VT-MOB-AH-EVB

Wi-Fi HaLow Evaluation Board
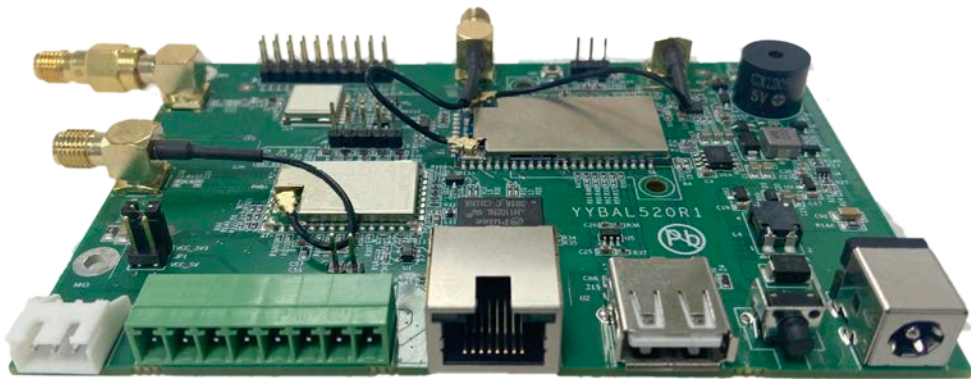
User Manual

Version: 1.3

Revision History:

No.	Version	Description	Date
1	V1.0	First release	Dec. 21, 2023
2	V1.1	Added steps for modifying MQTT configuration file of the EVB	Jan. 20, 2024
3	V1.2	Updated the description on MQTT messaging	Jan. 22, 2024
4	V1.3	Differentiated the two options of VantronOS login for HAP 101 in 2.1	Jan. 31, 2024

Table of Contents

Foreword

Thank you for purchasing the VT-MOB-AH Wi-Fi HaLow Module Evaluation Board ("the EVB"). This manual intends to provide instructions on setting up and operating the EVB to facilitate the use of VT-MOB-AH Wi-Fi HaLow Module and reduce the time-to-market of customer products that integrate the module. Please read this manual and make sure you understand the basics of the Wi-Fi HaLow technology before putting the EVB into use.

Intended Users

This manual is intended for:

- Embedded system engineers

- Developers

- Technical support engineers

- Other users

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Disclaimer

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It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, mobe specifications of the product may be changed without notice.

Technical Support and Assistance

Should you have any question about the EVB that is not covered in this manual, contact your sales representative for solution. Please contain the following information in your question:

- Product name and PO number;

- Complete description of the problem;

- Error message you received, if any.

Vantron Technology, Inc.

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Email: sales@vantrontech.com

Regulatory Information

VT-MOB-AH is designed to comply with:

- FCC

- CE

- IC

Please refer to the Appendix for Regulatory Compliance Statement.

Symbology

This manual uses the following signs to prompt users to pay special attention to relevant information.

⚠	Caution for latent damage to system or harm to personnel
▷	Attention to important information or regulations

General Safety Instructions

The EVB is supposed be installed by knowledgeable, skilled persons familiar with local and/or international electrical codes and regulations. For your safety and prevention of damage to the EVB and other equipment connected to it, please read and observe carefully the following safety instructions prior to installation and operation. Keep this manual well for future reference.

- Do not disassemble or otherwise modify the EVB. Such action may cause heat generation, ignition, electronic shock, or other damages including human injury, and may void your warranty.

- Keep the EVB away from heat source, such as heater, heat dissipater, or engine casing.

- Do not insert foreign materials into any opening of the EVB as it may cause the EVB to malfunction or burn out.

- To ensure proper functioning and prevent overheating of the EVB, do not cover or block the ventilation holes of the EVB.

- Follow the installation instructions with the installation tools provided or recommended.

- The use or placement of the operation tools shall comply with the code of practice of such tools to avoid short circuit of the EVB.

- Cut off the power before inspection of the EVB to avoid human injury or product damage.

Precautions for Power Cables and Accessories

⚠ Use proper power source only. Make sure the supply voltage falls within the specified range.

⚠ Place the cables properly at places without extrusion hazards.

⚠ Use only approved antenna(s). Non-approved antenna(s) may produce spurious or excessive RF transmitting power which may violate FCC limits.

⚠ Cleaning instructions:

- Power off before cleaning the EVB

- Do not use spray detergent

- Clean with a damp cloth

- Do not try to clean exposed electronic components unless with a dust collector

⚠ Power off and contact Vantron technical support engineer in case of the following faults:

- The EVB is damaged

- The temperature is excessively high

- Fault is still not solved after troubleshooting according to this manual

⚠ Do not use in combustible and explosive environment:

- Keep away from combustible and explosive environment

- Keep away from all energized circuits

- Unauthorized removal of the enclosure from the device is not allowed

- Do not replace components unless the power cable is unplugged

- In mobe cases, the device may still have residual voltage even if the power cable is unplugged. Therefore, it is a must to remove and fully discharge the device before replacement of the components.

CHAPTER 1 INTRODUCTION

1.1   Product Overview

The VT-MOB-AH-EVB evaluation board is intended for programmers or developers who seek to reduce the time-to-market of their embedded products designed based on Vantron VT-MOB-AH Wi-Fi HaLow system-on-module.

VT-MOB-AH-EVB features a VT-MOB-AH Wi-Fi HaLow module soldered on a carrier board, providing an enhanced platform for better showcasing the performance and capabilities of the VT-MOB-AH Wi-Fi HaLow module, and allowing for the developers to explore its integration into different applications.

The EVB delivers optimal performance with data rates up to 150 Mbps (2.4GHz Wi-Fi) and 32.5 Mbps (Wi-Fi HaLow), respectively. With the Wi-Fi HaLow standard supported, it operates between 850MHz and 950MHz bands and supports 1/2/4/8MHz channel width to provide extended transmission range and faster data rate.

The EVB runs OpenWRT system, and offers a USB Type-A that supports OTG host mode to receive data from USB devices and serial ports (RS232 and RS485) for data transmission.

1.2   Product Features

- Single-stream data rate up to 32.5 Mbps @8MHz or 15 Mbps

  @4MHz channel bandwidth

- Support worldwide Sub-1 GHz frequency bands

  Frequency range: 850MHz~950 MHz

  Channel bandwidth options: 1/2/4/8 MHz

  Support 1 MHz and 2 MHz duplicate modes

- Packet detection & channel equalization

- BPSK & QPSK, 16-QAM & 64-QAM Modulation

- OpenWRT system, complete Wi-Fi HaLow solution

- AP and STA modes supported

- Easy integration to any embedded device

- I^2C, UART, GPIO for flexible expansion

- Ultra-low-power, reduced cost & time-to-market

1.3   Product Layout
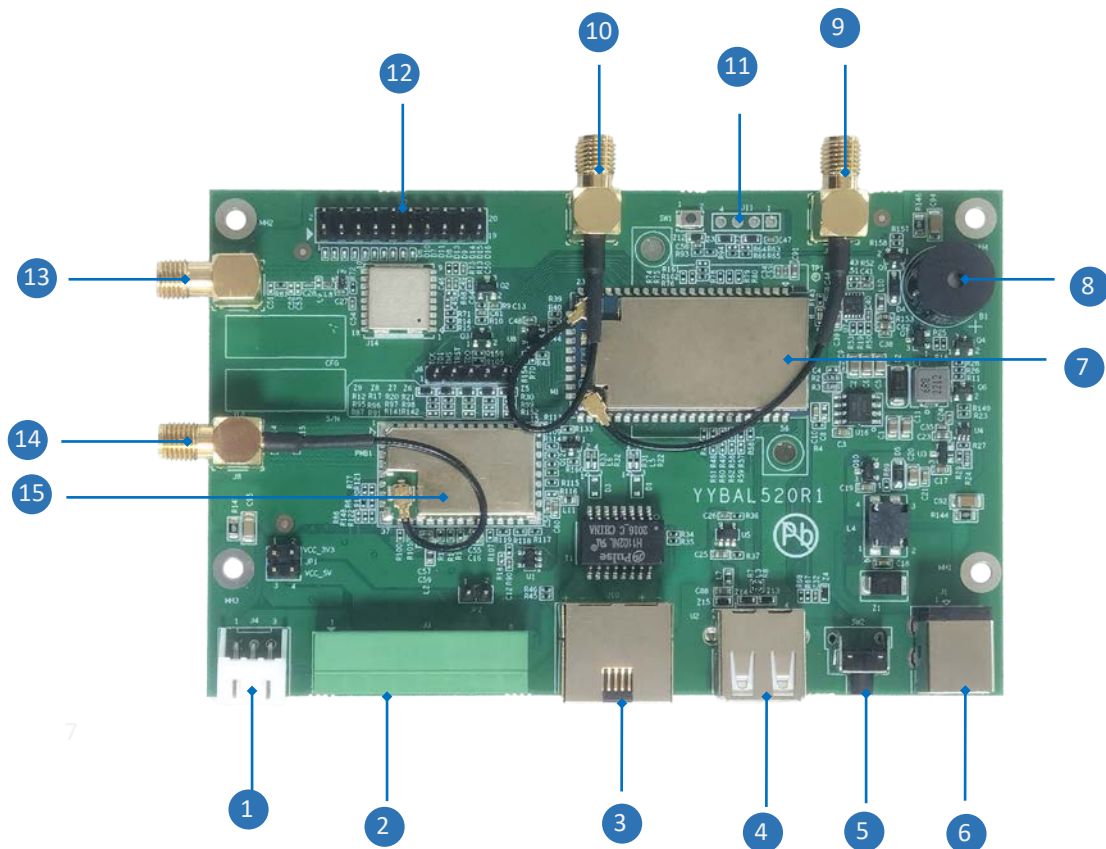
Please refer to the next page for the description of above I/Os.

