Shenzhen Hi-Link electronic co., Ltd

HLK-7688A AT Command

ETHERNET

WIFI

Full function serial network/wifi module

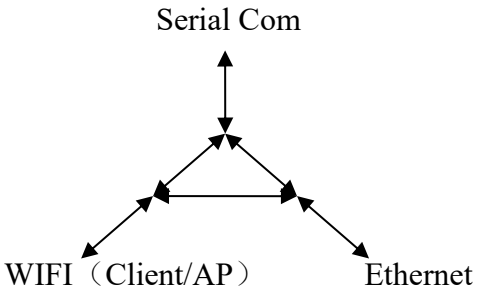
Directory

1 Brief Introduction

HLK-7688A is a new low-cost embedded UART - ETH - WIFI module developed bu shenzhen Hi-Link electronic technology co.,ltd.

This product is an embedded module based on the universal serial interface network standard, built-in TCP/IP protocol stack, enabling the user serial port, Ethernet, wireless network (wifi) interface between the conversions.

Through the HLK-7688A module, the traditional serial devices do not need to change any configuration; Data can be transmitted through the internet network. Provide a quick solution for the user's serial devices to transfer data via Ethernet.



Picture 1.Function Structure

2 Summarize

2.1 Technical Specifications

Table 2-1 Technical Specifications

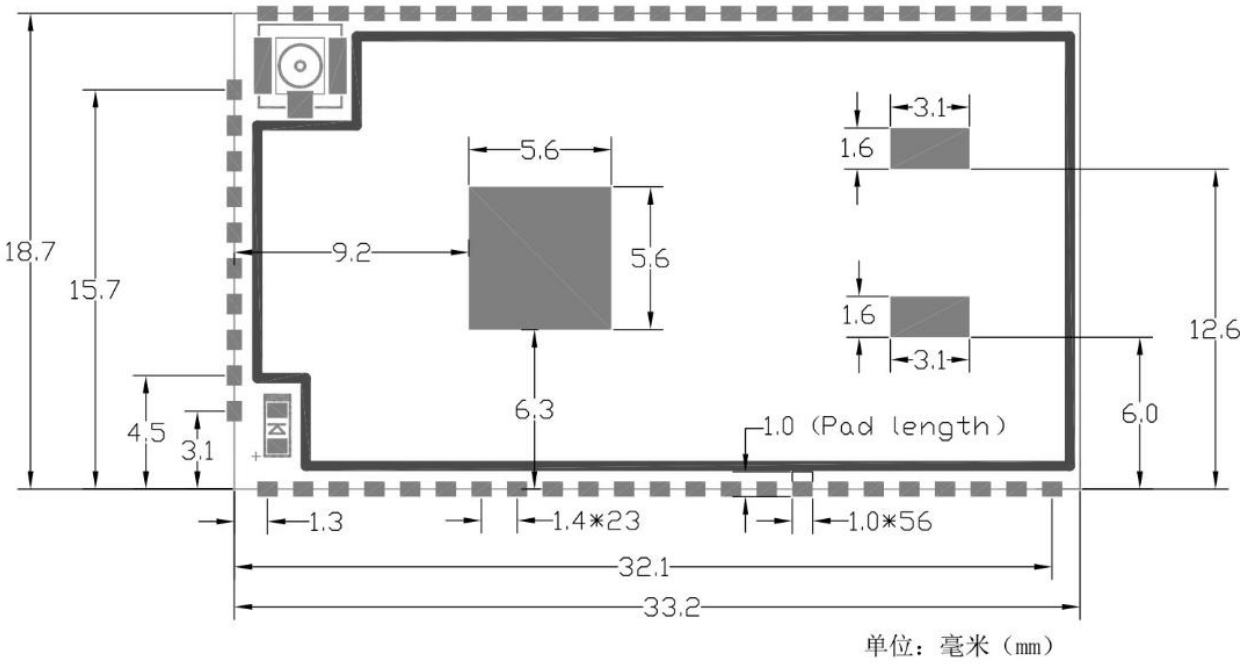
Network Standard	Wireless：IEEE 802.11n、IEEE 802.11g、IEEE 802.11b
	Wired：IEEE 802.3、IEEE 802.3u
Wireless Transmission Rate	11n:Maximum up to 150Mbps 11g:Maximum up to 54Mbps 11b:Maximum uo to 11Mbps
Tracks Number	1-14
Frequency range	2.4-2.4835G
Emission power	12-15DBM
Interface	5 Ethernet、2 Serial、1 USB（host/slave）、GPIO
Antenna	
Antenna Type	On board antenna /External antenna
Functional Parameters	

WIFI Work Mode	Network Drive/Wireless/Router
WDS Function	Support WDS wireless bridge connection
Wireless Security	Wireless MAC address filtering
	Wireless security function switch
	64/128/152 bit WEP encryption
	WPA - PSK/WPA2 - PSK、WPA/WPA2 security mechanism
Network Management	Remote Web management
	Configuration file import and export
	WEB software upgrade
Serial to Ethernet	
Maximum transmission	500000bps
TCP connection	Max connection number>20
UDP connection	Max connection number>20
Serial baud rate	1200~500000bps（Support nonstandard bps）
Other parameter	
Status indicator light	Status indicator
Environmental standards	Operating temperature：-20-70℃
	Operating humidity：10%-90%RH（non-condensing）
	Storage temperature：-40-80℃
	Storage humidity：5%-90%RH（non-condensing）
Other performance	Frequency bandwidth optional：20MHz、40MHz, automatically

2.2 Hardware Explanation

2.2.1 Mechanical Dimensions

HLK-7688A size is shown below：（L*W）=18mm*32.8mm*2.8mm


18.7
15.7
4.5
3.1
9.2
5.6
5.6
6.3
3.1
1.6
1.6
3.1
12.6
6.0
1.0 (Pad length)
1.3
1.4*23
1.0*56
32.1
33.2

单位：毫米（mm）


Model: HLK-7688A
RoHS CE FC
FCCID:2AD56HLK-7688A 1632

Note：

1. I/O port electrical level voltage is 3.3V

3 Quick start

3.1 Factory resetting

In order to ensure that all the configuration process correctly, let module restore factory settings. In factory mode can skip this step. 5V(350mA) to supply power to the module, wait about 30 seconds after startingthe low WDT/RST pin exceeds Trst, the release of WDT/RST Pin，the system will automatically restart. The system is already in factory mode.

3.2 Configuration network parameter

Set the PC to static IP mode and then connect it with the module via Ethernet or WIFI. The IP address is set to 192.168.16.100/255.255.255.0, gateway192.168.16.254.（wifi default and ssid default password, see this document）open the browser **http://192.168.16.254/**，enter the web configuration page， default user name and password is admin/admin. Modity the network parameter through the web. Now, the module's IP address is192.168.16.254. Configuration details can be seen in 5.1.

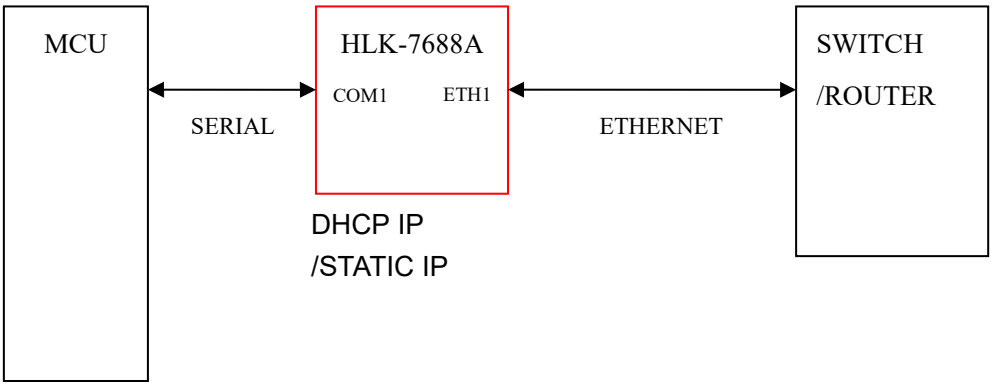
3.3 Configuration serial network parameter

Open the browser **http://192.168.16.254/**，enter the serial to network web configuration page. Configure the serial to network parameter as needed through a wed page. Configuration details can be seen in 5.2.

4 Function Description

The module can be divided into four modes: default mode, serial to Ethernet, serial to wifi client, and serial to wifi AP.

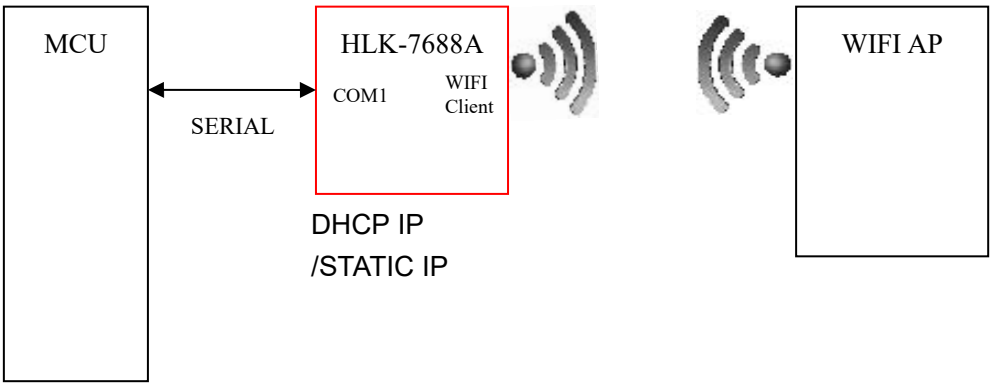
4.1 Serial to Ethernet



Picture 3.Serial to Ethernet model

In this mode，ETH1 enable，WIFI、ETH2 function close. Through the appropriate settings,data between COM1 and ETH1 network can achieve mutual conversion.
Ethernet can be configured as dynamic IP address（DHCP），can also configured ad static address（STATIC）.

