

WM821-M-LS

Wireless 802.11N dual-band mini PCI module

User Manual

Rev 1.0

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

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

Operations in the 5.15-5.25GHz band are restricted to indoor usage only

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna,
- 3) For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 3 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, LVD TV... etc.).

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “**Contains FCC ID: Q87-WM821M**”.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Canadian Regulatory Notice

This device complies with RSS-210 of the Industry Canada Rules. Operation is subject to the following two conditions:

- 1) this device may not cause interference and
- 2) this device must accept any interference, including interference that may cause undesired operation of the device

Caution:

The device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

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Introduction

The WM821-M-LS is a dual-band, quad-mode wireless network adapter that works on all the frequencies allocated for WLAN operation everywhere in the world. It is in compliance with the Draft IEEE802.11n standard in a 2x3 MIMO configuration. It also complies with the IEEE 802.11a, 802.11g, and 802.11b standards. WM821-M-LS features the compactness and high bus speed of the Mini PCI specifications which gives users of laptops, notebooks, tablet PCs, and other mobile computing devices transparent Internet access anywhere in the world through any Wi Fi network without software changes or additional hardware.

Able to provide greater than 100Mbps real world throughput using high-speed spatial multiplexing modes, the WM821-M-LS provides the freedom to work as you wish, wherever you wish, using whatever kind of application you wish to use. The adapter installs directly in any host device with a Mini PCI slot: just plug it in and you're ready to access local resources and/or the Internet at the highest speed the WLAN, the location, and the host computer can provide. It is ready to work "out of the box" in any embedded device or in any computer running Microsoft® Windows 2000, or XP. The WM821-M-LS Mini PCI Card is truly a "must-have" for every productivity-sensitive laptop, notebook, or tablet PC user and any bandwidth-sensitive embedded design..

Features

- mPCI 32 interface.
- Draft IEEE 802.11n compatible.
- Backward compatible with IEEE 802.11a/b/g standard.
- Wire-free access to networked resources from anywhere beyond the desktop.
- Delivers data rates up to 300 Mbps.
- 802.11n: Dynamically shifts among 130, 117, 104, 78, 52, 39, 26 and 13Mbps in a 20MHz bandwidth and 300, 243, 216, 162, 108, 81, 54 and 27Mbps in a 40MHz bandwidth, based on signal strength, for maximum availability and reliability of connection.
- 802.11a/g: Dynamically shifts between 54, 48, 36, 24, 18, 12, 9 and 6 Mbps network speed, based on signal strength, for maximum availability and reliability of connection.
- 802.11b: Dynamically shifts between 11M, 5.5M, 2M, and 1 Mbps network speed, based on signal strength, for maximum availability and reliability of connection.
- Supports 802.11h (DFS) power adjustment (11a mode only).
- Allows users move between Access Points without resetting the connection reconfigurations.
- Three ultra-mini connectors with for diversity antennae.
- Uses 2.4GHz and 5GHz frequency band, complying with regulatories worldwide
- Supports most popular operating systems: Window 2000/XP. Linux support is also available.
- Ensures great security by providing the 64/128 bits Wired Equivalent Privacy (WEP) and WiFi Protected Access (WPA) defined in the IEEE standard.
- WPA support. Radius clients in EAP-TLS, EAP, TTLS, EAP-LEAP, EAP, PEAP.
- WPA2, WMM-compliant.
- WiFi-Protected Setup(WPS)-supported

WiFi-Protected Setup(WPS)-supportedWhat is Wireless LAN?

Wireless Local Area Network (WLAN) systems offer a great number of advantages over traditional wired systems. WLANs are flexible and easy to setup and manage. They are also more economical than wired LAN systems.

Using radio frequency (RF) technology, WLANs transmit and receive data through the air. WLANs combine data connectivity with user mobility. For example, users can roam from a conference room to their office without being disconnected from the LAN.

Using WLANs, users can conveniently access shared information, and network administrators can configure and augment networks without installing or moving network cables.

WLAN technology provides users with many convenient and cost saving features:

- **Mobility:** WLANs provide LAN users with access to real-time information anywhere in their organization, providing service opportunities that are impossible with wired networks.
- **Ease of Installation:** Installing is easy for novice and expert users alike, eliminating the need to install network cables in walls and ceilings.
- **Scalability:** WLANs can be configured in a variety of topologies to adapt to specific applications and installations. Configurations are easily changed and range from peer-to-peer networks suitable for a small number of users to full infrastructure networks of thousands of users roaming over a broad area.

Chapter 2 Hardware installation

This chapter covers how to installing the Wireless MiniPCI Module in your embedded system.

Hardware description

The Wireless MiniPCI Module has a standard MiniPCI interface for attaching to the MiniPCI connector on embedded system.

And this module has IPEX connector to connect to external antenna.

Outlook

Following is the MiniPCI module outlook

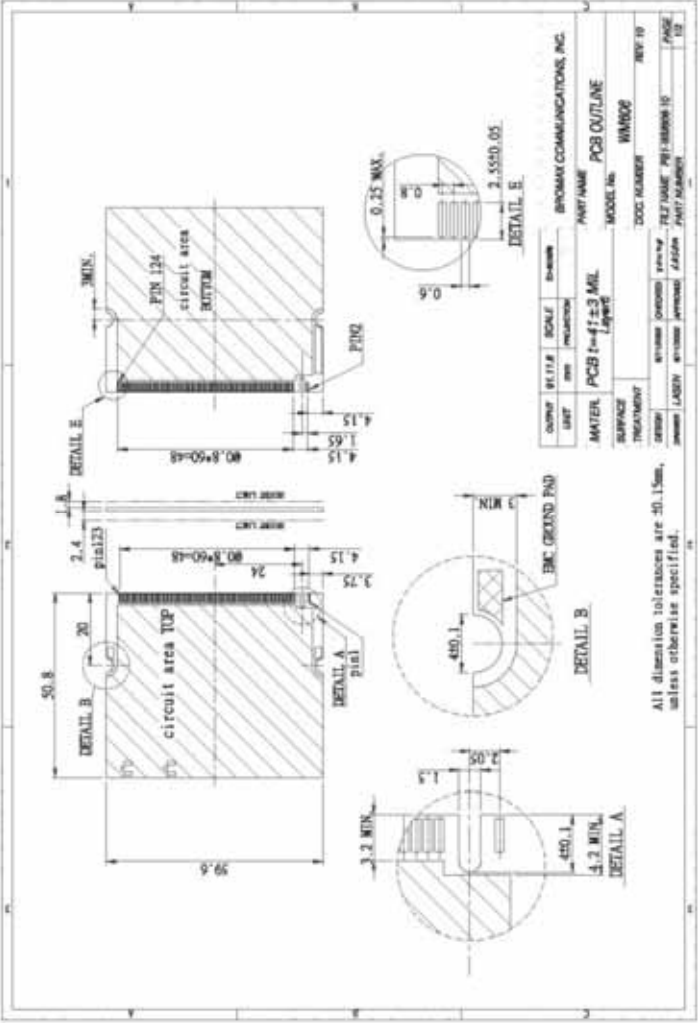


Figure 1: MiniPCI module outlook

Chapter 3

Using the Wireless Utility

This module also come with a wireless utility, following describe how to use the utility.

Configuration Utility

The Client Card Configuration Utility allows configuration of WM821-M high throughput client cards through the following tabs:

- **Network Status**—displays the status of the network to which the user is connected. The Configuration Utility initializes on this page.
- **Profile Manager**—displays the current profiles and allows the user to set attributes for network type, security options, and protocols, as well as create/modify/delete profiles.
- **Site Survey**—displays site survey information.
- **Statistics**—displays the statistics of the current session.
- **Advanced**—used to set protocol parameters.
- **AutoLink**—to set AutoLink connection
- **Admin**—used to import and export profiles.

3.1 Network Status Tab

The **Network Status** tab displays the status of the network. When the Wireless client card Configuration Utility initializes, it displays the **Network Status** tab.

