



Shenzhen Hi-Link Electronic CO.,Ltd

HLK-RM60 User Manual

Contents

1. PRODUCT INTRODUCTION.....	- 1 -
1.1. OVERVIEW.....	- 1 -
1.2. PRODUCT FEATURES.....	- 1 -
2. DIAGRAM.....	- 2 -
2.1. SPECIFICATION.....	- 3 -
2.2. NUMBER OF INTERFACES.....	- 3 -
2.3. TECHNICAL SPECIFICATIONS.....	- 4 -
2.4. APPLICATION FIELD.....	- 5 -
3. ELECTRICAL PARAMETERS.....	- 5 -
3.1. OPERATING VOLTAGE.....	- 5 -
4. PIN INTRODUCTION.....	- 6 -
5. SIZE.....	- 12 -
6. INDICATOR LIGHT DESCRIPTION.....	- 13 -
7. PIN FUNCTION DESCRIPTION.....	- 13 -
8. CONFIGURATION PAGE.....	- 14 -
9. SET WIFI HOTSPOT NAME.....	- 15 -

1. Product Introduction

Overview

HLK-RM60 is a high-performance embedded WIFI6 module launched by Hilink Electronics.

The module complies with IEEE standard 802.11 a/b/g/n/ac/ax. The module integrates a

2.4G/5.8G radio frequency transceiver with a transmission rate. High characteristics.

Product Features

- Compatible IEEE 802.11 a/b/g/n/ac/ax
- Dedicated high performance 32-bit RISC CPU
- Support 20/40MHz in 2.4G, Support 20/40/80MHZ in 5G
- Support 2.4g/ 5.8 GHz ,Data rate up to 573+1201 Mbps
- Support STA/AP
- Built-in TCP/IP protocol stack
- Support Wireless upgrade (OTA)
- 3.3V Single power supply

Specification

Items	Parameter	Notes
Model Number	HLK-RM60	
Main Chipset	MT7621	
Kernel	MIPS1004Kc	
Main frequency	880MHz	
RAM	DDR2 128MB	
Flash	16MB	
Temperature	Ambient temperature: -20℃~+60℃	
Humidity	Using: 10~95% (Non-condensing) Stock: 5~95% (Non-condensing)	
Size	90mm×60mm	

Number of interfaces

Interface	Quantity	Default firmware Support
WiFi Standard	IEEE 802.11b/g/n/a/ac/ax	Support
Ethernet Interface	5* 100M/1000M (Adaptive)	1*WAN、4*LAN
UART	2	2*UART
SDIO	1	Not Support
SPI	1	Not Support
I2C	1	Not Support
USB3.0	1	Not Support
USB2.0	1	Not Support

Technical specifications

Module	Model Number	HLK-RM60
	Package	In-line
Wireless parameters	Wireless standard	IEEE 802.11 a/b/g/n/ac/ax
	Frequency Range	2.4G Wi-Fi: 2412-2462MHz ; 5G Wi-Fi: 5150-5250MHz, 5725-5850MHz
	Transmit power	802.11b: +18.99dBm
		802.11g: +18.65dBm, 802.11a: +16.80dBm
		802.11n20: +23.69dBm, 802.11ac20: +19.64dBm
		802.11n40: +21.48dBm, 802.11ac40: +20.00dBm
		802.11ax20: +19.56dBm , 802.11ax40: +20.29dBm
		802.11ac80: +21.31dBm, 802.11ax80: +21.38dBm
	Receiving sensitivity	802.11b: -88.4 dBm (@11Mbps ,CCK)
		802.11g: -75.7dBm (@54Mbps, OFDM)
802.11n: -73.6dBm (@HT20, MCS7)		
802.11a: -75.0 dBm (@MCS7)		
802.11ac: -75.0 dBm (@MCS9)		
802.11ax: -73.0 dBm (@MCS11)		
Antenna Type	External : 4*1-PEX Connector	
Hardware parameters	Hardware interface	UART, IIC, PWM, GPIO, SPI
	Network port	5*Full Gigabit Ethernet port
	USB	1*USB3.0+1*USB2.0
	Work Voltage	3.3V
	GPIO Drive capability	Max: 12ma
	Work Current	Keep sending=>average: ~800mA,Max: 1000mA In normal mode=>average: ~750mA,Max: 800mA
	Temperature	Operating temperature : -20°C~ +60°C Storage temperature: -40°C~ +85°C
	Size	90*60mm
Software parameters	Wireless network type	STA/AP
	Firmware Upgrade	Web Upgrade
	Network protocol	IPv4, TCP/UDP
	User configuration	Web configuration

Table 1. Technical specifications

Application field

- Smart home;
- Instrumentation;
- Wi-Fi Remote monitoring/control ;
- Toy field;
- Color LED control;
- Intelligent integrated management of fire protection and security;
- Smart card terminals, wireless POS machines, handheld devices, etc.