4.2 Serial to WIFI CLIENT



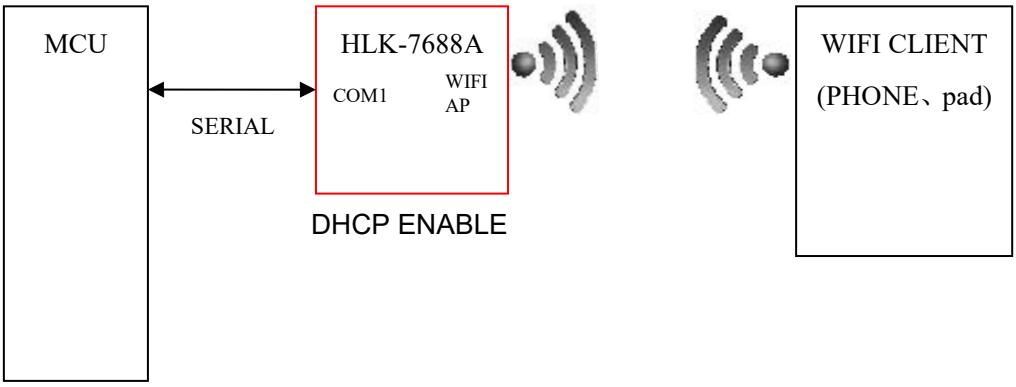
Picture 4.Serial to WIFI CLIENT model

In this mode, WIFI enable, module works in the CLIENT mode, ETH1 、 ETH2function close.Through the appropriate settings,data between COM1 and ETH1 network can achieve mutual conversion.

WIFI CLIENTcan be configured as dynamic IP address（DHCP），can also configured ad static address（STATIC）.

WIFI safety: support all encryption methods at present.

4.3 Serial to WIFI AP



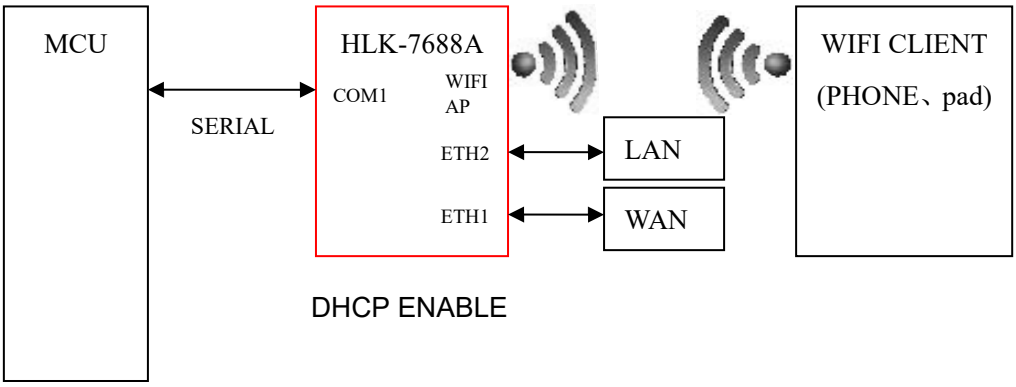
Picture 5.Serial to WIFI AP model

In this mode, WIFI enable, module works in the AP mode, ETH1 、 ETH2function close.Through the appropriate settings,data between COM1 and ETH1 network can achieve mutual conversion.

WIFI safety: support all encryption methods at present.

In this mode, WIFI device can connect with the module and become the device under WIFI LAN.

4.4 Default Mode



Picture 6.Default mode model

In this mode, WIFI enable, module works in the AP mode, ETH1、ETH2function enable.ETH1 works as WAN,ETH2 works as LAN.Through the appropriate settings,data between COM1 and network can achieve mutual conversion.

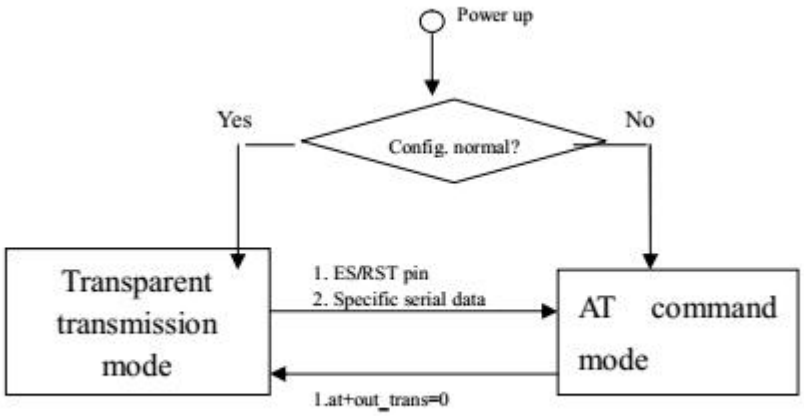
WIFI safety: support all encryption methods at present.

In this mode, WIFI device can connect with the module and become the device under WIFI LAN.

WAN default IP is dynamic IP address.LAN、 WIFI for the same local area network, enable by default DHCP server.

4.5 Serial work mode switching

Module serial work status is defined as two modes: transparent transmission mode, the AT command mode.

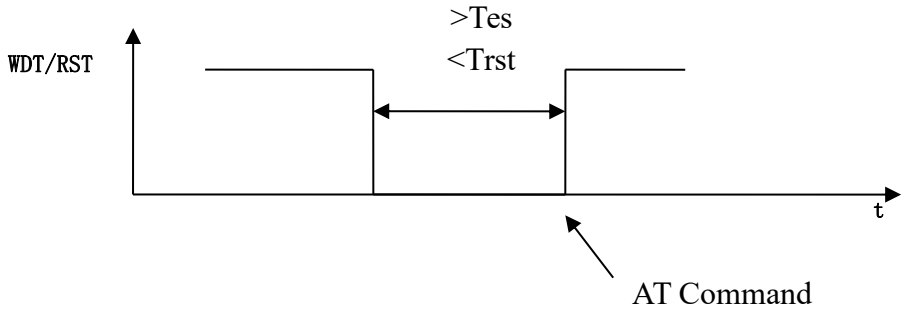


Picture7.Serial work mode switching

After power on normally, the module will check whether the current network serial port configuration is normal, if the network connection is normal, the module automatically enters.
There are three kinds of methods for transparent mode entering AT command mode:

1.WDT/RST Pin.

In any state, keep WDT/RST pin low time greater than Tes and less than Trst, the module will immediately enter the AT command mode.

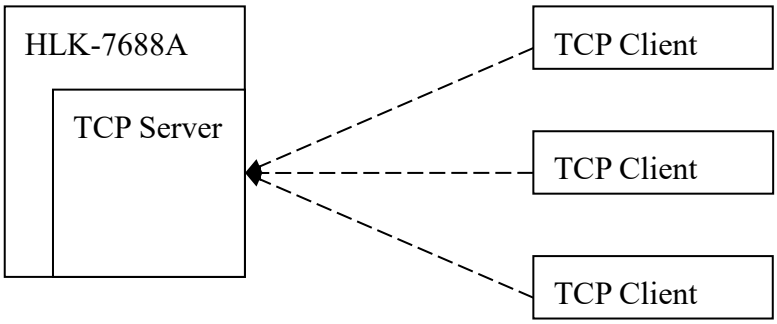


Picture8. WDT/RST Exit transparent transmission mo

4.6 Serial-network data conversion

Serial data conversion divided into 4 modes：TCP Server、TCP Clinet、UDP Server、UDP Client。

TCP Server



Picture 10.TCP Server

In this mode, the module is listening on the specified port, waiting for TCP client connection, if connected, all TCP data is sent directly to the serial port end, the data of the serial end sent to TCP client end.

TCP Client

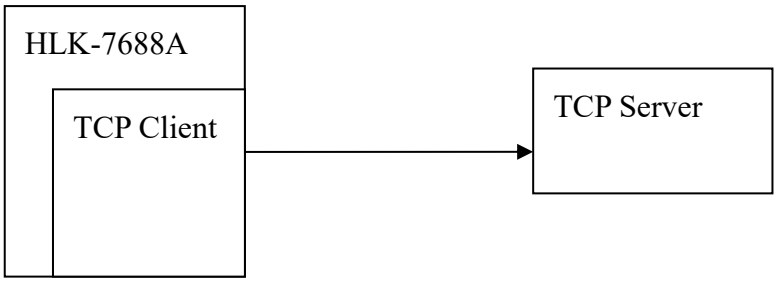


图 11.TCP Client

In this mode, the module is connected to the specified domain /IP port. All the data sent from the TCP server-side end will be sent directly to the serial port, the data from the serial end sent to the TCP server-side. abnormal network disconnect will cause the module active reconnect. TCP active reconnect, and otherwise the module will not reconnect.

UDP Server

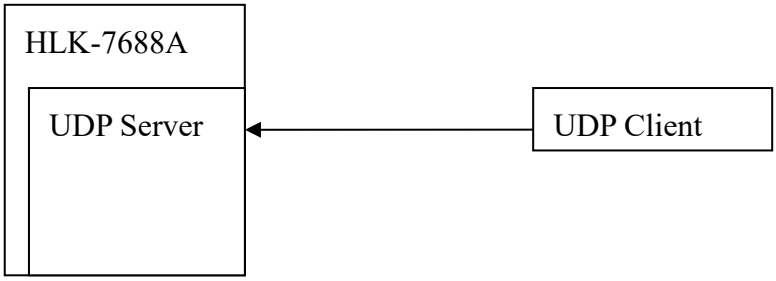


图 12.UDP Server

In this mode, module open the specified local port, once received is sent to the data port, and record the last connection on remote information. Serial port to receive data will be sent directly to the remote IP,recorded port.

