

1. **Component Checklist**

Check if all components are available before wiring:

- HAP101 (better to use two, one in AP mode, one in STA mode)
- 1 x Wi-Fi HaLow antenna (longer)
- 2 x 2.4GHz Wi-Fi antenna (shorter)
- A router functioning as a DHCP server and an Ethernet cable (not necessary if you just intend to verify the HaLow connection)
- 12V DC power adapter
- DC Power connector
- Firmware version: **V200R003.F0000-0B** or later

2. **Installation and Wiring**

When mounting HAP101 on a vertical surface, please ensure that the device is oriented with the LED indicators pointing down. This positioning allows the LEDs to be visible to the user on the ground.

1. Use two M3 x 8mm screws to fix HAP101 (screw anchors might be necessary);
2. Tighten the screws and gently swing the device to make sure it is fastened;
3. Install the shorter antennas to the WLAN antenna connectors (*silk screened as WLAN1 and WLAN2/BT*);



4. Install the longer antenna to the Wi-Fi HaLow antenna connector (*silk screened as HaLow*);



5. Connect the Ethernet port of HAP101 to a LAN port of a router using the Ethernet cable, when necessary;



6. Plug the DC power connector into the power terminal of the device and connect it to the power source using the 12V DC adapter to start it.



3. **Pairing Two HAP101 Devices**

You have multiple options to pair two HAP101 devices via Wi-Fi HaLow. Choose the one that best suits your situation.

Typically, each HAP101 operates in both HaLow AP and 2.4GHz Wi-Fi AP mode **by default**, with a fixed LAN IP of 172.18.2.1. When switched to HaLow station/client mode, the LAN IP will change to 172.18.3.1, ensuring proper IP allocation.

3.1 **Pairing via Station Setup on the Web Portal**

To set an HAP101 to the station mode (**H2**) and connect it to an AP-mode HAP101 (**H1**) via Wi-Fi HaLow, **simply configure H2** using the web-based management portal (VantronOS).

To access VantronOS for H2 from a host computer, connect the host to the 2.4GHz Wi-Fi network of H2, then enter H2's WLAN IP address in a web browser to log in. For additional login methods, please refer to the user manual.

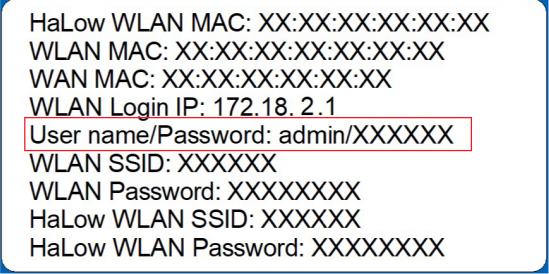
1. Power on **H1** and use an Ethernet cable to connect it to a router that functions as a DHCP server;
 - * *The router is used for network access and unified IP allocation. Connecting to it is not necessary if you just intend to verify the HaLow connection.*
2. Power on **H2**;
3. Connect a host computer to the 2.4GHz Wi-Fi of **H2** using the default SSID and password provided on the device label as shown below;

HaLow WLAN MAC: XX:XX:XX:XX:XX:XX
 WLAN MAC: XX:XX:XX:XX:XX:XX
 WAN MAC: XX:XX:XX:XX:XX:XX
 WLAN Login IP: 172.18. 2.1
 User name/Password: admin/XXXXXX
 WLAN SSID: XXXXXX
 WLAN Password: XXXXXXXX
 HaLow WLAN SSID: XXXXXX
 HaLow WLAN Password: XXXXXXXX

4. Use the default **WLAN Login IP** provided on the device label of H2 as the address for VantronOS login;

HaLow WLAN MAC: XX:XX:XX:XX:XX:XX
 WLAN MAC: XX:XX:XX:XX:XX:XX
 WAN MAC: XX:XX:XX:XX:XX:XX
 WLAN Login IP: 172.18. 2.1
 User name/Password: admin/XXXXXX
 WLAN SSID: XXXXXX
 WLAN Password: XXXXXXXX
 HaLow WLAN SSID: XXXXXX
 HaLow WLAN Password: XXXXXXXX

