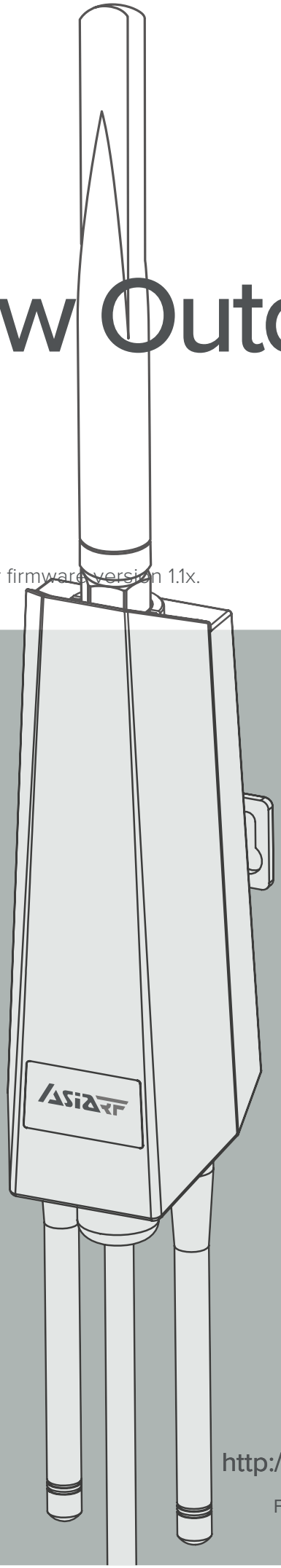
Wi-Fi HaLow Outdoor Gateway

ARFHL-OD-MS02 Applicable for firmware version 1.1x.



Type-C Support

HaLow + 2.4 GHz

IEEE 802.11ah and IEEE 802. 11b/g/n

Dual-band Integration

User Manual

http://www.asiarf.com/

Final Update : 1/20/2025

CONTENT

Getting to Know Your Wi-Fi HaLow Outdoor Gateway

1.1 Your HaLow Gateway

The AsiaRF Wi-Fi HaLow Outdoor Gateway is a dual-band Wi-Fi HaLow CERTIFIED gateway, supporting 2.4GHz and Wi-Fi HaLow. Ideal for long-range remote control and industrial IoT in large campus environments, it has an IP65 rating and operates in temperatures from -20°C to 70°C. The lightweight device is easy to install, with dimensions of 193(L) x 74.5(W) x 60.71(H) cm, or 401(L) x 74.5(W) x 60.71(H) cm with the antenna.

1.2 Package Contents

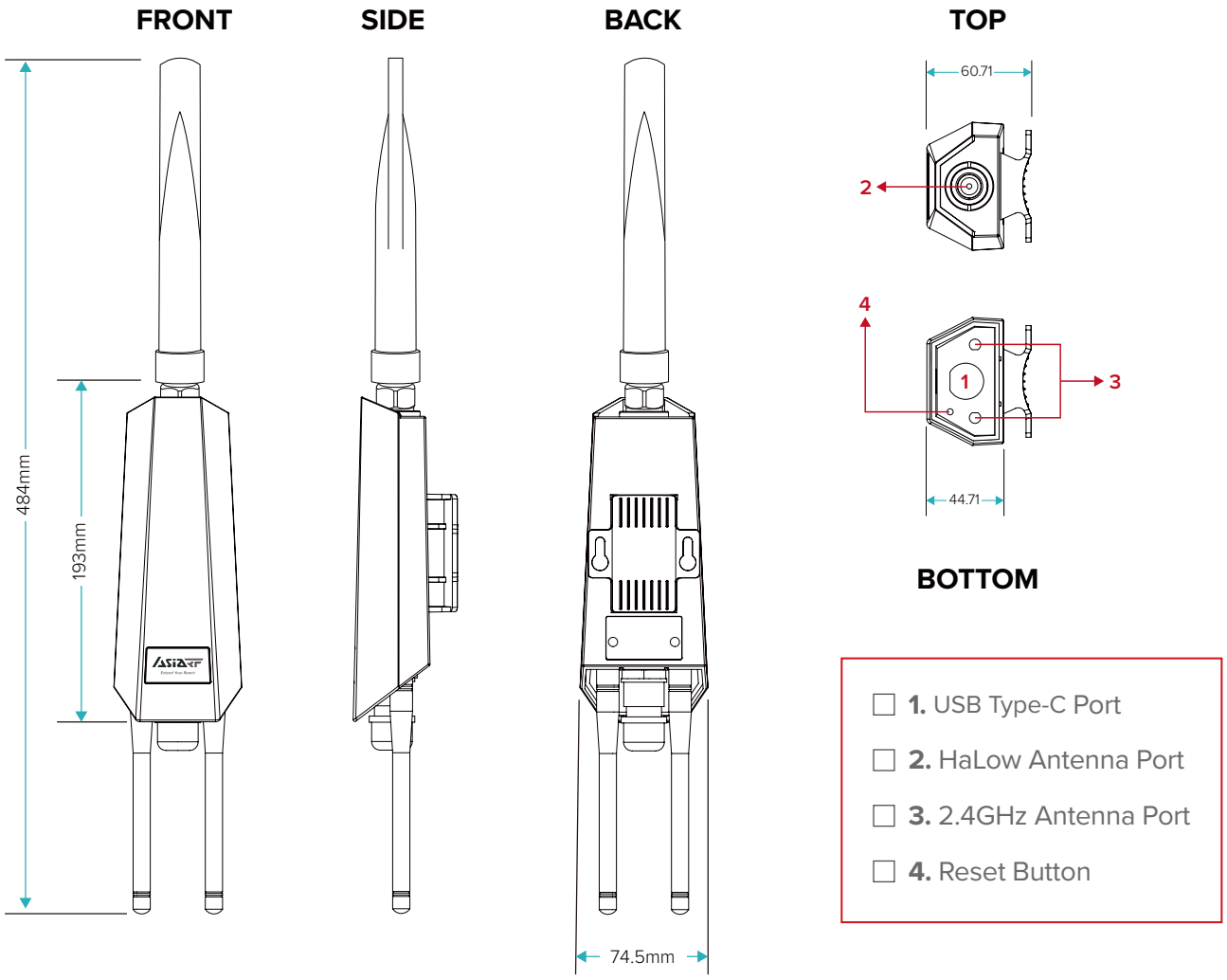
- ☐ **A.** Wi-Fi HaLow Outdoor Gateway x 1
- ☐ **B.** Wi-Fi HaLow Antenna x 1
- ☐ **C.** Wi-Fi 2.4GHz Antenna x 2
- ☐ **D.** 30cm Nylon Cable ties x 2
- ☐ **E.** M4 x 18mm stainless steel self-tapping screws x 2
- ☐ **F.** 1-inch wall plugs x 2
- ☐ **G.** PoE 1-port injector Cable + 48V / 0.5A Adaptor

Option: Advanced 802.3af PoE injector with AC power cable is avalible, please contact us: sales@asiarf.com

Notes:

- *Please keep the original packaging in case you need to return the product due to issues; it will make the return and exchange process smoother.*
- *The MAC address information is printed on the label on the back of the gateway.*
- *If any of the accessories listed above are damaged or missing, please contact AsiaRF technical support as soon as possible. You can refer to the AsiaRF technical support hotline: +886 2 2940-7880 *18 or contact to our sales team:* sales@asiarf.com

1.3 Dimension and Interface Overview



- ☐ **1.** USB Type-C Port
- ☐ **2.** HaLow Antenna Port
- ☐ **3.** 2.4GHz Antenna Port
- ☐ **4.** Reset Button

1.4 Accessories

The AsiaRF Wi-Fi HaLow Omni Antenna operates in the frequency range of 900 MHz to 930 MHz with a gain of 3dBi, ensuring stable and efficient long-distance transmission for the ARFHL-OD.

This HaLow Outdoor Gateway also includes a high-performance Wi-Fi 2.4GHz antenna.

Its waterproof PoE design ensures stable power and network transmission during outdoor operations, regardless of weather conditions.

1.4.1 Optional Accessories

For an advanced injector: a 1-port PoE injector (with surge protection circuit) providing 48V and 13W, please contact us at sales@asiarf.com.

1.5 Installation Instructions

A. Pole Mounting Steps

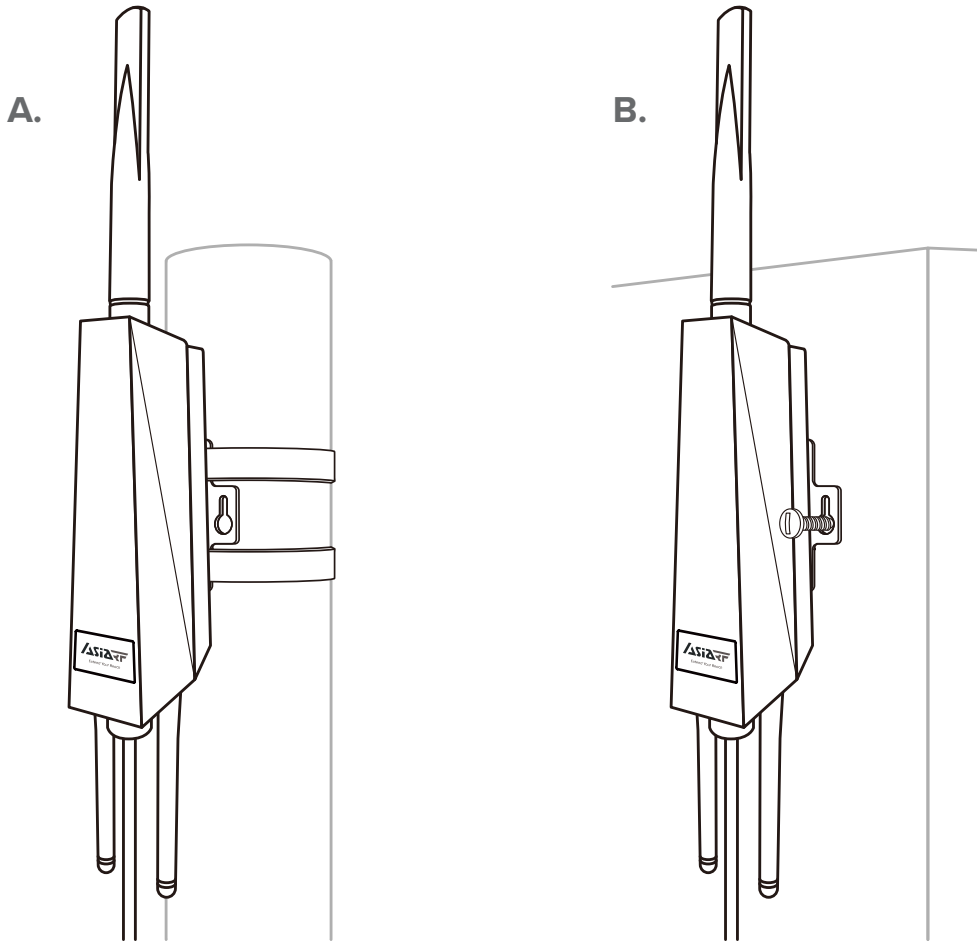
Use the included 30cm nylon cable ties to secure the HaLow Outdoor Gateway mounting bracket to the pole. Pass the ties through the bracket holes and tighten around the pole. For added stability, use an extra set of cable ties.

Notes: *Ensure the nylon ties are tight but not over-tightened to avoid damaging the device.*

B. Wall Mounting Steps

Use the included M4 x 18mm stainless steel self-tapping screws to attach the mounting bracket or plate to the wall. Drill holes in the wall according to the plate's screw pattern, insert the 1-inch wall plugs, and then secure the plate to the wall. Finally, mount the device on the plate and tighten it with the screws.

Notes: *Ensure the plate is firmly secured and all screws are tight to prevent the device from falling.*



1.6 Long range, Low power Wi-Fi® for IoT

Wi-Fi HaLow, is a sub-1GHz technology designed for IoT, offering extended range and efficient power usage. Ideal for industrial application and remote areas, it ensures stable connections in settings and coexists with existing Wi-Fi, providing secure, high-performance connectivity for diverse IoT applications.

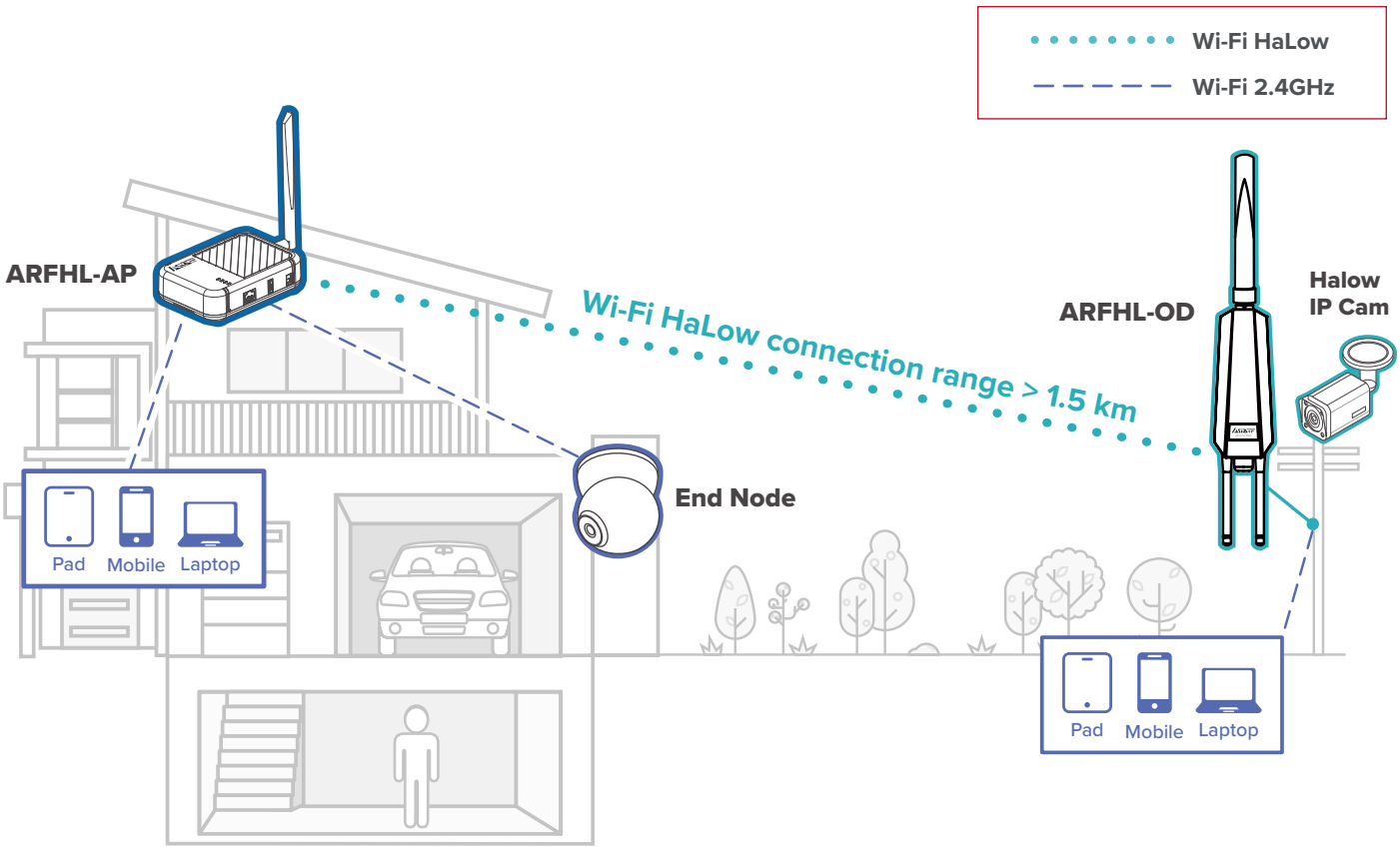
Long range : **Sub-1GHz** | More Connections : **> 8,000 nodes** | Extended Range : **100 times coverage** | Greater Penetration : **10 times greater**

1.7 Network Topology

1.7.1 Star Topology

The Wi-Fi HaLow IoT Gateway supports both Wi-Fi 2.4GHz and HaLow bands, capable of connecting to 8191 nodes through HaLow. Using a star topology, it can place multiple client nodes within a 1.5 km radius of the access point (AP) center, ensuring comprehensive coverage.

