802.11g Mini PCI WLAN Card

User's Manual

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About This User's Manual

This manual was written for Mini PCI Wireless LAN Card. For brevity, throughout this manual **Wireless LAN Card** is used to indicate **802.11g WLAN Card Mini PCI**. Also, the following terms/abbreviations are used interchangeably:

- Access Point-AP

- Wireless LAN-WLAN

- Ethernet network-LAN-network

This User's Manual contains information on how to install and configure your Wireless LAN Card. From now on, we will guide you through the correct configuration steps to get your device up and run.

Chapter 1 Introduction

The Wireless LAN Card design is based on Atheros WLAN chipset. It supports 802.11g standards to provide maximum data rates of 54 Mbps.

Wireless LAN Basics

This section contains some Wireless LAN basics to help you better understand how the products work together to create a wireless network.

Local Area Network (LAN)

Simply put, a LAN is a network that exists in a relatively limited area. A network is two or more computers connected together sharing files and peripheral devices such as printers.

The Wireless LAN Card allows you to interact with other computers without having to run cables normally associated with networks. This lets you move your computer around while staying connected to your network.

There are two ways to use the Wireless LAN Card. One way is to connect directly to one or more Wireless LAN Card equipped computers, forming an Ad Hoc wireless network. The second way is to connect to an Access Point that gives you access to an existing wired LAN, forming an Infrastructure wireless network.

Wireless Network Topologies

The 802.11 standard defines two wireless modes: Infrastructure mode and Ad Hoc mode.

Ad Hoc Network

An Ad Hoc network offers peer to peer connections between wireless stations that are in range of each other. The stations communicate directly with each other without using an Access Point or any connection to a wired network. This mode is useful for quickly and easily setting up a wireless network anywhere that a wireless infrastructure does not exist or is not required for services. In an Ad Hoc network, all wireless stations must have the same SSID, channel and WEP keys (if enabled) to communicate with each other.
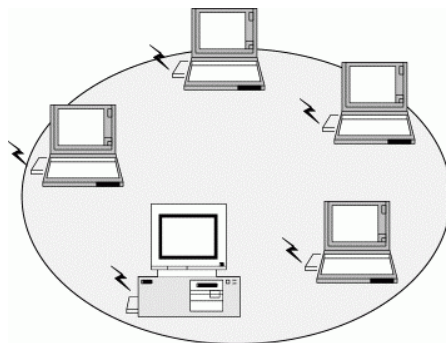
Figure 1-1 Ad Hoc Network

Infrastructure Network

An Infrastructure wireless network consists of at least one Access Point connected to the wired network infrastructure and a set of wireless end stations. The AP acts as a gateway, linking the wireless network to a wired LAN. As a result, wireless stations have access to all of the features of your wired LAN including e-mail, Internet, network printers and files server access.
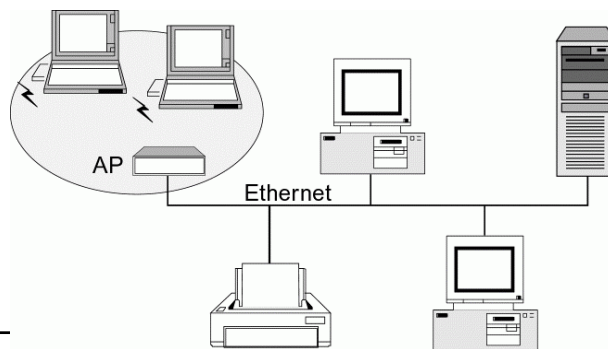
Figure 1-2 Infrastructure Network

Roaming Between Multiple Access Points

For large environments, multiple Access Points can be implemented to extend the wireless service coverage area for seamless wireless access. It allows wireless clients to roam from one AP to another while maintaining the wireless connectivity at all times. A wireless client wandering across multiple APs will automatically change the operating radio frequency as required.

In a roaming network, all APs and wireless clients must have the same Service Set Identity (SSID) and security setting (if enabled). Alternatively the mobile station may use an SSID of "any" to associate with any available AP, regardless of the AP's SSID. Roaming among different Access Points is controlled automatically to maintain the wireless connectivity at all times.
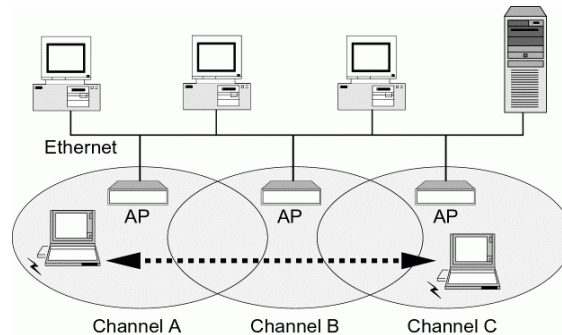
Figure 1-3 Roaming Across Multiple Access Points

802.11g

This Wireless LAN Card is an IEEE 802.11g radio solution. Getting familiar with some technical terms will help you better understand your device.

- **Operating Frequency Band**

  Operates in the 2.4GHz band .

- **Data Rates**

  Supports data rates of 1, 2, 5.5, 6, 9,11, 12, 18, 24, 36, 48 and 54Mbps.

- **Modulation**

  Complementary Code Keying (CCK) and Orthogonal Frequency Division Modulation (OFDM).

Chapter 2   Installing the Driver and Utility Software

This chapter describes the first-time installation of the driver and software for the Wireless LAN Card. Proper driver installation is to allow the device to operate on your host computer while the utility software, a Windows program, is to help you configure and monitor your Wireless LAN Card.

Note: This Mini PCI model is an integrated Wireless LAN Card solution, your laptop computer is probably shipped with its driver and software properly installed. If this is the case, ignore this chapter and proceed with the configuration steps in the next chapter.

