USB WIRELESS MODULE

GWF-3M08

User's Manual

（FCC Version 2.0）

FCC Statement

Federal Communication Commission Interference Statement

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 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.

IMPORTANT NOTE:

Any changes or modification to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC RF RADIATION EXPOSURE STATEMENT:

This module must be installed and operated in accordance with provided instructions and the antenna used for this transmitter must be installed to provied a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-uses and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

LABELING REQUIREMENTS:

1. 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.

2. Host device of OEM integrator must be labeled with:

   CONTAINS TX FCC ID: QR4WF5370M08

INFORMATION FOR THE OEM INTEGRATORS:

The following statements must be included with all versions of this document supplied to an OEM or integrator,

but should not be distributed to the end user:

1. This module is intended for OEM integrators only.
2. Please refer to the full Grant of Equipment document for other restrictions.
3. This module must be operated and used with a locally approved access point.

USER'S MANUAL OF THE END PRODUCT:

In the user's manual of the end product, the following information in a prominent location must include:

1. To comply with FCC RF radiation exposure requirements, the antenna(s) used for this module must not be co-located or operating in conjunction with any other antenna or transmitter.
2. The end user has to be informed: 1). to keep at least 20 cm separation with the antenna while this end product is installed and operated. 2). the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. 3). any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.
3. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19. statement is required to be available in the user's manual: this device complies with part 15 of 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.
4. Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

1. Introduction

GWF-3M08 is a WLAN module supporting IEEE 802.11 b/g/n standards with max 7-pin connector supporting USB 2.0 /1.1 interfaces. This is a small form factor and low cost compact WLAN module designed for the wireless connectivity of products with embedded system.

This module operates in 2.4GHz ISM frequency band, it applies a highly integrated MAC/BBP and RF single chip RT5370 with 150Mbps PHY rate supporting. This module can be built-in other embedded applications such as IP Camera, IP set top box, GPS, Internet radio apparatus, it can be directly soldered on a main PCB.

1.1 Features

- 802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 24, 36, 48, 54Mbps
- 802.11n: (20MHz) MCS0-7, Support up to 72Mbps
  (40MHz) MCS0-7, Support up to 150Mbps
- OFDM, Peak rate 150Mbps, Peak throughput 90Mbps.
- Security support for 64/128 WEP, WPA, WPA2, TKIP, AES
- Operates in 2.4GHz frequency bands. Power Management
- WPS and TX external control, WiFi-direct supported.

2. Product Information

2.1 Typical Specification Overview

Standards	IEEE802.11b/g/n (1T1R mode)
Operating Frequency	2.412GHz ~ 2.462GHz.
Protocols	802.11b: CCK, QPSK, BPSK, 802.11g/n: OFDM
Antenna	Built-in On Board PCB antenna
Security	WPA/WP2/WPAI, 64/128/152-bit WEP, WPS
Transmit Output Power (Typical value to antenna)	11b: 17±1.0dBm @ 11Mbps; 11g: 14±1dBm @ 54Mbps
	802.11n: (HT20), 12+/-1dBm, 802.11n: (HT40), 12+/-1dBm
Receive Sensitivity (Typical value after antenna)	11b: -84dBm @ 11Mbps; 11g: -72dBm @ 54Mpbs.
	802.11n: (HT20), -68dBm@MSC7, (HT40),-67dBm@MSC7
Operating Voltage	5.0V or 3.3VDV± 5%
Operating Current（OFDM, 54Mbps）	5.0V power input,<150mA; 3.3V power input.<250mA
Bus Interface	USB 2.0/1.1
USB Interface	Max: 7 pins, 2.0 mm pitch pin header. Or Max: 7 pins semi-hole.

2.2 Hardware Information

2.2.1 General view

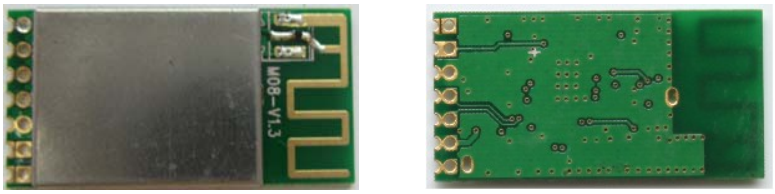


Fig 1

2.2.2 Block Diagram

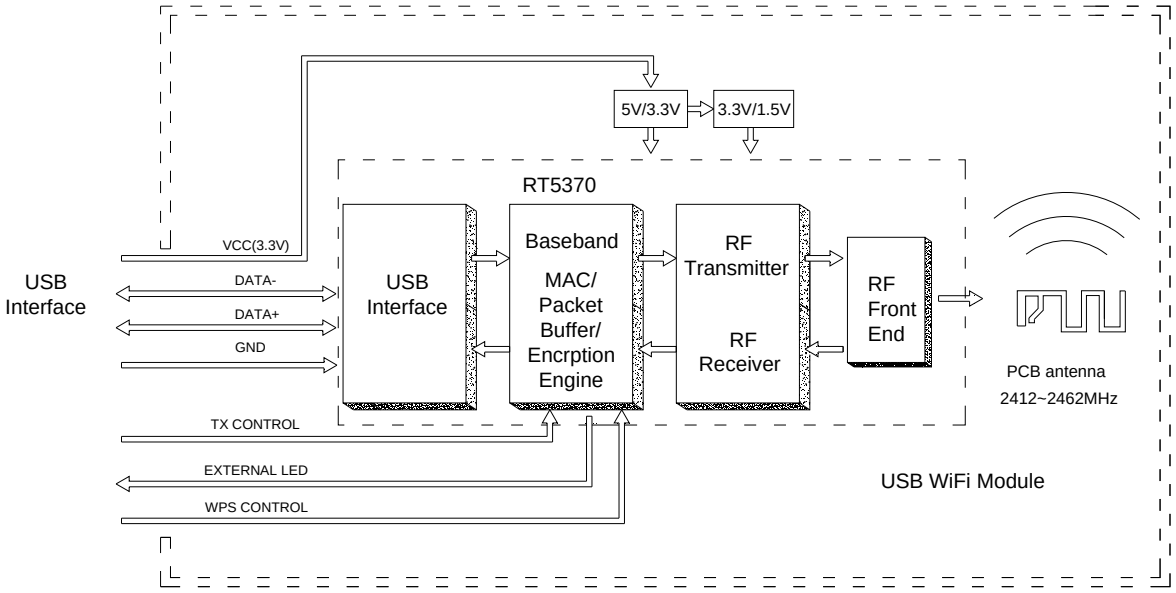


Fig 2. With onboard PCB antenna used

2.2.3 Mechanical Information

A. Physical Dimensions:

a. Semi-holes with 2.0mm pitch (onboard PCB antenna).

