




Taixin **AH** Bridge Instructions for Use




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Confidentiality level	A	Tyxin AH Bridge Instructions for Use	File No	
Release date 2023-4-10			File version V1.3.3	
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date	Version	describe	Revised by	
2023-4-10	V1.3.3	Modify footer;	WE	
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2020-07-28	V1.1.3	Fix rssi unit error	JHB	
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Confidentiality level	A	Tyxin AH Bridge Instructions for Use	File No	
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2020-06-24	V1.1.2	Added description of LED signal light; added method of turning off firewall method; add special instructions for distance test; add switching mode Explanation for failure to connect later	JHB
2020-06-24	V1.1.1	Added flow test method; added usage precautions; added Add common troubleshooting	ZS
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2020-05-11	V1.0.0	initial version	JHB

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Confidentiality level	A	Tyxin AH Bridge Instructions for Use	File No	
Release date 2023-4-10			File version V1.3.3	
Catalog Tyxin AH Bridge Instructions for Use.....1				
Revision history.....2				
1 Solution introduction				
1 2 Instructions for use.....3				
2.1 Pairing method.....3 2.2 Traffic				
Test Methods.....4 2.2.1 Tool				
preparation.....4 2.2.2				
Flow rate test method.....4 2.2.3 1M				
mode setting... ..11 2.3				
Introduction to commonly used AT+ commands.....11				
2.3.1 Commonly used Order.....12				
2.3.2 Example				
2.4 Introduction to network port tools				
2.4.1 Netat.exe				
2.4.2 Netlog.exe.....13 2.5 Firmware				
upgrade function description.....13				
2.6 Relay function description				
2.6.1 Relay network Configuration.....14 2.6.2				
Signal indicator lights of relay network				
Roaming function description				
2.7.1 Roaming configuration.....15 3 Precautions				
for use.....16 3.1 Precautions				
for erection location.....16				
3.2 Power supply precautions.....17 3.3 Avoid				
interference.. ..17 4 Common				
Troubleshooting.....18 4.1				
Unable to pair.....18 4.2 Repeated				
restarts.....18 4.3 The				
flow rate is abnormally low.....18 4.4				
demo Unable to connect after restarting after switching roles.....19				
4.5 The bridge shows that it is connected but cannot communicate normally.....				
19 Appendix				
Reference flow index.....21 A				
21 A.1 Floor penetration test				
Distance test.....twenty one				



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1 Solution introduction

The following is the interface and LED description of the bridge solution demo:



Figure 1 Interface description

The network bridge has the following

peripherals: 1. SMA antenna holder.

2. Mode DIP switch, you can select AP or STA. 3. Press the pairing button, AP

and STA at the same time to pair.

4. Serial port printing, used to print debugging information.

5. RJ45 network port. 6. Debug

interface, only for developers. 7. Power socket supports 5V (1A)/12V

(500mA) input. Note that the computer's USB is only 5V.

(500mA), which cannot provide power for the bridge, please do not use computer USB for power supply.

Note: The bridge interface of the old version is slightly different, please consult our FEA.

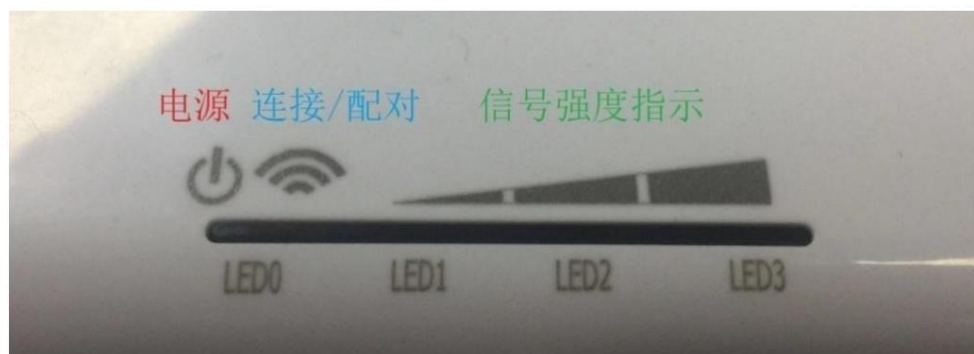


Figure 2 LED description

What the LED indicators mean:

1. LED0 is the connection status and power indicator light. When plugged in, the red light of LED0 will remain on. The blue light (or green light) of LED0 is always on, indicating that the bridge is connected. LED0 blue light (or green light) Flashing indicates successful bridge pairing. If the blue light (or green light) of LED0 is off, it means that the bridge has been disconnected.
2. LED1~3 represents the wireless signal strength. When 3 LEDs are all on, it means rssi is greater than -48dBm; when 2 LEDs (LED1~2) are on, it means rssi is greater than -60dBm and less than -48dBm; only When LED1 is on, it means that rssi is greater than -72dBm and less than -60dBm; when all three LEDs are not on, but the blue light (or green light) of LED0 remains on, it means that rssi is less than -72dBm.
3. When the bridge is connected to one-to-many, the signal strength light on the AP side is invalid because the STAs may be near or far. You can check the STA's signal indicator to understand the signal condition.

