

User Manual

ETHERNET

WIFI

Full Function Serial Network/Wireless Module

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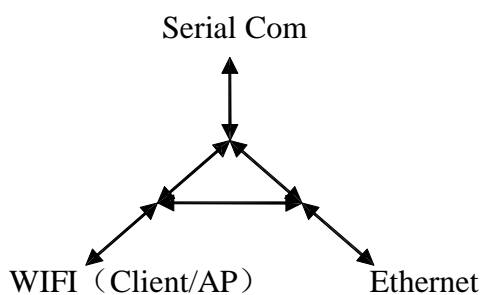
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1 Brief Introduction

HLK-RM04 is a new low-cost embedded UART-ETH-WIFI module (serial port - Ethernet - Wireless network) developed by Shenzhen Hi-Link ElectronicTechnology 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-RM04 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.



Picture1.F-structure

2 Summarize

2.1 Technical Specifications

Table2-1Technical 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 up to 11Mbps
Tracks number	1-14
Frequency range	2.4-2.4835G
Emission power	12-15DBM
Interface	1 个 10/100Mbps LAN/WAN multiplex interface、interface
Antenna	
Antenna type	Onboard antenna / External Antenna

Functional Parameters	
WIFI work mode	Client/AP/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 rate	230400bps
TCP connection	Max connection number>20
UDP connection	Max connection number>20
Serial baud rate	50~230400bps
Other Parameters	
Status indicator	Status indicator
Environmental standard	Operating temperature: -20-70℃
	Operating humidity: 10%-90%RH (noncondensing)
	Storage temperature: -40-80℃
	Storage humidity: 5%-90%RH (noncondensing)
Additional properties	Frequency bandwidth optional: 20MHz、40MHz, Auto

3 Quick Start

3.1 Restore factory settings

In order to ensure that all of configuration process is correct, bringing the module to restore the factory settings firstly. Factory mode, the module can skip this step. Above 5V (500mA) to power the module on the power, wait about 2.5 minutes for the system to start, after the start completion, pulled ES / RST pin down and make it surpass Trst, release ES / RST pin, the system will automatically restart. After rebooting, the system is already in Factory mode.

3.2 Configure 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, gateway 192.168.16.254. The (wifi default ssid and

the 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. Modify the network parameters through the web. Now, the module's IP address is 192.168.16.254. Configuration details can be seen in 5.1.

3.3 Configure serial network parameter

Opens the browser <http://192.168.16.254/ser2net.asp>, enter the serial-to-network web configuration page. Configure the serial-to-network parameters as needed through a web page. Configuration details can be seen in 5.2.

4 Parameter configuration direction

The module provides two ways for the configuration parameters:

1. Web page;
2. Serial AT command.

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

Configuring parameters through the serial port AT command needs to make the module into the AT command mode first.

5 WEB configuration

Through the correct module address, you can access to the WEB configuration page.

5.1 WEB network configuration

Detailed information can refer to <<HI-LINK Router User manual>>

5.2 WEB serial configuration

Serial Web configuration page ([ser2net.asp](#)) is as follows:

Serial Settings

	Current	Updated
Serial Configure:	115200,8,n,1	<input type="text" value="115200,8,n,1"/>
Serial Framing Lenth:	64	<input type="text" value="64"/>
Serial Framing Timeout:	10 milliseconds	<input type="text" value="10"/> milliseconds (< 256, 0 for no timeout)
Network Mode:	client	<input type="text" value="Client"/>
Remote Server Domain/IP:	192.168.11.245	<input type="text" value="192.168.11.245"/>
Locale/Remote Port Number:	8080	<input type="text" value="8080"/>
Network Protocol:	udp	<input type="text" value="UDP"/>
Network Timeout:	0 seconds	<input type="text" value="0"/> seconds (< 256, 0 for no timeout)
		<input type="button" value="Submit"/>

Current shows the current configuration , Updated shows the current revision parameters. Submit submit the revision.

Serial Configure: Serial configuration.fomat: Baud rate, data bits, parity bit, stop bit.

For example: “115200, 8, n, 1” .

Serial Framing Lenth: **The Lenth of Serial Framing**

Serial Framing Timeout: **The time of Serial Framing**

Network Mode: choose Client、Server or none。

Remote Server Domain/IP: **Remote Server Domain/IP address**

For expmale: 192.168.11.245 or www.hlktech.com .