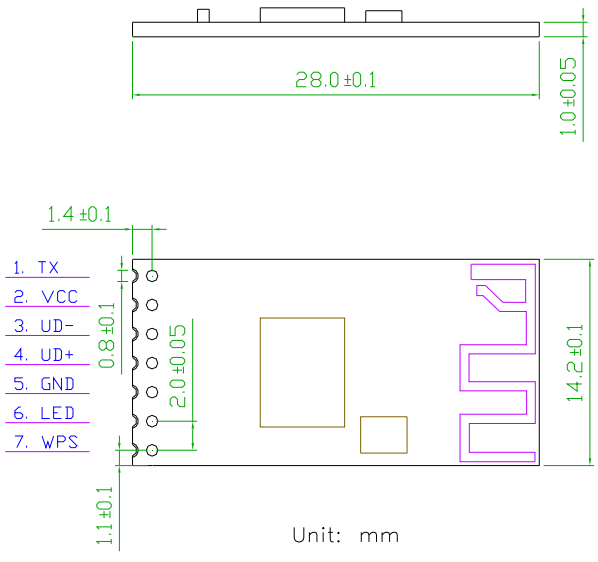


Fig 3.

b. Top side 7-pin pin header with 2.0mm pitch

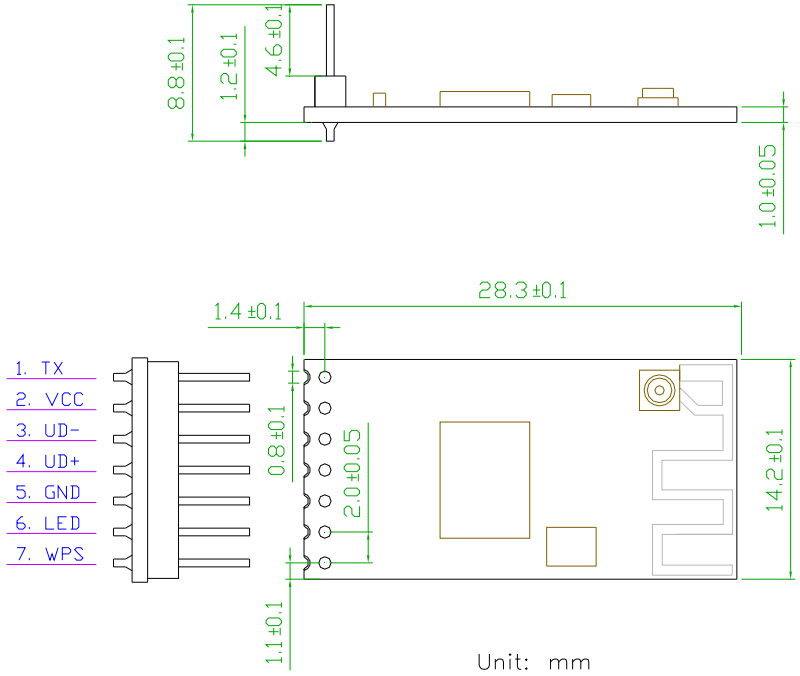


Fig 4

c. Bottom side 7-pin pin header with 2.0mm pitch

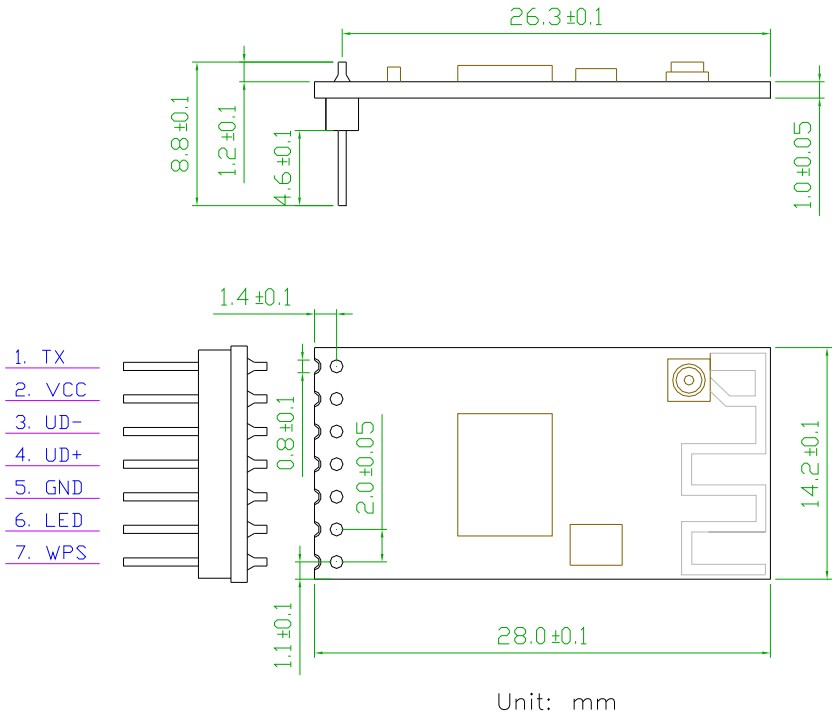


Fig 5.