You can get the rssi information by viewing the print, as shown in the figure below:



```
STA3: 0:22:33:44:12:55
tx3: mcs=7 bw=8MHz snr=35 cnt=436 agg=9 data=461KB dur=137ms dut=4% cca=2180 ack=428KB(3772) drop=0KB(0) per= .7% d
rx3: mcs=7 bw=8MHz evm(avg:std)=-29:1 rssi=-49 agc=7773 cnt=308 agg=23 data=11135KB fcsErr=0, freqDev=1791Hz, dur=33
```

Operating system

description: The network bridge is not running Linux and does not support Linux operation

commands. The bridge itself does not have IP and needs to be connected to a device with IP. A pair of connected bridges can be understood as a network cable.

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2 Instructions for use

2.1 Pairing method

The following uses the demo of multiple network bridge solutions as an example to illustrate how to use:

1. Before powering on, set one of the demos as AP and the other demos as STA. 2. Plug in the power supply. At this time, LED0 should light up red, indicating that the power supply is normal.
3. Press the pairing button of the AP and one of the STA, and wait until the blue lights of LED0 of the two demos flash, indicating that the two demos have been paired successfully and can be released. (If it has been paired before, You can skip step 3)
4. Wait for the blue light (or green light) of LED0 of the two demos in step 3 to be steady on, indicating that the two demos
The connection has been established, and the bridge can realize the Ethernet transparent transmission function; if the blue light (or green light) of LED0 of the two demos is not on, it means that the two demos have not been established.
Connected or disconnected.
5. If there are multiple bridge solution demos to be paired and connected, repeat steps 3~4.
6. If the role of the demo changes, the bridge demo needs to be re-paired to ensure that the bridge demo can work properly.

When step 4 is completed, the bridge solution demo will save the connection information and will be reconnected after the next power-on or disconnection.

The status of the lights after pairing is shown in Figure 3.



Figure 3 Pairing ok status

2.2 Traffic test method

2.2.1 Tool preparation

- Two Windows computers with wired network ports (if there is no wired network port, use USB to connect to the wired network port

Also possible) •

Two network cables

- A pair of Taixin network bridges that have been successfully paired according to the pairing method section (including host, antenna, 5v power supply) • jperf (contact Taixin

F&E to provide)

2.2.2 Traffic test method

2.2.2.1 The first step is to connect the computer and the network bridge with a network cable

Use one network cable to connect one computer to the network bridge

and a second network cable to connect the other computer to the network bridge.



2.2.2.2 The second step is to configure the wired network IP addresses for the two computers.

Open Control Panel\Network and Internet\Network and Sharing Center

Click Ethernet as shown below



Click Properties as shown below



Click on the Internet Protocol Version option and click on Properties as shown below



Configure the wired network IP address as shown below. For example, one of the computers is configured as 10.10.10.156, and the other one is configured as 10.10.10.156.

The computer is configured as 10.10.10.123



2.2.2.3 The third step is to temporarily turn off the firewall

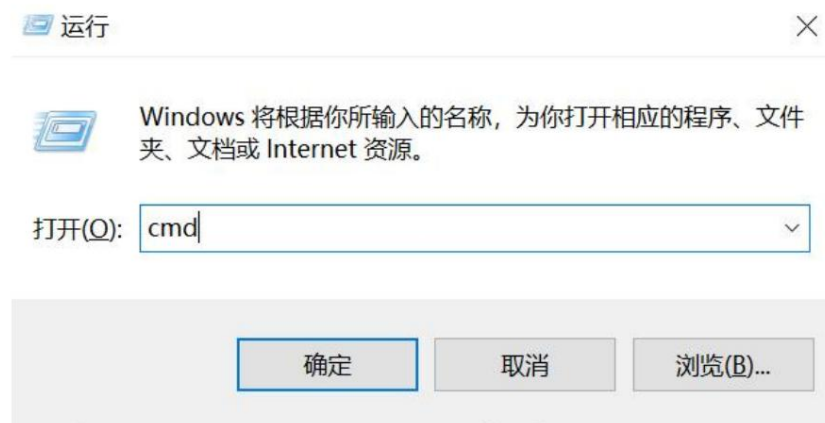
When using iperf as a traffic test method, the firewall must be turned off, otherwise the traffic test will fail.

OK.

