IEEE802.11b/g Wireless LAN Mini-PCI Card

User Manual

Version: 1.1
(Jul, 2006)

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

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

FCC Caution

This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.

Federal Communication Commission (FCC) Radiation Exposure Statement

This equipment complies with FCC radiation exposure set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 2.5cm (1 inch) during normal operation.

Information for the OEMs and Integrators

The following statement must be included with all versions of this document supplied to an OEM or integrator, but should not be distributed to the end user.

This device is intended for OEM integrators only.
Please See the full Grant of Equipment document for other restrictions.
This device must be operated and used with a locally approved access point.

Label Information to the End User by the OEM or Integrator

The following regulatory and safety notices, the final end product must be labeled with "Contains FCC ID: WHD-DS-42-WG in a visible area.

Federal Communications Commission (FCC) RF Exposure Requirements

SAR compliance has been established in the laptop computer(s) configurations with PCMCIA slot on the side near the center, as tested in the application for Certification, and can be used in laptop computer(s) with substantially similar physical dimensions, construction, and electrical and RF characteristics. Use in other devices such a PDAs or lappads is not authorized. This transmitter is restricted for use with the specific antenna(s) tested in the application for Certification. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

R&TTE Compliance Statement

This equipment complies with all the requirements of DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of March 9, 1999 on radio equipment and telecommunication terminal Equipment and the mutual recognition of their conformity (R&TTE)
The R&TTE Directive repeals and replaces in the directive 98/13/EEC (Telecommunications Terminal Equipment and Satellite Earth Station Equipment) As of April 8, 2000.

Safety

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this and of the computer manufacture must therefore be allowed at all times to ensure the safe use of the equipment.

EU Countries Intended for Use

The ETSI version of this device is intended for home and office use in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.
The ETSI version of this device is also authorized for use in EFTA member states: Iceland, Liechtenstein, Norway, and Switzerland.

EU Countries Not intended for use

None.

CONTENTS

1 Introduction

Thank you for purchasing the 802.11g Wireless LAN Mini-PCI Card. This module complies with IEEE 802.11g standard, which supports up to 54Mbps high-speed wireless network connections. It can also work with IEEE 802.11b devices. When the module connects to 11b devices, the link speed will be up to 11Mbps.

This module enables higher data throughput than the IEEE 802.11g standard (up to 54Mbps). It supports specific ways to increase the data transfer rate at a time; compress the data and decrease the waiting time to send the next data to the Routers or APs. This feature is called Turbo Mode. When the module is connecting to the Routers or APs with the proprietary Turbo Mode feature, the wireless network will be more effective.

For WLAN security issues, this module supports 64/128-bit WEP data encryption that protects your wireless network from eavesdropping. It also supports WPA (Wi-Fi Protected Access) feature that combines IEEE 802.1x and TKIP (Temporal Key Integrity Protocol) technologies. Client users are required to authorize before accessing to APs or AP Routers, and the data transmitted in the network is encrypted/decrypted by a dynamically changed secret key. Furthermore, this module supports WPA2 function, WPA2 provides a stronger encryption mechanism through AES (Advanced Encryption Standard), which is a requirement for some corporate and government users.

When you use the devices such as Voice over Internet Protocol (VoIP) phones, televisions, VCRs and MP3 players, how can you speed up the audio, video and voice data to pass through the wireless network? IEEE 802.11e Quality of Service (QoS) (The Wi-Fi Alliance defined WMM as a profile of the IEEE 802.11e) extensions for 802.11 networks will help to define the priorities of the data traffics by the data categories to provide enhanced multimedia support. This module supports the advanced technology for sure.

The power consumption of the module is also very low. This module provides several levels of power saving modes allowing user customizes the way of saving the power from his/her portable or handheld devices.

This module is cost-effective, together with the versatile features; it is the best solution for you to build your wireless network.

1.1 Features

- Works with both IEEE 802.11b and IEEE 802.11g products.
- High-speed transfer data rate – up to 54Mbps.
- Supports Turbo Mode to enhance the data transfer speed within the specific wireless network.
- Supports WMM (IEEE 802.11e QoS standard) function to meet the multi-media data bandwidth requirement.
- Supports 64/128-bit WEP, WPA (TKIP with IEEE 802.1x), WPA2 (AES with IEEE 802.1x) functions for high level of security.
- Supports CCX 2.0 (Cisco Compatible Extensions) for the radio monitoring and fast roaming.
- Automatic fallback increases data security and reliability.
- Supports the most popular operating system: Windows 98SE/Me/2000/XP/2003 Server.
- Supports Mini-PCI Type III B.

1.2 Specifications

- Standards: IEEE 802.11b/g
- Interface: Mini-PCI Type III B
- Frequency Band: 2.4000 ~ 2.4835GHz (Industrial Scientific Medical Band)
- Modulation: OFDM with BPSK, QPSK, 16QAM, 64QAM (11g)

  BPSK, QPSK, CCK (11b)
- Data Rate: 54/48/36/24/18/12/11/9/6/5.5/2/1Mbps auto fallback
- Securities: 64/128-bit WEP Data Encryption, WPA (TKIP with IEEE 802.1x), WPA2 (AES with IEEE 802.1x)

  Note: WPA2 is only enabled in Windows 2000/XP/2003 Server.
- Antenna: I-PEX x 2
- Drivers: Windows 98SE/Me/2000/XP/2003 Server
- Transmit Power: 16dBm~18dBm
- Dimension: 59.6(L) x 44.45(W) mm
- Temperature: 32~131˚F (0 ~ 55˚C)
- Humidity: 10-95% (NonCondensing)
- Certification: FCC, CE

1.3 Package Contents

Before you begin the installation, please check the items of your package. The package should include the following items:

- One Mini-PCI Card
- One CD (Driver/Utility/User's Manual)
- One Quick Guide

If any of the above items is missing, contact your supplier as soon as possible.

2 Installation Procedure

Before you proceed with the installation, please notice following descriptions.

Note1: The following installation was operated under Windows XP. (Procedures are similar for Windows 98SE/Me/2000/2003 Server.)

Note2: If you have installed the Turbo Wireless LAN Mini-PCI Card driver & utility before, please uninstall the old version first.

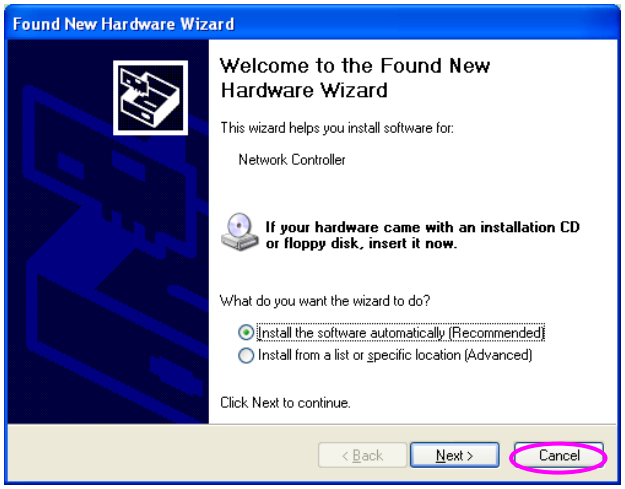
2.1 Install the Hardware

Installation Procedure

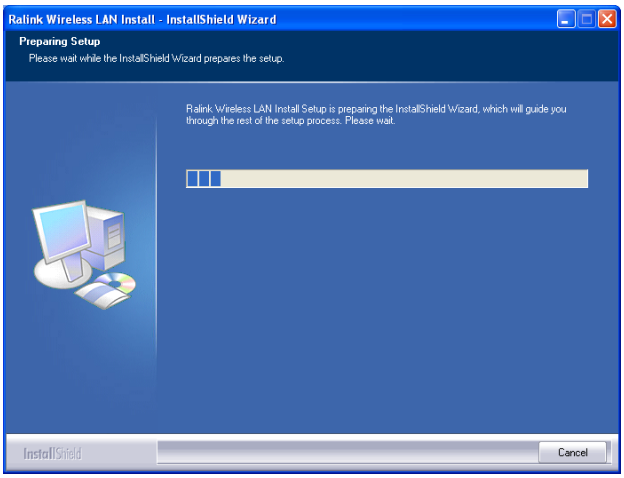
A. Turn off your computer and remove its cover.
B. Insert the Mini-PCI card to an available Mini-PCI slot firmly.
C. Secure the antenna to the antenna connector of the module.
D. Turn on the computer.

2.2 Install the Driver and Utility

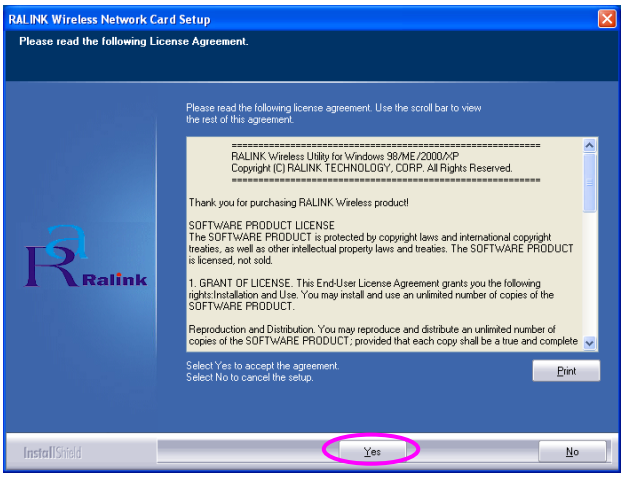
A. "Found New Hardware Wizard" is displayed after the Mini-PCI card is installed and the computer is restarted. Click "Cancel".



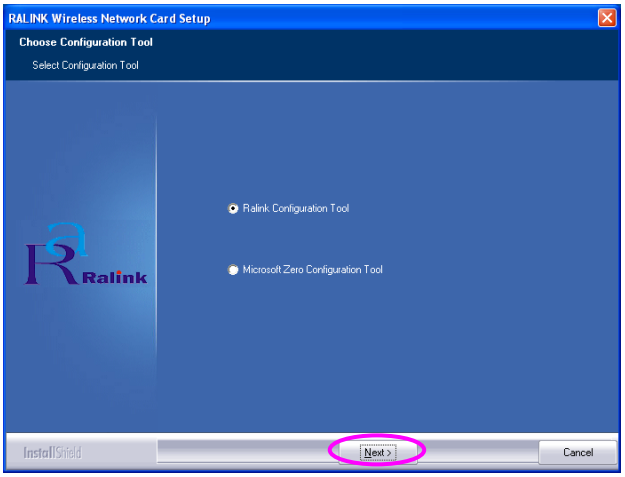
B. Insert the Installation CD to your CD-ROM Drive. Execute the “setup” program.