d. 90 degree 7-pin pin header with 2.0mm pitch

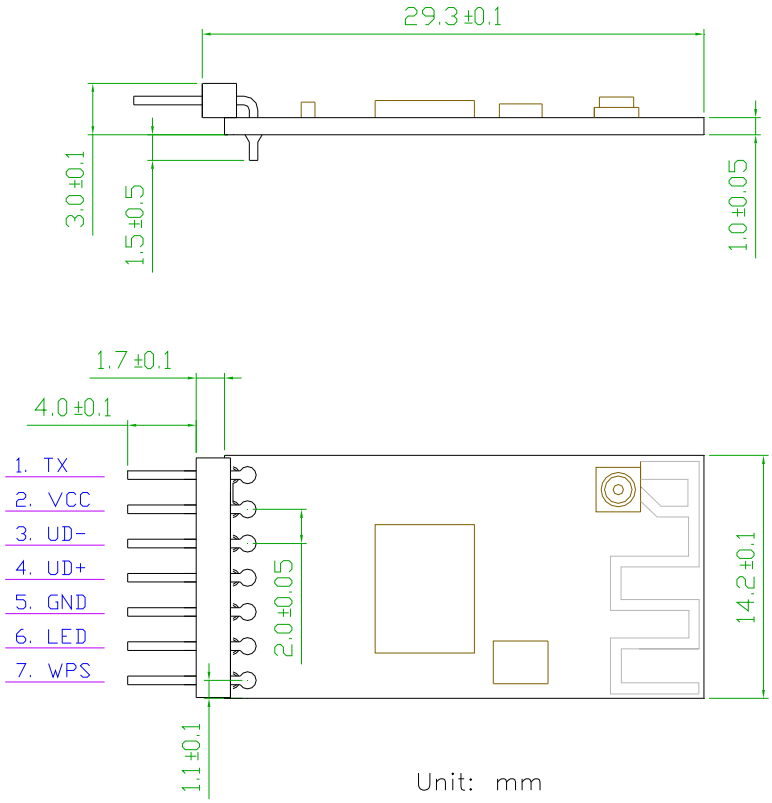


Fig 6.

B. Pin Descriptions:

Pin	Name	Descriptions
1	TX	RF ON/OFF control; low level activated to OFF
2	VCC	5.0VDC or 3.3VDC, +/-5%
3	UD-	USB data-
4	UD+	USB data+
5	GND	Ground
6	LED	Indicate module working status
7	WPS	External to activate WPS function. Low level activated.

Notes:

1. *TX terminal must be pulled up with an external resistor (4.7K ohm) to high level.*
2. *LED terminal output 3.3V LED blink signal. To limit LED current, a series 330 ohm or other value resistor should be connected.*
3. *WPS terminal is internally pulled up with an onboard 4.7K ohm resistor to 3.3VDC.*

C. RF signal input and output:

on-board PCB antenna.

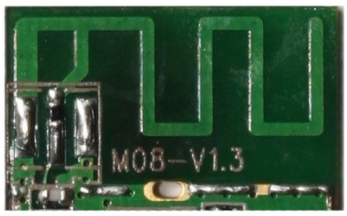


Fig 7

The onboard antenna is designed with tiny space which affects the signal performance. If the onboard antenna does not satisfy user's application, please use other external antenna.

Warning:

Should an external antenna rather than the built-in PCB antenna be used, the OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed.

2.3 Software and system Information

Operation System	CPU Supplier	Driver
Linux 2.4/2.6	ARM, MIPSII	Available
Windows XP/Vista/7	X86 Platform	Available
Windows CE 5.0/6.0	ARM, MIPSII	Available
Mac OS X 10.3/10.4/10.5/10.6/10.7	N/A	Available

2.4. Design Concerns:

2.4.1 Power supply:

1) The input power can be 5.0VDC or 3.3VDC, please mentioned it when place an order.
2) The operation current of 5.0VDC power input will be different with that of 3.3V power input. The external power shall be well designed with enough current capacity.
3) Should 3.3VDC power be selected, please be sure it's clean with low ripple; otherwise, the EMI or RF performance might be deteriorated.

2.4.12 Using pin headers:

1) The pins can be less than 7 pins, but at least the VCC, UD-, UD+, GND must be applied for USB interface communication.
2) Should the pin header connection be applied, please still keep enough metallic clear space around the antenna end of the module, this gives better signal performance.

2.4.2 Using semi-holes:

1) When the module is designed to be soldered on a main PCB board directly, the area under the antenna end of the module should be keep clear of metallic components, connectors, vias, traces and other materials that can interfere with the radio signal. The recommended clear space requirements are refer to Fig 8 and Fig 9.

2) The module is not recommended using reflow oven process, hand soldering is suggested.

2.4.2 Clear place to use the module:

The following drawing shows a recommended footprint which can be a reference for a main PCB design.

The clear space requirement for onboard antenna is suit for either pin header or semi-holes connection application.