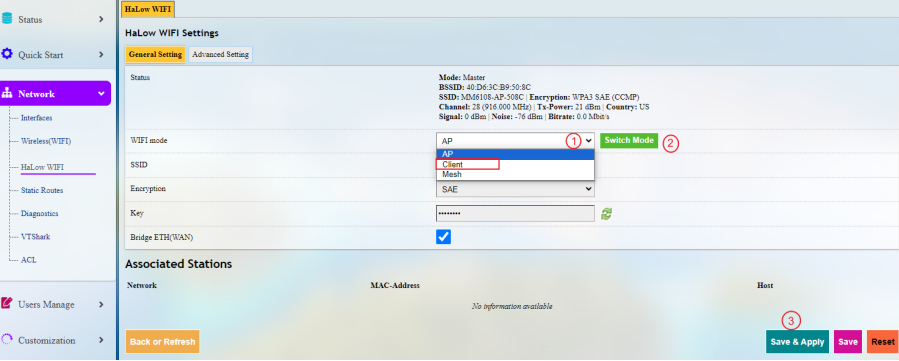
5. Log in to VantronOS using the username and password on the device label;



* For higher permissions on VantronOS, log in as a superuser:

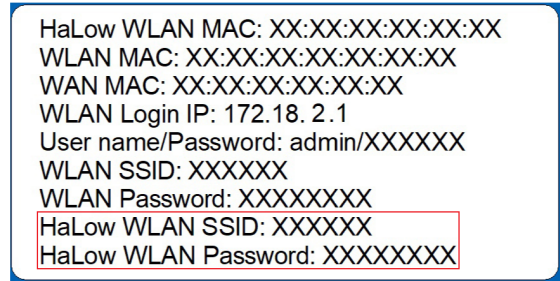
Super user: root // password: rootpassword

6. Navigate to **Network > HaLow WIFI** and switch the HaLow mode of **H2** to **Client**, then wait a few seconds to allow the change to apply;

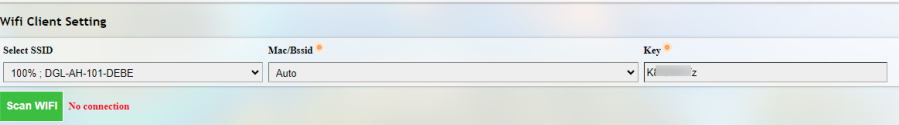


* The LAN IP of the device will change to **172.18.3.1** when the HaLow mode switches to **Client**.

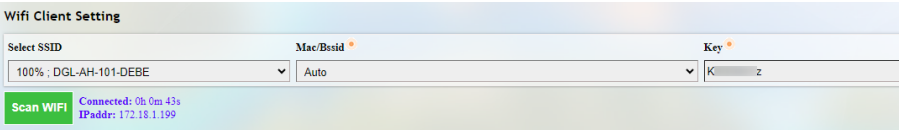
7. Reconnect the host computer to the 2.4GHz Wi-Fi of **H2** and log in to VantronOS using the new WLAN IP: 172.18.3.1;
8. Check the device label of **H1** for the HaLow WLAN SSID and password for HaLow connection;



9. Navigate to **Network > HaLow WIFI** in VantronOS for **H2**. Under the **Wifi Client Setting** tab, select the SSID of **H1** from the list and enter the password for HaLow connection;



10. If the target SSID is not included in the HaLow SSID list, click the **SCAN WIFI** button to refresh the list;
11. Save and apply the settings;
12. When **H2** successfully connects to **H1** via Wi-Fi HaLow, the connection status will be displayed next to the **SCAN WIFI** button.



3.2 HaLow DPP Pairing (via Hardware Setup)

DPP (Device Provisioning Protocol) specifically refers to the fast provisioning of the HAP101 devices for a standard HaLow connection (“**HaLow DPP**”). The DIP switches and Pair/Restore button enable a quick HaLow connection via hardware setup.

Switch 1	Switch 2	Description
Non-Mesh [Standard HaLow mode]	AP/Portal	The device operates as a HaLow AP
	STA/Point	The device operates as a HaLow station
Mesh [HaLow mesh mode]	AP/Portal	The device operates as a mesh portal
	STA/Point	The device operates as a mesh point

HaLow DPP configurations on **H1** (AP-mode HAP101) and **H2** (Station-mode HAP101) for a standard HaLow connection are as follows.

