

Wi-Fi HaLow™ Gateway

PN: AP7688-WHM

User Manual

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Introduction

AP7688-WHM is a small-size 9 x 11.5cm, Wi-Fi4 & Wi-Fi HaLow IoT Gateway with RS232 console for industrial control.

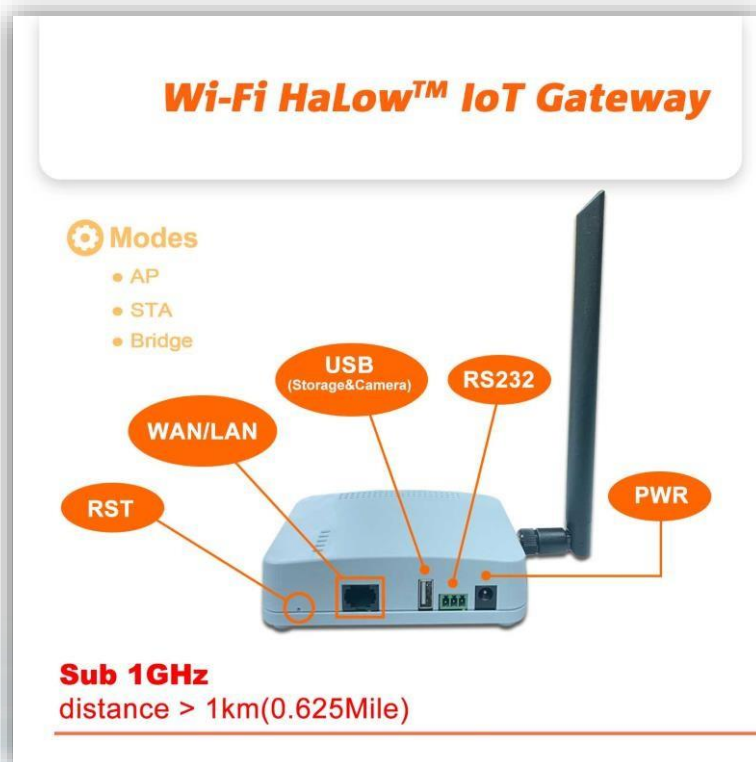
The Main parts are **Wi-Fi 4 Router** and **Wi-Fi HaLow**, each one operates individually.

Wi-Fi HaLow is the best solution for long distance IoT applications and Video stream transmission. **Wi-Fi HaLow** Throughput reaches 20Mbps provide standard surveillance system could have a long distance linking with perfect quality.

Wi-Fi HaLow linking distance is more than 1 KM, which is 10 times farther than 2.4 GHz Wi-Fi4 or Bluetooth along with 100M the coverage of traditional Wi-Fi networks, making it perfect for warehouses, factories, retail stores and other large campus environments.

Matter/BLE/Zigbee is optional in near future.

Operating temperature : -25°C - 65°C



Hardware Information

1.1 Contents

1. Wi-Fi HaLow Gateway X 1,
2. Wi-Fi HaLow Antenna X 1
3. 12V / 1A Power Adaptor X 1



For wall mounting, the used screw size should be less than M5 screw, length is 6mm around.
The operation temperature of this sets of products is maximum 40°C.

1.2 LEDs and Interfaces

1.2.1 LED display meaning



LED light meaning :

Name	Action	Description
Power (Blue)	On	Power on
Wi-Fi (Orange)	Blinking	Wi-Fi ready
Ethernet (Green)	Blinking	Linked up
Booting (Green)	Blinking	System booting
	Off	System Ready

1.2.1 Interfaces



Software Information

2 HaLow Access Point (AP) and HaLow Station (STA)

The Gateway inside have 2 Main parts, which are **Wi-Fi 4 Router** and **Wi-Fi HaLow**, each one operates individually.

We will use one of gateways to be a **HaLow AP** as a **master data center**, the rest are **HaLow Stations (STA)**, you can call them **client devices** too.

HaLow AP gateway and HaLow Station (STA) gateway settings we separate to two sections.

2.1 HaLow AP settings

2.1.1 Wi-Fi 4 Router and Main Wi-Fi Router relationship

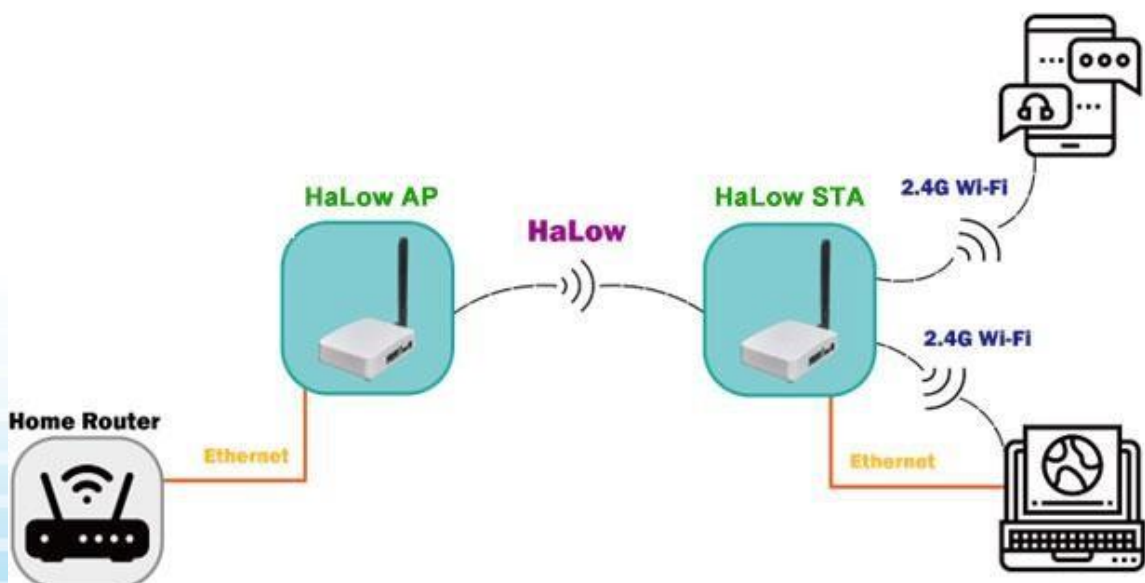
The Gateway inside have 2 Main parts, which are **Wi-Fi 4 Router** and **Wi-Fi HaLow**, each one operates individually.

