CBNG

CAMBRIDGE BROADBAND NETWORKS GROUP

CB-UE-HB-MP-v2 series

VectaStar NR UE High Band Med Power
-Outdoor mmWave Receiver

Quick Start Guide

Document Version: 1.10
Document Release: 2025-Feb

can make changes to equipment design or specifications at any time without giving notice or taking responsibility.

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Country safety statements

UK: Hazardous substance notice

This product do not contain hazardous substances (as defined in UK Control of Substances Hazardous to Health Regulations 1989 and the Dangerous Substances Regulations 1990). At the end of this product's life cycle, the customer should consult with the system integrator to ensure that the product is disposed of in conformance with the relevant regulatory requirements.

Europe: Directive 2014/53/EU

European Council Recommendation 2014/53/EU details basic restrictions and reference levels on human exposure to electromagnetic fields as advised by the ICNIRP. Adherence to these recommended restrictions and reference levels should provide a high level of protection as regards the established health effects that may result from exposure to electromagnetic fields.

Country Safety statements

USA: Federal Communications Commission

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. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 80 cm from all persons.

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 into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: Changes or modifications made to this device not expressly approved by the manufacturer may void the FCC authorization to operate this device.

Precautions for Wireless Devices

When using this device, ensure that the antenna of the device is at least 80 cm away from all persons.

WARNING: Do not use this device where using wireless devices is prohibited or may cause interference or danger.

If you are using any electrical medical device, contact its manufacturer for the restrictions on the use of this device.

CAUTION: The EM radio waves generated by this device may interfere with the operation of electronic medical devices. Do not take this device into operating rooms, intensive care units (ICUs), or coronary care units (CCUs).

Usage safety precautions

- Do not use this device where flammables or explosives are stored, for example, in a gas station, oil depot, or chemical plant. Otherwise, explosions or fires may occur. In addition, follow the instructions indicated in text or symbols in area used.
- Place this device on a stable surface.
- Keep this device far from electronic devices that generate strong magnetic or electric fields, such as microwave ovens, satellite dish antennas, or large appliances.
- Do not use any other power adapter except the one is provided with this device. Use of other adapters could damage this device.
- Before connecting and disconnecting cables, ensure that your hands are dry.
- To avoid electric shock, damage, and fire resulting from short-circuiting, do not use the product if wet, with wet hands, or while holding or drinking any liquids.
- Only insert relevant cables or devices into the ports, do not insert metal or other foreign objects.
- Do not place naked flame sources, such as lighted candles, on this device. Keep this device far from sources of heat and fire, such as a heater or a candle.
- Damage caused by user misuse or not following instructions are not covered by warranty.
- Do not cover this device. Reserve space around the vents of this device for heat dissipation.
- Do not use this device in an area under or over temperatures stated in **operating environment** in this product's **specifications**.

Service information

Refer all repairs to qualified service personnel. Do not modify any part of this device, as this will void the warranty.

Disconnect the power to this product and return it for service if the following conditions apply:

1. The product does not function after following the operating instructions outlined in this manual.

2. The product has been dropped or impacted and appears physically damaged.

Locate the serial number of the product and record this on your registration card for future reference. Also record the MAC address, located on the product sticker.

Electrical safety precautions

- Read all instructional and cautionary documents before operating this device.
- Ensure that users are experienced with this communications equipment and can make mechanical settings or adjustments safely.
- Make sure enough electrical sockets are available and not over overloaded by unfused adaptors as this can cause fires.
- Ensure there are no trailing cables that can cause people to trip or fall.
- Switch off and unplug this device before relocating or opening the server chassis.
- Stop using this device immediately if it appears to be faulty or have damaged parts and have it checked by competent persons.
- This device must be grounded properly to earth. Failure to use properly grounded outlets may result in electrical shocks.

Outdoor usage

- This device is designed for outdoor use with an ingress protection for waterproof & dust proof.

Installation location requirement

- This device is for locations where it is unlikely that children will be present and not suitable to be installed where children may be present in the future.

This document details the procedure for installing the component as stated. This document is intended for qualified personnel with a working knowledge of communications equipment.

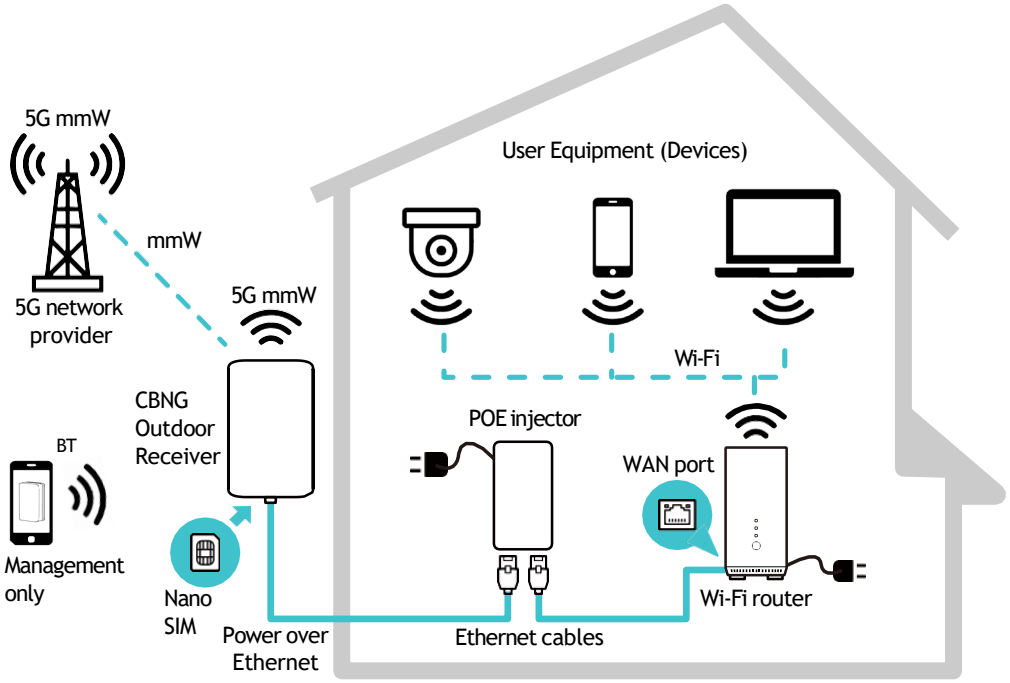
Document revision history

Revision	Date	Notes
1.8	**2024-Dec**	Add accessory waterproof coupler.
1.9	**2025-Jan**	Angle adjustment bracket and accessory added.
1.10	**2025-Feb**	Modify model name for fan-less model.

