FOXCONN® *Network System Group*

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LAN-Express IEEE 802.11

Wireless Adapter

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User Guide

T60N865

LAN-Express IEEE 802.11 Wireless Adapter User Guide

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Chapter 1 Introduction of IEEE 802.11 Wireless Adapter

1-1 Introducing the LAN-Express IEEE 802.11 Wireless Adapter

LAN-Express IEEE 802.11 Wireless Adapter is a high performance wireless LAN adapter that complies with the IEEE 802.11b and 802.11g wireless standards, which can be used with 802.11b or 802.11g devices to form a stand-alone wireless Peer-to-Peer Group* or used in conjunction with an Access Point infrastructure to provide mobile clients with wireless access to an Ethernet network.

The LAN-Express IEEE 802.11 Wireless Adapter supports Windows XP, Windows 2000, Windows Millennium Edition (ME), and Windows 98.

A wireless LAN provides the same functionality of a wired network, but it eliminates the need to install networking cables and other networking equipment. A wireless LAN is not only easier to deploy, but it also allows for mobility through “roaming.” For example, the LAN-Express IEEE 802.11 Wireless Adapter can roam from a conference room to an office without being disconnected from the network.

 *Available features vary by region/country.

1-2 Specifications & System Requirements

You must meet the following minimum requirements in order to begin using an LAN-Express IEEE 802.11 Wireless Adapter,

- Windows XP, Windows 2000, Windows Millennium Edition (ME), or

Windows 98 Second Edition (SE) installed

- PC Card expansion slot (32-bit CardBus) for LAN-Express IEEE 802.11 Wireless Adapter
- 32-bit PCI bus slot on your desktop for the LAN-Express IEEE 802.11 Wireless Adapter.
- At least 64 MB of memory
- A 300 MHz processor or higher
- At least one other IEEE 802.11b-compliant or 802.11g-compliant device

1-2-1 IEEE 802.11 Specifications

The Institute of Electrical and Electronics Engineers (IEEE) adopted the 802.11 standard for wireless devices operating in the 2.4 GHz frequency band in 1997. This standard includes provisions for three radio technologies: direct sequence spread spectrum, frequency hopping spread spectrum, and infrared. Devices that comply with the 802.11 standard operate at a data rate of either 1 or 2 Mbps.

802.11b

In 1999, the IEEE modified the 802.11 standard to support direct sequence devices that can operate at speeds of up to 11 Mbps. The IEEE ratified this standard as **802.11b**. 802.11b devices are backwards compatible with 2.4 GHz 802.11 direct sequence devices (that operates at 1 or 2 Mbps).

802.11a

Also in 1999, the IEEE modified the 802.11 standard to support devices operating in the 5 GHz frequency band. This standard is referred to as **802.11a**. 802.11a devices are not backward compatible with 2.4 GHz 802.11 or 802.11b devices. 802.11a radios use a radio technology called Orthogonal Frequency Division Multiplexing (OFDM) to achieve data rates of up to 54 Mbps.

802.11g

In 2003, the IEEE ratified the 802.11g standard. This standard delivers the same 54Mbps maximum data rate as 802.11a, yet it offers an additional and compelling advantage-backward compatibility with 802.11b equipment. This means that 802.11b

client cards will work with 802.11g access points, and 802.11g client cards will work with 802.11b access points. Note that 802.11b products cannot be upgraded to support 802.11g since the 802.11g radios use a different chipset than 802.11b devices. However, 802.11g products and 802.11b products can work in the same network. Because 802.11g and 802.11b operate in the same unlicensed band, the two standards share the same three channels, which can limit wireless capacity and scalability.

An 802.11a device and an 11b/g device cannot communicate with each other.

The Wi-Fi standard certified at 2.4 GHz ensures the wireless interoperability with other Wi-Fi (802.11b) certified devices.

1-2-2 Security Standards

The LAN-Express IEEE 802.11 Wireless Adapter supports the following security standards (features vary based on models):

- Cisco Client Extension compatibility (including LEAP)
- Wired Equivalent Privacy (WEP) encryption using 64 bit, 128 bit or 152 bit encryption
- AES-CCM Encryption support
- Support for Windows 802.1x supplicants
- Wi-Fi Protected Access (WPA) encryption using PassPhrase (text string with at least 8 to 63 characters, it can be any combination of letters, numbers and other characters).

Chapter 2 Installation

This chapter describes how to install an LAN-Express IEEE 802.11 Wireless Adapter and software in a computer running Windows XP, Windows 2000, Windows Millennium Edition (ME), or Windows 98 Second Edition (SE).

 Note for Windows XP Users:

The Windows XP operating system has a built-in feature known as "Wireless Zero Configuration" which has the capability to configure and control the LAN-Express IEEE 802.11 Wireless Adapter (refer to 4-7 Configuring Your Wireless Networking Settings with Windows XP for more details). This Windows XP feature will be automatically disabled if you install the Wireless LAN Client utility.

2-1 Notes before Installation

Review the following notes before installing an LAN-Express IEEE 802.11 Wireless Adapter. The LAN-Express IEEE 802.11 Wireless Adapter must comply with the following EMI, safety and ESD requirements:

Emission

802.11g

- North America — FCC Part 15b, Part 15c
- Europe — EN 301 893
- Japan — TELEC STD –33, STD- 66

Safety Requirements

- North America — UL 60950 Ver.3 for USA, CSA C22.2 for Canada
- Europe — EN 60950

ESD Requirement

LAN-Express IEEE 802.11 Wireless Adapter must withstand 15KV test voltage of

electrostatic discharge under operational conditions.

2-2 Windows ME and Windows 98 SE Installation CD Requirement

Before beginning the installation of an LAN-Express IEEE 802.11 Wireless Adapter, ensure that you have a Windows 98 SE or Windows ME installation CD available (depending on the computer's operating system). Windows 98/ME users may be prompted to insert a Windows CD during the installation. You should not need a Windows CD when installing the card in a Windows XP or Windows 2000 computer.
If you do not have a Windows 98/ME CD, it is possible that you already have the Windows installation files on your hard drive. These Windows installation files are known as Windows Cabinet or CAB files. The Cabinet files are commonly located in ***C:\WINDOWS\OPTIONS\INSTALL\ or C:\WINDOWS\OPTIONS\CABS*.**

Windows 98/ME users may need the Windows CD or Cabinet files to complete the installation of an LAN-Express IEEE 802.11 Wireless Adapter. It is recommended that you do not proceed with the installation until you have confirmed that you have one of these Windows installation media available.

2-3 Wireless Client Utility Installation

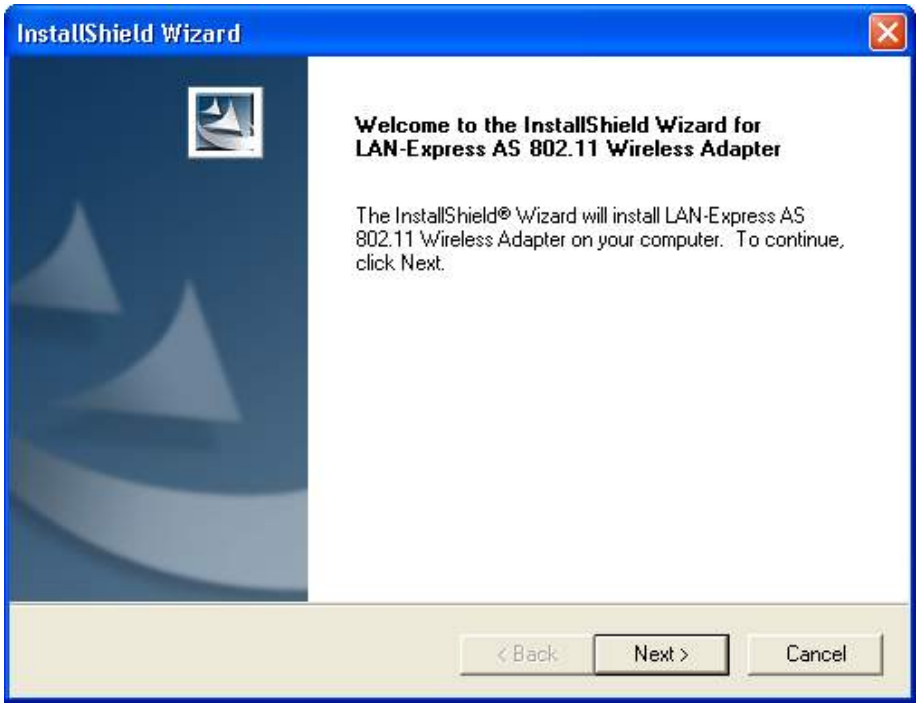
Follow the instructions below to install an LAN-Express IEEE 802.11 Wireless Adapter in a Window 98 SE, Windows ME, Windows 2000, or Windows XP computer by running the installation program before inserting the wireless adapter into the computer. It is recommended that you insert the wireless adapter after the setup and configuration procedure is completed.

1. Turn on the computer and logon to Windows, if applicable.
2. Insert the wireless Installation CD into the computer's CD-ROM drive.

3. Run **SETUP.EXE** from the Installation CD to launch the program if the Installation program does not launch automatically.

4. Click **"Next"** on the Software Setup Welcome dialog box as shown in Figure 2-1.

Figure 2-1 Setup "Welcome" Dialog Box

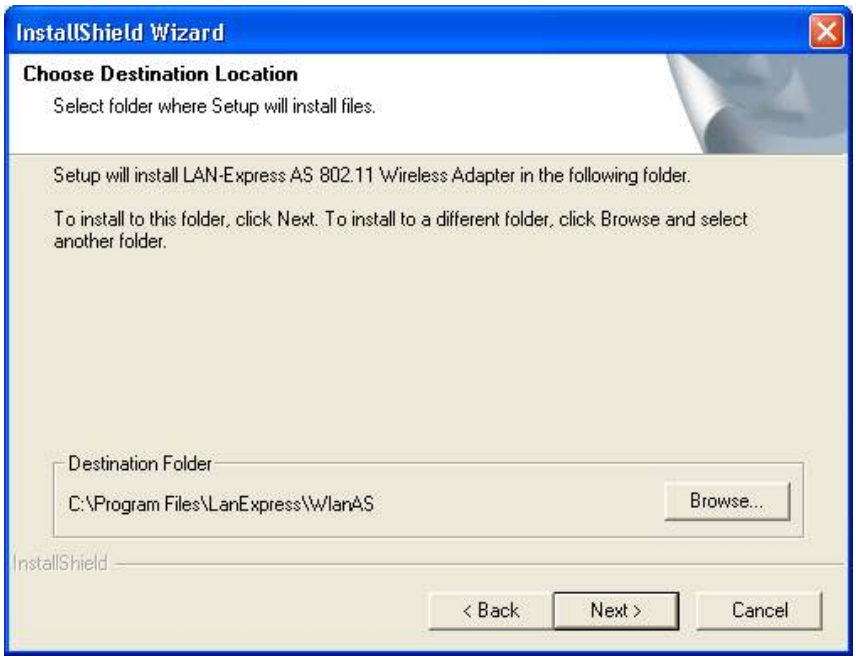


5. The License Agreement screen appears. Click **"Yes"** to continue.

Figure 2-2 License Agreement for the Installation of the LAN-Express IEEE 802.11 Wireless Adapter

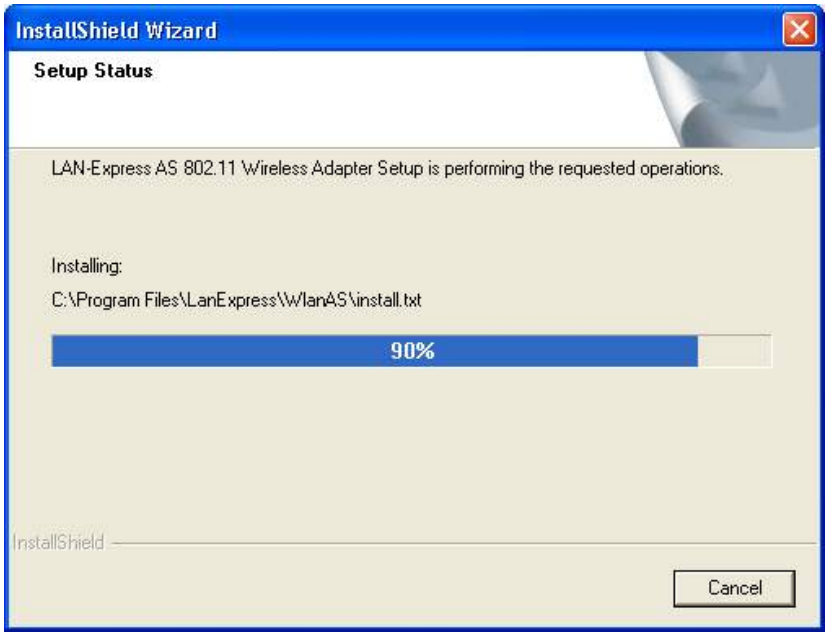
6. Choose a destination location for the LAN-Express IEEE 802.11 Wireless Adapter installation files. You may use the default path or click **"Browse"** to specify a different location. After you are done, click the **"Next"** button.

Figure 2-3 Choose Destination for Installation



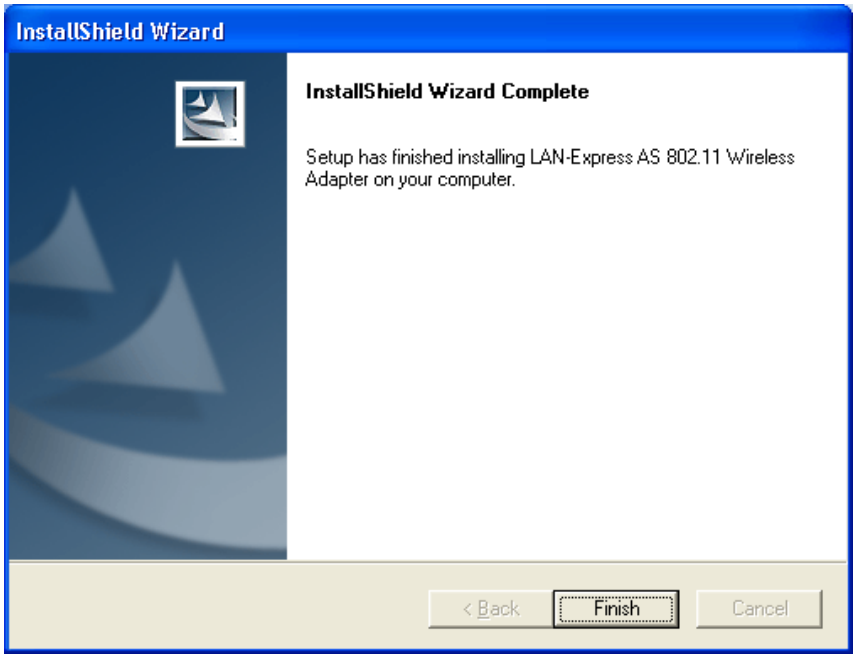
7. Be patient while the software is installed on your computer.