Additionally, it offers internet access for personal mobile devices via Wi-Fi 2.4GHGz, making it especially suitable for IoT applications in large spaces and high-rise buildings.regardless of weather conditions.



1.7.2 Daisy Chain Topology / MESH Architecture

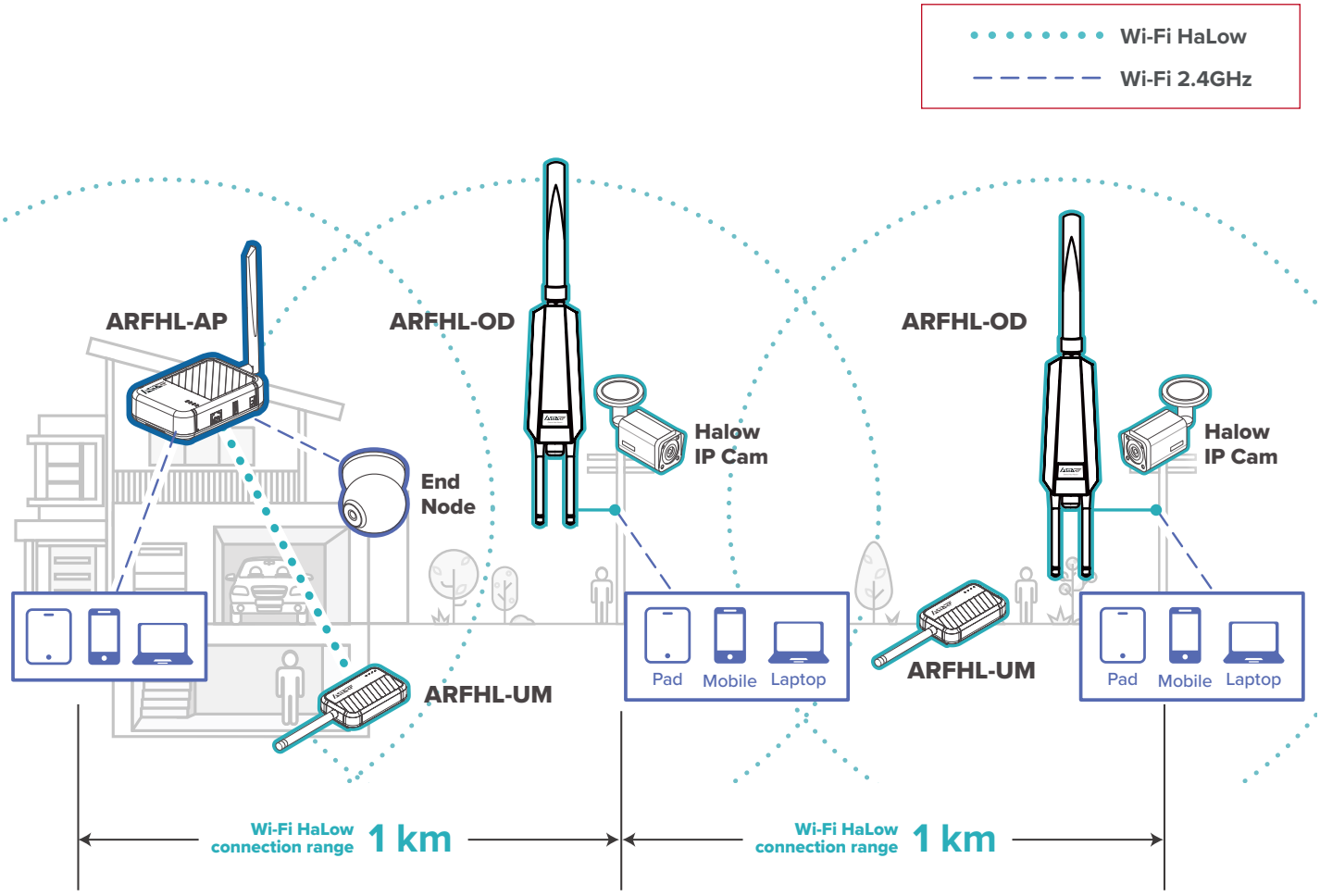
The Wi-Fi HaLow Outdoor Gateway supports both Daisy chain topology and MESH architecture, enhancing flexibility and scalability.

In a Daisy chain topology, nodes are connected in series, ideal for linear installations like pipelines or corridors. This ensures continuous communication even if a node fails, as the signal can reroute.

In a MESH architecture, nodes connect to multiple others, creating a robust, self-healing network. This setup provides redundant data paths, ensuring reliability and stability. MESH architecture is particularly beneficial in complex environments like industrial sites or large campuses, offering extensive and reliable IoT coverage.

Both modes can also provide internet access for personal mobile devices via Wi-Fi 2.4GHz, ensuring comprehensive connectivity.

***Note:** For setting up MESH mode, please refer to the Wi-Fi HaLow Mesh User Manual.*



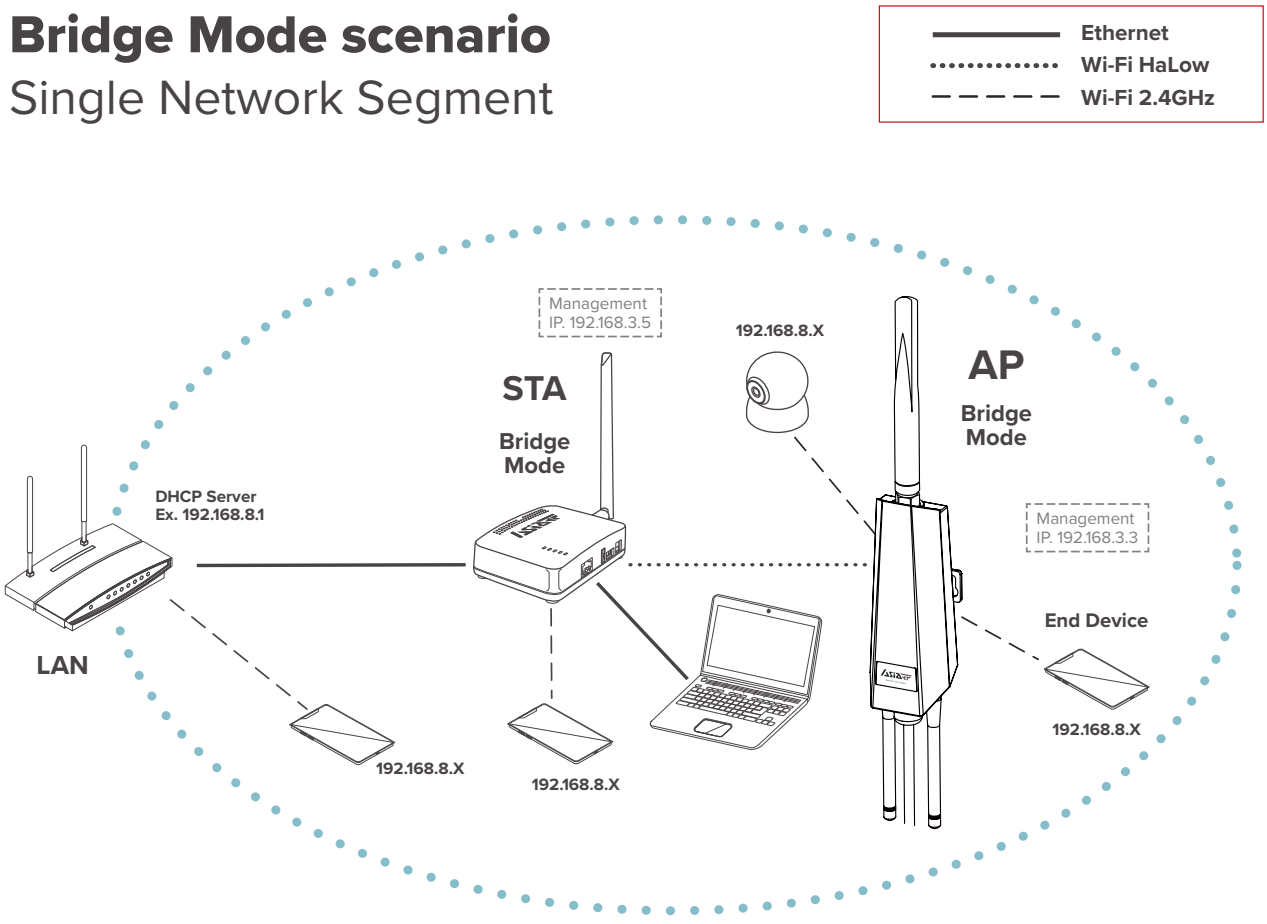
Wi-Fi HaLow Bridge Mode Settings

2.1 Bridge Mode Scenario

In a Bridge Mode scenario, the use of HaLow is transparent to the rest of the devices on the network. The HaLow connection serves as a means to provide a virtual Ethernet link between two points where running a physical cable may not be feasible.

The advantage of this approach is that it offers a convenient way to expand your network coverage or connect networks in two separate buildings without isolating them into smaller sub-networks, especially when employing bridge mode.

Bridge Mode scenario
Single Network Segment



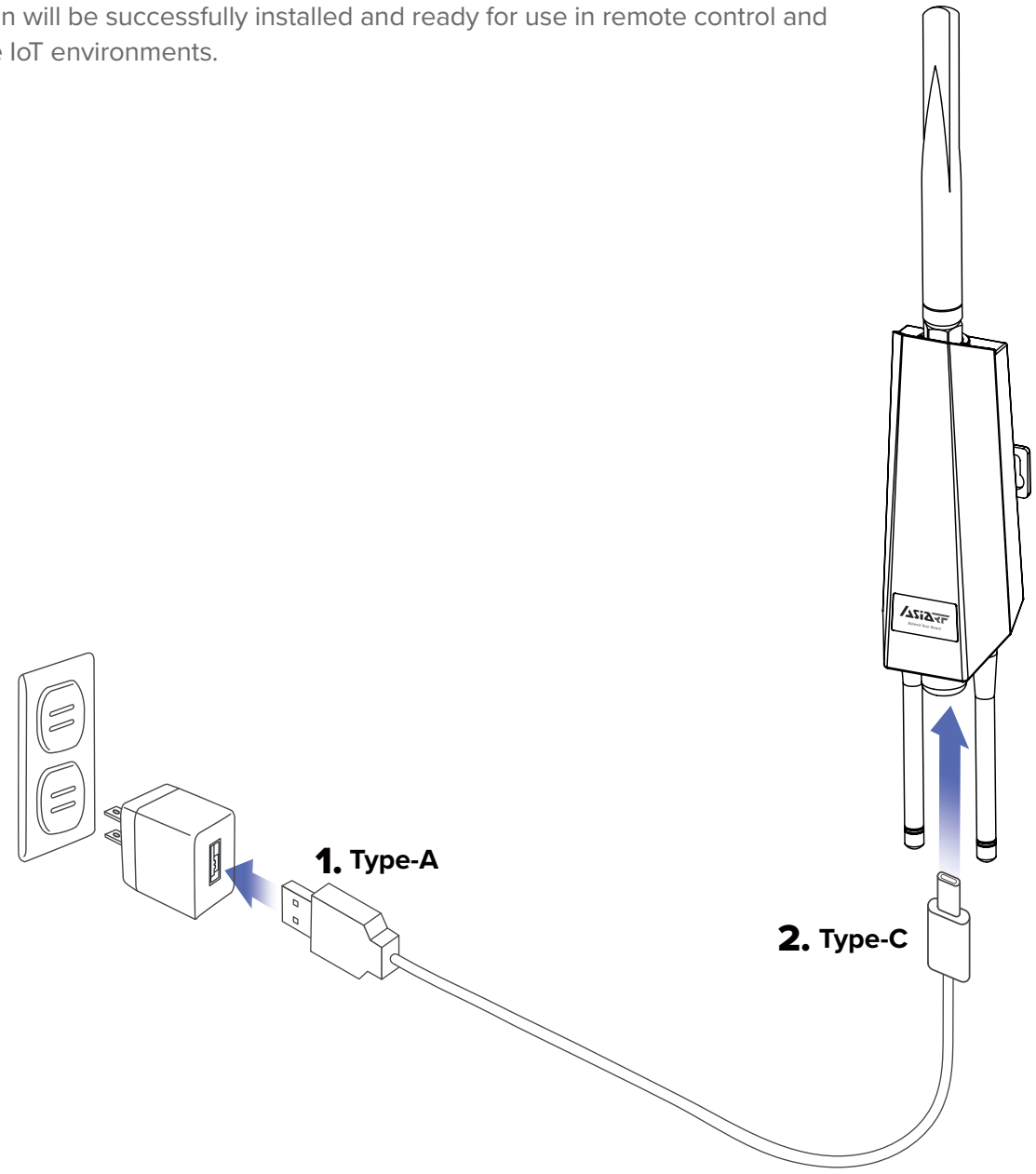
Notes:
In the bridge mode of a HaLow Gateways, DHCP services are not available for IP address allocation. This necessitates manual configuration of IP addresses for devices to ensure they are on the same network segment for access. For detailed configuration methods, please see section 2.3 Managing Bridge Mode HaLow Gateways.