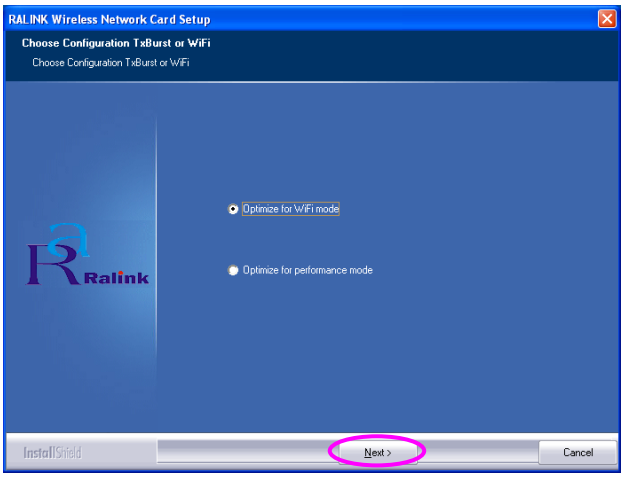
C. Click “Yes” to process the installation if you accept the license agreement.



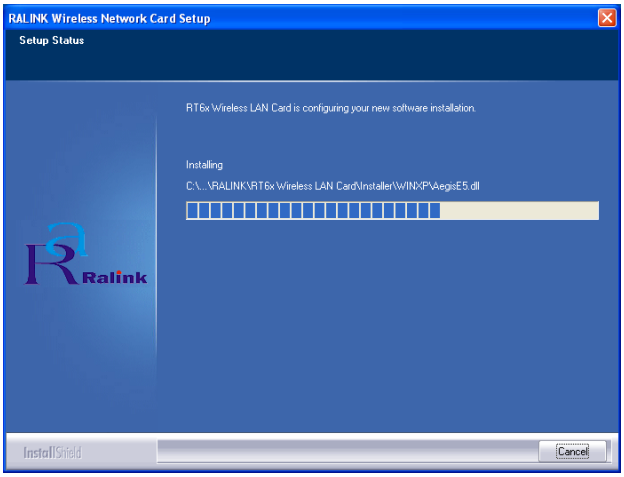
D. In Windows XP, there is a “Windows Zero Configuration Tool” for you to setup the wireless module. You can choose to configure the module through the Windows Zero Configuration Tool or the Ralink Configuration Tool for the module. It is recommended to choose the Ralink Configuration Tool for the module. Click “Next” to continue.



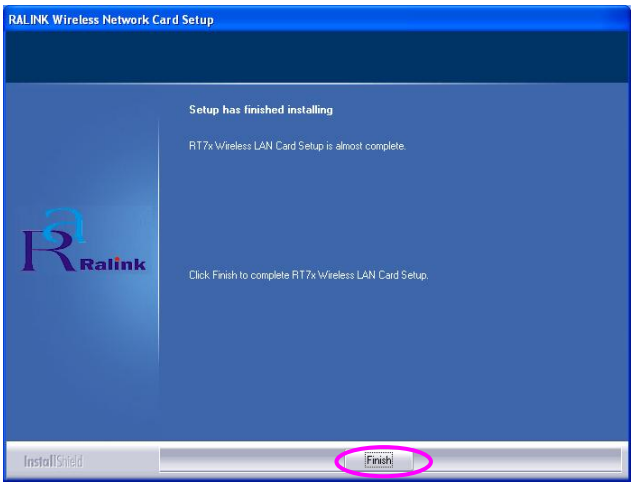
E. If you need the module to operate with better performance, please choose the “Optimize for performance” to enable the Tx Burst mode. Or you can choose “Optimize for Wi-Fi mode” to let the module run in standard wireless network.



F. The system starts to install the software of the module .



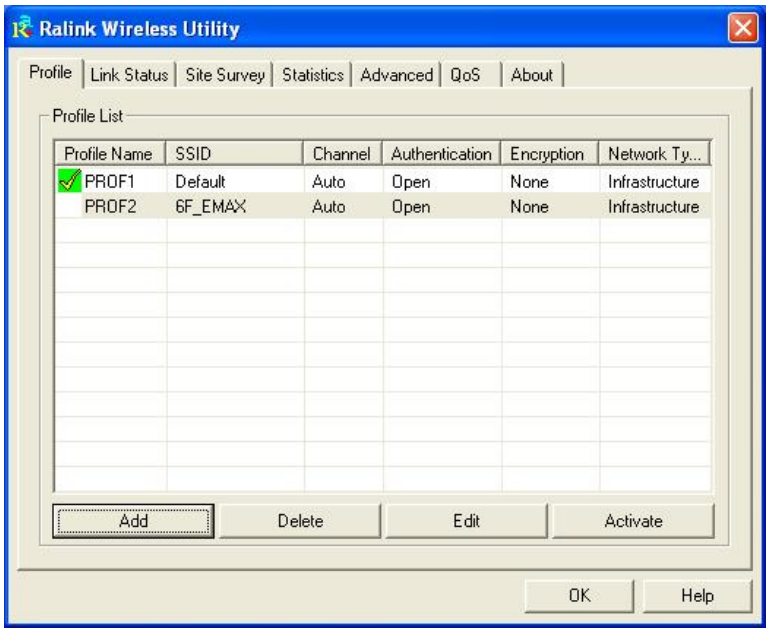
G. Please click “Finish” to complete the installation.



3 Configuration Utility

The Ralink Configuration Utility is a powerful application that helps you configure the Mini-PCI card and monitor the link status and the statistics during the communication process.

When the module is installed, the configuration utility will be displayed automatically. This module will auto connect to wireless device which has better signal strength and no wireless security setting.



The Ralink Configuration Utility appears as an icon on the system tray of Windows while the module is running. You can open the utility by double-click on the icon.

In Windows XP, there is a “Windows Zero Configuration Tool” for you to setup wireless clients. If you want to switch to use Ralink configuration utility, please follow one of the ways as below.

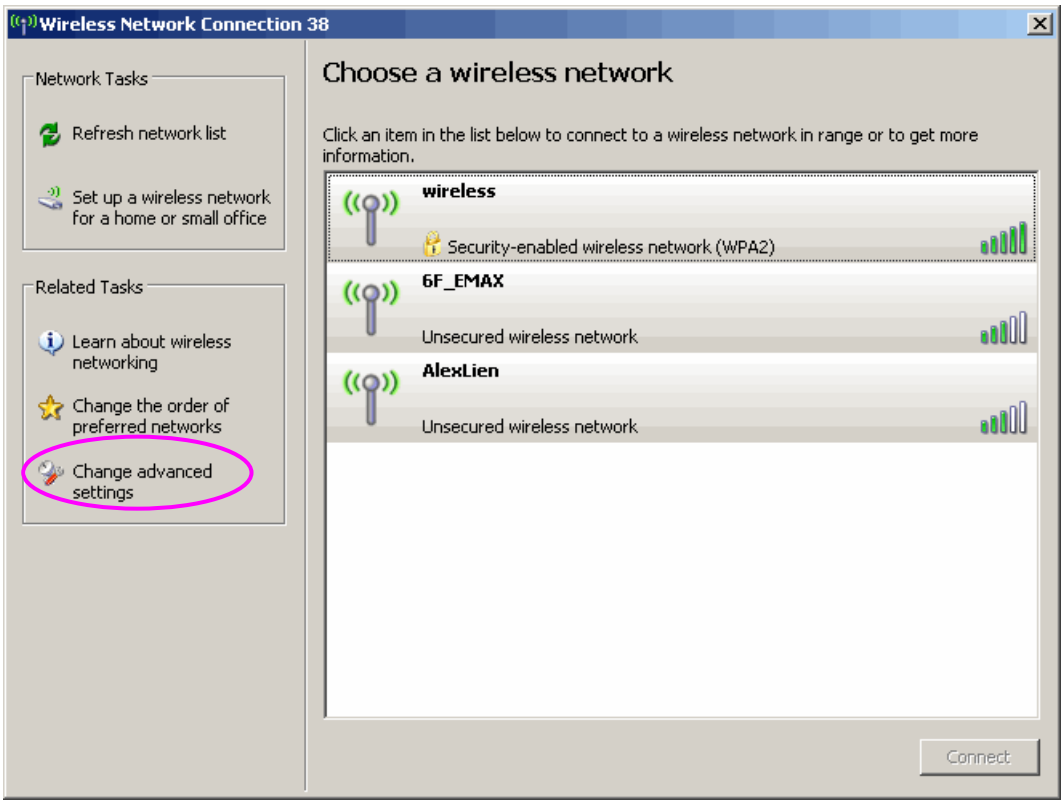
First Way

Right click the icon in the system tray and select “Use RaConfig as Configuration utility”.