I/O description:

| No.	Name	Description
1	I^{2}C	Allows for serial communication between the evaluation board and peripherals, like sensors or other integrated circuits
2	RS232 & RS485	Enables serial communication between the evaluation board and the access point for data transfer (115200, 8N1)
3	Ethernet jack	1Operates in the LAN area by default (default Ethernet IP address: 172.18.1.1)
4	USB 2.0 Type-A	OTG Host mode supported
5	Reset button	Restarts the board upon a short press (< 1 second) Factory resets the settings upon a long press (> 5 seconds)
6	Power jack	Powers up the board via a 12V DC power adapter
7	VT-MOB-AH	VT-SOM-AH Wi-Fi HaLow module
8	Buzzer	/
9	2.4GHz Wi-Fi antenna connector	For connecting primary 2.4GHz Wi-Fi antenna
10	2.4GHz Wi-Fi antenna connector	For connecting secondary 2.4GHz Wi-Fi antenna
11	Debug UART	For connecting a host PC to debug the board (115200, 8N1)
12	GPIO	Inputs and outputs for user expansion
13	GPS antenna connector	For connecting a GPS antenna to use the GPS function
14	Wi-Fi HaLow SMA connector	For connecting a Wi-Fi HaLow antenna to enhance the signal strength
15	MCU	

1.4 Outlines
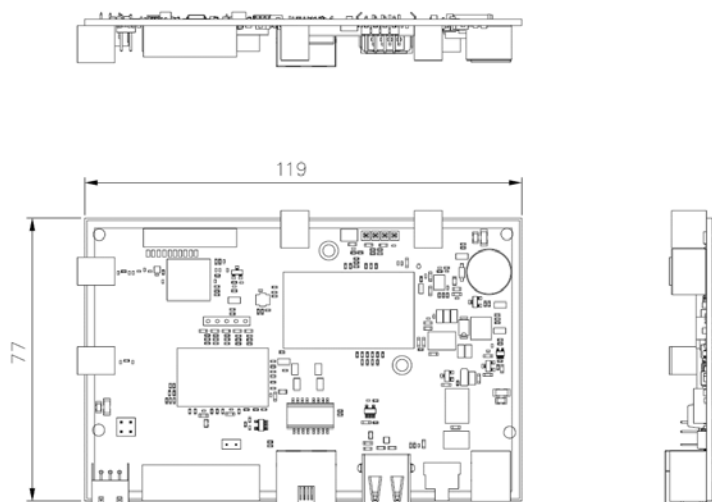
1.5   Specifications

VT-MOB-AH-EVB			
Wi-Fi HaLow Chip	Morse Micro MM6108		
SoC	MT7628 (128MB DDR3 +32MB Flash)		
RF	GNSS	GPS, Beidou	
I/Os	Ethernet	1 x RJ45, 100Mbps	
	USB	1 X USB Type-A (OTG host mode)	
	GPIO	10 x GPIO	
	Serial port	1 x RS232, max. 120kbps (baud rate: 115200, 8N1)	
		1 x RS485, max. 500kbps (baud rate: 115200, 8N1)	
	Debug	1 x Debug UART	
	Expansion	1 x I^{2}C	
	Antenna	1 x GNSS antenna connector	
		1 x Wi-Fi HaLow antenna connector	
		2 x 2.4GHz Wi-Fi antenna connector	
WLAN Features	2.4 GHz Wi-Fi	Standard: IEE 802.11 b/g/n	
		Channel bandwidth: 20/40 MHz	
		Data rate: up to 150 Mbps	
	Wi-Fi HaLow	Standard: IEEE 802. 11ah	
		Frequency: 850MHz ~ 950MHz	
		Channel bandwidth: 1 / 2 / 4 /8 MHz	
		Data rate: up to 32.5 Mbps @8MHz or 15 Mbps @4MHz	
		Working mode: AP, STA configurable	
Software	Operating system	OpenWRT	
System Control	Button	1 x Reset button (short press to reboot)	
	LED indicator	1 x Power indicator	
	Buzzer	1 x Buzzer (5V)	
Mechanical	Dimensions	119mm x 77mm	
Power	Input	12V DC	
		1 x DC jack (Over-current protection, reverse polarity protection)	
Environment Condition	Temperature	Operating: -20℃~+60℃	Storage: -40℃~+85℃
	Humidity	5%~95%RH (Non-condensing)	

1.6　Unpacking

The EVB has been carefully packed with special attention to quality. However, should you find any component damaged or missing, please contact your sales representative in due time.

The EVB contains the following:

- A VT-MOB-AH module soldered on a carrier board

- A 12V/1A DC power adapter

Actual accessories might vary slightly from the list above as the customer order might be different from the standard configuration options.

*The VT-MOB-AH-EVB supports both Wi-Fi HaLow AP and STA modes. When it operates in the **station** mode, it is designed to be used in combination with a Wi-Fi HaLow access point. We recommend that you use Vantron HAP 101/HAP 103 Wi-Fi HaLow AP for that purpose. Please refer to Appendix A for the specifications of HAP 101.*

1.7　Power Characteristics

VT-MOB-AH-EVB is designed to work with 9V ~ 12V DC power input. It is recommended that a 12V/1A power adapter be used.

CHAPTER 2 QUICK START

The VT-MOB-AH-EVB evaluation board supports both **Wi-Fi HaLow AP and STA modes**. When it operates in the station mode, it is recommended you use Vantron HAP 101/HAP 103, which supports both 2.4GHz Wi-Fi and Wi-Fi HaLow standards, as the access point.

This chapter uses HAP 101 to demonstrate how to connect VT-MOB-AH-EVB (STA mode) to the access point using Wi-Fi HaLow technology.

2.1 Access Point Setup

HAP 101 runs on VantronOS system which is accessible from a host computer via two methods, depending on how the host computer is connected to the Internet.

Option 1— 2.4GHz Wi-Fi connection: Use the wireless IP of the device as the login address.

Option 2— Ethernet connection: Use the WAN port IP of the device as the login address.

It is important to note that when logging in to VantronOS for HAP 101, the IP address of the host computer must be on the same network as HAP 101.

Since the Ethernet jack of HAP 101 operates in the WAN area by default, the WAN port IP address of the device cannot be determined without removing the upper cover to debug the device using the debug UART.

Therefore, regardless of the option you choose, you need to identify the wireless IP of the device and log in to VantronOS first.
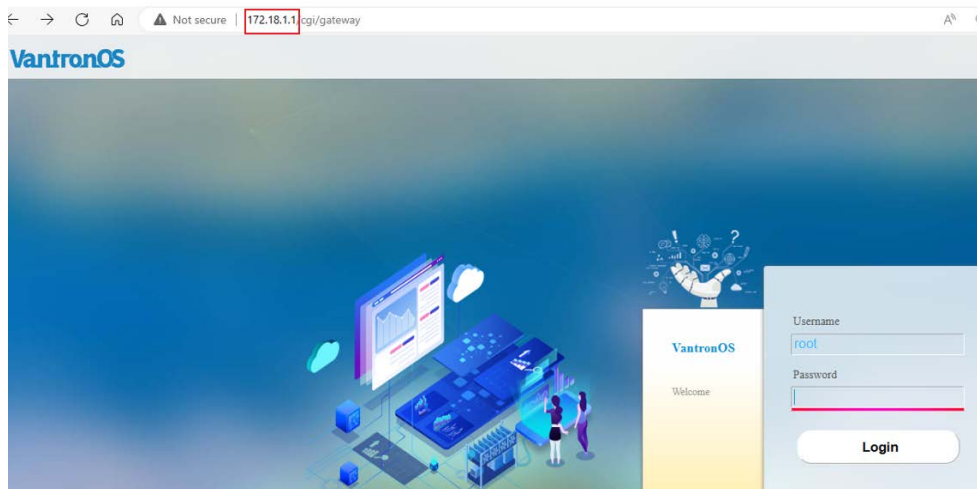
VantronOS login via Option 1