Device	Switch 1	Switch 2	Pair/Restore Button Action	Result
H1	Non-mesh	AP/Portal	1. Short press the Pair/Restore button to enter the HaLow DPP state;	DPP state enabled in the HaLow AP mode
H2	Non-mesh	STA/Point	2. No button action in 3 seconds to confirm the state.	DPP state enabled in the HaLow station mode

Steps:

- Short press the Pair/Restore button of **H1** to enter the HaLow DPP state;
- Perform no action within 3 seconds to confirm the HaLow DPP state;
- Repeat steps 1 and 2 on **H2** within 120 seconds after **H1** confirms the HaLow DPP state;
- Wait for the devices to pair;
- Upon successful connection, the HaLow indicators on both devices will enter the ‘netdev’ mode. The UP indicator on H1 and the DOWN indicator on H2 will blink at a frequency of 4Hz for 3s and later turn solid green.

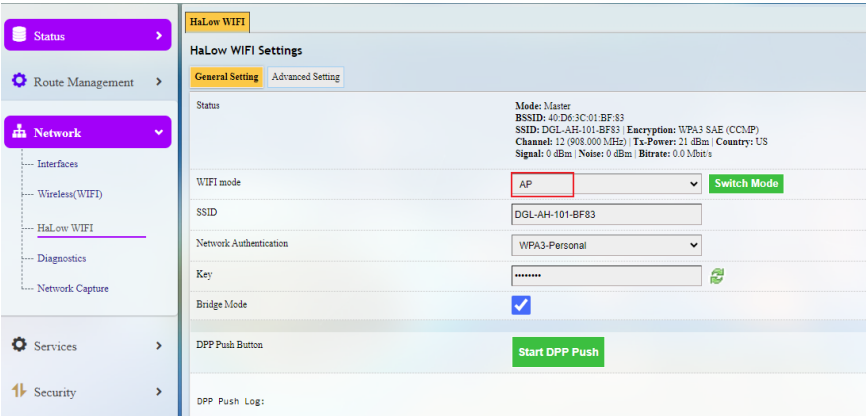
The devices will **exit** the DDP state if:

- H1 and H2 are successfully connected; or
- The Pair/Restore button is briefly pressed during the DDP state; or
- The second device does not enable the DDP state in 120 seconds after the first device does, or if the connection fails.

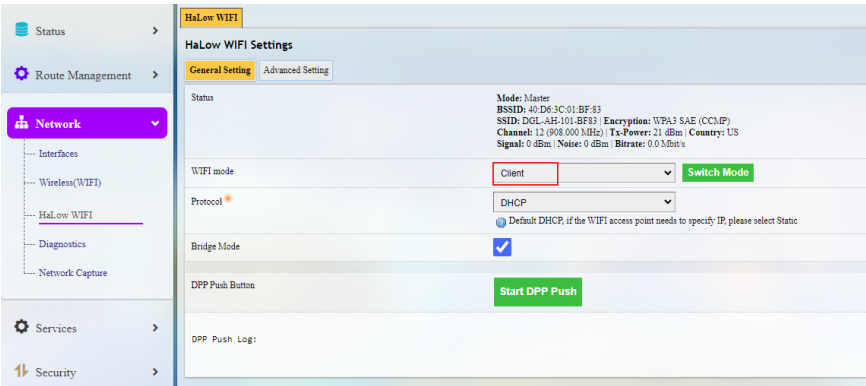
3.3 HaLow DPP Pairing (via Software Setup)

DPP (Device Provisioning Protocol) specifically refers to the fast provisioning of the HAP101 devices for a standard HaLow connection (“**HaLow DPP**”). You can pair an AP-mode HAP101 (**H1**) and a station-mode HAP101 (**H2**) in VantronOS, regardless of the physical settings of the devices.

- Connect a host computer (PC1) to **H1** via 2.4GHz Wi-Fi and log in to VantronOS for H1 using the device’s WLAN IP (refer to steps 1~5 in 3.1);
- Connect another host computer (PC2) to **H2** via 2.4GHz Wi-Fi and log in to VantronOS for H2 using the device’s WLAN IP (refer to steps 1~5 in 3.1);
- Navigate to **Network > HaLow WIFI** in VantronOS separately on both computers;
- Keep the settings of **H1** unchanged;