Figure 2-4 Software Setup in Process



8. Click **"Finish"** to close the Software Setup wizard when prompted.

Figure 2-5 Installation Completed



The Wireless Client Utility will be automatically loaded each time your computer starts. To access the utility, click the Wireless Client Utility icon in the Windows Taskbar.

9. Per the specific interface of the LAN-Express IEEE 802.11 Wireless Adapter, Insert it into your laptop's PC card slot, or….

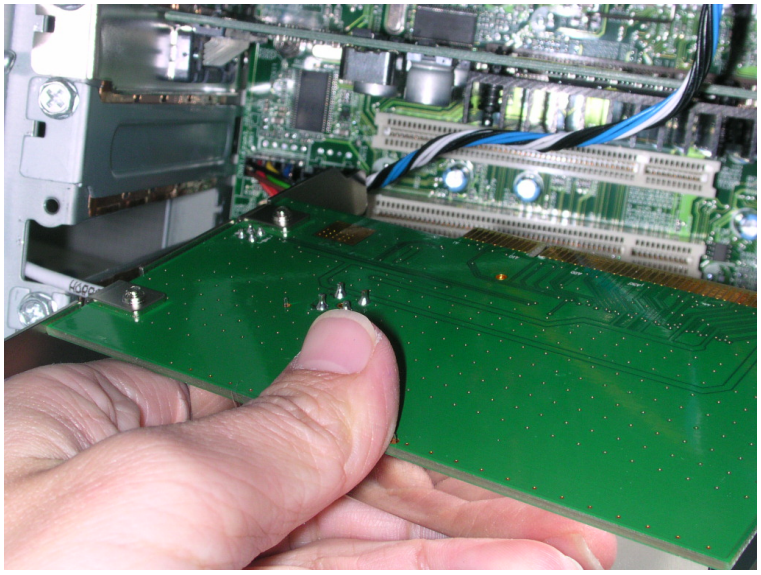
10. If the wireless adapter you purchased is a PCI Card, insert the LAN-Express IEEE 802.11 Wireless Adapter by first shutting down your computer and unplug the power cable from the power outlet.

11. Remove the computer cover according to the instructions provided by the computer's manufacturer. Touch the metal chassis of your computer to avoid damage caused by electrostatic discharge.

12. Select a PCI bus slot and remove the metal filler strip. Feed the external antenna and cable through the PCI slot and out the back of the computer.

13. Insert the card into the PCI slot and secure it in place as shown in Figure 2-6 (refer to the PC's user documentation for details).

Figure 2-6 Insert PCI Card into PCI Slot



14. Put the computer cover back into place. Reconnect the cabling and restart your computer.

If prompted, follow any on-screen instructions to complete the installation.

The Wireless Client should now be successfully installed. If you have an Access Point on the network with no security enabled, the Wireless Client should connect automatically.

If you have an Access Point on the network with security enabled, double-click the LAN-Express icon to launch the Wireless Client Utility; use this utility to create profiles, configure the card, and enable security.

If you do not have an Access Point, use the Wireless Client Utility to set the card to Peer-to-Peer Ad Hoc mode.

For more information on Peer-to-Peer Groups and Access Point networks, see Chapter 3 Wireless Topologies.

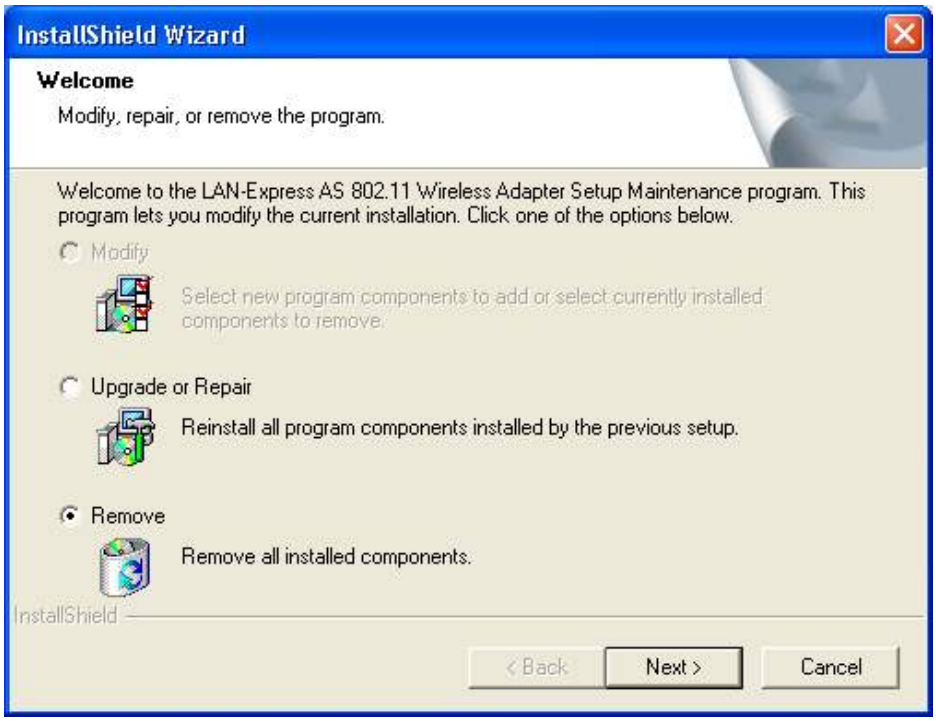
2-4 Uninstalling an LAN-Express IEEE 802.11 Wireless Adapter

Follow the images and steps shown below in case you need to uninstall the card:

Access the **Control Panel** from the **Start** menu. Click the **Add/Remove Programs** icon. Select **LAN-Express AS 802.11 Wireless Adapter** and click **Change/Remove** button as shown in Figure 2-7.

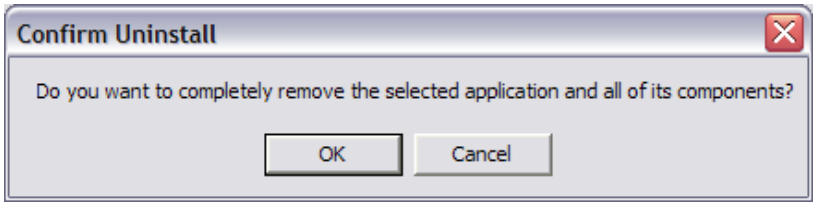
Figure 2-7 Select "Add/Remove Program" in Control Panel

Figure 2-8 Uninstall LAN-Express IEEE 802.11 Wireless Adapter



Select **Remove** and then click the **Next** button to perform the un-installation. When prompted, click **OK** to remove the Wireless Client Utility.

Figure 2-9 Un-installation Confirmation



Be patient while the card is uninstalled from your computer.

Figure 2-10 Install Un-installing Wireless Client Utility

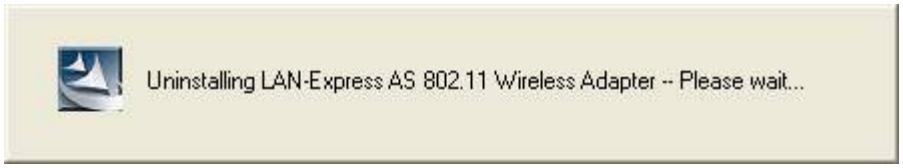
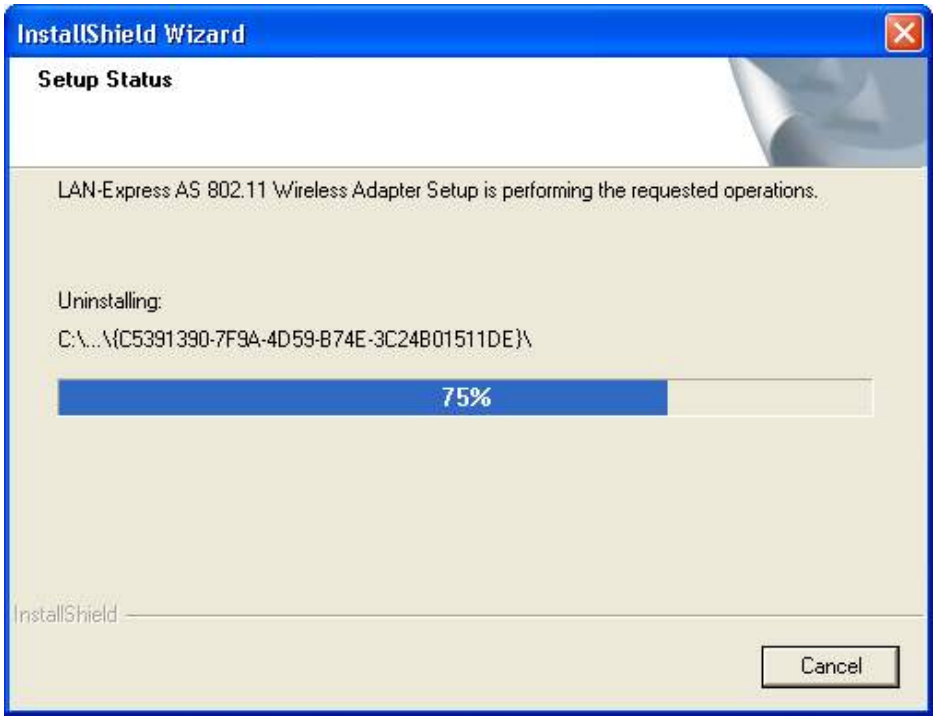
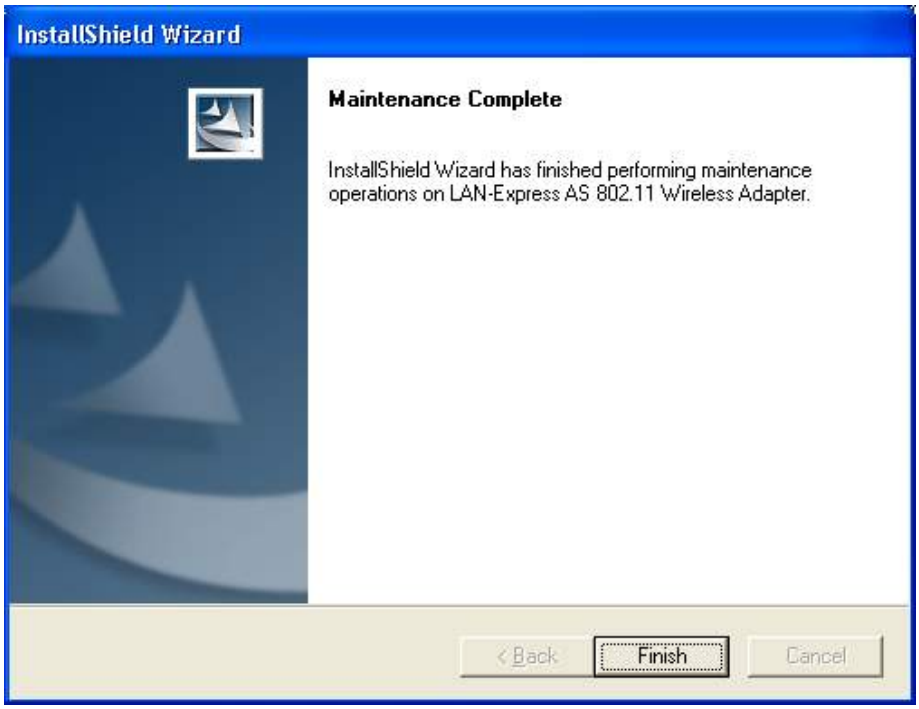


Figure 2-11 Un-installation in process



When prompted, click **Finish** to complete the un-Installation procedure.

Figure 2-12 Un-installation and Maintenance Completed



Chapter 3 Wireless Topologies

LAN-Express IEEE 802.11 Wireless Adapter looks and operates similar to Ethernet products. The only difference is that a radio replaces the wire between communicating devices. This means that all of your existing applications that operate over Ethernet will work with the LAN-Express IEEE 802.11 Wireless Adapter without any special wireless networking software.

A wireless LAN can be configured for two different modes of operation. While each method has its advantages, one of them may be better suited for your needs. Review the following configurations to determine which mode is best for you.

3-1 Peer-to-Peer Group

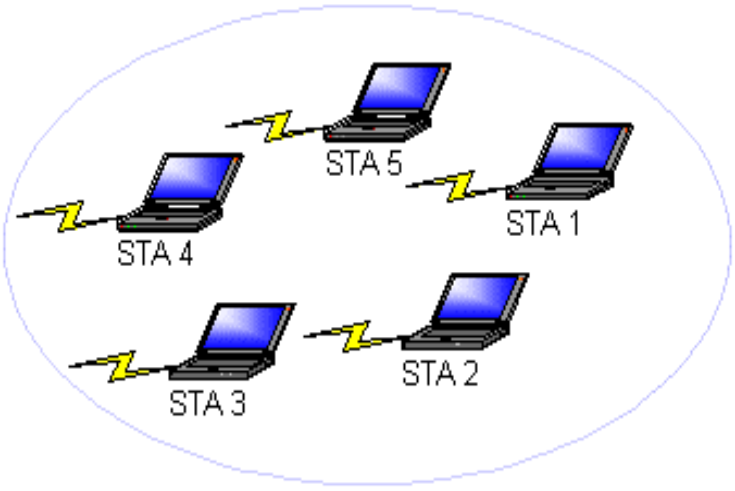
A Peer-to-Peer group—also known as an **Ad-Hoc** network-- is the simplest to deploy and is ideal for small offices. Peer-to-Peer Group can be comprised of two or more wireless client configured to communicate with one another. Peer-to-Peer Group clients communicate directly with each other without using an access point (AP). As a user on this type of network, you are able to quickly build up a wireless network in order to share files with other employees, print to a shared office printer, and access the Internet through a single shared connection.

Ad-hoc networking is cost effective, because no other devices components are needed (such as access points, hubs or routers) in order to setup a network. However, with Ad-Hoc networking, your computer is only able to communicate with other nearby

wireless clients.

By using the off-the-shelf peer-to-peer network operating systems, each computer can dynamically connect and reconnect to the others with no additional configuration, as illustrated in Figure 3-1.