5G mmW outdoor receiver for internet service

The CB-UE-HB-MP-v2 outdoor receiver is a customer-premises equipment (CPE) that supports 5G NR SA core networks with mmWave. It offers the flexibility of 5G NR mobile broadband access to provide much higher download speeds. The CB-UE-HB-MP-v2 are designed for outdoor usage which protects against temporary water submersion. It is powered by a POE (802.3bt) and provides a 10G ethernet port that can transmit multi-gigabit high-speed connections for internet access. With a mounting bracket, this outdoor receiver can be attached to a wall or pole and function as a fixed wireless access modem with a cable connection to an in-house Wi-Fi gateway.

Here is a basic topology to diagram the parts involved and how they are related:



► The following specifications may change without notice.

Package Contents

- Outdoor 5G receiver
- Port cover with Ethernet cable (2m)
- POE injector and AC power cord
- Angle Adjustment Mounting kit (wall/pole mount bracket and accessories)
- RJ45 ethernet cable (cat 6A, 2m)
- RJ45 waterproof coupler (female to female)

Technical specifications

- Qualcomm® Snapdragon™ X65 5G modem-RF (EU/NA)
- Qualcomm® QTM547 mmWave antenna
- 5G NR, 3GPP release 16, mmWave
- Network Mode: SA
- mmW bands: n257/n258/n260/n261
- mmW Antenna: 2x2 MIMO, PC1
- GNSS L1

Ports & Connections

- Ethernet: 10M/100M/1000M/2.5G/5G/10G Base-T
- USB Type-C (debugging only)
- Nano-sized (4FF) SIM slot
- eSIM (optional)
- BT (management only)

Management

- HTTPS

Certifications/Standards

- FCC, UL, RoHS

Antennas

- Integrated internal 5G
- Four 5G mmW antenna elements

Status indicators

- Signal and Status LEDs (2)

Physical button

- Reset

Power supply

- POE injector: AC input 100V-240V AC
- POE (802.3bt) via RJ-45 port
- RJ-45 port rating: 56V DC / 1.08A
- Power: Under 60 Watts

Physical specifications

- Dimensions: 214.5 x 132.5 x 61.7 mm
- Weight: 1.5 kg

Mounting

- Pole and wall by bracket (ODU)

Operating environment

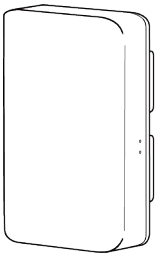
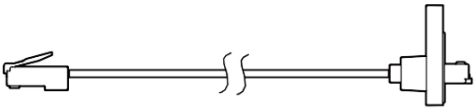
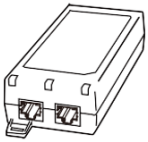
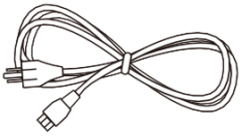
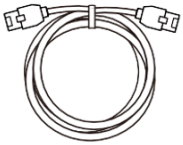
- -40˚ C to 55˚ C
- waterproof & dust proof
- Lightning / ESD Protection

Specifications by territory

Note: The above specifications may change without notice.

PRODUCT LIST (VARIES BY REGION)

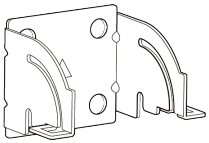
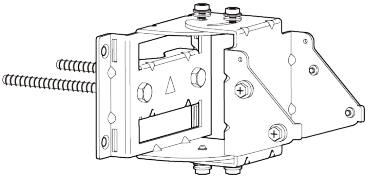
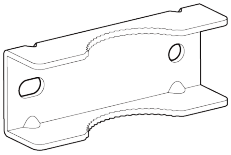
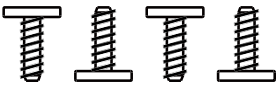
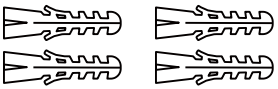
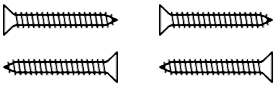
► Examples only, actual items and quantities will depend on order

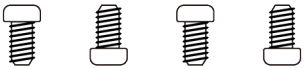
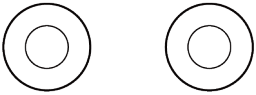
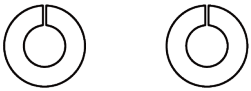
PARTS	QTY	IMAGE	
● CB-UE-HB-MP-v2 5G receiver	x1		
● Bottom port cover with round Ethernet cable (2 meters)	x1		
● POE injector (Power over Ethernet)	x1		(Indoor-use only with a maximum operating temperature of 40˚C (104˚F))
● AC power cord	x1		(Plug types depends on region.)
● RJ45 ethernet cable (Cat 6A, 2 meters)	x1		(Category 6A performance is defined for frequencies up to 500 MHz.)
● RJ45 waterproof coupler (female to female)	x1		(Category 6A, Ethernet cable diameter range Ø5.5~Ø7, IP67, -40~80˚C)

Please be noted that all interconnecting cables are to be routed inside UL Listed flexible conduits of outdoor use.

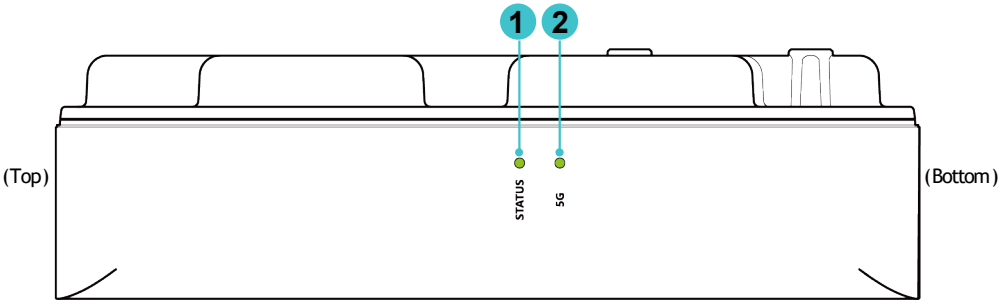
MOUNTING KIT (VARIES BY REGION)

Examples only, actual items and quantities will depend on order

PARTS	QTY	IMAGE
• Back cover bracket ADJ (Zenith Angle Adjustment bracket)	x1	
• Wall or pole mount bracket ADJ (Azimuth Angle Adjustment bracket)	x1	
• Pole mount U bracket	x1	
• Back cover screw (M4*12L)	x4	
• Plastic wall anchors (Ø6*29.6L)	x4	
• Wall mount screws (M4*30.42L)	x4	

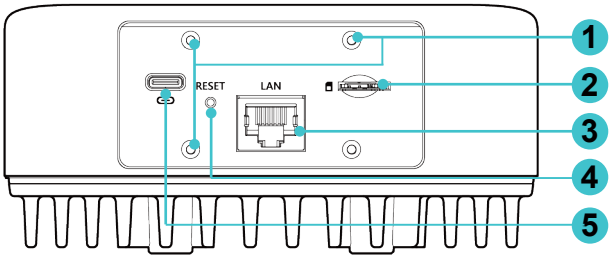
PARTS	QTY	IMAGE
• I/O door cover screw (M3*6L)	x4	
• M6 Washer	x2	
• M6 Spring Washer	x2	
• M6 HEX NUT	x2	