In case you need to re-install the driver and software for any reason, we recommend that you remove any previously installed driver and software from your system first. Refer to the section "Chapter 6 Uninstalling the Wireless LAN Card" for the instructions on how to remove previous driver releases.

System Requirements

To use the Wireless LAN Card, your computer must meet the following minimum requirements:

- Windows 98®/Me®/2000®/XP®
- 32 MB of RAM or greater
- 300 MHz processor or higher
- UL listed I.T.E. computers

Installing the driver and software

If your operation system has not been installed with the Wireless LAN Card driver, the Windows Plug-and-Play capability will automatically detect the new device (e.g., Ethernet Controller) and display the wizard requesting for drivers. Click **Cancel** to bypass the wizard screen and then take out the steps below.

1. Close all Windows programs that are running.

2. Insert the provided Software Utility CD into your CD-ROM drive. Run **Setup.exe** from the Software Utility CD to launch the setup program.

3. When the Atheros Install Program screen appears, click **Next**.
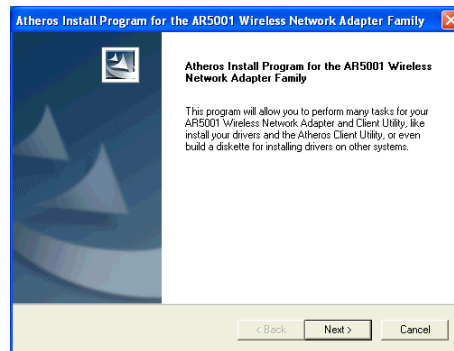
4.   Click **Yes** to accept the license agreement.
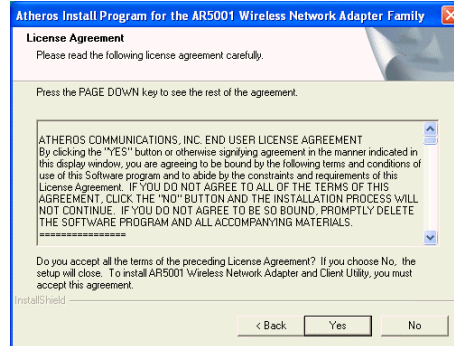
5.   For first-time installation, select the first option as shown below then click **Next**.
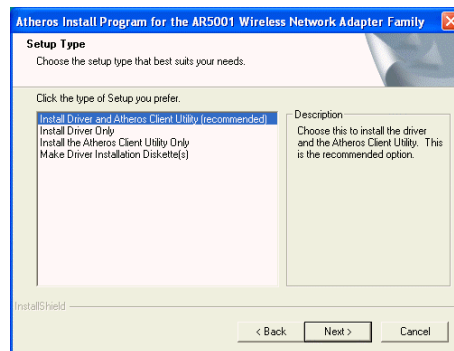
6. Let **Enable icon in system tray** check box selected. Click **Next**.

7. Read the following instructions about the utility (ACU or ZERO) you want to use to control your Wireless LAN Card. Click **Next** to continue.
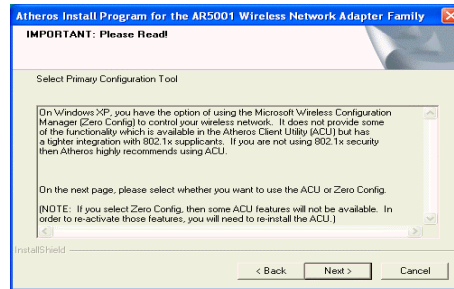
8. Select the preferred utility then click **Next**.
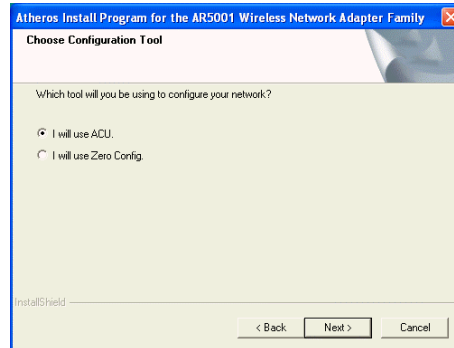
9. Click **Finish** to complete the installation and reboot your computer.
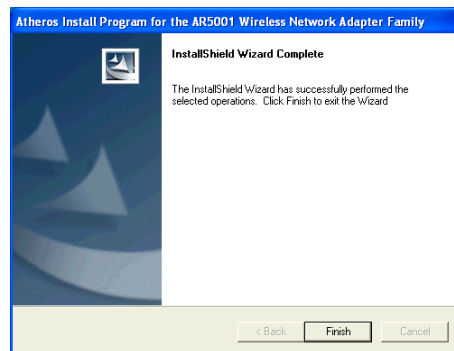
Depending on your operating system, following situation may occur during the installation:

- For Windows XP: When **Found New Hardware Wizard** appears, have **Install the software automatically** selected and follow the on-screen instructions to proceed. If digital signature message appears, just click **Continue Anyway**.
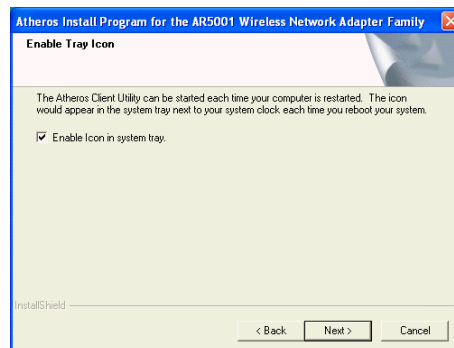
Now you are done with the installation procedure. Proceed to next chapter to configure or fine-tune your Wireless LAN Card settings.