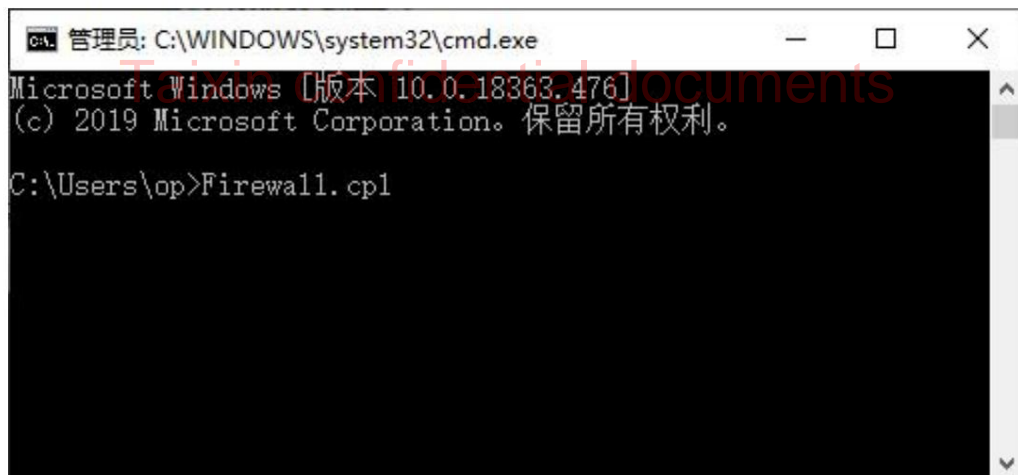
The following only explains how to turn off the firewall that comes with Windows. For firewalls of other security software, please

Find a way to close it yourself:

1. Win+R brings up the run interface, enter cmd, and then press Enter



2. In the pop-up cmd interface, enter Firewall.cpl and press Enter

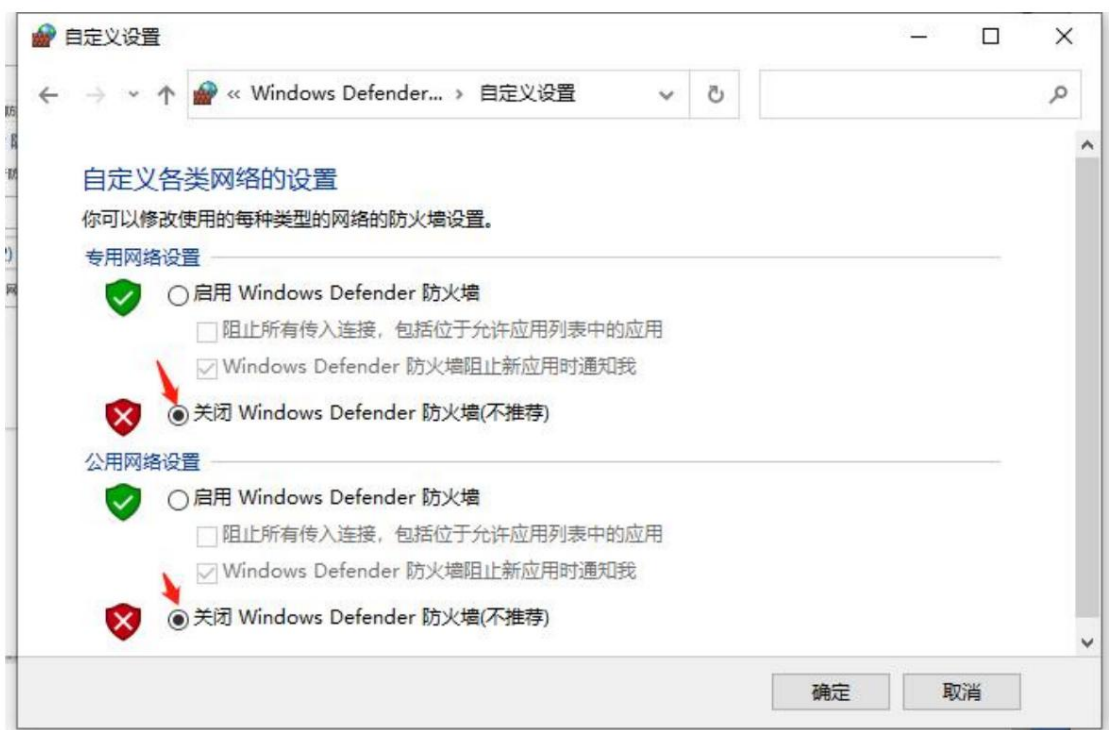


3. In the pop-up firewall page, click "Turn Windows Defender Firewall on or off"

Options



4. In the pop-up "Customize Settings" page, select "Turn off Windows Defender Firewall" option and click OK



5. After the traffic test is completed, you can reopen the firewall on the page in step 4.

2.2.2.4 The fourth step is to run **jperf** to measure traffic.

1.tcp test: Run

jperf on the first computer (the IP address is 10.10.10.156, the bridge is in ap mode). Transport layer options select tcp (default is tcp).