UDP Client

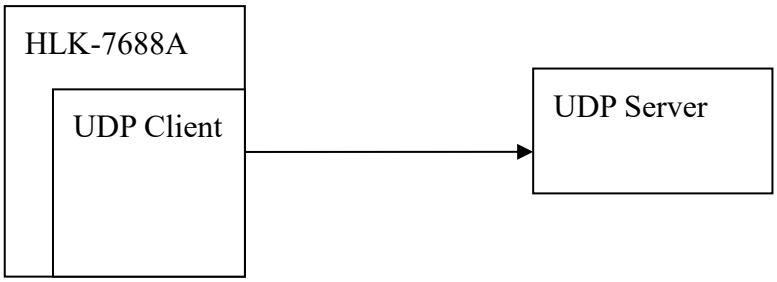


图 13.UDP Client

In this mode, the module directly sends the serial data to the specified ip, port. The serial data returned from the server will be distributed to serial port.

4.7 Parameter configuration direction

The module provides two ways for the configuration parameter：

1.WEB page；

2.Serial AT command.

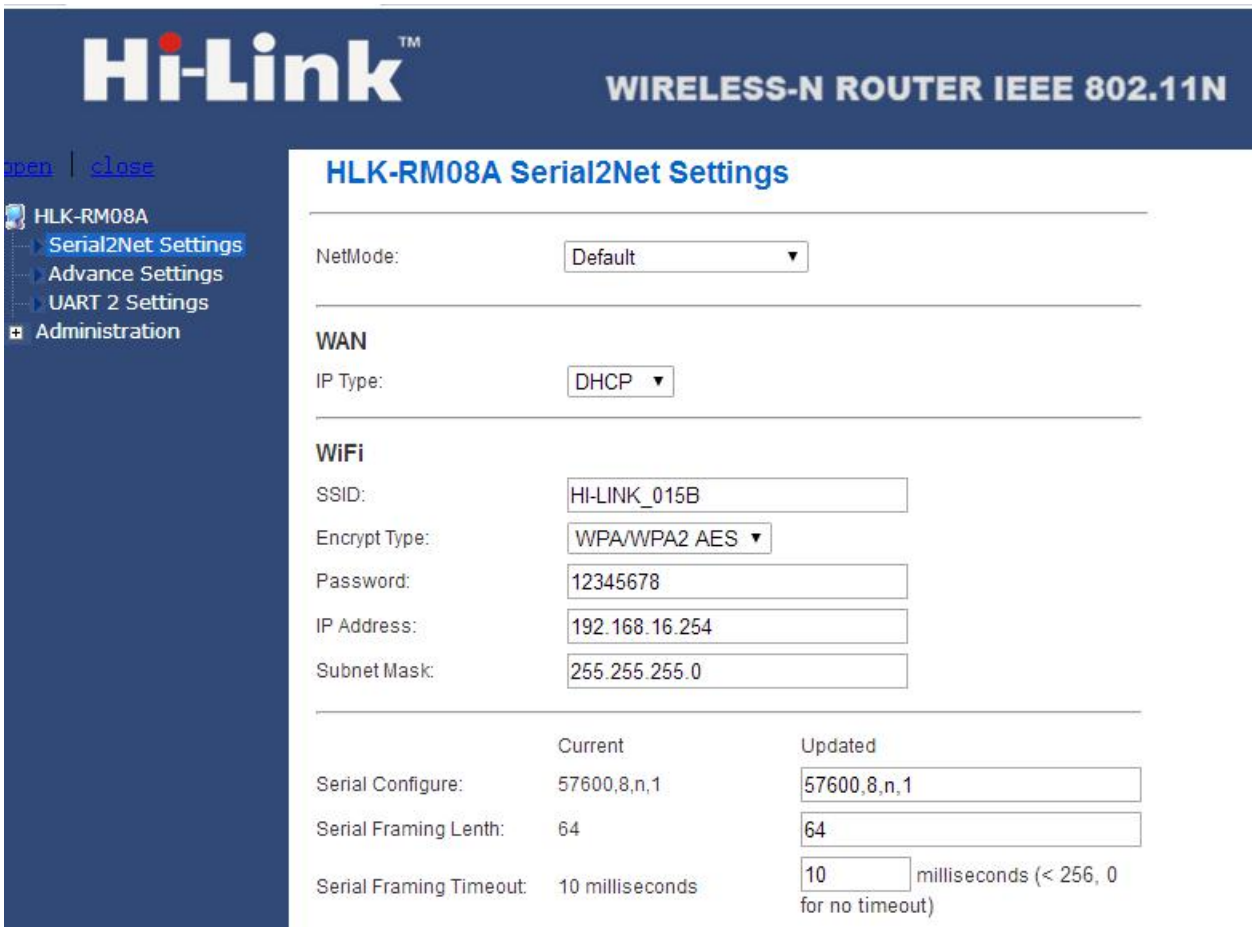
Access to WEB configuration page requires the confirmation of the module's IP address, as well as the user name and password that authenticated by WEB.

Configure parameter through the serial port AT command needs to make the module into the

AT command mode first.

Serial configuration HLK-7688A_CONFIG: Configure the module through AT command, provide a easier and convenient configuration process through the configuration combination of each parameter.

5 WEB configuration



Picture 14.WEB configuration page

Through the correct module address (default addresshttp://192.168.16.254/)you can access to the web configuration page, the page can be divided onto 3 areas：

1 Network configuration area;

2 Serial function area;

3 Configuration submit area;

5.1 WEB Network configuration

Net mode selection (NetMode)：

Default - default work mode

ETH -SERIAL - Serial to Ethernet

WIFI(CLIENT)-SERIAL - Serial to WIFI CLIENT

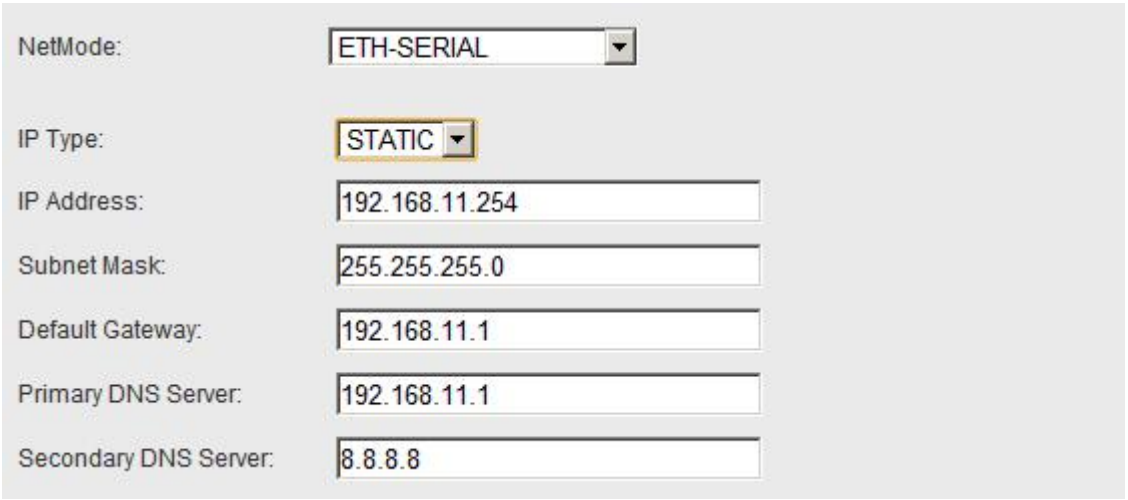
WIFI(AP)-SERIAL) - Serial to WIFI AP

Choose different work mode, the web will show you different page. Mode configuration page is as follows:

5.1.1 Serial to Ethernet- dynamic ip

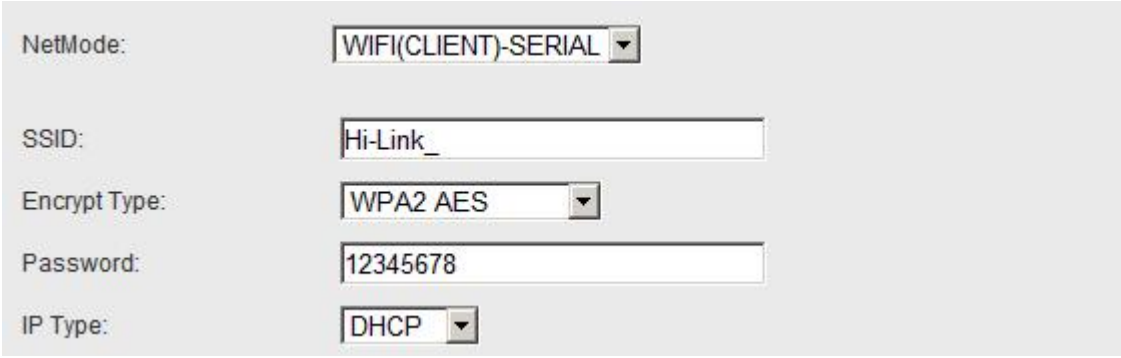
Picture 15. Serial to Ethernet- dynamic

5.1.2 Serial to Ethernet - static ip



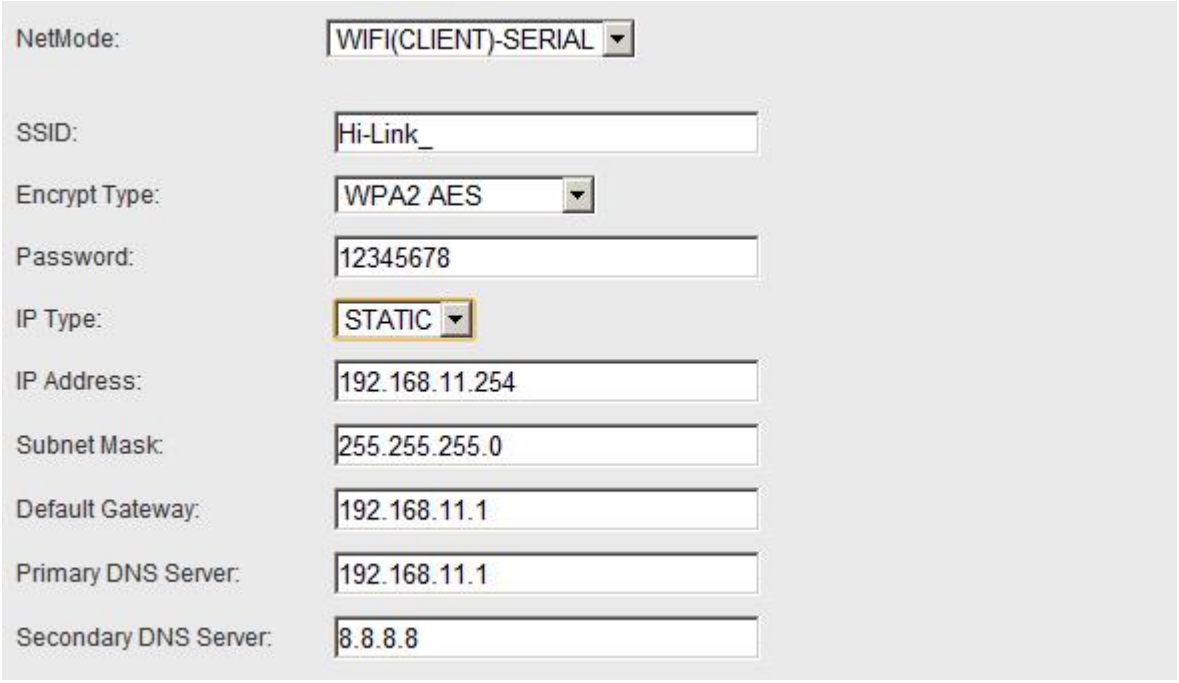
Picture 16. Serial to Ethernet - static

5.1.3 Serial to WIFI CLIENT- dynamic ip



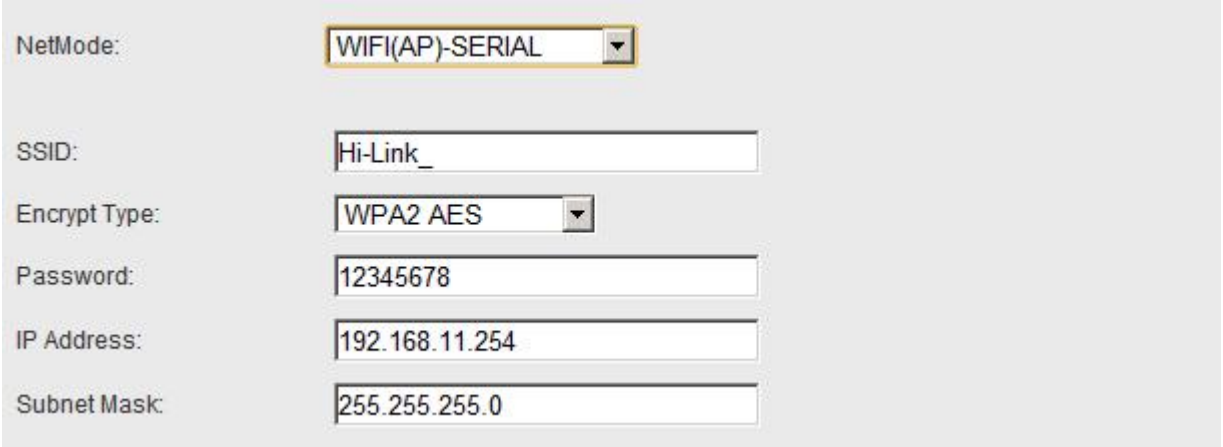
Picture17. Serial to WIFI CLIENT- dynamic

5.1.4 Serial to WIFI CLIENT- static ip



Picture18. Serial to WIFI CLIENT- static

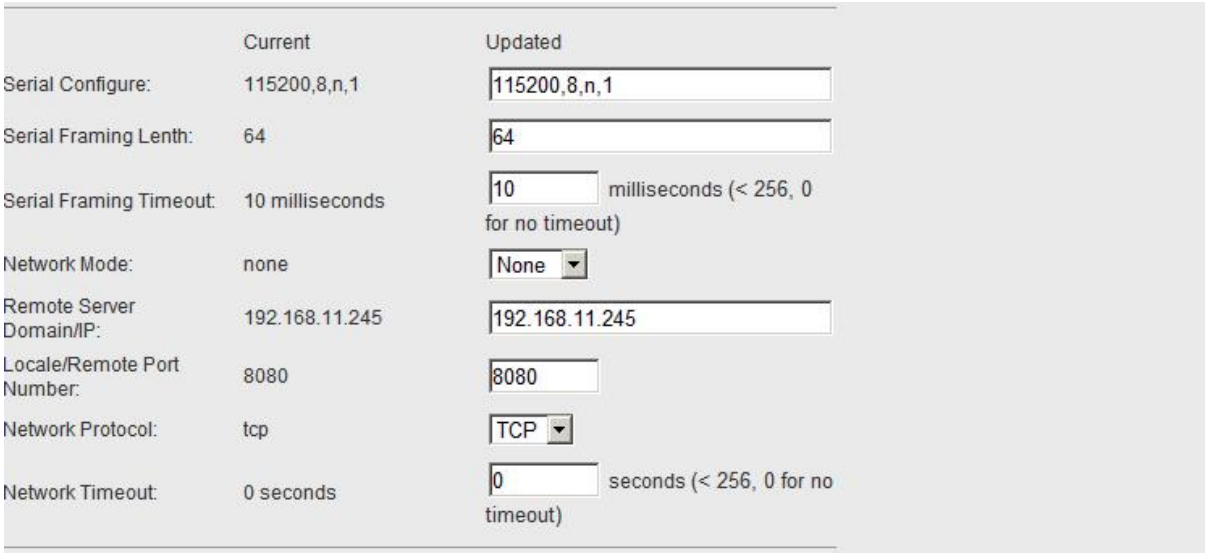
5.1.5 Serial to WIFI AP



Picture19. Serial to WIFI AP

5.2 WEB serial port configuration

Serial web configuration is as follows:



Picture 20. web serial port configuration

Current shows the current configuration,Updated shows the current parameter.

Serial Configure: Serial configuration. The format is as follows:Mbps,data bits,parity bit and stop bit.

For example: “115200,8,n,1”。

Serial Framing Lenth: The serial frame length

Serial Framing Timeout: The serial frame time

Network Mode: The network mode.Choose Client、Server or none.

Remote Server Domain/IP: The remote server name or IP address.

For example: 192.168.11.245 or www.hlktech.com 。

Locale/Remote Port Number: Local or remote port number.Network mode is different parameters specified remote port number, server is the specified port number.

Network Protocol: The type of network protocol.Used tcp or udp.

Network Timeout：Network timeout. Server network mode, when there is no data transmission within the timeout period, the connection will be disconnected. 0 specified never disconnected.

5.3 Commit changers

Click on the Apply configuration of the current page submission. If the network parameters have been changed, the submission process may require about 25 seconds. If only modify the serial port function configuration, the submission process will finished soon.

Click cancel to reload the page, the modified configuration will be lost/

6 Serial AT command configuration

6.1 Enter AT command mode

6.2 AT command

In AT mode, the configuration parameters of the system can be done through the serial port AT instruction. The command as follows:

at+[command]=[value]\r

According to the different command module will return different value.For example: ”at+remoteip=192.168.11.133\r”Set the ipaddress is 192.168.11.133。

Foe example : ”at+remoteip=? \r”check the remote ip address.

Command list is as following:

netmode	Network model
wifi_conf	WiFi configuration
Channel	WiFi channel
dhcpc	DHCP Client configuration
net_ip	Network IP address
net_dns	Network DNS address
dhcpd	DHCP server configuration
dhcpd_ip	DHCP server IP address
dhcpd_dns	DHCP server DNS address
dhcpd_time	DHCP server allocates time
net_commit	Submit network configuration

out_trans	Exit transmission
remoteip	Remote server domain name or address
remoteport	Local or remote port number
remotepro	Network protocol type
timeout	Network timeout
mode	Serial network mode
uart	Serial configuration
uartpacklen	Serial frame length
uartpacktimeout	Serial frame time
escape	Exit serial transmission
tcp_auto	TCP automatic reconnect
save	Submit serial port configuration and restart service
reconn	Restart service
default	Factory reset
reboot	Restart module
ver	Version
CLport	TCP/UDP CLIENT local port
RTS	Serial output instructions (485)
XON_XOFF	XON/XOFF flow control enable
net_wanip	wan ip address
tcp_client_check	TCP CLIENT remote state detection
S2N_Stat	Serial port function
Get_MAC	Get MAC address
wifi_ConState	WiFi CLIENT connect status
wifi_Scan	WiFi scan
suspend	System hang up
C2_uart	Serial 2 serial configuration
C2_mode	Serial 2 serial network mode
C2_remoteip	Serial 2 remote server name or IP address
C2_port	Serial 2 local or remote port number
C2_CLport	Serial 2 TCP/UDP CLIENT local port
C2_protocol	Serial 2 network protocol type
C2_timeout	Serial 2 network timeout
C2_uartpacklen	Serial 2 serial frame length

C2_uartpacktimeout	Serial 2 serial frame time
C2_tcp_auto	Serial 2 TCP automatic reconnect
C2_tcp_client_check	Serial 2 TCP CLIENT remote state detection

6.2.1 netmode

Function:

Network mode setting.

Form:

at+netmode=<netmode>\r

Parameter:

Network mode

value	Meaning
0	Default mode
1	Ethernet
2	WiFi client
3	WiFi AP

6.2.2 wifi_conf

Function:

Wireless setting.