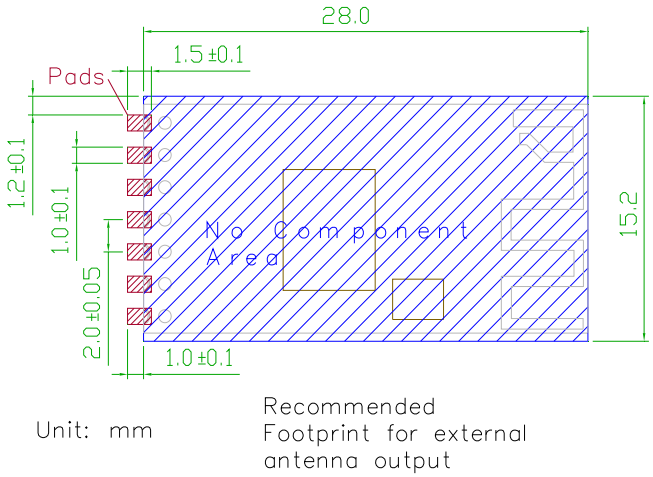


Fig 8

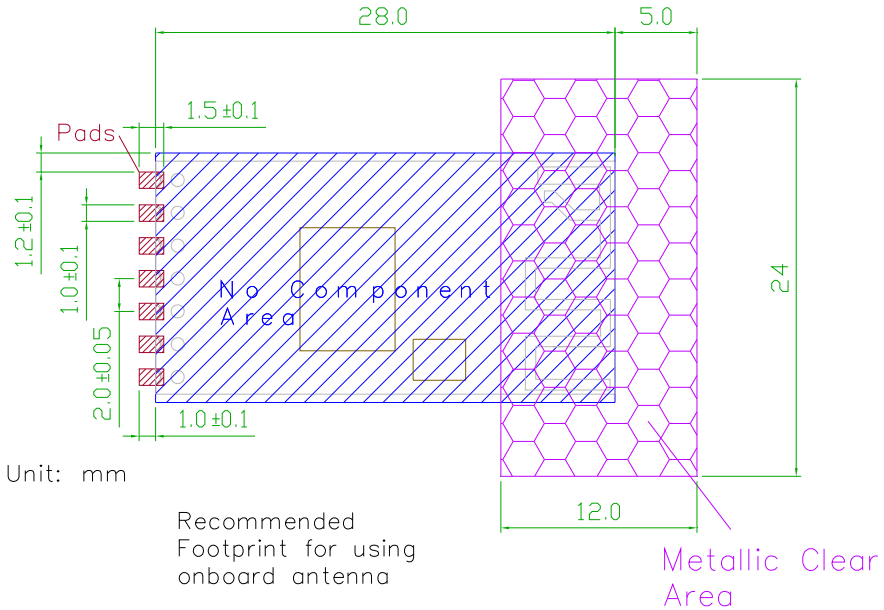


Fig 9.

3. Software Installation

Mentioned: *The following information just describes the procedures of software installation under Windows system. As for those under Linux, Android, the OEM integrator must do their own specific embed system programming, the procedures is entirely different.*

To install the driver of the module, please use administrator user account to login before the following steps:

Tips: *the latest original drivers can be down loaded from the website of Ralink chipset manufacturer. The current website is* http://www.ralinktech.com/en/04_support/support.php?sn=500
To find a correct driver, please identify the chipset type applied in the module you have.

For Windows XP:

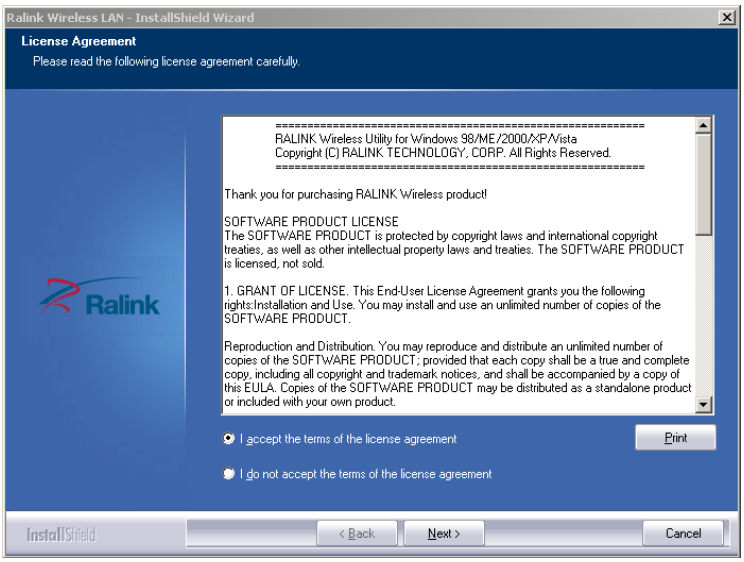
The system will detect a new hardware has been added, and start the **"Found New Haerdware Wizard**". Click on "**Cancel**".

1. Please insert the disc into your CD-ROM drive. The disc should auto start, dispaying the following window, If it does not start due to the system setting, open the browser window, find the autorun.exe file in your CD-ROM folder, click to run it.
2. Ralink has integrated all the 54Mbps 802.11b/g ,150Mbps or 300Mbps 802.11n driver into one file. Click to run the "**Driver Installation**"

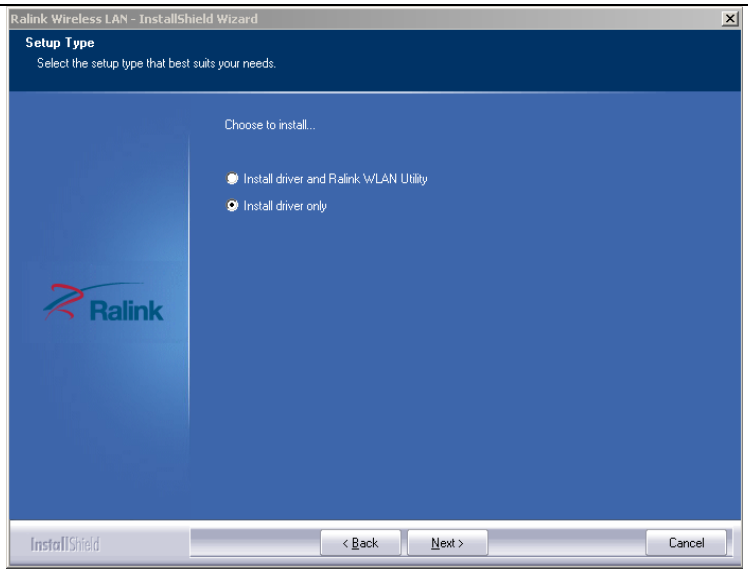
Notes: Because Ralink often updates software, the drivers contained in the disc might be changed without prior notice.