RIGHT SIDE - SYSTEM LEDS



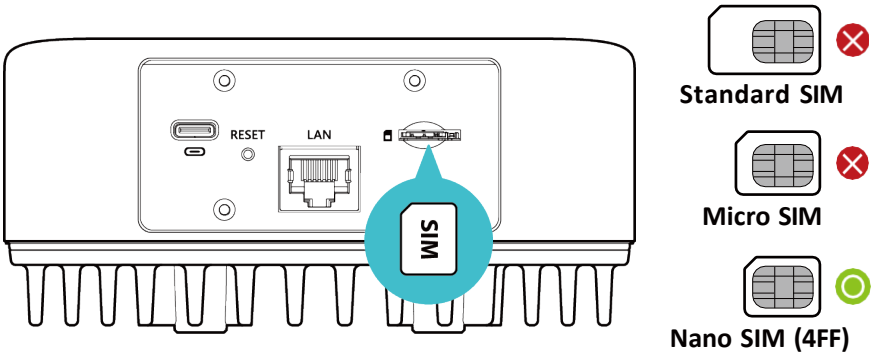
No.	Name	Color	State	Description
1	Status	<dark>	Off	Powered off
		Green	Blinking (1/s)	Connecting... to the Internet
		Green	Blinking (2/s)	WWAN Tx active
		Green	Solid	Connected to the Internet
		Amber	Solid	System ready after bootup
		Red	Blinking	Booting
		Red	Solid	Error
		Red-Amber-Green	Looping	Firmware upgrading...
2	5G (signal strength)	Green	Solid	Signal available and "strong"
		Amber	Solid	Signal available but "moderate"
		Red	Solid	Signal available but "weak"

BOTTOM SIDE - PORTS & BUTTON



No.	Item	Description
1	Cover screw holes (4)	To secure the bottom port cover with the provided screws.
2	Nano SIM card slot	For a nano (4FF) SIM card.
3	Ethernet port	Ethernet port for POE. When the bottom cover is installed, the RJ45 on the LAN cable plugs into the Ethernet port. The other end inserts into the provided POE injector.
4	Reset button	System reboot: Press & hold for over 3 secs (under 10 secs). Reset to default: Press & hold over 10 secs.
5	USB type-C port	The USB port of this device is used for maintenance only.

BOTTOM - MOBILE SIM SLOT



Item	Description
Nano SIM slot	Install a 5G nano SIM card for wireless connectivity to your mobile network provider. Like a mobile phone, this device will automatically connect to the Internet when powered on.

INSTALLATION REQUIREMENTS

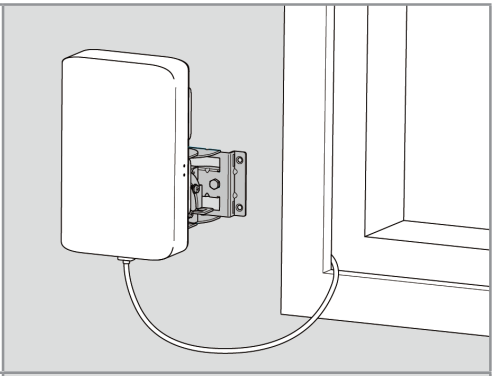
Confirm and understand the following:

- You have tested this device to see that it receives a good 5G signal at this location.
- There is an indoor AC power outlet for this device that is not near a water source. Never use an outdoor AC outlet.
- You can route the cable through a window that will still fully close.
- You are mounting this device vertically and below a roof line.
- You have the following tools on-hand:
  - Power drill and drill bit for the screws or plastic anchors used
  - Screwdriver for the screws used
  - Hammer to insert plastic anchors if used
  - Exterior sealant to help secure cable and prevent water leakage
- Although customers with advanced home maintenance skills may choose to perform the outdoor setup, it is highly recommended that most customers find professional outdoor setup help.
- Outdoor setup is a complex installation task, best suited for those with experience in mounting equipment on the exterior of their homes. Improper mounting of the receiver can cause damage to both the equipment and your home.
- Do not attempt this installation if you are unsure about the siding material or backing material type.
- CBNG is not liable for any property damage resulting from the installation process.

INSTALLATION LOCATIONS

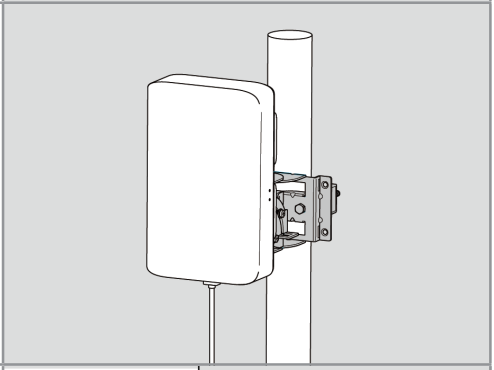
Wall mount / flat surfaces

- Any area that allows installation of screws



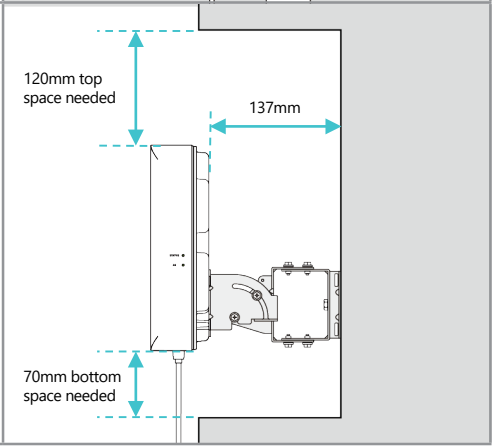
Pole mount / non-flat surfaces

- Any surface that allows wrapping of zip ties or metal bands



SPACE REQUIREMENTS

Installation of this device requires space on top and bottom to allow proper air flow.



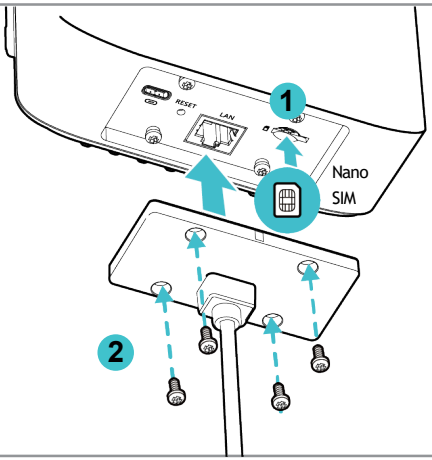
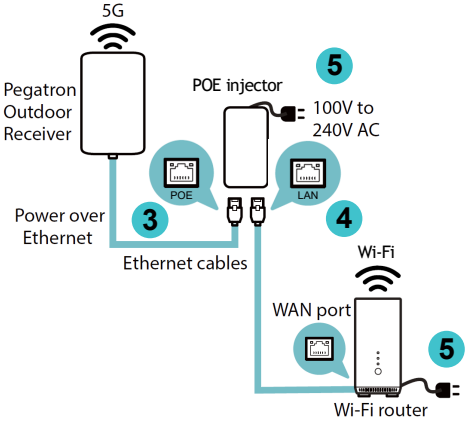
TESTING INSTRUCTIONS

► You will need to connect and test this device on a flat surface inside your window before any physical installations.