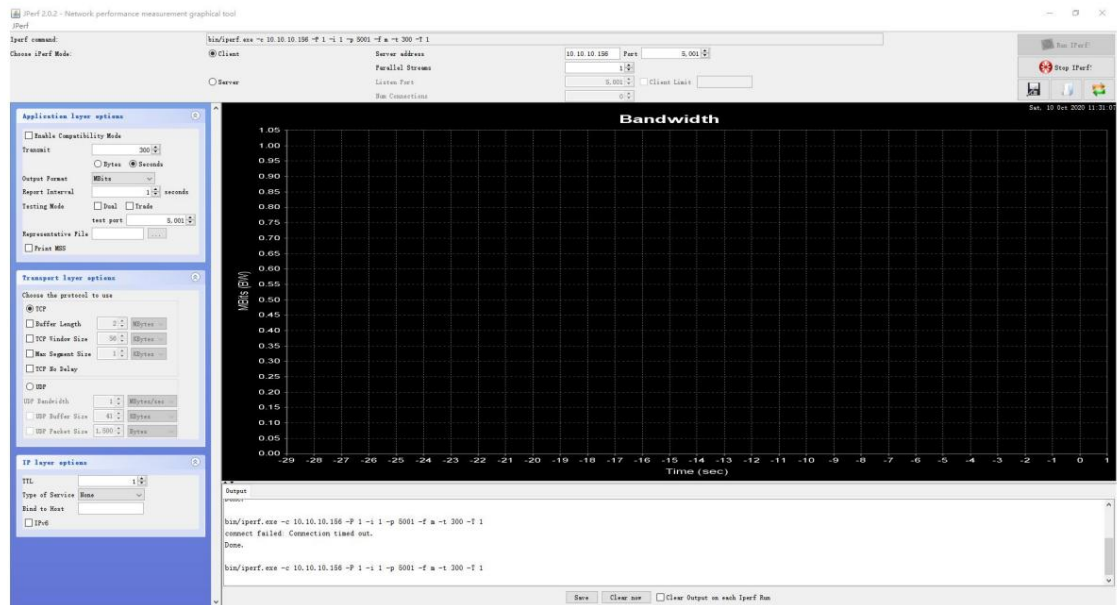
Choose iperf mode:server, that is, as the server. Then click run iperf.



Run jperf on the second computer (IP address is 10.10.10.123, bridge is in sta mode). Transport layer options select tcp (default is tcp).

Choose iperf mode:client, that is, as a client. Server address Enter the ip of another computer, which is 10.10.10.156. Port 5001 is the default port number, and the server and client just need to be consistent.

The traffic test duration can be modified in the transmit item of Application layer options (for example For example: 600 seconds). Select the traffic unit (for example: Mbits) in the output format item. Then click run iperf.