3. Follow the instructions and prompts of the "InstallShield Wizard" to finish the driver installation:

a. Select the "I accept the terms of the license agreements", then click the "Next".



b. There shows a setup type window, you can select "Install driver only" or "Install driver and Ralink WLAN utility" and then click the "Next".

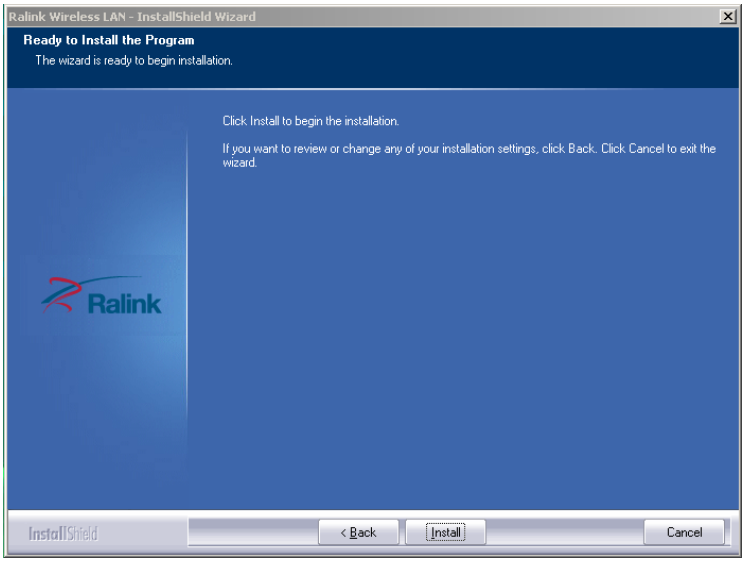


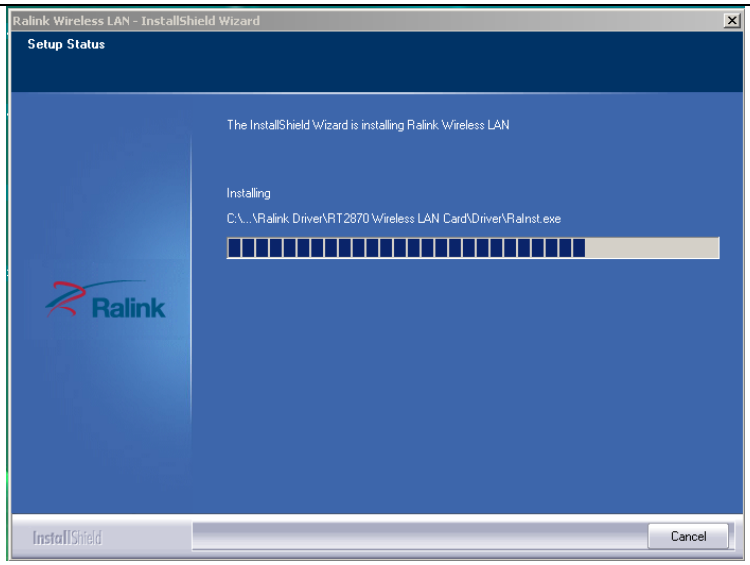
Tips:

1).The Windows XP utilizes a "Wireless Zero Configuration(WZC)" Service built into the operating system. Many wireless network module cards utilize this service.

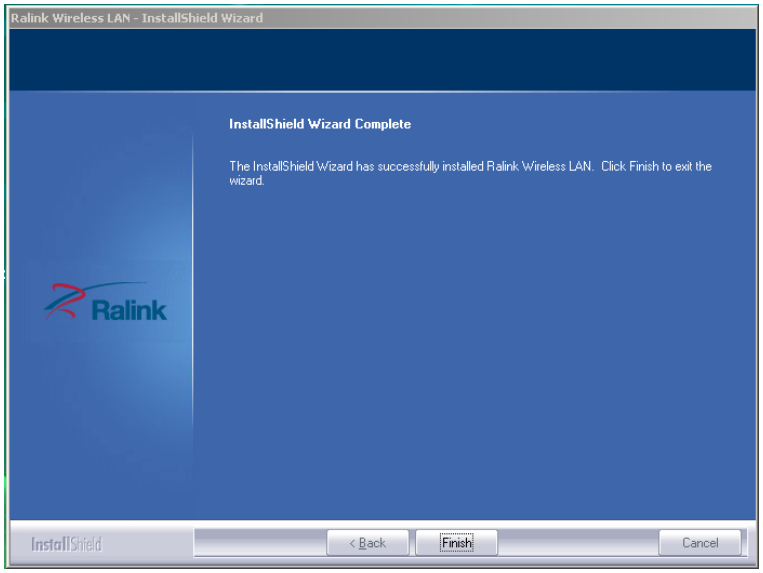
2). Ralink- the chipset manufacturer has developed a utility for setting up wireless connection. If you select this item, you can switch between the Windows XP's WZC service and the Ralink WLAN utility service later.

c. Click the "Install" to confirm the installation, there shows the installation progress.





d. Click "finish" to finish the driver installation.



For Windows 7:

Once the wireless USB module be plugged into an USB port, the following message will appear on screen.

The following installation procedures are similar to those of Windows XP. Please refer to the installation steps for Windows XP.

4. Wireless Connection

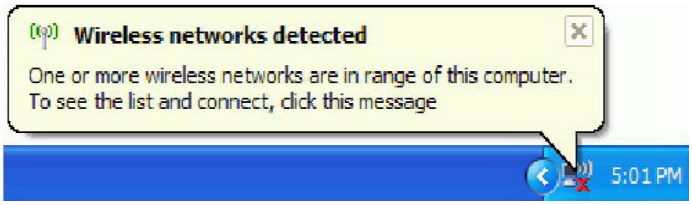
For Windows XP:

1. After finishing driver installation, insert the USB module to Notebook or PC that supports

USB 2.0/1.1 interface.