Figure 3-1 Peer-to-Peer Group



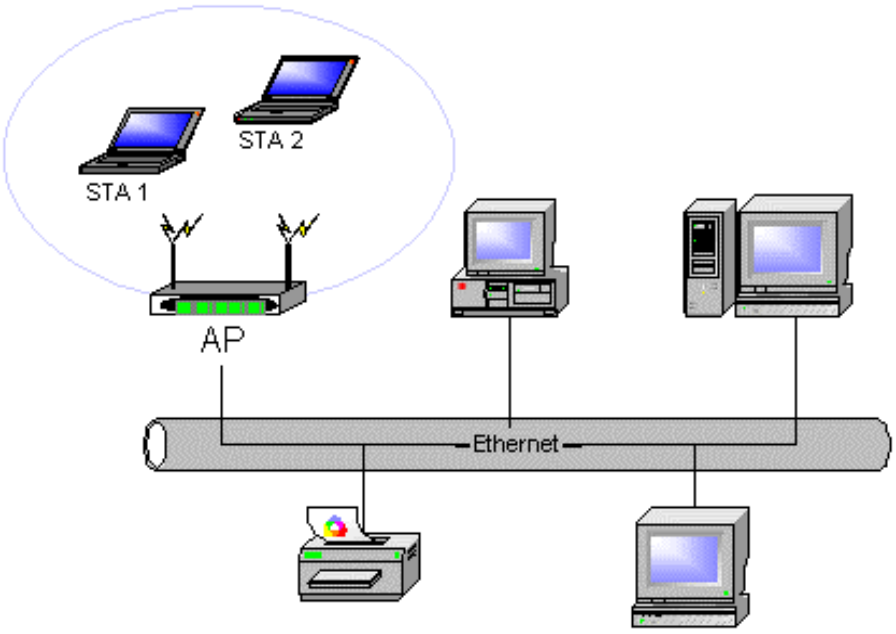
The LAN-Express IEEE 802.11 Wireless Adapter can communicate with an 802.11b or 802.11g Peer-to-Peer Group (but it can not dynamically switch between the two). Therefore, you must manually configure the wireless adapter to use one specific radio mode.

3-2 Access Point Infrastructure

Many companies have an existing Ethernet or wired LAN infrastructure and want to be able to extend that capability to wireless nodes. This is accomplished by installing one or more Access Points on the Ethernet network. Access Points are devices that communicate with both the Ethernet network and the wireless network.

An Access Point network is also referred to as an **Infrastructure** network. The key difference between an Infrastructure network and an Ad-Hoc network is the addition of one extra element—the Access Point. The Access Point serves as the focal point for all data traffic on your wireless network, optimally managing all wireless data transactions. Additionally, the wireless Infrastructure can provide access to an existing wired LAN. This link allows computers on the wireless LAN to access the other wired LAN's resources and tools, including Internet access, email delivery, file transfer, and printer sharing. See figure 3-2 for example.

Figure 3-2 Access Point Network



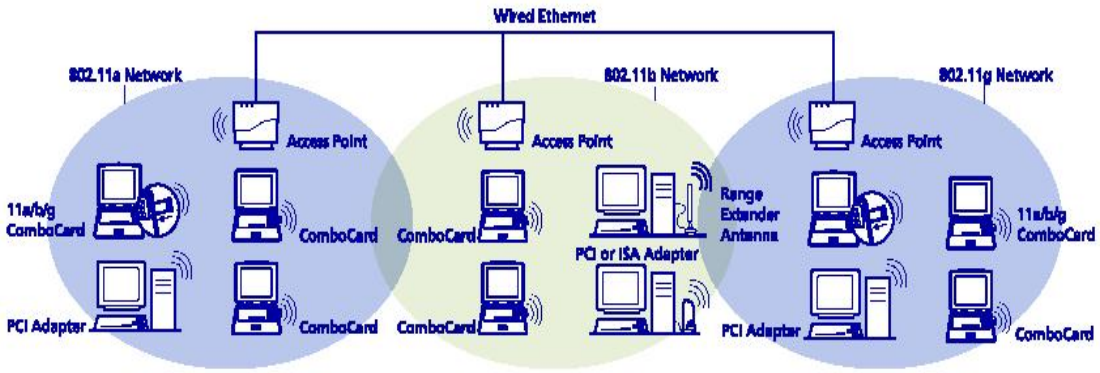
You can use the LAN-Express IEEE 802.11 Wireless Adapter to communicate with 802.11g Access Points, 802.11b Access Points, or a combination of Access Point types. The wireless adapter is compatible with 802.11g and 802.11b Access Points from any vendor.

3-2-1 Roaming Among Multiple APs

For larger environments, the LAN-Express IEEE 802.11 Wireless Adapter may roam from one Access Point to another while maintaining the same network connection. The Access Points establish coverage areas or cells similar in concept to those of a cellular phone network. The card will connect to any Access Point that is within range.

The LAN-Express IEEE 802.11 Wireless Adapter supports both roaming between APs of the same type (for example, from one 802.11b AP to another) and roaming between APs of different types (for example, from an 802.11b AP to an 802.11g AP). Figure 3-2 illustrates roaming between APs of different radio types:

Figure 3-2 Roaming Between APs of Different Radio Types



As the mobile client seamlessly switches from cell to cell, its network connectivity is preserved. The user can move freely between the Access Points in the network. When the roaming client leaves the transmission range of one Access Point, the card automatically detects the other Access Point(s) in the same vicinity to continue the network connection.

3-2-2 Roaming Principles

A LAN-Express IEEE 802.11 Wireless Adapter can roam between 802.11g Access Points and 802.11b Access Points.

All 802.11b and 802.11g Access Points that a client will roam between must have the same Network Name. Depending on the Wireless Mode selection, a user can roam among 802.11g and 802.11b Access Points.

All workstations with LAN-Express IEEE 802.11 Wireless Adapter installed must use either a Network Name of "any" or the same Network Name as the Access Points that they will roam between.

All Access Points and LAN-Express IEEE 802.11 Wireless Adapter must have the same security settings to communicate.

The Access Points' cells must overlap to ensure that there are no gaps in coverage and to ensure that the roaming client will always have a connection available.

Access Points installed in the same vicinity that use the same frequency band (2.4 GHz) should each use a unique, independent Channel to avoid potential interference.

Access Points that use the same Channel should be installed as far away from each other as possible to reduce potential interference.

Chapter 4 Wireless Client Utility Configuration

The chapter introduces the Wireless Client Utility (WCU). The WCU provides quick access and friendly interface to configure the Wireless LAN settings. However, if you are using Windows XP and have not installed the Wireless Client Utility, 4-7 Configuring Your Wireless Networking Settings with Windows XP contains information on how to configure your LAN-Express IEEE 802.11 Wireless Adapter using Windows XP Zero Configuration.

4-1 Wireless Client Utility icon

The Wireless Client Utility icon will appear in the Windows Taskbar (also known as the System Tray) each time your computer is restarted. Double-click the WCU icon to launch the utility.

Figure 4-1 Wireless Utility Icon

The Wireless Client Utility icon will display the current status of the wireless connection. A number appears in the upper left portion of the icon that indicates the radio's current operating frequency (2.4 GHz). When the radio is in a "no link" state, the frequency band will search at 2.4 GHz while it is scanning through those frequencies. The following are different status displayed by the icon.

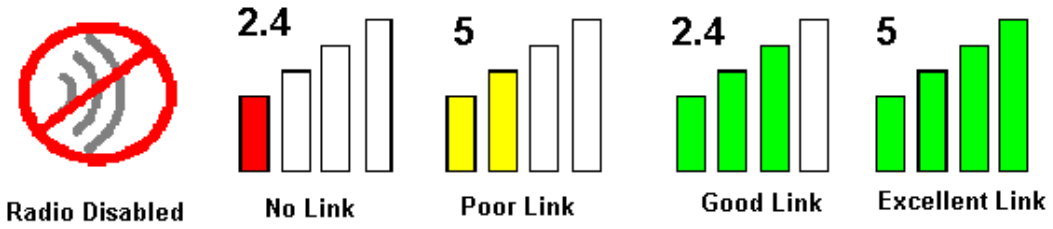
A. **"Radio Disabled"** indicates that the LAN-Express IEEE 802.11 Wireless Adapter has been disabled through either Hardware or Software.

B. **"Yellow bars"** indicate that the signal strength is weak and the wireless connection is at the limit of its range.

C. **"Green bars**" indicate good or excellent signal strength.

See Figure 4-2 for the different status of the Wireless Client Utility icon.

Figure 4-2 Different Status of Wireless Client Utility Icon



4-2 Current Status Tab

The current status tab, shown in Figure 4-3, displays the following information about your wireless connection.

Profile Name – The current name of the selected configuration profile.

Network Type – The current type of wireless network: either Access Point or Ad-hoc.

Wireless Mode – The current frequency and data rate that has been selected.

Current Channel – Specifies the current channel that the LAN-Express IEEE 802.11 Wireless Adapter is connected to or scanning on.

Link Status – Indicates whether the card is connected or disconnected to an Access Point or other wireless client.

Encryption Type – Describes whether or not the wireless traffic is being encrypted.

IP Address –The current IP address of the LAN-Express IEEE 802.11 Wireless Adapter.

Figure 4-3 Current Status Tab Displays Current Wireless Connection

The Advanced button as shown in Figure 4-4 provides more detailed information regarding your wireless connection.

Transmit Power Level – Provides current setting of Radio output power.

Network Name (SSID) – The wireless network name (SSID) that the device is currently connected with.

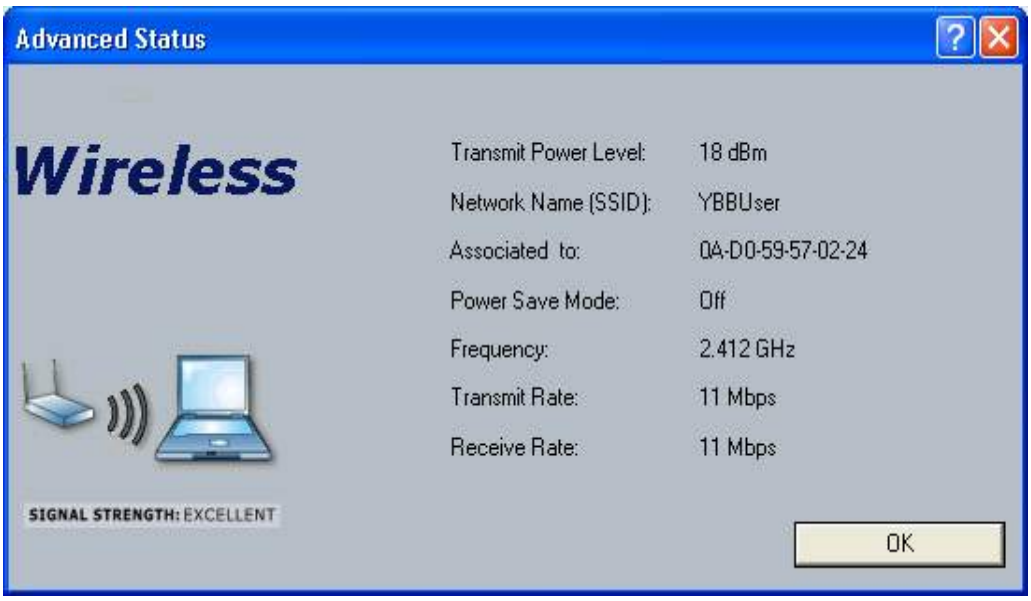
Power Save Mode – The type of Power Savings that is configured on the device.

Frequency – The current frequency that the Wireless device is connected or scanning on.

Transmit Rate – The transmit rate (Mbps) for the current connection for the wireless driver.

Receive Rate – The receive rate (Mbps) for the current connection for the driver.

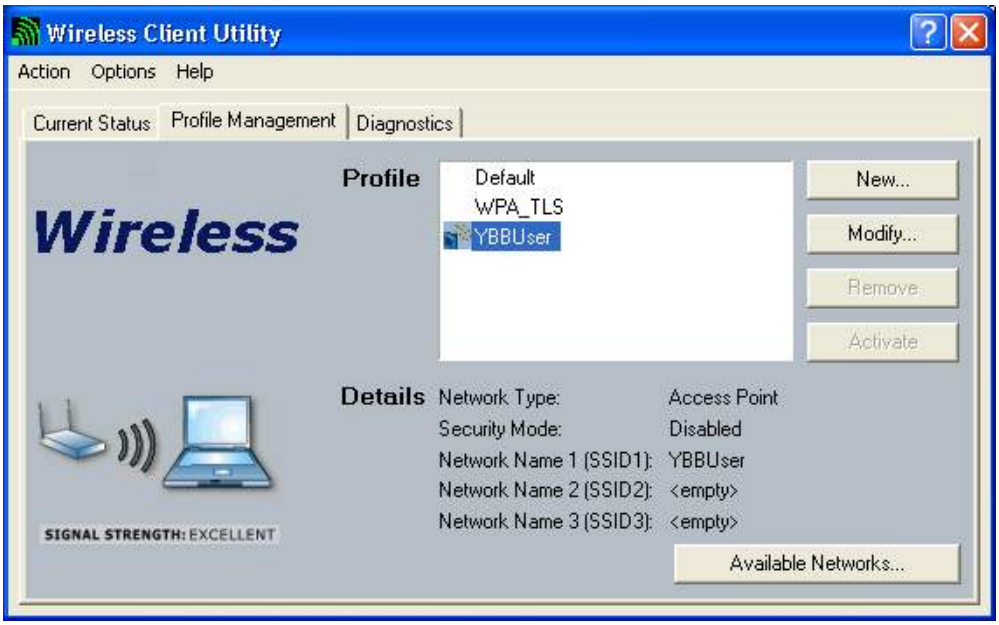
Figure 4-4 Advanced Status of Current Wireless Connection



4-3 Profile Management

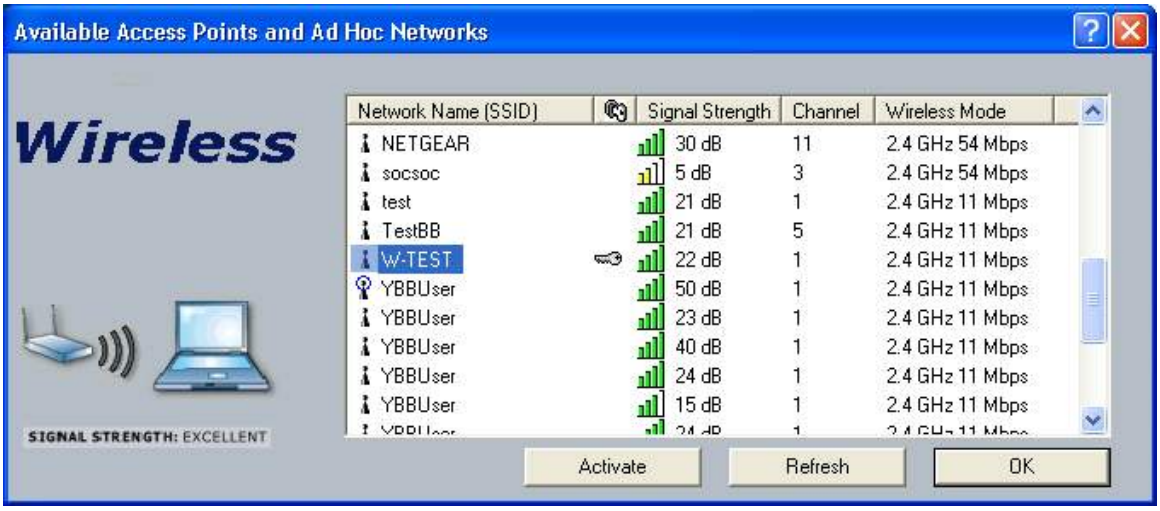
The **Profile Management** tab allows the user to define multiple configuration profiles. Each profile can be configured to match the appropriate settings of a unique wireless network. The ***Profile*** box lists all the configured profiles. The ***Details*** dialog describes the basic settings (SSID, Network Type, Security Mode) of the highlighted profile. The active profile will be displayed with the wireless icon next to it. To make a profile active, highlight the profile and click the **Activate** button. After selecting a new active Profile, the Wireless Client searches for wireless networks that match up to the new profile's specific settings.