Locale/Remote Port Number: The specified parameter is not the same under the different network modes. Client specifies the port number on the remote, Server specified local port number.

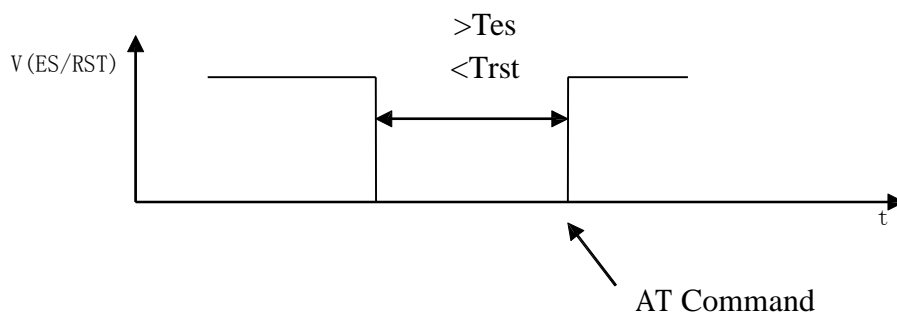
Network Protocol: Use tcp or udp Protocol

Network Timeout: Under the server network mode, no data transmission within the timeout period, the connection will be disconnected. 0 specifies never disconnected.

6 Serial AT command configuration

6.1 Access to AT command mode

Module in network fault, such as fault allocation situation will automatically exit the transparent transmission mode, enter AT instruction mode. In any condition, keep ES/RST feet low level of time but more than T_{es} and less than T_{rst} , the module will enter AT instruction mode immediately.



6.2 AT Command

In AT mode, you can configure the system parameters through the serial port AT instruction. Instruction format is as follows:

`At+[command]=[value]\r`

According to the different command, module will return a different return value.

For example: "at+remoteip=192.168.11.133\n" set remote ip address as 192.168.11.133.

For example: "at+remoteip=? \n" Inquiry remote ip address.

At command is as follows:

ver	The version of module
remoteip	Remote server domain name or IP address
remoteport	The local or distal port number

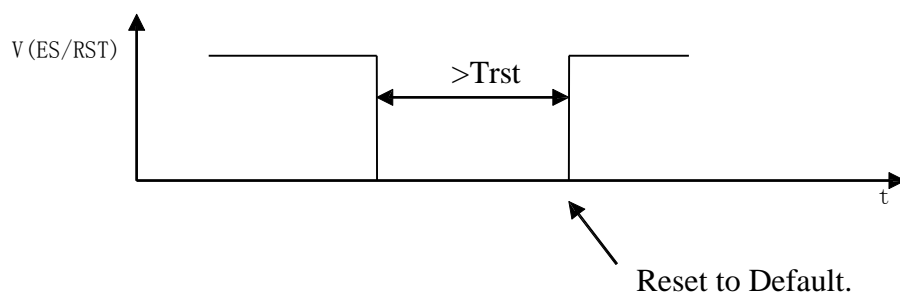
remotepro	Network Protocol type
timeout	Network timeout
mode	Network mode
uart	Serial port configuration
uartpacklen	Serial group frame length
uartpacktimeout	Serial framing time
save	Save the configuration and start service
reconn	Restart services

Parameter definition is consistent with the web configuration parameter.

7 Restore factory Settings

Support the following ways to restore the factory settings

1. Through the Web page.
- 2 By keeping the ES/RST pin low level time greater than Trst.



Factory setting parameter values, see the following list:

IP address	192. 168. 16. 254
Web username/password	admin/admin
Wifi password	0000000000
Serial Configure	115200, 8, n, 1
Serial Framing Lenth	64
Serial Framing Timeout	10
Network Mode	Client
Remote Server Domain/IP:	192. 168. 11. 245
Locale/Remote Port Number	8080
Network Protocol	Udp
Network Timeout	0

Tes	100ms
Trst	5s

8 Firmware upgrade

1. Restore the factory value.
2. Pc can connect with module through Ethernet, ip: 192.168.16.123/255.255.255.0. Browser visits 192.168.16.254. Username / password: admin / admin.
3. Open the following page. Select the appropriate firmware, click apply upgrades. Wait about 3 minutes. Can not cut out the upgrade process, otherwise it may cause damage to the module.