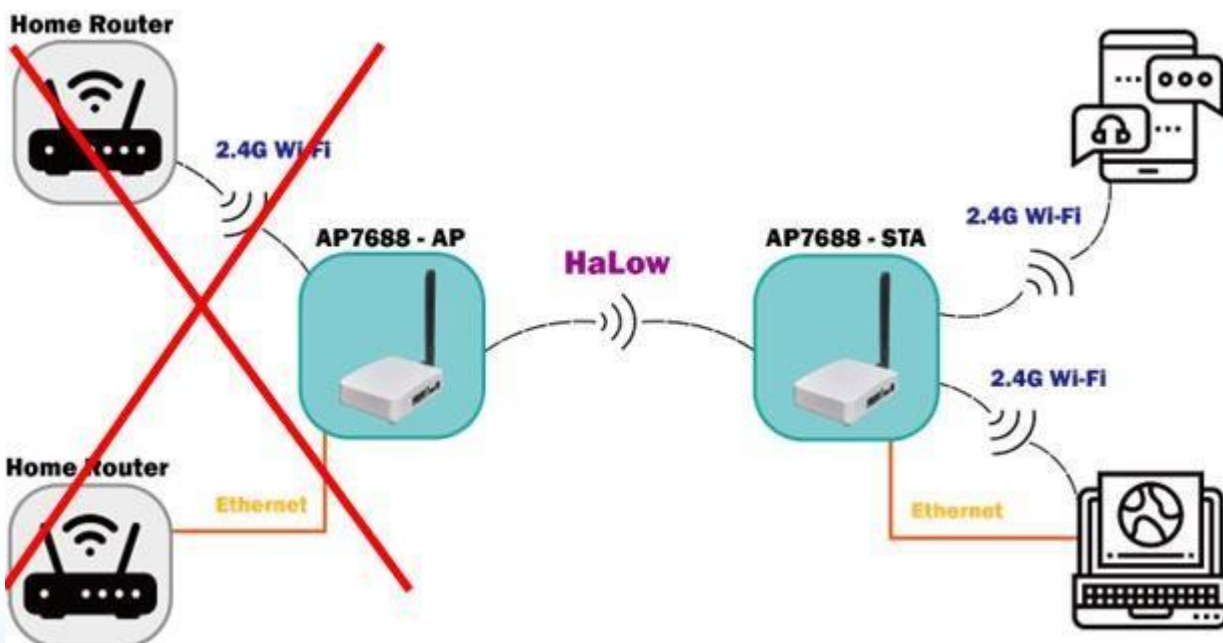
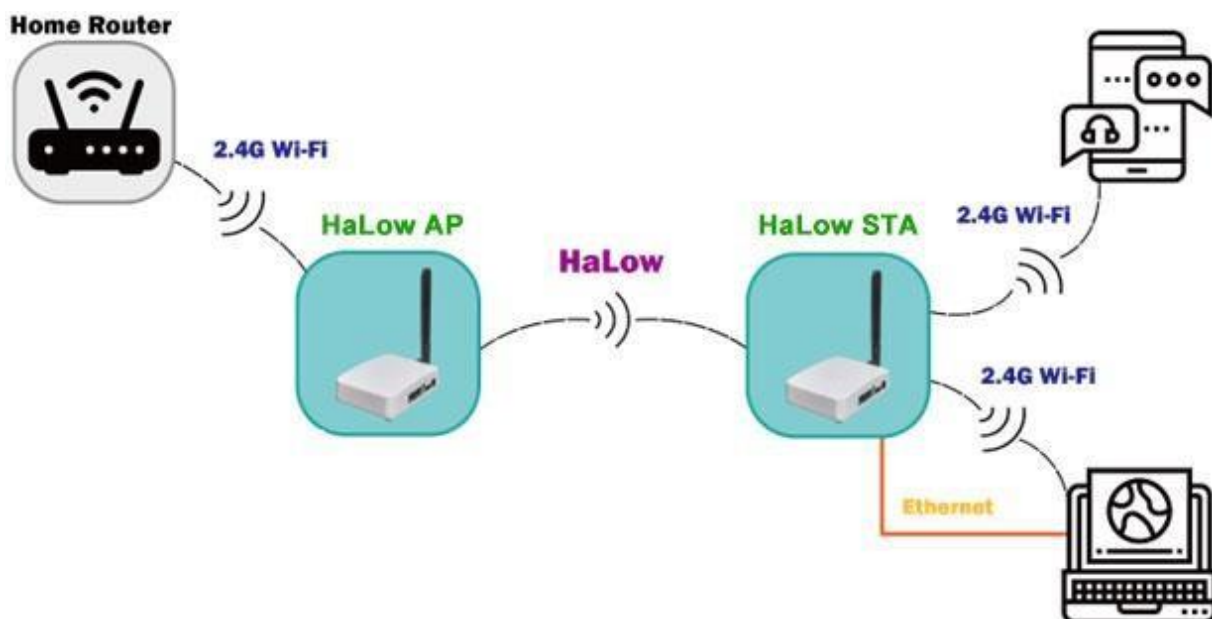
Important:

You can use HaLow AP Gateway to link with Main Home Router by two ways.

1. By LAN cable
2. By Wi-Fi linking

You can choose **one way to link only**, if you use two ways in the meantime, the network will be locked and can not access internet.



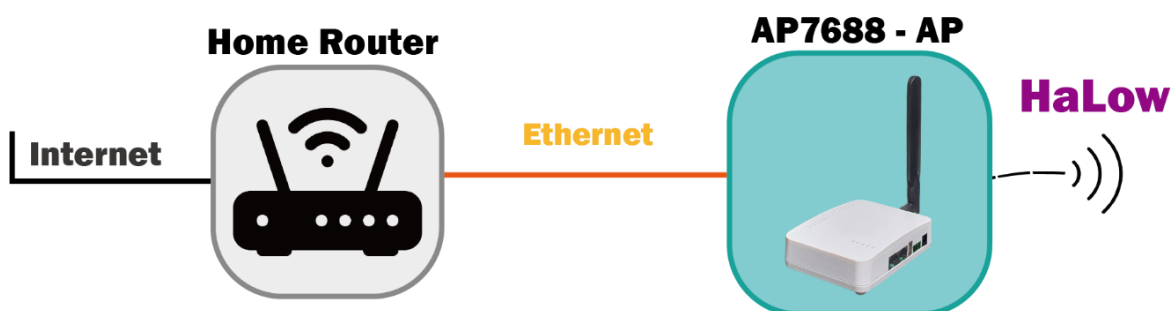


2.1.2 HaLow AP internet linking by LAN cable

Plug in the power and start to setting.

After plug in the power on device and wait for about 2 minutes. Device finish booting once the fourth LED light(green) turns off and second LED light(orange) turns on.

***** LAN and Wi-Fi two settings need to choose one only. *****
***** Switch linking setting you need to power off and power on again! *****

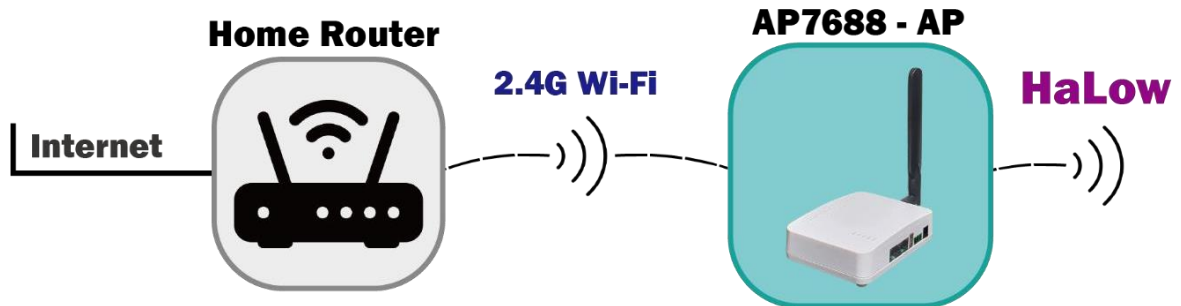


Use CAT5 / CAT6 Cable plug in the AP mode gateway's RJ45 port.



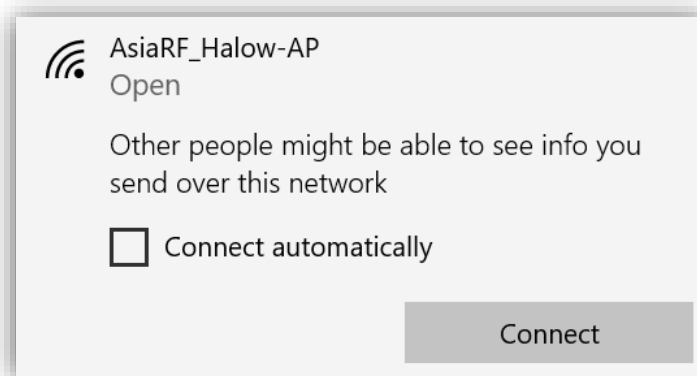
Use PC or Mobile phone connect to the Wi-Fi (SSID: AsiaRF_Halow-AP, Password: none) and check whether network is operating successfully.