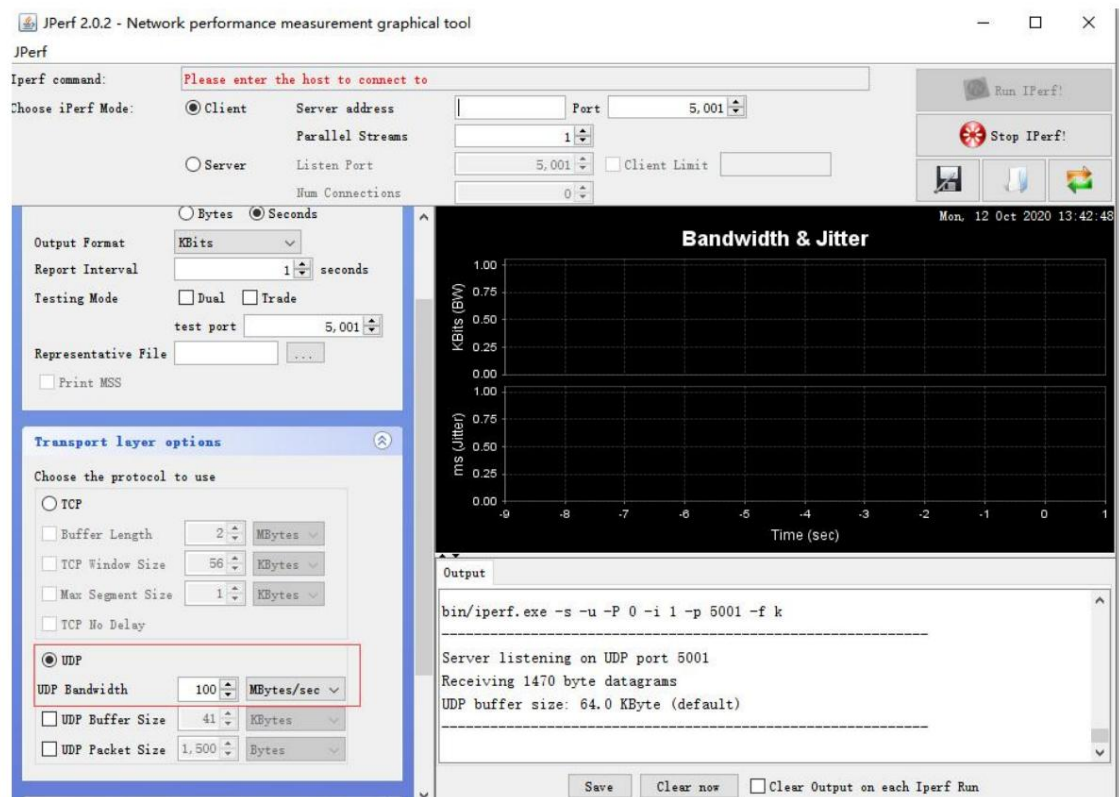
2.udp test

The steps are the same as the tcp test. Run iperf on the first computer and select udp in the transport layer options.

Choose iperf mode:server, that is, as the server, and then click run iperf. Run iperf on the second computer and select udp in the transport layer options.

Choose iperf mode:client, that is, as a client, set udp bandwidth to 100 (default is 1). Server address

Enter the ip of another computer. Port 5001 is the default port number. Keep the server and client the same, and then click run iperf. Just observe the traffic data on the server side.



The current bridge design prioritizes traffic from sta to ap. If the traffic direction is changed from ap to sta, the traffic received will be slightly smaller.

2.2.31M mode setting

Before snv version 11371, if you work in 1M mode, you need to set tx_bw to 1M, bss_bw Set to 2M. Please refer to Section 2.3.2. After this version, just set bss_bw=1 directly.

In 1M mode, if you use MCS2/1/0/10, you need to set the MTU to 300byte.

```
ifconfig hg0 man 300
```

```
ifconfig eth2 man 300
```

2.3 Introduction to commonly used AT+ commands

AT+ command is a set of debugging instructions defined by TaiXin AH solution. It communicates through UART serial port and serial port waveform.

The special rate is 115200; AT+ is not case sensitive;

2.3.1 Common commands

1. AT+CHAN_LIST, set the center frequency of the working channel, unit 100kHz, frequency range reference

Module

specifications; 2. AT+BSS_BW, set the channel bandwidth, unit MHz, optional 2 / 4 / 8; 3. AT+TX_MCS,

set the MCS of the transmitted signal, the optional values are 0~7 and 255, if set to 0~7

The value in means selecting a fixed first-level MCS. If it is set to 255, it is automatically adjusted;

4. AT+SSID, set SSID.

The above command will be saved when the power is turned off.

2.3.2 Example

Test items:

8M bandwidth MCS2, test command sequence:

1. AT+CHAN_LIST=9080,9160,9240 //Set the center frequency to 908M/916M/924M //Set bw to 8M;
2. AT+BSS_BW=8
3. AT+TX_MCS=2 //Set tx_mcs to 2;
4. AT+SSID=hgic_ah_test

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2.4 Introduction to network port tools

For scenarios where the serial port is inconvenient to use, TaiXin provides two network port-based tools to facilitate customers to configure parameters (netat.exe) and view logs (netlog.exe). Note that both tools require bridge firmware version 12954 or later to work. Instructions for use are introduced below.

2.4.1 Netat.exe

When you need to use AT+ commands to configure network bridge parameters, you can use netat.exe.

Connect the bridge device and PC with a network cable. Double-click to run, enter the IP address of the pc, and the mac of the connected

device will be displayed. If only one device is connected, device 1 will be auto selected.

```
select ipaddr for bind:10.10.10.151
----- Discover 1 Device -----
1: fa-de-09-8a-9b-38
>:auto select device 1
```

If several devices are connected through the switch, you can select the device by entering a number



```

1>:
----- Discover 3 Device -----
1: f6-de-09-9b-a7-60
2: f6-de-09-60-96-60
3: f6-de-09-99-6f-60

1>:2
select device 2

2>:3
select device 3
  
```

After selecting the device, enter the AT command to execute the AT command. The usage is the same as the serial port.

If you need the source code of netat for Linux integration related functions, please contact FAE to obtain: libnetat.C.

2.4.2 Netlog.exe

When you need to use a network cable to view the debugging log of the network bridge, you can use

netlog.exe. Connect the bridge device and PC with a network cable. Double-click to run netlog.exe, enter the IP address of the pc, and the log will be printed automatically. Only the log of the device connected to the network cable will be displayed. When using, be careful not to use a switch to connect multiple deviceŷ

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2.5 Firmware upgrade function description

If you upgrade the old version of firmware (before SVN 10000), you need to use the OTA tool to upgrade. Please consult us for details.

FAE;

New version firmware (after SVN 10000) upgrade, in addition to OTA tools, you can also use UART to upgrade

(at+fwupg), please consult FAE for details.