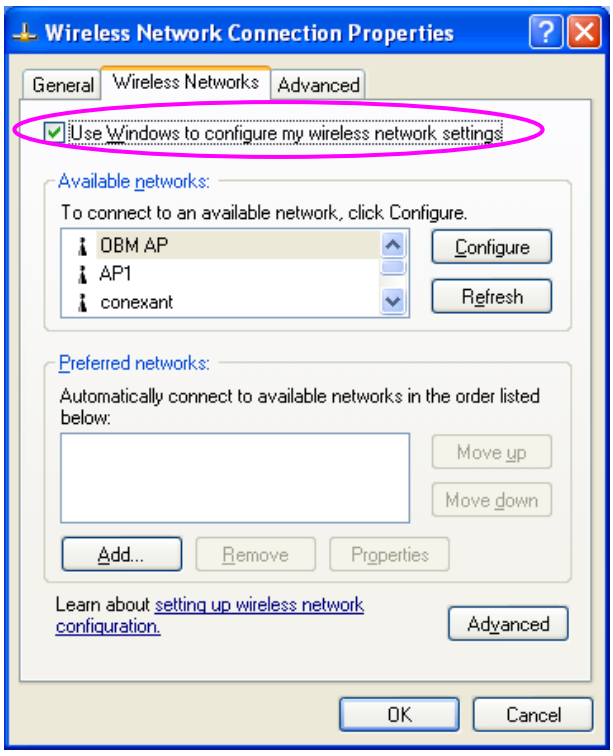
Second Way

A. Right-click the icon and select “View Available Wireless Networks”.

B. Click “Advanced”.



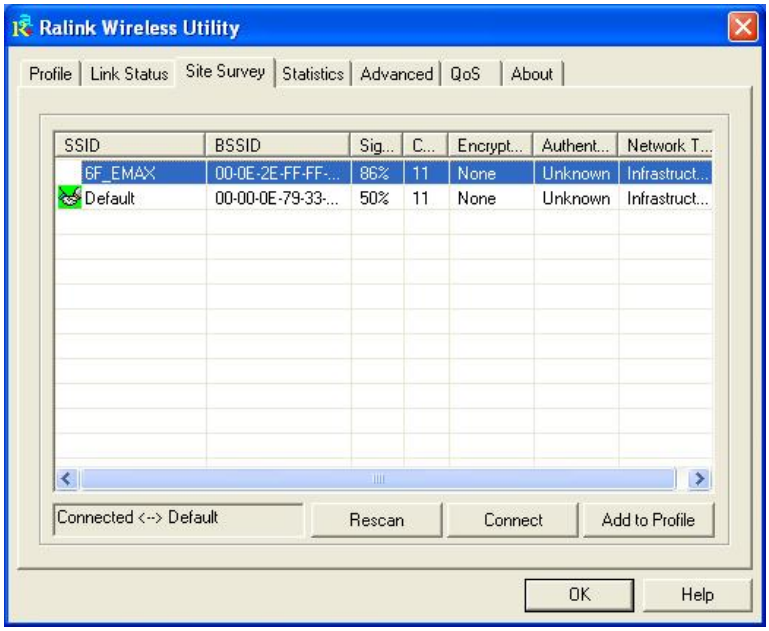
C. Uncheck “Use Windows to configure my wireless network settings” to enable the utility for the module.



Note: If “Wireless Zero Configuration” is enabled, you can only configure the advance setting or check the link status and statistics from the configuration utility of the module.

3.1 Site Survey

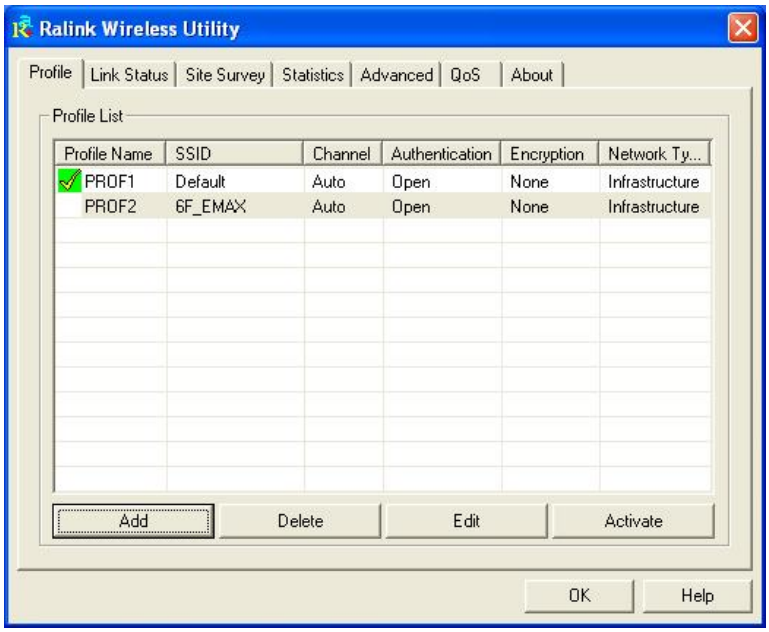
When you open the Ralink Configuration Utility, the system will scan all the channels to find all the access points/stations within the accessible range of your module and automatically connect to the wireless device with the highest signal strength. From the “Site Survey”, all the networks nearby will be listed. You can change the connection to another networks or add one of the networks to your own profile list.



Parameter	Description
Available Networks	This list shows all available wireless networks within range of your module. It also displays the information of the networks including the SSID, BSSID, Signal Strength, Channel, Encryption, Authentication and Network Type. If you want to connect to any networks on the list, double-click the item on the list, and the module will automatically connect to the selected network.
Rescan Button	Click “Rescan” button to collect the new information of all the wireless networks nearby.
Connect Button	Click “Connect” to connect to the selected network.
Add to Profile Button	Add the selected network to Profiles list.

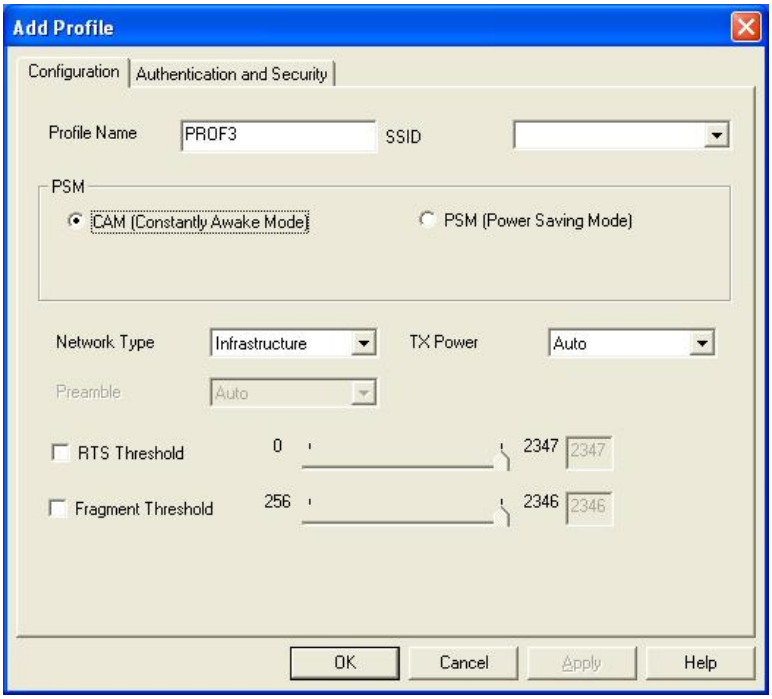
3.2 Profile

The “Profiles List” is for you to manage the networks you connect to frequently. You are able to Add/Delete/Edit/Activate a profile.



Parameter	Description
Profiles List	The profiles list display all the profiles and the relative settings of the profiles including Profile Name, SSID, Channel, etc. This sign indicates the activated profile is been connecting. This sign indicates the activated profile is not been connecting.
Add/Delete/Edit Button	Click these buttons to add/delete/edit the selected profiles.
Activate Button	Click “Activate” to connect to the selected profile. When a profile is activated, the module will be initially connected to the profile.

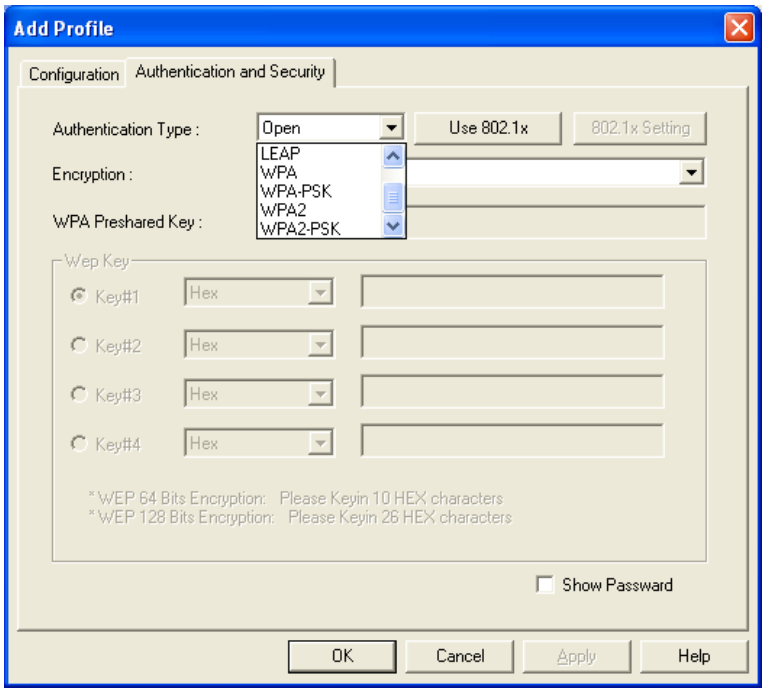
3.2.1 Configure the Profile



3.2.1.1 Configuration

Parameter	Description
Profile Name	Define a recognizable profile name for you to identify the different networks.
SSID	The SSID (up to 32 printable ASCII characters) is the unique name identified in a WLAN. The ID prevents the unintentional merging of two co-located WLANs. You may specify a SSID for the module and then only the device with the same SSID can interconnect to the module. If you want to add the network nearby to the profile list, pull down the menu, all the networks will be listed for you to add one of them to the profile list.
PSM (Power Saving Mode)	The power saving function is only available when the network type is in Infrastructure. **CAM (Constantly Awake Mode)** – The module will always set in active mode. **PSM (Power Saving Mode)** – Enable the module in the power saving mode when it is idle.

Parameter	Description
Network Type	**Infrastructure** – This operation mode requires the presence of an 802.11 Access Point. All communication is done via the Access Point or Router. **Ad-Hoc** – Select this mode if you want to connect to another wireless stations in the Wireless LAN network without through an Access Point or Router.
TX Power	If you want to lower the transmit power of the module for saving the power of the system, you can select the lower percentages from the list. The lower power will cause the lower signal strength and the coverage range.
Preamble	The preamble defines the length of the CRC block for communication among wireless devices. This option is only active in the Ad Hoc network. There are two modes including Auto and Long Preamble. If “Auto“ mode is selected, the module will auto switch the preamble mode depending on the wireless devices the module is connecting to.
RTS Threshold	Minimum packet size required for an RTS (Request To Send). For packets smaller than this threshold, an RTS is not sent and the packet is transmitted directly to the wireless network. Select a setting within a range of 0 to 2347 bytes. Minor change is recommended.
Fragment Threshold	The value defines the maximum size of packets; any packet size larger than the value will be fragmented. If you have decreased this value and experience high packet error rates, you can increase it again, but it will likely decrease overall network performance. Select a setting within a range of 256 to 2346 bytes. Minor change is recommended.
Channel	This setting is only available for Ad Hoc mode. Select the number of the radio channel used for the networking. The channel setting should be the same with the network you are connecting to.