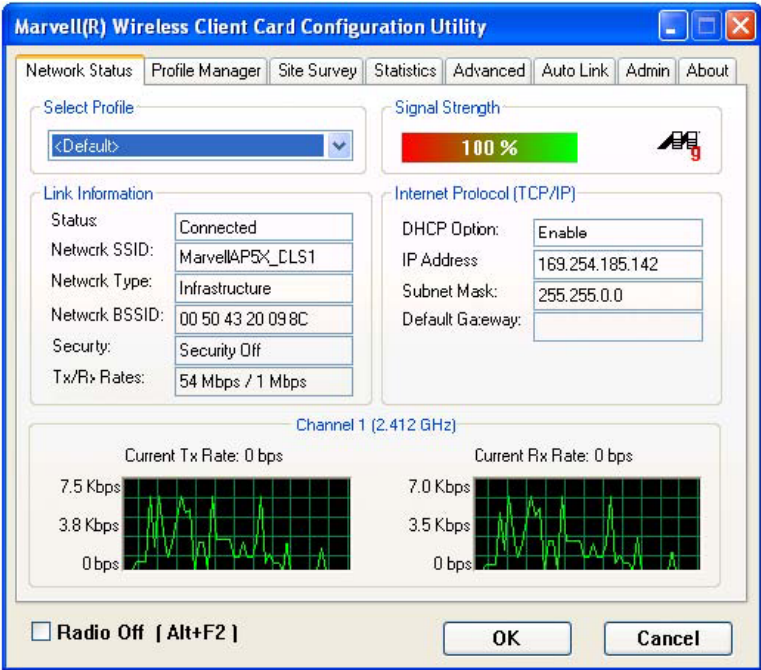


Figure 2 :Network Status tab

3.1.1 Select Profile

The **Select Profile** section displays the name of the profile in use. Additional information about the profile is provided in the **Profile Manager**.

Select one of the profiles previously defined by clicking the **down arrow** and highlighting a profile from the pull-down list.

Figure 3: Select Profile Section



Figure 3: Select Profile

Profiles are created, modified, and deleted through the **ProfileManager**.



Note

This feature is disabled when Windows Zero Configuration Utility is enabled.

3.1.2 Link Information

The **Link Information** section contains the current information about the wireless connection. **Figure 4: Link Information Section**

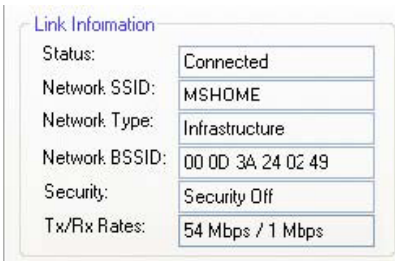


Figure 4: Link Information Section

Table 1:Link Information

Field	Description
Status	<p>Status of the wireless network connection:</p> <ul style="list-style-type: none"> • Card Unplugged Client card is not plugged in, or client card is plugged in but not recognized. • Connected Client card is plugged in and connected to a wireless network. • No Connection Client card is plugged in, but no wireless connection. • No Radio Client card is plugged in, but the radio is turned off. Clear the Radio Off check box to turn the radio on. • Scanning for Scanning for available APs and wireless stations in the area.
Network SSID	<p>Network SSID label (i.e., Network Name). The Network Name is a text string of up to 32 characters.</p>
Network Type	<p>Type of environment connected to: • Infrastructure Mode In this mode, wireless clients send and receive information through APs. When a wireless client communicates with another, it transmits to the AP. First the AP receives the information and rebroadcasts it, then other devices receive the information. The APs are strategically located within an area to provide optimal coverage for wireless clients. A large WLAN uses multiple APs to provide coverage over a wide area. APs can connect to a LAN through a wired Ethernet connection. APs send and receive information from the LAN through the wired connection.</p>

Network BSSID	Network Basic Service Set Identifier. The BSSID is a 48-bit identity used to identify a particular BSS within an area. In Infrastructure BSS networks, the BSSID is the MAC address of the AP. In independent BSS or Ad-Hoc networks, the BSSID is generated randomly.
Security	Reports the type and level of security set. The security level is set through the Profile Setting of the Profile Manager tab. Configure security settings also through the Site Survey tab when connecting to a network.
Tx/Rx Rates	Current Tx Rate and Rx Rate of the channel being monitored.

3.1.3 Signal Strength / Wireless Mode Indicator

The color-coded **Signal Strength** bar displays the signal strength of the last packet received by the client card.

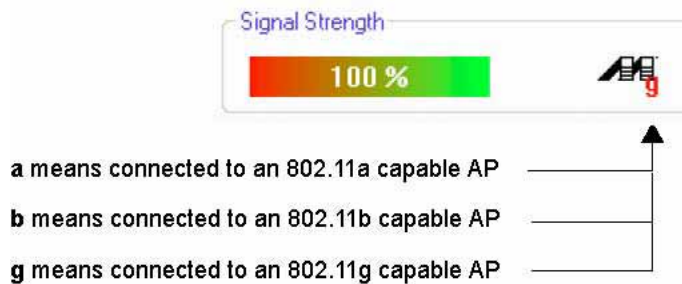


Figure 5: Signal Strength

Signal strength is reported as a percentage. A signal in the red indicates a bad connection. A signal in the green indicates a good connection.

The Wireless Mode indicator shows the data rates the client card operates. There are three modes:

- . • 802.11a
- . • 802.11b
- . • 802.11g (backward compatible to 802.11b)

3.1.4 Internet Protocol (TCP/IP)

The Internet Protocol specifies the format of packets, also called data grams, and the addressing scheme. Most networks combine IP with a higher-level protocol called TCP, which establishes a virtual connection between a destination and a source.

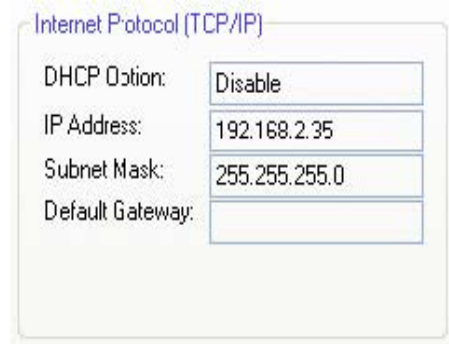


Figure 6: Internet Protocol Section

Table 2 Internet Protocol Section Description

Field	Description
DHCP Option	Dynamic Host Configuration Protocol. Either enabled or disabled.
IP Address	An identifier for a computer or device on a TCP/IP network. The format of an IP address

	is a 32-bit numeric address written as four numbers separated by periods. Each number can be 0 to 255.
Subnet Mask	A mask used to determine what subnet an IP address belongs to. An IP address has two components, the network address and the host address. The first two numbers represent the Class B network address, and the second two numbers identify a particular host on this network.
Default Gateway	The default node on a network that serves as an entrance to another network. In enterprises, the gateway is the computer that routes the traffic from a workstation to the outside network that is serving the Web pages. In homes, the gateway is the ISP that connects the user to the Internet.

3.1.5 Actual Throughput Performance

This section of the **Network Status** tab displays the Current Tx Rate and the Current Rx Rate of the channel being monitored.

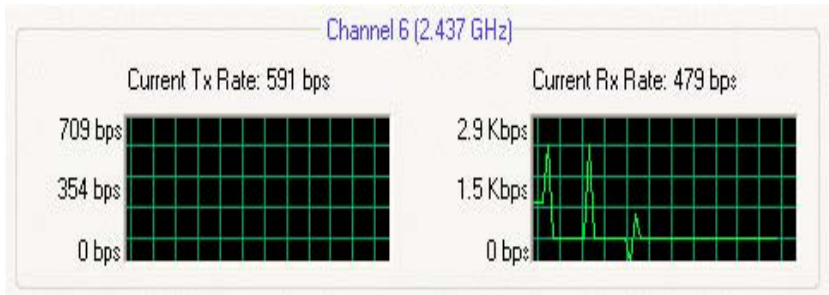


Figure 7: actual throughput diagrams



Note

These are actual throughput diagrams (without the WLAN overhead delivered by the client card).