2.2 Connect to Your Wi-Fi HaLow Gateway as AP

2.2.1 Installation Steps for AsiaRF Wi-Fi HaLow MESH Outdoor Gateway PoE Version (ARFHL-OD-MS01):

1. **Connect ARFHL-OD-MS01 to the PoE Cable:** Insert the PoE cable into the bottom connector of the ARFHL-OD-MS01 gateway and ensure a secure connection.
2. **Connect the PoE Cable to the PoE Injector:** Plug the other end of the PoE cable into the PoE Injector.
3. **Connect the PoE Injector to the Adapter and Plug into Power:** Attach the power end of the PoE Injector to the adapter and plug it into the wall outlet to provide 48V, 13W power to the device.
4. **Connect the PoE Injector to the Router:** Use an Ethernet cable to connect the data port of the PoE Injector to the corresponding port on the router to complete the network setup.

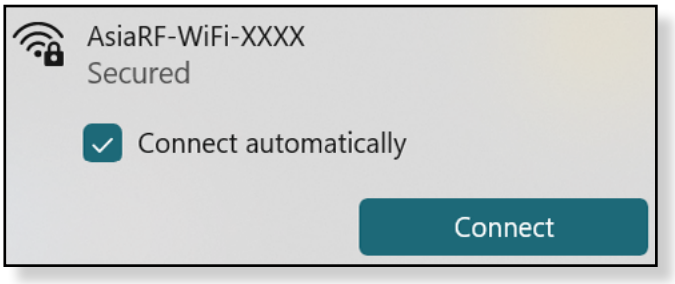
Once these steps are completed, your AsiaRF Wi-Fi HaLow MESH Outdoor Gateway PoE Version will be successfully installed and ready for use in remote control and large-scale IoT environments.



2.3 Bridge Mode Access Point (AP) Setting

STEP. 1

Use PC or mobile phone to connect to the Wi-Fi. (SSID: AsiaRF-WiFi-xxxx, Password: 12345678)

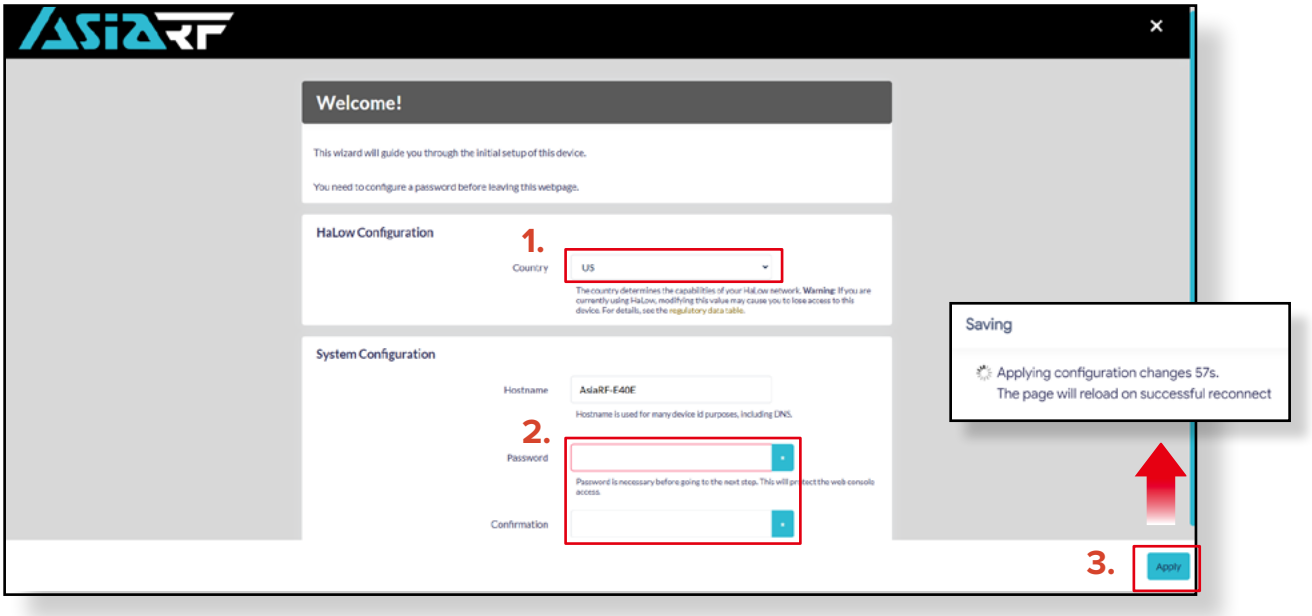


STEP. 2

Open a web browser and enter **the default IP address "192.168.3.3".** Then click "Login" (no password is required by default). *If you encounter any issues accessing the settings webpage, refer to Troubleshooting Case 2 for assistance.*

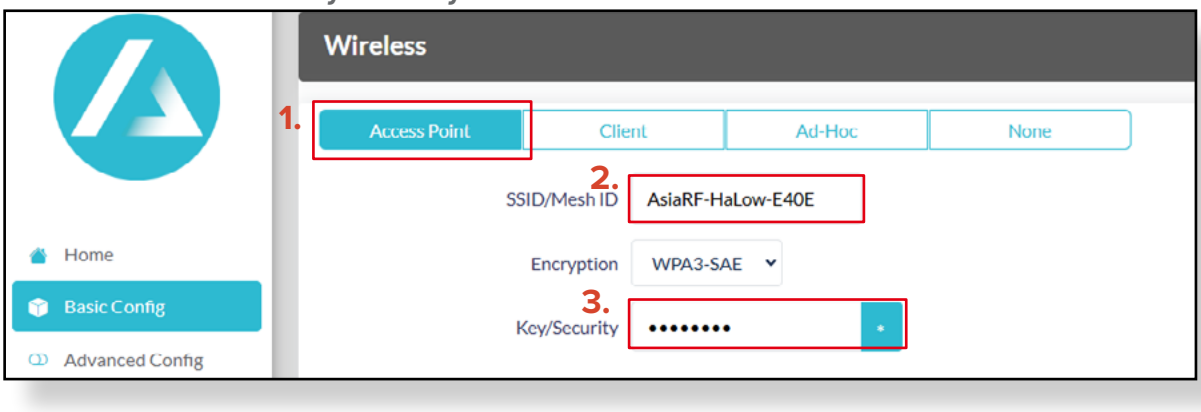
STEP. 3

At first setup, do not connect ARFHL-AP to the router which has DHCP server, or you may acquire the incorrect subnet of IP address.



STEP. 4

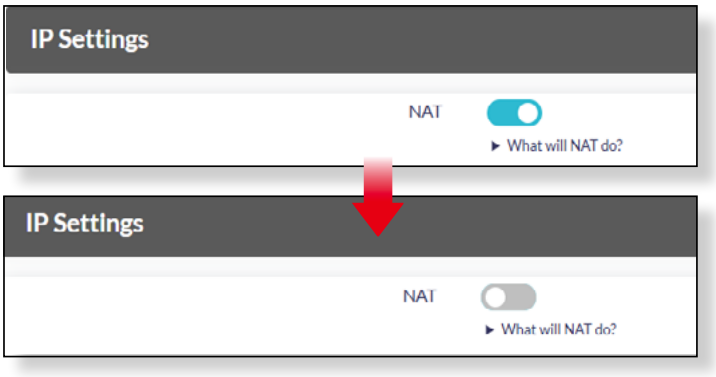
Press the 'Basic Config' tab. Press the **'Access Point'** button, and then enter yout **'SSID/Mesh ID'** and **'Key/Security'.**



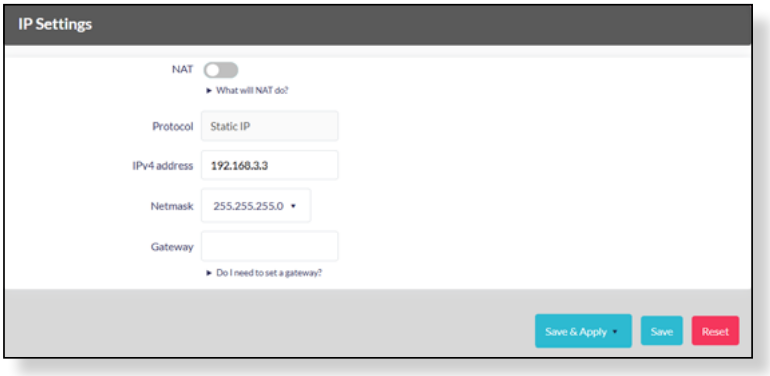
STEP. 5

Remember, our default IP address is **"192.168.3.3"** with the default Wi-Fi- 2.4 GHz SSID being **"AsiaRF-WiFi-xxxx"** and the password **"12345678".**

Disable NAT in the **"IP Settings"** section.

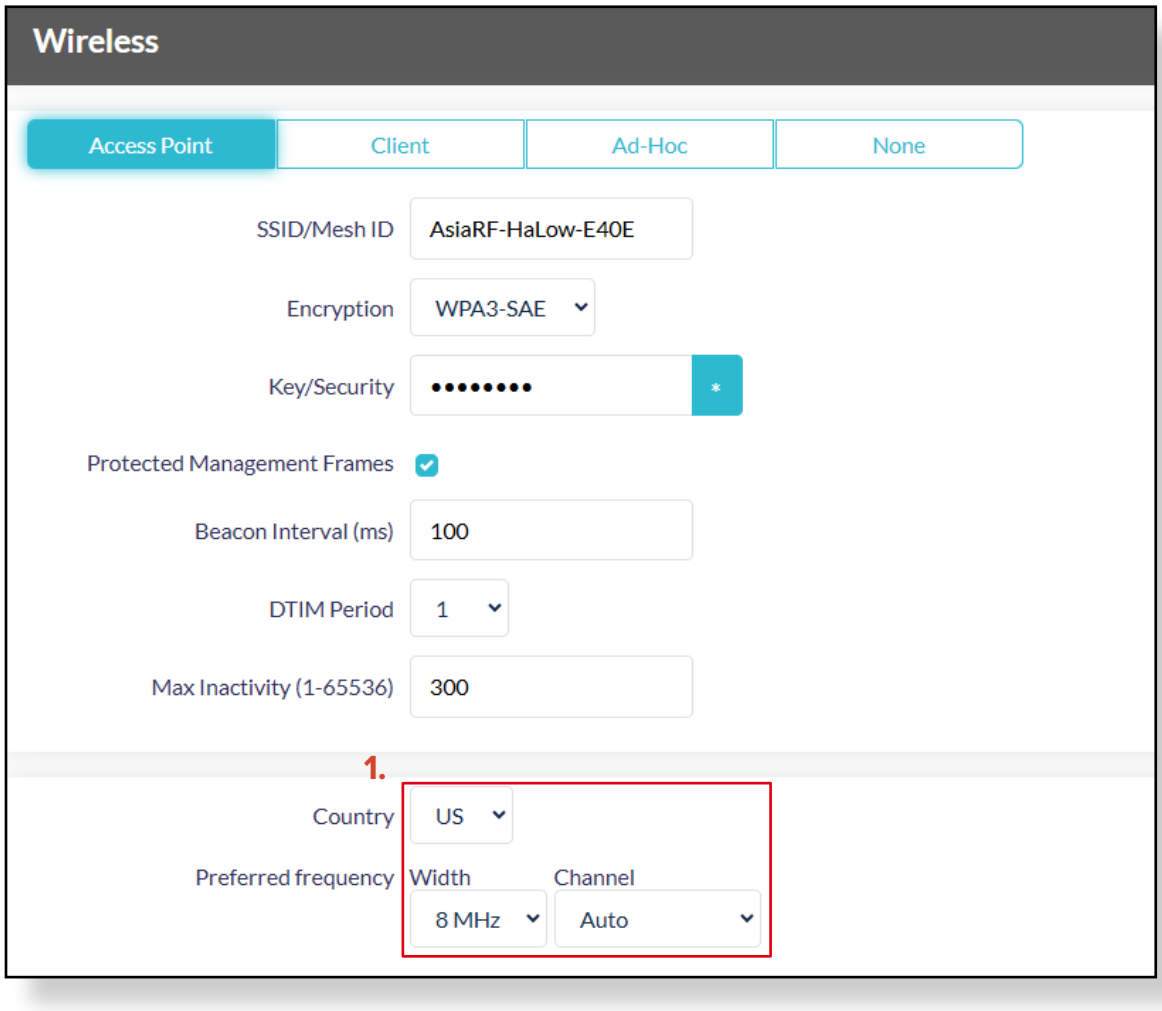


Set your own **"gateway's"** IP address in the **"IP Setting"** section.



STEP. 6

In the **"Wireless"** settings, the region you initially selected will be displayed. If you wish to change the region, you can do so here. Remember to click **"Save&Apply"** after making any adjustments.