1. Power on the device and the 2.4GHz Wi-Fi will be turned on by default;

2. Connect the host computer to HAP 101 via 2.4GHz Wi-Fi using the SSID and password provided on the device label;

3. Check the details of the wireless connection on the host computer and identify the gateway IP of the wireless connection;
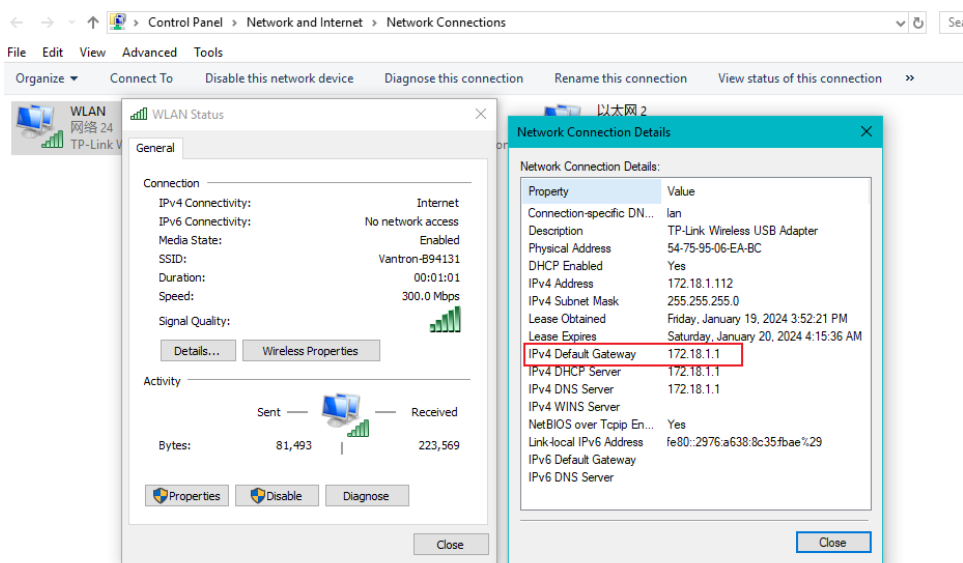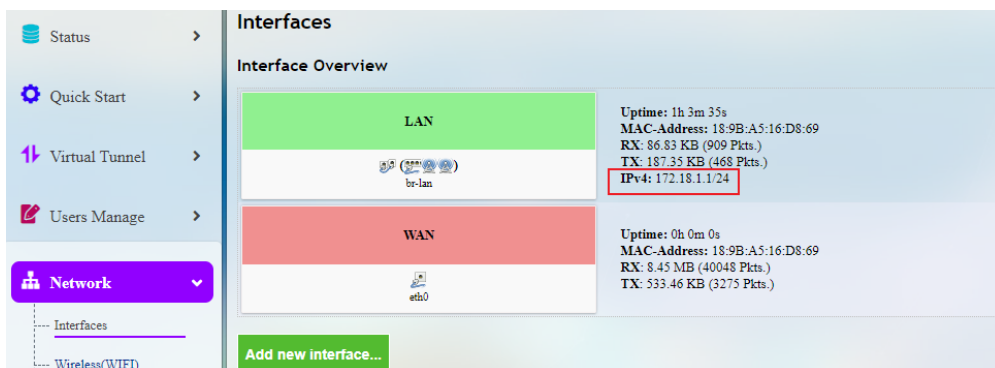
4. Log in VantronOS for HAP 101 using the gateway IP identified in prior step;

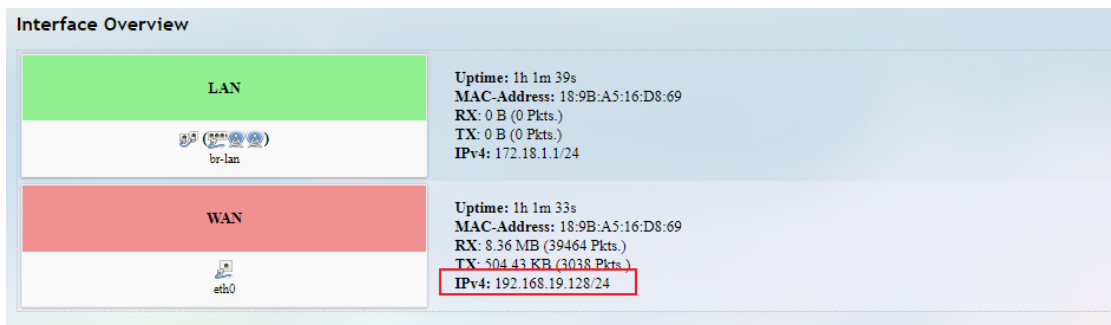   username: root

    password: rootpassword

5. Navigate to **Network > Interfaces** to check the interface information of the device (the virtual LAN port IP is the current login address of VantronOS for HAP 101).

VantronOS login via option 2

1. Connect the host computer to a router/switch using an Ethernet cable;

2. Connect HAP 101 to the same router/switch using an Ethernet cable;

3. Connect the host computer to the 2.4GHz Wi-Fi of HAP 101 using the SSID and default password provided on the device label;

4. Log in to VantronOS via the steps in option 2;

5. Navigate to **Network > Interfaces** to identify the WAN port address of HAP 101;

6. Log in to VantronOS for HAP 101 using the WAN port IP identified in the prior step.

   username: root   //   password: rootpassword
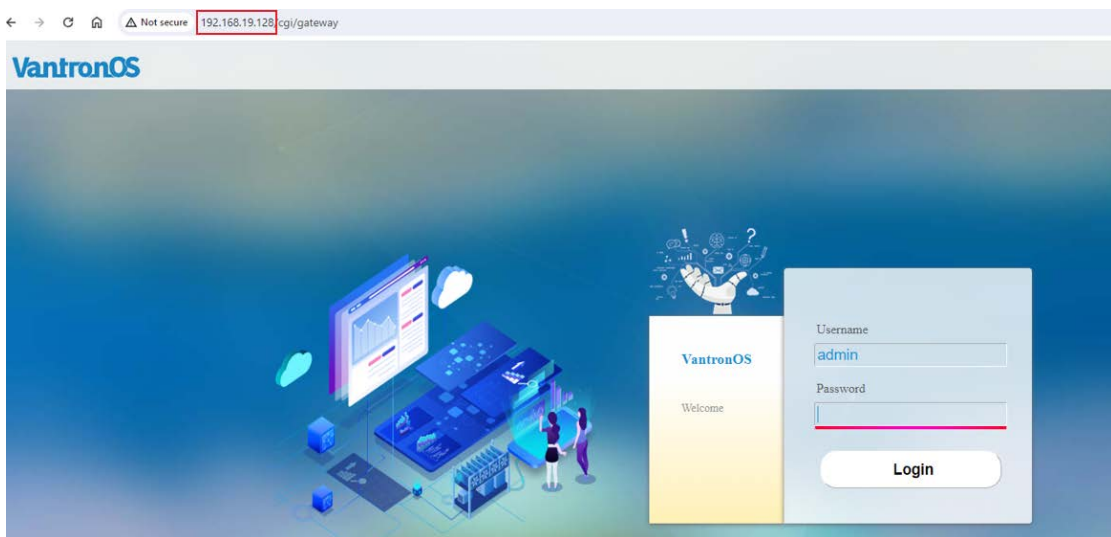
After logging in to VantronOS, you can proceed with the configurations.

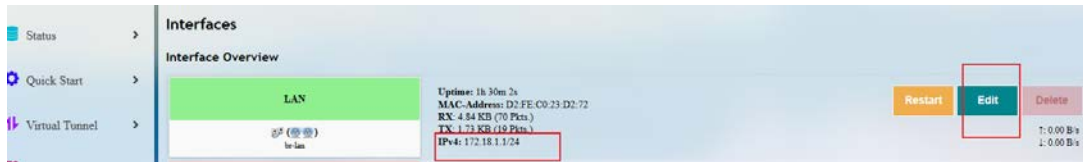Since the virtual LAN port IP (172.18.1.1) of HAP 101 coincides with the default Ethernet IP address of VT-MOB-AH-EVB, you are advised to modify this IP to another one (e.g., 172.18.2.1) and the modified IP address will be the default host for the MQTT messaging.

1. Click the **Edit** button behind the LAN port;

2. Assign a new LAN port IP (e.g., 172.18.2.1) to HAP 101 and save the changes;
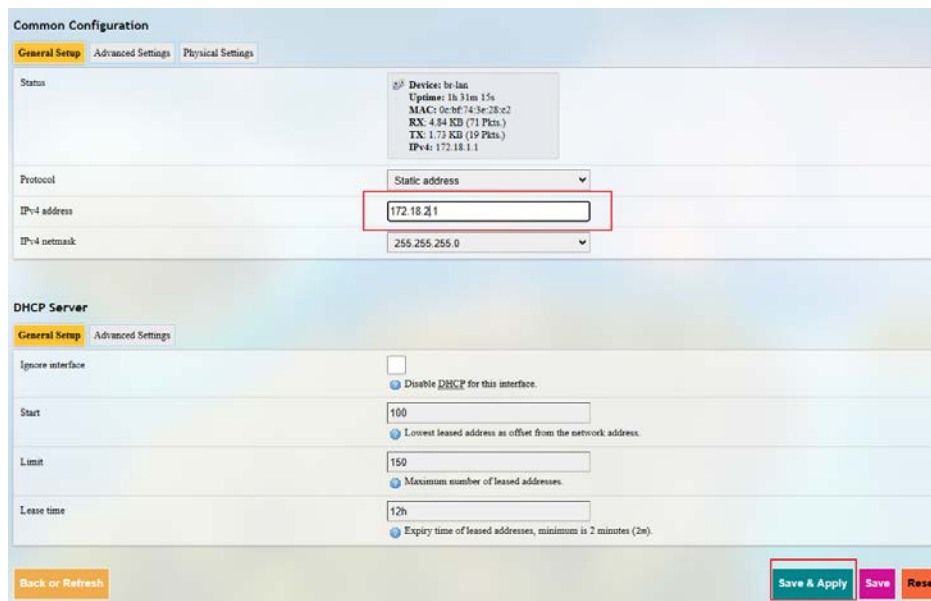
3. Navigate to **Network > HaLow Wi-Fi;**

4. Set the Wi-Fi mode to AP and configure the SSID, encryption, and password under the **General Setting** tab, then click the **Save & Apply** button;

5. You can then proceed to configure the device under the **Advanced Setting** tab.

Note: US is the default country code.