9 Typical application network settings

This section will give some simple examples to use the different functions of a typical configuration.

9.1 Serial to Ethernet

1. Restore factory value setting.
2. Pc can connect with module through Ethernet, ip: 192.168.16.123/255.255.255.0. Browser visits 192.168.16.254. Username / password: admin / admin.
3. Open the following page, click on the RADIO OFF button to turn off wifi function, shown as below. Clicks APPLY to take effect.

Hi-Link™ WIRELESS-N ROUTER IEEE 802.11N

[open all](#) | [close all](#)

- HLK-RM02
 - Wizard
 - Operation Mode
 - Internet Settings
 - LAN
 - VPN Passthrough
 - Wireless Settings
 - Basic**
 - Advanced
 - Security
 - WDS
 - WPS
 - Station List
 - Statistics
 - Administration
 - Management
 - Upload Firmware
 - Settings Managemen
 - Status

Basic Wireless Settings

You could configure the minimum number of Wireless settings for communication, such as Network Name (SSID) and Channel. The Access Point can be set simply with only the minimum setting items.

Wireless Network		
Driver Version	2.6.0.1	
Radio On/Off	<input type="button" value="RADIO ON"/>	
WiFi On/Off	<input type="button" value="WiFi OFF"/>	
Network Mode	11b/g/n mixed mode ▼	
Network Name(SSID)	HI-LINK_5066	Hidden <input type="checkbox"/> Isolated <input type="checkbox"/>
Multiple SSID1		Hidden <input type="checkbox"/> Isolated <input type="checkbox"/>
Multiple SSID2		Hidden <input type="checkbox"/> Isolated <input type="checkbox"/>
Multiple SSID3		Hidden <input type="checkbox"/> Isolated <input type="checkbox"/>

4. Open the following page. This page allows you to modify the the LAN port parameters. Set Ethernet ip address, gateway, dns server information, click apply to take effect.

Hi-Link™ WIRELESS-N ROUTER IEEE 802.11N

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Local Area Network (LAN) Settings

You may enable/disable networking functions and configure their parameters as your wish.

LAN Setup	
IP Address	192.168.16.254
Subnet Mask	255.255.255.0
LAN 2	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
LAN2 IP Address	
LAN2 Subnet Mask	
Default Gateway	192.168.16.1
Primary DNS Server	168.95.1.1
Secondary DNS Server	8.8.8.8

5. At this moment, you must use new ip address to access the web page.

9.1 Serial to wifi (ap)

1. Restore factory value setting.

2. Pc can connect with module through Ethernet, ip: 192.168.16.123/255.255.255.0. Browser visits 192.168.16.254. Username / password: admin / admin.

3. Open the following page, dhcp type opens the server function. Click APPLY enable. This page allows you to modify the the LAN port parameters.

HLK-RM02

Wizard

Operation Mode

Internet Settings

LAN

VPN Passthrough

Wireless Settings

Basic

Advanced

Security

WDS

WPS

Station List

Statistics

Administration

open all

close all

Hi-LinkTM

WIRELESS-N ROUTER IEEE 802.11N

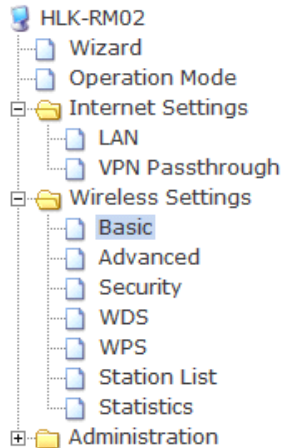
Local Area Network (LAN) Settings

You may enable/disable networking functions and configure their parameters as your wish.