Form:

at+wifi_conf=<ssid>, <encrypt type>, <password> \r

Parameter:

ssid: Network SSID

encrypt type: Encryption

Encryption

value	Meaning
none	Open network
wep_open	Wep encryption, open authentication
wep	Wep encryption,keyed authentication
wpa_tkip	wpa tkip
wpa_aes	wpa aes
wpa2_tkip	wpa2 tkip
wpa2_aes	wpa2 aes
wpawpa2_tkip	wpa/wpa2 tkip
wpawpa2_aes	wpa/wpa2 aes
auto	Automatic selection

password: password

6.2.3 Channel

Function:

WiFi Wireless channel choice.

Form:

at+Channel=<Channel>\r

Parameter:

Channel:0-14. (0-automatic selection)

6.2.4 dhcpc

Function:

Dhcp client enable

Form:

at+dhcpc=<dhcpc>\r

Parameter:

Dhcp client enable

value	Meaning
0	Static ip address
1	Dynamic ip address

6.2.5 net_ip

Function:

The network IP sets. This parameter is invalid when DHCP client is working.

Form:

at+Net_ip=<ip>, <mask>, <gateway>\r

Parameter:

Ip: ip address

Mask: subnet mask

Gateway: gateway

6.2.6 net_dns

Function:

The network DNS sets.his parameter is invalid when DHCP client is working.

Form:

at+Net_dns=<dns1>, <dns2>\r

Parameter:

dns1: Primary DNS address

dns2: Secondary DNS address

6.2.7 dhcpd

Function:

DHCP server enable. 网 This parameter is invalid when the network mode not in AP mode.

Form:

At+dhcpd=<dhpcd>\r

Parameter:

Dhcp Server enable

value	Meaning
0	Close
1	Open

6.2.8 dhcpd_ip

Function:

Dhcp server ip setting.

Form:

At+Dhcpd_ip=<ip start>, <ip end>, <mask>, <gateway>\r

Parameter:

Ip start: ip start address

Ip end: ip cut-off address

Mask: subnet mask

Gateway: gateway

6.2.9 dhcpd_dns

Function:

Dhcp server dns setting.

Form:

At+Dhcpd_dns=<dns1>, <dns2>\r

Parameter:

dns1: Primary dns address

dns2: secondary dns address

6.2.10 dhcpd_time

Function:

Dhcp server timesetting

Form:

At+Dhcpd_time=<time >\r

Parameter:

time: allocate dhcp valid time to device

6.2.11 net_commit

Function:

Submit network setting.All parameters related to network configuration are required to be committed after this setting. The command execution time takes about 30s.

Form:

At+ Net_commit=< Net_commit >\r

Parameter:

Submit network settings

value	Meaning

0	Disable
1	Refer

6.2.12 out_trans

Function:

Exit the pass through mode. The function of exiting the pass mode cannot actually be used on the serial port.

Form:

At+out_trans=<out_trans>\r

Parameter:

Submit network settings

value	Meaning
0	Enter transparent transmission
1	Exit transparent transmission

6.2.13 remoteip

Function:

Remote ip or domain name setting.

Form:

At+remoteip=< remoteip >\r

Parameter:

Remote server domain name or ip address.

6.2.14 remoteport

Function:

Remote port setting.

Form:

At+ remoteport=<remoteport>\r

Parameter:

Remoteport: Remote port.

6.2.15 remotepro

Function:

Protocol type setting.

Form:

At+ remotepro=<remotepro>\r

Parameter:

remotepro setting

value	Meaning
None	None
Tcp	Tcp protocol
Udp	Udp protocol

6.2.16 timeout

Function:

Network timeout

Form:

At+timeout=<timeout>\r

Parameter:

Network timeout. Under server network mode,When there is no data transfer in the timeout period, the connection will be disconnected and the.0 specified never disconnects.

6.2.17 mode

Function:

Convert mode setting

Form:

At+mode=<mode>\r

Parameter:

Mode setting

value	Meaning
None	None
Client	Client
Server	Server

6.2.18 uart

Function:

Serial port configuration setting

Form:

At+uart=<baud>, <data>, <parity>, <stop>\r

Parameter:

Baud: Bps

Data: data bit

Parity: check bit

Stop: stop bit

6.2.19 uartpacklen

Function:

Frame length of serial port group setting.

Form:

At+uartpacklen =<uartpacklen>\r

Parameter:

uartpacklen: Frame length of serial port group (units: bytes) 。

6.2.20 uartpacktimeout

Function:

Group frame time of serial setting

Form:

At+ uartpacktimeout=<uartpacktimeout>\r

Parameter:

uartpacktimeout: Group frame time of serial (Units: ms) 。

6.2.21 escape

Function:

Serial port exit transparent transmission enable

Form:

At+ escape=<escape>\r

Parameter:

escape: 0 - close, 1 - enable

6.2.22 tcp_auto

Function:

TCP automatic reconnection. This function is turned on and the connection will continue to try to re-establish the connection, regardless of any reason.

Form:

At+ tcp_auto=<tcp_auto>\r

Parameter:

tcp_auto: 0 - Close , 1 - enable

6.2.23 save

Function:

Submit the serial port conversion configuration and restart the service

Form:

At+ save=<save>\r

Parameter:

Submit serial port setting

value	Meaning
0	Disable
1	Refer

6.2.24 reconn

Function:

Restart serial conversion service

Form:

At+ reconn =< reconn >\r

Parameter:

Restart serial conversion service

value	Meaning
0	Disable
1	Restart serial conversion service

6.2.25 ver

Function:

Firmware version inquiry

Form:

At+ ver =? \r

Parameter:

None.

6.2.26 Clport

Function:

TCP/UDP CLIENT local port

Form:

At+CLport=<CLport>\r

Parameter:

Clport: local port number.

6.2.27 RTS （This function has not been implemented yet）

Function:

Serial output indication. In the 485 scenario, a separate pin is usually required to indicate the reception or transmission status of the 485 transceiver. After this function is enabled, the GPIO_1 pin indicates the output state of the serial port as the output pin.

Form:

At+ RTS =< RTS >\r

Parameter:

RTS

value	Meaning
0	Close
1	Open

6.2.28 XON_XOFF

Function:

XON/XOFF Flow control enable.

Form:

At+ XON_XOFF=< XON_XOFF >\r

Parameter:

XON_XOFF

value	Meaning
0	Close
1	Open

6.2.29 net_wanip

Function:

wan ip address.

Form:

At+ net_wanip =? \r

Parameter:

无

6.2.30 tcp_client_check

Function:

TCP CLIENT Remote status detection.

Form:

At+ tcp_client_check =< tcp_client_check >\r

Parameter:

tcp_client_check

value	Meaning
0	Close
1	Open

6.2.31 S2N_Stat

Function:

Serial function status

Form:

At+ S2N_Stat =? \r

Parameter:

None

6.2.32 Get_MAC

Function:

Get MAC sddress

Form:

At+ Get_MAC =? \r

Parameter:

None

6.2.33 wifi_ConState

Function:

WiFi CLIENT Connection status

Form

At+ wifi_ConState =? \r

Parameter:

None

6.2.34 wifi_Scan

Function:

WiFi scan

Form:

At+ wifi_Scan =? \r

Parameter:

None

6.2.35 suspend

Function:

System suspension

Form:

At+ suspend =< suspend >\r

Parameter:

suspend

value	Meaning
0	Awake
1	Hang up

6.2.36 C2_remoteip

Function:

Serial 2 remote ip or domain setting

Form:

At+C2_remoteip=< remoteip >\r

Parameter:

Remote server domain name or IP address

6.2.37 C2_remoteport

Function:

Serial 2 remote port setting

Form:

At+ C2_remoteport=<remoteport>\r

Parameter:

Remoteport: Remote port

6.2.38 C2_remotepro

Function:

Serial port 2 protocol type setting.

Form:

At+ C2_remotepro=<remotepro>\r

Parameter:

Remotepro setting

value	Meaning
None	None
Tcp	Tcp protocol
Udp	Udp protocol

6.2.39 C2_timeout

Function:

Serial 2 network timeout

Form:

At+ C2_timeout=<timeout>\r

Parameter:

Network timeout. Under server network mode,When there is no data transfer in the timeout period, the connection will be disconnected and the.0 specified never disconnects.

6.2.40 C2_mode

Function:

Serial port 2 conversion mode setting.

Form:

At+ C2_mode=<mode>\r

Parameter:

Mode setting

value	Meaning
None	None

Client	Client
Server	Server

6.2.41 C2_uart

Function:

Serial port 2 serial configuration setting.

Form:

At+C2_uart=<baud>, <data>, <parity>, <stop>\r

Parameter:

Baud: Bps

Data: data bit

Parity: check bit

Stop: stop bit

6.2.42 C2_uartpacklen

Function:

Serial2 frame length setting

Form:

At+C2_uartpacklen =<uartpacklen>\r

Parameter:

uartpacklen: Frame length of serial port group (Units: bytes) 。

6.2.43 C2_uartpacktimeout

Function:

Serial port 2 serial frame time setting

Form:

At+ C2_uartpacktimeout=<uartpacktimeout>\r

Parameter:

uartpacktimeout: Group frame time of serial (Units: ms)

6.2.44 C2_tcp_auto

Function:

The serial 2TCP auto reconnect. This function is open and any connection is disconnected for any reason. The module will continue to try to re-establish the connection

Form:

At+ C2_tcp_auto=<tcp_auto>\r

Parameter:

tcp_auto: 0 - close, 1 - enable

6.2.45 C2_tcp_client_check

Function:

Serial 2TCP CLIENT remote status detection.