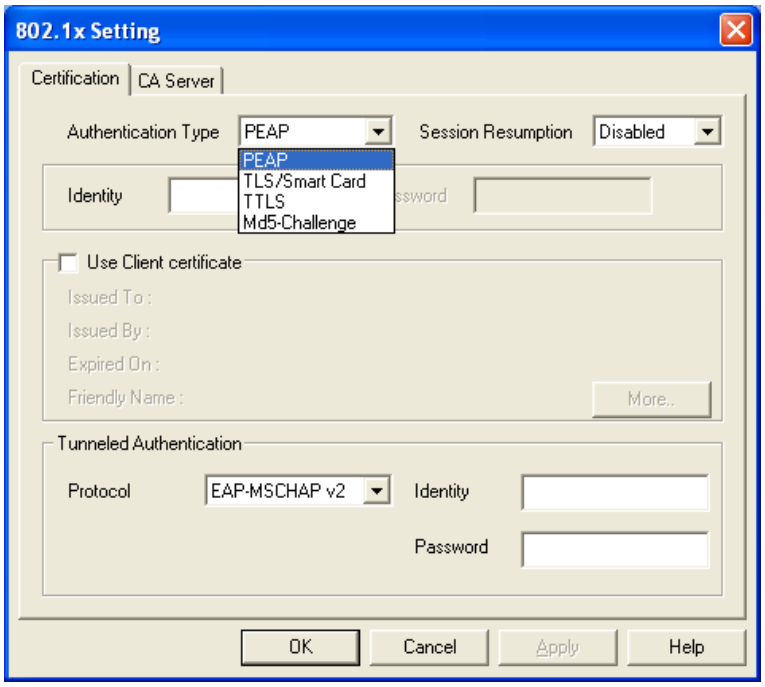


3.2.1.2 Authentication and Security

Parameter	Description
Authentication Type	This setting has to be consistent with the wireless networks that the module intends to connect. **Open** – No authentication is needed among the wireless network. **Shared** – Only wireless devices using a shared key (WEP Key identified) are allowed to connecting each other. **LEAP** – LEAP is a pre-EAP, Cisco-proprietary protocol, with many of the features of EAP protocols. Cisco controls the ability of other vendors to implement this protocol, so it should be selected for use only when limited vendor choice for client, access-point, and server products is not a concern. When you have set up LEAP authentication, you have to enter the user name and password of your computer. **WPA –** WPA provides a scheme of mutual authentication using either IEEE 802.1x/Extensible Authentication Protocol (EAP) authentication or pre-shared key (PSK) technology. It provides a high level of assurance to enterprises, small businesses and home users that data will remain protected and that only authorized users may access their networks. For enterprises that have already deployed IEEE 802.1x authentication, WPA offers the advantage of leveraging existing authentication databases and infrastructure.

Parameter	Description
	WPA-PSK – It is a special mode designed for home and small business users who do not have access to network authentication servers. In this mode, known as Pre-Shared Key, the user manually enters the starting password in their access point or gateway, as well as in each wireless station in the network. WPA-PSK takes over automatically from that point, keeping unauthorized users that don't have the matching password from joining the network, while encrypting the data traveling between authorized devices. **WPA2** – Like WPA, WPA2 supports IEEE 802.1x/EAP authentication or PSK technology. It also includes a new advanced encryption mechanism using the Advanced Encryption Standard (AES). AES is required to the corporate user or government users. The difference between WPA and WPA2 is that WPA2 provides data encryption via the AES. In contrast, WPA uses Temporal Key Integrity Protocol (TKIP). **WPA2-PSK –** WPA2-PSK is also for home and small business. The difference between WPA-PSK and WPA2-PSK is that WPA2-PSK provides data encryption via the AES. In contrast, WPA-PSK uses Temporal Key Integrity Protocol (TKIP). **WPA-NONE –** WPA-NONE is defined for Ad hoc mode and behaves like WPA-PSK (WPA-PSK is only defined for infrastructure mode). The user manually enters the Pre-Shared Key in each wireless station in the network and WPA-NONE controls unauthorized users that don't have the matching Pre-Shared Key from joining the network and also encrypts the data traveling between authorized devices.
802.1x Setting	When you have set the Authentication Type to Open, Shared, WPA or WPA2, you can also enable IEEE 802.1x setting to use the authentication server or certification server to authenticate client users.
Encryption Mode	**None** – Disable the encryption mode. **WEP** – Enable the WEP Data Encryption. When the item is selected, you have to continue setting the WEP Encryption keys. **TKIP** – TKIP (Temporal Key Integrity Protocol) changes the temporal key every 10,000 packets (a packet is a kind of message transmitted over a network.) This ensures much greater security than the standard WEP security.

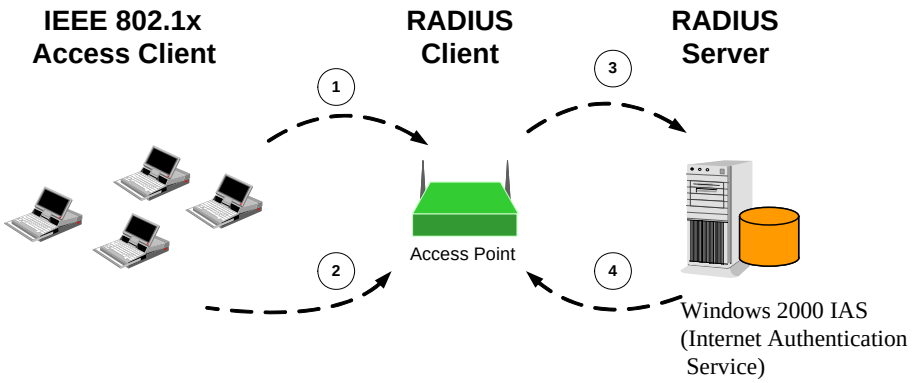
Parameter	Description
	AES – AES has been developed to ensure the highest degree of security and authenticity for digital information and it is the most advanced solution defined by IEEE 802.11i for the security in the wireless network. Note: All devices in the network should use the same encryption method to ensure the communication.
WPA Pre-Shared Key	The WPA-PSK key can be from 8 to 64 characters and can be letters or numbers. This same key must be used on all of the wireless stations in the network.
WEP Key (Key1 ~ Key4)	The WEP keys are used to encrypt data transmitted in the wireless network. There are two types of key length: 64-bit and 128-bit. Select the default encryption key from Key 1 to Key 4 by selected the radio button. Fill the text box by following the rules below. **64-bit** – Input 10-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 5-digit ASCII characters (including “a-z” and “0-9”) as the encryption keys. For example: “0123456aef“ or “test1”. **128-bit** – Input 26-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 13-digit ASCII characters (including “a-z” and “0-9”) as the encryption keys. For example: “01234567890123456789abcdef“ or “administrator”.



The IEEE 802.1X specification describes a protocol that can be used for authenticating both clients and servers on a network. The authentication algorithms and methods are those provided by the Extensible Authentication Protocol (EAP), a method of authentication that has been in use for a number of years on networks that provide Point-to-Point Protocol (PPP) support as many internet service providers and enterprises do.

When an AP acting as an authenticator detects a wireless station on the LAN, it sends an EAP-Request for the user's identity to the device. (EAP, or the Extensible Authentication Protocol, is an authentication protocol that runs before network layer protocols transmit data over the link.) In turn, the device responds with its identity, and the AP relays this identity to an authentication server, which is typically an external RADIUS server.

An example for MD5 Authentication



(1) Client requests to login the network.

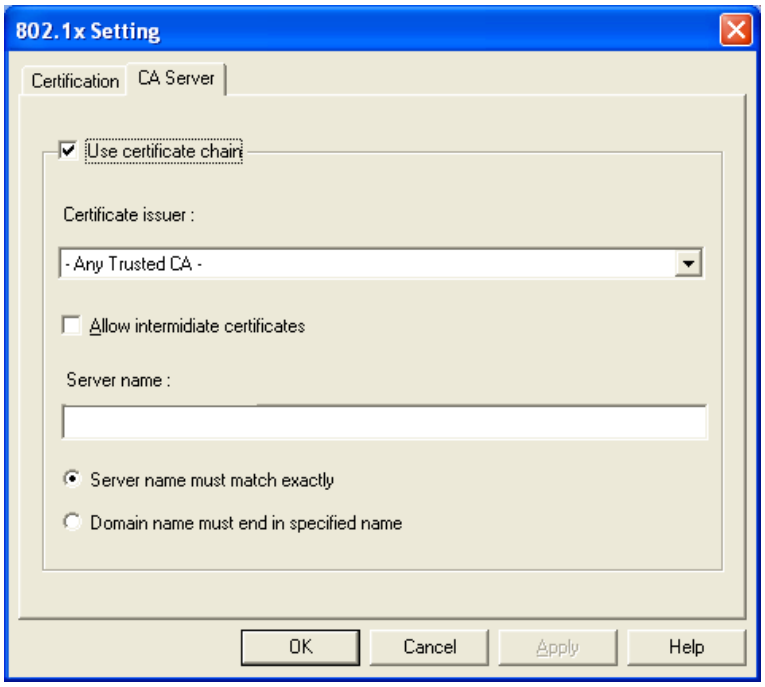
(2) Login with username, password.

(3) Send username, password to RADIUS server.

(4) Approve or deny user login to the LAN.

3.2.1.3 802.1x Setting-Certification

Parameter	Description
Authentication Type	The EAP authentication protocols this module has supported are included as follows. This setting has to be consistent with the wireless APs or Routers that the module intends to connect. **PEAP &TTLS** – PEAP and TTLS are similar and easier than TLS in that they specify a stand-alone authentication protocol be used within an encrypted tunnel. TTLS supports any protocol within its tunnel, including CHAP, MS-CHAP, MS-CHAPv2, PAP and EAP-MD5. PEAP specifies that an EAP-compliant authentication protocol must be used; this module supports EAP-MSCHAP v2, EAP-TLS/Smart Card and Generic Token Card. The client certificate is optional required for the authentication. **TLS/Smart Card** –TLS is the most secure of the EAP protocols but not easy to use. It requires that digital certificates be exchanged in the authentication phase. The server presents a certificate to the client. After validating the server's certificate, the client presents a client certificate to the server for validation.
Session Resumption	There are "Disabled", "Reauthentication", "Roaming", "SameSsid" and "Always" selections for you to choose whether to recovery the session in different status.
Password	Enter the password as the identity for the server.
Use Client Certificate	A client certificate is required for TLS, and is optional for TTLS and PEAP. This forces a client certificate to be selected from the appropriate Windows Certificate Store and made available to the RADIUS server for certification.
Tunneled Authentication	
Protocol	When the authentication type is PEAP or TTLS, select a protocol to be used to build the encrypted tunnel.
Identity	This is the protected user EAP Identity used for authentication. The identity specified may contain up to 63 ASCII characters, is case sensitive and takes the form of a Network Access Identifier, consisting of <name of the user>@<user's home realm>. The user's home realm is optional and indicates the routing domain.
Password	The password used for authentication. It may contain up to 63 ASCII characters and is case sensitive.