Figure 4-5 Basic Settings Displayed on Profile Management Screen



The **Available Networks** button allows the user to view a list of all available wireless networks that is within range of the LAN-Express IEEE 802.11 Wireless Adapter. Each wireless network entry displays the network's SSID, encryption settings, signal strength level, Channel and Wireless Mode. You can use the **Available Networks** feature to create a new profile by highlighting the wireless network you want to create a profile for and clicking the **Activate** button.

Figure 4-6 Available Networks under Profile Management Mode



4-3-1 Create or Modify a Profile

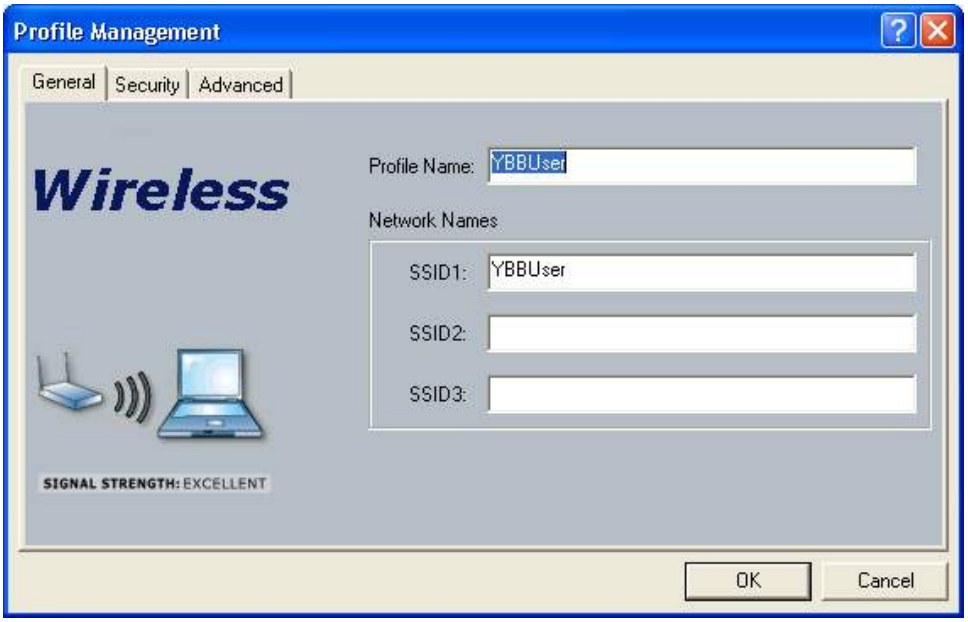
From the "**Basic Setting**" screen under the **Profile Management** mode, shown in Figure 4-5, click the **New** or **Modify** button.

The ***Network Configuration Settings*** dialog box appears as shown in Figure 4-7.

In the ***Profile Name*** box, enter a unique name that describes the profile or the wireless network you want the wireless adapter to connect to.

In the ***SSID*** boxes enter the SSID that matches the SSID of the wireless network you want the wireless adapter to connect to. There are three SSID selections (SSID1, SSID2, SSID3) available; this feature allows you to configure a single profile to match up to 3 different SSIDs.

Figure 4-7 Network Configuration Settings



Click the **Security** tab to manage the security settings associated with this profile.

Figure 4-8 Establish Security Settings for Wireless Network

Choose the security setting that matches the wireless network you want the card to connect to.

If you select **WPA** or **802.1x**, a drop-down menu to the right of the selection becomes available to allow you for additional configuration settings required by the selected security mode.

Click **Advanced** if you want to configure the advanced parameters (see 4-3-3 Advanced Settings in Profile Management for details).

Click **OK** to save the profile.

4-3-2 Security Settings under Profile Management Mode

The **Security** tab allows you to configure the LAN-Express IEEE 802.11 Wireless Adapter to match the security settings of the Wireless LAN network. Refer to Figure 4-9 for an example.

Select the appropriate security mode:

WPA – Wi-Fi Protected Access mode allows for the authentication and interoperability with enterprise class WPA enabled networks. This feature allows for authentication with networks that support the EAP-TLS or PEAP Extensible Authentication Protocol (EAP) types.

WPA-PSK – Wi-Fi Protected Access, Pre-Shared Key mode allows you to use WPA style authentication and encryption in a network that does not support EAP/802.1x authentication.

802.1x - This security mode allows the authentication of the user and/or the station to create a dynamic Wired Equivalent Key (WEP) key. LEAP authentication with a Cisco network infrastructure is included in this mode selection. Other EAP types supported by this mode are EAP-TLS and PEAP.

Pre-Shared Key - This mode is commonly referred to as IEEE 802.11 Wired Equivalent Privacy (WEP) encryption.

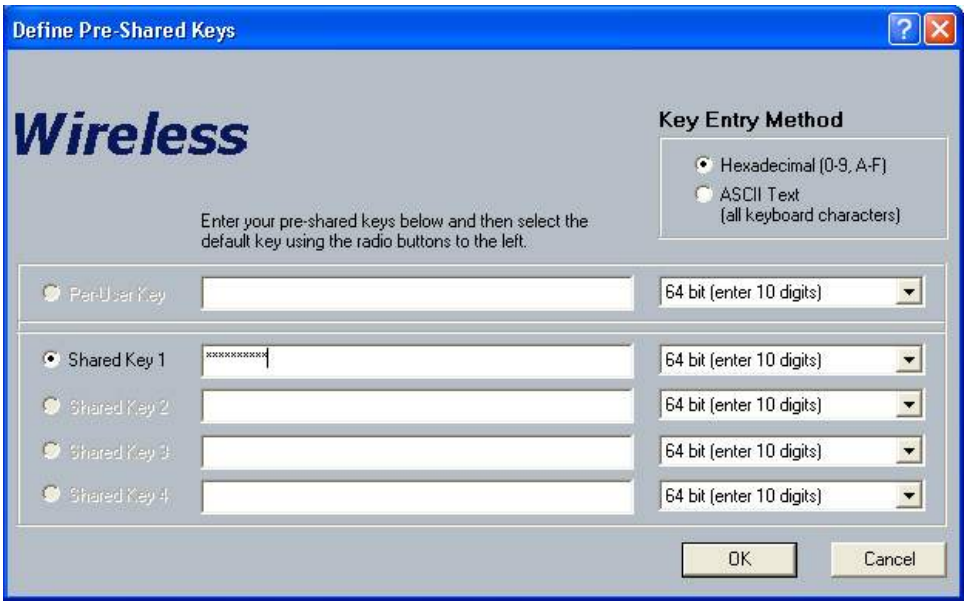
None - Use this mode when there is no authentication or encryption enabled on the Wireless LAN network.

Figure 4-9 Security Setting under Profile Management Mode

Setting Pre-Shared Keys

You can define the Pre-Shared keys (Figure 4-10) by using the ***Define Pre-Shared Keys*** box.

Figure 4-10 Defined Pre-Shared Keys Screen



Key Entry Method – Determines the entry method for an encryption key:

- Hexadecimal (0-9, A-F)
- ASCII text (any keyboard characters, A-Z, 0-9)

Per User Key – Defines the unique encryption key for network configuration security. The Per User key is used with many authentication mechanism and encryption. It is also known as a Per-Station key, this key must match the WEP key stored on the access point for this particular device. This allows for data only for this device to be encrypted by its own unique key. If this key is used, one of the shared keys must also be defined for multicast messages between the access point and the device. Multicast messages are those messages that are not sent to a particular station, but all the stations on a particular network.

Shared Keys – Also known as Group keys, these keys must match the WEP key(s) stored on the access point. While four keys can be entered at the same time, only one can be used to encrypt data going to and coming from the access point. Select one of the radio buttons on the left edge to set the currently active encryption key. At least one Shared Key field must be

entered to enable security using a shared key. If more then one key is defined then click the appropriate radio button to select a key as the default encryption key.

Key Length – The options for Key Length are

- 64 bit encryption (10 digits in HEX mode)
- 128 bit encryption (26 digits in HEX mode)
- 152 bit encryption (32 digits in HEX mode)

The number of characters that may be entered in the encryption key field will be automatically determined by the Key length setting.

Setting WPA PassPhrase Encryption

WPA is a new standard-based wireless security solution developed by the Wi-Fi Alliance. WPA also supports the WEP (Wired Equivalent Privacy) security standard. Microsoft provides a security patch called "Windows XP Support Patch for Wireless Protected Access" on its website for free download and it works only with Windows XP. The WPA encryption is supported on Windows® XP Professional and Windows XP Home Edition.

There are two types of WPA security:

WPA-PSK (with no server) – it uses the so-called "pre-shared key" as the security key. A pre-shared key is basically a password that is between eight and 63 characters long. It can be any combination of letters, numbers, and other characters. This is the typical mode that is used in a home environment. WPA-PSK is a lightweight 802.1x type authentication that uses a shared secret ASCII based passphrase known by both the access point and station. To enable WPA with a passphrase (WPA-PSK), select "WPA-PSK" from the Security Options list and click OK to configure as shown in Figure 4-11.

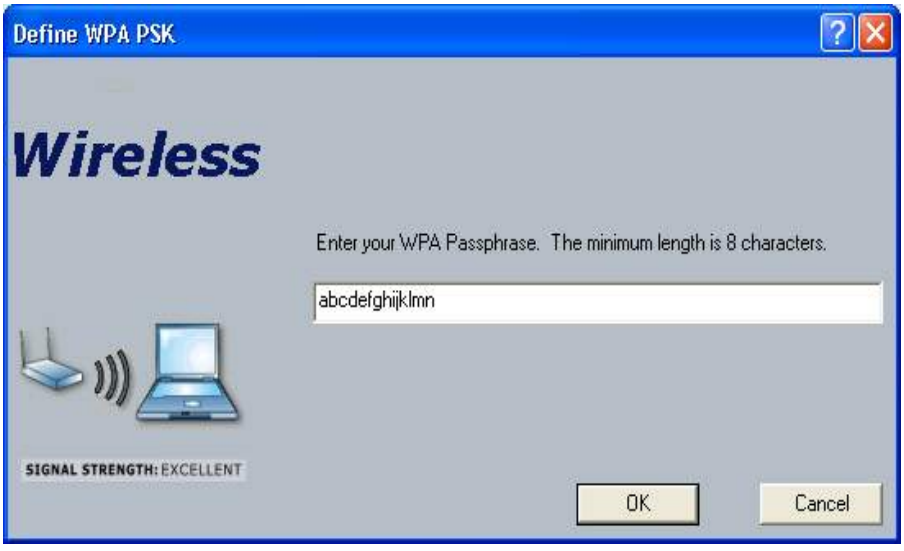
WPA (with server) – it is a system where a RADIUS server distributes the keys to the clients automatically. It is typically used in a business environment.

Figure 4-11 Define with a PassPhase

The "**Define WPA PSK**" screen appears as shown in Figure 4-12. Enter your passphrase text strings to complete the configuration process.

For WPA Passphrase, input the ASCII based secret passphrase. The passphrase must be more than 8 characters, but less than 64 characters.

Figure 4-12 Define WPA PassPhrase



Dynamic Security Authentication Setting

The Dynamic Security setting prevents unauthorized network access; a network RADIUS server must authenticate each user before the access was granted to the network.

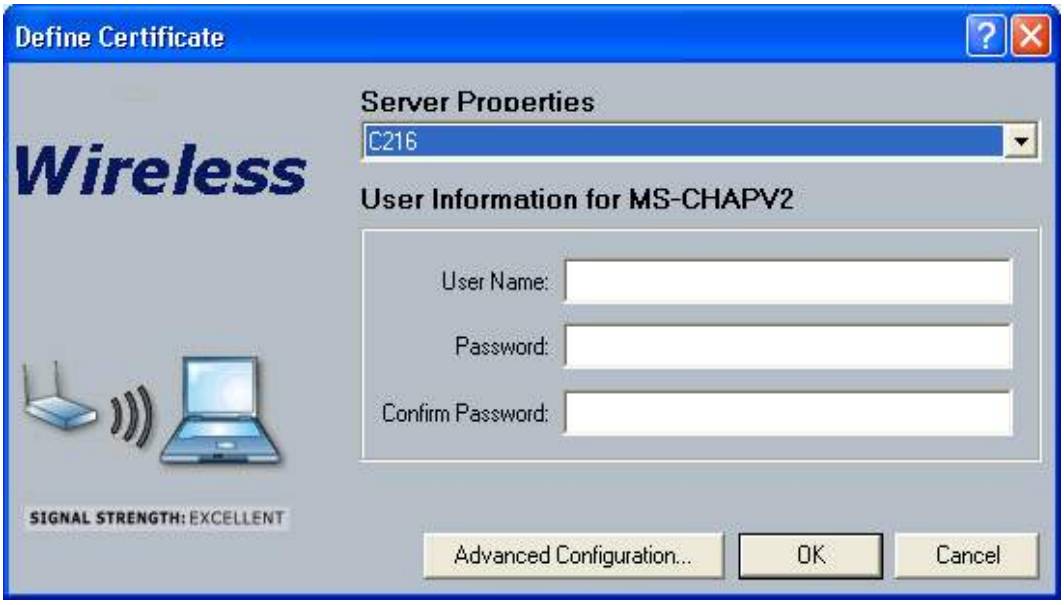
To configure the Dynamic Security settings for a particular profile, select **"WPA"** or **"802.1x"** mode. You can select "TLS" or "PEAP" from the drop-down menu **"WPA EAP Type"** if you wish to enable the WPA function, or select "TLS", "PEAP", or "LEAP" from the **"802.1x EAP Type"** with no WPA function enabled. The LEAP mode can only been shown in the **"802.1x EAP Type"** drop-down menu, because the WPA does not apply to the LEAP function. When selected, click the **Configure** button to configure the settings described below.