Note: If you need to set up the TCP/IP properties of your Wireless LAN Card, refer to "Appendix A Setting Up TCP/IP" for details.

Chapter 3 Utility Configuration

The configuration of the Wireless LAN Card is done through the **Atheros Client Utility (ACU)**. The user-mode utility also includes a number of tools to display current statistics and status information pertaining to your Wireless LAN Card. The **Atheros Client Utility** screen pops up with three available tabs: **Current Status**, **Profile Management**, and **Diagnostics**. This chapter will focus on the **Station Configuration** tab to guide you through the configuration tasks. For description of other tabs, please refer to "Chapter 4 Checking Status or Statistics".

Accessing the Atheros Configuration Utility

You can access the **Atheros Client Utility** by any of the following methods:

- Double-click the **Atheros Client Utility** tray icon on the system tray.

Atheros wireless tray icon
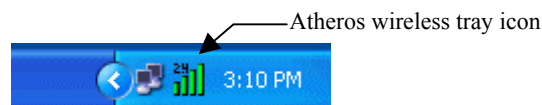
Note: If the tray icon is not launched, you can manually start the utility tray icon by selecting **Start** > **Programs** > **Atheros** > **Atheros Client Utility.**

- Right-click the ACU tray icon and select **Launch Client Utility…** from the context menu.
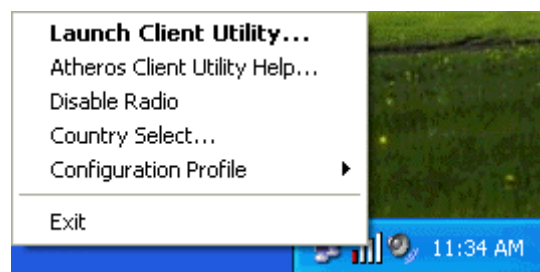
Note to Windows XP Users

Windows XP provides built-in **Wireless Zero Configuration Utility** for wireless network. The utility is enabled by default. When it is active, it will override the **Network Name**, **Security** and other settings of the **Atheros Client Utility**.

If you want to disable the Windows XP **Wireless Zero Configuration Utility** and have your device managed only by the **Atheros Client Utility**, proceed as follows:

1. Double-click the Windows XP wireless tray icon and then click **Advanced** (or **Properties**) > **Wireless Networks**.

    Windows XP wireless icon ——————— Atheros wireless icon

2. On the **Wireless Networks** tab, uncheck the **Use Windows to configure my wireless network settings** box and click **OK**.

If you need to revert back to using Windows XP **Wireless Zero Configuration Utility**, just go to the **Wireless Networks** tab and check the **Use Windows to configure my wireless network settings** box and click **OK**.

Network Basic Configuration

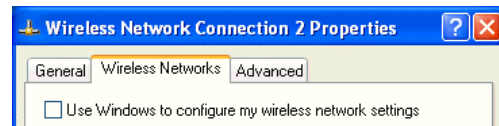To add a new Ad Hoc or Infrastructure profile, click **New** on the **Profile Management** tab. The dialog box displays three tabs: **General, Security** and **Advanced**.

General Tab

The configuration items on the **General** tab are described as below.

Profile Name: Enter a unique name to identify this network setting. Configuration names are not case sensitive.

Network Names (SSID):

*   *Ad Hoc mode*: It is the name of the Wireless LAN group you want to create or participate in. This field has a maximum limit of 32 characters. A network name is **mandatory** for Ad Hoc mode. The SSID for all stations in a single Ad Hoc network must be the same. Enter only one SSID.

*   *Infrastructure mode*: It is the name of the Wireless LAN group you want to participate in. This field has a maximum limit of 32 characters. You can enter up to three SSID. In an Infrastructure network, the SSID must match on AP and all the wireless clients to communicate with each other. Note that under Access Point mode, if the **Network Name (SSID)** field is left blank or filled in with the special SSID name "**any**", your Wireless LAN Card will connect to the first compatible and "open" AP with the best signal strength within the connection range. It allows your Wireless LAN Card to wander across networks with different SSID.
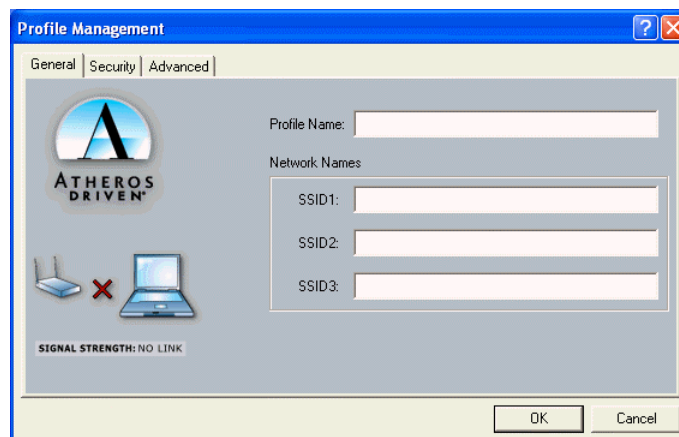
Figure 3-1 General tab under the Profile Management

Security Tab

The **Atheros Client Utility** provides four types of encryption: **Pre-Shared Keys**, **LEAP**, **Externally Managed 802.1x Keys** and **Disabled**.

Each wireless device within a WLAN must use the same security settings to allow communication. Depending on whether you are connecting to an Ad Hoc or Infrastructure network, you will need to consult one of the workgroup participants or network administrator for the correct security settings.

Pre-Shared Keys

To use this option, enable the **Pre-Shared Keys** option on the **Security** tab and click **Define Pre-Shared Keys** to set the encryption keys. Then configure the fields below:

Key Entry Method: Select the method to enter the key. If **Hexadecimal** is selected, only digits 0-9 and letters a-f, A-F are allowed. If **ASCII Text** is selected, you can enter alphanumeric characters.