LAN Setup	
IP Address	192.168.16.254
Subnet Mask	255.255.255.0
LAN 2	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
LAN2 IP Address	
LAN2 Subnet Mask	
Default Gateway	
Primary DNS Server	168.95.1.1
Secondary DNS Server	8.8.8.8
MAC Address	00:0C:43:30:50:38
DHCP Type	Server
Start IP Address	192.168.16.100
End IP Address	192.168.16.254

4. Open the following page. Through this page, you can modify wifi basic configuration

[open all](#) | [close all](#)



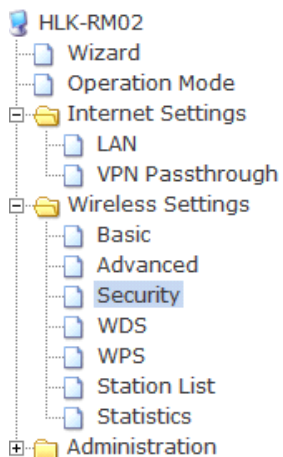
Basic Wireless Settings

You could configure the minimum number of Wireless settings for communication, such as Network Name (SSID) and Channel. The Access Point can be set simply with only the minimum setting items.

Wireless Network	
Driver Version	2.6.0.1
Radio On/Off	<input type="button" value="RADIO OFF"/>
WiFi On/Off	<input type="button" value="WiFi OFF"/>
Network Mode	11b/g/n mixed mode
Network Name(SSID)	HI-LINK_5066 <input type="checkbox"/> Hidden <input type="checkbox"/> Isolated
Multiple SSID1	<input type="text"/> <input type="checkbox"/> Hidden <input type="checkbox"/> Isolated
Multiple SSID2	<input type="text"/> <input type="checkbox"/> Hidden <input type="checkbox"/> Isolated

5. Open the following page. This page can modify the wifi security related function. You can modify the wifi key. Clicks APPLY to take effect.

[open all](#) | [close all](#)



Wireless Security/Encryption Settings

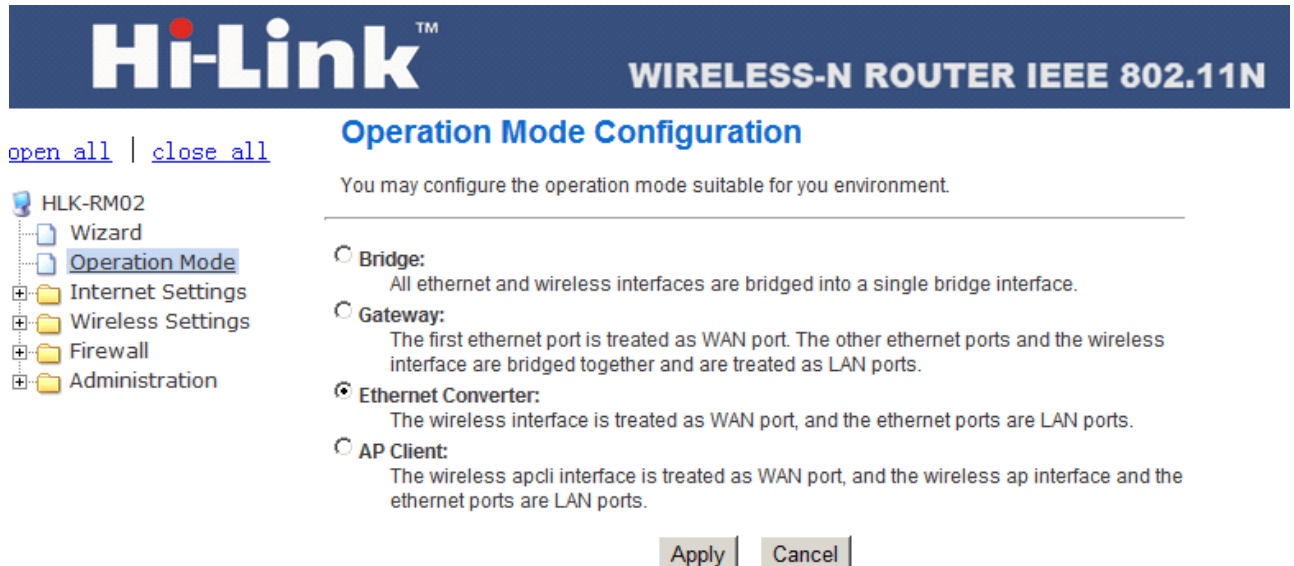
Setup the wireless security and encryption to prevent from unauthorized access and monitoring.