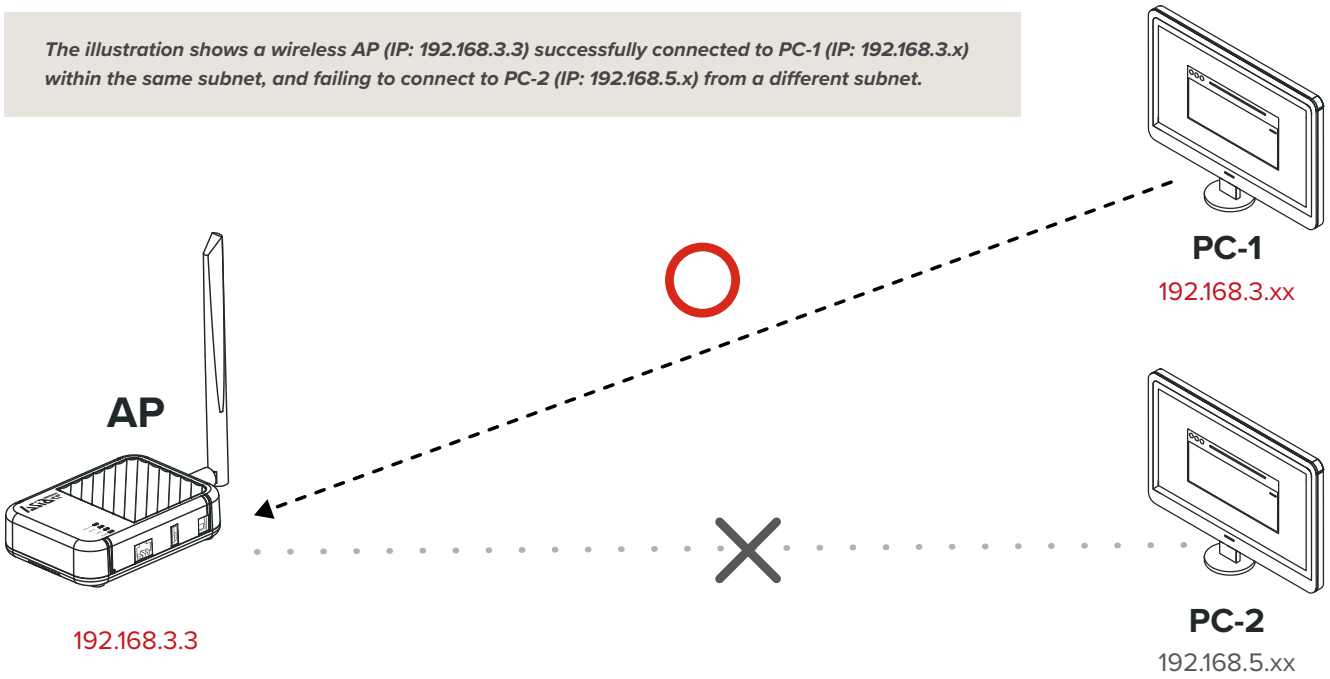
2.4 Managing Bridge Mode HaLow Gateways *(The necessary steps for troubleshooting.)*

In the bridge mode of a HaLow Gateways, DHCP services are not available for IP address allocation.

This necessitates manual configuration of IP addresses for devices to ensure they are on the same network segment for access.

Here's a straightforward example: if the management IP of an Access Point (AP) is the default 192.168.3.3, any device you wish to connect must have its IP address configured within the 192.168.3.x subnet. This enables access to the AP's configuration settings, and the principle similarly applies to devices on the Client (CLI) side.

The illustration shows a wireless AP (IP: 192.168.3.3) successfully connected to PC-1 (IP: 192.168.3.x) within the same subnet, and failing to connect to PC-2 (IP: 192.168.5.x) from a different subnet.



2.4.1 Setting a Static IP on a Windows PC for HaLow Gateway Access:

To connect and configure your device in a Windows environment, follow these steps:

1. **Connect to the Wi-Fi Network:** Look for the SSID named "AsiaRF-WiFi-xxxx" and use the password "12345678" to connect.
2. **Set a Static IP Address:** Once connected, you'll need to manually set your PC's IP address to be within the 192.168.3.x range, matching the network segment of the HaLow Gateway's bridge mode configuration.

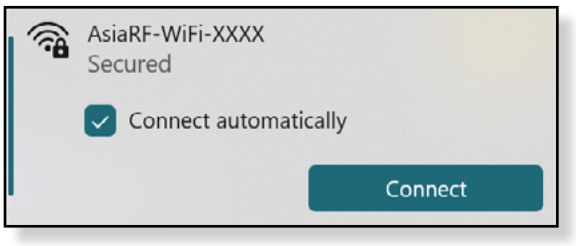
This process ensures that your devices can communicate with the HaLow Gateway in bridge mode, facilitating seamless management and configuration. **Please follow the instructions on the next page step by step**.

STEP. 1

Use PC or mobile phone connect to the Wi-Fi.

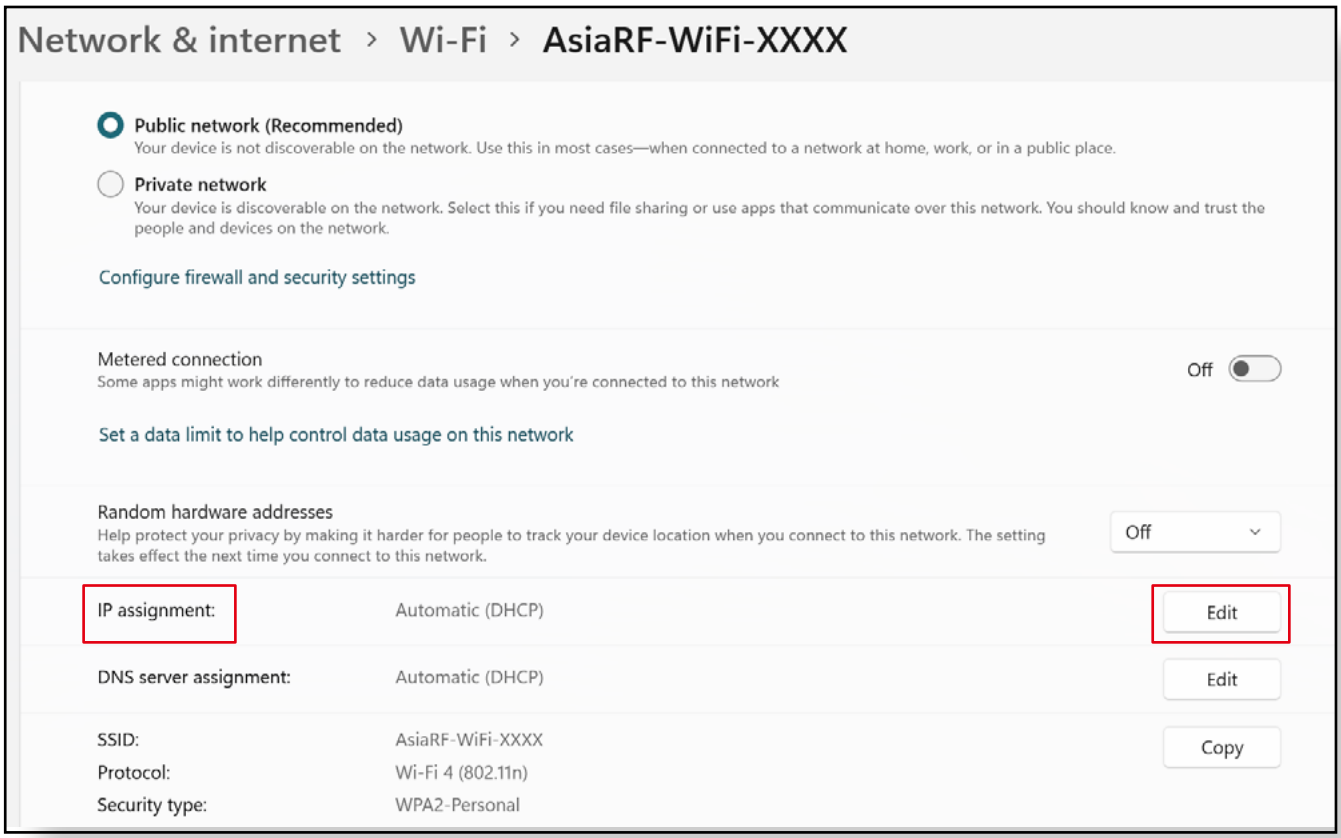
(SSID: AsiaRF-WiFi-xxxx, Password: 12345678).

Click the 'Properties' button to access the settings screen.

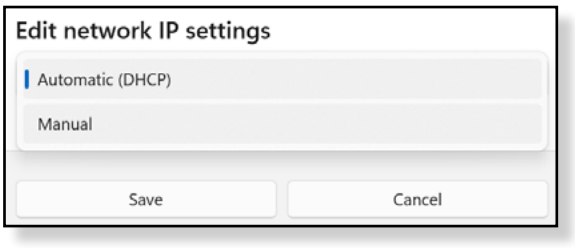


STEP. 2

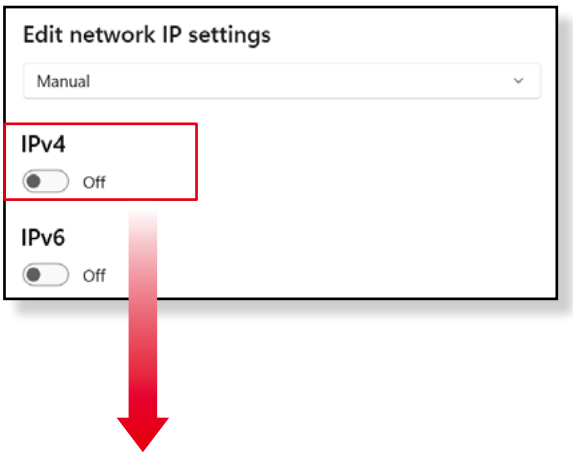
Click "**Edit" button in "IP assignment"** to set static IP.



STEP. 3 Choose "Manual"

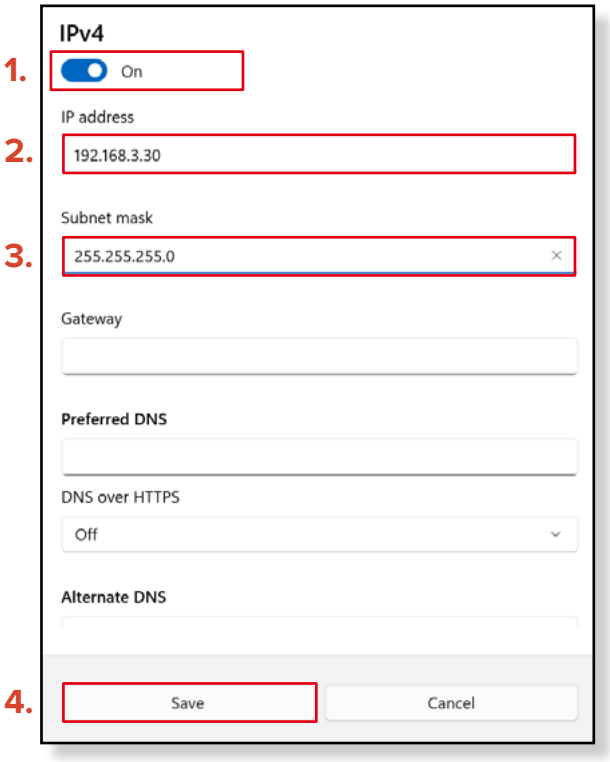


STEP. 4 Turn on the IPv4 radio button.



STEP. 5

Enter an IP address that belongs to the same network segment (192.168.3.x), input "255.255.255.0" as the Subnet mask, and finally, click 'Save' to apply the settings.



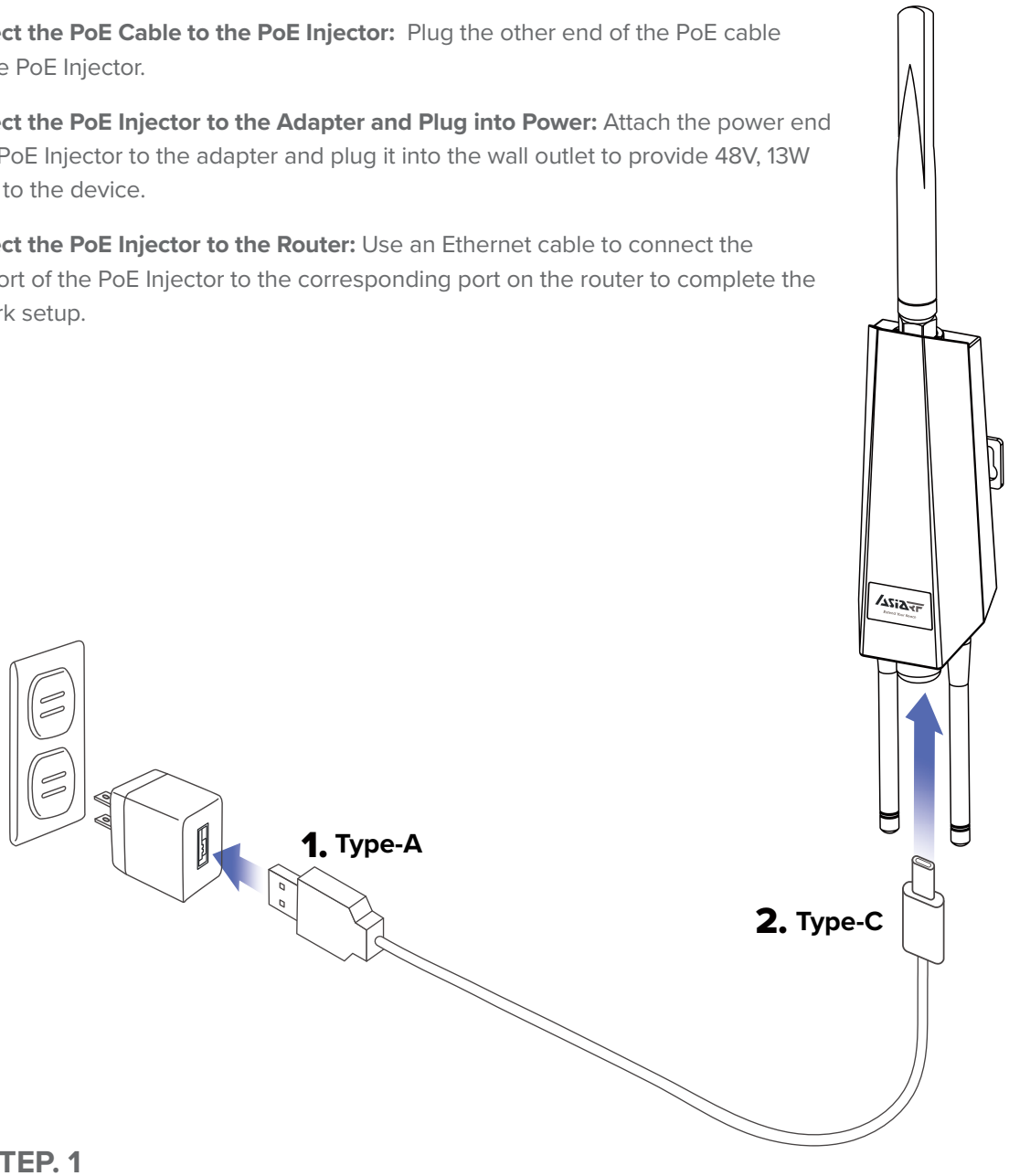
By adhering to the steps provided, you should be able to effectively manage the Bridge Mode HaLow Gateway. For accessing the settings webpage, simply input the IP address of the target gateway into your browser.