Key Length (bit): Defines the length for each encryption key. Key length varies according to the WEP type. As the Key Length is changed, the number of available characters in the field is changed automatically. If an already entered key is too long, the key is automatically truncated to fit. If the key length is increased again, the field does not automatically restore to its previous value.

Per-User Key: Defines the unique encryption key for network configuration security. This field must be populated to enable security using a unique key. This key is not used in Ad Hoc mode.

Shared Keys (1 ~ 4): Defines a set of shared encryption keys for network configuration security. At least one **Shared Key** field must be populated to enable security using a shared key.

Note: All encryption key fields are displayed only when initially entered. On subsequent entry into the security property page, the field are masked.

Select the default encryption keys to be used (either **Per-User Key** or **Shared Key**). You are only allowed to select one **Per-User Key**, or one **Shared Key 1**, **Shared Key 2**, **Shared Key 3**, or **Shared Key** 4 whose corresponding field has been completed.

Note: Currently, Windows XP does not support 152-bit encryption when using the built-in **Wireless Zero Configuration Utility**. You must disable the zero configuration in order to use 152-bit encryption.
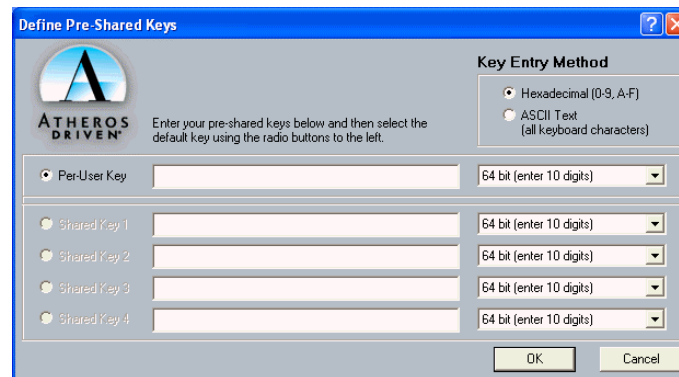
Figure 3-2 Define Pre-Shared Keys screen

LEAP (Light Extensible Authentication Protocol)

Enables the use of LEAP for dynamic security keys. If you want to connect to a network using Cisco LEAP, make sure to check the **LEAP** option and enter the **User Name** and **Password** used to log in to the network in the provided fields.

Note: If you are going to connect to an LEAP network, you should disable Windows XP **Wireless Zero Configuration Utility** entirely because it is basically incompatible with LEAP.

Figure 3-3 Define User Information screen

Externally Managed 802.1x Keys

Windows XP provides native support for 802.1x standard. Its **Wireless Zero Configuration Utility** allows to set up 802.1x related parameters. However, to use 802.1x function, your wireless station also needs some essential components, such as a certificate from the certificate authority. Please consult with the network administrator for the configuring procedures.
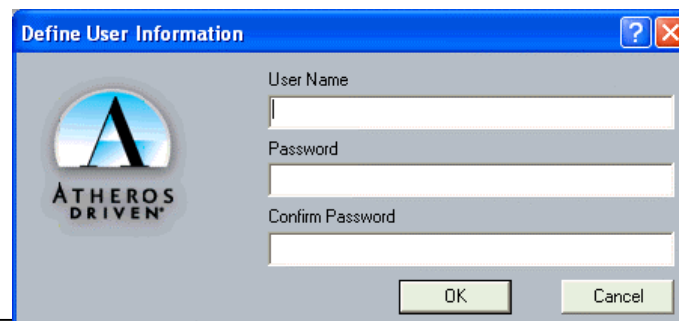
If you are using a operating system other than Windows XP, the **Define Static Encryption Keys** button is available for you to enter at least one key into the **Atheros Client Utility** static key configuration. In the AP-802.1x network, the static keys serve only to initialize the security data structures. Real keys are dynamically provided by 802.1x key distribution protocol.
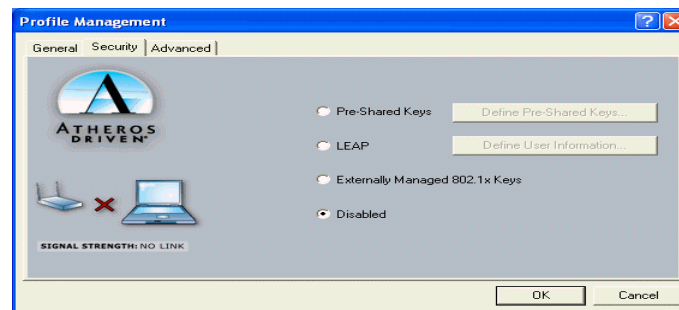
Figure 3-4 Security tab under the Profile Management

Advanced Tab

The configuration items on the **Advanced** tab are described as below.

Power Save Mode: Infrastructure mode ONLY. This feature reduces power consumption by the Wireless LAN Card to extend the battery life of your computer. The options include **Off**, **Normal** and **Maximum**.

- **Off –** The power management is disabled and the card consumes full power from the computer.

- **Normal –** The driver turns off power to the adapter for brief periods over briefly spaced time intervals.

- **Maximum –** The driver turns off power to the adapter for longer periods over more widely spaced time intervals.

The guideline for choosing **Normal** or **Maximum**:
- The card wakes up more often and responds sooner to network requests in Normal mode than in Maximum mode.
- Maximum mode consumes less power than Normal mode.