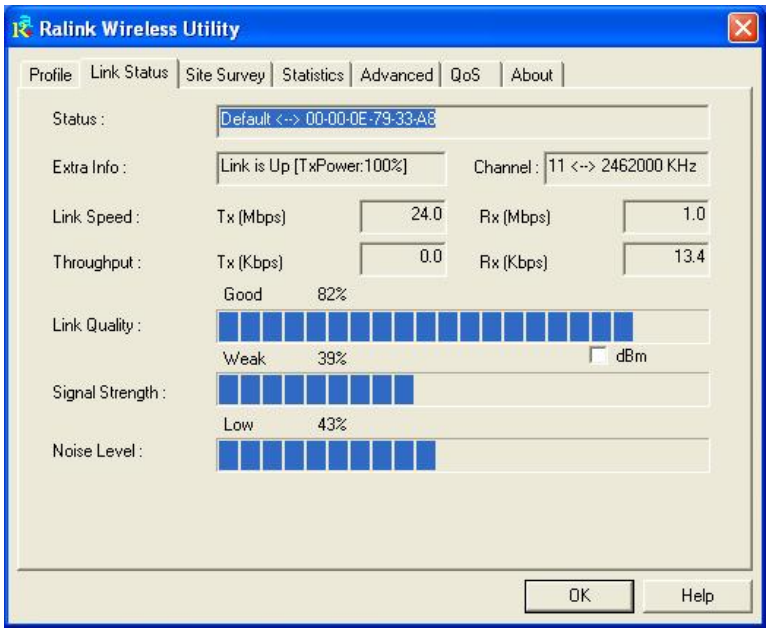


3.2.1.4 802.1x Setting-CA Server

Parameter	Description
Use Certificate Chain	When the EAP authentication type such as TLS, TTLS or PEAP is selected and required a certification to tell the client what server credentials to accept from the authentication server in order to verify the server, you have to enable this function.
Certificate Issuer	Choose the server from the list to issue the certificate. If “Any Trusted CA” is selected, any CA included in the list (provided by the Microsoft Certificate Store) is permitted.
Allow Intermediate Certificates	A server designates an issuer as a trusted root authority by placing the issuer's self-signed certificate, which contains the issuer's public key, into the trusted root certification authority certificate store of the host computer. Intermediate or subordinate certification authorities are trusted only if they have a valid certification path from a trusted root certification authority.
Server Name	Enter the authentication server name.
Server name must match exactly	When selected, the server name must match exactly the server name found on the certificate.
Domain name must end in specified name	When selected, the server name field identifies a domain. The certificate must use a server name belonging to this domain or to one of its sub-domains (e.g. zeelans.com, where the server is blueberry.zeelans.com) but it may be any name used in the certificate name field.

3.3 Link Status

From the “Link Status” option, you can view all the information of the network you are connecting to.

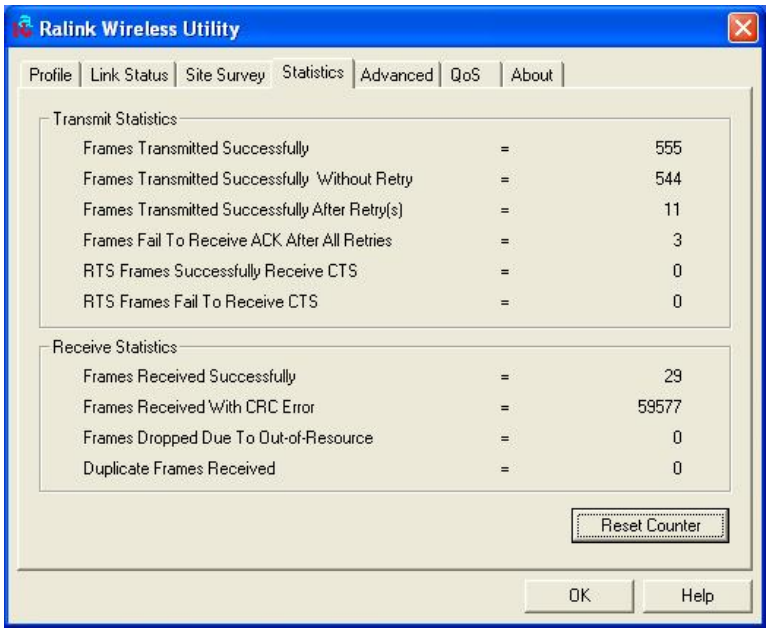


Parameter	Description
Status	Display the SSID and MAC ID of the network the module is connecting to.
Extra Info	Display the link status.
Channel	Display the number of the radio channel and the frequency used for the networking.
Link Speed (Mbps)	Display the transmission and reception rate of the network. The maximum transmission rate is 54Mbps.
Throughput (Kbps)	Display the speed of data transmitted and received.
Link Quality	This bar indicates the quality of the link. The higher the percentage, the better the quality.
dBm	If you want to know the signal strength in the unit of dBm, select this check box.
Signal Strength	This bar shows the signal strength level. The higher percentage shown in the bar, the more radio signal been received by the module. This indicator helps to find the proper position of the wireless device for quality network operation.

Parameter	Description
Noise Level	Display the noise level in the wireless environment.

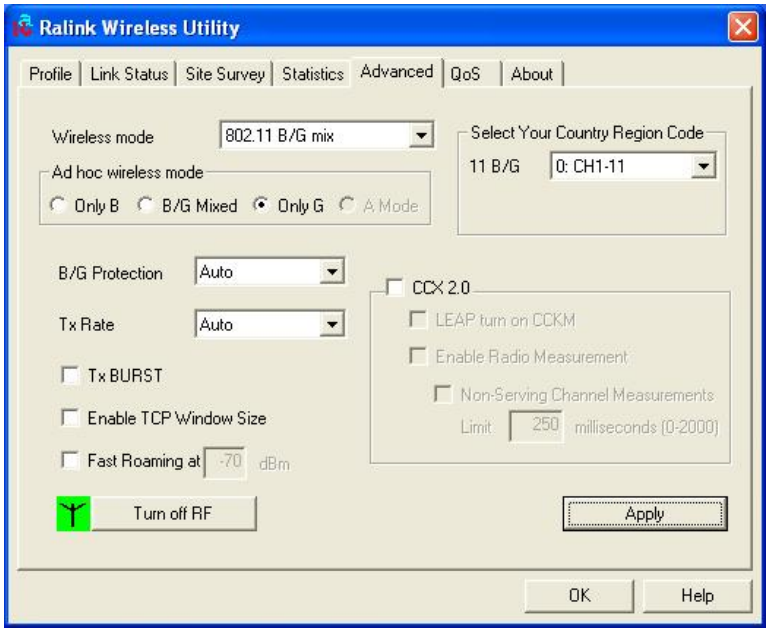
3.4 Statistics

This option enables you to view the statistic information of the connection including transmit statistics and receive statistics. You may reset the counters by clicking ”Reset Counter”.



3.5 Advance

This option enables you to configure more advanced settings, for example: wireless mode, protection mode and etc.



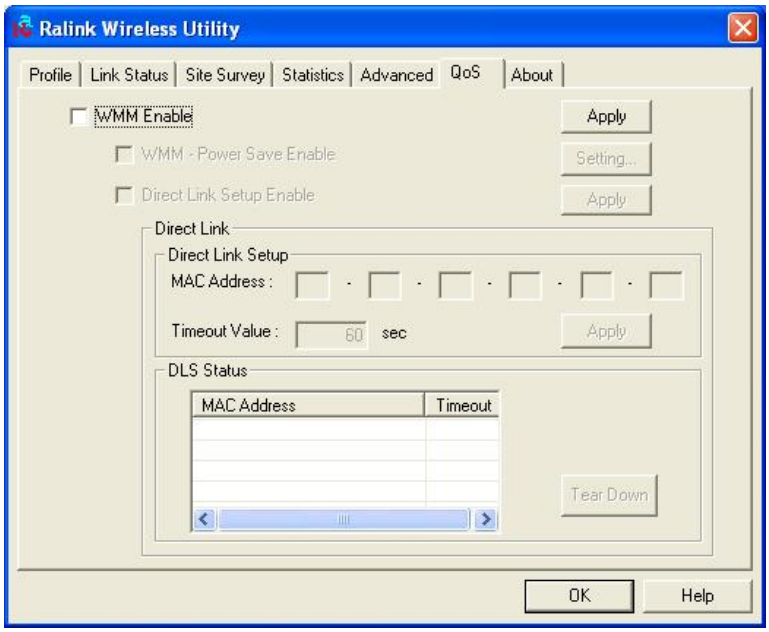
Parameter	Description
Wireless Mode	**802.11 B/G mix** – If you have a mix of 802.11b and 802.11g wireless stations in your network, it is recommended to set the module to this mode. This mode is also the default setting. **802.11 B only** – This module can be compatible with both 802.11g and 802.11b wireless stations. If there are only 802.11b wireless stations in the network, you can set the module to this mode.
Ad Hoc Wireless Mode	When the module is set in Ad Hoc (Peer to Peer Mode), you can designate the wireless connection mode for the Ad Hoc network. **Only B** – This module can be compatible with both 802.11g and 802.11b wireless stations. If there are only 802.11b wireless stations in the network, you can set the module to this mode. **B/G Mixed** – If you have a mix of 802.11b and 802.11g wireless stations in your network, it is recommended to set the module to this mode. This mode is also the default setting. **Only G** – This module can be compatible with both 802.11g and 802.11b wireless stations. If there are only 802.11g wireless stations in the network, you can set the module to this mode.
Select Your Country Region Code	The available channel differs from different countries. For example: USA (FCC) is channel 1-11, Europe (ETSI) is channel 1-13. The operating frequency channel will be restricted to the country user located before importing. If you are in different country, you have to adjust the channel setting to comply the regulation of the country.
B/G Protection	If you have a mix of 802.11b and 802.11g wireless stations in the network, it is recommended to enable the protection mechanism. This mechanism can decrease the rate of data collision between 802.11b and 802.11g wireless stations. When the protection mode is enabled, the throughput of the module will be a little lower due to many of frame traffic should be transmitted. **Auto** – Based on the status of the network and automatically disable/enable protection mode. **On** – Always enable the protection mode. **Off** – Always disable the protection mode.