2.2 Host Computer Setup

The Ethernet IP of the VT-MOB-AH-EVB evaluation board is set to 172.18.1.1 by default, which is used as the login address of the web interface for the evaluation board.

Since the Ethernet jack of VT-MOB-AH-EVB works in the **LAN** area with DHCP server enabled by default, users can login to the web interface directly with its Ethernet IP when connecting VT-MOB-AH-EVB to a host computer using an Ethernet cable.

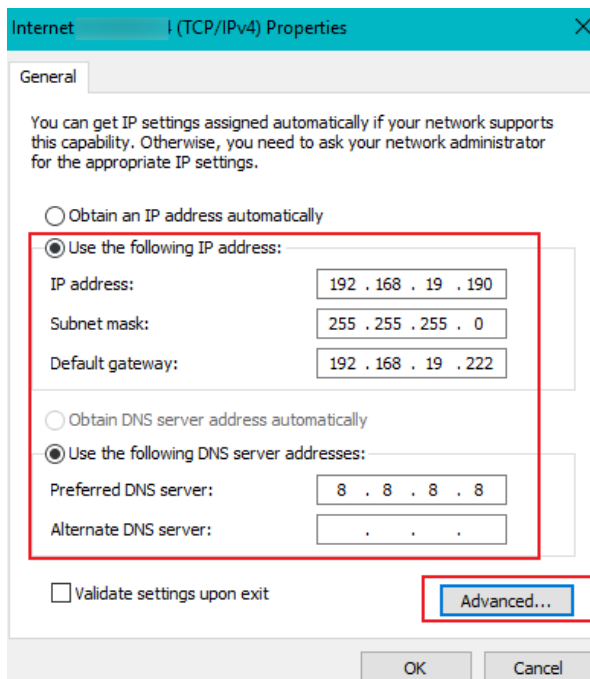*Note: The IP address of the host computer shall be on the same network.*

Properties

Link-local IPv6 address:	fe80::b004:8214:819f:7ab%8
IPv4 address:	172.18.1.174
IPv4 DNS servers:	172.18.1.1

Physical address (MAC):   18-C0-4D-43-AD-6B

Copy
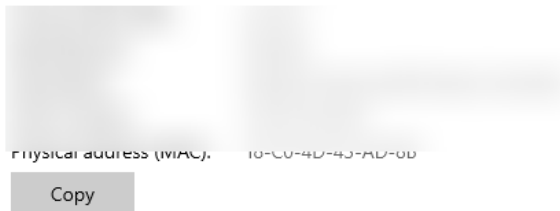
To make future operations easier, it is recommended that you connect VT-MOB-AH-EVB, HAP 101, and the host computer separately to a router/switch using Ethernet cables and assign two static IP addresses to the host computer so that you can login the web interfaces of VT-MOB-AH-EVB and HAP 101 simultaneously on the host computer.

1. Access the Ethernet adapter options and open the properties of Internet IPv4;

2. Assign a static IP address to the host computer within the same network as HAP 101;

Internet   I (TCP/IPv4) Properties   ✕

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically
◉ Use the following IP address:

IP address:	192 . 168 . 19 . 190
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	192 . 168 . 19 . 222

○ Obtain DNS server address automatically
◉ Use the following DNS server addresses:

Preferred DNS server:	8 . 8 . 8 . 8
Alternate DNS server:	. . .

☐ Validate settings upon exit   Advanced...

OK   Cancel

3. Then click the **Advanced** button in the **Properties** window;

4. Click **Add** in the new window and input an IP address within the same network as VT-MOB-AH-EVB;
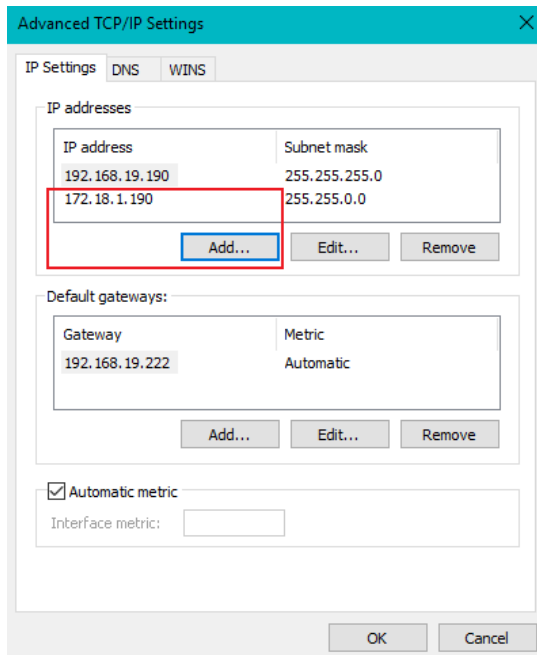
5. Click **OK** one by one to close the windows;

6. Now you can proceed to log in to the web portals of VT-MOB-AH-EVB and HAP 101 separately on the host computer.

Note: You don't necessarily need assign two static IP addresses to the host computer as long as you make sure the IP address of the host computer is within the same network as VT-MOB-AH-EVB or HAP 101 when logging in to the web portal of the specific device.

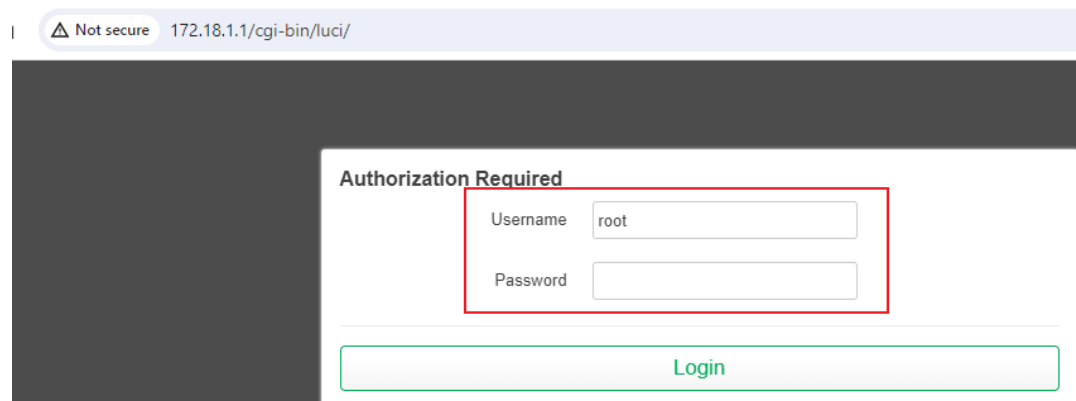## 2.3   EVB Setup to Connect to a Wi-Fi HaLow AP

This section introduces how to connect the station-mode VT-MOB-AH-EVB to HAP 101 using Wi-Fi HaLow technology.

1. Login the web interface of VT-MOB-AH-EVB with the default Ethernet IP address of the board;

    Address: http://172.18.1.1/
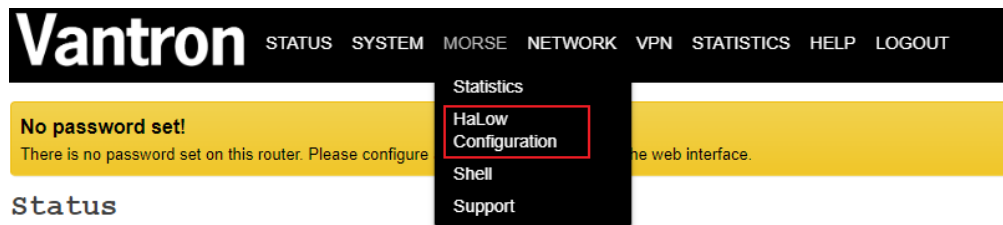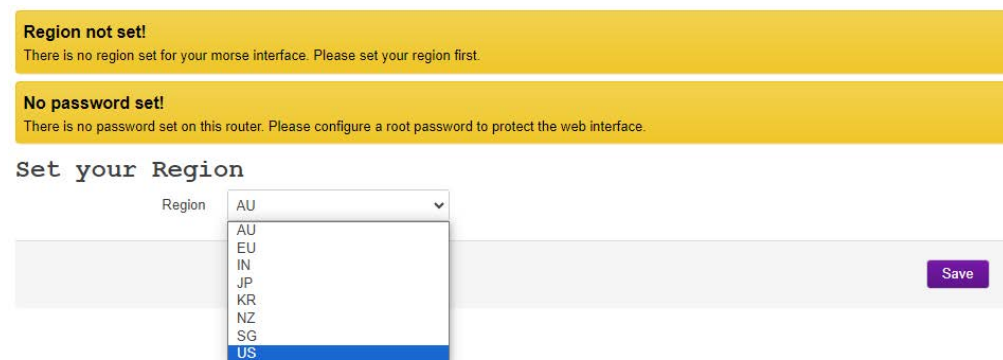
    Username: root

    No password needed

2. Navigated to **MORSE > HaLow Configuration**;

3. Before you are redirected to HaLow settings, you will need to set the region for the board, which shall coincide with that of HAP 101 (US);

4. Click on the **Station** tab and scan for the available SSIDs;

5. Select the SSID of HAP 101 you set in 2.1 or manually input an SSID in the box;

6. Select an encryption method same as that of HAP 101 and input the password;

7. In the Traffic Management section, if you enable "Bridge", the LAN and Wi-Fi HaLow interfaces are combined and the traffic is routed between the interfaces. You can leave the settings unchanged;

8. Keep the other settings as they are;

9. Click the **SAVE** button to save above settings and allow them to take effect;

10. The connection status of VT-MOB-AH-EVB will change to STA in a few seconds.

Note: If you connect VT-MOB-AH-EVB and the host computer separately to a switch/router, you'd better follow the steps in 2.2 to assign a static IP address to the host computer and disable the DHCP server to avoid any interference with other devices using the same Ethernet network.