Remarks: Make sure to connect the module to an USB port on your computer directly rather than an USB hub. Although it might work when connecting with an USB hub, the likelihood of configuration problems will be higher.

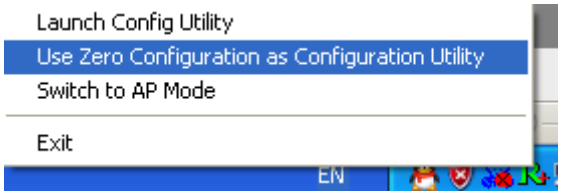
2. The system shows a wireless utility icon in the Windows system tray, which locates in the bottom-right corner of your computer screen, and pops up a message that indicates a new hardware is found and installed, something like this:



Should the service " Wireless Zero Configuration (WZC)" be applied.

Before you begin, ensure WZC is enabled, by right-clicking on the Ralink icon  in the task bar in the bottom right hand corner of your screen.

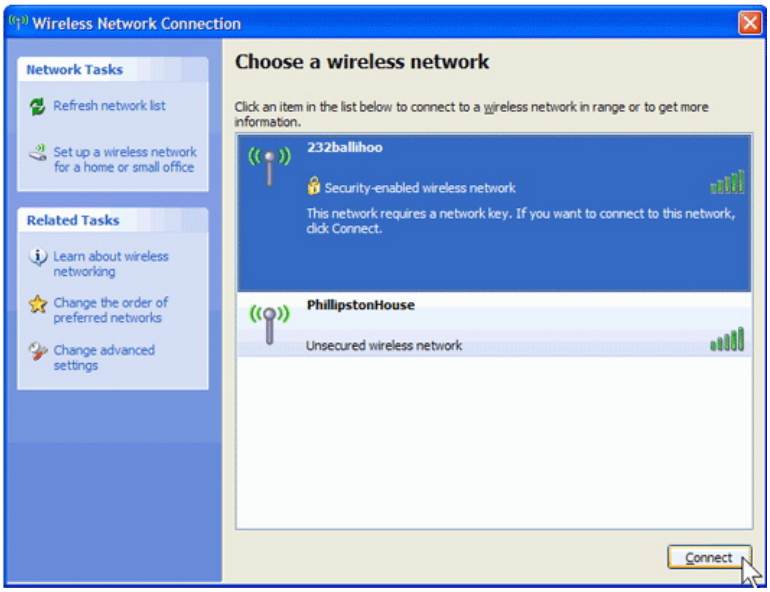
In the menu that appears, select "Use Zero Configuration as Configuration Utility" to use Windows' wireless management feature, Windows Zero Configuration (WZC), to manage your Ralink Wireless Module.



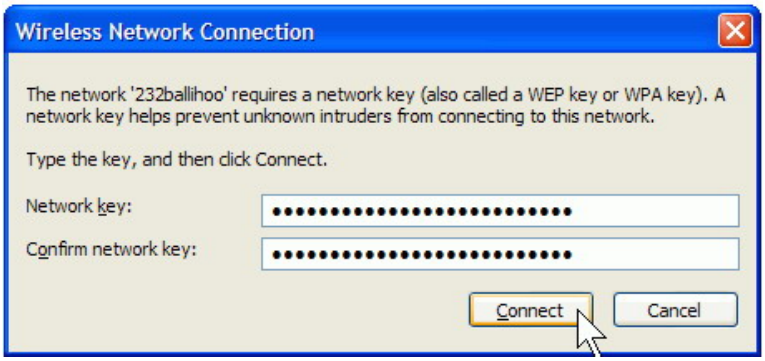
1. Right click the icon and then select "View Available Wireless Networks" to launch the utility, the Wireless Network Connection window appears and displays your wireless network listed with the SSID you chose.

Notes: *Before configuring your WiFi access, you need to have your network's SSID (service set identifier), security key and authentication type handy. Check the documentation coming with your router, ask your network administrator to get the information.*

2. If you don't see your network, click "Refresh network list" in the upper left corner. If you are locating within the valid range of hotspots or wireless routers, all available networks will be recognized and listed automatically. Click your preferred network, and then click "Connect" in the lower right corner.



3. If the network security key hasn't been inputted before, Windows XP prompts you to enter the network's security key to access the wanted SSID. Type the encryption key that you wrote down earlier in both the Network key and Confirm network key boxes, and then click "Connect".



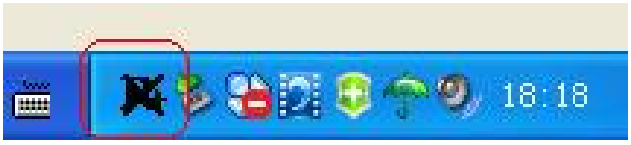
Tips: *If there are free hotspots, simply select the network you want from the list displayed, then click Connecting. It tries to launch your Internet browser—you should be connected to the Internet.*

If there is a pay hotspot, signing in or up will require either to enter your login information-if you're an existing customer, or to enter your credit card information for payment, it is just decided by you. Then clicking the Connecting, your default Internet browser will launch and take you to the service provider's login page. Most providers have very simple and step-by-step instructions for you to sign up and then to be connected. Another way to access the service provider's login page is to simply launch your Internet browser, if there's a pay network available, you'll be taken directly to the login page.

Should the service of Ralink wireless connection utility be applied.