Network Type: Select **Ad Hoc** or **Access Point.**

802.11b Preamble: The preamble is part of the IEEE 802.11b physical layer specification. All 802.11b devices are mandatory to support the long preamble format, but may optionally support the short preamble. This Wireless LAN Card supports the short preamble. The default **Short & Long** option allows communication with other 802.11b devices which support short preamble to boost the throughput. If your device is having trouble to communicate with other 802.11b devices, you may try to select the **Long Only** option.

Transmit Power Level: Specifies the transmit power to be used. Reducing the transmit power level conserves battery power but decreases radio range.

Wireless Mode: Specifies the wireless operation mode. The Wireless LAN Card will scan the radio signals only in the base band you specified. You can check all for your convenience.

- **2.4 GHz 11 Mbps:** Specifies whether to use 11 Mbps mode.
- **2.4 GHz 54 Mbps:** Specifies whether to use 54 Mbps mode.

Wireless Mode When Starting Ad Hoc Network: Disabled in Infrastructure mode. Set up the operational mode of your Ad Hoc Network. Select the **Channel** (1~11 or Auto) and choose the base band:

- **2.4 GHz 11 Mbps:** Specifies whether to use 11 Mbps mode.
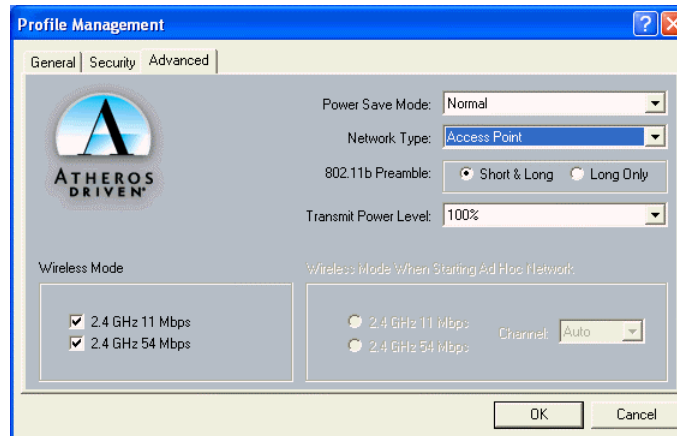- **2.4 GHz 54 Mbps:** Specifies whether to use 54 Mbps mode.

Figure 3-5 Advanced tab under the Profile Management

Connecting to an Existing Network

To check for existing networks near your computer, open the **Profile Management** tab and click **Available Networks…** button, the following screen will pop-up.
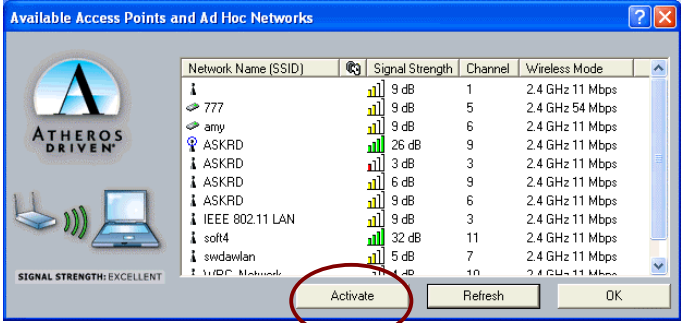
Figure 3-6 Available Networks

All available networks will be shown in the above list box. Highlight the network name (SSID) you wish to join in and click the **Activate** button. If no configuration profile exists for the selected network, the **General** tab under **Profile Management** will pop. Enter a name for the selected network in the **Profile Name** field and click **OK** to return to the **Profile Management** tab.

In the **Profile** list box highlight the profile name and in **Details** section will appear information about the selected profile. To get connected, double-click on the profile name or highlight the profile name and click **Activate** button.
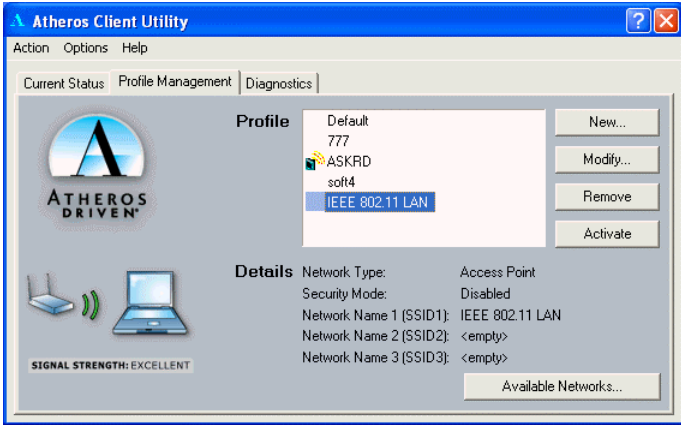
Figure 3-7 Selecting Networks

Another way to switch the profile is to right-clicking the ACU tray icon and select **Configuration Profile …** from the context menu. Another menu will appear, click on the profile you wish to connect to.

Modifying a Configuration Profile

To modify a configuration profile, highlight the profile name from the **Profile** list box and click the **Modify** button.

Removing a Configuration Profile

To remove a configuration profile:

1. Highlight the profile to remove from the **Profile** list on the **Station Configuration** tab.
2. Click the **Remove** button.

Chapter 4 Checking Status or Statistics

The **Atheros Client Utility** includes a number of options to display statistics and status information. These tools can be accessed via the corresponding tabs of the **Atheros Client Utility**.

Status Monitor Tray Icon

The **Atheros Client Utility** tray icon allows you to easily and quickly monitor your wireless connection status. The tray icon shows the signal strength using colors and the received signal strength indication (RSSI).

The number (2.4 or 5) indicates the current wireless base band. The colors and the signal strength are defined as follows:

Color	Quality	RSSI (dBm)
Green	Excellent	20 dBm +
Yellow	Good	10-20 dBm
Orange	Poor	<10 dBm
Red	No Link	No connection

You can hold the mouse cursor over the ACU tray icon to display transmit and receive speed and the current configuration profile name.