2.6 Relay function description

Firmware version 1.3.4.x and later supports the bridge relay function. The relay node is in APSTA mode. The number of relay levels is limited to one level. At the first level of relay, the traffic will be reduced by half and the delay will be doubled. For example, under the 8M bandwidth, at the first level of relay, the peak traffic will be only about 8Mbps.

Note that the pairing buttons and character buttons of the relay node are invalid.

2.6.1 Configuration of relay network

2.6.1.1 Role configuration

1. For AP and STA nodes, it is recommended to use the role button to select the

role: 2. The role button of the relay node is invalid, and you can only use the serial port AT+ command to select the role:

AT+MODE=APSTA

2.6.1.2 SSID configuration

In a bridge network without relay nodes, the AP and STA can be paired by pressing the pairing button;

The bridge network of the relay node can be paired by configuring the SSID. The setting method is as follows:

1. AP: Set SSID, for example AT+SSID=AH_AP; 2. Relay: Set

R_SSID to connect to the upper-level node (i.e. AP), for example AT+R_SSID=AH_AP;

Set the SSID to connect to the next-level node (STA), for example AT+SSID=AH_REPEATER;

3. STA: Set the SSID to connect to the relay node, such as AT+SSID=AH_REPEATER;

2.6.1.3 Key settings

If encryption is not turned on, AT+KEYMGMT=NONE, you do not need to set a key;

If encryption is turned on, AT+KEYMGMT=WPA-PSK, each node must set a key (64 hex

characters), please refer to the "AT Command Development Guide":

1. AP: Set PSK, the command is AT+PSK=xxx1 (a 64 hex character); 2. Relay: Set R_PSK to connect

to the upper-level node (i.e. AP), for example AT+R_PSK=xxx1; Set PSK is used to connect to the next-level node (i.e.

STA), for example AT+PSK=xxx2 (another 64 hex characters);

3. STA: Set PSK to connect to the relay node, such as AT+PSK=xxx2;

2.6.2 Signal indicator lights of relay network

In relay mode, the STA signal light displays the signal strength to the relay, and the relay displays the signal strength to the AP. If the AP is only connected to one relay, the signal strength of the relay will be displayed. If the AP is connected to two devices, all signal lights will be on.

2.7 Roaming function description

Firmware version 1.3.4.x and later supports bridge roaming function.

Note that roaming and relay functions are currently not supported at the same time.

2.7.1 Roaming configuration

2.7.1.1 SSID configuration

The SSID of the AP in the roaming network can be set by full word matching or fuzzy matching. Whole-word matching:

The SSIDs of all APs are set to the same SSID. The length of the SSID is not limited and does not exceed

32 characters will do. STA is also set to this SSID.

Fuzzy matching: The last three characters of SSID of different APs are different. The total length of the SSID must be greater than 8 characters, consisting of a common string (located at the beginning of the SSID string) and a 3-character ID (located at the end of the string).

For example, if the common string is HUGE_IC_AH, then you can set the SSID of AP1 to HUGE_IC_AH001, the SSID of AP2 to HUGE_IC_AH002, and so on. The SSID of the STA should be set to be consistent with the SSID of one of the APs.

2.7.1.2 Key settings

It is recommended to turn on encryption (AT+KEYMGMT=WPA-PSK).

In the roaming network, the keys of all APs and STAs must be set to be consistent. For example:

AT+PSK=baa58569a9edd7c3a55e446bc658ef76a7173d023d256786832474d737756a82

Please refer to the "AT Command Development Guide".

2.7.1.3 Roaming mode enable

The STA node needs to enable roaming mode (AT+ROAM=1).

3 Precautions for use

3.1 Precautions for erection location

- It is recommended to use brackets to raise the network bridge to more than 1.5 meters to eliminate the risk of antenna propagation caused by people moving around.

Route interference; •

Do not place the network bridge too close to the wall, as too close will affect the performance of the antenna;

- Some antennas do not support bending. If there is a "Do not bend" label on the antenna, please do not

to bend

- Do not place the bridge too close. It is recommended to keep a distance of more than 1 meter to prevent the signal from being too strong.



The network bridge needs to be installed when the distance is long, because the Fresnel zone of 900mhz/700mhz radio is relatively 2.4Ghz Fresnel zone is higher. The figure below shows a comparison of the Fresnel zone calculation results of 700mhz and 2.4Ghz.

中国移动4G

下午4:47

菲涅尔区在线计算|无线传输损耗计...

菲涅尔区图示:

频率: 700 兆赫兹 (MHz)

距离: 0.5 千米(Km)

清空 计算

菲涅尔区半径: 7.32 米(m)

天线最小高度: 障碍物高度 + 5.86 米(m)

中国移动4G

下午4:48

菲涅尔区在线计算|无线传输损耗计...