Parameter	Description
Tx Rate	There are several options including Auto/1/2/5.5/11/6/9/12/18/24/36/48/54Mbps for you to select. When the “Auto” is selected, the device will choose the most suitable transmission rate automatically. The higher data rate you designated in the network, the shorter distance is allowed between the module and the wireless stations. When the wireless mode is “802.11 B only”, the maximum data rate is 11Mbps (11b) so that there are only “Auto/1/2/5.5/11Mbps” options you can select.
Tx BURST	Tx Burst enables the module to deliver better throughput in the same period and environment.
Enable TCP Window Size	The TCP Window is the amount of data a sender can send on a particular connection before it gets an acknowledgment back from the receiver that it has gotten some of it. When the Router or AP the module is connecting to have set up the TCP Window, you can enable the parameter to meet the data size for the Router or AP connection. The larger TCP Window the better performance.
Fast Roaming at -70dBm	When you want to fast roaming to the network nearby without intercepting the wireless connection especially the module is applied to the multimedia application or a voice call, you can enable the parameter. The module will fast roaming to the near network when the receive sensitivity (signal strength) is lower to the value you have set up.
Turn Off RF Button	If you want to turn off the radio of the module temporarily, click this button. To turn on the radio, click this button again.
CCX 2.0	CCX 2.0 (Cisco Compatible Extensions) is developed by Cisco for the radio monitoring and fast roaming.

Parameter	Description
LEAP Turn on CCKM	During normal operation, LEAP-enabled client devices mutually authenticate with a new access point by performing a complete LEAP authentication, including communication with the main RADIUS server. When you configure your wireless LAN for fast re-association, however, LEAP-enabled client devices roam from one access point to another without involving the main server. Using Cisco Centralized Key Management (CCKM), an access point configured to provide Wireless Domain Services (WDS) takes the place of the RADIUS server and authenticates the client so quickly that there is no perceptible delay in voice or other time-sensitive applications.
Enable Radio Measurement	When this parameter is enabled, the Cisco AP can run the radio monitoring through the associated CCX-compliant clients to continuously monitor the WLAN radio environment and discover any new APs that are transmitting beacons.
Non-Serving Channel Measurements	The Cisco AP can perform monitoring measurements through the CCX-compliant clients on the non-serving channels when this parameter is enabled.
Limit xxx milliseconds (0-2000)	It limits the channel measurement time. The default value is 250 milliseconds.

3.6 QoS

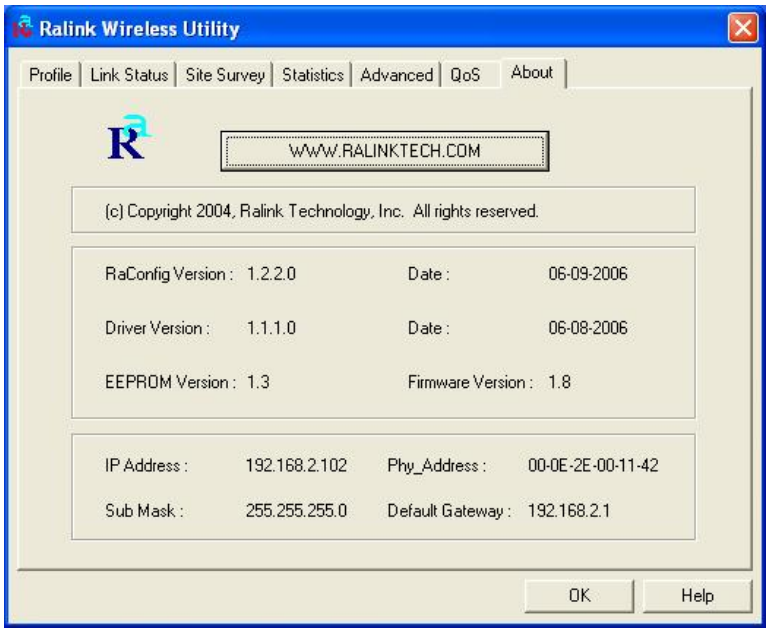
This option enables you to configure QoS settings, for example: WMM, WMM - Power Save and Direct Link Setup.



Parameter	Description
WMM Enable	Check on this item and click “Apply” to enable WMM function, and then further you can configure WMM Power Save and Direct Link Setup function.
WMM – Power Save Enable	Check on this item to enable WMM Power Save function. Click “Setting” to further configure WMM Power Save setting, which includes: AC_BK, AC_BE, AC_VI and AC_VO.
Direct Link Setup Enable	Check on this item and click “Apply” to enable DLS function.
Direct Link	
Direct Link Setup	
MAC Address	Specify the MAC Address of the client card you want to direct link to and click “Apply” to add into DLS Status table.
Timeout Value	Specify the timeout value for the direct link you want to setup.
DLS Status	The DLS Status displays all the direct link connections and you can click “Tear Down” to stop any of them.

3.7 About

By choosing this option, you can click the hyperlink to connect the website for the information of the wireless chipset vendor and review basic information about the Utility such as the Driver, Utility and EEPROM Version. The MAC Address of the module is displayed in the screen as well.



3.8 Turbo Mode

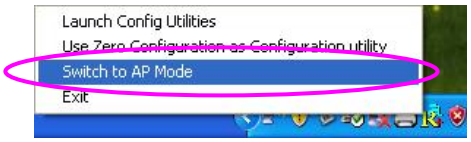
This module supports specific ways to increase the data transfer rate at a time; compress the data and decrease the waiting time to send the next data to the Routers or APs, this feature (known as Turbo Mode) enables higher throughput than IEEE 802.11g standard (Up to 54Mbps).

When the module is connecting to the Routers or APs with the proprietary Turbo Mode feature, the Turbo Mode will be enabled automatically without any configuration.

3.9 SoftAP

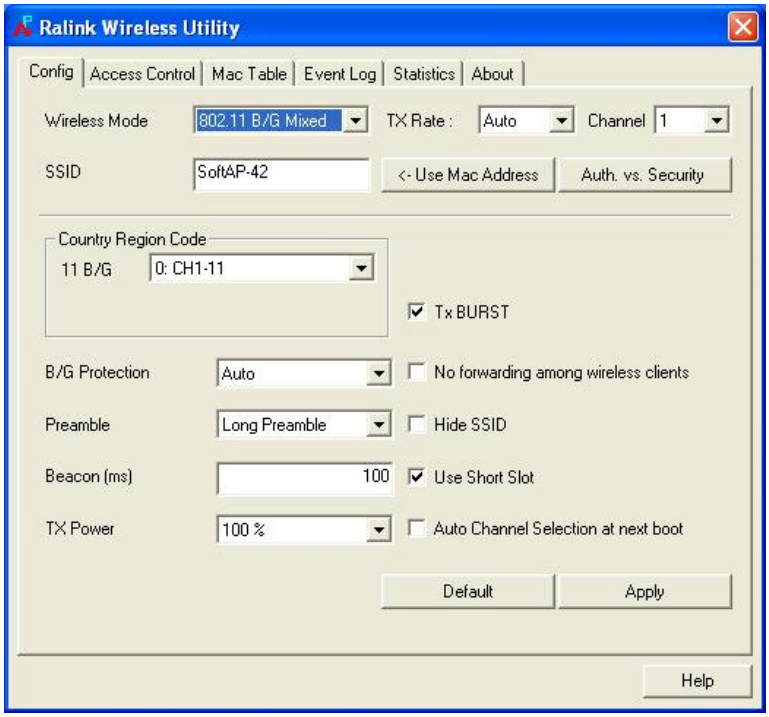
This module can run as a wireless AP. The relative configurations of the AP including channel, SSID, MAC Address Filtering and so on are described as follows.

Right click the Ralink Configuration Utility icon on the system tray of Windows and select “Switch to AP Mode” to turn on SoftAP function.



3.9.1 Config

The Config page enables you to configure the AP connection setting, Country Region Code and other advanced functions.



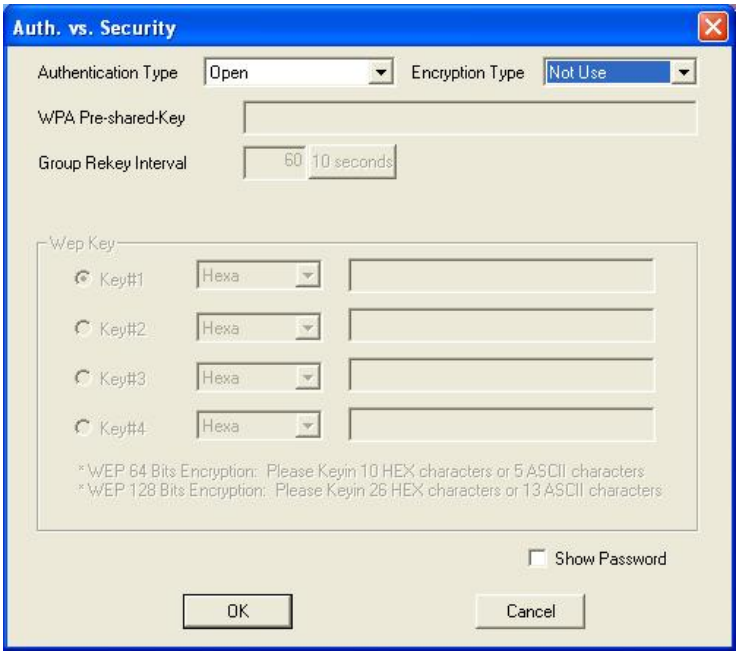
Parameter	Description
Wireless Mode	Selects the wireless mode supports by the AP. **802.11 B/G Mixed** – The AP works in 11b+g mixed mode. **802.11 B Only** – The AP works in 11b mode. **802.11 G Only** – The AP works in 11g mode.
TX Rate	There are several options including Auto/1/2/5.5/11/6/9/12/18/24/36/48/54Mbps for you to select. When the “Auto” is selected, the AP will choose the most suitable transmission rate automatically. The higher data rate you designated in the network, the shorter distance is allowed between the AP and the wireless clients. When the wireless mode is “802.11 B only”, the maximum data rate is 11Mbps (11b) so that there are only “Auto/1/2/5.5/11Mbps” options you can select.
Channel	Select the number of the radio channel used by the AP. The wireless cards connected to the AP should set up the same channel.
SSID	The SSID (up to 32 printable ASCII characters) is the unique name identified in a WLAN. The ID prevents the unintentional merging of two co-located WLANs. The default SSID of the AP is SoftAP-X. (X is the last number of this module’s Mac Address) Wireless cards connect to the AP should set up the same SSID as the AP.
Use Mac Address	Click this button to create a unique SSID based on the module’s Mac Address.
Auth. vs. Security	Click this button to further configure WLAN authentication and security setting. Please refer to **3.9.1.1.**
Country Region Code	The available channel differs from different countries. For example: USA (FCC) is channel 1-11, Europe (ETSI) is channel 1-13. The operating frequency channel will be restricted to the country user located before importing. If you are in different country, you have to adjust the channel setting to comply the regulation of the country.