PEAP Mode

Select "**PEAP**" from the drop-down menu under the WPA mode to configure the WPA authentication for PEAP as shown in Figure 4-13 and Figure 4-14.

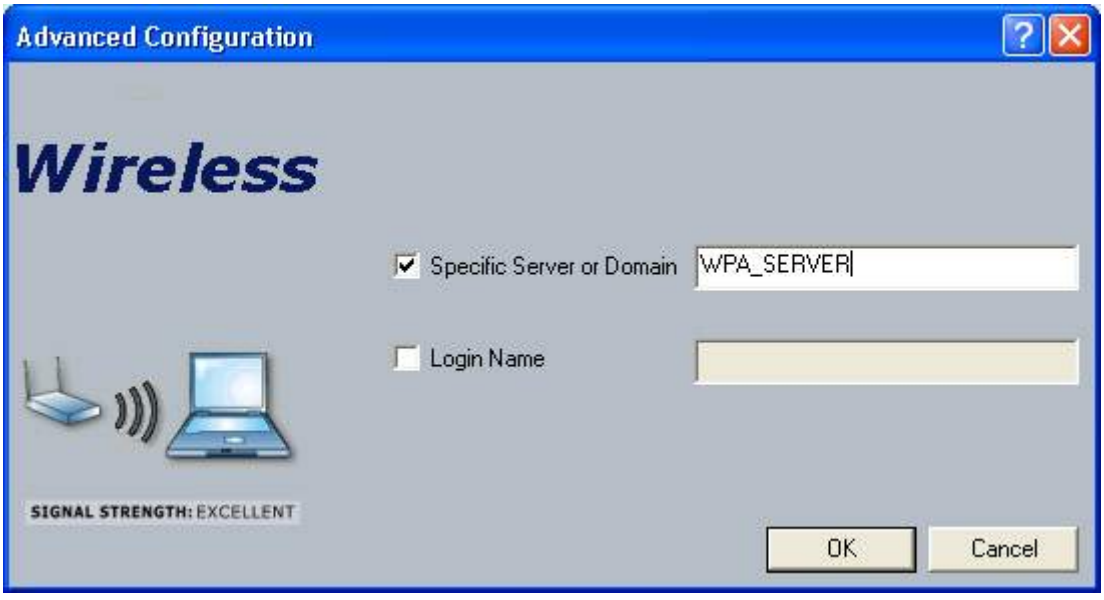
Figure 4-13 Dynamic Security with PEAP Authentication

Figure 4-14 Define Certificate for PEAP Mode



Click “Advanced Configuration” to define the specific server or domain name as shown in Figure 4-15.

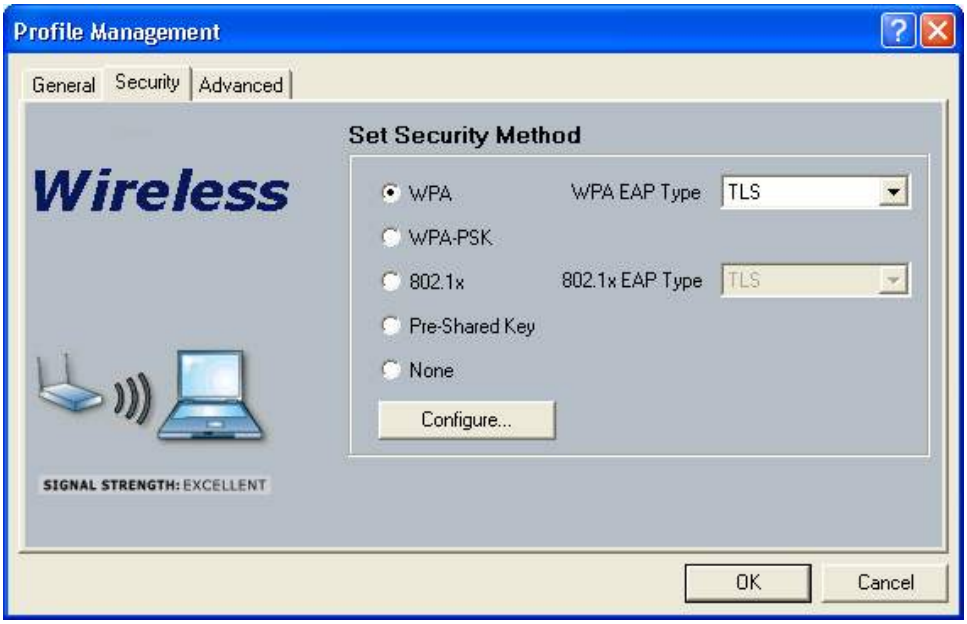
Figure 4-15 Define Specific Server or Domain Name under Advanced Configuration



TLS Mode

WPA security with TLS mode selected is shown in Figure 4-16.

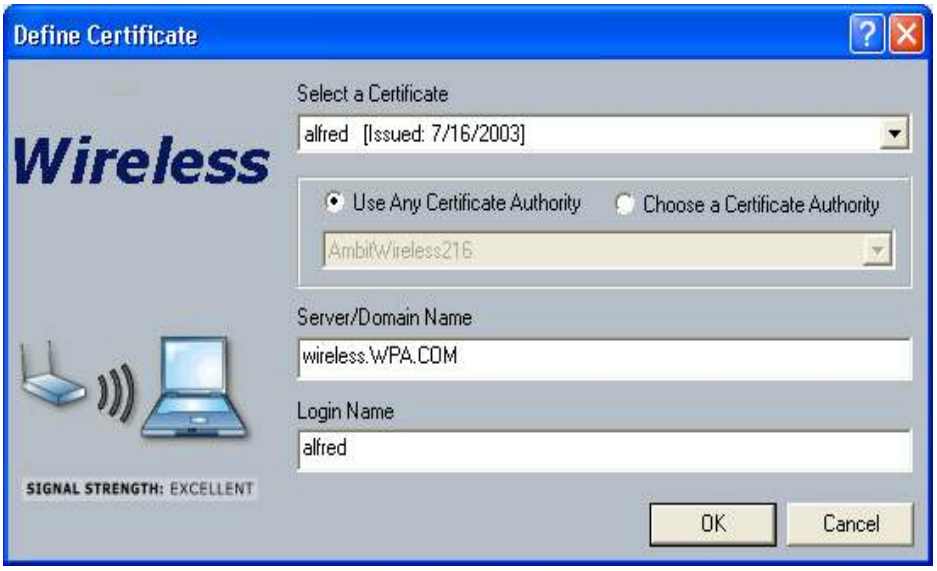
Figure 4-16 Dynamic Security with TLS Authentication



Define Certificate

The Define Certificate dialog screen appears after you click the **Configure** button. The field name "**Select a Certificate**" that can only be seen under the TLS mode is designed to authenticate the user to the RADIUS (Remote Authentication Dial-In Service) server from the drop-down menu.

Figure 4-17 Define Certificate for TLS Mode



This dialog allows setting the values to accomplish authentication via the EAP-TLS. In EAP-TLS the station and authentication server authenticate each other via an exchange of security certificates.

Select a Certificate – Allows the selection of any one of the certificates currently stored in the current user's personal certificate store as the station half of the EAP-TLS authentication process.

Certificate Authority - This field allows the Client Utility to verify the authentication server's certificate. If you accept any certificate, click the "Use Any Certificate Authority" radio button. Otherwise, select the specific Certificate Authority that must be the Trusted Root Certificate Authority for the authentication's certificate.

Server/Domain Name –This field is to restrict which authentication servers you allow the Client Utility to authenticate against. Input a domain name that restricts the authentication to a server in the domain. Likewise input a server name that restricts the authentication to that particular authentication server.

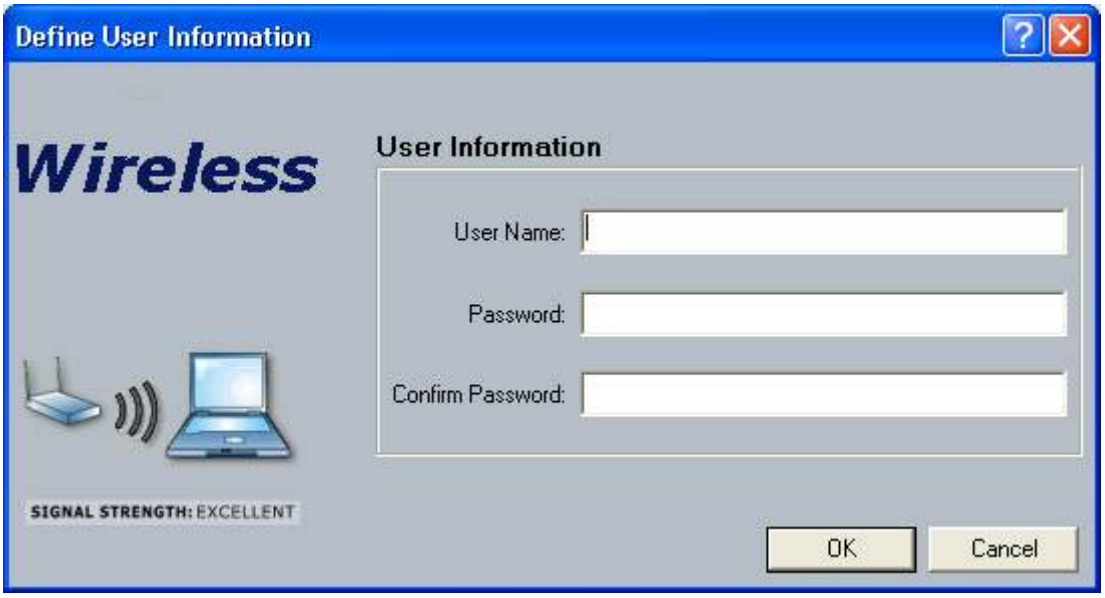
Login Name –This field is transmitted to the authentication server for informational purposes only. It allows the server's authentication log file to include your account information.

LEAP Mode

Select "**LEAP**" from the drop-down menu to set the Dynamic Security method to LEAP as shown in Figure 4-18 and Figure 4-19.

Figure 4-18 Dynamic Security with LEAP Authentication

Figure 4-19 Define User Information for LEAP Mode



4-3-3 Advanced Settings in Profile Management

The **Advanced** tab provide more complex wireless settings and these settings should only be modified if there is a specific requirement on your wireless network.

Power Save Mode - allows the user to minimize power utilized by the LAN-Express IEEE 802.11 Wireless Adapter. Note: Setting Power Save Mode to enabled (Normal or Maximum) may cause the user to experience an extended connection delay of up to one minute.

Network Type - allows the user to configure the LAN-Express IEEE 802.11 Wireless Adapter as either a Peer-to-Peer Group (Ad-hoc) or Access Point type network

802.11b Preamble - configures the preamble for 802.11b radio packets so that they match up with the specified wireless network.

Transmit Power Level - allows the user to modify the power output of the radio.

User may set the transmit power to the following levels. Maximum power setting will vary

according to individual country regulations.

Setting this to any other value except 100% will decrease the range of your LAN-Express IEEE 802.11 Wireless Adapter. However, operation at the higher power levels increases power consumption and the likelihood of interference between wireless LANs.

Figure 4-20 Advanced Setting Provides Complex Wireless Setting- Infrastructure Mode

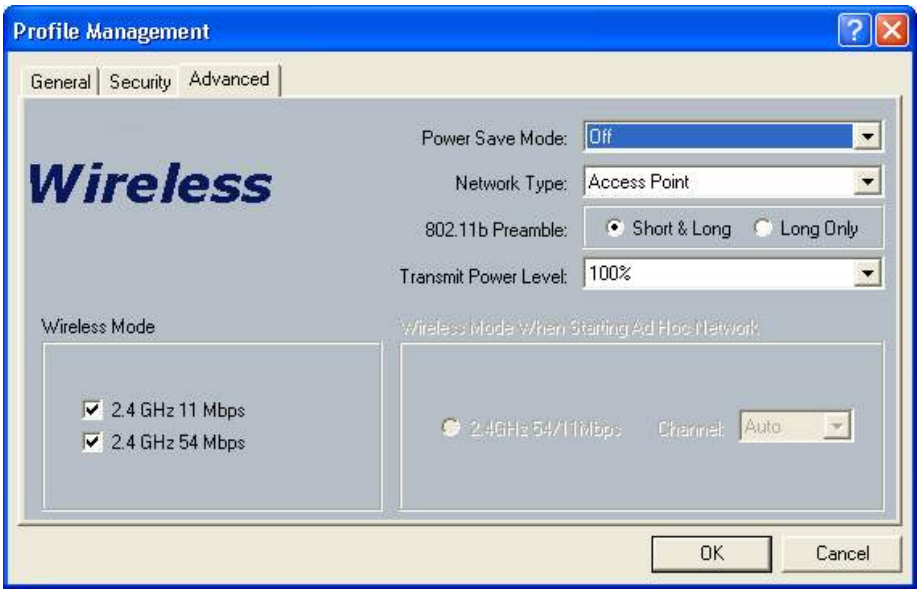
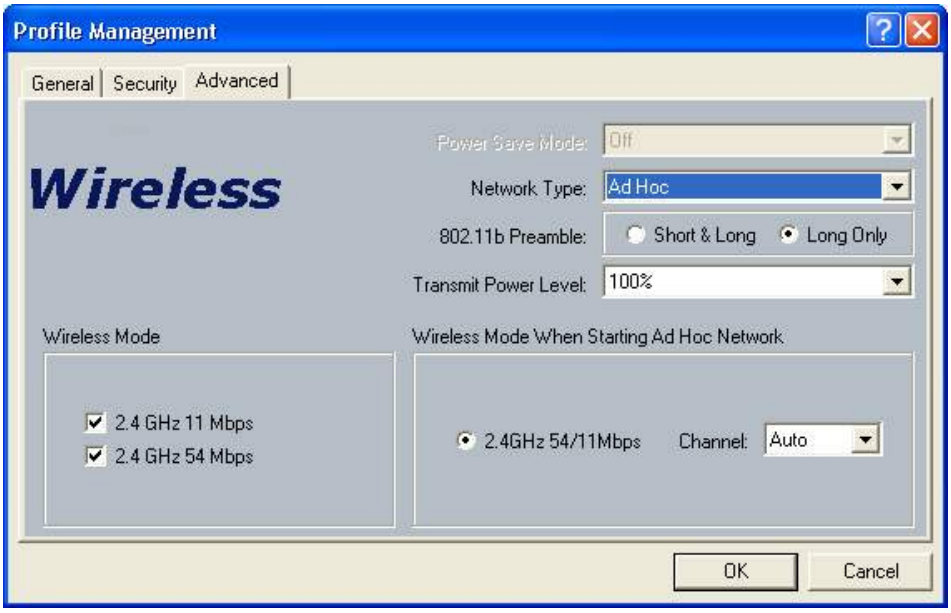


Figure 4-21 Advanced Setting Provides Complex Wireless Setting- Ad-Hoc Mode


Profile Management
General
Security
Advanced
Wireless
Power Save Mode:
Off
Network Type:
Ad Hoc
802.11b Preamble:
Short & Long
Long Only
Transmit Power Level:
100%
Wireless Mode
2.4 GHz 11 Mbps
2.4 GHz 54 Mbps
Wireless Mode When Starting Ad Hoc Network
2.4GHz 54/11Mbps
Channel:
Auto
OK
Cancel

Wireless Mode Setting

The **Wireless Mode** settings allow the user to specify which wireless frequency and data rate the wireless network is operating at. If all selections are chosen, the LAN-Express IEEE 802.11 Wireless Adapter will automatically search for all frequencies and data rates for wireless networks that match up to the profile settings.