2. Electrical parameters

Working voltage

Parameter	Smallest	Typical	Max	Unit
Working voltage	3	3.3	3.6	V
I/O Voltage	3	3.3	3.6	V
Peak module current	1000mA	800		mA
Supply current requirements		≥1500		mA
Power supply ripple requirements		≤50		mV

Table 2. Module power supply requirements

3. Pin introduction

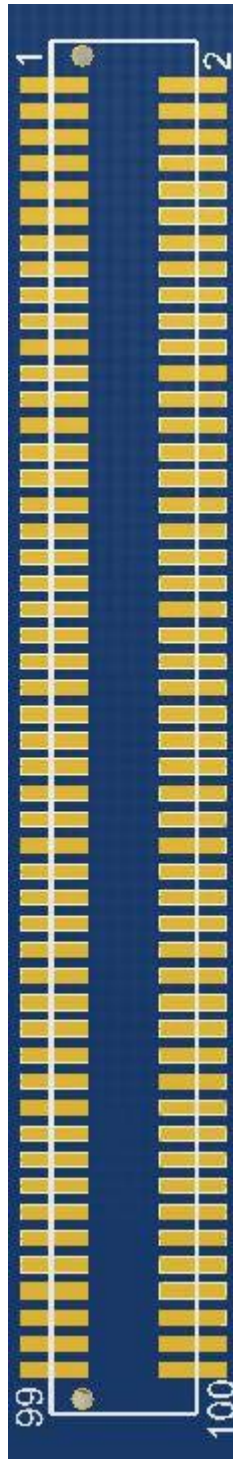


Figure 2. Module pin sorting

Table 3. Module pin sorting

1:3.3VD	2:GND	39:ND_D2	40:ESW_TXVN_D_P1	77:I2C_SDA	78:GND
3:3.3VD	4:GND	41:ND_D1	42:GND	79:NC	80:ESW_TXVP_A_P4
5:3.3VD	6:GND	43:ND_D0	44:ESW_TXVP_A_P2	81:WDT_RST_N	82:ESW_TXVN_A_P4
7:3.3VD	8: ESW_TXVP_A_P0	45:ND_RB_N	46:ESW_TXVN_A_P2	83:ESW_P4_LED	84:ESW_TXVP_B_P4
9:3.3VD	10:ESW_TXVN_A_P0	47:ND_RE_N	48:ESW_TXVP_B_P2	85:ESW_P3_LED	86:ESW_TXVN_B_P4
11:NC	12:ESW_TXVP_B_P0	49:ND_CS_N	50:ESW_TXVN_B_P2	87:ESW_P2_LED	88:ESW_TXVP_C_P4
13:SSUSB_TX_P	14:ESW_TXVN_B_P0	51:ND_WP	52:ESW_TXVP_C_P2	89:ESW_P1_LED	90:ESW_TXVN_C_P4
15:SSUSB_TX_N	16:ESW_TXVP_C_P0	53:ND_CLE	54:ESW_TXVN_C_P2	91:ESW_P0_LED	92:ESW_TXVP_D_P4
17:SSUSB_RX_P	18:ESW_TXVN_C_P0	55:ND_WE_N	56:ESW_TXVP_D_P2	93:3.3VD	94:ESW_TXVN_D_P4
19:SSUSB_RX_N	20:ESW_TXVP_D_P0	57:ND_ALE	58:ESW_TXVN_D_P2	95:3.3VD	96:GND
21:NC	22:ESW_TXVN_D_P0	59:NC	60:GND	97:3.3VD	98:GND
23:USB_D_N	24:GND	61:USB2.0_DM	62:ESW_TXVP_A_P3	99:3.3VD	100:GND
25:USB_D_P	26:ESW_TXVP_A_P1	63:USB2.0_DP	64:ESW_TXVN_A_P3		
27:NC	28:ESW_TXVN_A_P1	65:RXD3	66:ESW_TXVP_B_P3		
29:ND_D7	30:ESW_TXVP_B_P1	67:TXD3	68:ESW_TXVN_B_P3		
31:ND_D6	32:ESW_TXVN_B_P1	69:TXD1	70:ESW_TXVP_C_P3		
33:ND_D5	34:ESW_TXVP_C_P1	71:RXD1	72:ESW_TXVN_C_P3		
35:ND_D4	36:ESW_TXVN_C_P1	73:D2DB_PORST_N	74:ESW_TXVP_D_P3		
37:ND_D3	38:ESW_TXVP_D_P1	75:I2C_SCLK	76:ESW_TXVN_D_P3		