When the RF signal of the Wireless LAN Card is disabled, the icon would appear as follows:

Current Status Tab

The **Current Status** tab of the **Atheros Client Utility** contains general information about the program and its operations.

The following table describes the items found in the **Current Status** tab.

| Screen Item	Description
Profile Name	The name of the current configuration.
Network Type	Displays if the adapter is connected to an Access Point or Ad Hoc network.
Wireless Mode	Displays the connection frequency and maximum speed: ● 2.4 GHz 54 Mbps ● 2.4 GHz 11 Mbps
Current Channel	Display the currently selected channel..
Link Status	Shows whether the station is connected to a wireless network.
Encryption Type	Displays the current security mode: ● WEP – use only WEP encryption. ● AES (Advanced Encryption Security) – only associate with Access Points that supports AES encryption. ● CKIP – Cisco Key Integrity Protocol ● Off – No encryption is used.
IP Address	Displays the IP address of the station.
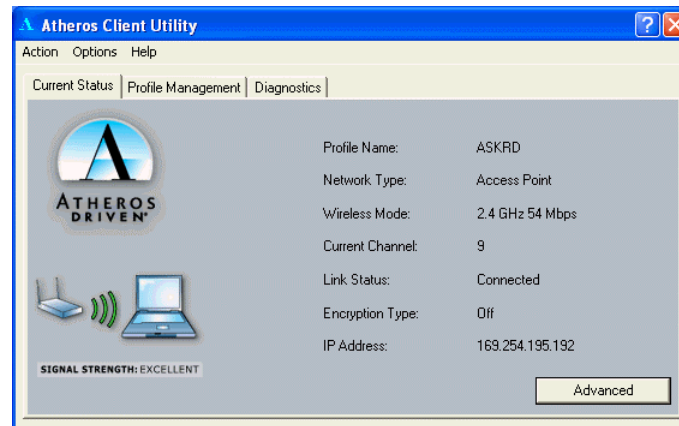
Figure 4-1 Current Status Tab

Advanced Status

You can view advanced information about the program and its operation by clicking the **Advanced** button on the **Current Status** tab.

The following table describes the items found on the **Advanced Status** screen.

| Screen Item	Description
Country	The regulatory domain of the network.
Transmit Power Level	Displays the transmit power level.
Network Name (SSID)	The wireless network name.
Power Save Mode	The power management options. Power management is disabled in Ad Hoc mode.
Frequency	The frequency the station is using.
Transmit Rate	Displays the transmit rate for the current connection.
Receive Rate	Displays the receive rate for the current connection.
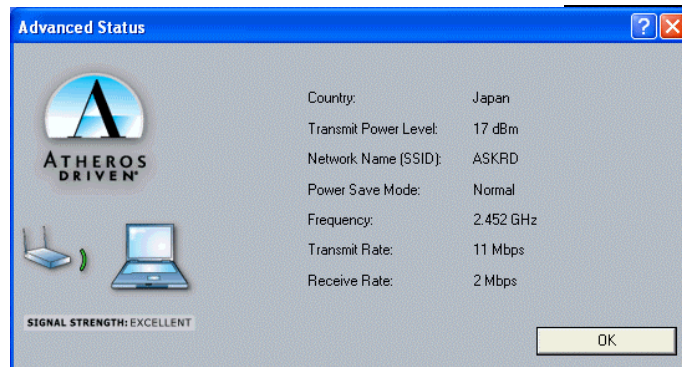
Figure 4-2 Advanced Status

Diagnostics Tab

The **Diagnostics** tab lists the following receive and transmit diagnostics for frames received by or transmitted by the wireless network adapter.

- Multicast frames transmitted and received

- Broadcast frames transmitted and received
- Unicast frames transmitted and received
- Total bytes transmitted and received
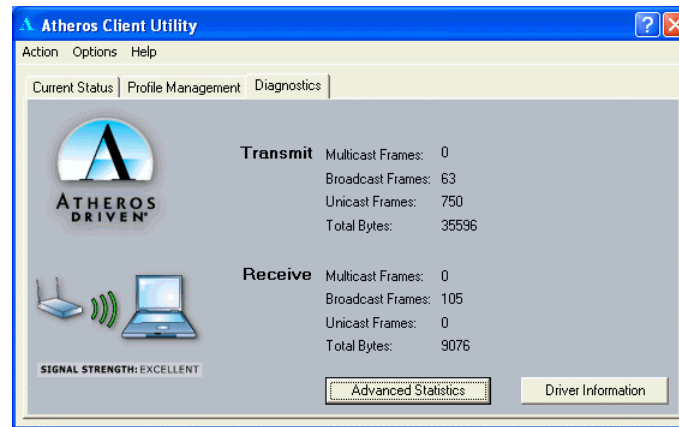
Figure 4-3 Diagnostics Tab

Advanced Statistics

Advanced Statistics also show receive and transmit statistical information for the following receive and transmit diagnostics for frames received by or transmitted to the wireless network adapter.

- Frames transmitted OK
- Frame retried
- Frames dropped
- Beacons received
- Frames received with errors
- Encryption errors
- Duplicate frames
- CTS frames
- Authentication rejects
- Association rejects
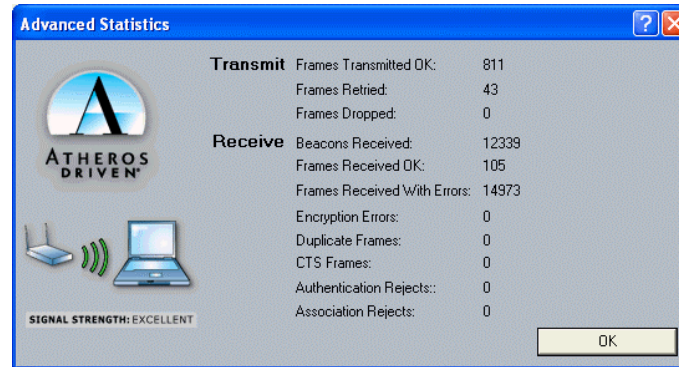
Figure 4-4 Advanced Statistics

Driver Information

The **Driver Information** contains general information about the network interface card (NIC) and the network driver interface specification (NDIS).