Should you encounter the issues of **"The AP SSID"** *does not appear in the scan list, please refer to* **"Troubleshooting 5.2"** *for solutions.*

2.5 Bridge Mode Client (CLI) Setting

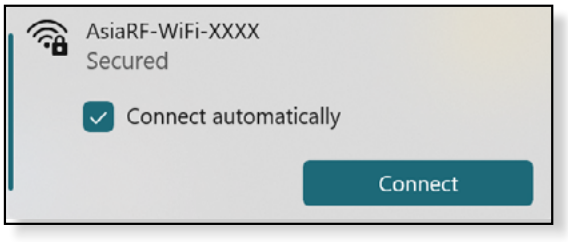
2.5.1 Setting a Static IP on a Windows PC for HaLow Gateway Access

1. **Connect ARFHL-OD-MS01 to the PoE Cable:** Insert the PoE cable into the bottom connector of the ARFHL-OD-MS01 gateway and ensure a secure connection.
2. **Connect the PoE Cable to the PoE Injector:** Plug the other end of the PoE cable into the PoE Injector.
3. **Connect the PoE Injector to the Adapter and Plug into Power:** Attach the power end of the PoE Injector to the adapter and plug it into the wall outlet to provide 48V, 13W power to the device.
4. **Connect the PoE Injector to the Router:** Use an Ethernet cable to connect the data port of the PoE Injector to the corresponding port on the router to complete the network setup.



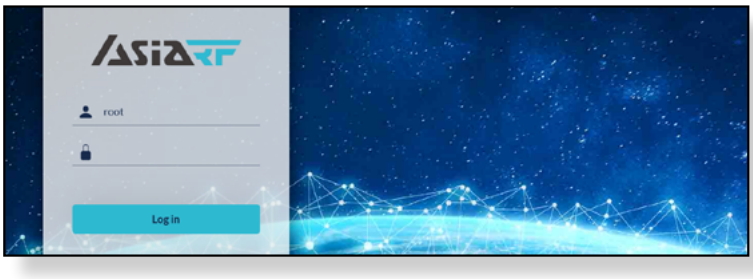
STEP. 1

Use PC or mobile phone to connect to the Wi-Fi. (SSID: AsiaRF-WiFi-xxxx, Password: 12345678)



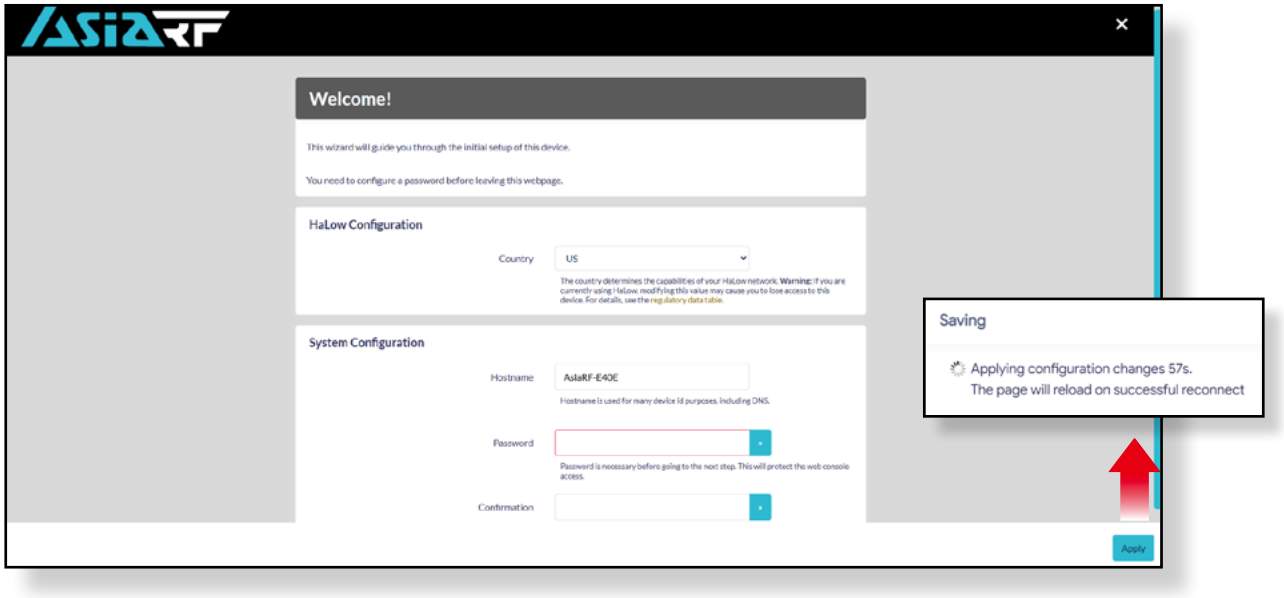
STEP. 2

Open a web browser and enter **the default IP address "192.168.3.3".** Then click "Login" (no password is required by default). *If you encounter any issues accessing the settings webpage, refer to Troubleshooting 5.2 for assistance.*



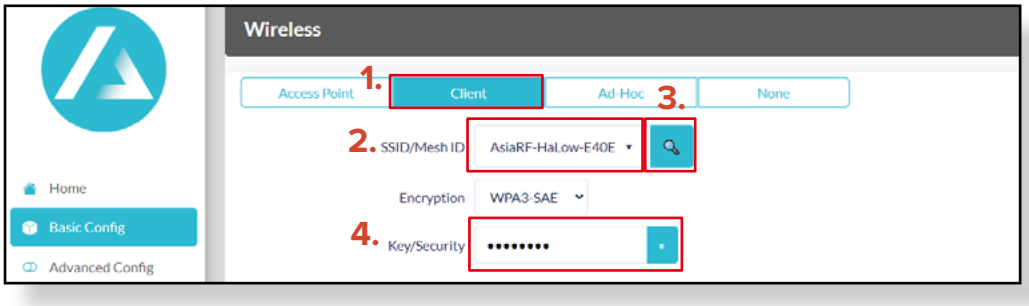
STEP. 3

At first setup, do not connect ARFHL-AP to the router which has DHCP server, or you may acquire the incorrect subnet of IP address.



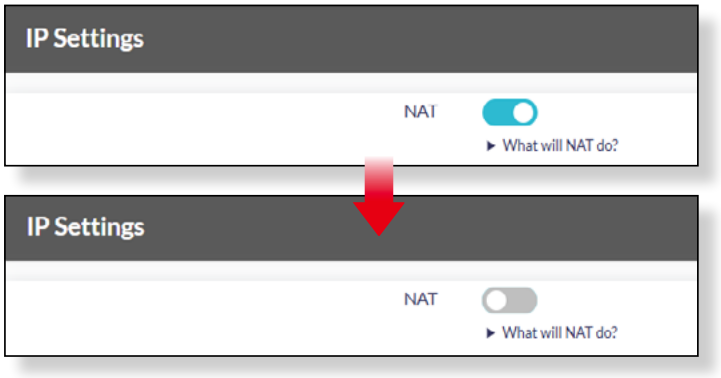
STEP. 4

Press the 'Basic Config' tab. Click the **“Client”** mode and press **“Scan”** button. It will automatically select a Wi-Fi HaLow AP nearby, or you can manually choose one from the list. Remember to enter the password, for example, SSID/Mesh ID:AsiaRF-HaLow-New. *If your SSID does not appear in the list of scanned APs, please refer to Troubleshooting case 3.*



STEP. 5

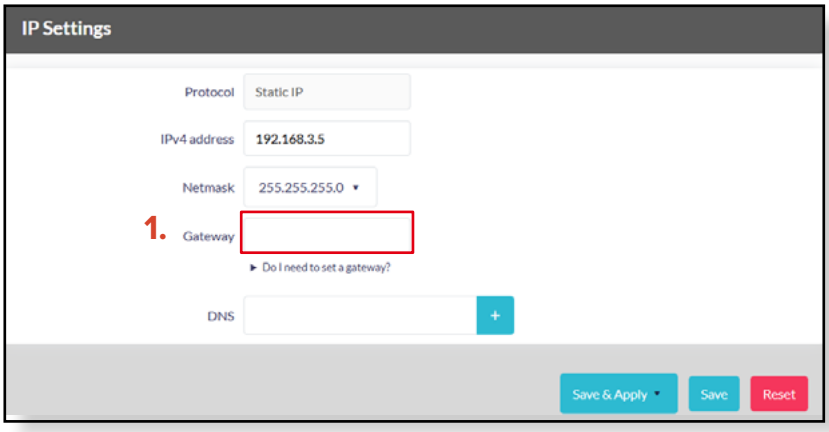
Disable NAT in the **'IP Setting'** section.



STEP. 6

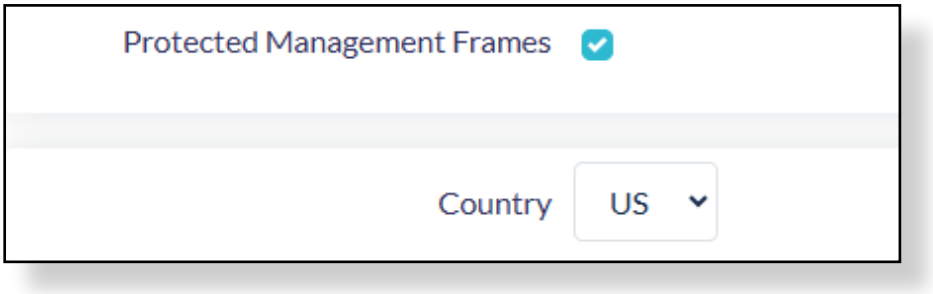
To Activate bridge mode, choose a static IP setting and adjust your IP address accordingly. For optimal management in conjunction with the Access Point (AP), it is recommended to select an IP from the 192.168.3.x range.

Ensure not to use an IP address that is identical to those of other HaLow devices.



STEP. 7

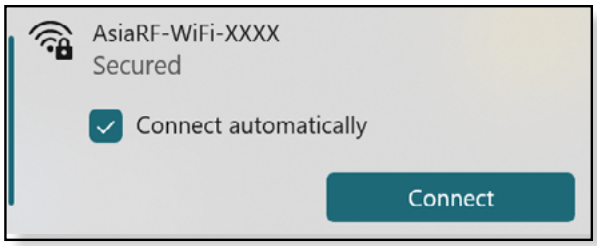
Select your region according to the AP settings, Click **“Save&Apply”** button to save the configuration.



2.6 2.4GHz Wi-Fi Managing

STEP. 1

Use PC or mobile phone to connect to the Wi-Fi 2.4 GHz. (SSID: AsiaRF-WiFi-xxxx, Password: 12345678)

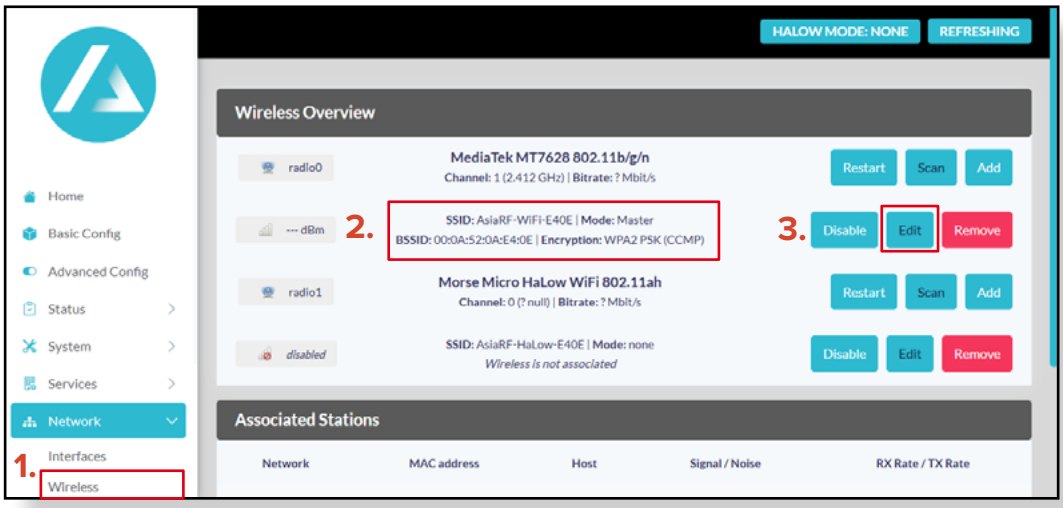


STEP. 2

Open a web browser and enter **the default IP address "192.168.3.3".** Then click "Login" (no password is required by default). *If you encounter any issues accessing the settings webpage, refer to Troubleshooting Case 2 for assistance.*

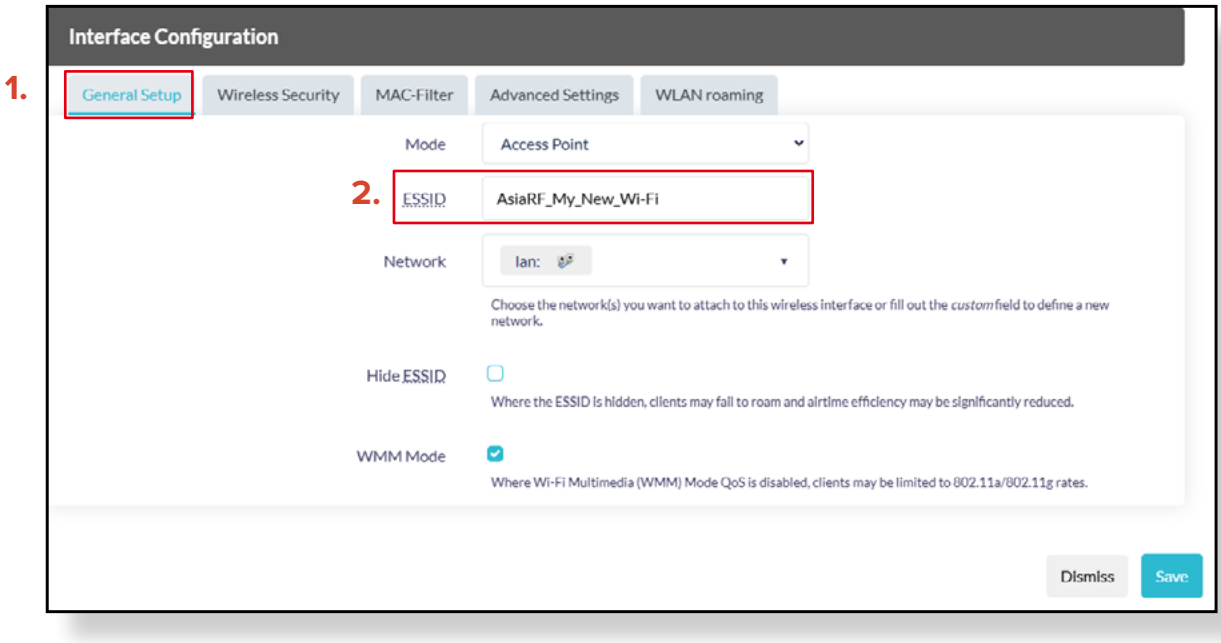
STEP. 3

Click the **“Wireless”** in the **“Network”** tab. Find your 2.4GHz Wi-Fi and click the **“Edit”** button.