Power pin description:

No.	Name	Type	Function description	Default function
1	3.3VD	P	3.3V Input, Current $\geq 1500\text{mA}$	Power Supply
3				
5				
7				
9				
93				
95				
97				
99				
2	GND	P	Ground	Power Supply
4				
6				
11				
21				
24				
42				
60				
78				
96				
98				
100				

USB3.0 Interface Description :

13	SSUSB_TX_P	I/O	USB3.0	USB3.0
15	SSUSB_TX_N			
17	SSUSB_RX_P			
19	SSUSB_RX_N			
23	USB_D_N	I/O	USB 3.0 Interface HS/FS/LS Pin	
25	USB_D_P			

SPI Interface Description:

29	ND_D7	I/O	SPI_HOLD	GPIO#40
31	ND_D6		SPI_WP	GPIO#39
33	ND_D5		SPI_MOSI	GPIO#38
35	ND_D4		SPI_MISO	GPIO#37
47	ND_RE_N		SPI_CLK	GPIO#36
55	ND_WE_N		SPI_CS1	GPIO#35
49	ND_CS_N		SPI_CS0	GPIO#34

SDIO Interface Description:

51	ND_WP	I/O	SD_WP	GPIO#41
45	ND_RB_N		SD_CLK	GPIO#42
57	ND_ALE		SD_CMD	GPIO#44
53	ND_CLE		SD_CD	GPIO#43
43	ND_D0		SD_DATA0	GPIO#45
41	ND_D1		SD_DATA1	GPIO#46
39	ND_D2		SD_DATA2	GPIO#47
37	ND_D3		SD_DATA3	GPIO#48

USB2.0 Interface :

61	USB2.0_DM	I/O	Usb2.0 Interface	Usb2.0 Interface
63	USB2.0_DP			

Serial Interface:

65	RXD3	I	RXD3/GPIO#8	Serial 3
67	TXD3	O	TXD3/GPIO#7	
69	TXD1	O	TXD1/GPIO#1	Serial 1
71	RXD1	I	RXD1/GPIO#2	

Reset pin:

73	D2DB_PORST_N	I	Hardware reset pin, active low	System reset
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I2C Interface:

75	75:I2C_SCLK	I/O	I2C_SCLK/GPIO#3	GPIO#3
77	77:I2C_SDA		I2C_SDA/GPIO#4	GPIO#4

Network port P0 System reset:

8	ESW_TXVP_A_P0		PORT0 Interface	Network port 0 , Please leave it in the air if you don;t need it
10	ESW_TXVN_A_P0			
12	ESW_TXVP_B_P0			
14	ESW_TXVN_B_P0			
16	ESW_TXVP_C_P0			
18	ESW_TXVN_C_P0			
20	ESW_TXVP_D_P0			
22	ESW_TXVN_D_P0			

Network port P1 Interface:

26	ESW_TXVP_A_P1		PORT1 Interface	Network port 1, Please leave it in the air if you don;t need it
28	ESW_TXVN_A_P1			
30	ESW_TXVP_B_P1			
32	ESW_TXVN_B_P1			
34	ESW_TXVP_C_P1			
36	ESW_TXVN_C_P1			
38	ESW_TXVP_D_P1			
40	ESW_TXVN_D_P1			

Network port P2 Interface:

44	ESW_TXVP_A_P2		PORT2 Interface	Network port 2, Please leave it in the air if you don;t need it
46	ESW_TXVN_A_P2			
48	ESW_TXVP_B_P2			
50	ESW_TXVN_B_P2			
52	ESW_TXVP_C_P2			
54	ESW_TXVN_C_P2			
56	ESW_TXVP_D_P2			
58	ESW_TXVN_D_P2			

Network port P3 Interface:

62	ESW_TXVP_A_P3		PORT3 Interface	Network port 3, Please leave it in the air if you don;t need it
64	ESW_TXVN_A_P3			
66	ESW_TXVP_B_P3			
68	ESW_TXVN_B_P3			
70	ESW_TXVP_C_P3			
72	ESW_TXVN_C_P3			
74	ESW_TXVP_D_P3			
76	ESW_TXVN_D_P3			

Network port P4 Interface:

80	ESW_TXVP_A_P4		PORT4 Interface	Network port 4 , Please leave it in the air if you don;t need it
82	ESW_TXVN_A_P4			
84	ESW_TXVP_B_P4			
86	ESW_TXVN_B_P4			
88	ESW_TXVP_C_P4			
90	ESW_TXVN_C_P4			
92	ESW_TXVP_D_P4			
94	ESW_TXVN_D_P4			