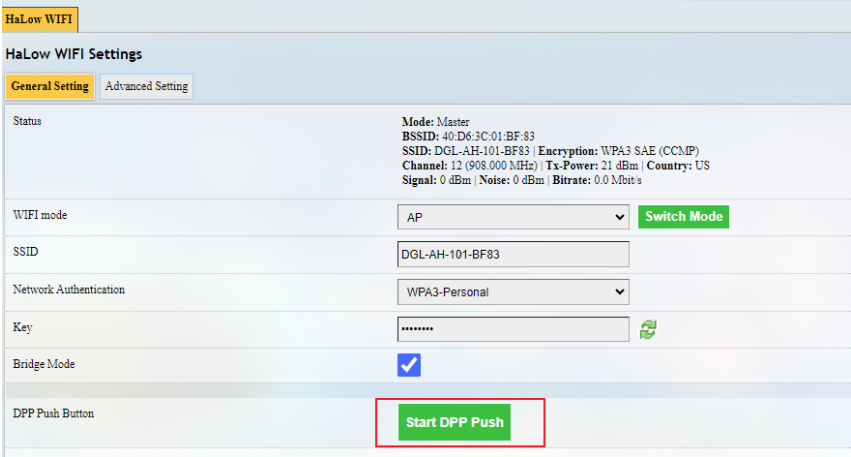


5. Switch the HaLow mode of **H2** to **Client**;



* You will need to re-log in to VantronOS for H2 using the new WLAN IP address: **172.18.3.1** when its HaLow mode switches to **Client**.

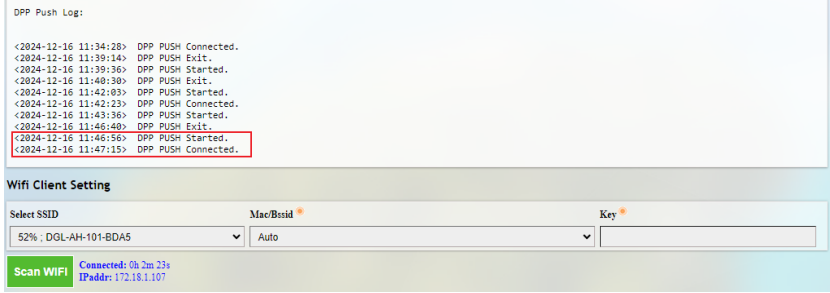
6. Click the **Start DPP Push** buttons on both computers simultaneously;



7. Wait for the devices to pair;

8. Upon successful connection, the HaLow indicators on both devices will enter the ‘netdev’ mode. The UP indicator on H1 and the DOWN indicator on H2 will blink at a frequency of 4Hz for 3s and later turn solid green;

9. The DPP push log indicates the success or failure state of the connection.

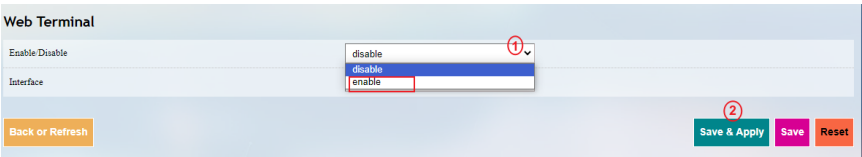


13. Throughput Testing

1. Connect a station-mode HAP101 (H2) to an AP-mode HAP101 (H1) via Wi-Fi HaLow via any of the methods set out in section 3;
2. Connect a host computer (PC1) to H1 via 2.4GHz Wi-Fi (refer to steps 1~5 in 3.1);
3. Connect another host computer (PC2) to H2 via 2.4GHz Wi-Fi (refer to steps 1~5 in 3.1);
4. Log in to VantronOS for H1 and H2 respectively on PC1 and PC2 using the device’s WLAN IP;

* Login address for H1: to **172.18.2.1**; Login address for H2: to **172.18.3.1**.

5. Navigate to **System > Terminal** in VantronOS and **enable** Web Terminal to activate the terminal for both devices;



6. Click the link to open the terminal and log in as the root user;

* User: root; password: rootpassword

7. Use H1 as the server and H2 as the client, then input the following commands in pair on PC1 and PC2, respectively for the throughout testing;

```

iperf3 -s // PC1
iperf3 -c 172.18.2.1 -t 30 // PC2 (HaLow IP of H1 & duration in seconds)