3.1.6 Radio On/Off Check Box

Selecting the **Radio Off** check box turns off the radio. Clearing the check box turns on the radio. **Figure 8: Radio On/Off Check Box**



Figure 8: Radio On/Off Check Box

Another way to turn the radio on or off is to right-click the **Configuration Utility** icon in **System Tray** and select **Turn Radio Off** to turn the radio off. When the radio is off, select **Turn Radio On** to turn the radio back on.



Figure 9: Radio On/Off in the System Tray

The system hot key **Alt+F2** can also be used to turn the radio on/off.

When the radio is off, there is no radio activity, and the following tabs are disabled:

- . Profile Manager
- . Site Survey

- . • Statistics
- . • Advanced
- . • AutoLink



Note

This feature is disabled when Windows Zero Configuration Utility is enabled.

3.2 Profile Manager Tab

The **Profile Manager** tab displays the profiles available and allows you to create, modify, and delete profiles.

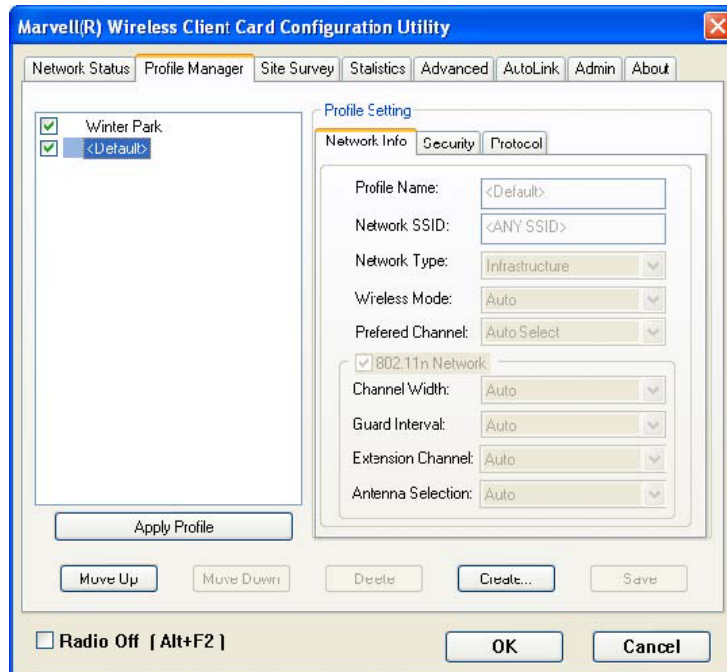


Figure 10: Figure 14: Profile Manager Tab



Note

The Profile Manager tab is not accessible when Windows Zero Configuration Utility is enabled.

PROFILE MANAGER—PROFILE LIST

The section on the left side of this tab lists all of the profiles available. Highlighting a profile selects it. If the check box next to the profile is selected, that profile is used in auto-configuration mode when the link is lost. If it is not selected, that profile is excluded in auto-configuration. The buttons associated with this window are as follows.

Table 3: Profile List Section Description

Button	Description
Apply Profile	Applies the profile selected.

	Apply the profile by double-clicking the desired profile.
Move Up / Down	Moves the list up and down in the window. All profiles with the Network Type set to Infrastructure are displayed before the profiles with the Network Type set to Ad-Hoc. In auto-configuration mode, the selected profiles at the top of the list have higher priority than selected profiles at the bottom of the list.
Delete	Deletes a profile
Create	Creates a profile
Save	Saves changes made to a selected profile

PROFILE MANAGER—PROFILE SETTING The Profile Settings are used to set, modify, and display information about the profile selected in the **Profile List** section. The information is divided into three tabs:

- . • Network Info
- . • Security
- . • Protocol

3.2.1 Profile Setting—Network Info Tab

The **Profile Manager** initially displays the **Network Info** tab.



Figure 11: Network Info Tab (Infrastructure Network)

The Network Info tab fields are as follows.

Table 4: Network Info Tab Description

Field	Description
Profile Name	Name of profile selected
Network SSID	Network SSID label
Network Type	• Infrastructure When an Infrastructure network is selected, the Profile Setting displays the Wireless Mode field.
Wireless Mode	• Auto

	<p>Connects to 802.11a network, 802.11g network, or 802.11b network (Infrastructure network only).</p> <ul style="list-style-type: none"> • 802.11a Connects to 802.11a only. • 802.11g Connects to either 802.11g network or 802.11b network. • 802.11b Connects to 802.11b network only.
802.11n Network	<p>Enables/disables draft-802.11n/EWC functionality. If enabled, the Modulation and Coding Scheme (MCS) index and 802.11n options can be configured.</p>
Channel Width	<p>Sets the channel bandwidth. Available options are Auto, 20 MHz, and 40 MHz. The default is Auto.</p>
Guard Interval	<p>Sets the Guard Interval. Available options are Auto, Standard, and Short. The default is Auto.</p>
Extension Channel	<p>Sets the extension channel mode when bandwidth is 40 MHz. Available options are Auto, None, Lower, and Upper. The default is Auto.</p>
Antenna Selection	<p>Sets the antenna selections. Available options are Auto, Antenna A, Antenna B, 2 by 2, and 2 by 3. The default is Auto.</p>



Note

The fields **Wireless Mode** and **Preferred Channel** are used only when an Ad-Hoc network is started by the client card. These two attributes are ignored if the client card is connected to an existing Ad-Hoc network with the same desired SSID.

3.2.2 Profile Setting—Security Tab

Clicking the **Security** tab displays the following security options:

- Authentication Mode
- Encryption Mode (Security off, WEP, TKIP, and AES)
- WEP Key Setting (Passphrase Key or Authentication Protocol)

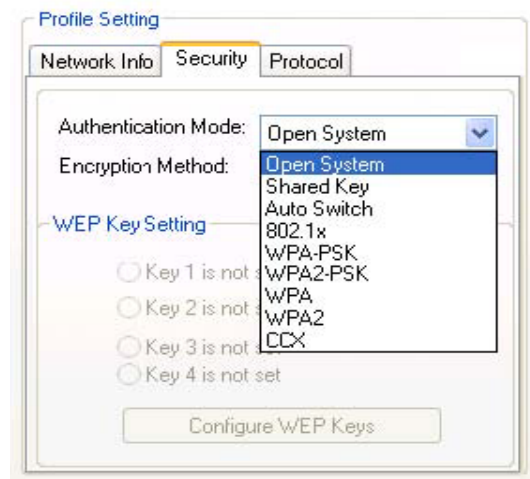


Figure 12: Security tab

3.2.2.1 Non-EAP Authentication Modes

The WM821-M Configuration Utility currently supports the following non-EAP authentication modes:

- Open System—Open Authentication (no key or a pre-shared WEP key is required).
- Shared Key—Shared Authentication (a pre-shared WEP key is required)

- Auto Switch—Auto Select Authentication modes (Open System or Shared Key, WEP key required)
- WPA-PSK—WPA Pre-Shared Key
- WPA2-PSK—WPA2 Pre-Shared Key

3.2.2.2 EAP Authentication Modes

The WM821-M Configuration Utility currently supports the following EAP authentication modes:

- 802.1x (TLS/PEAP)
- WPA (TLS/PEAP/LEAP)
- WPA2 (TLS/PEAP/LEAP)
- CCX (LEAP)

3.2.2.2.1 WPA-PSK/WPA2-PSK SUPPORT

In Infrastructure mode, if WPA-PSK/WPA2-PSK is selected as the Authentication Mode, the encryption method AES or TKIP can be selected.



Figure 13: Security selection



Figure 14: Security Tab—WPA-PSK/WPA2-PSK with TKIP

Enter the network passphrase into the **Passphrase** and **Confirm** boxes.



Note

WPA-PSK/WPA2-PSK is not supported in Ad-Hoc network mode.

3.2.2.2.2 802.1X/WPA/WPA2 EAP/TLS SUPPORT

If the 802.1x EAP/TLS option is selected, the encryption method AES or TKIP can be selected, and a certificate is required for the authentication.

1. To connect to an AP through the RADIUS server, select 802.1x WPA/WPA2 as the Authentication Mode.
2. Select TKIP or AES as the Encryption Method.
3. Select EAP/TLS (Use Certificate) as the 802.1x Authentication Protocol.