1. Navigate to **NETWORK > Interfaces > privlan**, and click the **Edit** button behind the interface;

2. Navigate to DHCP Server > General Setup;

3. Click **Ignore interface** and save the settings to disable DHCP server.

2.4   EVB Used as an Access Point

VT-MOB-AH-EVB may also function as an access point to allow other stations to connect.

1. Connect VT-MOB-AH-EVB to a host computer and make the host computer is on the same network as VT-MOB-AH-EVB (refer to 2.2);

2. Login the web interface of VT-MOB-AH-EVB with the default Ethernet IP address of the board;

    Address: http://172.18.1.1/

    Username: root

    No password needed
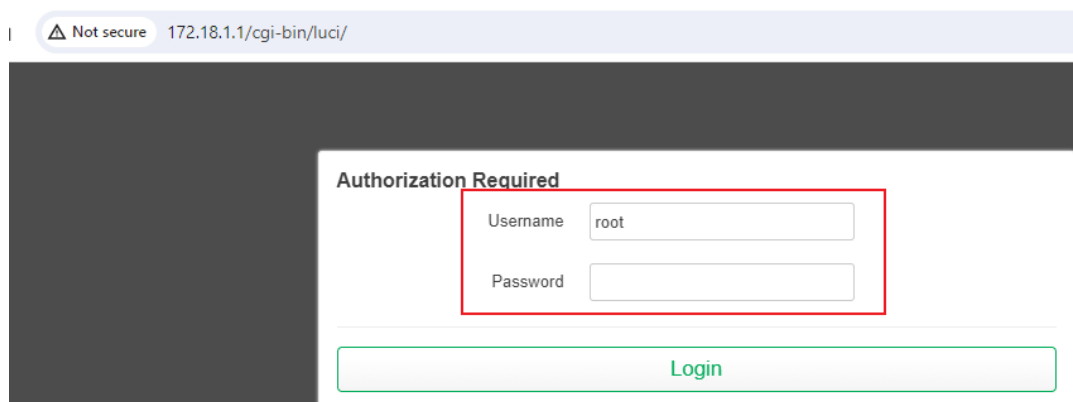
3. Navigated to **MORSE > HaLow Configuration**;
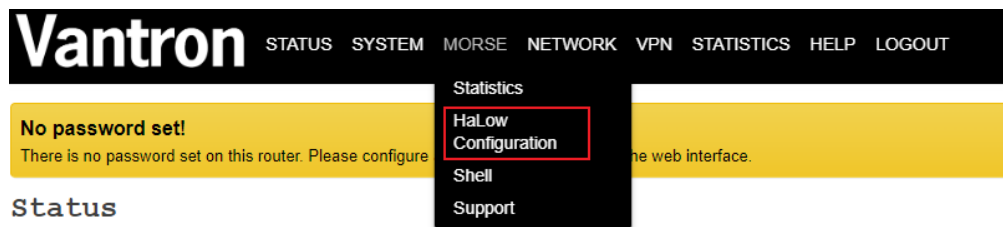
4. Before you are redirected to HaLow settings, you will need to set the region for the board, which shall coincide with that of HAP 101 (US);
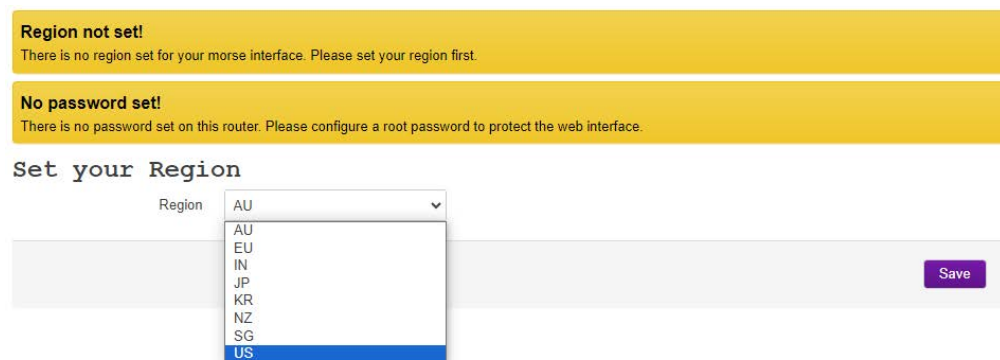
5. Click on the **Access Point** tab and set the SSID, encryption, and password for VT-MOB-AH-EVB;

6. In the Traffic Management section, if you enable "Bridge", the LAN and Wi-Fi HaLow interfaces are combined and the traffic is routed between the interfaces. You can leave the settings unchanged;

7. Keep the other settings as they are;

8. Click the **SAVE** button to save above settings and allow them to take effect;

9. Use a Wi-Fi HaLow device to test if the network is accessible.

Section 3.1 provides a process demo for data communication between the EVB and the access point, with data input from the Micro USB port.

CHAPTER 3 DATA COMMUNICATION DEMO

This chapter is going to use VT-MOB-AH-EVB, HAP 101 and an RFID reader (RD905U) to demonstrate the flow of data communication between the devices.

Here is a simplified topology where VT-MOB-AH-EVB is in the station mode and HAP 101 is the access point for the Wi-Fi HaLow connection.
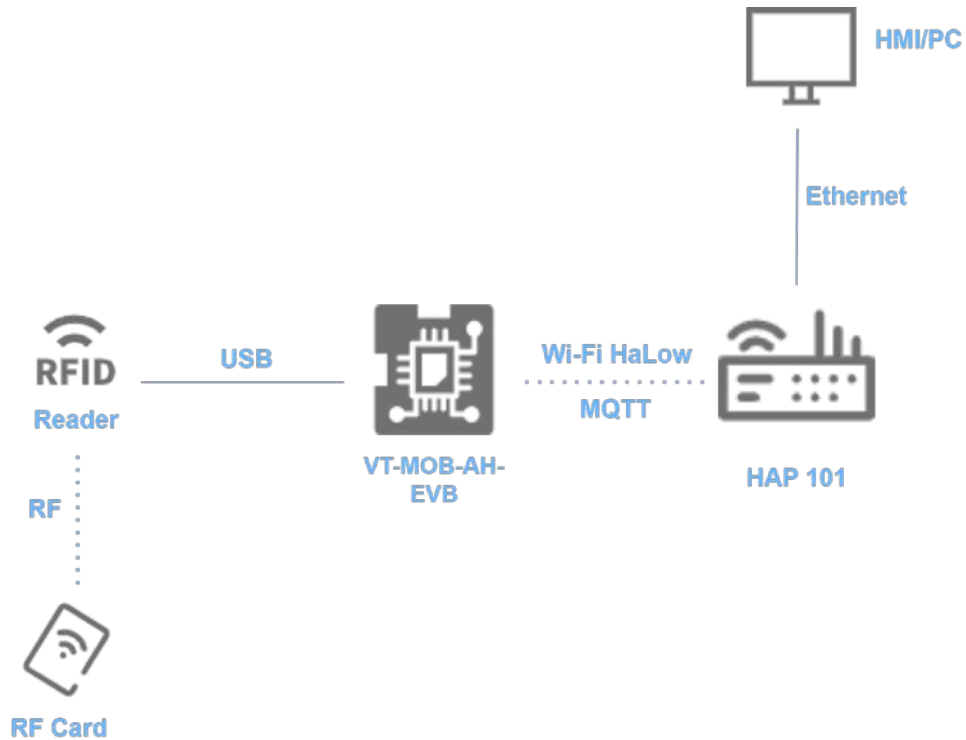
Before getting started, please follow the steps in 2.1 Access point Setup, 2.2 Host Computer Setup, and 2.3 EVB Setup to Connect a Wi-Fi HaLow AP to configure the devices.