1. Insert your own 5G NR SIM card into the SIM card slot on the bottom of the receiver.
2. Connect the provided flat ethernet cable attached to the bottom port cover by securing with the provided screws. Make sure to do this carefully and evenly.
3. Connect the other end of the provided flat Ethernet cable to the POE port of the POE injector.
4. Connect the provided ethernet cable to the LAN port of the POE injector and the other end into an existing switch, PC, indoor Wi-Fi router, or similar device.
5. Plug in the AC power and power on your own Wi-Fi router to similar device.

► It is recommended to use a category 6a cable (as provided) to connect the POE injector and your indoor Wi-Fi router.

► The AC input of the POE injector (adapter) is 100V to 240V AC.

Bottom port cover installation	**Connection example**
Place the port cover into the bottom with the RJ45 connector aligned into the Ethernet port. Secure the cover with the provided cover screws.	Follow the connection example below with your own Wi-Fi router.
	

MOUNTING TO POLES OR BARS

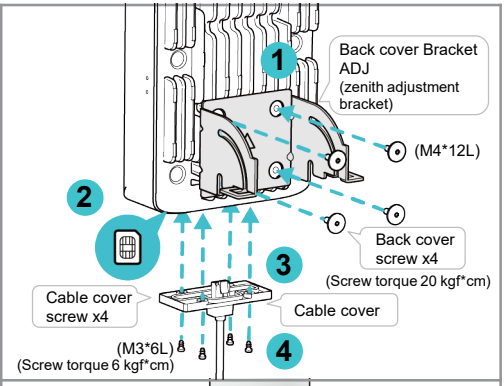
► If this device will be mounted outside where there will be people nearby, it must be installed at a height above your head to prevent people from obstructing the signal.

1.Attach the back cover bracket (zenith adjustment bracket) on the device with four back cover screws.

2.Insert a 5G/4G nano SIM card into the SIM slot.

3.Place the I/O cover over the bottom with the RJ45 connector into the Ethernet port.

4.Secure the cover with four cover screws.

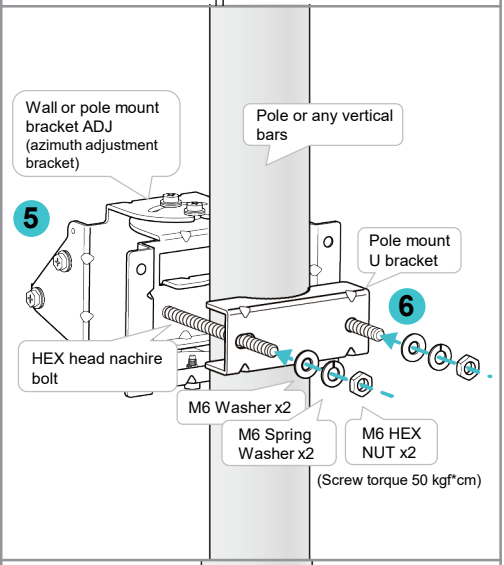


5.Ensure the azimuth bracket is positioned upwards as shown, and pass the hex head nachire bolts through to the pole.

6.Install the hexagonal head bolts on the U-shaped bracket, then sequentially place the washer, spring, and hex nut. Finally, secure the hex nut.

►The provided mounting kit allows for mounting on poles, bars, or any vertical support with. The diameter of the pole is 42~48mm.

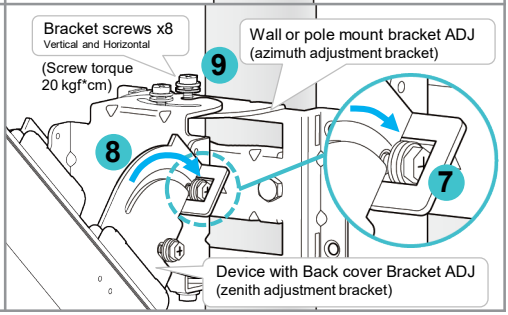
►The torque may need to be adjusted based on the strength of the pole. If the pole is sufficiently strong, it is recommended to lock the torque at 50 kgf*cm to prevent the equipment from moving during strong winds. If the pole is not strong enough, the torque should be appropriately reduced to avoid damaging the pole.



7.Align the grooves on the zenith bracket with the screws on the azimuth bracket.

8.Align the holes, then slide and install the device (with the zenith adjustment back cover bracket) into the azimuth mounting bracket.

9.Fine-tune the angle for the best signal, then secure the 8 screws on both the zenith and azimuth brackets.



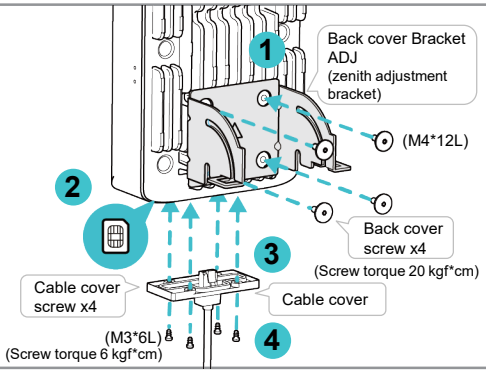
MOUNTING TO FLAT SURFACES

1.Attach the back cover bracket (zenith adjustment bracket) on the device with four back cover screws.

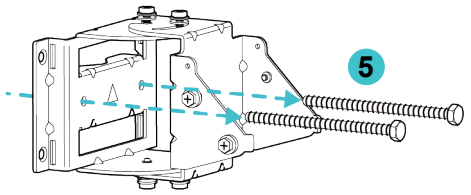
2.Insert a 5G/4G nano SIM card into the SIM slot.

3.Place the I/O cover over the bottom with the RJ45 connector into the Ethernet port.

4.Secure the cover with four cover screws.



5.Remove the hex head nachire bolts from the azimuth adjustment bracket.