Parameter	Description
B/G Protection	If you have a mix of 802.11b and 802.11g wireless clients in the network, it is recommended to enable the protection mechanism. This mechanism can decrease the rate of data collision between 802.11b and 802.11g wireless clients. When the protection mode is enabled, the throughput of the AP will be a little lower due to many of frame traffic should be transmitted. **Auto** – Based on the status of the network and automatically disable/enable protection mode. **On** – Always enable the protection mode. **Off** – Always disable the protection mode.
Preamble	802.11g wireless cards support both long and short preamble, but for 802.11b wireless cards, supporting short preamble is optional. The throughput will be better when using short preamble, **Long Preamble** – 128 bits sync field. **Short Preamble** – 56 bits sync field.
Beacon (ms)	Here defines the time between two beacons, the default value is 100ms.
TX Power	If you want to lower the transmit power of the AP for saving the power of the system, you can select the lower percentages from the list. The lower power will cause the lower signal strength and the coverage range.
Tx BURST	Tx BURST enables the AP to deliver better throughput in the same period and environment.
No forwarding among wireless clients	Enable this setting to force the wireless clients connected to this AP not sharing information each other.
Hide SSID	If “Hide SSID” checkbox is enabled, the AP will not appear in the site survey list of any wireless clients. It means only the wireless clients set the same SSID can connect to the AP. It avoids the AP being connected by unauthorized users.
Use Short Slot	Short slot time is 9 us and long slot time is 20 us.
Auto Channel Selection at next boot	The AP will select a random channel at next booting.

Parameter	Description
Default	Click to use with default value.
Apply	Click to apply the setting change.

3.9.1.1 Auth. Vs. Security

This option enables you to configure the authentication mode and encryption algorithm used within the AP.

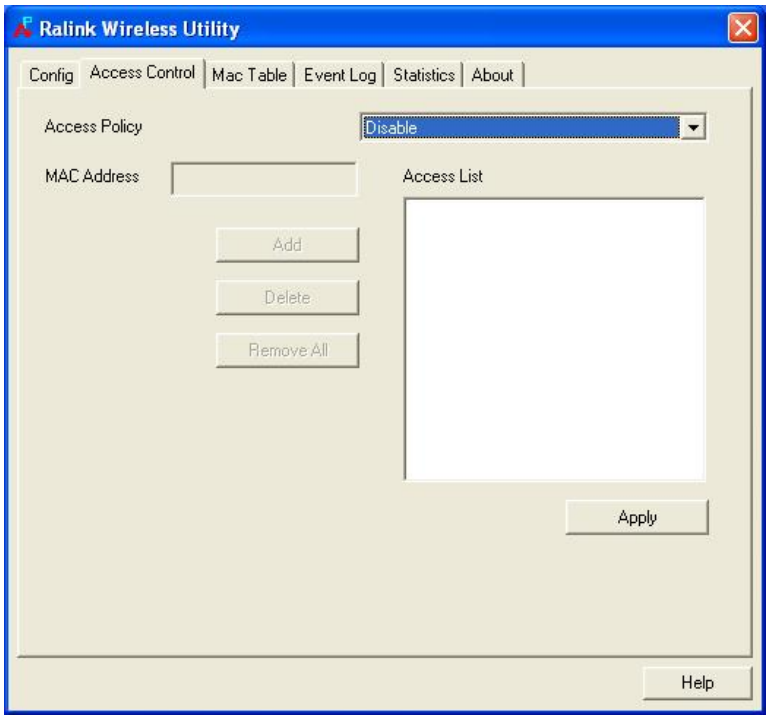


Parameter	Description
Authentication Type	There are four types of authentication mode supported. **Open** – No authentication is needed among the wireless network. **WPA-PSK -** It is a special mode designed for home and small business users who do not have access to network authentication servers. In this mode, known as Pre-Shared Key, the user manually enters the starting password in their access point or gateway, as well as in each wireless station in the network. WPA-PSK takes over automatically from that point, keeping unauthorized users that don't have the matching password from joining the network, while encrypting the data traveling between authorized devices. **WPA2-PSK -** WPA2-PSK is also for home and small business. **WPA-PSK/WPA2-PSK –** When selecting this mode, the AP supports both WPA-PSK and WPA2-PSK.

Parameter	Description
Encryption Type	**Not Use -** Disable the encryption mode. **WEP -** Enable the WEP Data Encryption. When the item is selected, you have to continue setting the WEP Key. **TKIP -** TKIP (Temporal Key Integrity Protocol) changes the temporal key every 10,000 packets (a packet is a kind of message transmitted over a network.) This ensures much greater security than the standard WEP security. **AES -** AES has been developed to ensure the highest degree of security and authenticity for digital information and it is the most advanced solution defined by IEEE 802.11i for the security in the wireless network. **BOTH –** When selecting this mode, the AP supports both TKIP and AES.
WPA Pre-shared Key	The WPA Pre-shared Key can be from 8 to 64 characters and can be letters or numbers. This same key must be used on all of the wireless stations in the network.
Group Rekey Interval	This function is available when using WPA-PSK and WPA2-PSK encryption algorithm. The key will change compliance with seconds or beacon that user set.
Wep Key (Key#1 ~ Key#4)	The WEP keys are used to encrypt data transmitted in the wireless network. There are two types of key length: 64-bit and 128-bit. Select the default encryption key from Key 1 to Key 4 by selected the radio button. Fill the text box by following the rules below. **64-bit** – Input 10-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 5-digit ASCII characters (including “a-z” and “0-9”) as the encryption keys. For example: “0123456aef“ or “test1”. **128-bit –** Input 26-digit Hex values (in the “A-F”, “a-f” and “0-9” range) or 13-digit ASCII characters (including “a-z” and “0-9”) as the encryption keys. For example: “01234567890123456789abcdef“ or “administrator”.
Show Password	The password will be shown in clear text instead of in asterisk.

3.9.2 Access Control

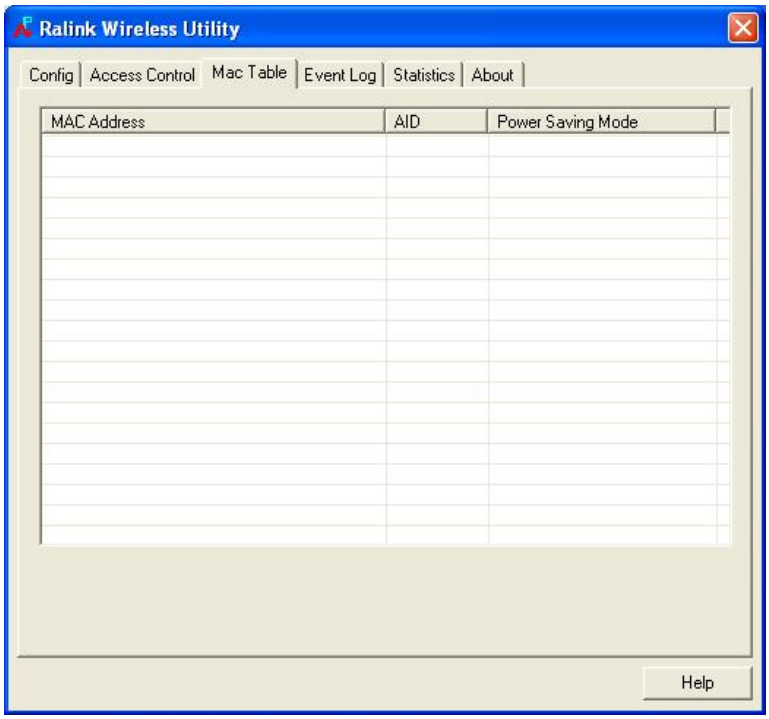
The Access Control page enables you to configure the access control policy used within the AP.



Parameter	Description
Access Policy	**Disable** – Disable the MAC Address filtering function. **Allow All** – Only the wireless cards with the MAC Address listed in Access List can connect to the AP. **Reject All** – The wireless cards with the MAC Address listed in Access List will be rejected to connect to the AP.
MAC Address	MAC Address is a unique identification for hardware devices in the network. It is a 12-digit hexadecimal values.
Access List	Display all the MAC Address user adds.
Add	Add the MAC Address to Access List.
Delete	Delete the selected MAC Address from Access List.
Remove All	Remove all the MAC Address from Access List.
Apply	Click to apply the setting change.