2.1.3 HaLow AP internet linking by Wi-Fi 4 Wireless

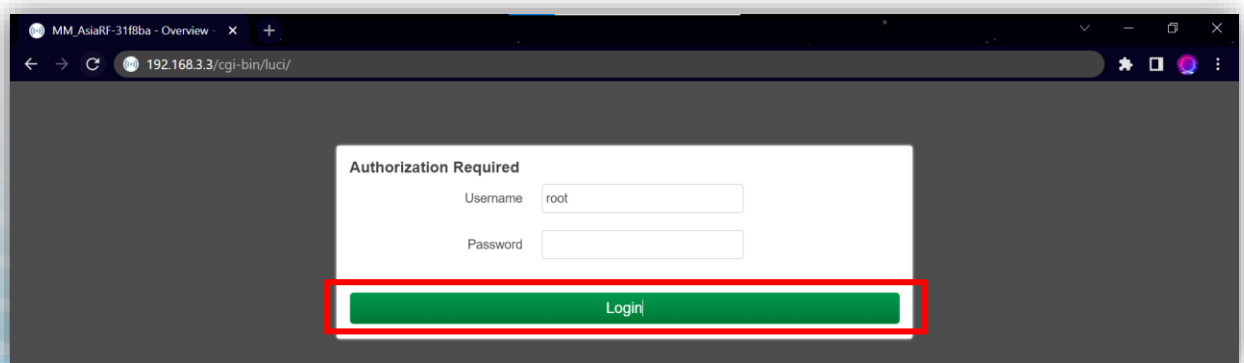


*** If you are going to re-connect a new Wi-Fi, check the [trouble shooting Case 1](#) first ***

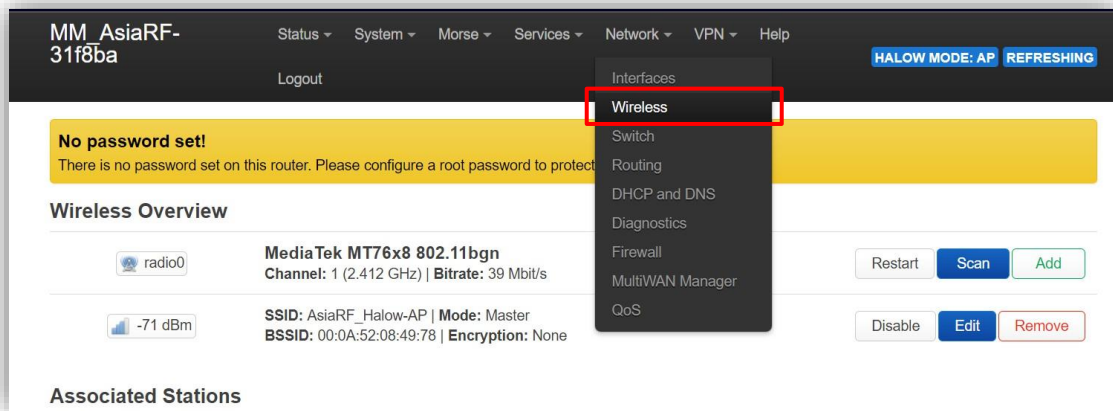
Use PC or mobile phone connect to the Wi-Fi (SSID: AsiaRF_Halow-AP, Password: none).



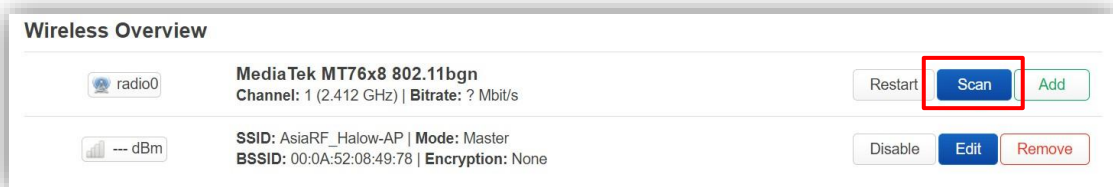
Open the browser and type "192.168.3.3".
Click "Login" (No password in default).



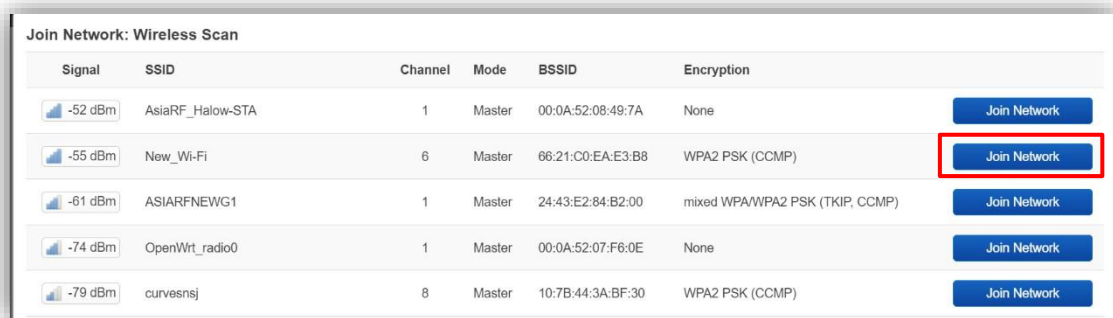
Click “Wireless” in the “Network” tab.



Click “Scan” to scan Wi-Fi.



Select the Wi-Fi which you want.



Input your Home Wi-Fi password in the “WPA passphrase” section and Click “Submit”.

Joining Network: "New_Wi-Fi"

☐ Replace wireless configuration
Check this option to delete the existing networks from this radio.

Name of the new network
The allowed characters are: A-Z, a-z, 0-9 and _

WPA passphrase
Specify the secret encryption key here.

☐ Lock to BSSID
Instead of joining any network with a matching SSID, only connect to the BSSID 86:21:C0:EA:E3:B8.

Create / Assign firewall-zone wan wan: (empty)
Choose the firewall zone you want to assign to this interface. Select unspecified to remove the interface from the associated zone or fill out the custom field to define a new zone and attach the interface to it.

Interface Configuration

☒ General Setup ☐ Wireless Security ☐ Advanced Settings

Mode Client

ESSID

BSSID

Network wwan
Choose the network(s) you want to attach to this wireless interface or fill out the custom field to define a new network.

Click “Save & Apply” to save the configuration.

No password set!
There is no password set on this router. Please configure a root password to protect the web interface.

Wireless Overview

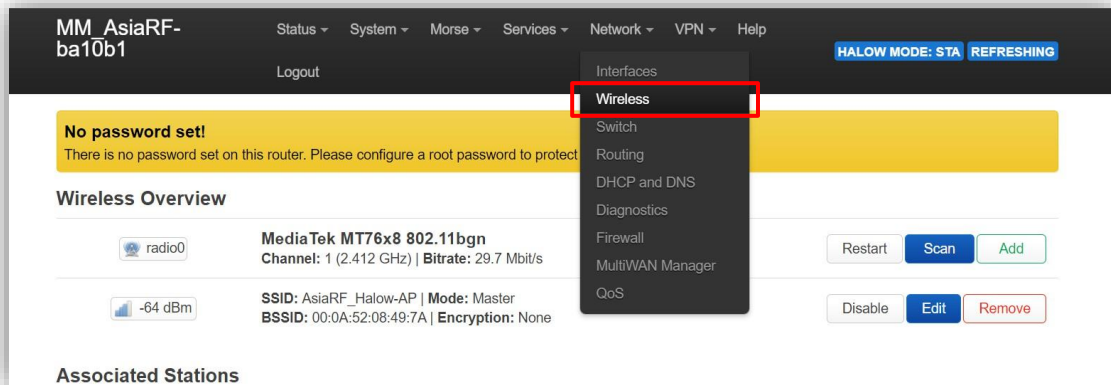
radio0	MediaTek MT76x8 802.11bgn Channel: 1 (2.412 GHz) Bitrate: ? Mbit/s	Restart Scan Add
dBm	SSID: AsiaRF_Halow-AP Mode: Master BSSID: 00:0A:52:08:49:78 Encryption: None	Disable Edit Remove
disabled	SSID: New_Wi-Fi Mode: Client Interface has 7 pending changes	Disable Edit Remove

Associated Stations

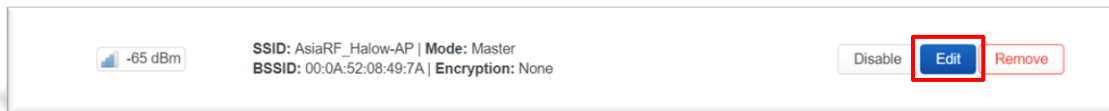
Network	MAC address	Host	Signal / Noise	RX Rate / TX Rate
No information available				

2.2 HaLow AP's Wi-Fi 4 wireless network setting (Wi-Fi SSID/Wi-Fi Password)

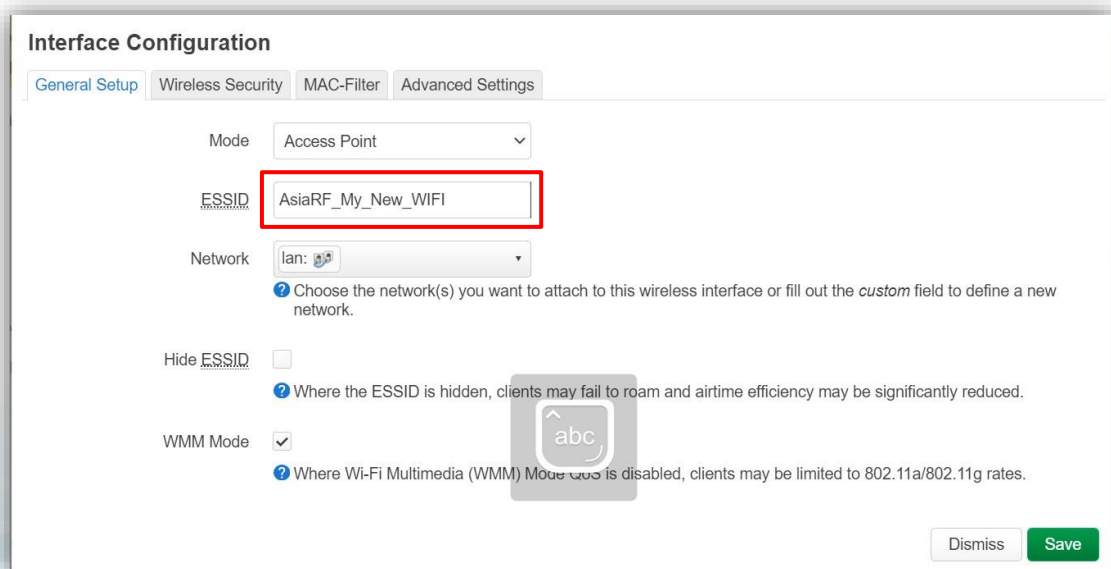
Click the "Wireless" in the "Network" tab.