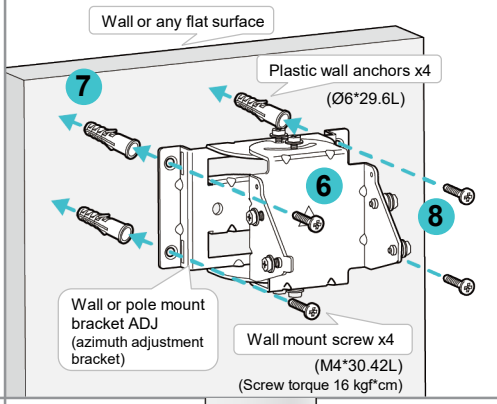


6.Ensure the azimuth bracket is positioned upwards as shown. Mark the locations for the four holes.

7.Drill holes that match the size of the screws or plastic anchors, if they are being used.

► Use protective gear for your eyes, hands, and face. Be careful to avoid drilling into electrical wires, gas lines, or water pipes to prevent injury and property damage.

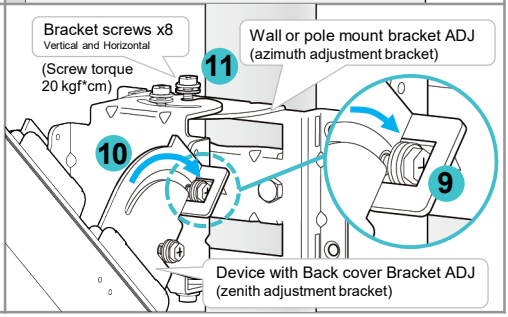
8.Secure the bracket with four wall mount screws.



9.Align the grooves on the zenith bracket with the screws on the azimuth bracket.

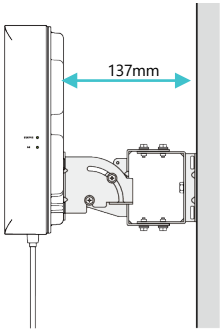
10.Align the holes, then slide and install the device (with the zenith adjustment back cover bracket) into the azimuth mounting bracket.

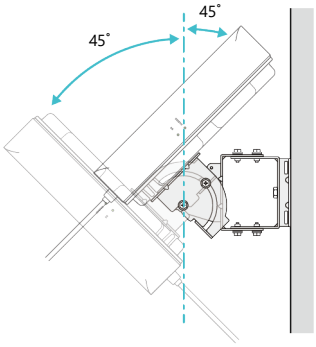
11.Fine-tune the angle for the best signal, then secure the 8 screws on both the zenith and azimuth brackets.



Pole / Wall Mounting Angle Adjustment

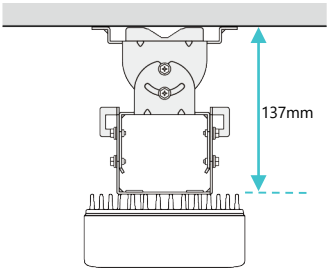
Bracket angle adjustment Side View

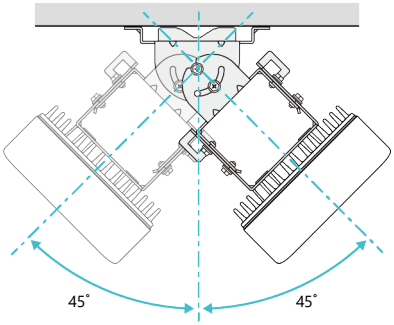




Vertical +45º / -45º

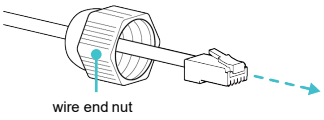
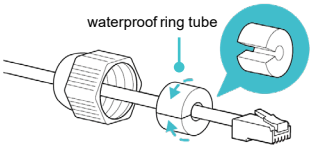
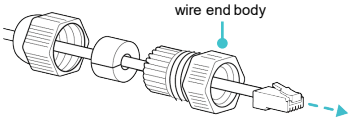
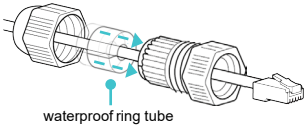
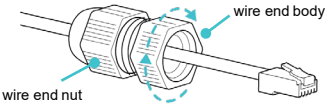
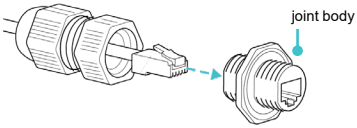
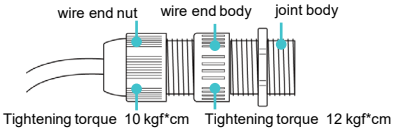
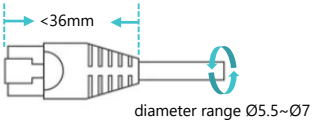
Bracket angle adjustment Top View





Horizontal +45º / -45º

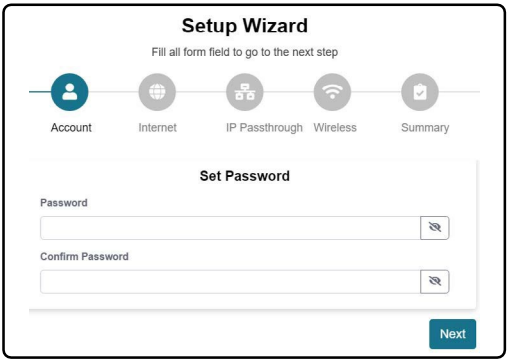
RJ45 Waterproof Coupler Assembly SOP

1. Thread the cable through the wire end nut.	
2. Peel off the waterproof ring tube and place it onto the cable.	
3. Pass the cable through the wire end body.	
4. Insert the waterproof ring tube into the wire end body.	
5. Secure the wire end nut to the wire end body.	
6. Connect the RJ45 plug to the joint body.	
7. Use a torque tool to tighten the assembled wire end and nut.	
For improved water resistance, ensure the following: 1. The distance from the RJ45 plug head end to the SR edge end should be less than 36mm. 2. The diameter range for the Ethernet CAT6A cable should be between Ø5.5 and Ø7.	

SETUP WIZARD FOR CELLULAR WAN

Setting up, configuring, managing the device, and troubleshooting can be done through the device's internal utility accessed using any Internet browser. You can check device status by viewing network connectivity and other useful information. The internal utility can be accessed through a PC, laptop, or tablet that has an internal network connection to this device when it is powered on.

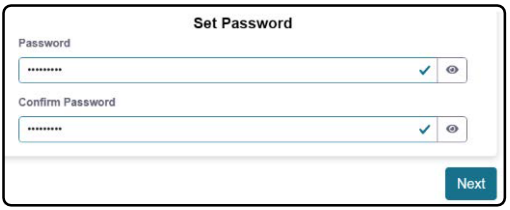
1. On a PC connected to the device by ethernet, open the web browser and enter the URL "**http://192.168.225.1**" to enter the login page.



2. If this is first time you login, you will be directed to the Setup Wizard, set your own login password and click **Next**.

► You must set a password or else you

► Passwords must be at least 8 one lower case letter. (Case sensitive (0–9, a–z, A–Z) and symbols supported.) Click the "eye" icon to see or hide your password.