STEP. 4

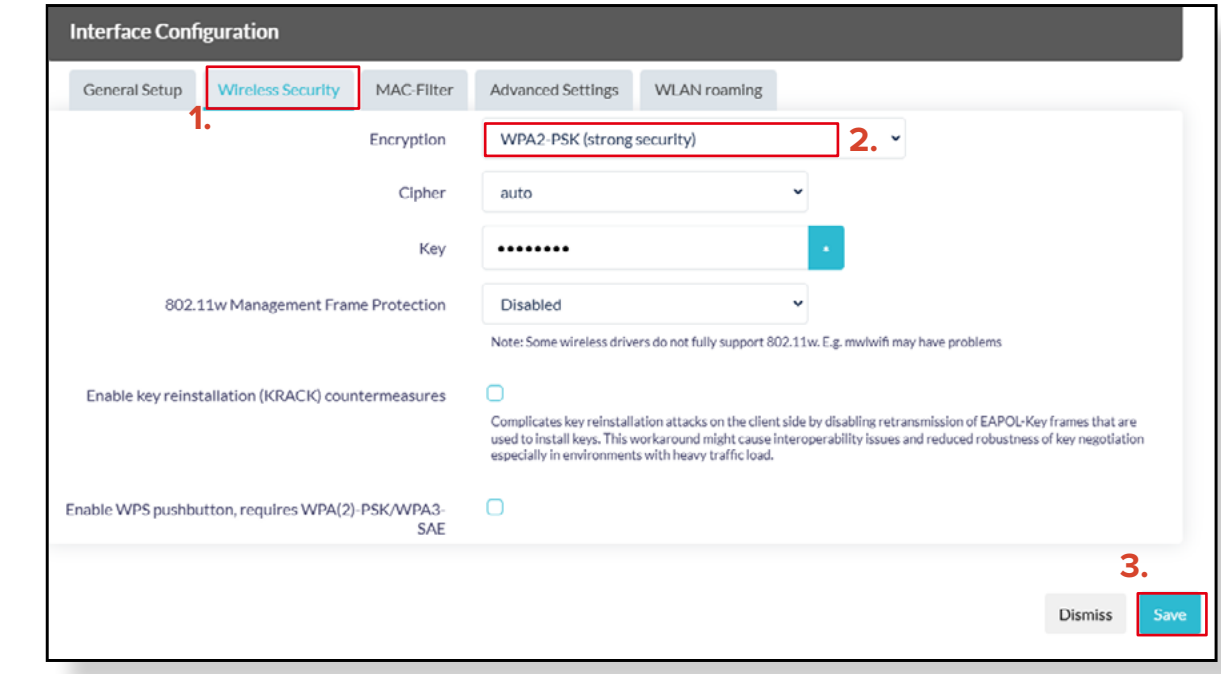
Click the **“Wireless”** in the **“Network”** tab. Find your 2.4GHz Wi-Fi and click the **“Edit”** button.



STEP. 5

Click **“Wireless Security”** and choose one of the encryption types. Ex. **“WPA2-PSK (strong security)”** Input your Wi-Fi password in **“Key”** field and don’t forget it.

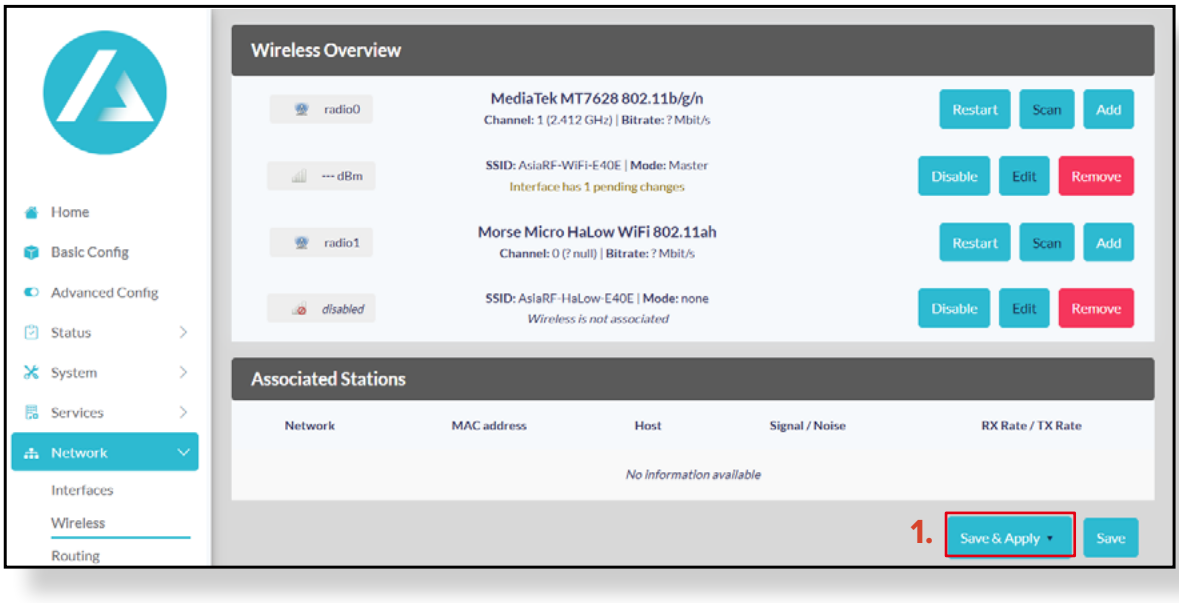
Click the **“Save”** button to save your configuration.



STEP. 6

Click the **“Save & Apply”** button to save the configuration.

The settings will reset your Wi-Fi interface.



2.7 Switching from Bridge Mode to Router Mode

STEP. 1

Factory Reset: Press and hold the reset button for at least 10 seconds to perform a factory reset.

STEP. 2

Wait for Initialization: Allow approximately 4 minutes for the device to complete its reset and initialization process.

STEP. 3

Configure Router Mode: Once the reset is complete, follow the detailed step-by-step setup procedure in Chapter 3 to configure the device in Router Mode.

Wi-Fi HaLow Router Mode Settings

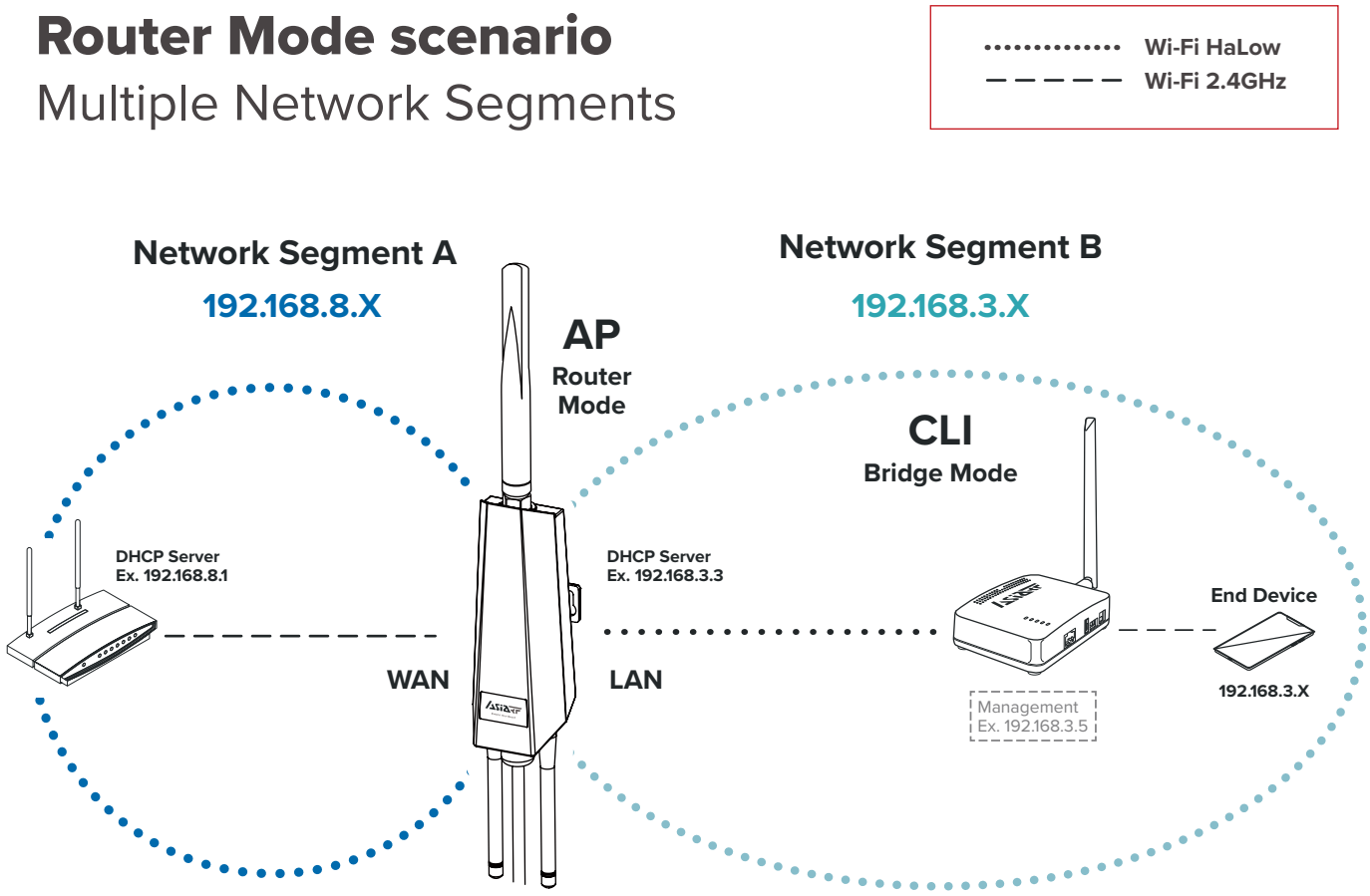
3.1 Router Mode Scenario

In Router Mode, the router is used to connect difference IP network segments together, with each segment having its own range of IP addresses and subnet mask, The router forwards packets allowing devices from difference network segment to communicate with each other, while also providing network layer isolation and security controls (such as firewall rules)

The advantage of this method lies in its ability to organize the network into multiple manageable segments, enhancing network security and traffic management. It allows for the creation of dedicated network areas within a broader network infrastructure, such as areas designated got visitor access or IoT devices.

Employing router mode with HaLow technology ensures that, even in environments where physical cable wiring is impractical, the network can maintain segmented control and integrated communication.

Router Mode scenario
Multiple Network Segments



3.2 Connect to Your Wi-Fi HaLow Gateway as AP

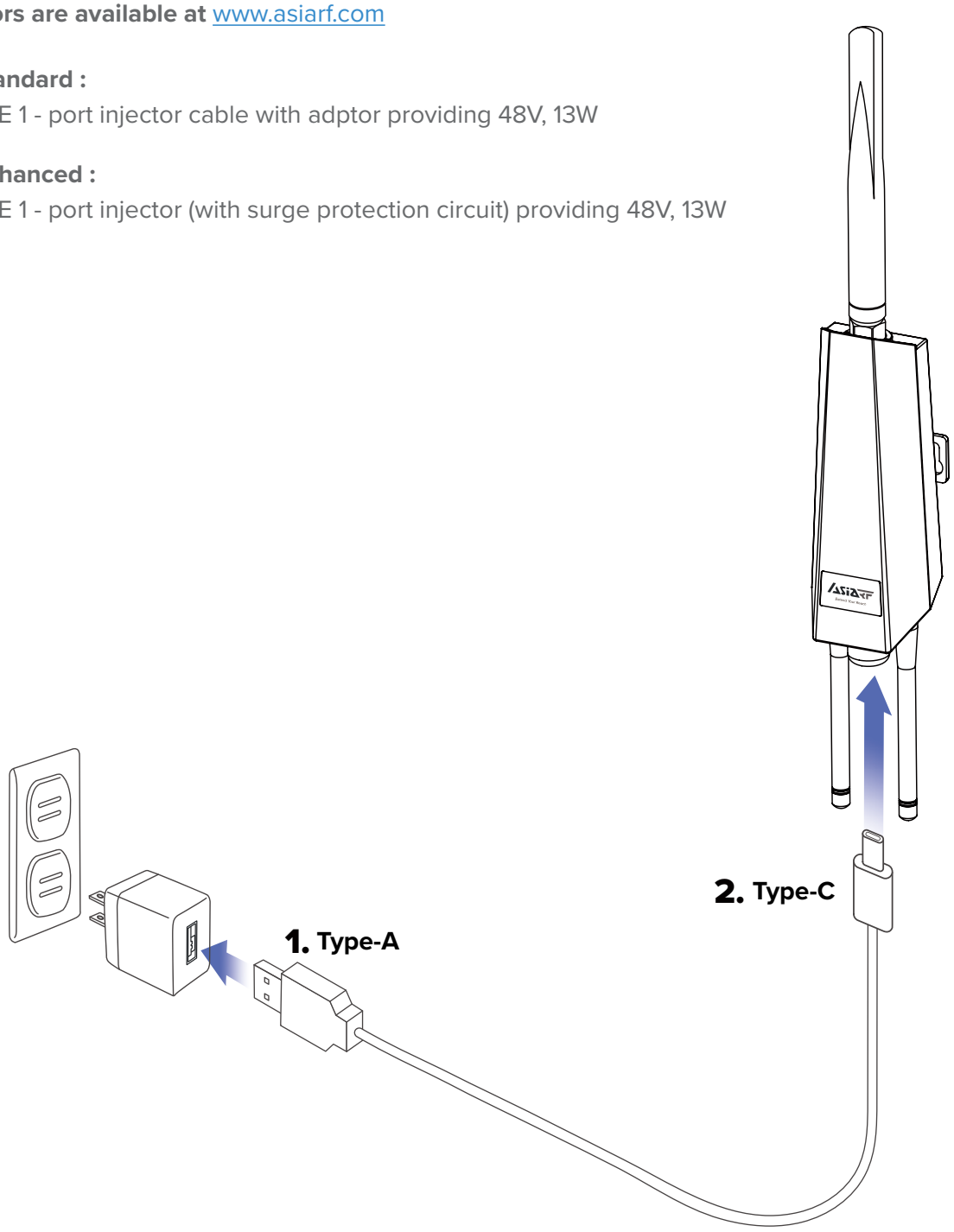
3.2.1 Connect to the Network:

First, prepare a PoE Ethernet cable to connect between the router and the ARFHL-OD-MS01 for power and activation in 3 minutes.