Form:

At+ C2_tcp_client_check =< tcp_client_check >\r

Parameter:

tcp_client_check

value	meaning
0	Close
1	Open

6.3 AT command control code routine

6.3.1 Configuration information query

code:

```
char *query="\
\
at+netmode=?\r\n\
at+wifi_conf=?\r\n\
at+dhcpd=?\r\n\
at+dhcpd_ip=?\r\n\
at+dhcpd_dns=?\r\n\
at+dhcpd_time=?\r\n\
at+dhcpc=?\r\n\
at+net_ip=?\r\n\
at+net_dns=?\r\n\
at+net_wanip=?\r\n\
\
at+remoteip=?\r\n\
at+remoteport=?\r\n\
at+remotepro=?\r\n\
at+timeout=?\r\n\
at+mode=?\r\n\
at+uart=?\r\n\
```

```
at+uartpacklen=?\r\n\
at+uartpacktimeout=?\r\n\
at+ver=?\r\n\
";

Com_send(query);
```

Return:

```
at+netmode=? 0
at+wifi_conf=? Hi-Link,wpa2_aes,12345678
at+dhcpd=? 0
at+dhcpd_ip=? 192.168.14.1,192.168.15.254,255.255.254.0,192.168.15.254
at+dhcpd_dns=? 192.168.15.254,0.0.0.0
at+dhcpd_time=? 86400
at+dhcpc=? 1
at+net_ip=? 192.168.15.254,255.255.254.0,192.168.11.1
at+net_dns=? 192.168.11.1,0.0.0.0
at+net_wanip=? ,,
at+remoteip=? 192.168.11.245
at+remoteport=? 8080
at+remotepro=? tcp
at+timeout=? 0
at+mode=? server
at+uart=? 115200,8,n,1
at+uartpacklen=? 64
at+uartpacktimeout=? 10
at+ver=? V1.39(Dec  6 2012)
```

6.3.2 Serial to Ethernet (dynamic ip address)

code：

```
char *commands_eth="\
\
at+netmode=1\r\n\
at+dhcpc=1\r\n\
\
at+remoteip=192.168.11.245\r\n\
at+remoteport=8080\r\n\
at+remotepro=tcp\r\n\
at+timeout=0\r\n\
at+mode=server\r\n\
at+uart=115200,8,n,1\r\n\
at+uartpacklen=64\r\n\
at+uartpacktimeout=10\r\n\
```

```
at+net_commit=1\r\n\
at+reconn=1\r\n\
";

Com_send(commands_eth);
```

Reurn:

```
at+netmode=1 ok
at+dhcpc=1
at+remoteip=192.168.11.245 ok
at+remoteport=8080 ok
at+remotepro=tcp
at+timeout=0 ok
at+mode=server
at+uart=115200,8,n,1 ok
at+uartpacklen=64 ok
at+uartpacktimeout=10 ok
at+net_commit=1
```

6.3.3 Serial to Ethernet (static ip address)

code:

```
char *commands_eth_static="\
\
at+netmode=1\r\n\
at+dhcpc=0\r\n\
at+net_ip=192.168.11.254,255.255.255.0,192.168.11.1\r\n\
at+net_dns=192.168.11.1,8.8.8.8\r\n\
\
at+remoteip=192.168.11.245\r\n\
at+remoteport=8080\r\n\
at+remotepro=tcp\r\n\
at+timeout=0\r\n\
at+mode=server\r\n\
at+uart=115200,8,n,1\r\n\
at+uartpacklen=64\r\n\
at+uartpacktimeout=10\r\n\
at+net_commit=1\r\n\
at+reconn=1\r\n\
";

Com_send(commands_eth_static);
```

Return:

at+netmode=1 ok
at+dhcpc=0
at+net_ip=192.168.11.254,255.255.255.0,192.168.11.1 ok
at+net_dns=192.168.11.1,8.8.8.8 ok
at+remoteip=192.168.11.245 ok
at+remoteport=8080 ok
at+remotepro=tcp
at+timeout=0 ok
at+mode=server
at+uart=115200,8,n,1 ok
at+uartpacklen=64 ok
at+uartpacktimeout=10 ok
at+net_commit=1

6.3.4 Serial to wifi client(dynamic ip address)

code：

```
char *commands_wifi_client="\
\
at+netmode=2\r\n\
at+wifi_conf=HI-LINK,wpa2_aes,12345678\r\n\
at+dhcpc=1\r\n\
\
at+remoteip=192.168.11.245\r\n\
at+remoteport=8080\r\n\
at+remotepro=tcp\r\n\
at+timeout=0\r\n\
at+mode=server\r\n\
at+uart=115200,8,n,1\r\n\
at+uartpacklen=64\r\n\
at+uartpacktimeout=10\r\n\
at+net_commit=1\r\n\
at+reconn=1\r\n\
";

Com_send(commands_wifi_client);
```

Return：

at+netmode=2 ok
at+wifi_conf=HI-LINK,wpa2_aes,12345678 ok
at+dhcpc=1
at+remoteip=192.168.11.245 ok
at+remoteport=8080 ok
at+remotepro=tcp

at+timeout=0 ok
at+mode=server
at+uart=115200,8,n,1 ok
at+uartpacklen=64 ok
at+uartpacktimeout=10 ok
at+net_commit=1

6.3.5 Serial to wifi client(static ip address)

code:

```
char *commands_wifi_client_static="\
\
at+netmode=2\r\n\
at+wifi_conf=HI-LINK,wpa2_aes,12345678\r\n\
at+dhcpc=0\r\n\
at+net_ip=192.168.11.254,255.255.255.0,192.168.11.1\r\n\
at+net_dns=192.168.11.1,8.8.8.8\r\n\
\
at+remoteip=192.168.11.245\r\n\
at+remoteport=8080\r\n\
at+remotepro=tcp\r\n\
at+timeout=0\r\n\
at+mode=server\r\n\
at+uart=115200,8,n,1\r\n\
at+uartpacklen=64\r\n\
at+uartpacktimeout=10\r\n\
at+net_commit=1\r\n\
at+reconn=1\r\n\
";

Com_send(commands_wifi_client_static);
```

return:

at+netmode=2 ok
at+wifi_conf=HI-LINK,wpa2_aes,12345678 ok
at+dhcpc=0
at+net_ip=192.168.11.254,255.255.255.0,192.168.11.1 ok
at+net_dns=192.168.11.1,8.8.8.8 ok
at+remoteip=192.168.11.245 ok
at+remoteport=8080 ok
at+remotepro=tcp
at+timeout=0 ok
at+mode=server
at+uart=115200,8,n,1 ok

at+uartpacklen=64 ok

at+uartpacktimeout=10 ok

at+net_commit=1

6.3.6 Serial to wifi AP

code:

```
char *commands_wifi_ap="\
\
at+netmode=3\r\n\
at+wifi_conf=Hi-Link_,wpa2_aes,0000000000\r\n\
at+dhcpd=1\r\n\
at+dhcpd_ip=192.168.16.100,192.168.16.200,255.255.255.0,192.168.16.254\r
\n\
at+dhcpd_dns=192.168.16.254,8.8.8.8\r\n\
at+dhcpd_time=86400\r\n\
at+net_ip=192.168.16.254,255.255.255.0,192.168.16.254\r\n\
at+net_dns=192.168.16.254,8.8.8.8\r\n\
\
at+remoteip=192.168.11.245\r\n\
at+remoteport=8080\r\n\
at+remotepro=tcp\r\n\
at+timeout=0\r\n\
at+mode=server\r\n\
at+uart=115200,8,n,1\r\n\
at+uartpacklen=64\r\n\
at+uartpacktimeout=10\r\n\
at+net_commit=1\r\n\
at+reconn=1\r\n\
";

Com_send(commands_wifi_ap);
```

return:

at+netmode=3 ok

at+wifi_conf=Hi-Link_,wpa2_aes,0000000000 ok

at+dhcpd=1 ok

at+dhcpd_ip=192.168.16.100,192.168.16.200,255.255.255.0,192.168.16.254 ok

at+dhcpd_dns=192.168.16.254,8.8.8.8 ok

at+dhcpd_time=86400 ok

at+net_ip=192.168.16.254,255.255.255.0,192.168.16.254 ok

at+net_dns=192.168.16.254,8.8.8.8 ok

at+remoteip=192.168.11.245 ok

at+remoteport=8080 ok

at+remotepro=tcp
at+timeout=0 ok
at+mode=server
at+uart=115200,8,n,1 ok
at+uartpacklen=64 ok
at+uartpacktimeout=10 ok
at+net_commit=1

6.3.7 Factory reset

code：

```
char *commands_device_default="\
\
at+default=1\r\n\
at+reboot=1\r\n\
";

Com_send(commands_device_default);
```