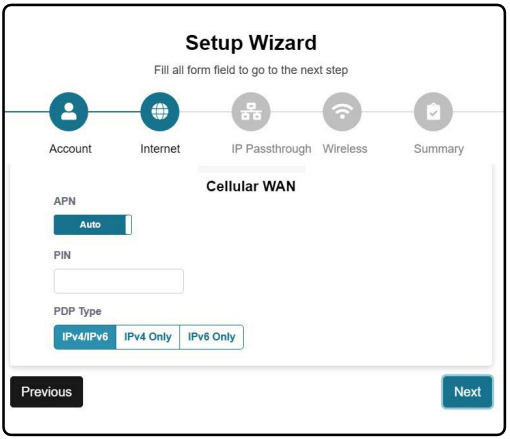


APN: Choose **Auto**.

PIN: Enter your SIM card pin if one was set, or leave empty.

► Note that your mobile carrier may

PDP Type: Select "**IPv4/IPv6**" and click "**Next**".



Note: Wireless function is not available for VectaStar CB-UE series.

Setup Wizard for cellular WAN

3. IP Passthrough: You can Enable or leave default of Disabled and click '**Next**".

[Enable allows a specific device on your local network to be exposed to the internet by assigning the router's public IP address to it, bypassing Network Address Translation (NAT).]

4. After clicking "**Apply**", you will need to login again to use the web interface.

Username: **admin**

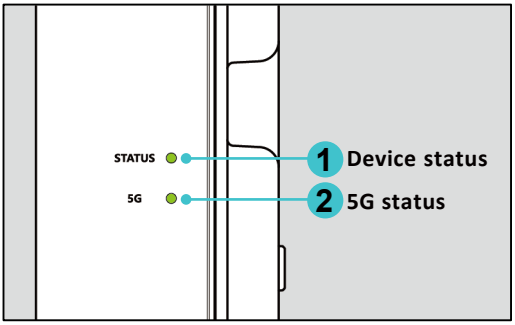
Note: Wireless function is not available for VectaStar CB-UE series.

CHECKING 5G SIGNAL STATUS

If your SIM card is 5G NR, the indicator color is mainly based on the 5G NR status.

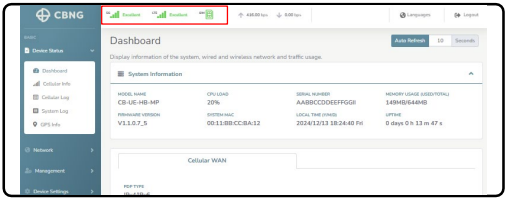
Physical: Check the 5G NR status by viewing the device status indicators on the device body. The status of the 5G NR will show either:

- **Green** = Excellent
- **Amber** = Good
- **Red** = Poor



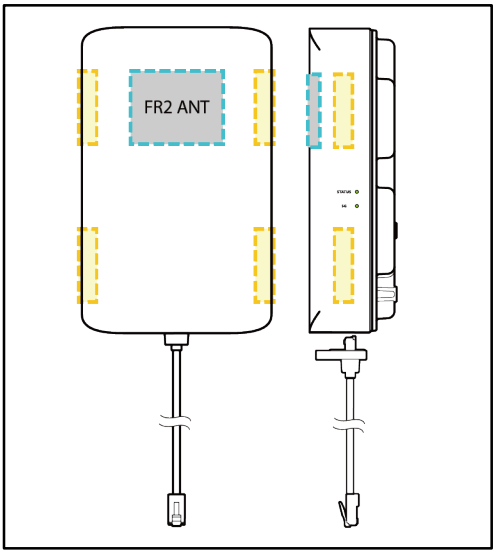
Software: You can also use the web interface to see the 5G NR LTE status. Click "CBNG" to display device information, the status of the will be displayed as colored icons in the upper left of the page.

5G NR Status: Displayed in three levels with explanation text.



IMPROVING 5G SIGNAL STATUS

If you want to increase the signal strength, you need to understand the antenna locations. Position your device towards to the FR2 base station.

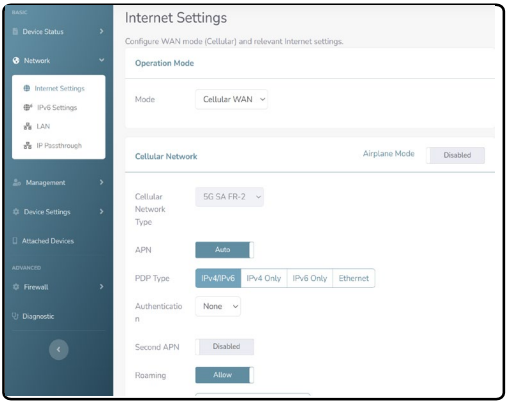


- **FR2 mmW:** A single **directional** type antenna and located on the front cover.

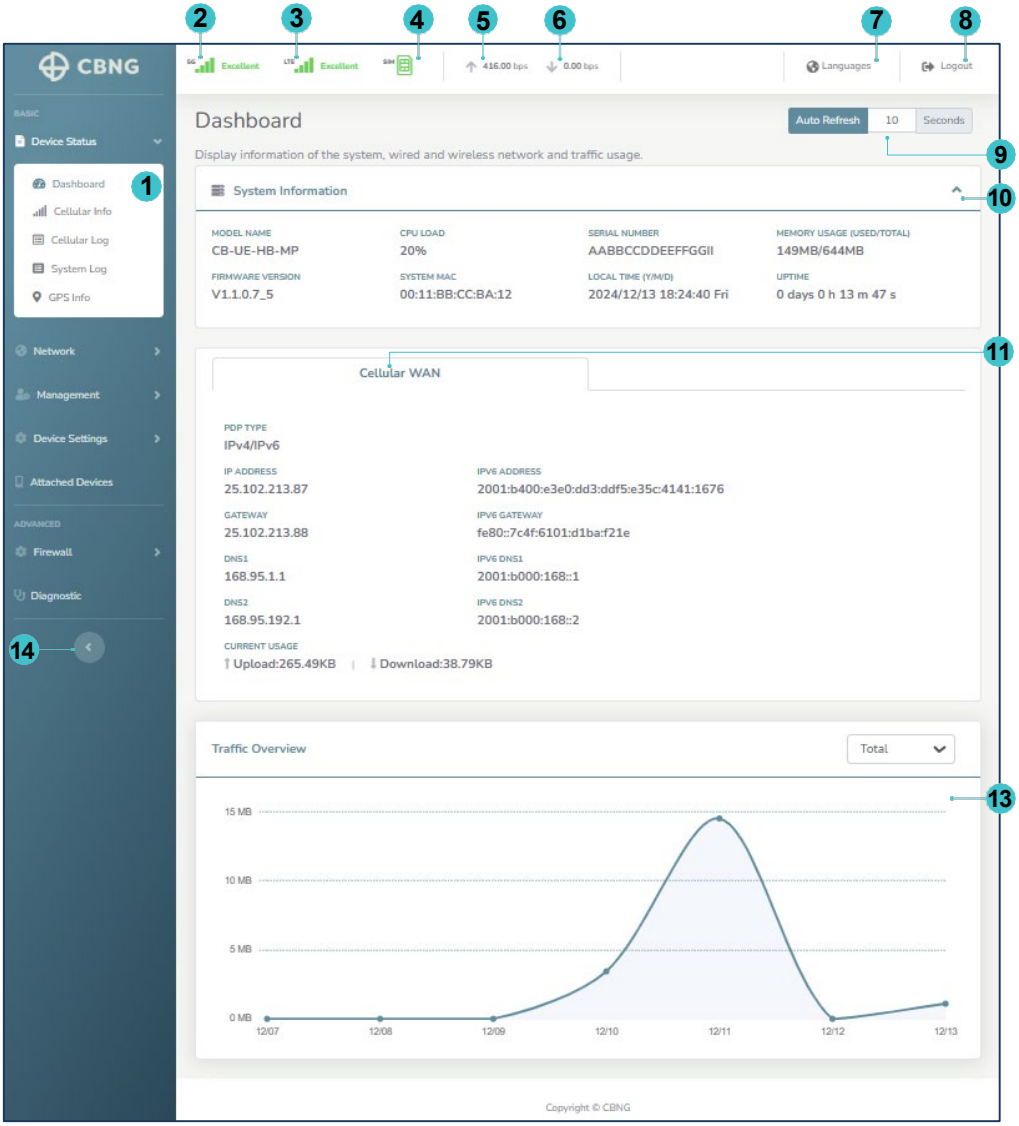
► You can move the device slowly or adjust the angle slowly, then observe the LED indicator status on the front or status icon in the web interface, to find the Excellent or Good signal level and quality.

