NWH3050

802.11g+ MiniPCI Module

User's Guide

October 9, 2003

TRADEMARKS

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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 to 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.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

FCC RF Radiation Exposure Statement

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

Packing List

Your NWH3050 802.11g+ MiniPCI Module package should contain the following items:

- One NWH3050 802.11g+ MiniPCI Module

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Introduction

Congratulations on choosing an outstanding wireless networking product, and thank you for taking the time to read this user's guide.

About the NWH3050

Your NWH3050 802.11g+ MiniPCI Module has standards-based and enhanced features.

Standards-based features: The adapter conforms fully to Institute of Electrical and Electronics Engineers (IEEE) standards 802.11b and 802.11g. IEEE 802.11b-compliant products form the heart of wireless local-area networks (WLANs) all over the world, including "hotspots" in many public areas. Using your adapter, you can connect wirelessly wherever you have the permission of the network operator to do so. It does not matter what brand or brands of wireless networking equipment the network is built on. IEEE 802.11b and 802.11g are worldwide standards.

IEEE 802.11b allows communication speeds up to 11 megabits per second (Mbps), transmission ranges (depending on electromagnetic conditions) up to tens of meters (yards) indoors and hundreds of meters outdoors (or more, at lower communication speeds), and, for security, Wired Equivalent Privacy (WEP) encryption using a digital "key" 64 or 128 bits long. IEEE 802.11g allows communication speeds up to 54 Mpbs.

Enhanced features: Your adapter has several capabilities not present in IEEE 802.11b-only or 802.11g-only devices:

- **4X mode.** This allows the packets exchanged between devices to be longer, reducing overhead and increasing throughput.
- **256-bit WEP encryption.** This greatly increases network security, as a longer key is many times harder to "crack."

These capabilities can be used on wireless links to products in the same family as your adapter. The adapter can automatically detect when 4X mode can be used; you can also control its use through the software included with the adapter.

About this Guide

This guide contains detailed instructions on installing and using your adapter and the software included with it. Basic terms and concepts of wireless networking are also introduced. Follow the instructions in this guide carefully to ensure that your adapter will give you many years of trouble-free, high-performance operation.

1 System Requirements

Before installing the adapter and related software, make sure the computer system meets the minimum requirements described below.

1. **Open the task bar's Start menu, go to Settings, and click Control Panel.**

2. **Double-click the System icon.**

   The **System Properties** window will appear.

3. **Find and click the Device Manager tab or button.**

   If there is no **Device Manager** tab in the **System Properties** window, click the **Hardware** tab. The **Device Manager** button will be in the middle of the panel that appears.

4. **Expand the MiniPCI Module entry.**

1.2 Software Requirements

The drivers included with the adapter allow the adapter to be used in Microsoft® Windows 98, ME, 2000, and XP. Third-party drivers may allow the adapter to be used, with reduced functionality, in these and other operating systems.

2 Terminology Used in this Guide

Ad-hoc Network

An ad-hoc network is a wireless local-area network (WLAN) made up of stations communicating directly with each other through their wireless interfaces. There is no central relay point, and normally no connection to a wired network. Ad-hoc mode is sometimes referred to as *peer-to-peer*, *computer-to-computer*, or *Independent Basic Service Set* (IBSS) mode. Figure 1 shows a typical ad-hoc network.

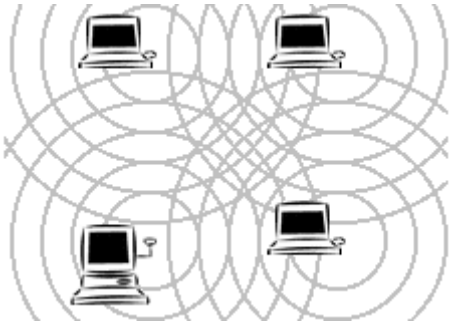


Figure 1. Ad-hoc network

Infrastructure Network

An infrastructure network is a WLAN made up of wireless stations and at least one wireless relay point, known as a *base station* or *access point* (AP). The AP usually has a connection to a wired network, allowing wireless stations to use resources on that network. The AP also relays all communications between wireless stations in its coverage area; these stations never communicate directly with each other. Infrastructure mode is sometimes referred to as *managed* or *Basic Service Set* (BSS) mode. Figure 2 shows a typical infrastructure network.

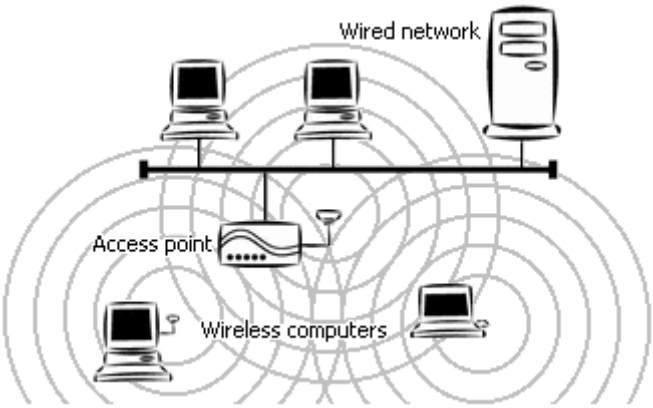


Figure 2. Infrastructure network

BSSID/MAC Address

A Basic Service Set (BSS) is two or more wireless devices that are in communication with each other. Like every wired Ethernet device, every wireless device has a fixed, unique "medium access control" (MAC) address. When wireless devices establish communication,

they automatically select the MAC address of one BSS member as an identifier for the group; this is the BSSID.

It has become customary to refer to a wireless device's MAC address as its BSSID even when the address is not being used to identify an active BSS.

A BSS that includes an access point is often referred to as a *cell*.