Watchdog reset Pin:

81	WDT_RST_N	I	Function pin, active low	GPIO#18
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Network port indicator pin:

83	ESW_P4_LED	I/O	Active low, drive capability 4ma	Network port P4 connection indicator
85	ESW_P3_LED		High level effective, drive capability 4ma	Network port P3 connection indicator
87	ESW_P2_LED		Active low, drive capability 4ma	Network port P2 connection indicator
89	ESW_P1_LED		Active low, drive capability 4ma	Network port P1 connection indicator
91	ESW_P0_LED		Active low, drive capability 4ma	Network port P0 connection indicator

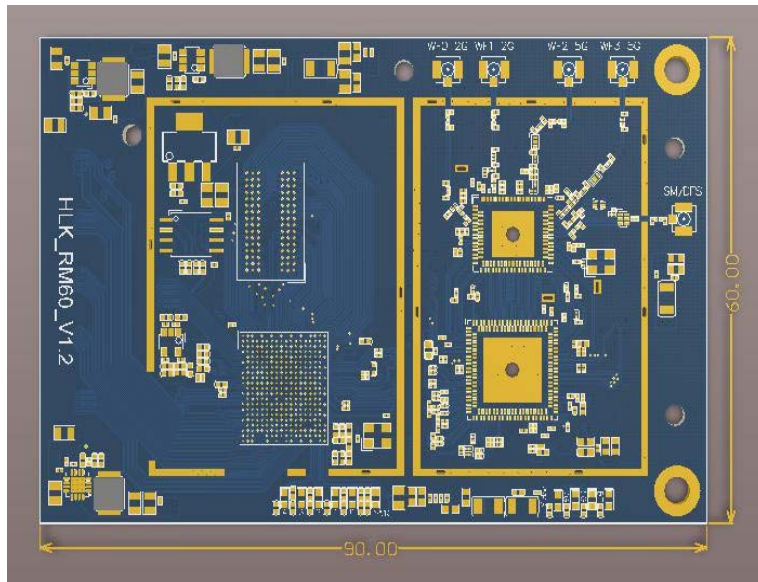
Other Pins :

59	NC		Hang in the air	Hang in the air
79	NC		Hang in the air	Hang in the air
27	NC		Hang in the air	Hang in the air

Remark:

I, I-Input; O-Output; I/O-Number I/O; P-Power. NC Hang in the air.

4. Size



Unit: (mm)

Figure 3 Size

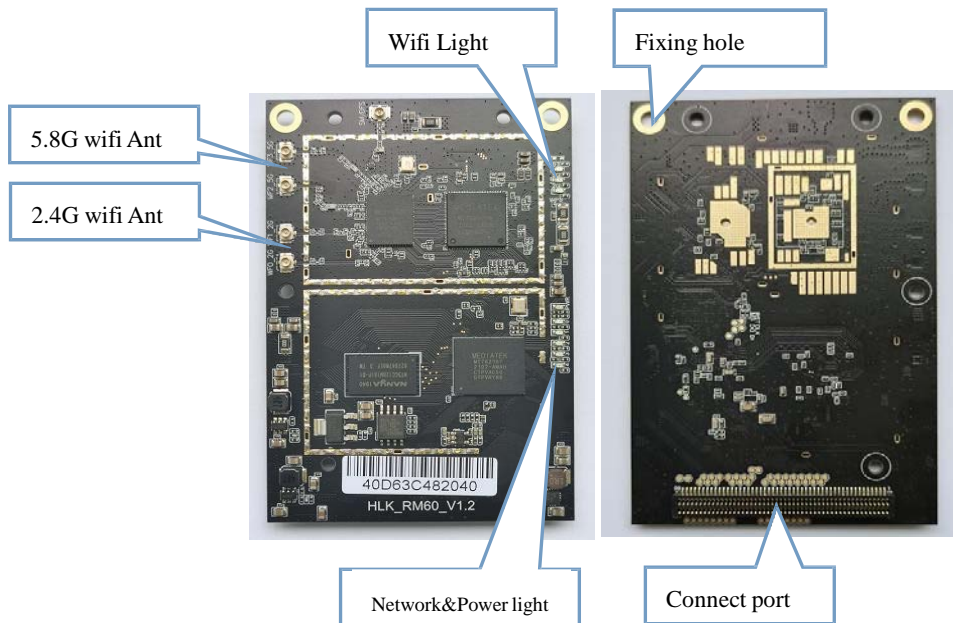


Figure 4 Module interface description

5. Indicator light description

2G/5G wifi indicator light: After turning on the wifi function, the module wifi indicator will flash, after turning off the wifi indicator, the module's wifi indicator will go out.