Wireless Mode when starting Ad-Hoc setting

The **Wireless Mode When Starting Ad-Hoc Network** setting allows the user to determine the type of ad-hoc network to be started. Note that this setting will only take effect if there are no other ad-hoc networks with the same SSID currently operating within range. If an existing ad-hoc networks with the same SSID is within range, then the LAN-Express IEEE 802.11 Wireless Adapter will connect using the frequency and data rate provided by the existing ad-Hoc network.

4-4 Diagnostic Tab

The Diagnostics tab displays the current data statistics for transmit and receive packets. Additional statistics and driver information can be displayed by clicking the appropriate labeled buttons.

Figure 4-22 Transmit and Receive Statistics

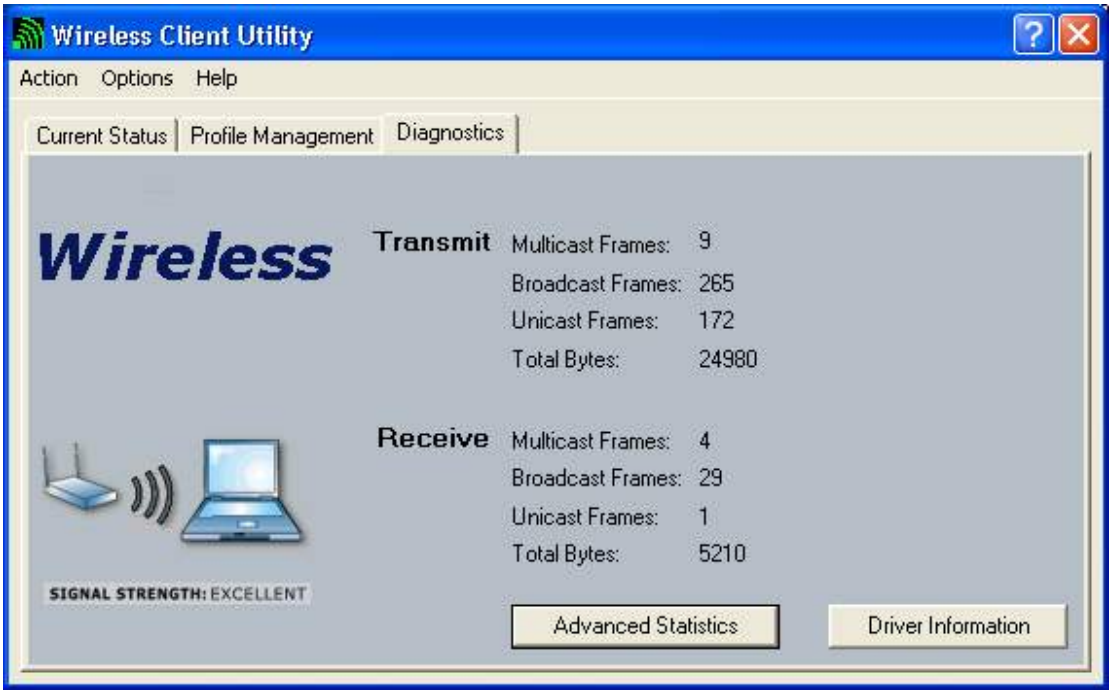


Figure 4-23 Driver Information

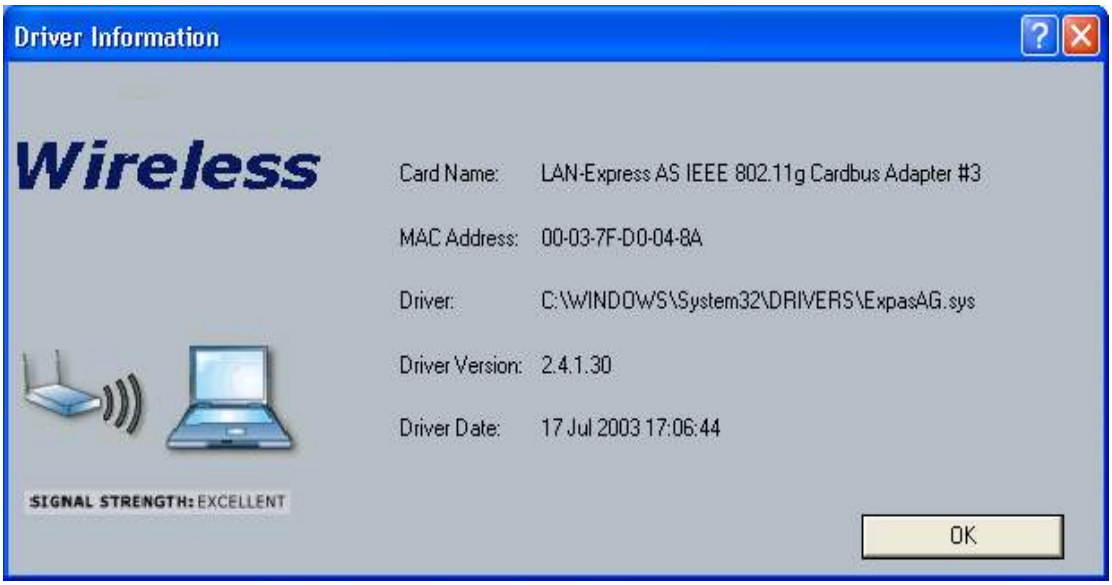
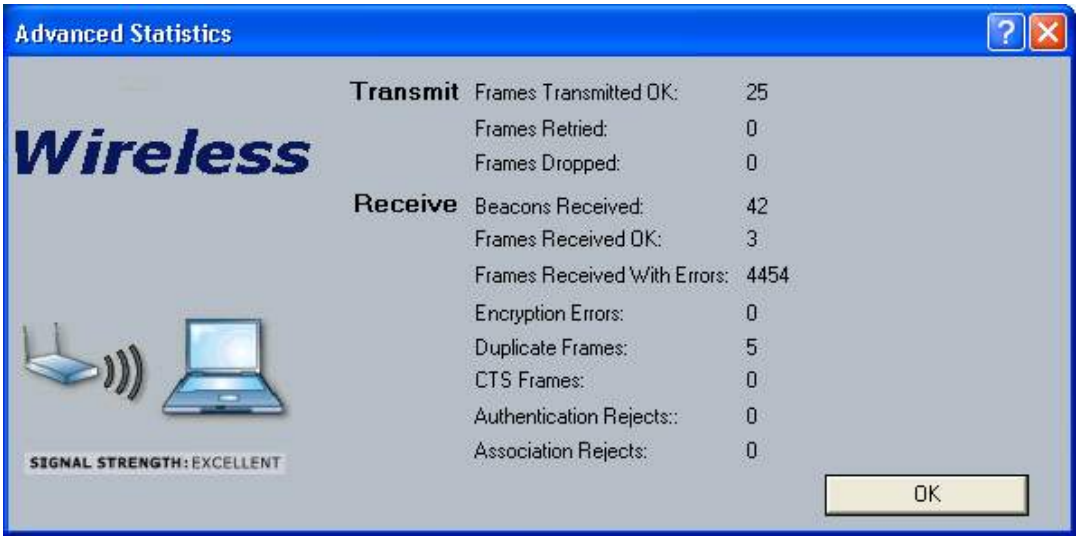


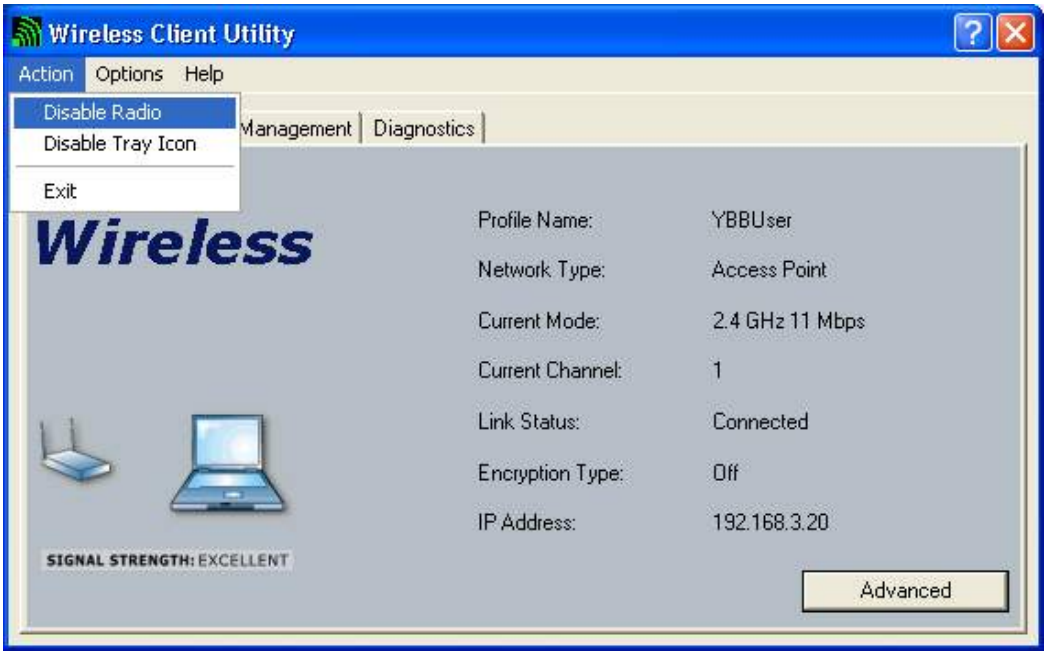
Figure 4-24 Detailed Date Shown under Wireless Advanced Statistics Mode



4-5 Action Menu

The **Action** menu enables and disables both the wireless radio and/or system tray icon.

Figure 4-25 Action Menu Used to Enable and Disable Wireless Radio/System Tray



4-5-1 Enable/Disable Radio

There may be situations when the user wants to disable the LAN-Express IEEE 802.11 Wireless Adapter's radio so that the wireless device cannot send or receive any wireless traffic. If a user is in an environment where there are no wireless networks, the user may turn off the radio in order to minimize power consumption of the LAN-Express IEEE 802.11 Wireless Adapter.

In the WCU's **Action** menu, there is an **Enable Radio**/**Disable Radio** selection. The choice provided in the menu will toggle the current state of the radio.

- **Enable Radio: The Radio is currently OFF (Disabled), and the Enable Radio selection will turn ON the Radio of the wireless device.**
- **Disable Radio: The Radio is currently ON (Enabled), and the Disable Radio selection will turn OFF the Radio of the wireless device.**

4-5-2 Enable/Disable Tray Icon

In the **Action** menu of the WCU, there is an **Enable Tray Icon**/**Disable Tray Icon** selection. The choice provided in the menu will present the current state of the System Tray Icon.

Disable Tray Icon: This will remove the tray icon from your System Tray (also known as the Windows Taskbar). Take the LAN-Express 802.11 Wireless Adapter as an example, the icon appears in the System Tray again after the system is restarted or if the Wireless Client Utility is opened again from ***Start > Programs > LAN-Express 802.11 Wireless Adapter > LAN-Express 802.11 Wireless Adapter***.

Enable Tray Icon: This option will return the icon to the System Tray.

4-6 Setting Up WPA in Windows XP

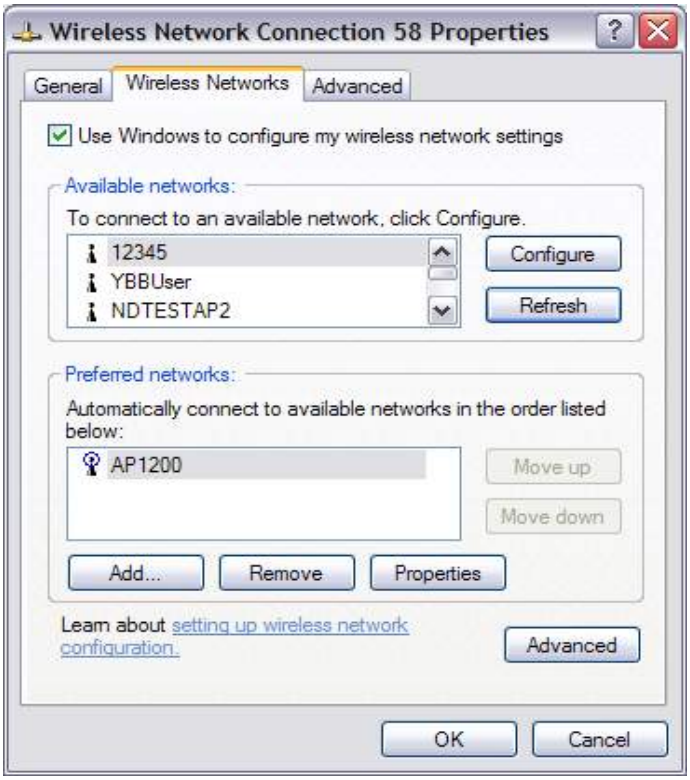
Follow the instructions below to set up WPA in " Windows wireless network utility".

