.

What do I do if the Echo 5G Boost loses connectivity during activation?

Your Bluetooth connection may have dropped if your laptop or smartphone was moved too far away from the Echo 5G Boost during activation. Try getting closer to the Echo 5G Boost with the device you

are using for activation via Bluetooth. You may need to re-do the network connection portion of the [Laptop-to-Echo](#) connection process.

What do I do if the Echo 5G Boost signal strength diminishes over time?

There may be a gradually increasing obstruction of the signal path to the gNB, such as leaves growing on trees that were not there during the initial Echo 5G Boost setup. Re-do the [Commissioning the Echo 5G Boost](#) steps of the Echo 5G Boost Activation.

What if the Echo 5G Boost is still not working?

Power the Echo 5G Boost off, then power it back on.

Notes:

- The Echo does not lose any settings when GUI/Bluetooth connection has been dropped and subsequently restored.
- If the above listed solutions do not appear to resolve your concern, please [contact Pivotal Commware](#) for additional assistance.

What if the RF Level LED returns to red after having been green after completing commissioning?

1. Run a speed test on 5G within the service area of the Echo 5G Boost
2. Adjust the gain dial clockwise (down) until the LED turns green. Then turn it one more step clockwise.

Getting Technical Assistance

Pivotal Commware is dedicated to the success of your Echo 5G Boost installation and operation. Feel free to contact us with any questions or concerns.

Before calling, gather the following details about your Echo 5G Boost:

- [Serial Number](#) (located on the bottom of the ODU, back of the IDU, and on the packaging box)

Pivotal Echo 5G Boost Technical Support:

- Phone – 1-855-956-2016
- Email – support@pivotalcommware.com
- File a Ticket – <https://pivotalcommware.freshdesk.com/support/home>
- Pivotal Support Resources: <https://pivotalcommware.com/echo-boost-installation-help/>



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Kirkland, WA 98033 USA
(425) 365-0408
pivotalcommware.com

Appendix C – Warranty Information

Your Pivotal Commware, Inc. ("Pivotal") Echo 5G Boost has been designed to provide reliable, worry-free service. If for any reason you have a problem with your equipment, please refer to the manufacturer's warranty in this section. For information regarding the terms and conditions of service for your Echo 5G Boost, please visit www.verizonwireless.com/support/ or call Verizon Wireless Customer Service at (800) 922-0204 or *611 from your Verizon Wireless mobile phone.

Standard Limited Warranty

What is Covered and For How Long?

Pivotal warrants to the original purchaser ("Purchaser" or "You") that the Pivotal Echo 5G Boost and accessories ("Products") included in this package are free from defects in material and workmanship under normal use and service for the period commencing upon the date of purchase and continuing for the following specified period of time after that date: All components carry a one-year warranty.

What is Not Covered?

This Limited Warranty is conditioned upon proper use of Product by Purchaser. This Limited Warranty does not cover: (a) defects or damage resulting from accident, misuse, abuse, neglect, unusual physical, electrical or electromechanical stress, or modification of any part of Product, including antenna, or cosmetic damage; (b) equipment that has the serial number removed or made illegible; (c) any plastic surfaces or other externally exposed parts that are scratched or damaged due to normal use; (d) malfunctions resulting from the use of Product in conjunction with accessories, products, or ancillary/peripheral equipment not furnished or approved by Pivotal; (e) defects or damage from improper testing, operation, maintenance, installation, or adjustment; (f) installation, maintenance, and service of Product, or (g) Product used or purchased outside the United States.

What are Pivotal's Obligations?

During the applicable warranty period, Pivotal will repair or replace, at Pivotal's sole option, without charge to Purchaser, any defective component part of Product. To obtain service under this Limited Warranty, Purchaser must return Product to an authorized service facility in an adequate container for shipping, accompanied by Purchaser's sales receipt or comparable substitute proof of sale showing the date of purchase, the serial number of Product and the seller's name and address. To obtain assistance on where to deliver the Product, call Verizon Customer Care at (800) 922-0204. Upon receipt, Pivotal will promptly repair or replace the defective Product. Pivotal may, at Pivotal's sole option, use rebuilt, reconditioned, or new parts or components when repairing any Product or replace Product with a rebuilt, reconditioned or new Product. All other repaired/replaced Product will be warranted for a period equal to the remainder of the original Limited Warranty on the original Product or for 90 days, whichever is longer. All replaced parts, components, boards and equipment shall become the property of Pivotal. If Pivotal determines that any Product is not covered by this Limited Warranty, Purchaser must pay all parts, shipping, and labor charges for the repair or return of such Product.

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