CELLULAR NETWORK TYPE

The cellular network type is FR2 mmW SA mode. To confirm this in web interface in the following path: **Network** > **Internet Settings** > **Cellular Network Type** > **5G SA FR-2**



DASHBOARD


2
3
4
5
6
7
8
CBNG
Excellent
Excellent
416.00 bps
0.00 bps
Languages
Logout
BASIC
Device Status
Dashboard
Cellular Info
Cellular Log
System Log
GPS Info
1
Network
Management
Device Settings
Attached Devices
ADVANCED
Firewall
Diagnostic
14
Dashboard
Auto Refresh
10
Seconds
9
Display information of the system, wired and wireless network and traffic usage.
System Information
10
MODEL NAME
CB-UE-HB-MP
CPU LOAD
20%
SERIAL NUMBER
AABBCCDDEEFFGGII
MEMORY USAGE (USED/TOTAL)
149MB/644MB
FIRMWARE VERSION
V1.1.0.7_5
SYSTEM MAC
00:11:BB:CC:BA:12
LOCAL TIME (Y/M/D)
2024/12/13 18:24:40 Fri
UPTIME
0 days 0 h 13 m 47 s
11
Cellular WAN
PDP TYPE
IPv4/IPv6
IP ADDRESS
25.102.213.87
IPV6 ADDRESS
2001:b400:e3e0:dd3:ddf5:e35c:4141:1676
GATEWAY
25.102.213.88
IPV6 GATEWAY
fe80::7c4f:6101:d1ba:f21e
DNS1
168.95.1.1
IPV6 DNS1
2001:b000:168::1
DNS2
168.95.192.1
IPV6 DNS2
2001:b000:168::2
CURRENT USAGE
Upload:265.49KB
Download:38.79KB
Traffic Overview
Total
13
15 MB
10 MB
5 MB
0 MB
12/07
12/08
12/09
12/10
12/11
12/12
12/13
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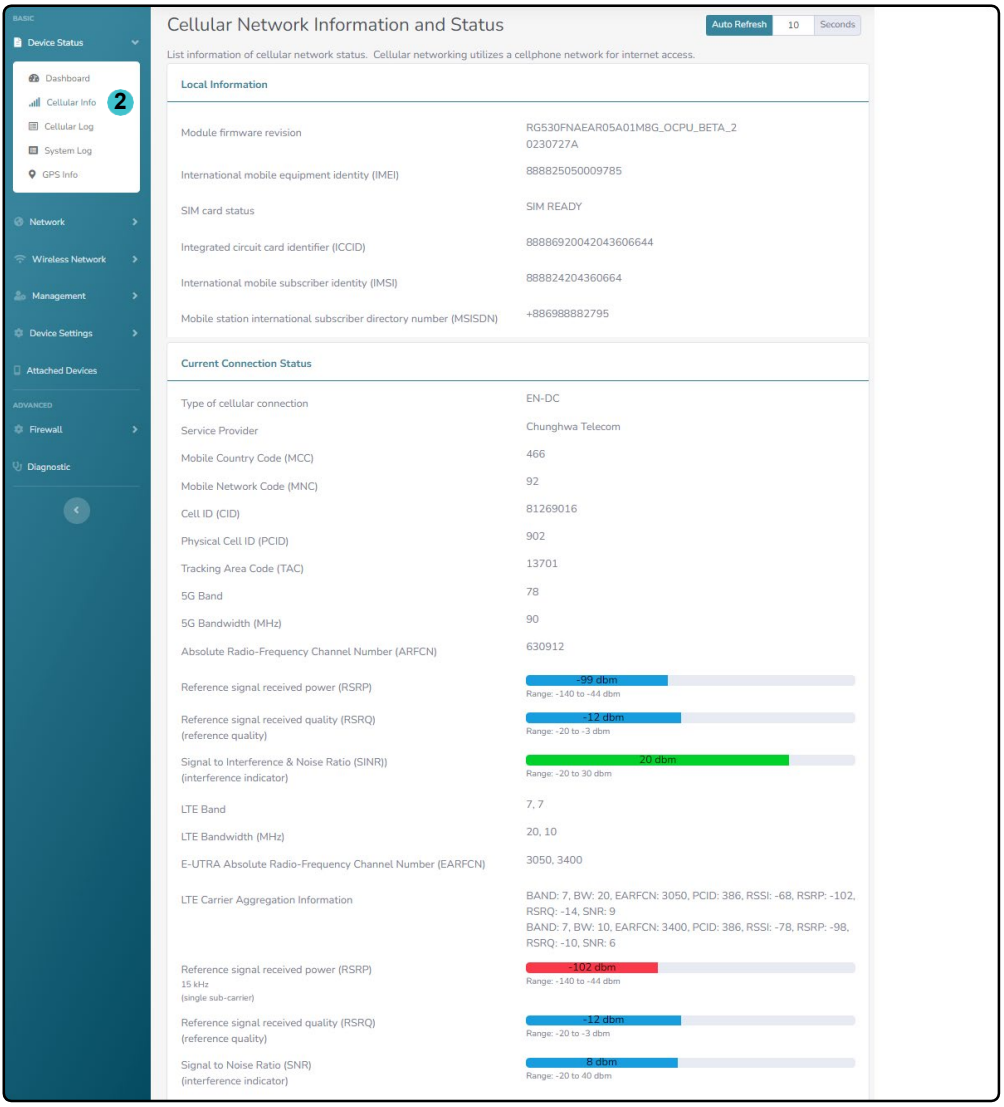
Dashboard