Select SSID	
SSID choice	HI-LINK_5066
"HI-LINK_5066"	
Security Mode	WPAPSKWPA2PSK
WPA	
WPA Algorithms	<input type="radio"/> TKIP <input checked="" type="radio"/> AES <input type="radio"/> TKIPAES
Pass Phrase	0000000000
Key Renewal Interval	3600 seconds (0 ~ 4194303)
Access Policy	

6. At this point, connected to the module by other wifi devices. Module IP: 192.168.16.254.

9.2 Serial to wifi (client)

2. Pc can connect with module through Ethernet, ip: 192.168.16.123/255.255.255.0. Using Browser to access to 192.168.16.254. Username / password: admin / admin.
3. Open the following page, set to Ethernet Converter mode. Click on the APPLY to take effect.



The screenshot shows the 'Operation Mode Configuration' page of a Hi-Link router. The left sidebar contains a tree view with 'Operation Mode' selected. The main area has four radio button options: Bridge, Gateway, Ethernet Converter (selected), and AP Client. Each option has a brief description of its function. At the bottom right, there are 'Apply' and 'Cancel' buttons.

Hi-Link™ WIRELESS-N ROUTER IEEE 802.11N

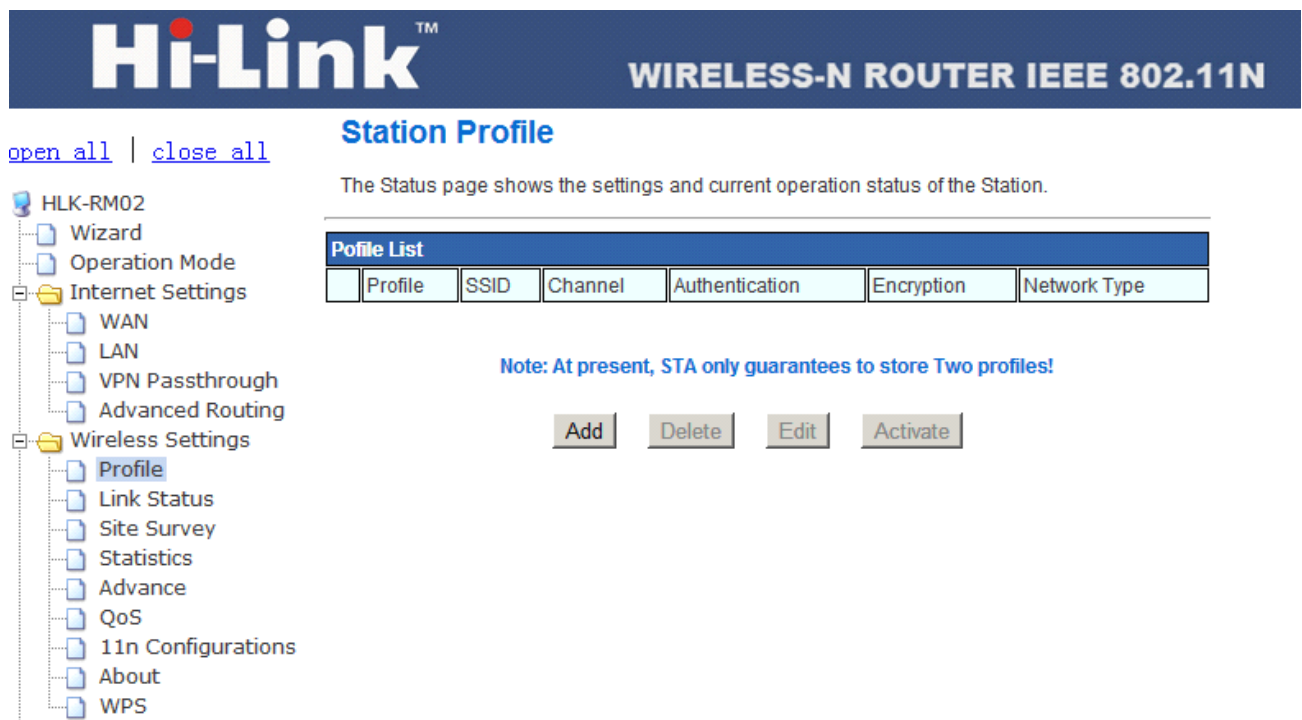
[open all](#) | [close all](#)

Operation Mode Configuration

You may configure the operation mode suitable for you environment.