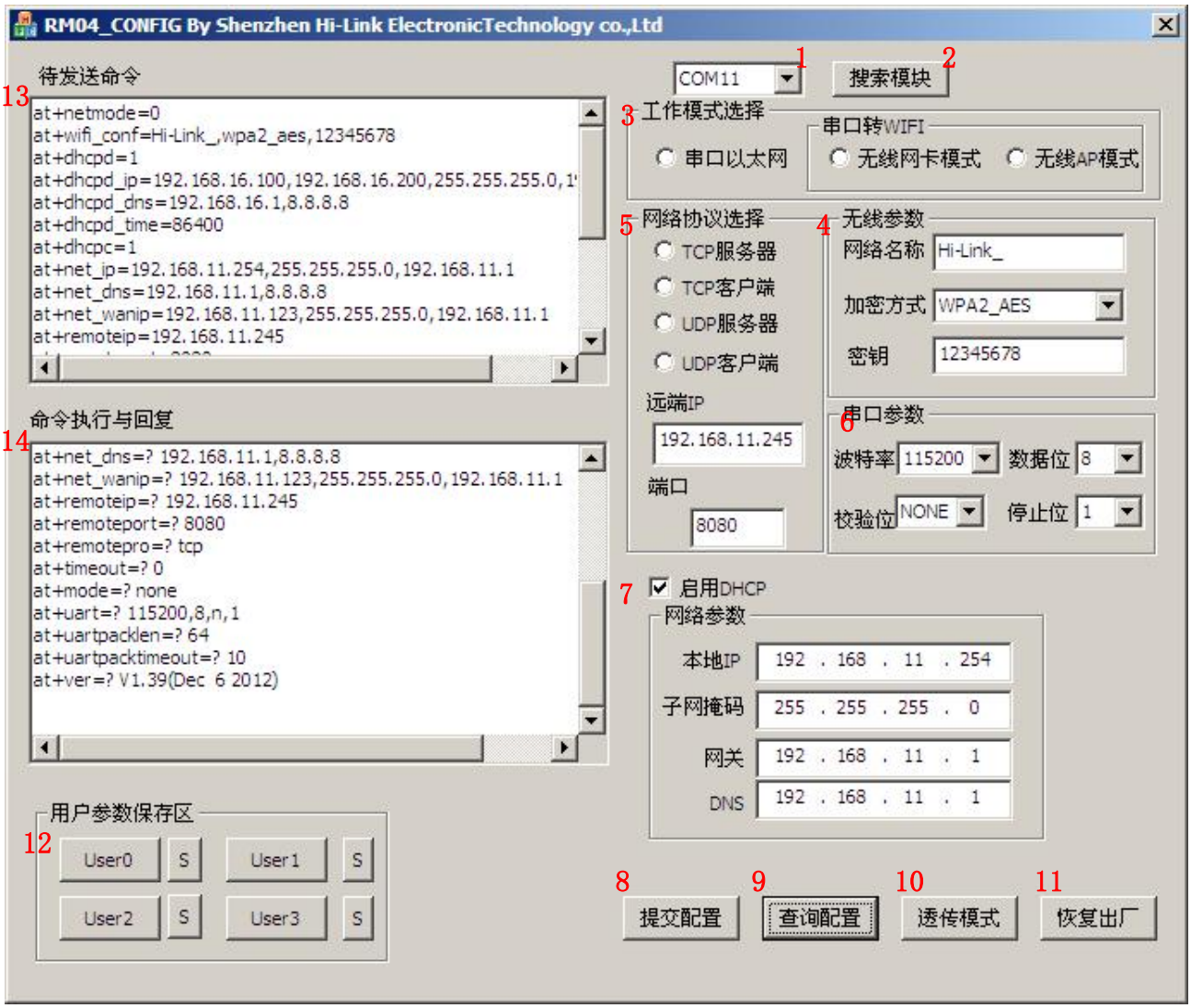
return：

at+default=1

After 30s, the module starts normally and all configuration parameters are factory configurations,

7 Serial configuration tool

HLK-7688A_CONFIG is a tool for configuring modules through serial ports. The tool interface is as follows:



Picture15. Serial configuration tool

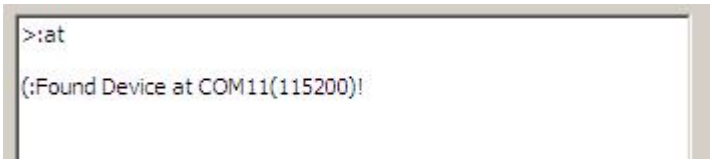
Interface description:

1. Configure serial selection
2. Search module button
3. Work mode select button
4. Wireless configuration parameter
5. Network protocol selection
6. Serial configuration parameter
7. Network IP address configuration
8. Submit configuration button
9. Query configuration button
10. Enter transparent transmission button

11. Restore factory setting button
12. AT command sending
13. AT command information return

7.1 Search module

By configuring the serial port selection, selecting the PC end string slogan, and clicking the search module button, the tool will search the HLK-7688A module with the specified serial port, and modules that have been connected and executed in the AT instruction mode will be searched. The searched module information will be displayed in the AT instruction execution return information area, as shown below:

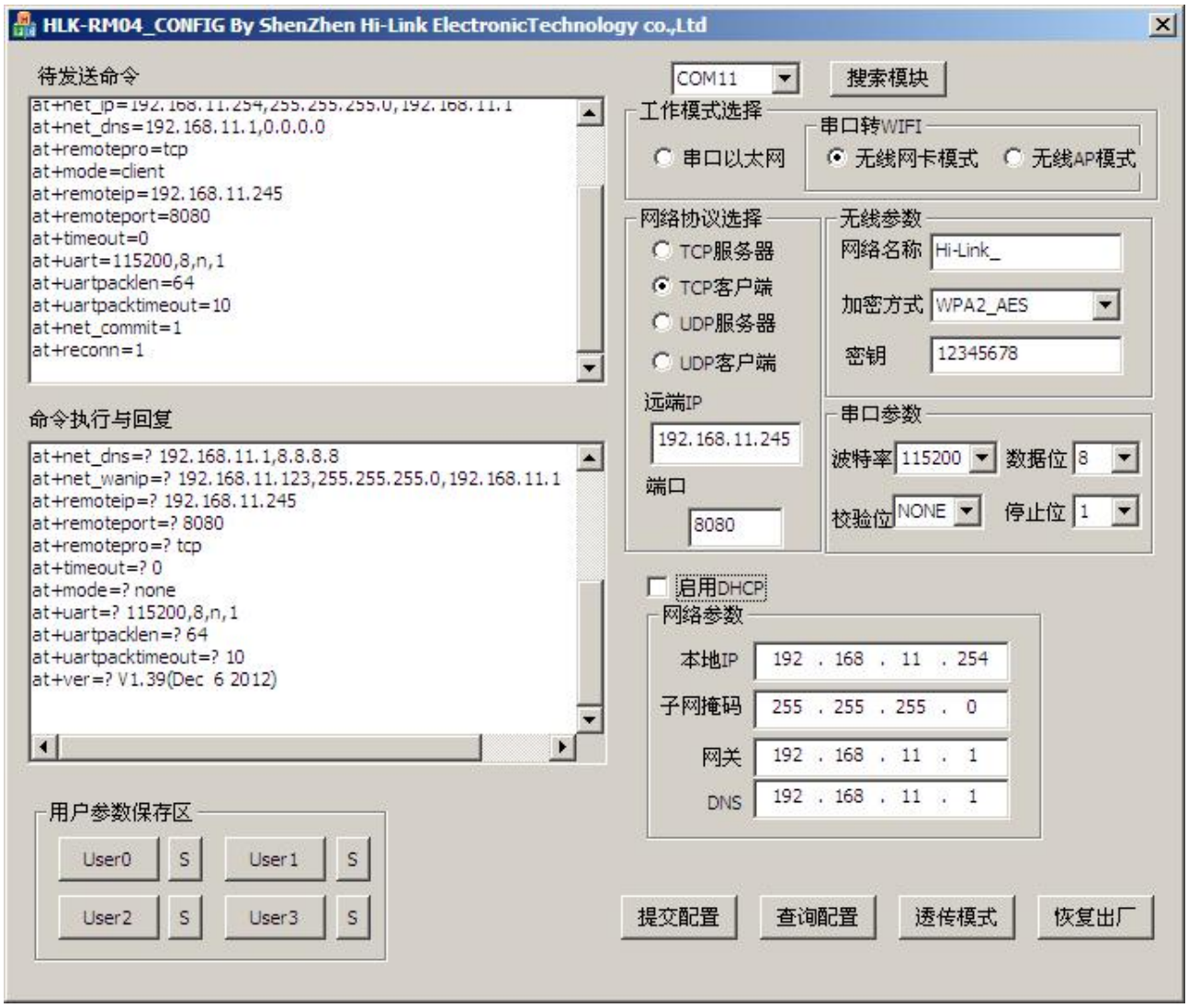


Picture16. Serial configuration tool search module

At this point, PC and modules have been able to establish normal AT instruction communication. All the AT command interaction processes need to be done on the basis of normal AT instruction communication

7.2 Set preferences

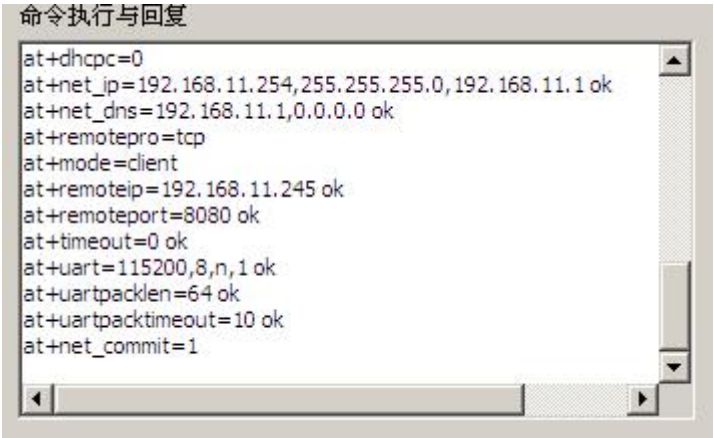
The configuration item 3,4,5,6,7 configures the required function. During configuration modification, the corresponding AT instruction is generated immediately after the AT instruction area to be sent. The resulting AT instruction is not passed to the module immediately. As follows:



Picture 17. serial configuration tool instructions

7.3 Submit configuration

By clicking the submit configuration button, the tool immediately sends the instruction of the AT instruction area to be sent to the module. The execution of the command is displayed in the AT instruction execution return information area.



Picture 18. Serial configuration tool

7.4 User data retention

The user parameter save area provides the ability to save parameters. By this function, you can save up to 4 groups of parameters, user0, user1, user2, user3., and click the S button next to them, which pops up the confirmation box, as shown below:

Picture19. Serial configuration tool to save

clicked"yes" button , the instruction of the AT instruction area to be sent will be saved as the user0 parameter group. After any click on the user0, the user0 parameter group will be called immediately and the AT command area to be sent will be covered

The saved user parameters are stored as text files in the tools directory. The filenames are user0, user1, user2, user3.

7.5 Inquiry configuration

Click the query button configuration tool, immediately to send a series of commands AT configuration module query module current, AT instruction execution results immediately executed in the AT command returns the information display area, each configuration item will return along with the corresponding change information.