#	Description
1	View Dashboard
2	5G signal status: Green = Excellent, Amber = Good, Red = Poor
3	4G signal status: [1]Not available for VectaStar CB-UE series.
4	SIM card status
5	Cellular upload speed (Bps[2])
6	Cellular download speed (Bps[2])
7	Language selection
8	Log out of this web interface
9	Dashboard auto refresh time (seconds) - Editable
10	System Information - Click to hide or show
11	Cellular connection information
12	Wireless connection information[3]
13	Traffic throughput - Select Total, Upload, or Download for viewing
14	Side bar - Click to shrink or widen

1. VectaStar CB-UE series only support 5G FR2, no 4G supported.
2. Bps here stands for Byte per second.
3. Wireless function for configuration purpose. Not available for VectaStar CB-UE series.

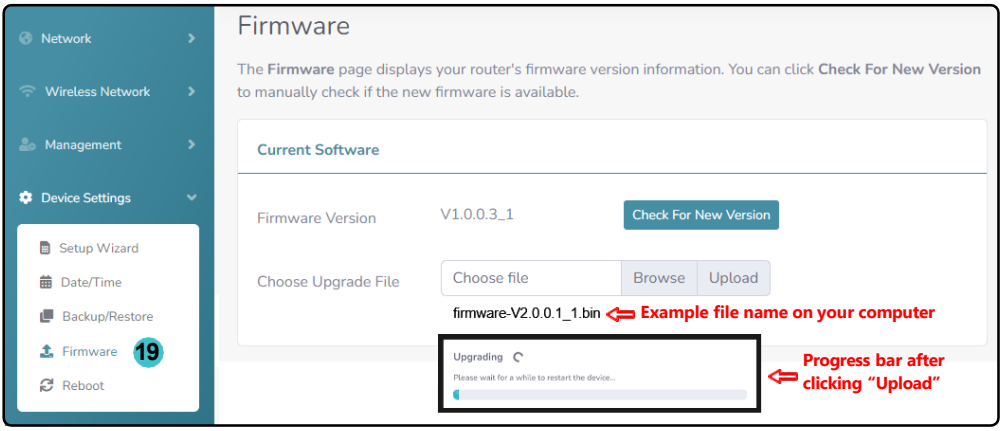
CELLULAR NETWORK INFO & STATUS

Lists Information and status of the cellular network. Cellular networking utilizes a cellphone (mobile) network for internet access.



Note: Wireless function is not available for VectaStar CB-UE series.

DEVICE SETTINGS - FIRMWARE



Item	Description
Check For New Version	Check for newer firmware on the Internet now.
Choose file / Browse	Click **Choose file** field or **Browse button** to select a file.
Upload	Click **Upload** to start the firmware upgrade process.

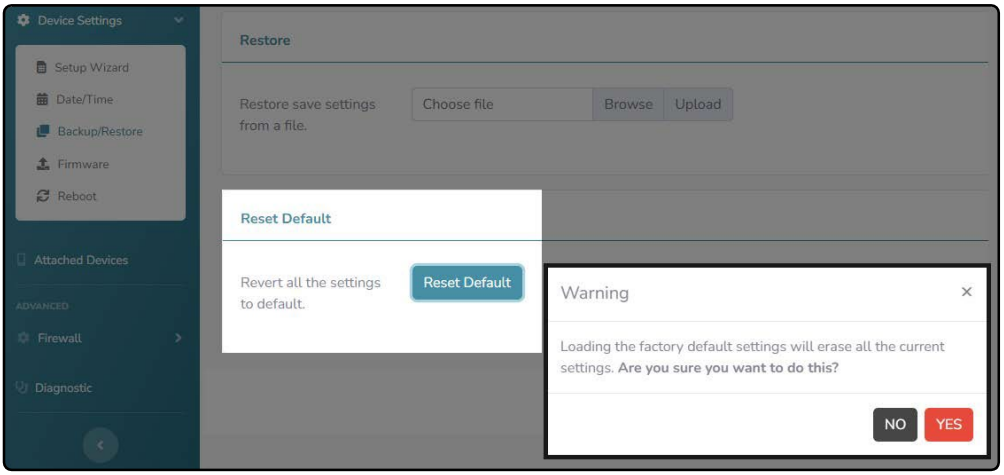
FIRMWARE UPGRADE

1. Click "**Upload**" to start the firmware upgrade process.
2. Click "**Proceed**" and all the connections will be terminated during firmware upgrade. Do not power off the device and wait for a few minutes while a progress bar is displayed.
3. It will reconnect to your computer after completion.
4. After the firmware is updated, the device will automatically restart and return back to the firmware page. It may need a few minutes to synchronize.

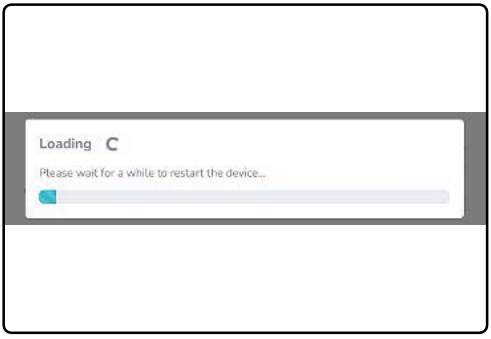
Note: Wireless function is not available for VectaStar CB-UE series.

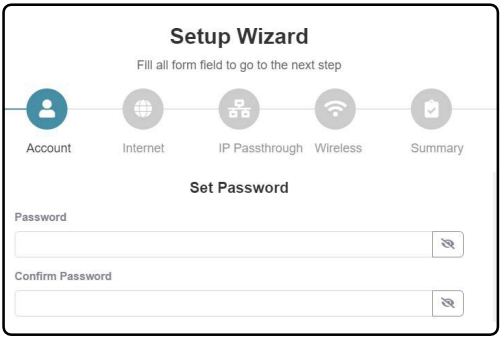
FIRMWARE_UPGRADE

5. After finishing synchronization, you can **Reset Default** to make sure the firmware update is utilized. Path: **Device Settings** > **Backup/Restore** > **Reset Default**
6. Click **YES** to load default and remove any user changes/settings.



7. Wait for the progress bar to finish:





8. After **Reset Default**, the web interface will lead to the **Setup Wizard** page.

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Website: www.cbng.co.uk
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