Figure 15: Security Tab—802.1x/WPA/WPA2 EAP/TLS Authentication

4. Click the **Configure WPA RADIUS** button to configure security settings.

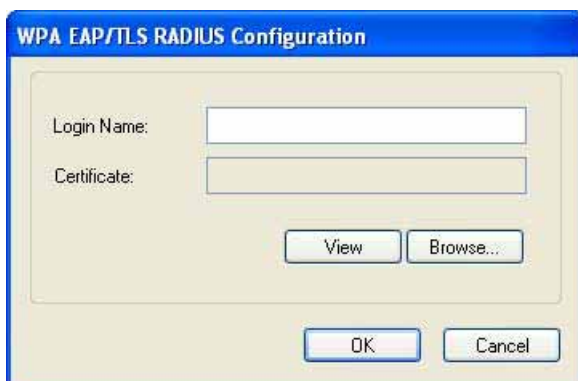


Figure 16: 802.1x/WPA/WPA2 EAP/TLS RADIUS Configuration Window

5. Click **Browse** to activate the dialog for selecting a certificate.
6. Before clicking **OK** to exit the dialog, make sure that the Login Name is entered.



Figure 17: Select Certificate

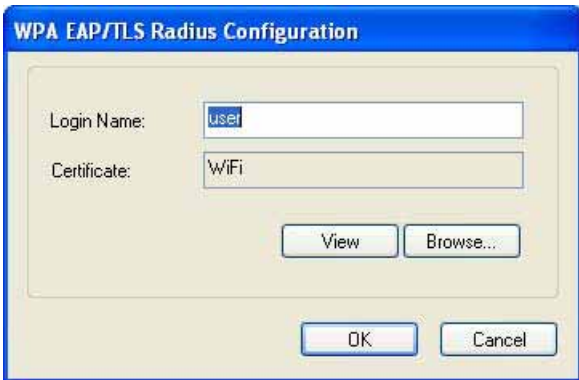


Figure 18: WPA RADIUS Configuration Window with Certificate

Table 5: 802.1x/WPA/WPA2 EAP/TLS RADIUS Configuration Window Description

Field/Button	Description
Login Name	Login name to the RADIUS server
Certificate	Certificate selected for authentication
View	Shows the selected certificate
Browse	Selects the certificate

3.2.2.2.3 802.1X/WPA/WPA2 PEAP SUPPORT IN INFRASTRUCTURE MODE

To connect to an AP through the RADIUS server, select 802.1x/WPA/WPA2 as the Authentication Mode, PEAP as the Authentication Protocol, and AES or TKIP as the Encryption Method.

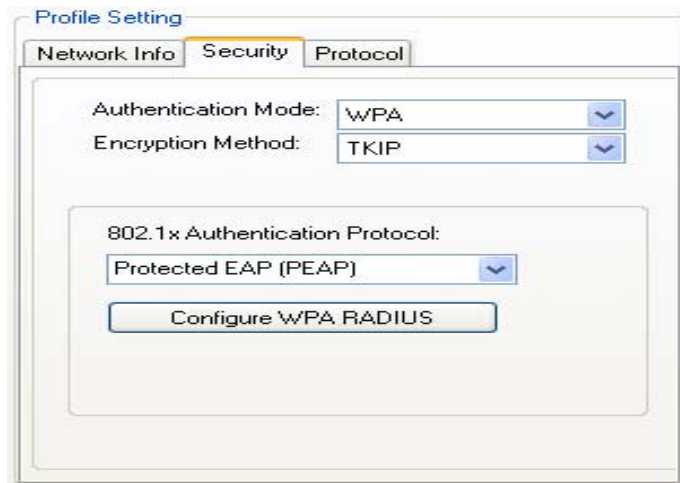


Figure 19: Security tab 802.1x/WPA/WPA2 PEAP RADIUS Authentication

Figure 25: 802.1x/WPA/WPA2 PEAP RADIUS Configuration Window

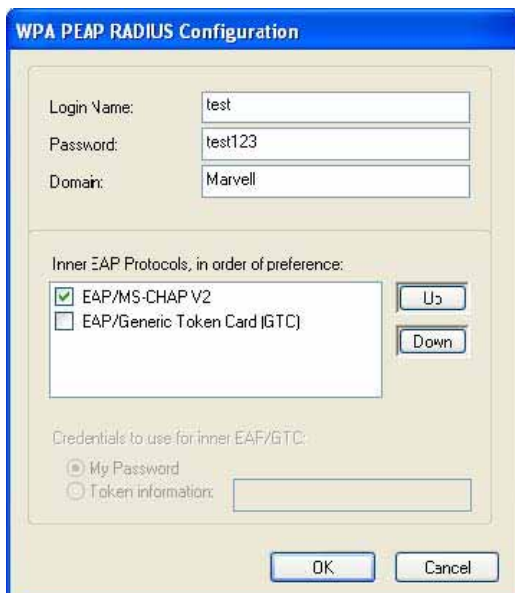


Figure 20: 802.1x/WPA/WPA2 PEAP RADIUS Configuration Window

Table 6: WPA PEAP RADIUS Configuration Window Description

Field	Description
Login Name	Login name to the RADIUS server
Password	Password to login to the RADIUS server
Domain	Domain name for login to the RADIUS server (optional)
Inner EAP Protocol	Use EAP/MS-CHAP V2 or EAP/GTC to login to the RADIUS server

Click **OK** to set the configuration.

3.2.2.2.4 WPA/WPA2 EAP/TTLS

To connect to an AP through the RADIUS server, select WPA/WPA2 as the Authentication Mode, TTLS as the 802.1x Authentication Protocol, and TKIP as the Encryption Method for WPA TTLS or AES as the Encryption Method for WPA2 TTLS.

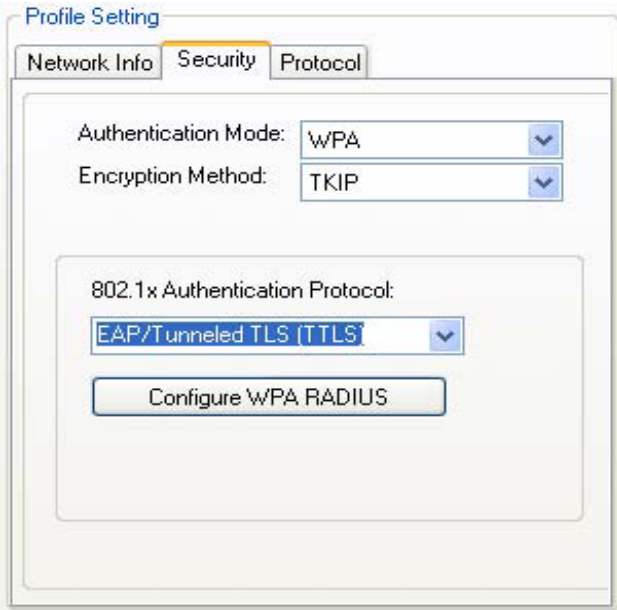


Figure 21: WPA/WPA2 EAP/TTLS Authentication

Clicking the **Configure WPA RADIUS** button displays the **WPA EAP/TTLS RADIUS Configuration** window. Enter all the required information.

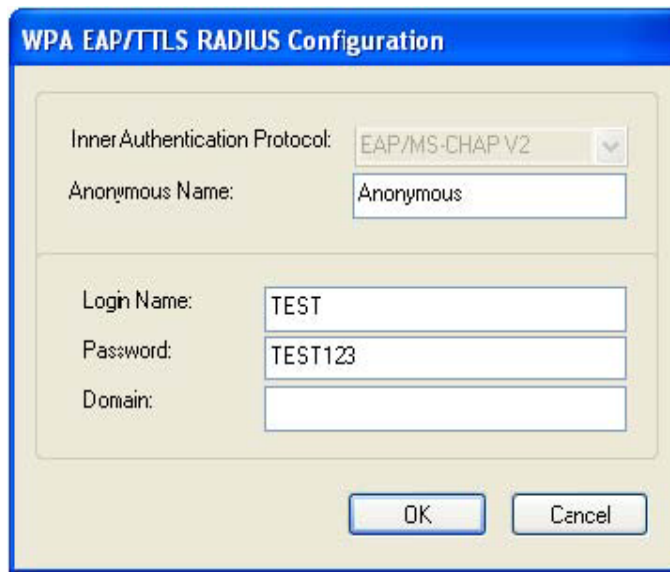


Figure 22: WPA EAP RADIUS Configuration window

Table 7: WPA TTLS RADIUS Configuration Window Description

Field	Description
Inner Authentication Protocol	Currently supports EAP/MS-CHAP V2 only
Anonymous Name	Indicates the identity of the authentication server with which to make contact
Login Name	Login name to the RADIUS server
Password	Password to login to the RADIUS server
Domain	Domain name for login to the RADIUS server (optional)

Click **OK** to set the configuration.