The following table describes the items found on the **Driver Information** tab.

Screen Item	Description
Card Name	The name of the NIC.
MAC Address	The station's MAC address. It is configured at the factory.
Driver	The location of the NDIS driver.
Driver Version	The NDIS driver version.
Driver Date	Date of the NDIS driver release.

Figure 4-5 Driver Information
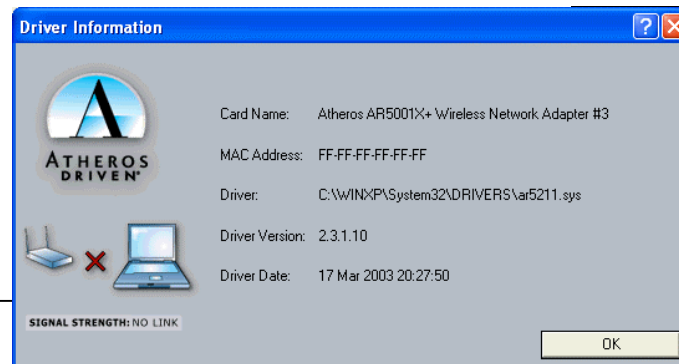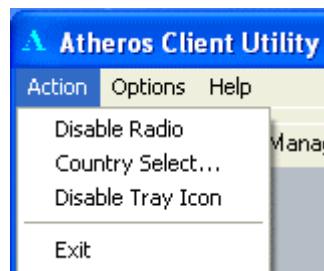
Chapter 5 ACU Toolbar

There are three menus **Action**, **Options**, **Help** in the ACU toolbar, check the appropriate section for more information.

Action Menu

You can enable/disable radio frequency or ACU icon in the system tray. Click **Exit** to shutdown the utilitity.

The **Country Select…** allows users to switch to different country codes. The Wireless LAN Card has EEPROM locations allocated to store country code information. The selections represent three regulatory domains: FCC (USA and Canada), ETSI (Europe) and MKK (Japan).

When the country code is changed, the NDIS driver scans only the legal frequency channels allowed in those countries.

Note: The **Country Select Selector** tool is not included for World-Wide cards, because the card switches countries automatically as needed. It is only available when the card is programmed to a single country only.

Options Menu

There is only one option under this menu. You can view or change the current display settings.
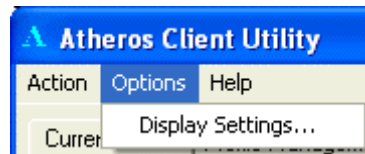
To change the display settings, click on **Display Settings…**. The display settings dialog box contains tools to set these parameters:

Signal Strength Display Units: Sets the units used when displaying signal strength: percentage or decibels.

Refresh Interval (seconds): Sets the display refresh interval in seconds.

Data Display: Sets the display to cumulative or relative.

- **Relative:** Displays the change (delta) in statistical data since the last update.
- **Cumulative:** Displays statistical data collected from the beginning of driver load.
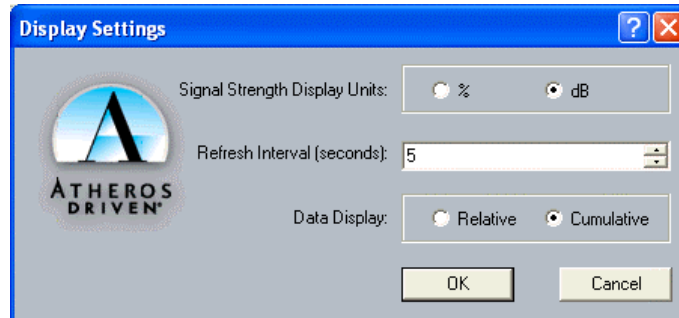
Figure 5-6 Display Settings

Help Menu

This menu contains **Atheros Client Utility Help** in web format and **About Atheros Client Utility.**
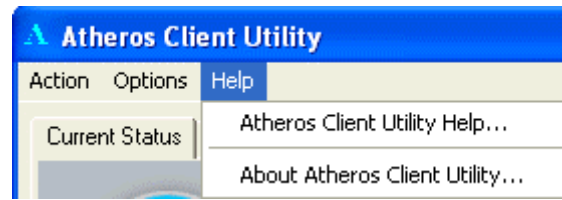
Chapter 6 Uninstalling the Wireless LAN Card

Should you need to uninstall the Wireless LAN Card and its application software for any reason, please proceed as follows.

The uninstallation procedures are basically the same under Windows 98, Me, 2000 and XP. The graphics here assume a Windows XP environment.