Pwr indicator: power indicator, always on when power on.

Network port indicator: After plugging in the network cable, the corresponding LED indicator will flash.

6. Pin function description

D2DB_PORST_N: Hardware reset pin, Pull down time $\geq 100\text{ms}$

WDT_RST_N: Software reset pin, Pull down time $\geq 6000\text{ms}$, The system will be restarted

7. Enter the configuration web interface

Connect the computer's network port and the module's LAN port, open the computer browser, enter 192.168.16.254, and you will enter the web login interface, enter the user name: root, password: admin, and then click the Login button to enter the configuration interface.

192.168.16.254/cgi-bin/luci

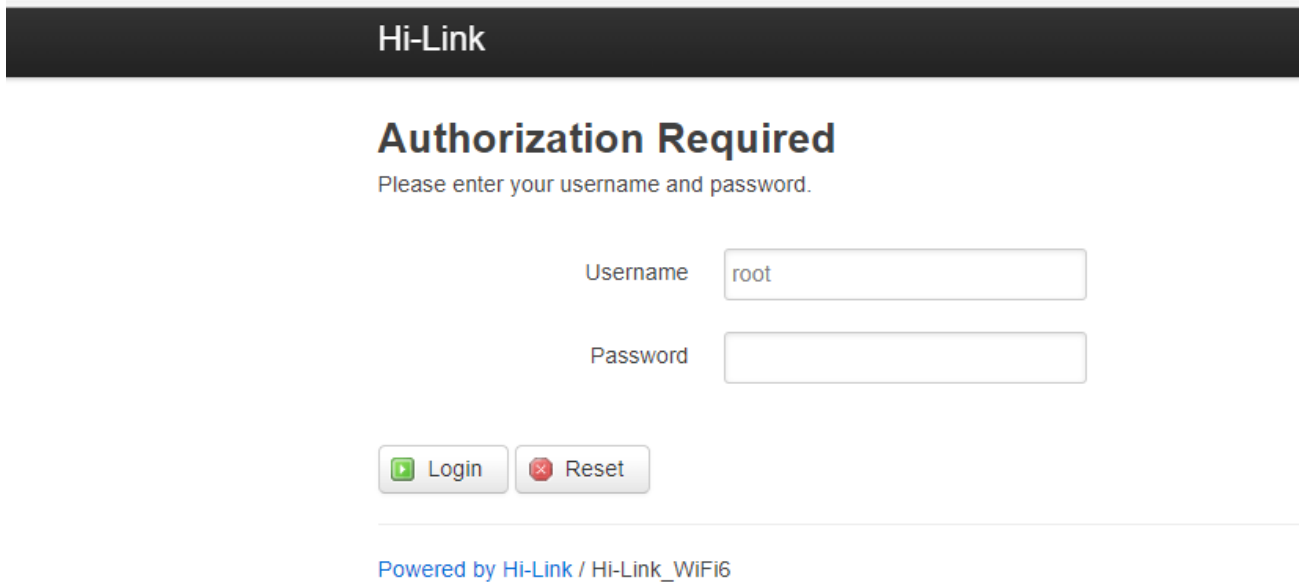
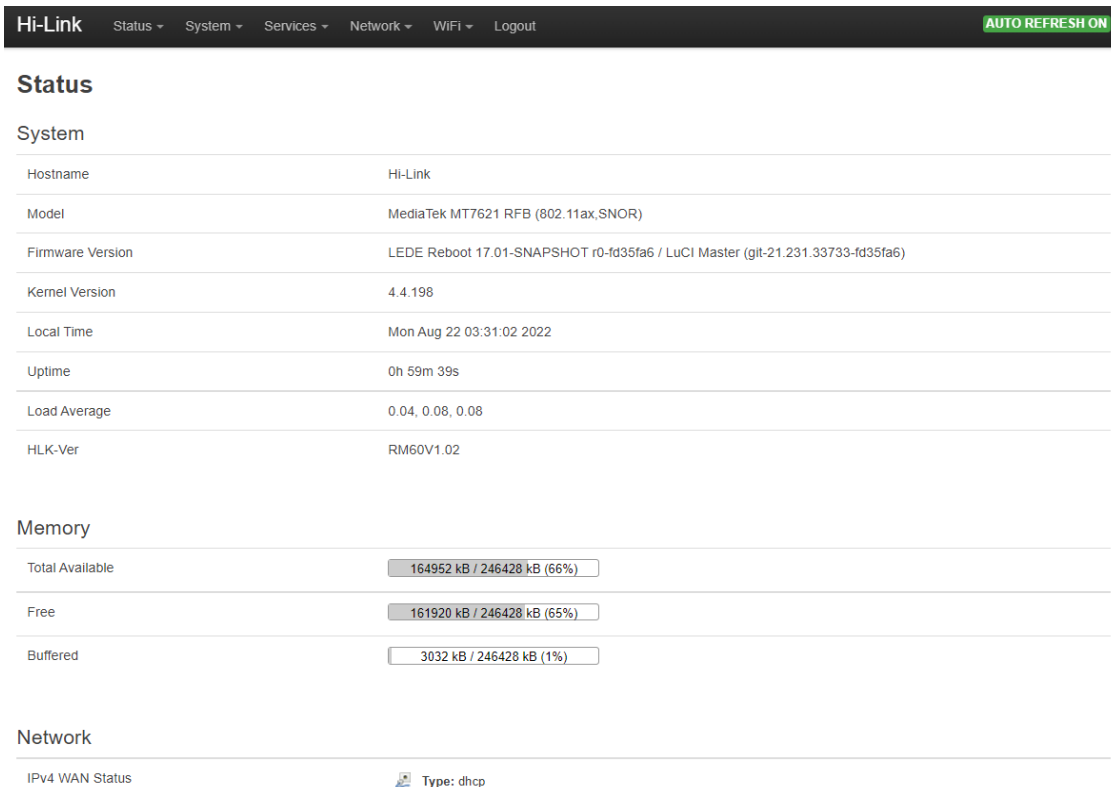