3.9.3 Mac Table

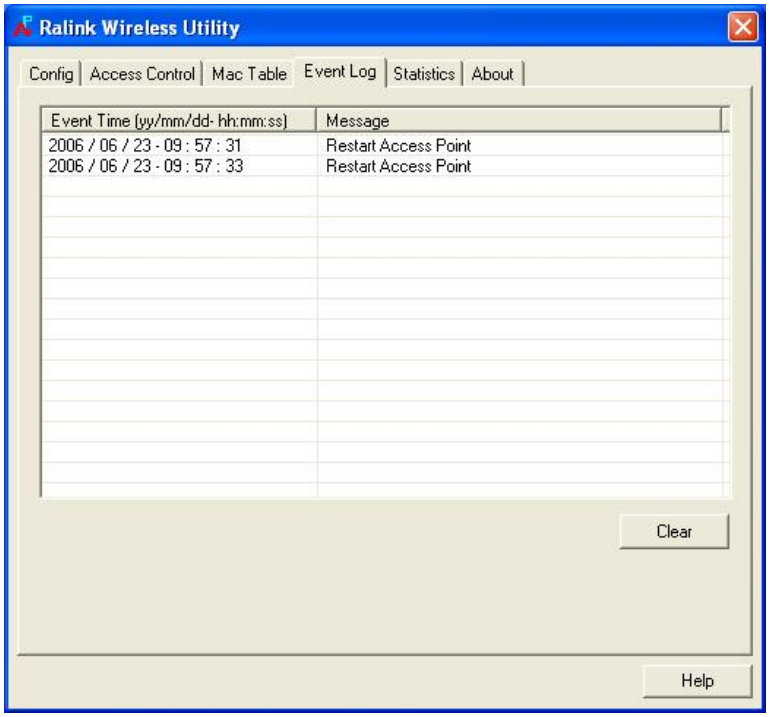
The Mac Table page displays the detail information of the wireless cards connected to the AP.



Parameter	Description
MAC Address	The MAC Address of the wireless cards connected to the AP.
AID	The Association ID of current connection.
Power Saving Mode	The supporting status of Power Saving Mode of the wireless card connected.

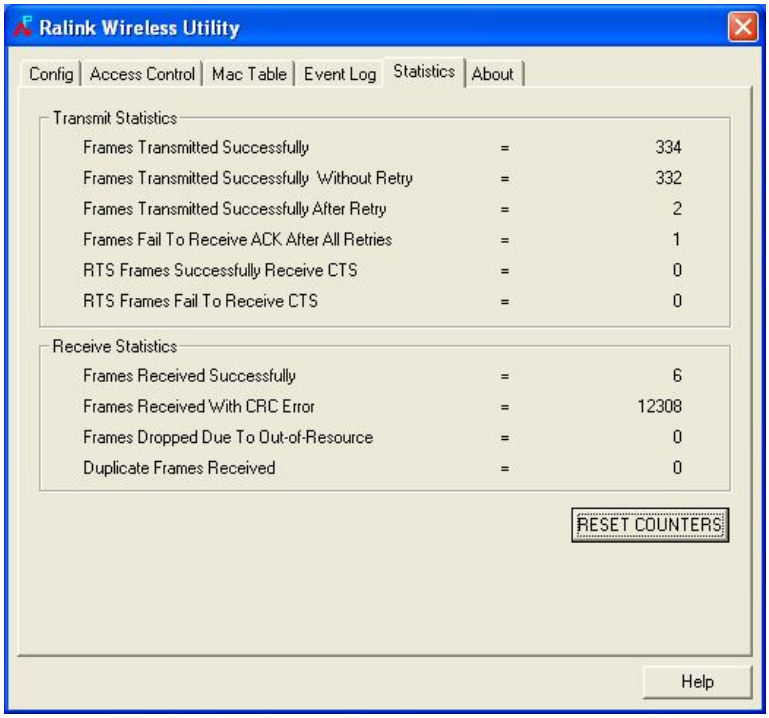
3.9.4 Event Log

The Event Log page displays all the event time and message. You may clear the table by clicking “Clear”.



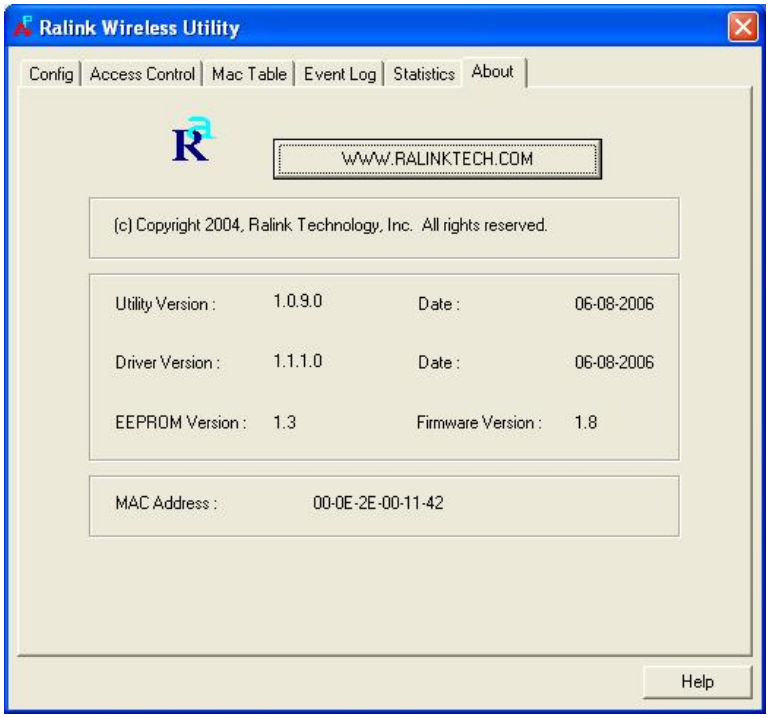
3.9.5 Statistics

The Statistics page displays the statistic information of the AP including transmit statistics and receive statistics. You may reset the counters by clicking “Reset Counters”.



3.9.6 About

The About page displays the basic information about the Utility, including Driver, Utility and EEPROM Version. The MAC Address of the module is displayed in the screen as well.



4 Troubleshooting

This chapter provides solutions to problems usually encountered during the installation and operation of the card.

1. What is the IEEE 802.11g standard?

802.11g is the new IEEE standard for high-speed wireless LAN communications that provides for up to 54 Mbps data rate in the 2.4 GHz band. 802.11g is quickly becoming the next mainstream wireless LAN technology for the home, office and public networks.

802.11g defines the use of the same OFDM modulation technique specified in IEEE 802.11a for the 5 GHz frequency band and applies it in the same 2.4 GHz frequency band as IEEE 802.11b. The 802.11g standard requires backward compatibility with 802.11b.

The standard specifically calls for:

A. A new physical layer for the 802.11 Medium Access Control (MAC) in the 2.4 GHz frequency band, known as the extended rate PHY (ERP). The ERP adds OFDM as a mandatory new coding scheme for 6, 12 and 24 Mbps (mandatory speeds), and 18, 36, 48 and 54 Mbps (optional speeds). The ERP includes the modulation schemes found in 802.11b including CCK for 11 and 5.5 Mbps and Barker code modulation for 2 and 1 Mbps.

B. A protection mechanism called RTS/CTS that governs how 802.11g devices and 802.11b devices interoperate.

2. What is the IEEE 802.11b standard？

The IEEE 802.11b Wireless LAN standard subcommittee, which formulates the standard for the industry. The objective is to enable wireless LAN hardware from different manufactures to communicate.

3. What does IEEE 802.11 feature support？

The product supports the following IEEE 802.11 functions:

- CSMA/CA plus Acknowledge Protocol
- Multi-Channel Roaming
- Automatic Rate Selection
- RTS/CTS Feature
- Fragmentation
- Power Management

4. What is Ad-hoc？

An Ad-hoc integrated wireless LAN is a group of computers, each has a Wireless LAN card, Connected as an independent wireless LAN. Ad hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.

5. What is Infrastructure？

An integrated wireless and wireless and wired LAN is called an Infrastructure configuration. Infrastructure is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.

6. What is BSS ID？

A specific Ad hoc LAN is called a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSS ID.

7. What is WEP？

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 40 bit shared key algorithm, as described in the IEEE 802 .11 standard.

8. What is TKIP?

TKIP is a quick-fix method to quickly overcome the inherent weaknesses in WEP security, especially the reuse of encryption keys. TKIP is involved in the IEEE 802.11i WLAN security standard, and the specification might be officially released by early 2003.

9. What is AES?

AES (Advanced Encryption Standard), a chip-based security, has been developed to ensure the highest degree of security and authenticity for digital information, wherever and however communicated or stored, while making more efficient use of hardware and/or software than previous encryption standards. It is also included in IEEE 802.11i standard. Compare with AES, TKIP is a temporary protocol for replacing WEP security until manufacturers implement AES at the hardware level.

10. Can Wireless products support printer sharing？

Wireless products perform the same function as LAN products. Therefore, Wireless products can work with Netware, Windows 2000, or other LAN operating systems to support printer or file sharing.

11. Would the information be intercepted while transmitting on air？

WLAN features two-fold protection in security. On the hardware side, as with Direct Sequence Spread Spectrum technology, it has the inherent security feature of scrambling. On the software side, WLAN series offer the encryption function (WEP) to enhance security and Access Control. Users can set it up depending upon their needs.

12. What is DSSS？What is FHSS？And what are their differences？

Frequency-hopping spread-spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern that is known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be short-duration impulse noise. Direct-sequence spread-spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip is, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without-the need for retransmission. To an unintended receiver, DSSS appears as low power wideband noise and is rejected (ignored) by most narrowband receivers.

13. What is Spread Spectrum？

Spread Spectrum technology is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communication systems. It is designed to trade off bandwidth efficiency for reliability, integrity, and security. In other words, more bandwidth is consumed than in the case of narrowband transmission, but the trade off produces a signal that is, in effect, louder and thus easier to detect, provided that the receiver knows the parameters of the spread-spectrum signal being broadcast. If a receiver is not tuned to the right frequency, a spread –spectrum signal looks like background noise. There are two main alternatives, Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).

14. What is WMM？

Wi-Fi Multimedia (WMM), a group of features for wireless networks that improve the user experience for audio, video and voice applications. WMM is based on a subset of the IEEE 802.11e WLAN QoS draft standard. WMM adds prioritized capabilities to Wi-Fi networks and optimizes their performance when multiple concurring applications, each with different latency and throughput requirements, compete for network resources. By using WMM, end-user satisfaction is maintained in a wider variety of environments and traffic conditions. WMM makes it possible for home network users and enterprise network managers to decide which data streams are most important and assign them a higher traffic priority.

15. What is WMM Power Save？

WMM Power Save is a set of features for Wi-Fi networks that increase the efficiency and flexibility of data transmission in order to conserve power. WMM Power Save has been optimized for mobile devices running latency-sensitive applications such as voice, audio, or video, but can benefit any Wi-Fi device. WMM Power Save uses mechanisms included in the IEEE 802.11e standard and is an enhancement of IEEE 802.11 legacy power save. With WMM Power Save, the same amount of data can be transmitted in a shorter time while allowing the Wi-Fi device to remain longer in a low-power “dozing” state.