Alternatively, you can purchase our PoE Injector, which converts a standard Ethernet cable into PoE functionality.

PoE Injectors are available at www.asiarf.com

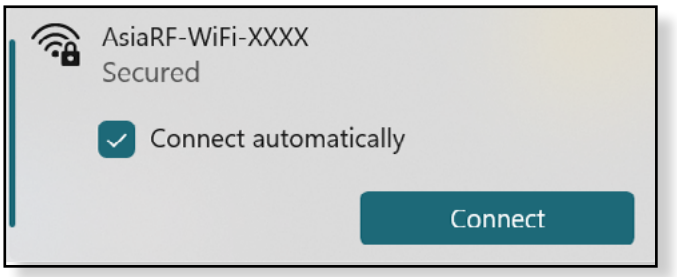
- **Standard :**
  PoE 1 - port injector cable with adptor providing 48V, 13W
- **Enhanced :**
  PoE 1 - port injector (with surge protection circuit) providing 48V, 13W



3.3 Router Mode Access Point (AP) Setting

STEP. 1

Use PC or mobile phone to connect to the Wi-Fi. (SSID: AsiaRF-WiFi-xxxx, Password: 12345678)

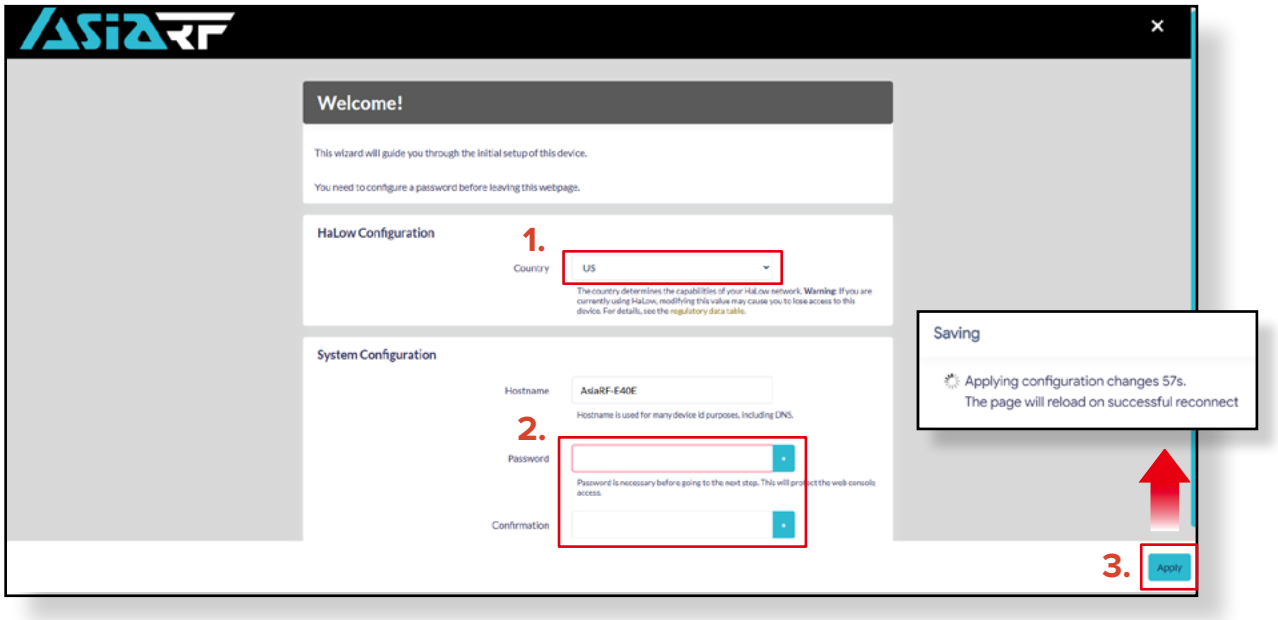


STEP. 2

Open a web browser and enter **the default IP address "192.168.3.3".** Then click "Login" (no password is required by default). *If you encounter any issues accessing the settings webpage, refer to Troubleshooting 5.2 for assistance.*

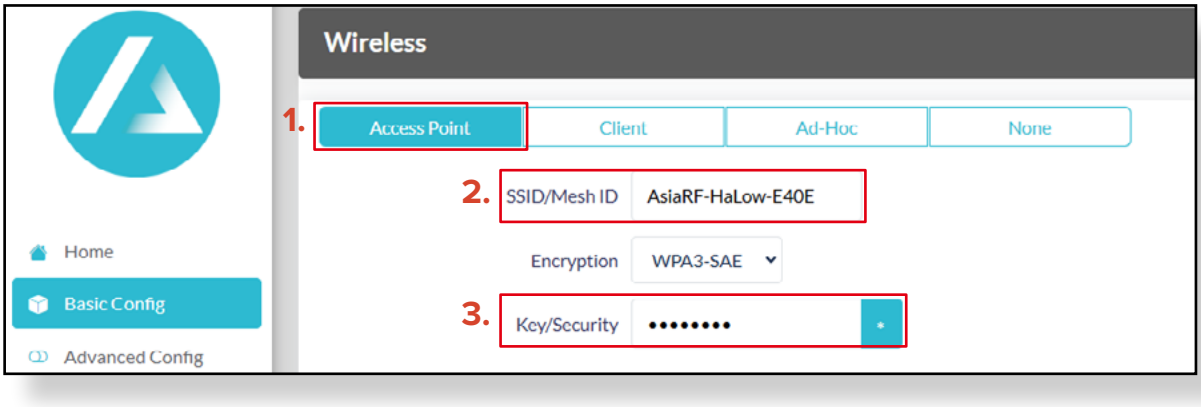
STEP. 3

At first setup, do not connect ARFHL-AP to the router which has DHCP server, or you may acquire the incorrect subnet of IP address.



STEP. 4

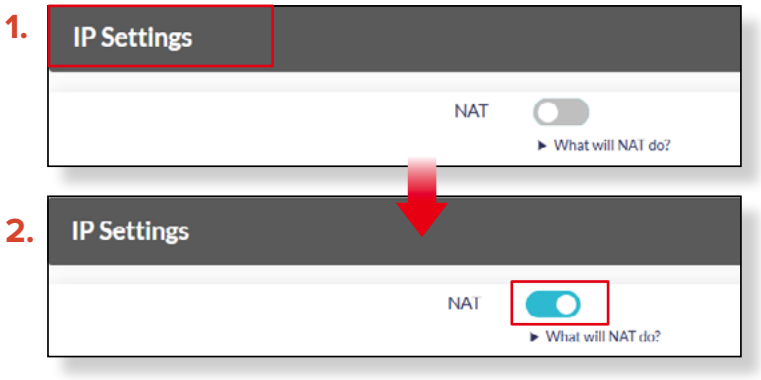
Press the 'Basic Config' tab. Press the **'Access Point'** button, and then enter yout **'SSID/Mesh ID'** and **'Key/Security'.**



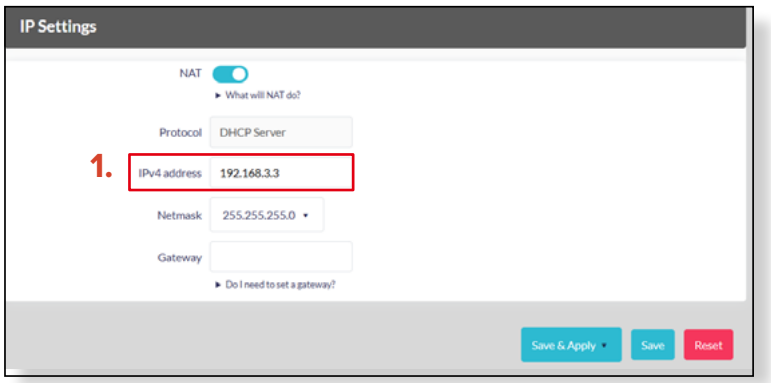
STEP. 5

Remember, our default IP address is **"192.168.3.3"** with the default Wi-Fi- 2.4 GHz SSID being **"AsiaRF-WiFi-xxxx"** and the password **"12345678".**

Enable NAT in the **"IP Settings"** section.

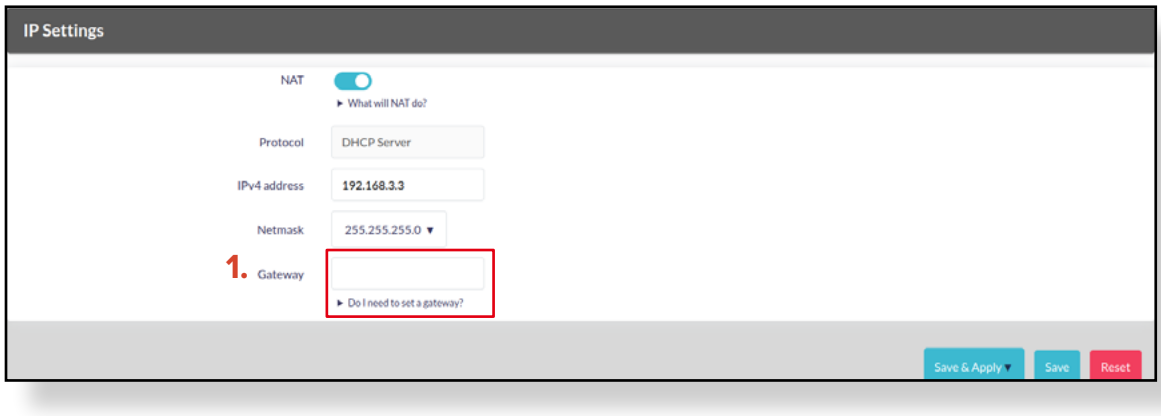


Set your own gateway's IP address. The DHCP server will use the same network segment here.



STEP. 6

In the **"Wireless"** settings, the region you initially selected will be displayed. If you wish to change the region, you can do so here. Remember to click **"Save&Apply"** after making any adjustments.



3.4 Router Mode Client (CLI) Setting

The HaLow Gateway Client configuration is identical in both Router Mode and Bridge Mode.

*For setup instructions, please see **Section 2.4, "Bridge Mode Client (CLI) Setting."***

3.5 2.4GHz Wi-Fi Managing

The HaLow Gateway 2.4GHz Wi-Fi configuration is identical in both Router Mode and Bridge Mode.

*For setup instructions, please see **Section 2.5, "2.4GHz Wi-Fi Managing."***

3.6 Switching from Router Mode to Bridge Mode

STEP. 1

Factory Reset: Press and hold the reset button for at least 10 seconds to perform a factory reset.

STEP. 2

Wait for Initialization: Allow approximately 4 minutes for the device to complete its reset and initialization process.

STEP. 3

Configure Router Mode: Once the reset is complete, follow the detailed step-by-step setup procedure in Chapter 2 to configure the device in Bridge Mode.

Firmware Upgrade

4.1 First, confirm your current firmware version

This section provides guidance on how to determine your current firmware version. Please follow the instructions provided below.

Should you encounter any issues with our product, please provide us with your firmware version to ensure the most effective after-sales service.

STEP. 1

Connect to the Wi-Fi 2.4 GHz network using a PC or mobile phone.
Look for the SSID **"AsiaRF_WiFi-xxxx"** and use the password **"12345678"** for access.

STEP. 2

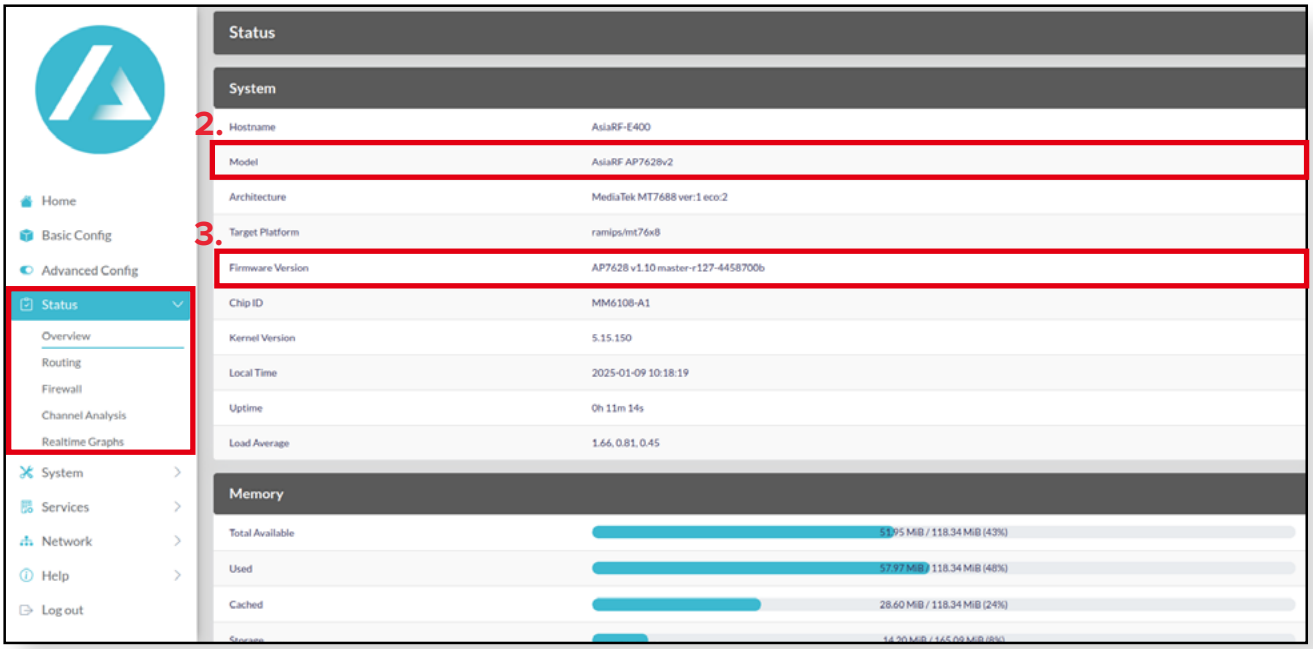
Open a web browser and enter **the default IP address "192.168.3.3".** Then click **"Login"** (no password is required by default).

If you encounter any issues accessing the settings webpage, refer to Troubleshooting 5.2 for assistance.

STEP. 3

Click **'Overview'** in the **'Status'** tab.

Then, you can get your model and firmware version. For example, it could be listed as **"AsiaRF AP7628v2"** at **'Model'** field and **"AP7628 v1.10 master-r127-4458700b"** at **'Firmware Version'** field. Please refer to the screenshot below for further clarification.