Commands for MQTT message subscription and publishing:

Topic	Description
mosquitto_sub -h 172.18.2.1 -t /vantron/list	MQTT message subscription
	-h is followed by the MQTT host (HAP 101) to connect to, -t is followed by the MQTT topic to be subscribed
mosquitto_pub -h 172.18.2.1 -t /vantron/list -m 'xxx'	MQTT message publishing
	-h is followed by the MQTT host (HAP 101) to connect to, -t is followed by the MQTT topic to be published, -m is followed by the specific message to send

3.1   USB Data from EVB to AP

3.1.1   Modifying the MQTT configuration file of VT-MOB-AH-EVB

1. Follow the steps in 2.1, 2.2, and 2.3 to set the devices and connect VT-MOB-AH-EVB to HAP 101;

2. Connect the RD905U RFID reader to VT-MOB-AH-EVB using a mini-USB-to-Type-A cable;

3. Navigate to **MORESE > Shell** in the web portal of VT-MOB-AH-EVB;
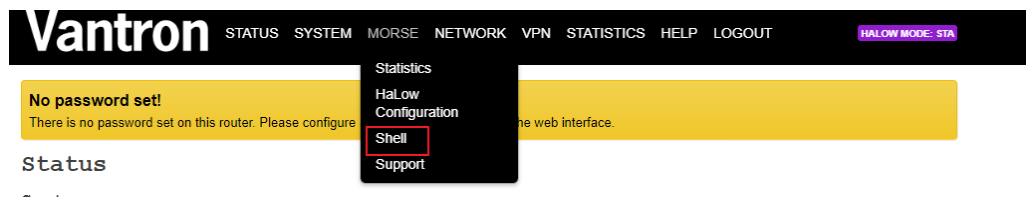
4. Login the shell of VT-MOB-AH-EVB with "root" as the user (no password);
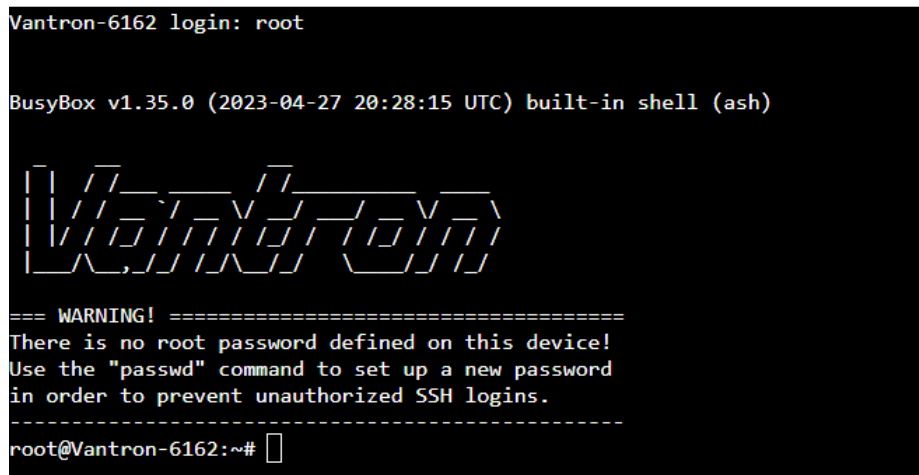
5. The default MQTT host in the configuration file of VT-MOB-AH-EVB is set to 172.18.1.1, and it shall be modified to the virtual LAN port IP address of HAP 101 (172.18.**2**.1 as modified in 2.1);

6. Access the directory of "rfid_tool" to modify this IP;

```
# cd /etc/config

/etc/config# vi rfid_tool
```

```
config rfid
    option event_path '/dev/input/event0'
    option topic '/vantron/list'
    option host '172.18.2.1'

~
~
~
```

7. Save the settings and exit;

8. Restart the "rfid_tool" file and check the file content.

```
/etc/config# /etc/init.d/rfid_tool restart

/etc/config# cat rfid_tool
```

```
root@Vantron-6162:/etc/config# /etc/init.d/rfid_tool restart
root@Vantron-6162:/etc/config# cat rfid_tool
config rfid
    option event_path '/dev/input/event0'
    option topic '/vantron/list'
    option host '172.18.2.1'

root@Vantron-6162:/etc/config#
```

Note: The "rfid_tool" file contains the MQTT topic (/vantron/list) published by VT-MOB-AH-EVB.

3.1.2   Subscribing MQTT messages on HAP 101

1. Use the wireless IP or WAN port IP of HAP 101 to log in VantronOS for HAP 101;

    Username / Password: root / rootpassword

2. Navigate to **System > Terminal**;

3. Select the **enable** option from the drop-down list and click **Save & Apply** to enable
    the terminal feature;
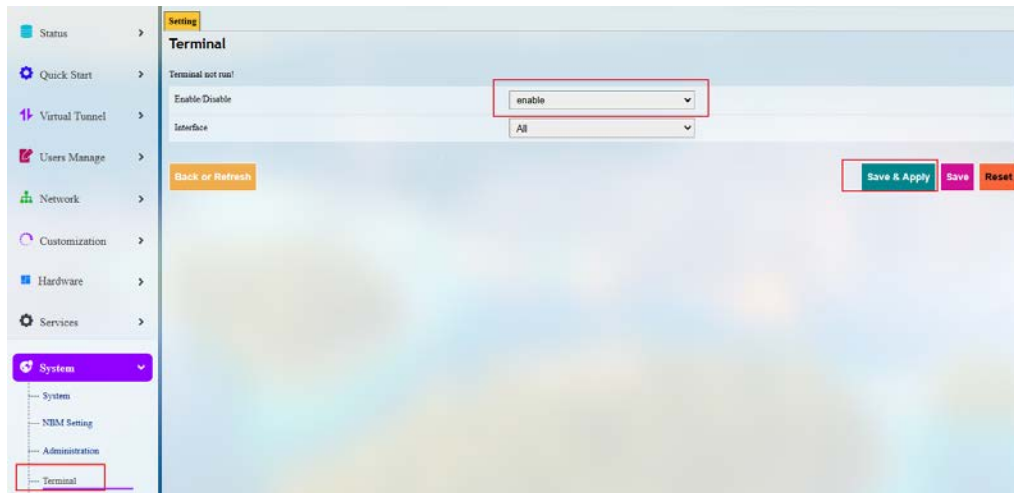
4. Click the **Terminal** tab next to the **Setting** tab, and login the shell of HAP 101 with
    above username and password;
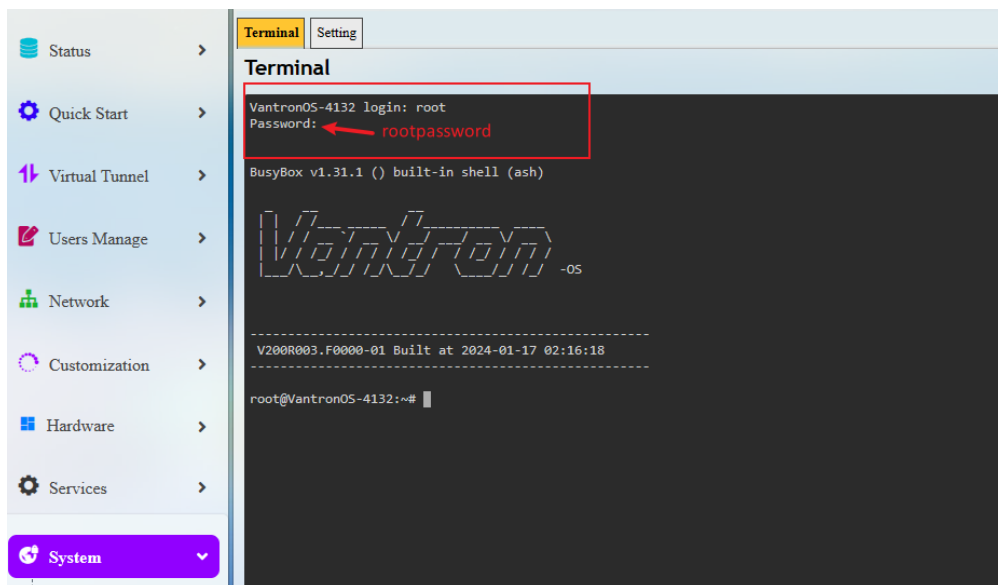
5. Access the "rfid" directory;

```
#cd /mnt/USER_SPACE/rfid
```

6. Subscribe MQTT messages sent from VT-MOB-AH-EVB with the topic of "/vantron/list";

```
# mosquitto_sub -h 172.18.2.1 -t /vantron/list
```

7. Swipe the card near the RFID reader to check the data printed on the terminal.

```
root@VantronOS-4132:/# cd /mnt/USER_SPACE/rfid
root@VantronOS-4132:/mnt/USER_SPACE/rfid# mosquitto_sub -h 172.18.2.1 -t /vantron/list


E28068940000502C3B623973

E28068940000502C3B623973

E28068940000502C3B623973

E28068940000502C3B623973

E28068940000502C3B623973
```

3.2 Serial Communication (Message Publishing from EVB)

There is an RS232 and an RS485 ports on VT-MOB-AH-EVB.