菲涅尔区图示:

频率: 2400 兆赫兹 (MHz)

距离: 0.5 千米(Km)

清空 计算

菲涅尔区半径: 3.95 米(m)

天线最小高度: 障碍物高度 + 3.16 米(m)

Fresnel zone calculation link

3.2 Precautions for power supply

The bridge supports 5v and 12v power supply.

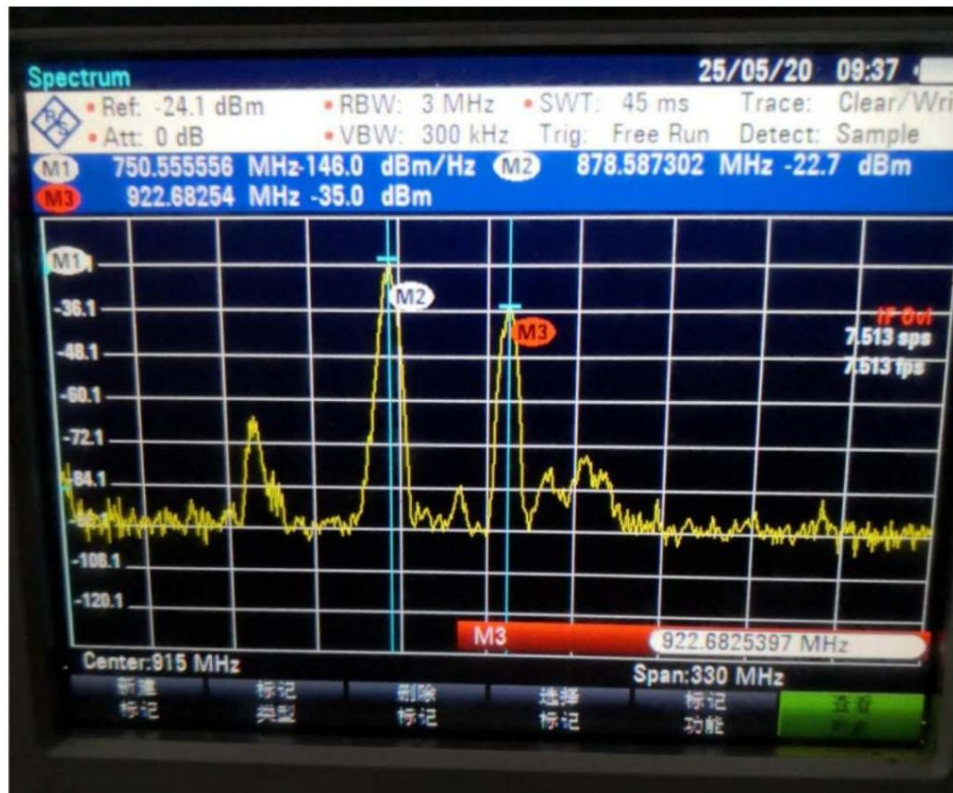
The resistance of the power supply line is required to be less than 0.2 ohms. Simply put, the thicker the better. A power supply line that is too thin may cause Excessive voltage drop may cause the bridge to work abnormally.

Note that the computer's USB only has 5V (500mA) and cannot supply power to the bridge. Please do not use the computer's USB power supply.

electricity.

3.3 Avoid interference

If there are high-power interference signals in the test environment, communication performance will also be seriously affected. If you have a spectrum analyzer, please measure the air interface condition of the operating frequency 700~1000mhz. The figure below shows the situation where there is obvious high-power interference near 900mhz, using a portable spectrum analyzer.



4 common troubleshooting

4.1 Unable to pair

Check whether the mode key (see the physical picture of the bridge solution demo in Chapter 1) is correct and the correct method

The method is to have and only one bridge in AP mode, and the remaining one or more bridges should be in STA mode.

If you still cannot pair, you can try to restore factory settings (use the factory reset function of the OTA tool),

Then pair again. Note that after restoring to factory settings, all previously maintained pairing information will be lost.

4.2 Repeated restarts

Check whether the power supply voltage of the network bridge is normal, for example, whether the power supply line is too thin and the voltage drop is too large.

4.3 Traffic is abnormally low

Please refer to the usage precautions section.

4.4 demo cannot connect after restarting after switching roles

Our bridge demo supports hot switching of working modes (AP/STA). When the role of the bridge demo is switched, the bridge automatically restarts. It should be noted

that if it was the demo of the AP before, and if it has been paired with more than one other bridge demo, after switching roles and restarting, the bridge demo will only connect back to the first saved bridge demo. At this time, it is easy to have the problem of failure to connect back (the bridge demo after the switch actually initiates the reconnection, but it is not necessarily the bridge demo that the reconnection customer thinks). Therefore, we require the demo to re-pair after switching roles to ensure the normal operation of the bridge in the future.

do.

4.5 bridge shows connected but unable to communicate normally

When encountering this problem, you can follow the following steps to locate the problem:

1. First determine whether the Ethernet connection is normal. If the RJ45 LED of the bridge does not light up, it means that the Ethernet connection

is not normal. You can try to replace the network cable, or check whether the device connected to the bridge is

Is it normal?