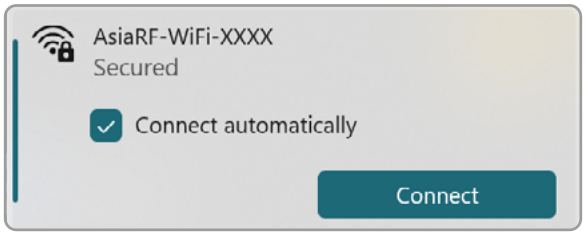


4.2 Upgrade your Firmware version.

To ensure you have the best experience with our product, follow the instructions in this chapter to upgrade your device whenever new firmware becomes available.

STEP. 1

Connect to the Wi-Fi 2.4 GHz network using a PC or mobile phone.
Look for the SSID **"AsiaRF_WiFi-xxxx"** and use the password **"12345678"** for access.



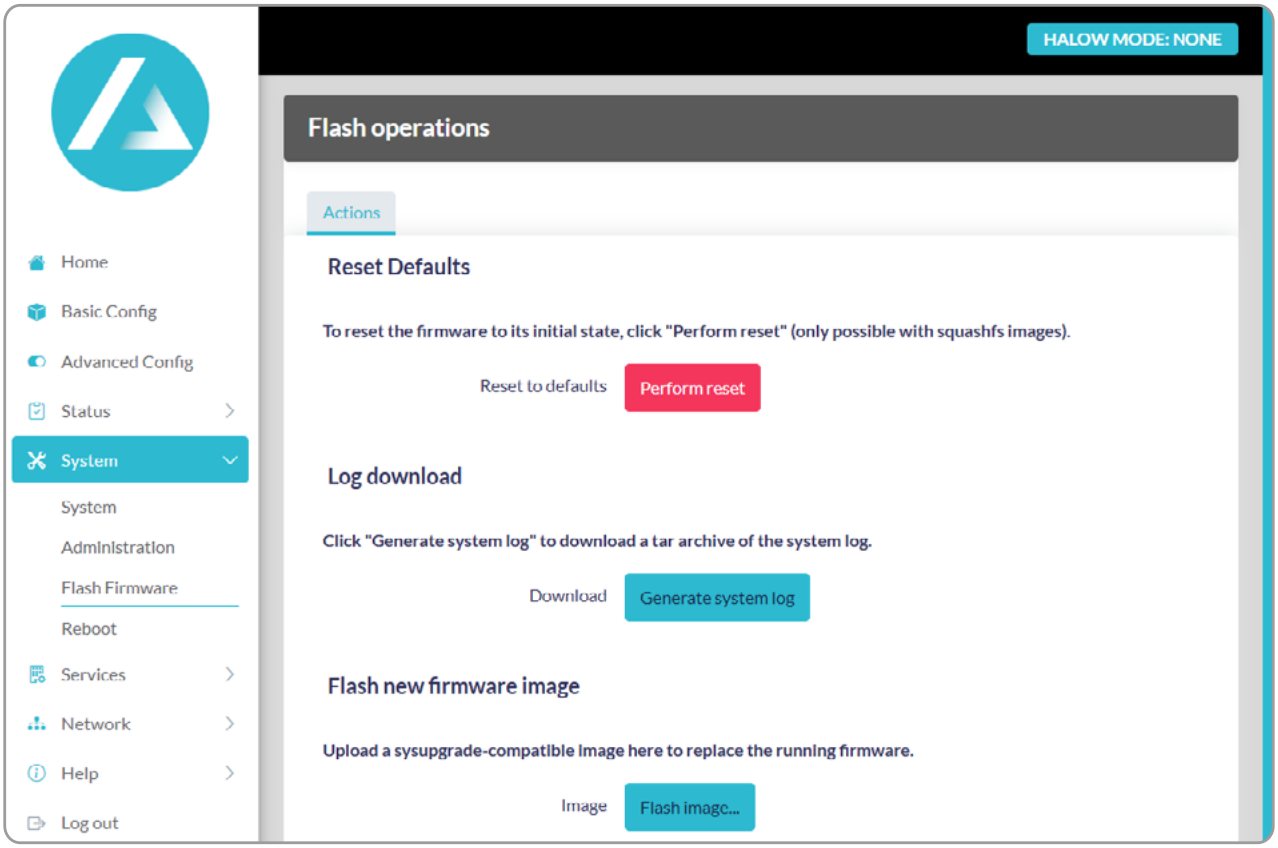
STEP. 2

Open a web browser and enter **the default IP address "192.168.3.3".** Then click **"Login"** (no password is required by default).

If you encounter any issues accessing the settings webpage, refer to Troubleshooting 5.2 for assistance.

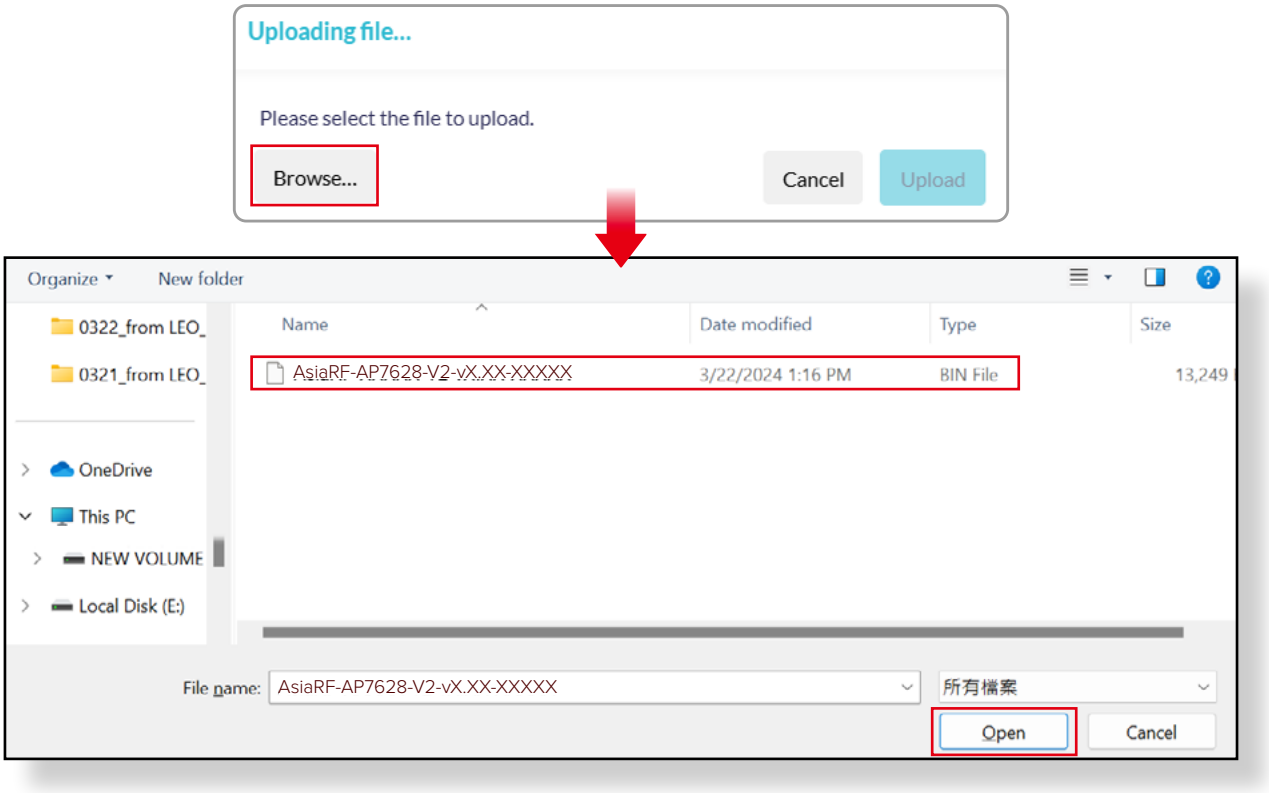
STEP. 3

Click **'Flash Firmware'** in the **'System'** tab of the **'Advanced Config'**, then Click **'Flash image'**.



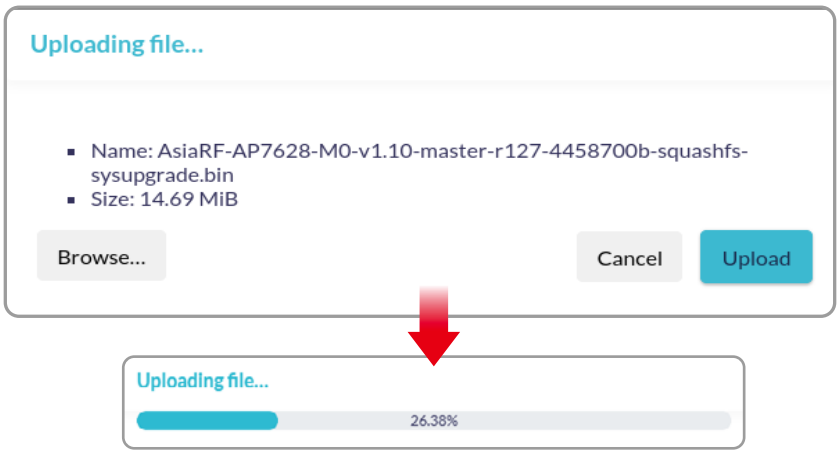
STEP. 4

Click on **"Browse"** to select the firmware you need. Choose the desired version and then click 'Open' to proceed.



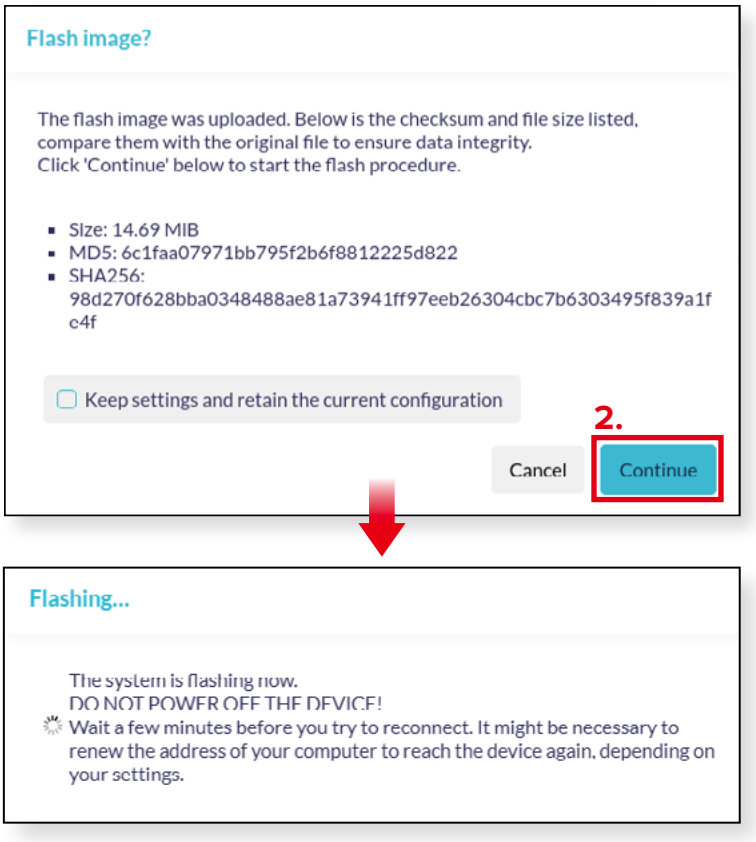
STEP. 5

After selecting the firmware, it will be displayed on your screen. Click 'Upload' to proceed, and the system will automatically verify if the version is compatible.



STEP. 6

Once your firmware upload is successful, you'll see a screen like the one in the image. It is not recommended to keep settings between major updates. Make sure to deselect the option by removing the check mark. After that, click on **"Continue"** to start the upgrade.



Once the flashing process on the screen completes, the device will automatically restart. Please refer to section 2.2 for guidance on the indicator lights during boot-up. The reboot process usually takes about four minutes.

Remember, the default IP address is "192.168.3.3." The default Wi-Fi 2.4 GHz SSID is "AsiaRF_HaLow-xxxx," with the password "12345678."

FAQ & Troubleshooting

5.1 Issue: System Reboot and Reset (Return to factory default)

Before proceeding, *prepare a pin* to press the RST (Reset) button:

- System Reboot: A quick press and release will reboot the device, which then restarts automatically.
- System Reset: A 5-second press will trigger a factory reset, restoring the default settings. *Be aware that all previous settings will be erased;* you will need to reconfigure your device.
- *For details on the LED indicators, refer to Section 2.2.*

5.2 Issue: Unable to access the settings webpage

When your Wi-Fi HaLow Gateway is set to operate in Bridge Mode, either as an AP or a Client, and you are unable to access the settings webpage from your PC or mobile device, please follow these steps:

1. To successfully access the settings page, *ensure that the IP address of your PC or mobile device is on the same network segment* as the Wi-Fi HaLow Gateway you wish to control.

> *Remember, our default IP address is "192.168.3.3," with the default Wi-Fi 2.4 GHz SSID being"AsiaRF-WiFi-xxxx" and the password "12345678."*

2. If access remains blocked, try resetting the device.
3. If the issue persists, please contact the *AsiaRF technical support hotline at +886 2 2940-7880, extension 18*, or contact our sales team via email at sales@asiarf.com.

5.3 Issue: The AP SSID does not appear in the scan list

When you're configuring your device in Client mode and the AP SSID does not appear in the scan list, you might want to try the following:

1. Attempt to press the *'scan'* button multiple times to refresh the list.
2. *It's possible that the Client Gateway and the AP Gateway are set to different regions.* Please verify and adjust both to the same region, then press 'Scan' again. This should make the AP SSID appear in your configuration screen.
3. If the issue still isn't resolved, consider resetting your device.
4. If the issue persists, please contact the *AsiaRF technical support hotline at +886 2 2940-7880, extension 18*, or contact our sales team via email at sales@asiarf.com.

Federal Communication Commission Interference 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 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.

FCC Caution:

To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

Industry Canada Statement

This device complies with Industry Canada licence-exempt RSS standard.

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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limit set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux CNR-102 d'Industrie Canada. Cet équipement doit êtreinstallé et utilisé avec une distance minimale de 20 centimètres entre le radiateur et votrecorps. Cet émetteur ne doit pas être co-localisées ou opérant en conjonction avec autreantenne ou émetteur. Les antennes utilisées pour cet émetteur doivent être installés etfournir une distance de séparation d'au moins 20 centimètre de toute personne et doit pas être co-située ni fonctionner en conjonction avec une autre antenne ou émetteur.