After the installation of Ralink utility, the system shows a special wireless utility icon in the

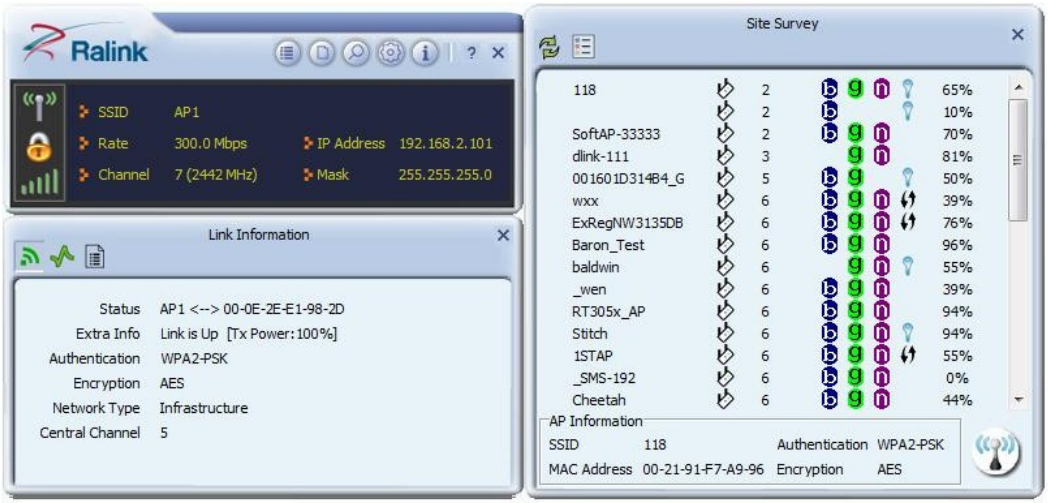
Windows system tray, *which* locates in the bottom-right corner of your computer screen:



When an USB wireless module is inserted into an USB 2.0/1.1 port of Notebook or PC, the icon changes colors according to the wireless signal quality.

Double-click the icon or right click the icon and then select "Launch Config Utility" to launch the utility, the RaUI window appears like:

The Ralink wireless utility starts in compact mode as shown above, provides profile management, the available networks listing, a statistical counter display, Wi-Fi multimedia (WMM), protected Wi-Fi setup, Cisco compatible extensions (CCX), call admission control (CAC), radio controls, Ralink driver/utility information, and help functions. Clicking the expanding icon  *can change to the full mode as shown below:*



In this utility, there are two applications can be selected: the Station mode and AP mode.

- ✧ **Station mode (client Mode) :** It is the default access way, the USB wireless module servers as a client to access Internet through other router or AP.
- ✧ **AP mode:** It sets the USB wireless module as an AP, which allows the other users can connect to Internet through your computer. Before using the mode, it must be available that an existed Internet connection via wire Ethernet connection or by 3G wireless connection.

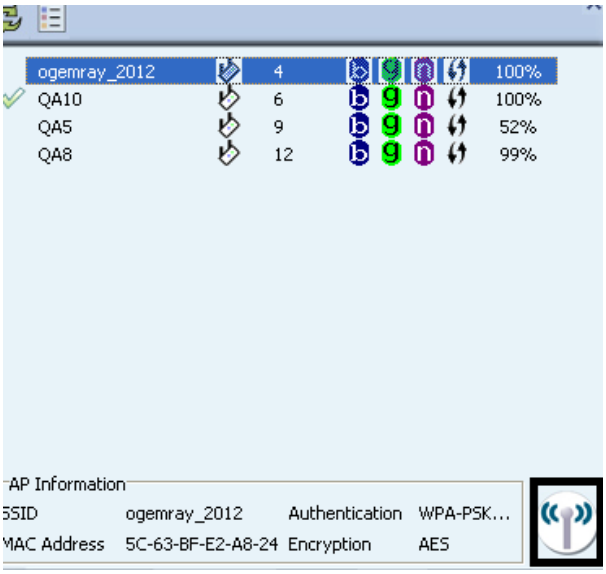
Tips: Point the cursor to the Ralink icon located on bottom-right corner of your computer screen, right click the mouse, from the pop up list, you can select the station mode or AP mode.

Below are the steps to connect to a wireless network using the Ralink Utility.

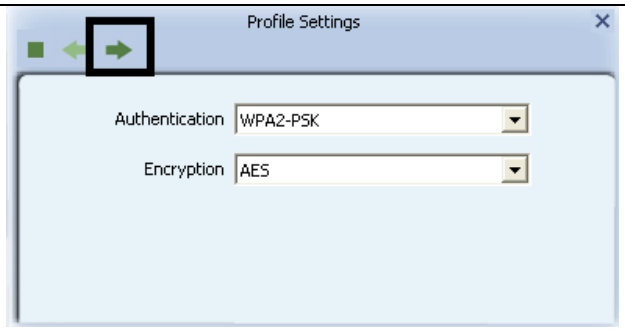
1. Open the Ralink Utility by double-clicking on the Ralink Utility icon in the taskbar.
2. The Ralink Utility appears, by default connected to an available open wireless network. Check the name of the network to which you are connected. If this is the correct network, no further steps are required.

3. To connect to an alternative network, click the Available Networks button.

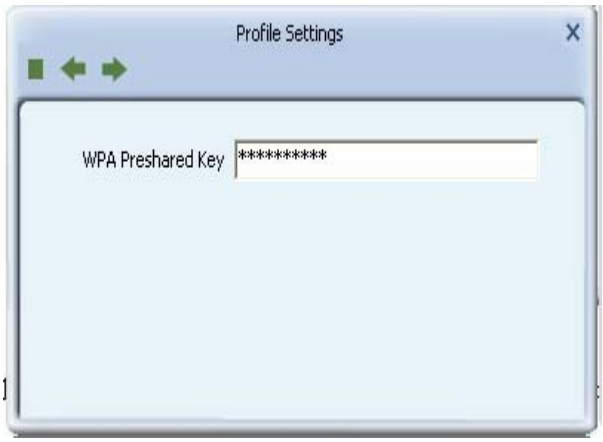
4. In the Available Networks window that appears, select the name of the network to which you are connecting. Then click the connect icon and wait several seconds while the Utility sets up a connection.