```

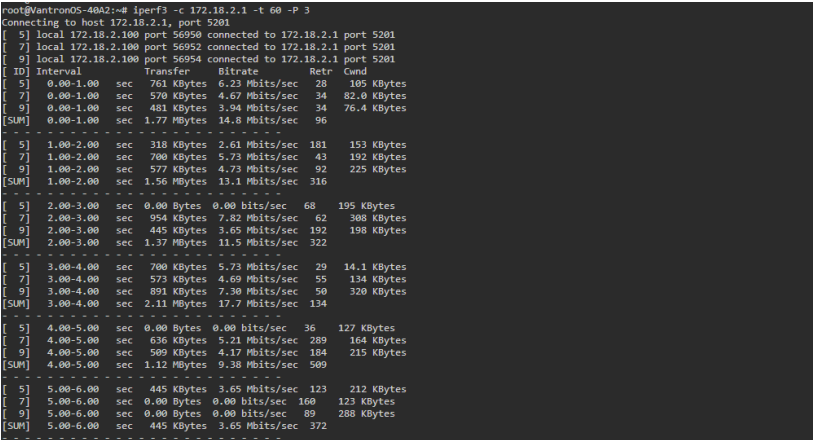
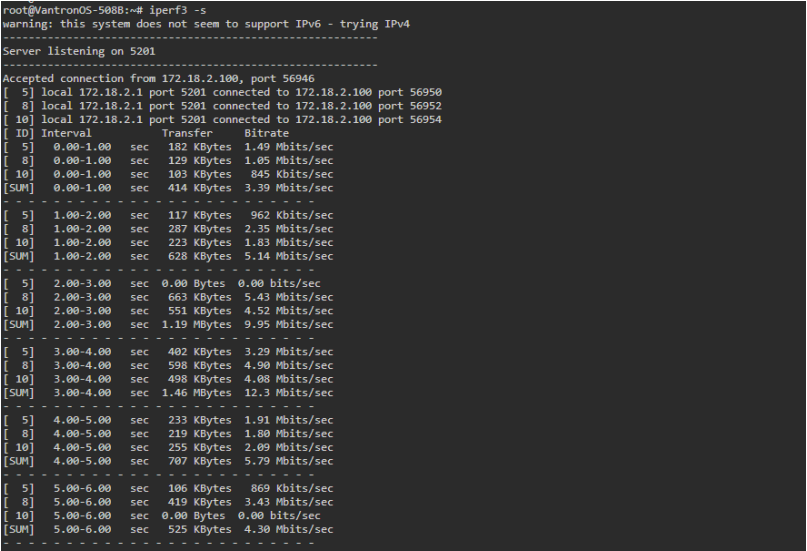
Alternatively, you can reverse the roles of H1 and H2:

```

iperf3 -s // PC2
iperf3 -c 172.18.2.100 -t 30 // PC1 (HaLow IP of H2 & duration in seconds)

```

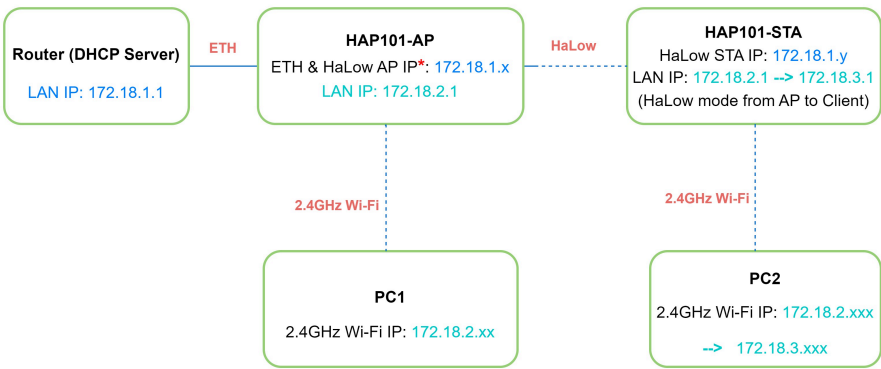
8. Test results shown in H1 and H2:



9. Move the devices dynamically to different positions to test the HaLow connection throughput in the same way.

14. Network Interface Bridging

The **Ethernet interface** and **HaLow AP interface** of each HAP101 are bridged by default. This means that after an AP-mode HAP101 connects to a DHCP server via an Ethernet cable, client devices connected to it via **Wi-Fi HaLow** will receive an IP address from the DHCP server, as shown in the diagram below.



Please refer to Chapter 4 of the user manual for a typical application of the devices.