1. Under Windows XP, click "Start > Control Panel > Network Connections".

2. Right-click on "Wireless Network Connection", and select "Properties".

3. Clicking on the "*Wireless Networks*" tab will display the following screen. Ensure the "*Use Windows to configure my wireless network settings*" box is checked.

Figure 4-26 Configure Wireless Network Connection under Windows XP



4. Under the "*Wireless Networks*" tab, click the "Configure" button and you will see the screen below.

Figure 4-27 Set Authentication for Wireless Network Connection

5. Select “WPA” under “Network Authentication”.

6. Select “*TKIP*” or “*AES*” under “*Data Encryption*”. This setting has to be identical to the Access Point that you set up.

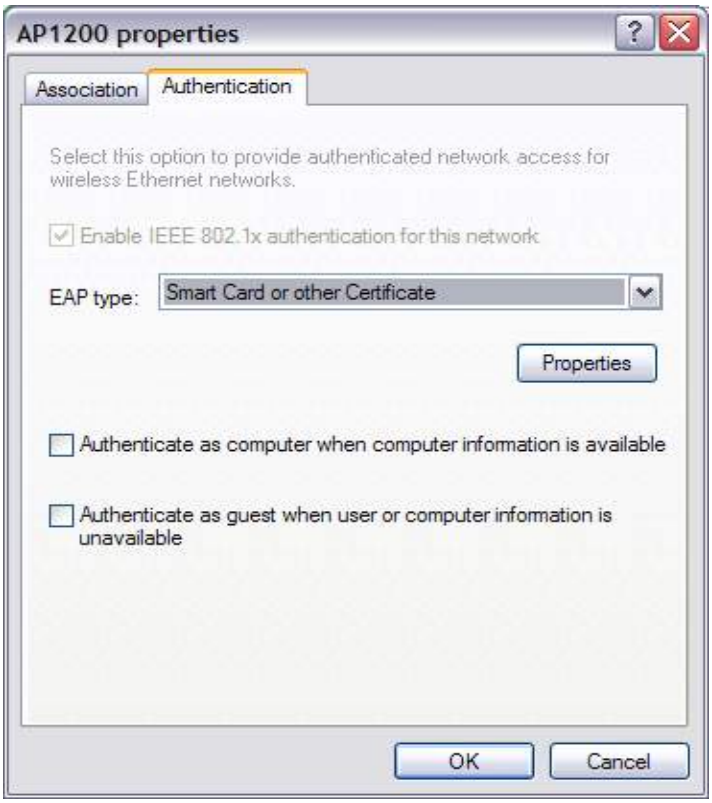
7. For Home or Small Business User, enter your encryption key in the “*Network Key*” box. It can be from eight to 63 characters and can be letters, numbers, or symbols. You must use the very same key on all the clients that you set up. If you are using this computer to connect to a corporate network that includes a RADIUS server, consult your network administrator for further information.

8. Click “*OK*” to apply settings.

The following is an example of setting WPA under the TLS mode of Dynamic Security for business users. You may also set the authentication under the PEAP mode that matches your specific environment. LEAP is an exclusive authentication mode with Cisco and is not provided by Microsoft.

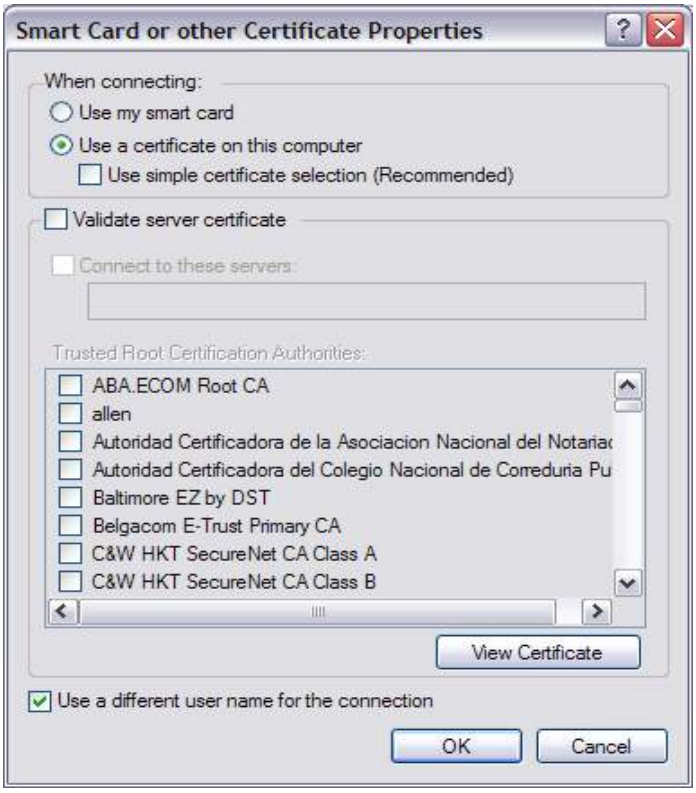
1. Click the "Authentication" tab. Select "*Smart Card or other Certificate*" under "*EAP type*" and you will see the following screen.

Figure 4-28 Set WPA Authentication Mode under Windows XP



2. Click "*Properties*" and "*OK*" to go to the following screen. You can check the proper boxes that match your specific environment.

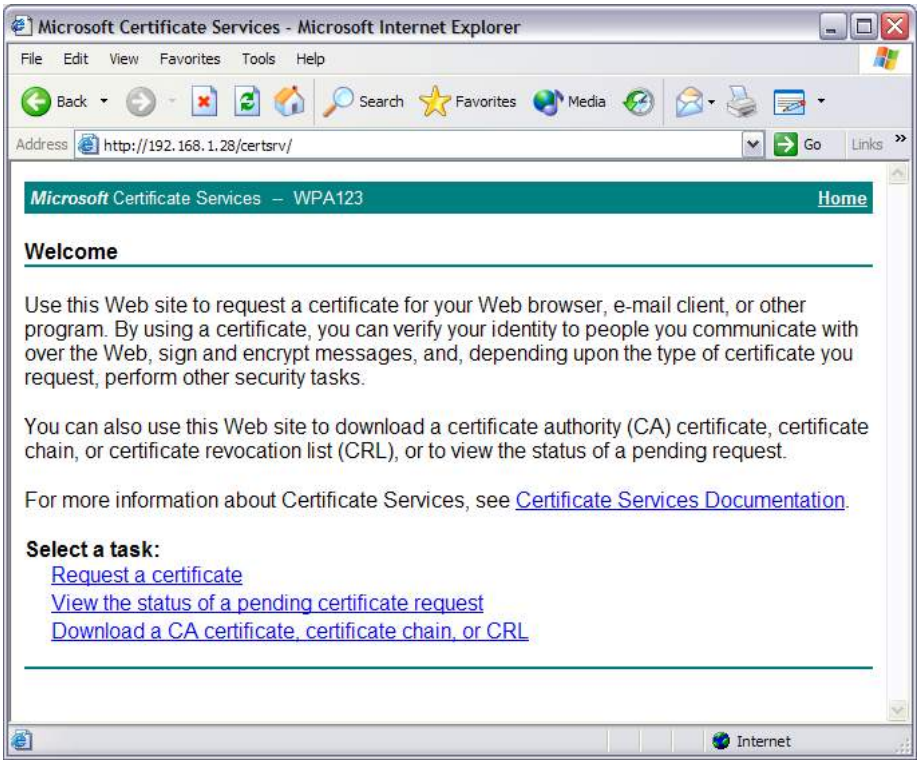
Figure 4-29 Define Certificate Properties



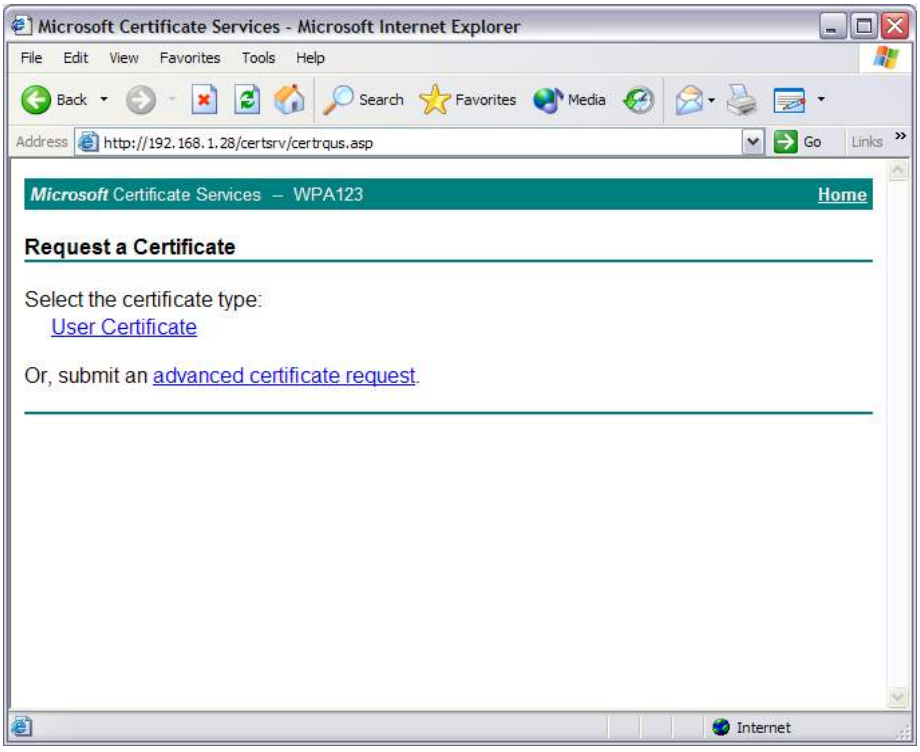
4-6-1 Load a Certification to Your Computer

Contact your network administrator for assistance if you do not have a certificate installed on your computer or do not know which one to use. Here is an example of loading a certification to your computer under the **Windows Server 2003 and Microsoft Certificate Service**.

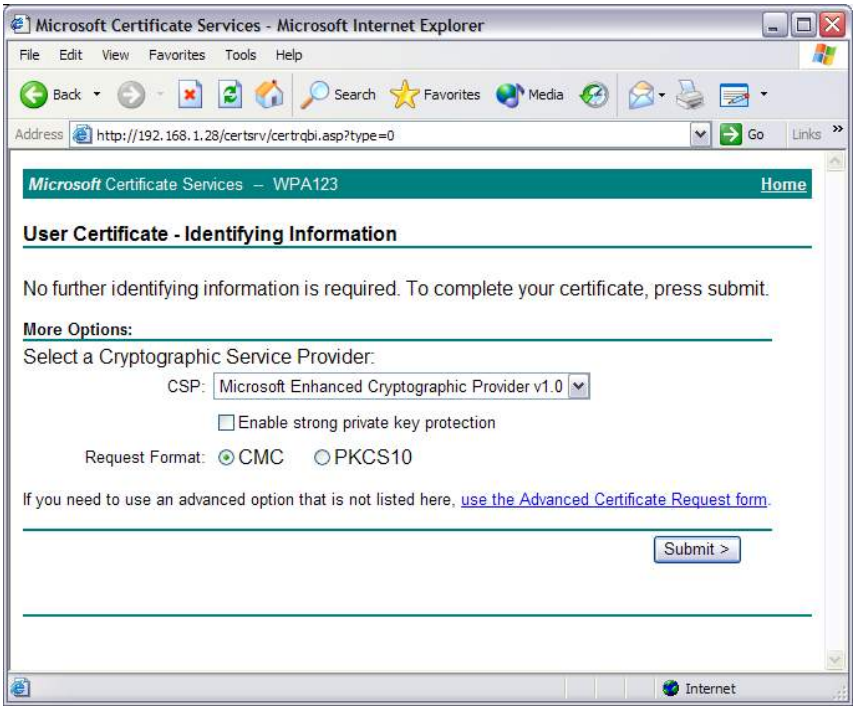
1. Go to the “Welcome” page and select “Request a certificate”.



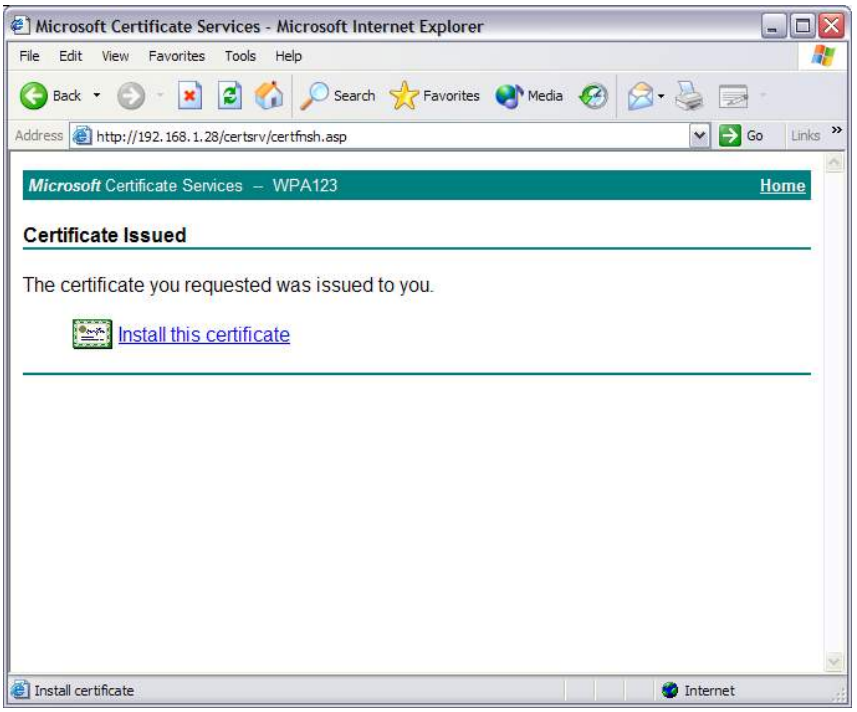
2. When the “Request a Certificate” screen appears, click on the “User Certificate” to continue.