Click the "Edit" button.

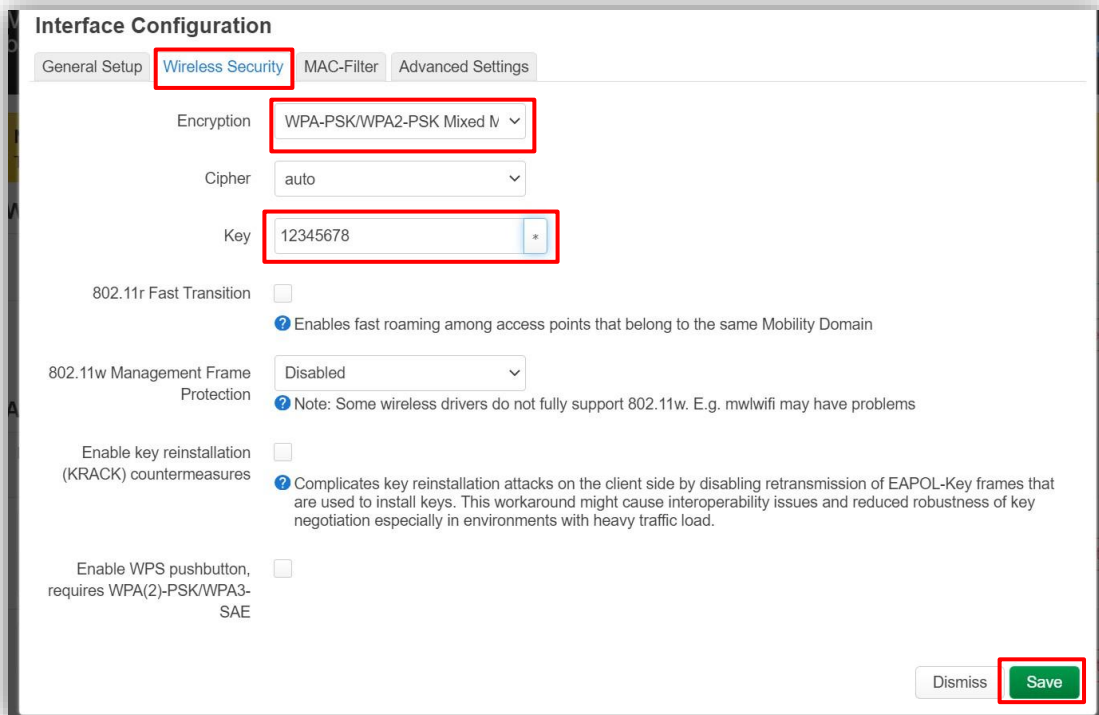


Change ESSID to your new name.



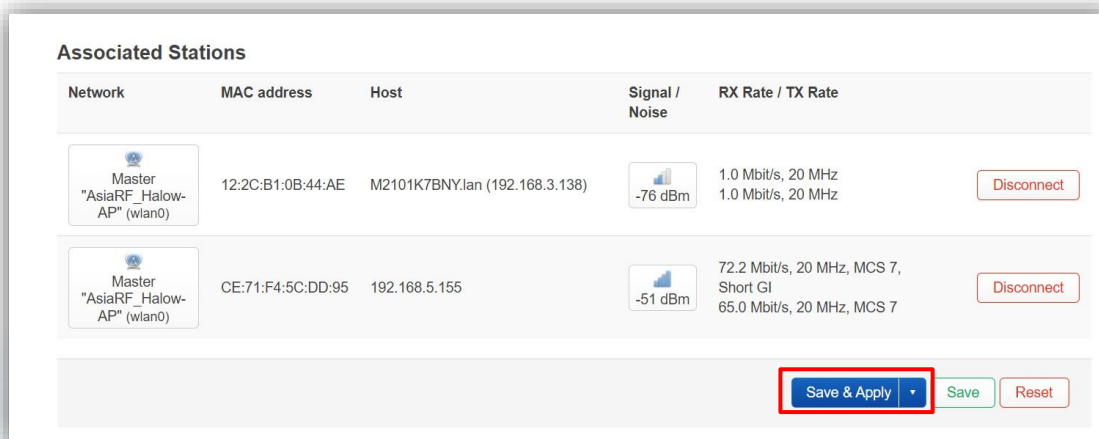
***** If you don't need to set the Wi-Fi password. *****
***** You can press the "Save" button to skip the next step. *****

Click "Wireless Security" and choose one of the encryption types.
Ex. "WPA-PSK/WPA2-PSK Mixed Mode(medium security)"
Input your WI-Fi password in "Key" field and don't forget it.
Click the "Save" button to save your configuration.



The screenshot shows the 'Interface Configuration' window with the 'Wireless Security' tab selected. The 'Encryption' dropdown is set to 'WPA-PSK/WPA2-PSK Mixed IV'. The 'Cipher' is set to 'auto'. The 'Key' field contains '12345678'. The '802.11r Fast Transition' checkbox is unchecked. The '802.11w Management Frame Protection' dropdown is set to 'Disabled'. The 'Enable key reinstallation (KRACK) countermeasures' checkbox is unchecked. The 'Enable WPS pushbutton, requires WPA(2)-PSK/WPA3-SAE' checkbox is unchecked. The 'Save' button is highlighted with a red box.

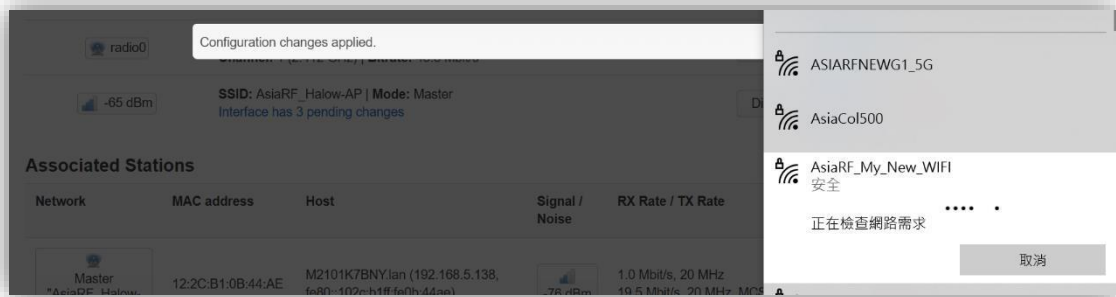
Click the "Save & Apply" button to save the configuration.



The screenshot shows the 'Associated Stations' table with two entries. The first entry is for a Master 'AsiaRF_Halov-AP' (wlan0) with MAC address 12:2C:B1:0B:44:AE and Host M2101K7BNY.lan (192.168.3.138). The second entry is for a Master 'AsiaRF_Halov-AP' (wlan0) with MAC address CE:71:F4:5C:DD:95 and Host 192.168.5.155. The 'Save & Apply' button is highlighted with a red box.

Network	MAC address	Host	Signal / Noise	RX Rate / TX Rate	
Master "AsiaRF_Halov-AP" (wlan0)	12:2C:B1:0B:44:AE	M2101K7BNY.lan (192.168.3.138)	-76 dBm	1.0 Mbit/s, 20 MHz 1.0 Mbit/s, 20 MHz	Disconnect
Master "AsiaRF_Halov-AP" (wlan0)	CE:71:F4:5C:DD:95	192.168.5.155	-51 dBm	72.2 Mbit/s, 20 MHz, MCS 7, Short GI 65.0 Mbit/s, 20 MHz, MCS 7	Disconnect

It will reset your Wi-Fi interface. Find the new Wi-Fi and enter your password. And it will finish your Configuration.