Figure 5. Log in Web

Enter the configuration interface:



System	
Hostname	Hi-Link
Model	MediaTek MT7621 RFB (802.11ax,SNOR)
Firmware Version	LEDE Reboot 17.01-SNAPSHOT r0-fd35fa6 / Luci Master (git-21.231.33733-fd35fa6)
Kernel Version	4.4.198
Local Time	Mon Aug 22 03:31:02 2022
Uptime	0h 59m 39s
Load Average	0.04, 0.08, 0.08
HLK-Ver	RM60V1.02

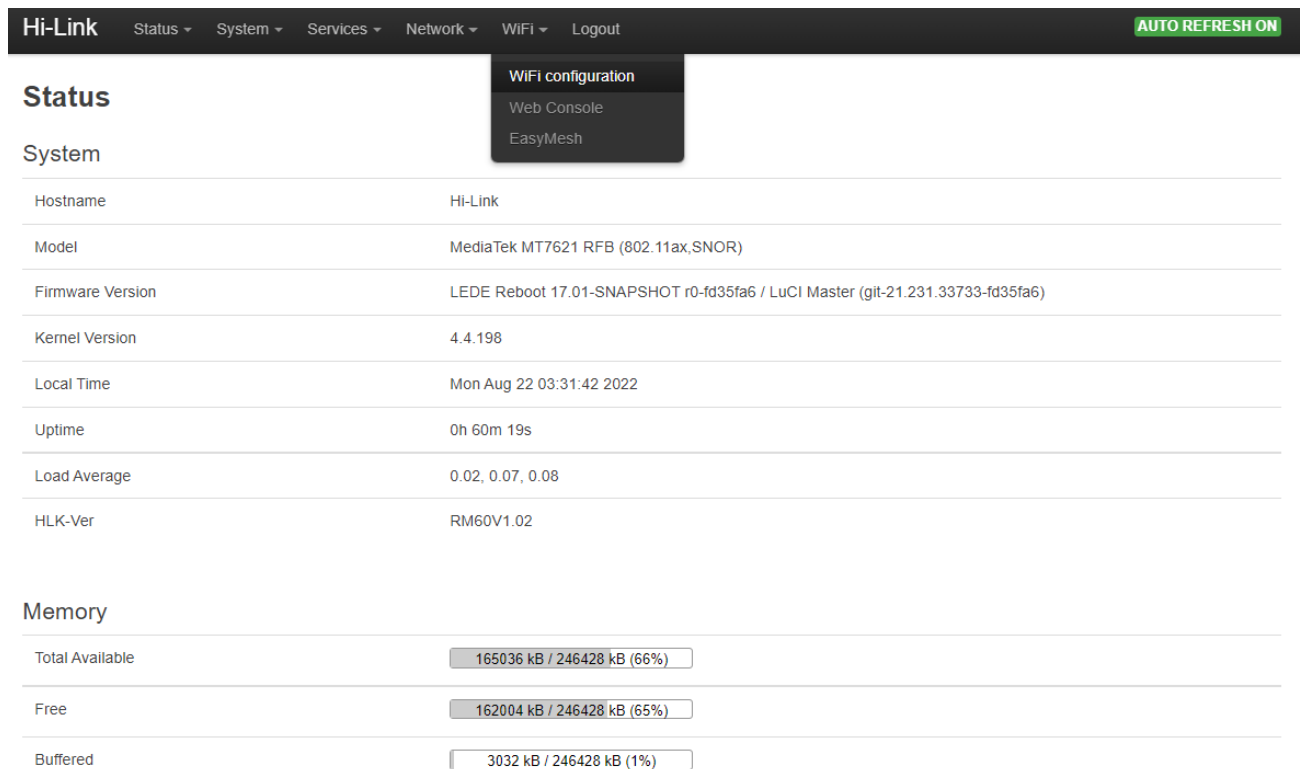
Memory	
Total Available	164952 kB / 246428 kB (66%)
Free	161920 kB / 246428 kB (65%)
Buffered	3032 kB / 246428 kB (1%)