3.2.2.2.5 CCX EAP/LEAP

To connect to a Cisco AP through the RADIUS server, select CCX EAP/LEAP. WEP is the Encryption Method, and the key is generated automatically.

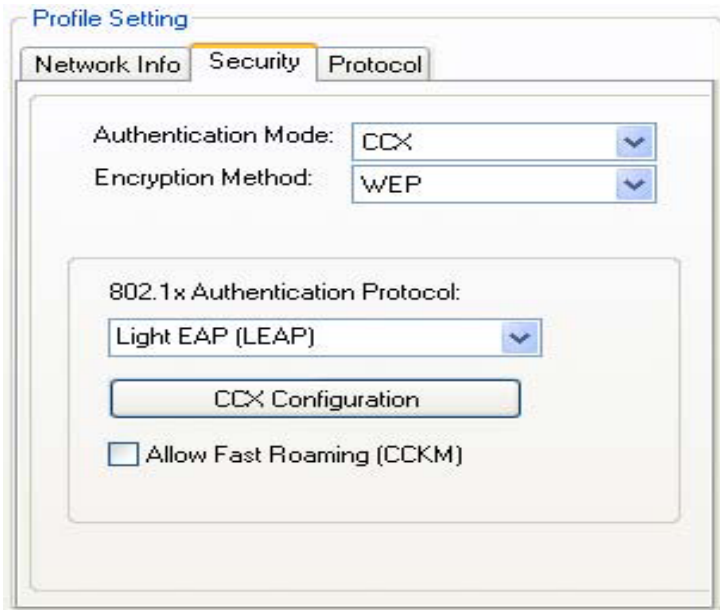


Figure 23: Security Tab-CCX EAP/LEAP Authentication

If **Allow Fast Roaming (CCKM)** is selected, Fast Roaming (Cisco Centralized Key Management (CCKM)) is enabled.

Clicking the **CCX Configuration** button displays the **CCX LEAP RADIUS Configuration** window. Enter all the required information.

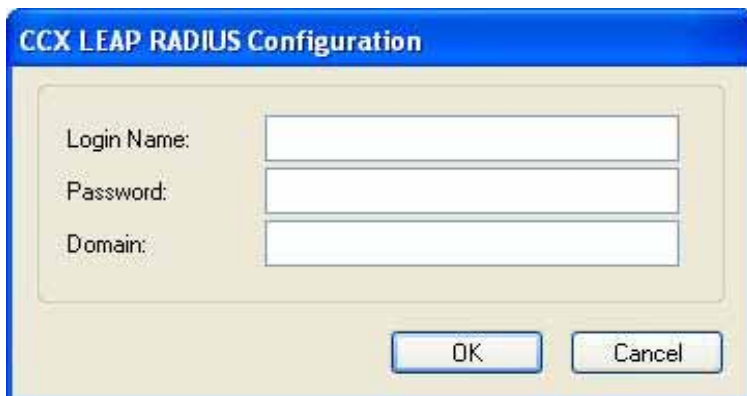


Figure 24: CCX EAP/LEAP RADIUS Configuration Window

Table 8: CCX EAP/LEAP RADIUS Configuration Window Description

Field	Description
Login Name	Login name to the RADIUS server
Password	Password to login to the RADIUS server
Domain	Domain name for login to the RADIUS server (optional)

Click **OK** to set the configuration.

3.2.2.3 Encryption Methods

The following encryption methods are available, depending on the authentication mode:

- Security Off
- WEP

- TKIP
- AES

3.2.2.4 WEP Key Settings

If the WEP Encryption Method is selected, the **Security** tab displays the WEP Key Setting. To configure the WEP keys, select the WEP Key Setting, and click the **Configure WEP Keys** button.



Note

The WEP key used for the transmission must be identical on the sending and the receiving station.



Figure 25: Security Tab-WEP Key Settings

Clicking the **Configure WEP Keys** button displays the **Configure WEP Key** window. Enter all the required information.



Figure 26: WEP Key Configuration Window

Table 9: WEP Key Configuration Window Description

Field	Description
Key Format	Either ASCII characters or hexadecimal digits
Key Size	• 40-bit, 5 character ASCII key size (40-bit, 10 character hexadecimal) • 104-bit, 13 character ASCII key size (104-bit, 26 character hexadecimal)
Transmit Keys	There are four transmit keys. The key value is in ASCII or hexadecimal, depending on the format selected. The WEP key size shown depends on the key size selected.

Click **OK** to set the configuration.

3.2.2.5 TKIP/AES Settings

If TKIP/AES is selected and the Authentication Mode is WPA-PSK or WPA2-PSK, the security tab displays the TKIP/AES passphrase settings. Enter the passphrase into the **Passphrase** and **Confirm** boxes, and click **OK**.

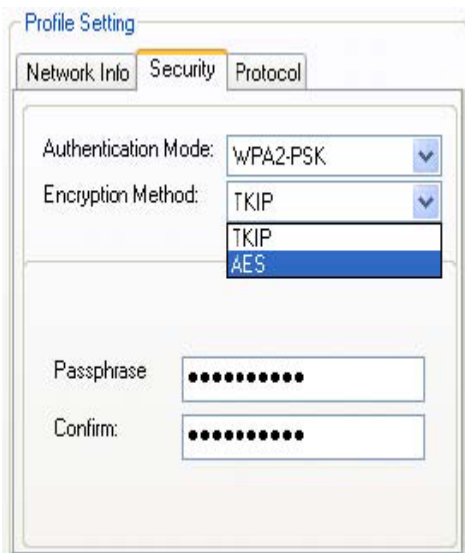


Figure 27: TKIP/AES Settings

Currently, only the functions WPA-PSK + TKIP and WPA2-PSK + AES are available. There is no such combination as WPA-PSK + AES or WPA2-PSK + TKIP.

3.2.3 Profile Setting—Protocol Tab

The **Protocol** tab allows you to set or change the protocol information.

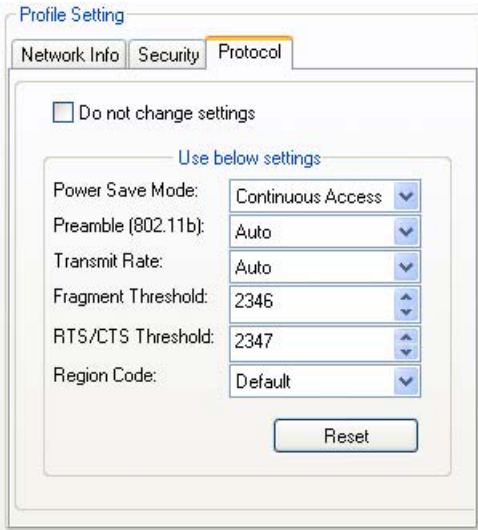


Figure 28: Protocol Tab

DO NOT CHANGE SETTINGS

If this check box is selected, the protocol setting is not changed when the profile is applied.

USE BELOW SETTINGS If the **Do not change setting** check box is not selected, the protocol settings include the following parameters.