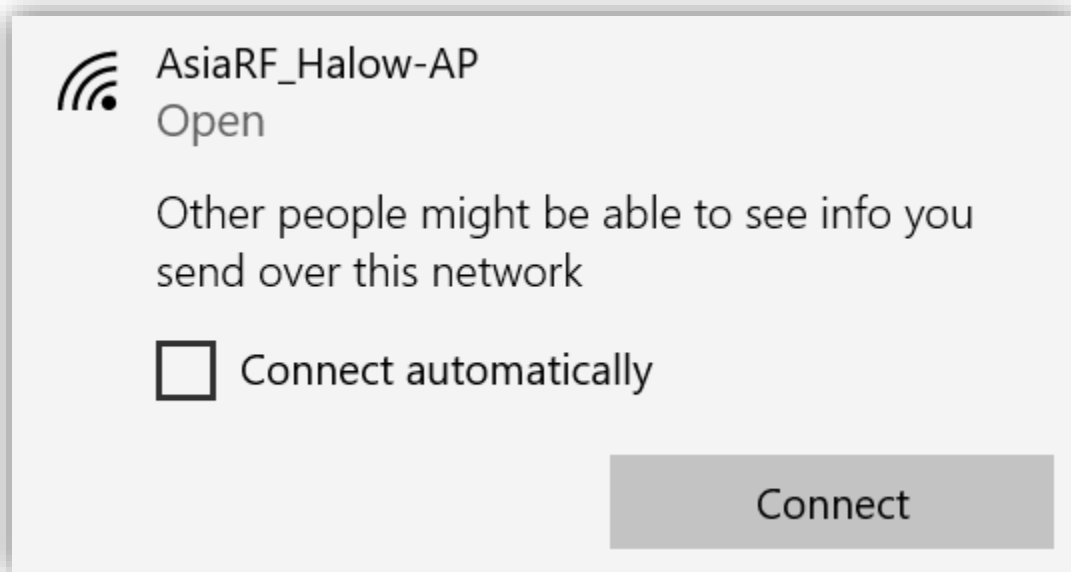


2.3 Wi-Fi HaLow AP mode setting

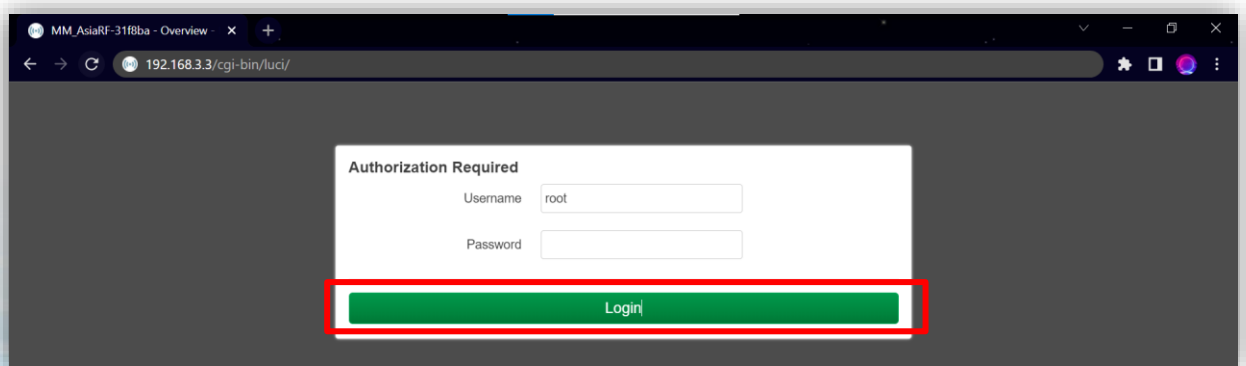
Our product is a pair of AP7688-WHM. It has default setting with Wi-Fi HaLow. If you don't need to set HaLow in special configuration, you can skip this chapter.

2.3.1 Connect to device

Use PC or mobile phone and connect to the Wi-Fi (SSID: AsiaRF_Halow-AP, Password: None)

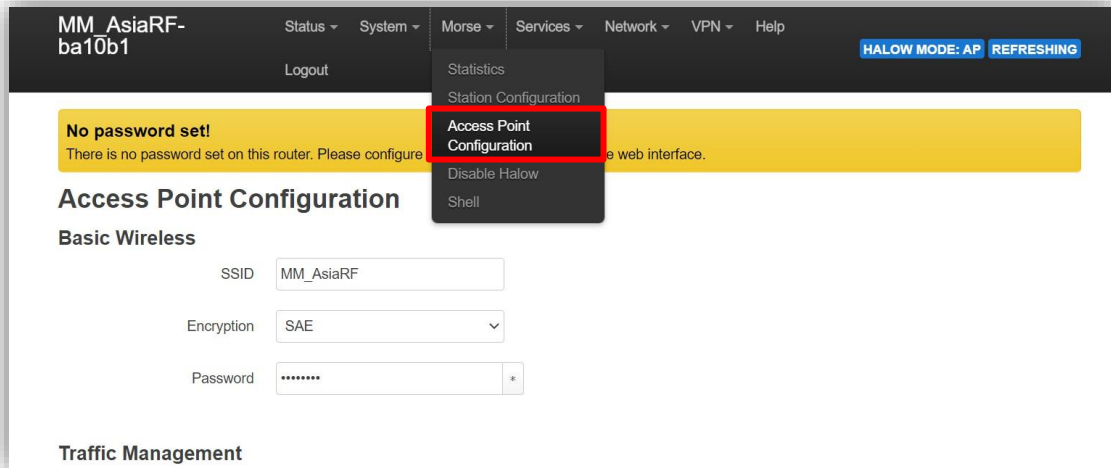


Open the browser and type "192.168.3.3".
Click "Login" (No password in default).



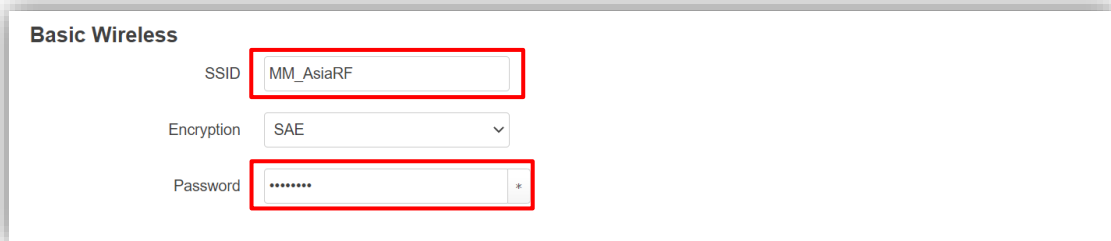
2.3.2 Setting to AP mode

Click “Access Point Configuration” in the “Morse” tab.

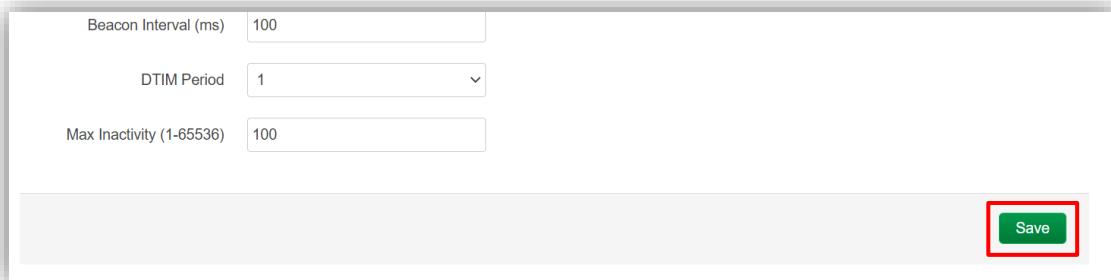


The screenshot shows the MM AsiaRF web interface. The top navigation bar includes tabs for Status, System, Morse, Services, Network, VPN, and Help. The Morse tab is selected, and a dropdown menu is open, highlighting the "Access Point Configuration" option. A yellow banner at the top of the main content area reads "No password set! There is no password set on this router. Please configure the web interface." Below this, the "Access Point Configuration" section is visible, with a "Basic Wireless" subsection containing fields for SSID (MM_AsiaRF), Encryption (SAE), and Password (masked with asterisks). A "Traffic Management" section is also visible below.

Setting your Wi-Fi HaLow SSID and password.



This screenshot focuses on the "Basic Wireless" configuration section. The SSID field is set to "MM_AsiaRF" and the Password field is masked with asterisks. Both fields are highlighted with red rectangles. The Encryption is set to "SAE".