5. The Ralink Utility automatically detects and displays the security settings of the network to which you are connecting in the Profile Settings screens.If the Utility shows that WPA-PSK or WPA2-PSK security is detected as shown below, click the right arrow to save your settings.



In the screen that displays, in the 'WPA Preshared Key' field, type a security key, the same as that used by the AP or wireless router to which you are connecting. Click the right arrow to save your settings and connect to the network.



6. Once you are connected the Available Networks screen shows the status of your connection.

For Windows 7:

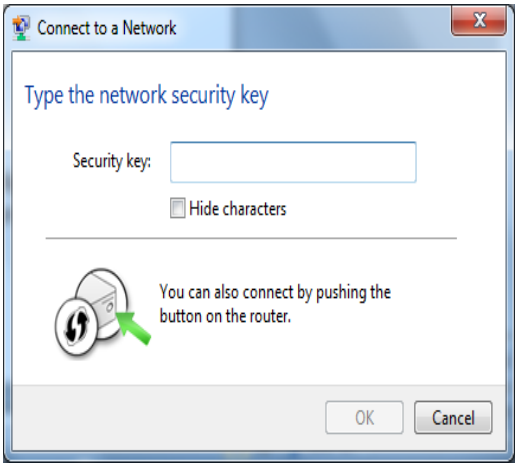
Notes: Windows Zero Configuration (WZC) is not necessary in Windows Vista,7,or higher, as you can use Windows and the Ralink Utility to manage the Module without switching .

1. Click on the wireless networks icon in the task bar in the bottom right hand corner of

your screen to display the available wireless networks.

2. Click the "Connect" button to connect to the selected network.

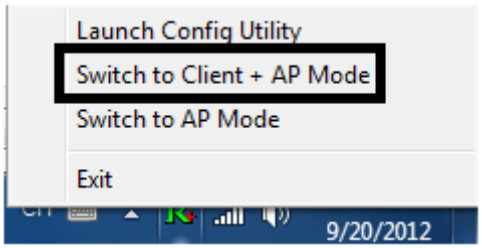
3. If your network has wireless security configured, enter the required settings. The following is an example only, your network settings may differ.



4. The success of your connection is indicated by the wireless networks icon.

Notes: The steps above of Connecting to wireless networks using the Ralink utility is the same as done in Windows XP

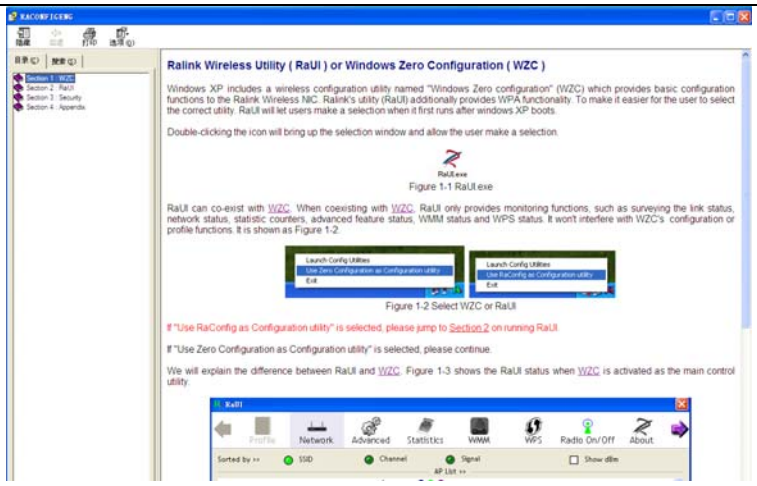
In addition to station and AP mode, there is the Client + AP Mode to be selected in Window 7 as well.



This mode lets you use the module both as an AP and as a member of a wireless network at the same time. Switching to this mode, you can let computers and devices connected to the Ralink AP access the Internet.

Another new feature in Window 7 is that you can let devices use your connection to a traditional wireless network to connect to the Internet using Wi-Fi Direct.

For more details about the RaUI utility, please read the help information of the utility by clicking the tap.



5. Tips for Wi-Fi users

With a Wi-Fi connection, you can roam about 150 m around the access point (depends on different environment), so find a spot where you can work without any interruption. Then see how much work you can do, such as:

- Easily and quickly receive and transmit files within your local network — no problem for big files.
- Access your email and surf the web with the same speed as that connected with network cables.
- Synchronize data between devices.
- Take advantage of wireless printing — send files directly from your laptop PC to a wireless printer over Wi-Fi connection.

6. Warning

Wi-Fi offers greater speed and range than Bluetooth, but it drains your portable device batteries a lot faster than Bluetooth does. In fact, if you use a Wi-Fi connection regularly on your laptop PC, you'll undoubtedly notice that you need to recharge more often. If you need to conserve battery life — on a long trip for example — turn off your Wi-Fi connection when you don't actually need it.

7. Security

Because wireless networks rely on radio signals to transmit data, they are not as secure as wire network. Wireless networks are susceptible to viruses and breaches like eavesdropping and need to be protected in order to be secure.

There are many security measures to safeguard wireless networks, protect the data, and keep unauthorized users out. Hotspots, on the other hand, are often free of standard security practices in an effort to make it easy for anyone to connect. It may be found that some pay hotspots administered by service providers offer have some level of security, however, when using a hotspot, it's always a good idea to be proactive and to employ security measures of your own.

8. Environment

8.1 Temperature

8.1.1 Operating Temperature

Continuous reliable operation in ambient temperature: -10ºC to +60ºC.

8.1.2 Storage Temperature

The product is not damaged or degraded when keeping in -20ºC to +85ºC.

8.2 Humidity

8.2.1 Operating Humidity Conditions

The product should be capable of continuous reliable operation when subjected to relative humidity in the range of 20% to 80% (non-condensing) .

8.2.2 Non-Operating Humidity Conditions (including warehouse)

The product should not be damaged or degraded when kept in the place (where relative humidity range is in the range of 20% to 80%) for 48 hours.

9. Disclaimer

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