Table 10: Protocol Tab Description

Field	Description
Power Save Mode	Sets the power mode. Available options are Continuous Access or Max Power Save. The default setting is Continuous Access.
Preamble (802.11b)	Sets the Radio Preamble to Auto, Short or Long. This option takes effect only when attaching to an 802.11b network.
Transmit Rate	The range of the data rate depends on the type of AP that the client card is connected to. The default setting is Auto Select. MCS index will be allowed to select when the 802.11n Network check box in the Network Info tab is selected.
Fragment Threshold	Sets the fragmentation threshold (the size that packets are fragmented into for transmission). The default setting is 2346.
Region Code	Sets the region code. Available options are FCC (U.S.), IC (Canada), ETSI (Europe), Spain, France, and MKK (Japan).
RTS/CTS Threshold	Sets the packet size at which the AP issues a Request-To-Send (RTS) or Clear-to-Send (CTS) frame before sending the packet. The default setting is 2347.
Reset	Resets the protocol settings to their default values

3.3 Site Survey Tab

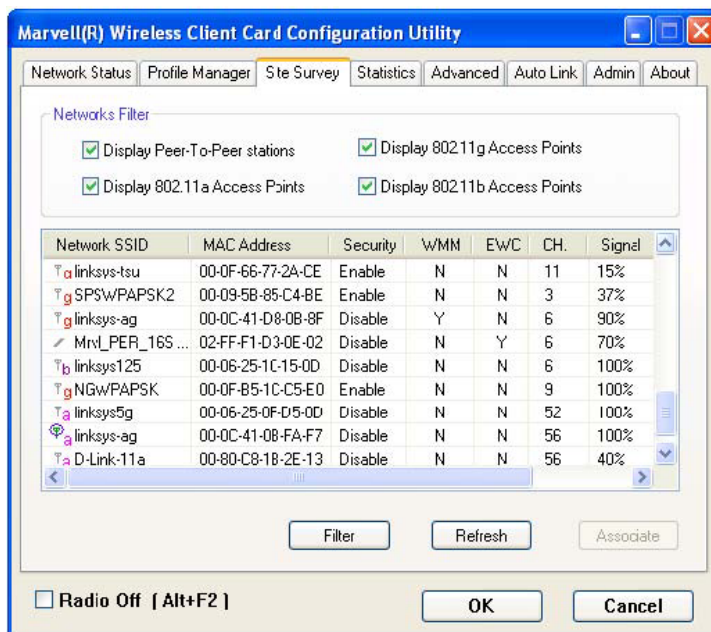


Figure 29: Site Survey Tab

3.3.1 Site Survey—Networks Filter

This section lets you customize which sites are displayed in the Site Survey list:

- **Display Peer-To-Peer stations**—selecting this check box displays all peer-to-peer (Ad-Hoc) stations within range.
- **Display 802.11a Access Points**—selecting this check box displays all 802.11a APs within range.
- **Display 802.11g Access Points**—selecting this check box displays all 802.11g APs within range.
- **Display 802.11b Access Points**—selecting this check box displays all 802.11b APs within range.

3.3.2 Site Survey—List of Detected Stations

This section reports information on the AP stations detected.

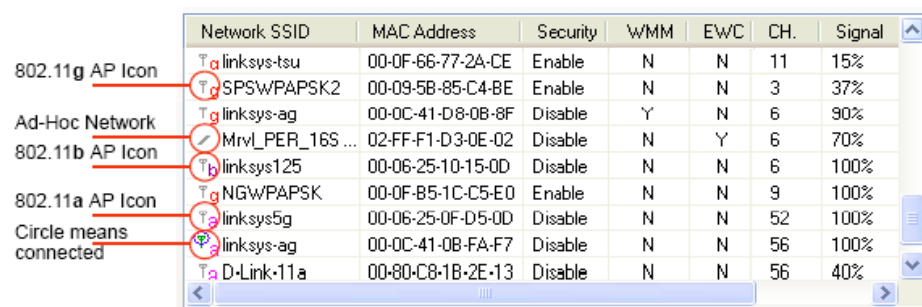


Figure 30: Site Survey-List of Detected Stations

Table 11: List of Detected Stations Description

Field	Description
Network SSID	Network SSID label (i.e., the Network Name). The Network Name is a text string.
MAC Address	MAC address, a hardware address that uniquely identifies each node of a network
Security	Security enabled or disabled
CH	Channel used by the detected device
Signal	Signal strength of the detected device as a percentage
Icons	The following icons may be displayed left of the Network SSID: • An antenna icon with a subscript a indicates an 802.11a AP.

	<ul style="list-style-type: none"> • An antenna icon with a subscript b indicates an 802.11b AP. • An antenna icon with a subscript g indicates an 802.11g AP. • A circle around the antenna icon means the client card is connected to this network.
WMM	Wireless Multimedia Enhancements (WMM) supported by the detected device
EWC	Draft-802.11n/EWC functionality supported by the detected device
Network Type	Type of environment connected to: Ad-Hoc or Infrastructure

3.3.3 Site Survey—Filter Button

Clicking the **Filter** button displays the **Advanced Filter** window.

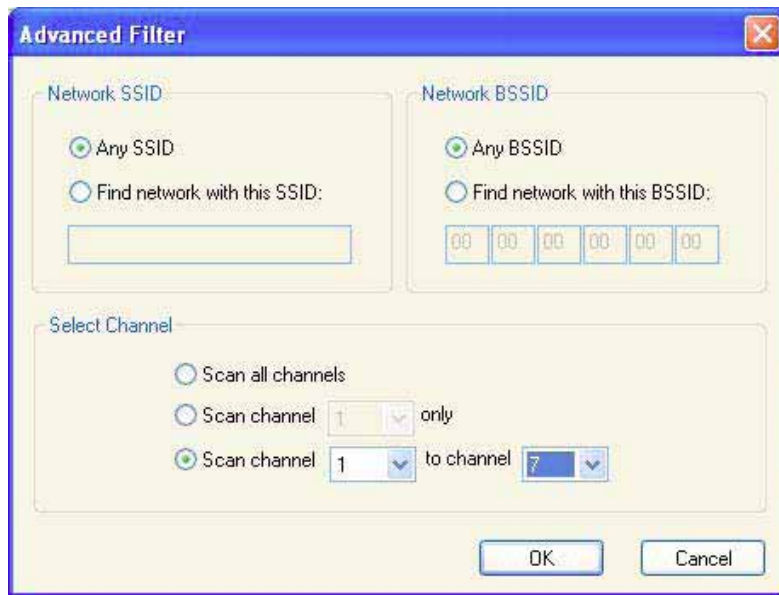


Figure 31: Figure 36: Site Survey—Advanced Filter Window

3.3.3.1 Network SSID

- **Any SSID**—no specific SSID is used when scanning for available networks in the area.
- **Find network with this SSID**—the utility searches for the specified SSID.

3.3.3.2 Network BSSID

- **Any BSSID**—no specific BSSID is used when scanning for available networks in the area.
- **Find network with this BSSID**—the utility searches for the specified BSSID.

3.3.3.3 Select Channel

- **Scan all channels**—all channels are scanned when searching for available networks in the area.
- **Scan channel Only**—only the specified channel is scanned when searching for available networks in the area.
- **Scan Channel to Channel**—a range of channels are scanned when searching for available networks in the area.

3.3.4 Site Survey—Refresh Button

Clicking the **Refresh** button requests a survey of the wireless networks in the area.

3.3.5 Site Survey—Associate Button

Select an available network, and then click the **Associate** button to establish a connection. Alternatively, the connection can be established by double-clicking the selected network.

3.4 Statistics Tab

Clicking the **Statistics** tab displays the statistics of the current connect session.