7.6 Enter transparent transmission

Assuming that the module is already under the AT command, you can enter the transmission mode immediately by clicking on the transmission mode button。

7.7 Factory reset

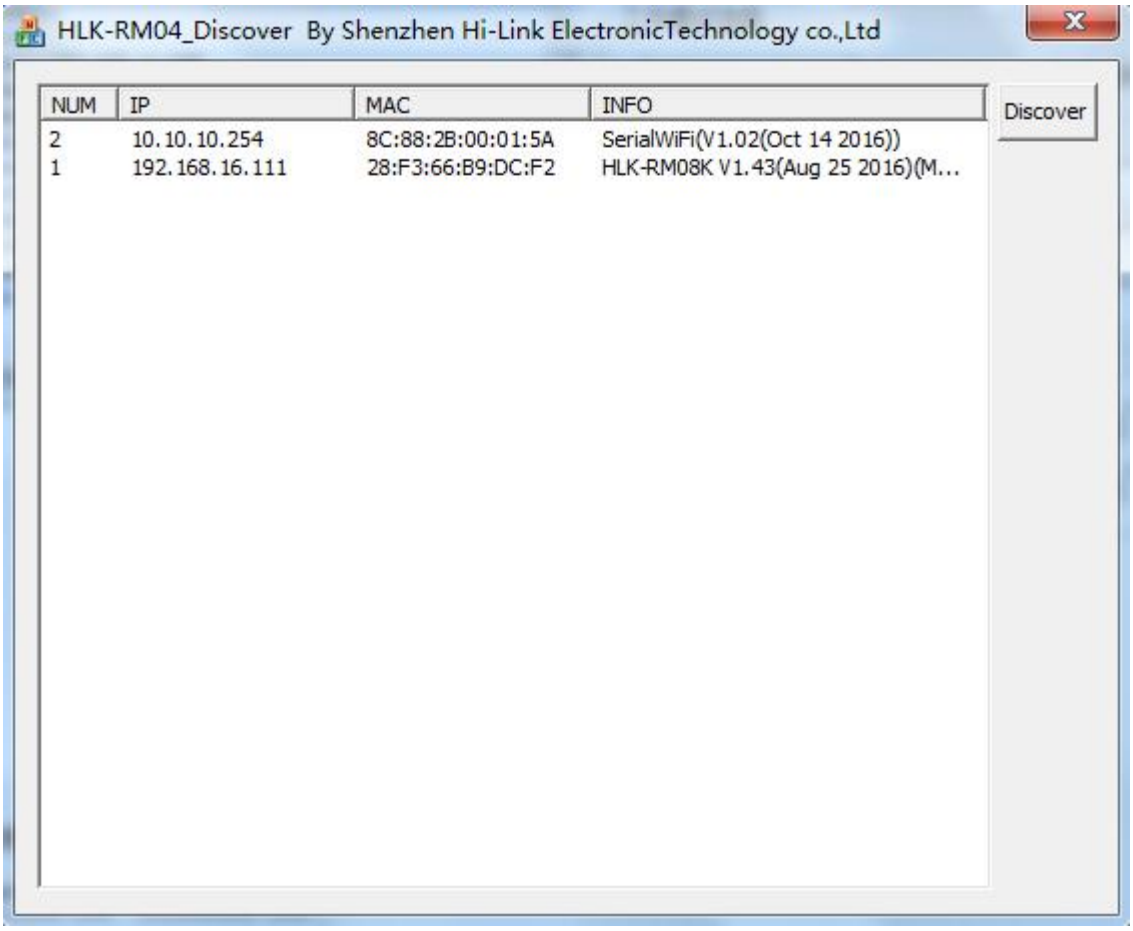
click the factory settings button,as shown below:

Picture 20. erial configuration tool to restore factory settings

Clicked "yes" button , the tool sends the AT command immediately. After about 30s, the module enters the status of the factory settings

8 Searching device tool

HLK-7688A_Discover is a tool for searching HLK-7688A modules on the web side. The interface is as follows:



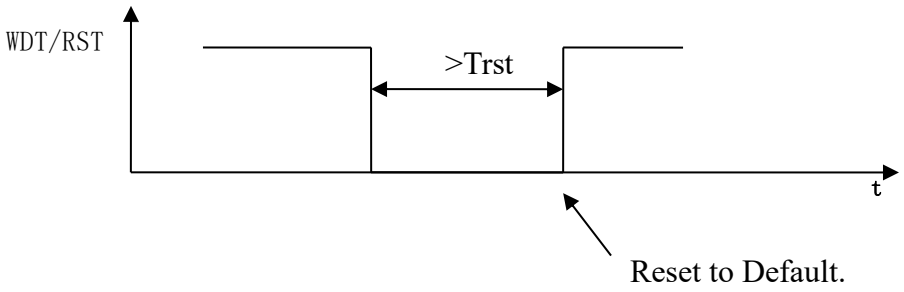
Picture 21. Device search tool interface

Click "Discover" button, The tool will immediately search all the HLK-7688A module in the LAN connected by PC. The search module is displayed immediately in the message, The information contains ip address 、mac address and version information.

9 Factory reset

Support the factory setting as following ways.

1. Through the web page.
2. Through the serial AT command.
3. By keeping WDT/RST pin low, the time is greater than Trst.



Picture 22. WDT/RST Factory reset

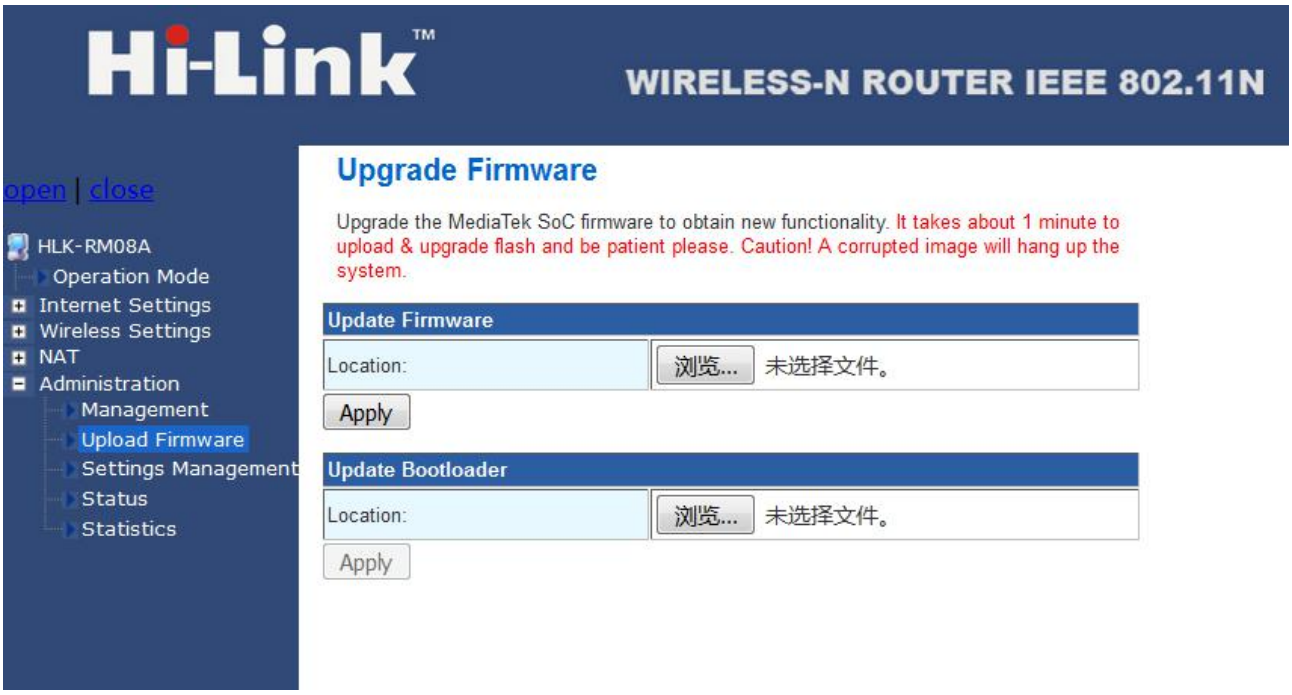
Factory default settings parameter as below:

netmode	0
wifi_conf	Hi-Link_,wpa2_aes,12345678
Channel	1
dhcpc	1
net_ip	192.168.11.254,255.255.255.0,192.168.11.1
net_dns	192.168.11.1,8.8.8.8
dhcpd	1
dhcpd_ip	192.168.16.100,192.168.16.200,255.255.255.0,192.168.16.1
dhcpd_dns	192.168.16.1,8.8.8.8
dhcpd_time	86400
remoteip	192.168.11.245
remoteport	8080
remotepro	tcp
timeout	0
mode	server
uart	115200,8,n,1
uartpacklen	64
uartpacktimeout	10
escape	0
escape2	1
tcp_auto	1
IP address	192.168.16.254

Wifi password	12345678
Web username/password	admin/admin
Tes	100ms
Trst	6s
Tescape2	2000ms
C2_uart	57600,8,n,1
C2_mode	0
C2_remoteip	192.168.1.245
C2_port	8081
C2_CLport	0
C2_protocol	1
C2_timeout	0
C2_uartpacklen	64
C2_uartpacktimeout	10
C2_tcp_auto	1
C2_tcp_client_check	1

10 Upgrade firmware

1. Restore factory setting
2. Pc connect module with Ethernet mode, ip:192.168.16.123/255.255.255.0. Browser access 192.168.16.254. User name/password：admin/admin。
3. Open the following page. Select the appropriate firmware, click apply to start the upgrade.Wait about 1.5 minutes, **can not cut off power during the upgrade, otherwise,module damage may occur.**



Picture 23. upgrade firmware

Attached：Please refer to other technical parameter：HLK-7688A-DATAsheet