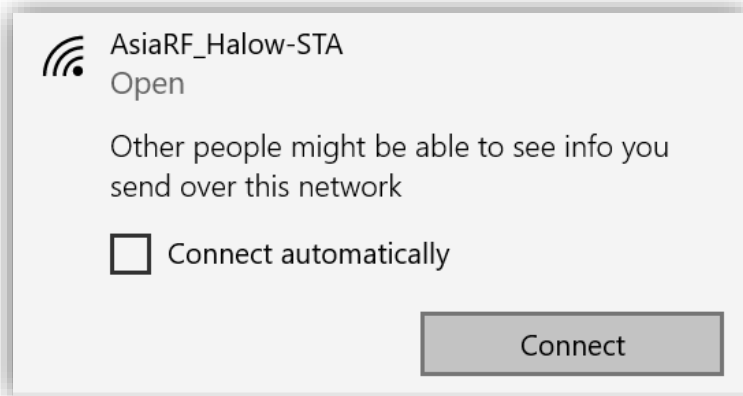


This screenshot shows the advanced configuration section. It includes fields for "Beacon Interval (ms)" set to 100, "DTIM Period" set to 1, and "Max Inactivity (1-65536)" set to 100. A green "Save" button is highlighted with a red rectangle at the bottom right of the section.

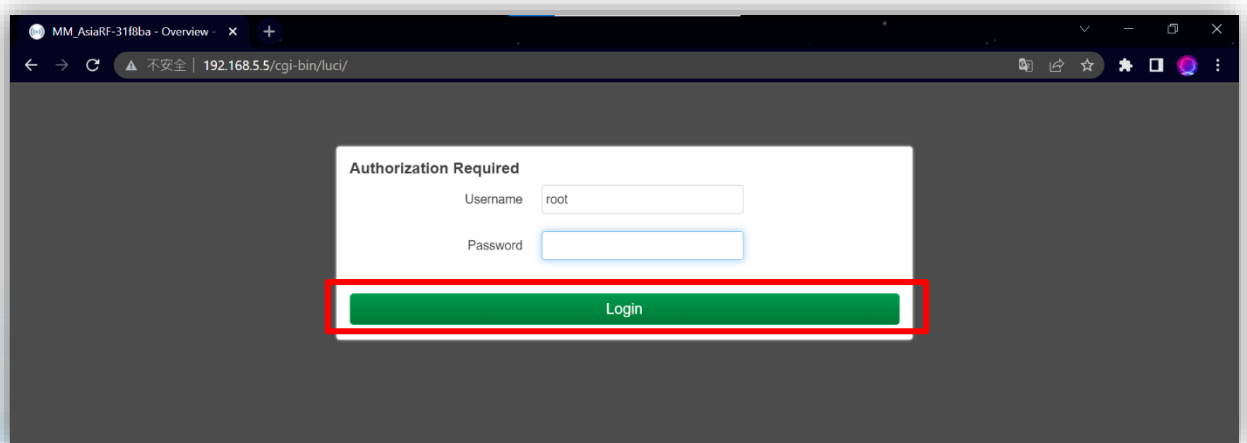
2.4 HaLow Station (STA) Gateway Configuration

2.4.1 HaLow STA Gateway Wi-Fi 4 Wireless Network setting (Wi-Fi SSID/Wi-Fi Password)

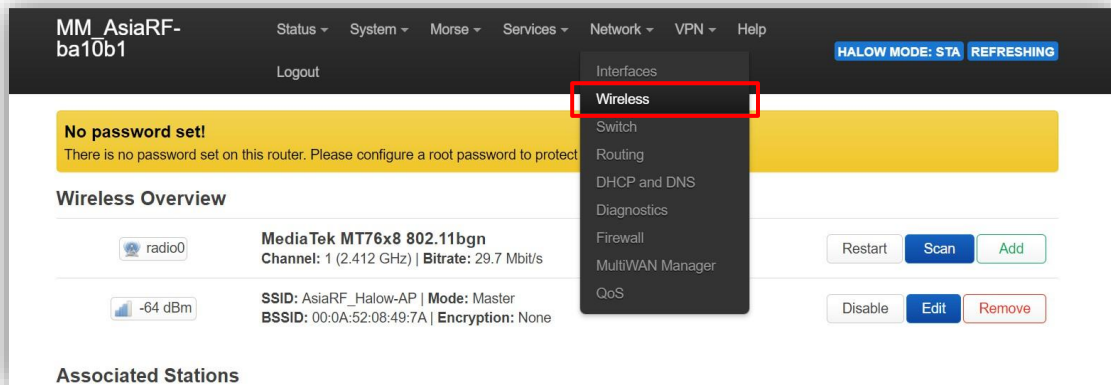
Use PC or mobile phone and connect to the Wi-Fi (SSID: AsiaRF_Halow-STA, Password: None)



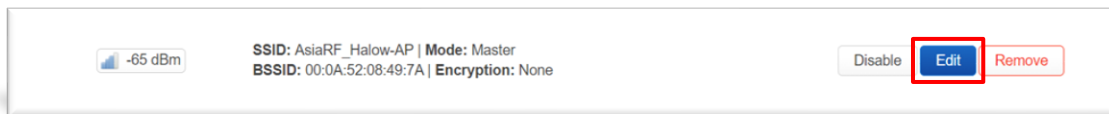
Open the browser and type "192.168.5.5".
Click "Login" (No password in default).



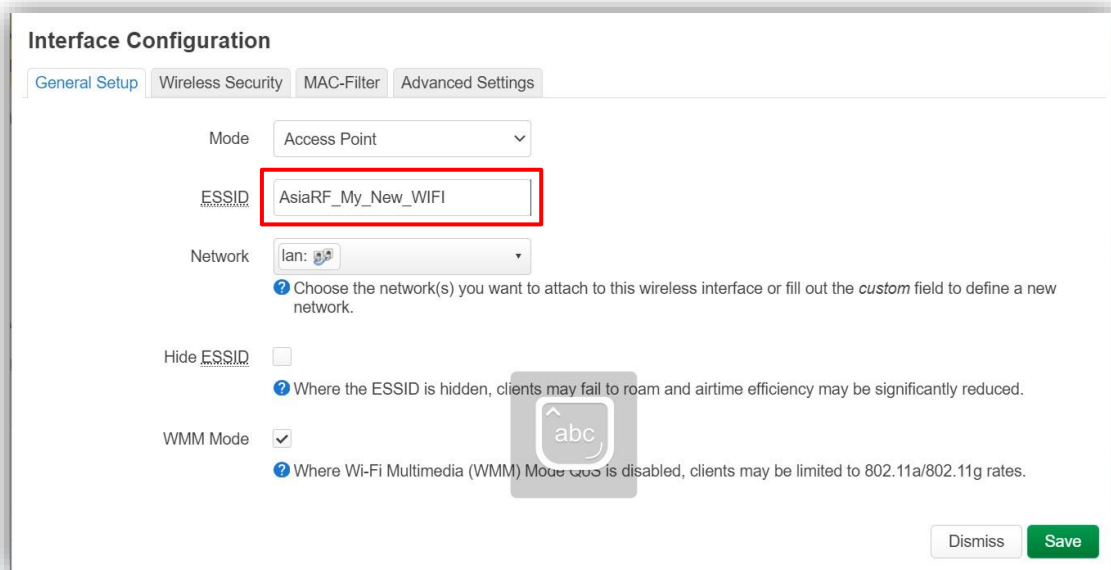
Click the “Wireless” in the “Network” tab.



Click the “Edit” button.

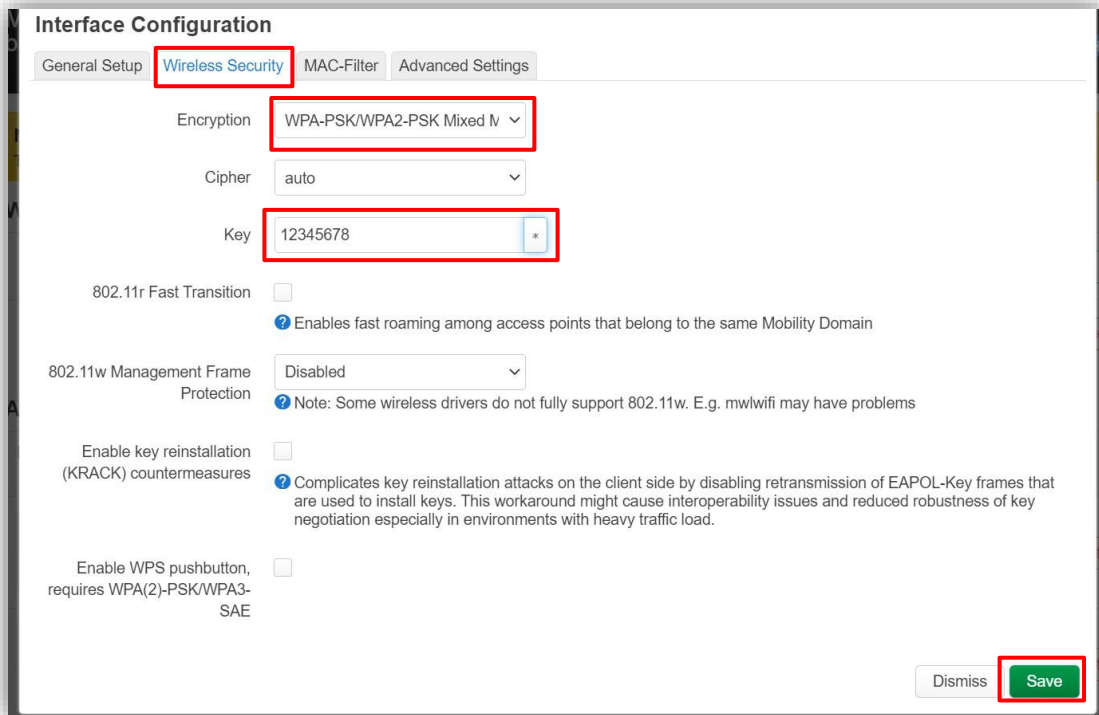


Change ESSID to your new name.