1. Close all programs that are currently running.

2. Right-click on the **Atheros Client Utility** (ACU) icon in the system tray. Click **Exit** to shut down the utility.

3. Select **Start** > **Settings** > **Control Panel**. Double-click the **Add or Remove Programs** icon.

4. Highlight **AR5001 Wireless Network Adapter and Client Utility** then click **Change/Remove.**
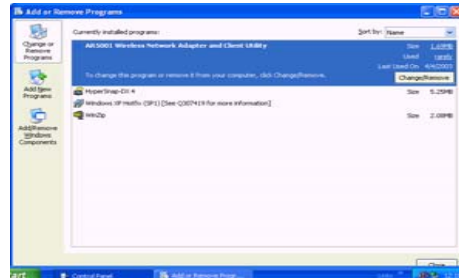
5. Select **Delete the previous installation** and click **Next**.
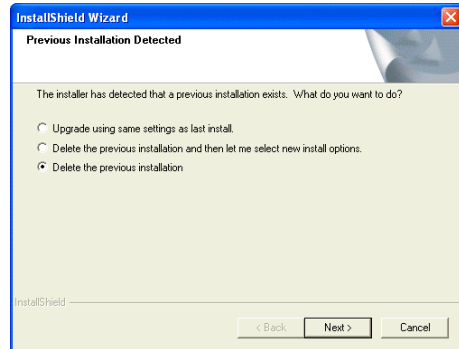
6. When confirm message appears, click **OK**.

7. Click **Finish**.
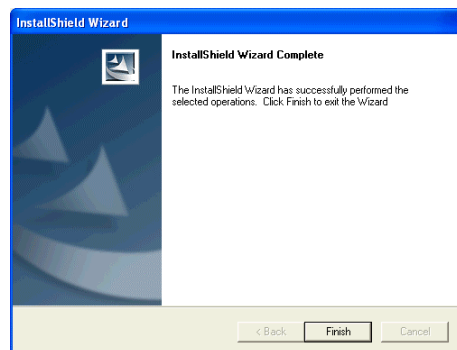
Chapter 7 Troubleshooting

My station cannot associate in Ad Hoc mode.

Make sure all the stations in the Ad Hoc network are set with the same SSID. You can set up one station to start the Ad Hoc network and wait briefly before setting other stations. This prevents several stations from trying to establish a network at the same time, which can result in multiple singular networks being established, rather than a single network with multiple stations associated to it.

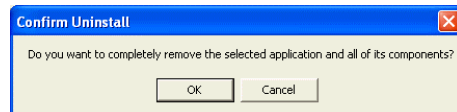If you are in the Europe using ETSI regulatory domain, Ad Hoc mode is not supported.

My station cannot access network resources in Infrastructure mode.

Even your link status indicates a successful connection with the Access Point, this connection applies to the "physical" network layer only. It is just like pulling a cable between two wired computers. To access the network resource, you will need a login name and login password as implemented by most of network operating systems. You should consult with your network administrator for required settings.

Radio Interference

You may be able to eliminate any interference by trying the following:

- Increase the distance between the wireless computers and the device causing the radio interference.
- Plug the computer equipped with the Wireless LAN Card into an outlet on a different branch circuit from that used by the affecting device.
- Consult the dealer or an experienced radio technician for help.
- For 802.11b connection, keep the computer with the Wireless LAN Card away from the microwave oven and large metal objects.

Cannot Connect to Another Wireless LAN Card

If you cannot make a connection to another Wireless LAN Card from your computer, it could be due to one of the following reasons:

- Incorrect SSID. Make sure the SSID is the same for all computers that have a Wireless LAN Card.
- Changes are not being recognized by your computer. Restart your computer.
- If in Ad Hoc mode, make sure the **Log on to Windows NT domain** check box is not selected in the **Client for Microsoft Networks Properties** dialog box in the **Network Configuration** tab.
- Incorrect IP address or subnet mask. Check these settings in the **TCP/IP Properties** dialog box in the **Network Configuration** tab.

Poor Link Quality

If the link quality display stays in the poor range, it could be due to one of the following reasons:

- Radio interference.
- Possible sources of interference can be microwave ovens, cordless phones or pager systems. Identify and eliminate the source of interference. Move your device closer to your target Access Point or wireless station.
- Distance between Wireless LAN Card and Access Point is too far. Decrease the distance between the Access Point or another wireless adapter.

Cannot Connect to an Access Point

If you cannot make a connection to an Access Point, it could be due to one of the following reasons:

- Make sure the Wireless LAN Card and the Access Point have no physical connection problems.
- Make sure the SSID for the Wireless LAN Card is the same as the Access Point.

- Make sure the security setting is the same as that of the Access Point. Also, make sure the default key is the same for both the Wireless LAN Card and the Access Point.

Appendix A Setting Up TCP/IP

This section contains instructions for configuring the TCP/IP protocol of the Wireless LAN Card. The IP address policy depends on your network. You should configure your TCP/IP protocol as instructed by your network administrator.

For Windows 2000/XP

1. Double-click **Network Dial-up Connections** (Windows 2000) or **Network Connections** (Windows XP) on **Control Panel**.

2. Right-click the **Local Area Connection** icon corresponding to your wireless adapter and click **Properties**.

3. On the **General** tab, highlight **Internet Protocol (TCP/IP)** and then click **Properties**.

   Option A: Use fixed IP address.

   Enable the **Use the following IP Address** option. Enter the **IP address**, **Subnet Mask** and **Default gateway**. Then click **OK**.

   Option B: Use dynamic IP address

   Select **Obtain an IP address automatically**.

4. Close the **Local Area Connection Properties** window. For Windows 2000, if prompted, click **Yes** to restart your computer.

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.

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.

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.

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.

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

The antenna must be installed such that 20 cm is maintained between the antenna and users, and

The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 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, digital device emissions, PC peripheral requirements, 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 (for example :Access Point). The final end product must be labeled in a visible area with the following: "Contains TX FCC ID: H8NWLL3020".

Manual Information That Must be Included
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 users manual of the end product which integrate this module.

The users manual for OEM integrators must include the following information in a prominent location " IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Antenna Requirement
Only those antennas approved by the manufacture can be used while this module is integrated into host equipment. The OEM integral has to apply their own FCC ID if other antenna is used.