Network	
IPv4 WAN Status	Type: dhcp

Figure 6 Status Page

8. Set the wifi name

After entering the web configuration interface, click WIFI, select WIFI configuration, enter the wifi configuration interface



The screenshot shows the Hi-Link web configuration interface. At the top, there is a navigation bar with the following items: Hi-Link, Status, System, Services, Network, WiFi, and Logout. On the right side of the navigation bar, there is a green button labeled "AUTO REFRESH ON". Below the navigation bar, the "WiFi" menu is open, showing three options: "WiFi configuration", "Web Console", and "EasyMesh". The "WiFi configuration" option is highlighted. Below the navigation bar, the main content area is divided into three sections: "Status", "System", and "Memory".

Status	
Hostname	Hi-Link
Model	MediaTek MT7621 RFB (802.11ax,SNOR)
Firmware Version	LEDE Reboot 17.01-SNAPSHOT r0-fd35fa6 / LuCI Master (git-21.231.33733-fd35fa6)
Kernel Version	4.4.198
Local Time	Mon Aug 22 03:31:42 2022
Uptime	0h 60m 19s
Load Average	0.02, 0.07, 0.08
HLK-Ver	RM60V1.02

Memory	
Total Available	165036 kB / 246428 kB (66%)
Free	162004 kB / 246428 kB (65%)
Buffered	3032 kB / 246428 kB (1%)

Figure 7 Enter the wifi setting interface

In this interface, you can see the WiFi name and mac address of 2.4g and 5.8g, click the config button to enter

the corresponding configuration interface

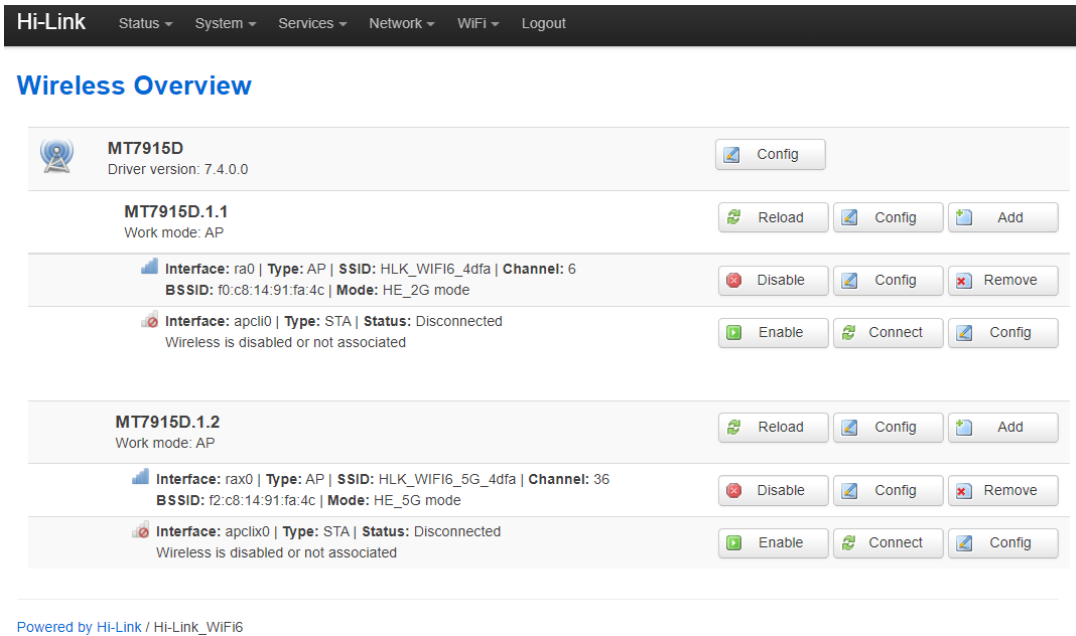


Figure 8 Wifi Status page

After clicking the config button, you will enter the configuration interface of the corresponding ssid and