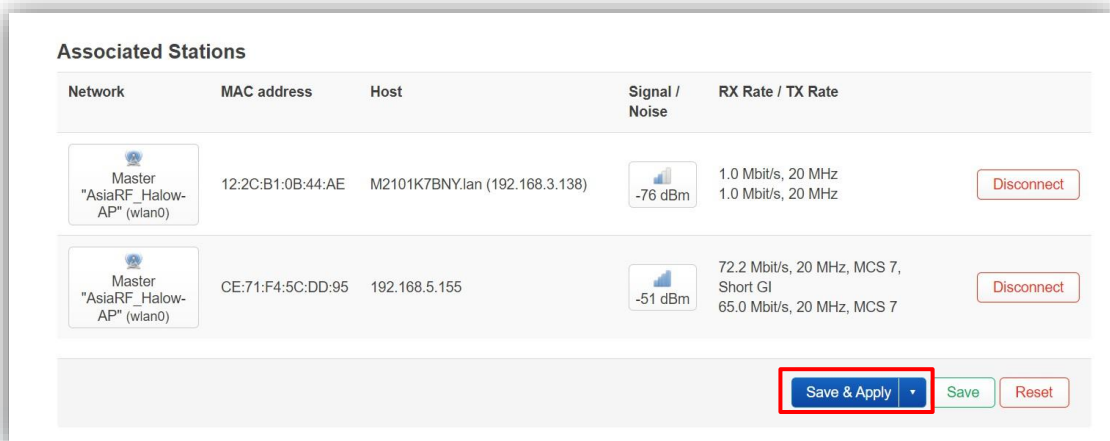
*** If you don't need to set the Wi-Fi password. ***
*** You can press the “Save” button to skip the next step. ***

Click “Wireless Security” and choose one of the encryption types.
Ex. “WPA-PSK/WPA2-PSK Mixed Mode(medium security)”
Input your WI-Fi password in “Key” field and don’t forget it.
Click the “Save” button to save your configuration.



The screenshot shows the 'Interface Configuration' window with the 'Wireless Security' tab selected. The 'Encryption' dropdown is set to 'WPA-PSK/WPA2-PSK Mixed IV'. The 'Cipher' is set to 'auto'. The 'Key' field contains '12345678'. Below these fields are several checkboxes and informational text: '802.11r Fast Transition' (unchecked), '802.11w Management Frame Protection' (set to 'Disabled'), 'Enable key reinstallation (KRACK) countermeasures' (unchecked), and 'Enable WPS pushbutton, requires WPA(2)-PSK/WPA3-SAE' (unchecked). At the bottom right, there are 'Dismiss' and 'Save' buttons.

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

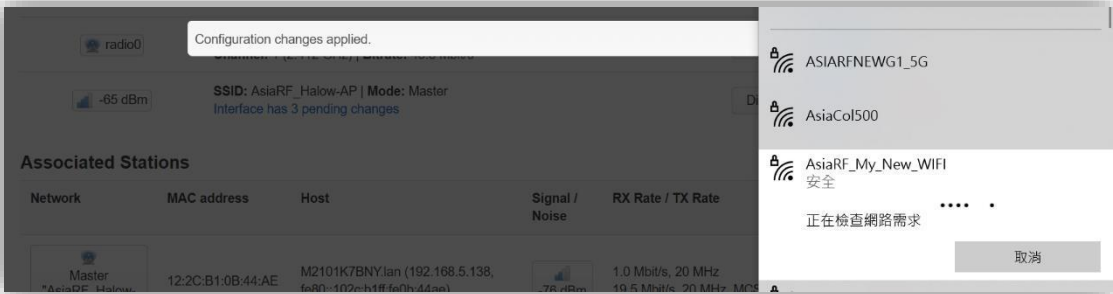


The screenshot shows the 'Associated Stations' table with two entries. The first entry is for a Master 'AsiaRF_Halov-AP' (wlan0) with MAC address 12:2C:B1:0B:44:AE and Host M2101K7BNY.lan (192.168.3.138). The second entry is for a Master 'AsiaRF_Halov-AP' (wlan0) with MAC address CE:71:F4:5C:DD:95 and Host 192.168.5.155. At the bottom right, there are 'Save & Apply', 'Save', and 'Reset' buttons.

Network	MAC address	Host	Signal / Noise	RX Rate / TX Rate	
Master "AsiaRF_Halov-AP" (wlan0)	12:2C:B1:0B:44:AE	M2101K7BNY.lan (192.168.3.138)	-76 dBm	1.0 Mbit/s, 20 MHz 1.0 Mbit/s, 20 MHz	Disconnect
Master "AsiaRF_Halov-AP" (wlan0)	CE:71:F4:5C:DD:95	192.168.5.155	-51 dBm	72.2 Mbit/s, 20 MHz, MCS 7, Short GI 65.0 Mbit/s, 20 MHz, MCS 7	Disconnect

It will reset your Wi-Fi interface. Find the new Wi-Fi and enter your password.

And it will finish your Configuration.

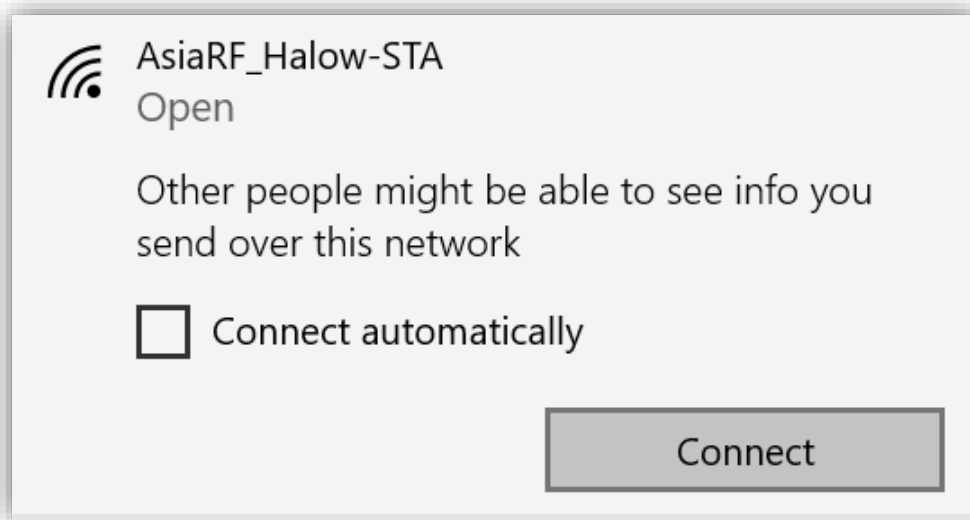


2.5 Wi-Fi HaLow STA mode setting

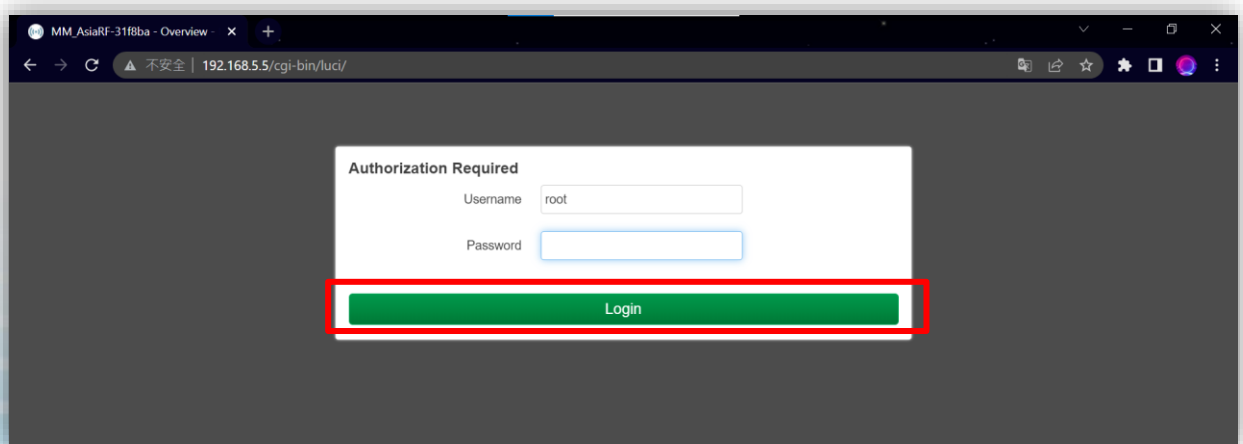
Our product is a pair of AP7688-WHM. It has default setting with Wi-Fi HaLow. If you don't need to set HaLow in special configuration, you can skip this chapter.