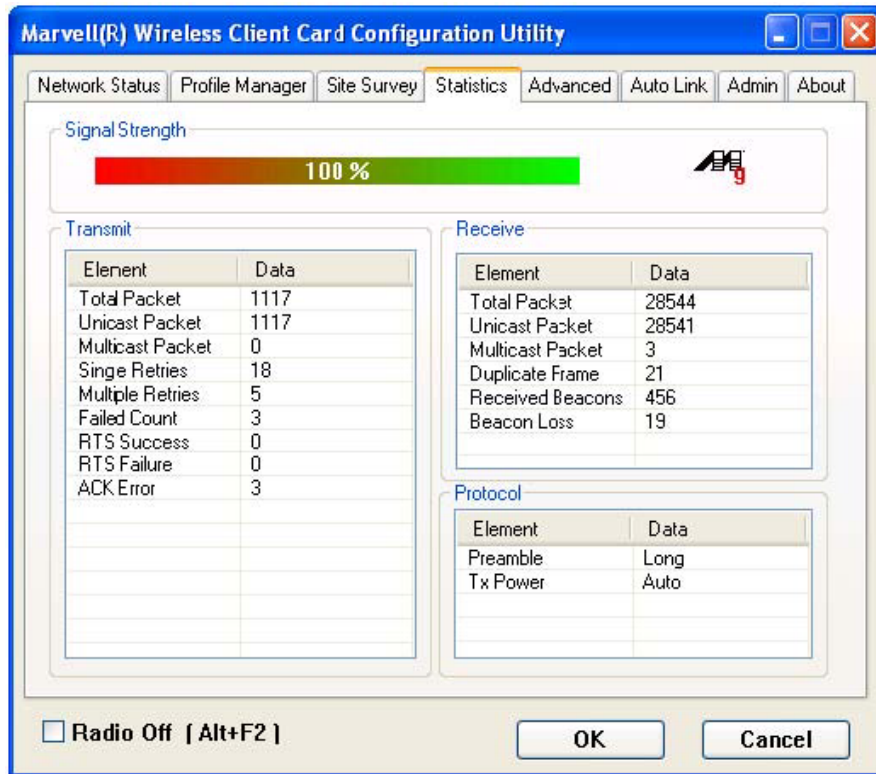


Figure 32: Statistics Tab

3.4.1 Signal Strength

The color-coded Signal Strength bar displays the signal strength of the last packet received by the client card. Signal strength is reported as a percentage. A signal in the red indicates a bad connection. A signal in the green indicates a good connection.

3.4.2 Transmit Section

The **Transmit** section displays the information on the packets sent.

Element	Data
Total Packet	74
Unicast Packet	74
Multicast Packet	0
Single Retries	3
Multiple Retries	2
Failed Count	0
RTS Success	0
RTS Failure	0
ACK Error	0

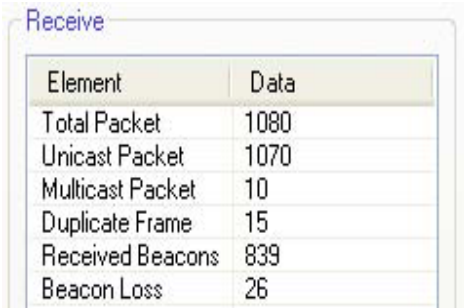
Figure 33: Transmit Section

Table 12: Transmit Section Description

Field	Description
Total Packet	Reports the total number of packets transmitted
Unicast Packet	Reports the number of packets transmitted by the client card that were destined for a single network node
Multicast Packet	Reports the number of packets transmitted by the client card that were destined for more than one network node
Single Retries	Reports the number of packets that require one retry before the client card received an acknowledgement. NOTE: After the client card sends a packet, it waits for an acknowledge from the receiving radio to confirm that the packet was successfully received. If the acknowledge is not received within a specified period of time, the client card retransmits the packet.
Multiple Retries	Reports the number of packets that require more than one retry before the client card received an acknowledgement
Failed Count	Reports the number of packets that were not successfully transmitted because the client card did not receive an acknowledge within the specified period of time
RTS Success	Reports the number of RTS attempts that were successful
RTS Failure	Reports the number of RTS attempts that were not successful
ACK Error	Reports the number of unicast transmit attempts for which no acknowledgement was received

3.4.3 Receive Section

The **Receive** section displays the information on the packets received.



Element	Data
Total Packet	1080
Unicast Packet	1070
Multicast Packet	10
Duplicate Frame	15
Received Beacons	839
Beacon Loss	26

Figure 34: Receive Section

Table 13: Receive Section Description

Field	Description
Total Packet	Reports the total number of packets received
Unicast Packet	Reports the number of packets received by the client card that were destined for a single network node
Multicast Packet	Reports the number of packets received by the client card that were destined for more than one network node
Duplicate Frame	Reports the number of duplicate frames received
Received Beacons	Reports the number of beacons received after association is established
Beacon Loss	Reports the number of missing beacons after association is established

3.4.4 Protocol Section

The **Protocol** section displays the information on the protocol status. **Figure 40: Protocol Section**

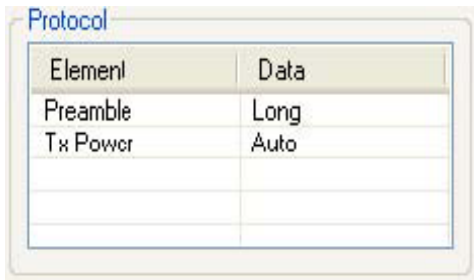


Figure 35: Protocol Section

Table 14: Protocol Section Description

Field	Description
Preamble	Displays radio preamble type: • Auto • Short • Long
Tx Power	Displays transmit power mode: • Auto • High • Medium • Low

3.5 Advanced Tab

The **Advanced** tab displays the advanced parameters available for the installed WM821-M client cards.

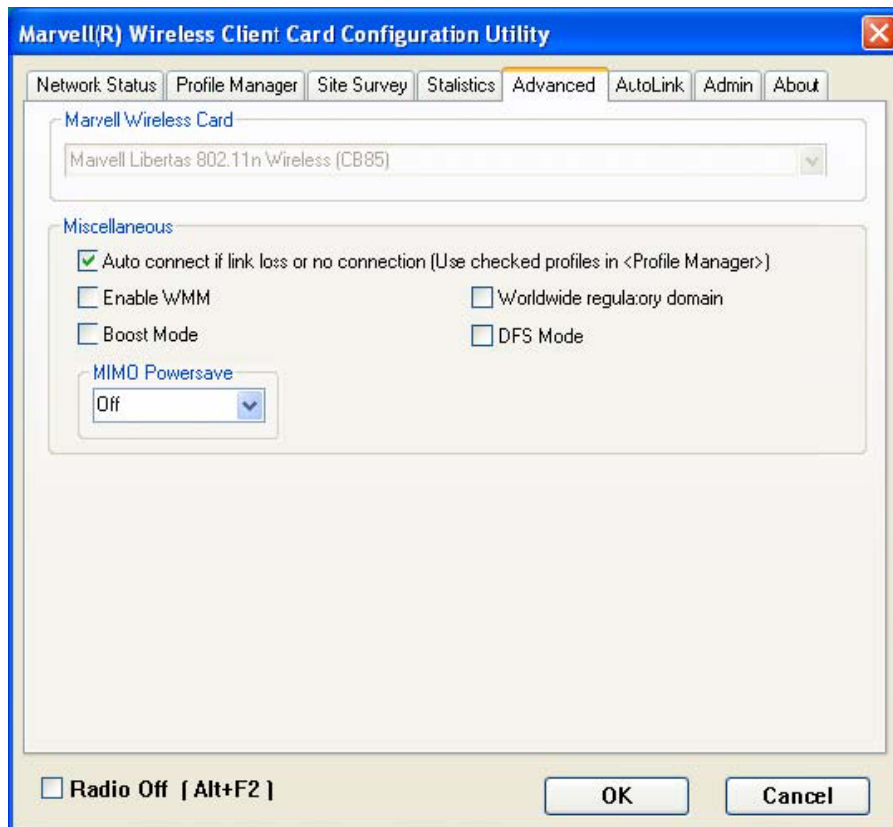


Figure 36: Advanced Tab



Note The **Advanced** tab is not accessible when the Windows Zero Configuration Utility is enabled.

3.5.1 Advanced Tab—WM821-M Wireless Card

This section of the **Advanced** tab reports the type of WM821-M client card installed.