password

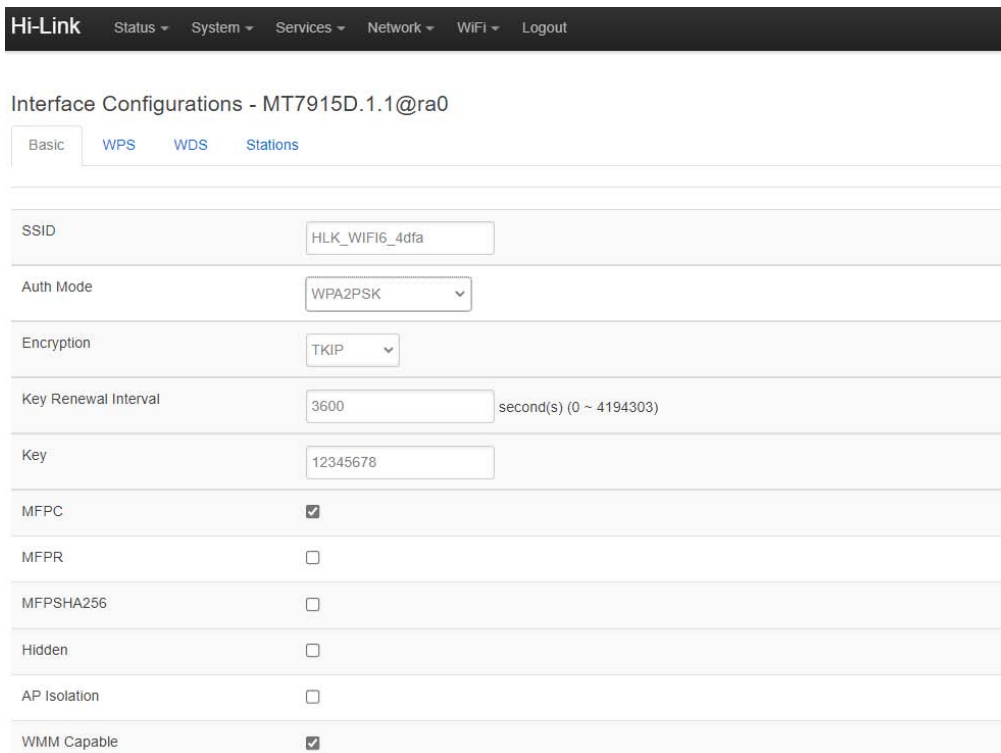


Figure 9 Wifi Setting Page

After the configuration is completed, click the following button to make the configured information take effect.

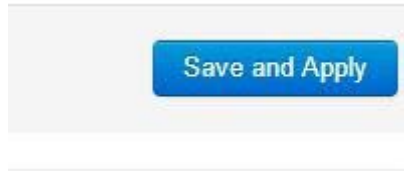


Figure 10 Save Button

Appendix A Document revision history

Version	Revision scope	Date
V1.0	Original Version	20210508

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the 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.

IMPORTANT NOTE:

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

OEM/Integrators Installation Manual

List of applicable FCC rules This module has been tested and found to comply with part 15.247 and part 15.407 requirements for Modular Approval.

Summarize the specific operational use conditions This module can be applied in Smart home, Instrumentation; Wi-Fi Remote monitoring/control; Toy field; Color LED control; Intelligent integrated management of fire protection and security; Smart card terminals, wireless POS machines, handheld devices. The input voltage to the module should be nominally 3.3 VDC, typical value 3.3VDC and the ambient temperature of the module should not exceed 60°C.

Limited module procedures N/A

Trace antenna designs N/A

Antennas The module of MT7975DN has two Antenna ports and the antenna gain as below:

2.4G Wi-Fi: 3.13dBi;

5G Wi-Fi: Band1: 3.62dBi, Band4: 3.52dBi.

Label and compliance information When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: Contains Transmitter Module

FCC ID: 2AD56HLK-RM60, the FCC ID can be used only when all FCC ID compliance requirements are met.

Information on test modes and additional testing requirements

- a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).
- b) The testing should check for emissions that may occur due to the intermixing of emissions with the

other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

- c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected.

Additional testing, Part 15 Subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part15 digital device. The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369. For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation. When testing the host product, all the transmitters must be operating. The transmitters can be enabled by using publicly available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available. When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.