2.5.1 Connect to device

Use PC or mobile phone and connect to the Wi-Fi (SSID: AsiaRF_Halow-STA, Password: None)



Open the browser and type "192.168.5.5".
Click "Login" (No password in default).



2.5.2 Setting to STA mode

Click “Station Configuration” in the “Morse” tab.

The screenshot shows the MM_AsiaRF web interface. At the top, there's a navigation bar with tabs: Status, System, Morse, Services, Network, VPN, and Help. The Morse tab is selected. Below the navigation bar, there's a dropdown menu with options: Statistics, Station Configuration (highlighted with a red box), Access Point Configuration, Disable Halow, and Shell. The main content area has a yellow banner that says "No password set! There is no password set on this router. Please configure the password to access the web interface." Below this, the "Station Configuration" section is visible, showing fields for SSID (MM_AsiaRF), Encryption (SAE), and Password (masked with asterisks). There's a "Scan" button next to the SSID field. At the bottom, there's a "Traffic Management" section.

The Wi-Fi HaLow default connect SSID is “MM_AsiaRF”.

The screenshot shows the "Basic Wireless" section of the web interface. It has a dropdown menu for SSID with "MM_AsiaRF" selected and a "Scan" button next to it.

You can click “Scan” button to scan the Wi-Fi HaLow AP around it.

The screenshot shows the "Basic Wireless" section. The SSID dropdown is set to "MM_AsiaRF". The "Scan" button is highlighted with a red box.

It will choose the Wi-Fi HaLow AP around you, or you can choose one in the list.

Ex. SSID: MM_AsiaRF_2

Don't forget to input the password.

The screenshot shows the "Basic Wireless" section. The SSID dropdown is now set to "MM_AsiaRF_2". The "Scan" button is still present. Below the SSID field, there's a field for "Encryption" set to "SAE". At the bottom, there's a "Password" field with the value "12345678" entered, which is highlighted with a red box.

Change your Wired IP Address to avoid the same IP network segment.
Ex. Wired IP Address: 192.168.5.5, Wired Gateway: 192.168.5.1

IP Settings - Ethernet

Wired IP Method

DHCP Server

Wired IP Address

192.168.5.5

Wired Netmask

255.255.255.0

Wired Gateway

192.168.5.1

DHCP Range Start

100

DHCP Range End

200

Click "Save" button to save the configuration.

Advanced Wireless

Region

US

Protected Management Frames
☐

Save

Saving

 Applying configuration changes. Forcing a page reload in 58s

Enter your new IP address to continue your other service / setting.

MM_AsiaRF-31f8ba - Overview

192.168.5.5/cgi-bin/luci/

Authorization Required

Username

root

Password

Login

Trouble Shooting

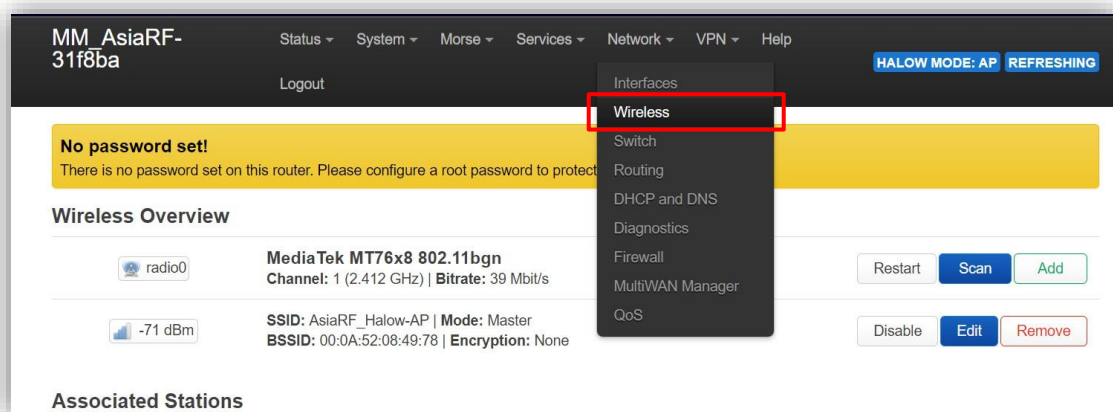
Case 1

Problem: AP gateway re-connect to new Wi-Fi.

Solution: Follow the steps below first to remove the old one and continue the chapter [2.1.3](#).

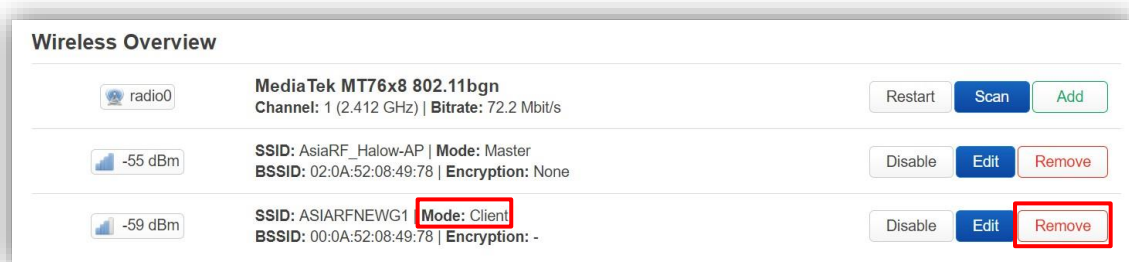
Use PC or mobile phone and connect to the AP-side Wi-Fi.

Click “Wireless” in the “Network” tab.



Check the previous connection of Wi-Fi. Remove the interface with "Mode: Client" at the bottom if it exists.

And click “Save & Apply” to save your configuration.



Wireless Overview

radio0

MediaTek MT76x8 802.11bgn
Channel: 1 (2.412 GHz) | Bitrate: ? Mbit/s

Restart Scan Add

dBm

SSID: AsiaRF_Halow-AP | Mode: Master
BSSID: 02:0A:52:08:49:78 | Encryption: None

Disable Edit Remove

Associated Stations

Network	MAC address	Host	Signal / Noise	RX Rate / TX Rate
No information available				

Save & Apply Save Reset

Case 2

Problem: Unable to connect to Wi-Fi or failed to get IP address after connecting.

AsiaRF_Halow-AP

IP 設定

IP 指派: 自動 (DHCP)
編輯

屬性

SSID: AsiaRF_Halow-AP
通訊協定: Wi-Fi 4 (802.11n)
安全性類型: 開放式
網路頻帶: 2.4 GHz
網路通道: 1
連結速度 (接收/傳輸): 65/65 (Mbps)
連結-本機 IPv6 位址: fe80::287c:1058:b22:2f63%15
IPv6 DNS 伺服器: fec0:0:0:ffff::1%1
fec0:0:0:ffff::2%1
fec0:0:0:ffff::3%1
製造商: Intel Corporation
描述: Intel(R) Wireless-AC 9560
驅動程式版本: 22.80.0.9
實體位址 (MAC): 3E-09-CC-AF-67-80
複製

Network details

Forget

Connecting...

Share

Signal strength

Excellent

Security

None

Network usage

Detect automatically

Privacy

Use randomized MAC (default)

Auto-connect

Allow connection to this network when in range

Solution: Restart the device, re-plug the power.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and 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: Any 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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement

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

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ISED Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body. Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de **20cm** de distance entre la source de rayonnement et votre corps.

The transmitter module may not be co-located with any other transmitter or antenna.
Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.