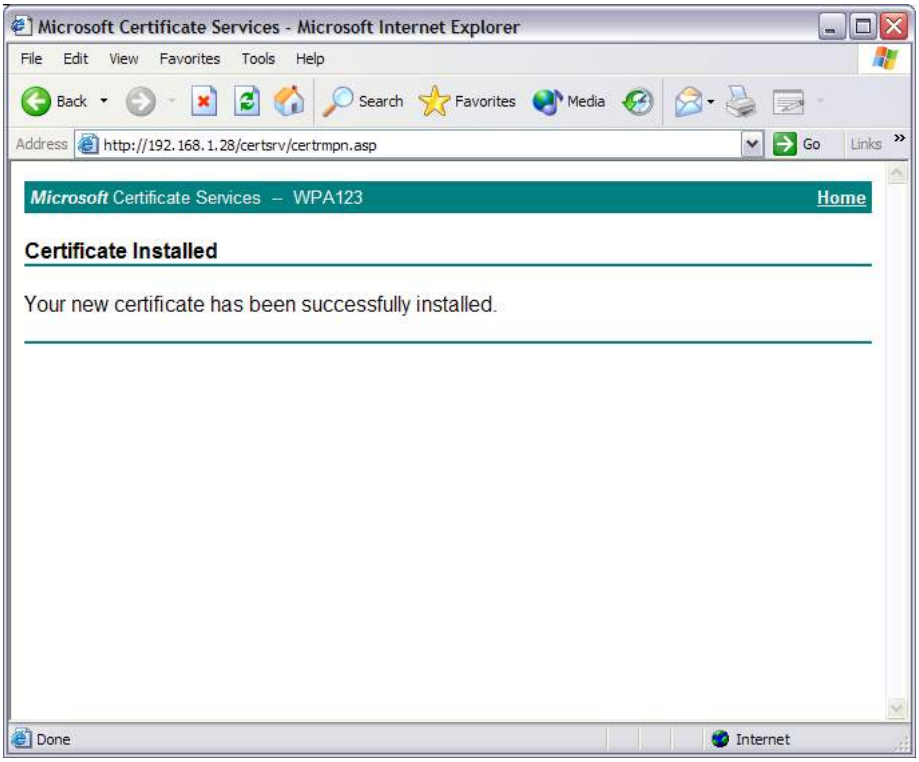
3. Select a Cryptographic Service Provider that matches the settings in your computer.



4. Wait for the Microsoft Certificate Services to issue the certificate to you.



5. Certificate installed successfully.



4-7 Configuring Your Wireless Networking Settings with Windows XP

The Windows XP operating system has a built-in feature known as "Wireless Zero Configuration" which has the capability to configure and control this Wireless LAN device. Follow the steps below to configure your device.

1. From the Start menu, select **Control Panel.**

2. Click Network and Internet Connections.

3. Click Network Connections.

4. Right-click the network connection associated with your LAN-Express IEEE 802.11

Wireless Adapter and select **Properties.**

5. Click the Wireless Networks tab.

6. Click the link Setting Up Wireless Network Configuration.

7. When the Help and Support Center window appears, you can access information regarding Wireless Network configuration. Follow the on-screen instructions to access configuration information for your adapter.

4-7-1 Advanced Wireless Settings

The LAN-Express IEEE 802.11 Wireless Adapter has several advanced settings which may need to be configured depending on your wireless network. It is recommended that these settings remain unchanged unless there is a specific need that requires modifying these settings.

1. From the **Start** menu, select **Control Panel**.

2. Click Network and Internet Connections.

3. Click Network Connections.

4. Right-click the connection for your LAN-Express IEEE 802.11 Wireless Adapter, and select **Properties**.

5. From the **General** tab, click the **Configure** button.

6. Click the **Advanced** tab.

7. Modify the wireless settings as required.

4-7-2 Help and Support Information

Configuration information and troubleshooting in Windows XP is available in Microsoft's Help and Support Center on Windows XP systems. Links to the appropriate Microsoft Web sites are also available here.

To access this information:

1. From the **Start** menu, select **Control Panel**.
2. Click Network and Internet Connections.
3. Click Network Connections.
4. Right-click the connection for your LAN-Express IEEE 802.11 Wireless Adapter, and select **Properties**.
5. From the **General** tab, click the **Configure** button.
6. From the **General** tab, click the **Troubleshoot** button.
7. When the Help and Support Center window appears, you can access information regarding the
8. Network adapter. To access configuration information for your adapter, follow the on-screen
9. Instructions. For the network adapter to function in a wireless LAN, you may need change the settings per the requirement of network environment.

Chapter 5 Troubleshooting

The LAN-Express 802.11 Wireless Adapter is designed to be very easy to install and operate. However, if you experience any difficulties, use the information in this chapter to help diagnose and solve the problem.

5-1 Common Installation Problems

Chapter 2 Installation describes how to install an LAN-Express IEEE 802.11 Wireless Adapter in a computer running Windows 98 Second Edition (SE), Windows Millennium Edition (ME), Windows 2000, or Windows XP. This section provides suggestions to resolve some of the common installation problems with a LAN-Express 802.11 Wireless Adapter.

5-1-1 Card Not Installed Properly

If Windows Networking reports that the LAN-Express IEEE 802.11 Wireless Adapter has not been properly installed or configured after you have completed the Installation program, open the Device Manager (found within the Control Panel's System icon) and locate the card's entry in the Network adapters category. If a yellow exclamation point ("!") appears next to the card's Device Manager entry, then the card is not working properly. Follow these steps:

Uninstall the card as described in Chapter 2 Installation.

Reinstall the card following the instructions in Chapter 2 Installation.

5-2 Configuring Networking Clients and Protocols

An LAN-Express 802.11 Wireless Adapter will bind to any existing networking components, such as Client for Microsoft Networks and the Internet Protocol (TCP/IP). Refer to the steps below that correspond to your computer's operating system to configure the card's networking components.

5-2-1 Windows XP/2000

Follow these steps to configure the card's networking clients and protocols in a Windows XP or 2000 computer:

Open the Control Panel's **Network and Dial-up Connections** (Windows 2000) or **Network Connections** (Windows XP) icon.

Scroll through the list of network connections and right-click the Local Area Connection that corresponds to the LAN-Express 802.11 Wireless Adapter.

Select **Properties** from the drop-down menu to view the connection's properties screen.

Select a client or protocol from the list of components and click **Properties** to configure its settings. For example, if you want to assign the card a static IP address, highlight **Internet Protocol (TCP/IP)** and click **Properties**.

 **To add a new client or protocol, click** Install... **and follow the on-screen instructions.**

5-2-2 Windows ME/98 SE

Follow these steps to configure a card's networking clients and protocols in a Windows 98/ME computer:

Open the Control Panel's **Network** icon.

Select a client or protocol from the list of installed components and click **Properties** to configure its settings. For example, if you want to assign the LAN-Express 802.11 Wireless Adapter a static IP address, highlight ***TCP/IP or TCP/IP -> LAN-Express 802.11 Wireless Adapter and click Properties***.

 **To add a new client or protocol, click** Add... **and follow the on-screen instructions.**

5-3 Range

Every environment is unique with different obstacles, barriers, materials, etc., and, therefore, it is difficult to determine the exact range that will be achieved without testing. Radio signals may reflect off of some obstacles or be absorbed by others depending on their construction.

The IEEE 802.11 standards support multiple data rates that correspond to different transmission techniques. For wireless devices, there is a trade-off between range and data rate. Transmission techniques that provide high data rates operate over short distances; techniques that provide slower data rates operate over greater distances. By default, the LAN-Express 802.11 Wireless Adapter automatically switches between these data rates to maintain a usable radio connection and achieve the best data rate based on the card's

distance from the Access Point. Therefore, a client that is close to an Access Point will operate at a higher data rate than a client that is farther away from the Access Point.

The LAN-Express 802.11 Wireless Adapter includes two integral omni-directional antennas. Note that the coverage footprint of the card's antennas will vary depending on the laptop's design and the location of the CardBus slot in the computer. Two antennas are provided to support antenna diversity, a technique which can improve system reliability. Due to the characteristics of radio waves, it is possible that one antenna may provide better performance than a second antenna installed a short distance away.

Proper antenna placement can help improve range. Here are some guidelines:

Try to keep the card's antennas free of obstructions (particularly metal objects) and do not place a sheet of metal (like a filing cabinet) between the antennas of two 802.11 devices.

Use the Wireless Client Utility to evaluate the signal strength and link quality between 802.11 devices.

Refer to the documentation that came with your Access Points for suggestions on how to locate the AP and its antennas to maximize range and performance.

5-4 LED Indicators

The LAN-Express 802.11 Wireless Adapter includes two round, green LED indicators on the end of the card. One is for power on/off status, and the other is for activity status.

These LEDs display the following behavior:

1. Both LEDs are off when the card is not receiving power or when the driver is not installed.
2. The LEDs blink in an alternating pattern to indicate that the card is searching for an

Access Point or Peer-to-Peer Group to communicate with.

3. The LEDs blink in unison when the card has associated with an Access Point or joined a Peer-to-Peer Group.

4. When there is network activity, the LEDs blink at a faster rate; the LEDs will blink in unison more often as the card's Transmit or Receive Rate increases.

5. The activity LED turns off when the radio is disabled.

6. After installing the LAN-Express 802.11 Wireless Adapter in a computer, you can check the behavior of the LED indicators when the computer cover is open. The PWR LED is on when the computer is turned on. The RF LED (radio) is on when roaming, connecting to an AP, and transmitting and receiving packets.

Appendix A - Specifications

The following technical specification is for reference purposes only. Actual product's performance and compliance with local telecommunications regulations may vary from country to country. Wireless Corporation will only ship products that are type approved in the destination country.

A-1 General

Compatibility	Fully interoperable with IEEE 802.11b and 802.11g compliant products in 802.11b and 802.11g mode.
LED Indicators	Two (2) LEDs indicate Power On, Sleep Mode, Transmit Activity, Association, and Power Off

A-2 Network Information

Security	64, 128 & 152-bit WEP data encryption; LEAP; AES.
Network Architecture	Supports Ad Hoc Peer-to-Peer Groups and communication to wired infrastructure networks via Access Points.
Installation & Diagnostics	Complete configuration utility application included. Utility's site survey tool, surveys other wireless units and reports packet throughput; Desktop icon continuously reports status
Operating System	Windows 98SE, 2000, ME, XP

Support	
Roaming	Seamless among 802.11b compliant access points (in 802.11b/g modes) and 802.11g compliant access points (in 802.11g mode)

A-3 Radio Specification for 802.11b Mode

Media Access Protocol	IEEE 802.11b DSSS, IEEE 802.11g OFDM
Radio Data Rate	11 Mbps, 5.5 Mbps, 2 Mbps, 1 Mbps
Frequency Band	2.4 GHz frequency band; actual frequencies in use vary by country
Radio Type	Direct Sequence Spread Spectrum
Modulation	CCK, QPSK, BPSK
Nominal Output Power	18 dBm
Channels	Varies by country.

A-4 Radio Specification for 802.11g Mode

Media Access Protocol	IEEE 802.11b DSSS (Direct Sequence Spread Spectrum), IEEE 802.11g OFDM
Radio Data Rate	802.11g: 54 Mbps with fall back rate of 48, 36, 24, 18, 12, 9, and 6Mbps. 802.11b: 11 Mbps with fall back of 5.5, 2 and 1Mbps.
Frequency Band	2.4 GHz frequency band; actual frequencies in use vary by country
Radio Type	Direct Sequence Spread Spectrum
Modulation	802.11g: OFDM; 802.11b: CCK (11Mbps, 5.5Mbps), DQPSK (2Mbps, 1Mbps)
Nominal Output Power	Typical 12dBm at 54Mbps, typical 15dBm at 11 Mbps
Channels	11 channels (US, Canada), 13 channels (Europe Countries), 14 channels (Japan)

A-5 Environmental Restrictions

Operating Temperature	0ºC to +70ºC
Storage Temperature	-10ºC to 75ºC
Non-Operating Humidity	5% to 95% non-condensing

A-6 Physical Features

Bus Interface	32-bit CardBus
PCB	4-layer design
WLAN	Atheros 5001X solution
Antenna	Dual diversity antennas
Voltage	3.3 VDC
Weight	45 grams
Dimension	54mm x 114.5mm x 5mm

A-7 Power Consumption

Doze Mode (802.11b & 802.11g)	15 mA
Receive (802.11b)	270 mA
Receive (802.11g)	330 mA
Transmit (802.11b)	450 mA
Transmit (802.11g)	600 mA

A-8 Available Transmit Power Settings

User may set the transmit power to the following levels. Maximum power setting will

vary according to individual country regulations.

- 100%
- 50%
- 25%
- 12.5%
- Lowest

Appendix B Regulatory Information

B-1 Regulatory Information

USA – Federal Communication Commission (FCC)

FCC Class B Statement

This device complies with Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

(1) This device may not cause harmful interference

(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC RF Safety Requirement

The radiated output power is far below the FCC radio frequency exposure limits.

Any change or modification not expressly approved by the grantee of the equipment authorized could void the user authority to operate the equipment.

This device and its antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

B-2 FCC WARNING

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 or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet on a circuit different from that which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

WARNING For your health sake, please keep at least 20 cm away from your Notebook LCD Panel while using wireless LAN.

Appendix C Glossary

WCU - Wireless Client Utility (WCU); the utility that configures the LAN-Express IEEE 802.11 Wireless Adapter.

PCI - Peripheral component Interconnect; a standard bus interface found on most desktop computers.

Access Point - An internetworking device that seamlessly connects wired and wireless networks together.

Ad Hoc - A peer- to-peer wireless network without Access Point. A group of wireless clients consistent an independent wireless LAN.

Backbone - The core infrastructure of a network, the portion of the network that transports information from one central location to another central location. The information is then off-loaded onto a local system.

BSS - Basic Service Set. An Access Point associated with several wireless stations.

ESS - Extended Service Set. More than one BSS can be configured as an Extended Service Set. An ESS is basically a roaming domain.

ESSID – Extended Service Set Identifier The length of the ESSID information is between 0 and 32 octets. A 0 length identifier indicates the broadcast SSID.

Ethernet - A popular local area data communications network, originally developed by Xerox Corp., which accepts transmission from computers and terminals. Ethernet operates on 10/100 Mbps transmission rate over shielded coaxial cable or over shielded twisted pair telephone wire.

Infrastructure - An integrated wireless and wired LAN is called an infrastructure

configuration.

Roaming - A function that allows one to travel with a mobile end system (wireless LAN mobile station, for example) through the territory of a domain (an ESS, for example) while continuously connecting to the infrastructure.

SSID – Service Set Identifier (SSID) is the network name used by the Wireless LAN. The length of the SSID information is between 0 and 32 octets.

WEP – Wired Equivalent Privacy is the optional cryptographic confidentiality algorithm specified by IEEE 802.11 used to provide data confidentiality that is subjectively equivalent to the confidentiality of a wired local area network (LAN) medium that does not employ cryptographic techniques to enhance privacy.