- ☐ **Bridge:**
All ethernet and wireless interfaces are bridged into a single bridge interface.
- ☐ **Gateway:**
The first ethernet port is treated as WAN port. The other ethernet ports and the wireless interface are bridged together and are treated as LAN ports.
- ☒ **Ethernet Converter:**
The wireless interface is treated as WAN port, and the ethernet ports are LAN ports.
- ☐ **AP Client:**
The wireless apcli interface is treated as WAN port, and the wireless ap interface and the ethernet ports are LAN ports.

4. Open the following page. Click APPLY to increase AP information.



The screenshot shows the 'Station Profile' page of a Hi-Link router. The left sidebar has 'Wireless Settings' > 'Profile' selected. The main area features a 'Profile List' table with columns for Profile, SSID, Channel, Authentication, Encryption, and Network Type. Below the table is a note about profile storage and a row of buttons: Add, Delete, Edit, and Activate.

Hi-Link™ WIRELESS-N ROUTER IEEE 802.11N

[open all](#) | [close all](#)

Station Profile

The Status page shows the settings and current operation status of the Station.

Profile List					
Profile	SSID	Channel	Authentication	Encryption	Network Type

Note: At present, STA only guarantees to store Two profiles!

5. Pop-up the following dialog box. Fill in SSID, encryption, key information. Click on the apply effect.

System Configuration	
Profile Name	<input type="text" value="PROF001"/>
SSID	<input type="text"/>
Network Type	<input type="text" value="Infrastructure"/>
Power Saving Mode	<input checked="" type="radio"/> CAM (Constantly Awake Mode) <input type="radio"/> Power Saving Mode
RTS Threshold	<input type="checkbox"/> Used <input type="text" value="2347"/> (range 1 - 2347, default 2347)
Fragment Threshold	<input type="checkbox"/> Used <input type="text" value="2346"/> (range 256 - 2346, default 2346)

Security Policy	
Security Mode	<input type="text" value="OPEN"/>
Encryption Mode	<input type="text" value="NONE"/>

This is no any security. Are you sure to connect AP?

6. Open the following page.This page can modify the WiFi security related function.You can modify the WiFi key.Click on the APPLY effect.

[open all](#) | [close all](#)

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Wireless Security/Encryption Settings

Setup the wireless security and encryption to prevent from unauthorized access and monitoring.

Select SSID	
SSID choice	HI-LINK_5066
"HI-LINK_5066"	
Security Mode	WPAPSKWPA2PSK
WPA	
WPA Algorithms	<input type="radio"/> TKIP <input checked="" type="radio"/> AES <input type="radio"/> TKIPAES
Pass Phrase	0000000000
Key Renewal Interval	3600 seconds (0 ~ 4194303)
Access Policy	

7. Open the following page, view IP information of the module. Wan IP address is the ip. If no IP address appears, it means disconnected to AP.

[open all](#) | [close all](#)

- HLK-RM02
 - Wizard
 - Operation Mode
 - Internet Settings
 - WAN
 - LAN
 - VPN Passthrough
 - Advanced Routing
 - Wireless Settings
 - Profile
 - Link Status
 - Site Survey
 - Statistics
 - Advance
 - QoS
 - 11n Configurations
 - About
 - WPS
 - Firewall
 - Administration
 - Management
 - Upload Firmware
 - Settings Manage
 - Status**

Access Point Status

Let's take a look at the status of HLK-RM02 Platform.

System Info	
SDK Version	V1.21(Oct 23 2012)
System Up Time	24 mins, 22 secs
Operation Mode	Ethernet Converter Mode
Internet Configurations	
Connected Type	DHCP
WAN IP Address	
Subnet Mask	
Default Gateway	
Primary Domain Name Server	168.95.1.1
Secondary Domain Name Server	8.8.8.8
MAC Address	00:0C:43:30:50:38
Local Network	
Local IP Address	192.168.16.254
Local Netmask	255.255.255.0
MAC Address	00:0C:43:30:50:77

Ethernet Port Status

not support

Appendix A document revision record

Version number	Revision range	Date
1.00	Draft version	2012-9-10