Parameters of RS232 & RS485 ports:

Baud rate	Data bit	Polarity	Stop bit
115200	8	None	1
Device name (RS232)	/dev/ttyS0	Device name (RS485)	/dev/ttyS1

Pinout description of RS232 & RS485 ports:

1. Follow the steps in 2.1, 2.2 and 2.3 to connect VT-MOB-AH-EVB to HAP 101;

2. Use a USB-to-serial adapter to connect the RS232/RS485 port to the host computer;

    For RS232 connection: TXD-RXD, RXD-TXD, GND-GND

    For RS485 connection: A-A, B-B, GND-GND

3. Make sure the MQTT configuration file of VT-MOB-AH-EVB is modified as set out in 3.1.1;

4. Navigate to **System > Terminal** in the web portal of HAP 101 and log in the shell of HAP 101 as described in 3.1.2;

5. Access the "rfid" directory;

    #cd /mnt/USER_SPACE/rfid

6. Subscribe MQTT messages sent from VT-MOB-AH-EVB with the topic of "/vantron/list";

    # mosquitto_sub -h 172.18.2.1 -t /vantron/list

    ```
    root@VantronOS-4132:/# cd /mnt/USER_SPACE/rfid
    root@VantronOS-4132:/mnt/USER_SPACE/rfid# mosquitto_sub -h 172.18.2.1 -t /vantron/list
    ```

7. Navigate to **MORESE > Shell** in the web portal of VT-MOB-AH-EVB;

8. Login the shell of VT-MOB-AH-EVB with "root" as the user (no password);
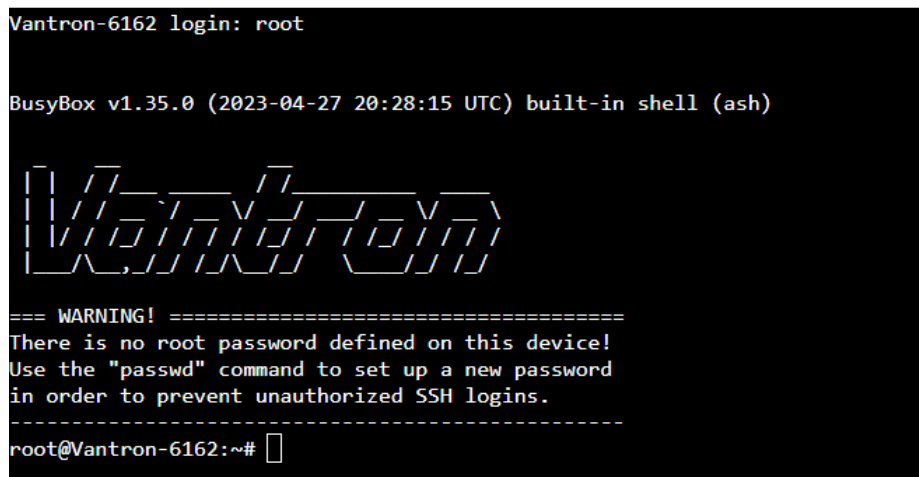
9. Publish an MQTT message from VT-MOB-AH-EVB to HAP 101 with the topic of "/vantron/list";

```
# mosquitto_pub -h 172.18.2.1 -t /vantron/list -m 'vantrontech'
```
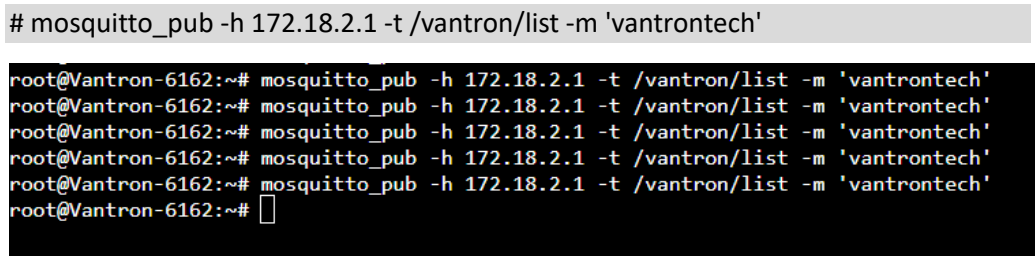

10. Check the data subscribed by HAP 101 in VantronOS.
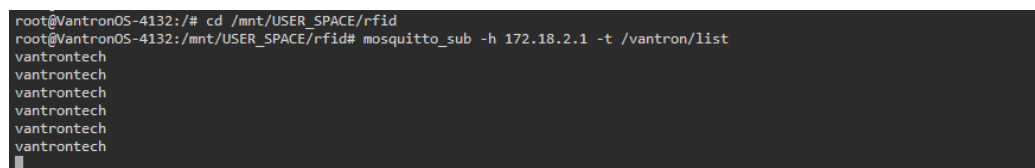
3.3   Message Publishing from AP

There is an RS232 and an RS485 ports on VT-MOB-AH-EVB.

Parameters of RS232 & RS485 ports:

Baud rate	Data bit	Polarity	Stop bit
115200	8	None	1
Device name (RS232)	/dev/ttyS0	Device name (RS485)	/dev/ttyS1

Pinout description of RS232 & RS485 ports:

1. Follow the steps in 2.1, 2.2 and 2.3 to connect VT-MOB-AH-EVB to HAP 101;

2. Use a USB-to-serial adapter to connect the RS232/RS485 port to the host computer;

    For RS232 connection: TXD-RXD, RXD-TXD, GND-GND

    For RS485 connection: A-A, B-B, GND-GND

3. Make sure the MQTT configuration file of VT-MOB-AH-EVB is modified as set out in 3.1.1;

4. Navigate to **MORESE > Shell** in the web portal of VT-MOB-AH-EVB;

5. Login the shell of VT-MOB-AH-EVB with "root" as the user (no password);

```
Vantron-6162 login: root

BusyBox v1.35.0 (2023-04-27 20:28:15 UTC) built-in shell (ash)


=== WARNING! ===================================
There is no root password defined on this device!
Use the "passwd" command to set up a new password
in order to prevent unauthorized SSH logins.
-------------------------------------------------
root@Vantron-6162:~#
```

6. Subscribe MQTT messages sent from HAP 101 with the topic of "/vantron/list";

mosquitto_sub -h 172.18.2.1 -t /vantron/list

```
root@Vantron-6162:~#
root@Vantron-6162:~#
root@Vantron-6162:~# mosquitto_sub -h 172.18.2.1 -t /vantron/list
```

7. Navigate to **System > Terminal** in the web portal of HAP 101 and login the shell of HAP 101 as described in 3.1.2;
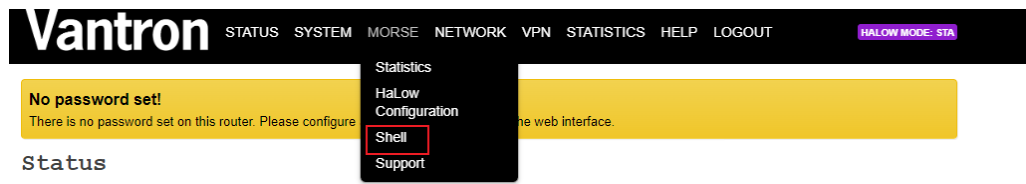
8. Publish MQTT messages to VT-MOB-AH-EVB with the topic of "/vantron/list";

mosquitto_pub -h 172.18.2.1 -t /vantron/list -m 'vantrontech'

```
root@VantronOS-4132:/#
root@VantronOS-4132:/# mosquitto_pub -h 172.18.2.1 -t /vantron/list -m 'vantrontech'
root@VantronOS-4132:/# mosquitto_pub -h 172.18.2.1 -t /vantron/list -m 'vantrontech'
root@VantronOS-4132:/# mosquitto_pub -h 172.18.2.1 -t /vantron/list -m 'vantrontech'
root@VantronOS-4132:/# mosquitto_pub -h 172.18.2.1 -t /vantron/list -m 'vantrontech'
root@VantronOS-4132:/#
```

9. Check the data subscribed by VT-MOB-AH-EVB in its web portal.

```
root@Vantron-6162:~# mosquitto_sub -h 172.18.2.1 -t /vantron/list
vantrontech
vantrontech
vantrontech
vantrontech
vantrontech
vantrontech
vantrontech
vantrontech
vantrontech
vantrontech
```

CHAPTER 4 HARDWARE DESCRIPTION

This chapter describes the hardware I/Os on VT-MOB-AH-EVB with respective pinout

description or specifications.

4.1 Power Jack

VT-MOB-AH-EVB is designed to work with 9V ~ 12V DC power input with power supplied via the power jack on the board. It is recommended that a 12V/1A power adapter be used.

4.2 I²C

There is an I2C connector on VT-MOB-AH-EVB for connecting peripherals to allow serial communication with external devices.
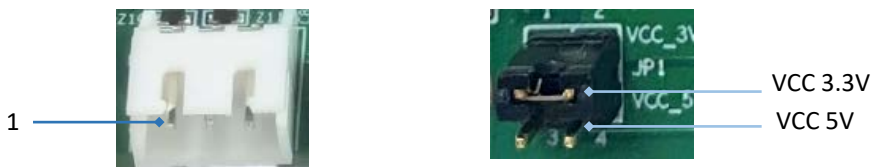
Pinout description:

Pin	Signal	Description
1	SCL	Serial data
2	SDA	Serial clock
3	GND	Ground

4.3 RS232 & RS485

VT-MOB-AH-EVB offers a non-isolated RS232 connector and a non-isolated RS485 connector for M2M serial communication.