2. The Ethernet connection is normal, but the communication is not normal. In this case, you can replace the network with a switch

Bridge, locate the problem: a) Determine the conditions

for reproducing the problem. Such as the power-on sequence of the network bridge and connected devices, the sequence of unplugging and plugging network cables, etc.

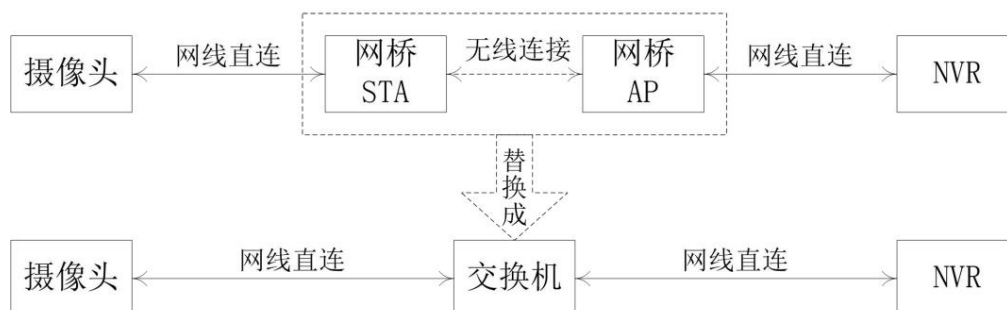
Order etc.

- b) Our company's bridge is essentially a switch that has a delay in transmitting data, so switching can be used

Replace the network bridge with your computer to determine where the problem is. It is recommended to use a pure transparent

transmission switch (such as Mercury's SG105M switch). The following figure takes NVR and camera as an example to show the switch

How to replace the bridge:



- c) After replacing the switch with the bridge, use the conditions for reproducing the problem in step a (such as the power-on sequence of the switch and connected devices, the sequence of removing and plugging the bridge, etc.) to observe whether abnormal communication still exists. If abnormal communication still occurs after using the switch, it means that the problem is not the bridge, but the device connected to the bridge. On the contrary, problems arise

It is a network bridge. In this case, you need to contact our FAE.

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appendix

A reference traffic indicator

A.1 Floor penetration test

Test location: Taixin office building. One network bridge is fixed in the stairwell on the first floor, and the other is mobile.

The first screenshot shows the '900M拉距离.xlsx' spreadsheet. The data is as follows:

	A	B	C	D	E	F	G	H	I
1									
2	楼层	evm	tx mcs	rx mcs	bgrssi	rsssi	平均流量 (KB/s)		
3	2楼	-30	7	7	-97	-37~-38	1858	备注: 频点890MHz	
4	3楼	-28~-30	7	6~7	-98~-99	-52~-57	1679		
5	4楼	-21~-24	3~4	4~5	-97	-65~-67	1030		
6	5楼	-9~-12	0	0	-99	-86	169	备注: 不稳定	
7									

The second screenshot shows the '700M网桥拉距离.xlsx' spreadsheet. The data is as follows:

	A	B	C	D	E	F	G	H	I
1									
2	位置	evm	tx mcs	rx mcs	bgrssi	rsssi	平均流量 (KB/s)		
3	2楼	-28~-30	7	7	-97	-35~-38	1907		
4	3楼	-30	7	7	-97	-48~-49	1914		
5	4楼电梯门口	-6~-14	0~2	0~1	-94	-72~-80	296		
6	4楼楼梯间 稍微 远离墙角	-21~-22	6~7	4~5	-96~-97	-68~-69	1785		
7	4楼楼梯间 墙角	-13~-14	1~2	0~1	-97	-77~-80	589		
8	5楼	-10~-12	0~1	0~1	-97	-79~-82	448		
9	5楼电梯门口							备注: 几乎无流量, 经常断线 备注: 只统计在我自己座位上的数据	
10	3楼办公桌	-12~-13	1~3	0~1	-95	-73~-74	731		
11									

A.2 Distance test

Straight line distance ŷmŷ	evm	tx mcs	rx mcs	bgrssi rssi	average traffic (KB/s)	Frequency ŷMHzŷ
300	-28~-29	6~7		-95~-97	-59~-61 1849 After the slave	890
600	-19	1	1~3	-95~-96	-68~-69 end is raised, there is 630KB/s	906

1200	-20~-21 0~1		1~4	-94~-95 -65~-67		After the slave side is raised, there is 808KB/s After putting the end down, there are probably 500KB/s	906
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Special note: This distance test was conducted on the Qi'ao Bridge, and the 300m and 600m positions are both located at

On the bridge, at 1200m, AP and ST can see each other across the sea. So the test saw 1200m of traffic

There may be flow rates higher than 600m.

Taixin confidential documents