3.5.2 AdvancedTab—Miscellaneous

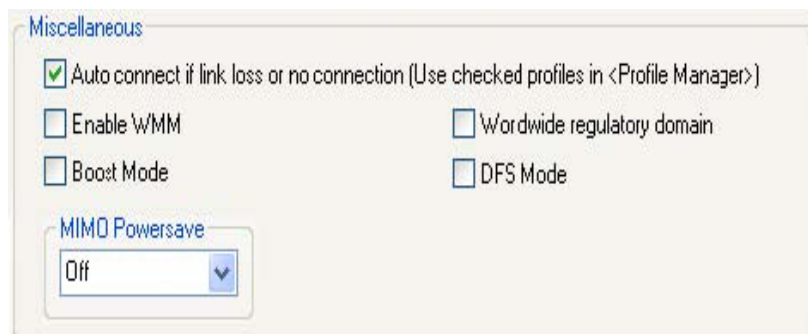


Figure 37: Miscellaneous Section

Table 15: Advanced Tab Miscellaneous Section Description

Field	Description
Auto connect if link loss or no connection (Use checked profiles in <Profile Manager>)	Clear this check box to disable the auto-configuration feature. Whenever there is a link loss, auto-configuration tries to establish a connection to the checked profiles in the Profile Manager window.

Boost Mode	Select this check box for performance enhancement.
Enable WMM	Select this check box to enable/disable the Wireless Multimedia Enhancements (WMM) feature.
Worldwide regulatory domain	Select this check box to set the regulatory domain
DFS Mode	Select this check box to enable Dynamic Frequency Selection (DFS)
MIMO Powersave	Enables/disables the Multiple Input Multiple Output (MIMO) Powersave Mode. Available options are Off and Static.

3.6 AutoLink Tab

To enable AutoLink mode, proceed as follows:

1. Toggle the AutoLink button on the Access Point to enable AutoLink mode.
2. Toggle the AutoLink button on the client to enter AutoLink mode.

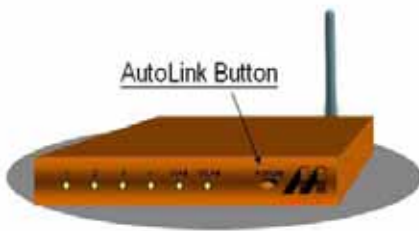


Figure 38: Access Point Autolink Button

Within 60 seconds, the AutoLink will be completed.



Figure 39: Auto Link Tab (Client)

AutoLink is complete.

3.7 Admin Tab

The **Admin** tab allows you to import and export profiles.

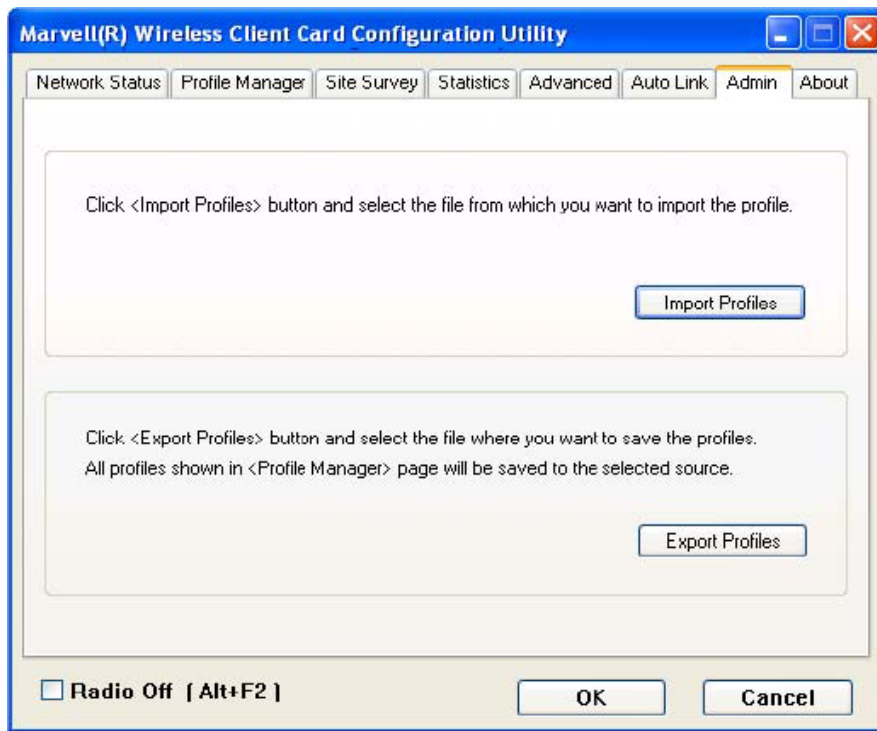


Figure 40: Admin Tab

3.7.1 Admin Tab—Import Profiles

To import a profile, proceed as follows:

1. Click **Import Profiles**.
2. Select the path and filename of the profile.
3. Click **Open**.

3.7.2 Admin Tab—Export Profiles

To export a profile, proceed as follows:

1. Click **Export Profiles**.
2. Select or enter the path and filename of the profile.
3. Click **Save**.

3.8 About Tab

The **About** tab displays information about the WM821-M Client Card Configuration Utility.



Figure 41: About Tab

Appendix A

Specifications

Specifications	
Product Name	Draft 802.11n-compatible Dual Band WLAN mPCI Card
Interface	mPCI 32 Type III-A
Network Standards	IEEE802.11a/g/b Draft n-compliant
Data Rate	54, 48, 36, 24, 18, 12, 9, 6, 11, 5.5, 2,1Mbps 20MHz BW: 130, 117, 104, 78, 52, 39, 26 and 13Mbps 40MHz BW: 300, 270, 243, 216, 162, 108, 81, 54 and 27Mbps
Modulation	802.11a/g/n---- 54, 48, 36,24,18,12,9,6Mbps (OFDM) 802.11b ---- CCK (11Mbps, 5.5Mbps), QPSK (2Mbps), BPSK (1Mbps)
Operating Frequency	2.412 ~ 2.462 GHz: North America 2.412 ~ 2.472 GHz: Europe ETSI 2.412 ~ 2.472 GHz: Japan (ARIB STD-T66) 5.15 ~ 5.35GHz/ 5.47~5.6/ 5.65~5.825 GHz: North America UNII 5.15 ~ 5.35GHz/ 5.47 ~ 5.725GHz: Europe ETSI Note: 5.25-5.35GHz and 5.47-5.725GHz bands are excluded for 11n mode 4.9 ~ 5.0GHz/ 5.15 ~ 5.35GHz: Japan
Operating Channels	11b: 1~11 for America,1~13 for Europe (ETSI),1~14 for Japan 11g: 1~11 for America,1~13 for Europe (ETSI) and Japan (ARIB STD-66) 11a: 36-64, 100-161 North America; 36-64 for Japan and other ch definitions
RF Output Power	15 dBm (2.4GHz, 11Mbps, CCK, typical for CH 1,11) 17 dBm (2.4GHz, 11Mbps, CCK, typical except CH 1,11) 13dBm (2.4GHz) (54Mbps, OFDM, typical for CH 1,11) 15dBm (2.4GHz) (54Mbps, OFDM, typical except CH 1,11) 13dBm (2.4 or 5GHz, 40MHz BW, all channels) 12 dBm (5GHz, 54Mbps, OFDM typical)
Antenna	Three IPEX connectors with diversity for external antenna
LED Indicators	Power LED: GPIO control Link LED: GPIO control
Coverage Area	Indoor: 20M@54Mbps, 35M@24Mbps, 60M@6Mbps, 100M@11Mbps Outdoor: 50M@54Mbps, 65M@48Mbps, 90M@36Mbps, 120M@24,18, 12,9,6Mbps, 80M@11Mbps, 120M@5.5Mbps, 200M@2Mbps, 300M@1Mbps
Receiver Sensitivity	-86 dBm @ 11M (CCK, 8% PER) -70 dBm @ 54M (11g,OFDM, 10% PER) -65 dBm @ 54M (11n,OFDM, 10% PER)
Power Consumption	TX power consumption @3.3V: 600-850mA RX power consumption @3.3V: 500-700mA

Support OS	Linux, Microsoft Windows Windows 2K, Windows XP (TBD)
Operating Temperature	0 to 55
Humidity	20% to 95% Non-condensing
Dimensions (mm)	(W) 59.6mm x (D) 50.95mm x (H) 4.9mm
Weight (g)	28 g
Voltage	3.3V