Pinout description of the serial ports:

Pin	Signal	Device Name	Description
1	GND	/dev/ttyS0	Ground
2	RS232_TX		RS232 transmit signal
3	RS232_RX		RS232 receive signal
4	VCC_5V		5V power output (NC)
5	VCC_5V	/dev/ttyS1	5V power output (NC)
6	RS485_A		RS485 data A signal
7	RS485_B		RS485 data B signal
8	GND		Ground

4.4   Ethernet Jack

There is an RJ45 Ethernet jack on the evaluation board, working in the LAN area by default.

4.5   USB 2.0 Type-A

The USB 2.0 Type-A port operates in OTG Host mode. Devices such as RFID readers can be connected to this port for transferring the card swiping information to the board.

4.6   Reset Button

The reset button is designed to restart the board upon a short press (< 1 second). It will factory reset the settings upon a long press (> 5 seconds).

4.7   Debug UART (J11)

The board is debugged via this port when connected to a host computer.
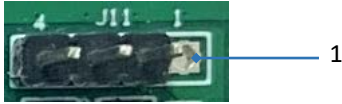
Pinout description:

Pin	Signal	Description
1	VCC_3.3V	3.3V power output (NC)
2	TX	Transmit signal
3	RX	Receive signal
4	GND	Ground

4.8   GPIO (J7)

The 20-pin GPIO header provides 4 GPIOs and other signals for connecting peripherals.
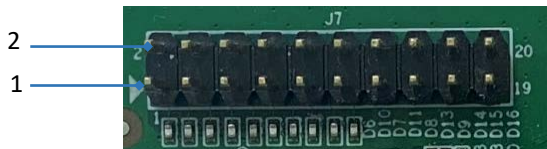
Pinout description:

Pin	Signal	Description
1	GPIO14	General purpose input and output 14
2	GPIO42	General purpose input and output 42
3	GPIO15	General purpose input and output 15
4	GPIO41	General purpose input and output 41
5	GPIO16	General purpose input and output 16
6	GPIO40	General purpose input and output 40

7	GPIO17	General purpose input and output 17
8	GPIO38	General purpose input and output 38
9	NC	
10	GPIO46	General purpose input and output 46
11	NC	
12	GPIO37	General purpose input and output 37
13	NC	
14	NC	
15	NC	
16	NC	
17	NC	
18	NC	
19	GND	Ground
20	GND	Ground

4.9   Antenna

There four antenna connectors on the EVB, designed for connecting a Wi-Fi HaLow antenna (J8), a GPS antenna (J9), and two 2.4GHz Wi-Fi antennas (J5, J13).

CHAPTER 5 DISPOSAL AND WARRANTY

5.1   Disposal

When the device comes to end of life, you are suggested to properly dispose of the device for the sake of the environment and safety.

Before you dispose of the device, please back up your data and erase it from the device.

It is recommended that the device is disassembled prior to disposal in conformity with local regulations. Please ensure that the abandoned batteries are disposed of according to local regulations on waste disposal. Do not throw batteries into fire or put in common waste canister as they are explosive. Products or product packages labeled with the sign of "explosive" should not be disposed of like household waste but delivered to specialized electrical & electronic waste recycling/disposal center.

Proper disposal of this sort of waste helps avoid harm and adverse effect upon surroundings and people's health. Please contact local organizations or recycling/disposal center for more recycling/disposal methods of related products.

5.2   Warranty

Product warranty

VANTRON warrants to its CUSTOMER that the Product manufactured by VANTRON, or its subcontractors will conform strictly to the mutually agreed specifications and be free from defects in workmanship and materials (except that which is furnished by the CUSTOMER) upon shipment from VANTRON. VANTRON's obligation under this warranty is limited to replacing or repairing at its option of the Product which shall, within **24 months** after shipment, effective from invoice date, be returned to VANTRON's factory with transportation fee paid by the CUSTOMER and which shall, after examination, be disclosed to VANTRON's reasonable satisfaction to be thus defective. VANTRON shall bear the transportation fee for the shipment of the Product to the CUSTOMER.

Out-of-Warranty Repair

VANTRON will furnish the repair services for the Product which are out-of-warranty at VANTRON's then-prevailing rates for such services. At customer's request, VANTRON will provide components to the CUSTOMER for non-warranty repair. VANTRON will provide this service as long as the components are available in the market; and the CUSTOMER is requested to place a purchase order up front. Parts repaired will have an extended warranty of 3 months.

Returned Products

Any Product found to be defective and covered under warranty pursuant to Clause above, shall be returned to VANTRON only upon the CUSTOMER's receipt of and with reference to a VANTRON supplied Returned Materials Authorization (RMA) number. VANTRON shall supply an RMA, when required within three (3) working days of request by the CUSTOMER. VANTRON shall submit a new invoice to the CUSTOMER upon shipping of the returned products to the CUSTOMER. Prior to the return of any products by the CUSTOMER due to rejection or warranty defect, the CUSTOMER shall afford VANTRON the opportunity to inspect such products at the CUSTOMER's location and no Product so inspected shall be returned to VANTRON unless the cause for the rejection or defect is determined to be the responsibility of VANTRON. VANTRON shall in turn provide the CUSTOMER turnaround shipment on defective Product within **fourteen (14) working days** upon its receipt at VANTRON. If such turnaround cannot be provided by VANTRON due to causes beyond the control of VANTRON, VANTRON shall document such instances and notify the CUSTOMER immediately.

Appendix   A: Specifications of VT-MOB-AH & HAP 101

VT-MOB-AH				
Major Chipset	Morse Micro MM6108 HaLow SoC			
RF	GNSS	GPS, Beidou		
I/O	Host interface	1 x SDIO/SPI		
	GPIO	9 x GPIO		
	Antenna	1 x GNSS U.FL connector		
	JTAG	Supported		
WLAN Features	Wi-Fi standard	IEEE 802. 11ah		
	Frequency range (Sub 1 GHz bands)	850MHz ~ 950MHz		
	Channel bandwidth	1 / 2 / 4 /8 MHz		
	Data rate	1 MHz	2 MHz	4 MHz	8 MHz
		3.33Mbps (Max.)	7.22Mbps (Max.)	15Mbps (Max.)	32.5Mbps (Max.)
	Security	AES encryption engine SHA1 and SHA2 hash algorithms (SHA-256, SHA-384, SHA-512) WPA3 including protected management frames (PMF)			
Mechanical	Dimensions	23mm x 14mm x 2.6mm		
	Voltage	VBAT: 3.3V	VDD_FEM: 3.3V	VDDIO: 3.3V	
	Temperature	Operating: -40℃~+85℃	Storage: -40℃~+90℃		
	Humidity	Less than 85% (Non-condensing)		
	Packaging	LGA		
	Certificate	FCC, IC, CE		

The kit is designed to be used in combination with a Wi-Fi HaLow access point. The following sheet lists the specification of Vantron HAP 101 Wi-Fi HaLow access point for your reference.

HAP101			
System	CPU	MediaTek 580MHz MIPS® CPU	
	Wi-Fi HaLow SoC	Morse Micro MM6108	
	Memory	256MB	
	Storage	64MB	
WLAN Features	**2.4GHz** Wi-Fi (Optional)	Standard: IEE 802.11 b/g/n	
		Frequency range: 2.412GHz ~ 2.484GHz	
		Channel bandwidth: 20/40 MHz	
		Data rate: up to 150 Mbps	
		Antenna: 2T2R	
	Wi-Fi HaLow	Standard: IEE 802.11 ah	
		Frequency range: 850MHz ~ 950 MHz	
		Channel bandwidth: 1/2/4/8 MHz	
		Data rate: up to 32.5 Mbps @8MHz or 15 Mbps @4MHz	
		Working mode: AP, STA configurable	
I/O	Fast Ethernet	1 x RJ45, 10/100 Mbps	
	Serial port (Optional)	1 x RS485 (4-pin terminal, 5V output, baud rate: 115200)	
	Antenna	1 x Wi-Fi HaLow SMA connector	
		2 x **2.4GHz** Wi-Fi SMA connector (optional)	
System Control	LED indicators	1 x Power indicator	1 x WLAN activity indicator
		1 x Wi-Fi HaLow activity indicator	1 x Error indicator
	Button	1 x Restore button	
Mechanical	Dimensions	110mm x 73mm x 28mm (with wall mount)	
	Casing material	Plastics (UL94, SP6 compliant)	
	Installation	Wall mounting	
	Heat dissipation	Fanless	
Power	Input	9V ~ 40V DC	
	Port	3-pin terminal (Over-current protection, reverse polarity protection)	
Software	Operating system	VantronOS	
	VPN	OpenVPN, IPSec	
	Device management platform	Vantron BlueSphere GWM	
	Upgrade	Local upgrade, OTA upgrade	
Security	**2.4GHz** Wi-Fi	64/128-bit WEP, TKIP, WPA, WPA2, AES, WPS	
	Wi-Fi HaLow	WPA3	
Environment Condition	Temperature	Operating: -20℃ ~ +60℃	Storage: -40℃ ~ +85℃
	Humidity	≤ 95% RH (non-condensing)	
	Certificate	FCC, IC	

Appendix   B: Regulatory Compliance Statement

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

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 FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates 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.

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

Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate this equipment.

IC Statement

This device complies with ISED's licence-exempt RSSs. 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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Le présent appareil est conforme aux CNR d' ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. le dispositif ne doit pas produire de brouillage préjudiciable, et

2. ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radio électrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.