SSID/Domain Identifier

A Service Set Identifier (SSID) is a shared name, usually assigned by a network administrator, that identifies wireless devices that are allowed to communicate with each other. This is one way of providing basic security on a wireless network. An SSID can be up to 32 characters long, is case-sensitive, and can include letters, symbols, and numbers.

Giving multiple access points the same SSID and encryption settings allows mobile stations that also share those settings to "roam" from one AP to another. When at least one AP is among the devices sharing an SSID, the name may be referred to as an *Extended Service Set Identifier* (ESSID).

An SSID is sometimes called a "domain name," but it is unrelated to the domain names used to identify machines and networks on the Internet. Other terms for SSID are *domain ID*, *net ID*, *network name*, *extended network ID*, and *wireless network name*. The set of devices that an SSID identifies is sometimes called a *communication domain* or *wireless domain*.

Figure 3 shows a common wireless network setup. If the APs share SSID and encryption settings, mobile devices that also share those settings can roam among them.

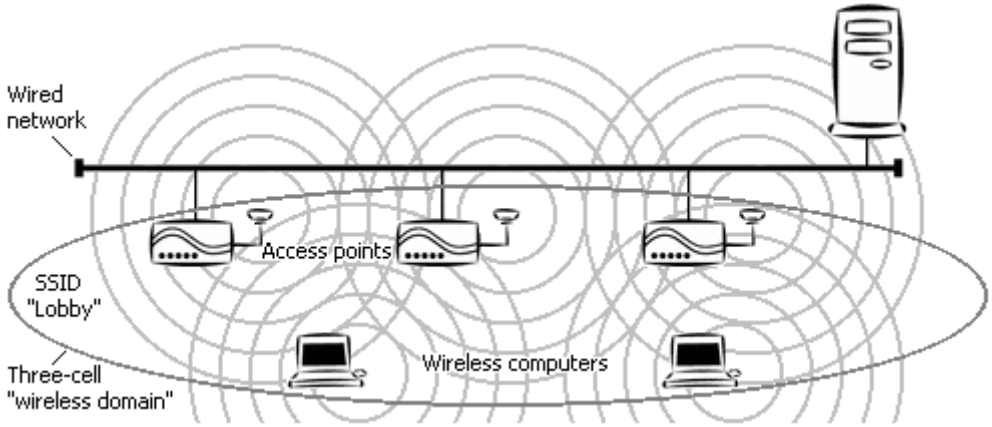


Figure 3. Roamable multi-AP infrastructure network

Roaming

When APs covering adjacent areas have the same SSID and encryption settings, a mobile device that also shares those settings can communicate through the APs continuously while moving from one coverage area to another. This is known as *roaming*. When one AP's signal begins to weaken, the mobile device automatically searches for another AP that it is authorized to "associate with" (that is, connect to); when the second AP's signal quality is better than that of the first, the station automatically switches over.

4 Software Installation

You must install the driver and utility from the adapter CD-ROM before inserting the adapter in the computer for the first time.

To install the driver and utility, insert the CD-ROM and wait for the window shown below to appear. This may take 20 to 30 seconds on a laptop or notebook computer.

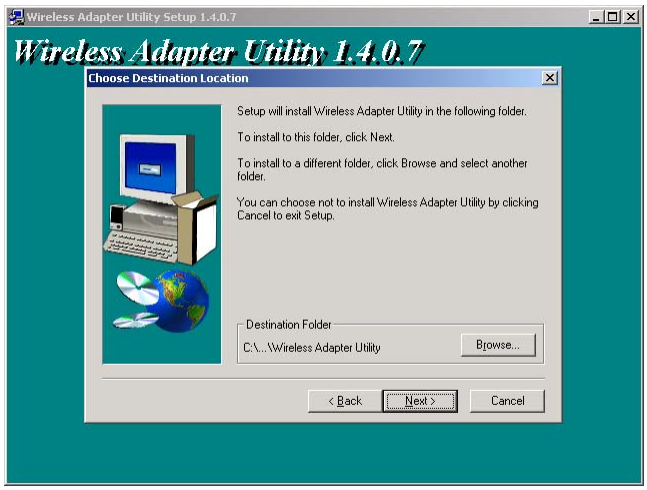
Click **Install Driver**, and then click **Next** in each window that appears. In the final window, click **Finish**. This process is illustrated below.

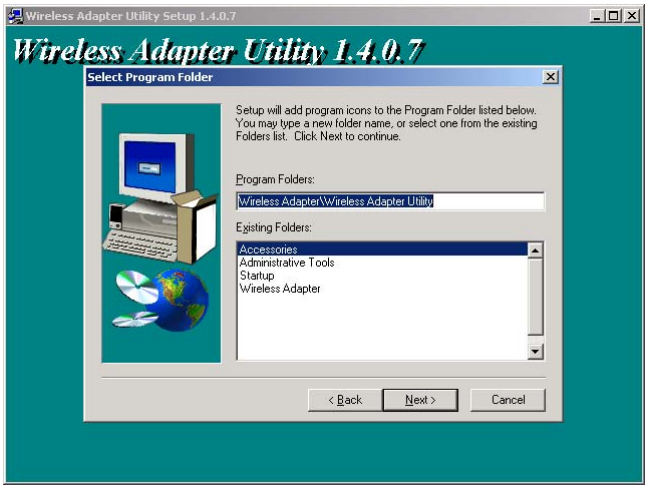
TNET1130 WLAN Adapter Driver 4.0.41
TNET1130 WLAN Adapter Driver 4.0.41
Choose Destination Location
Setup will install TNET1130 Driver in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install TNET1130 Driver by clicking Cancel to exit Setup.
Destination Folder
C:\...\Wireless Adapter\TNET1130 Driver
Browse...
< Back
Next >
Cancel

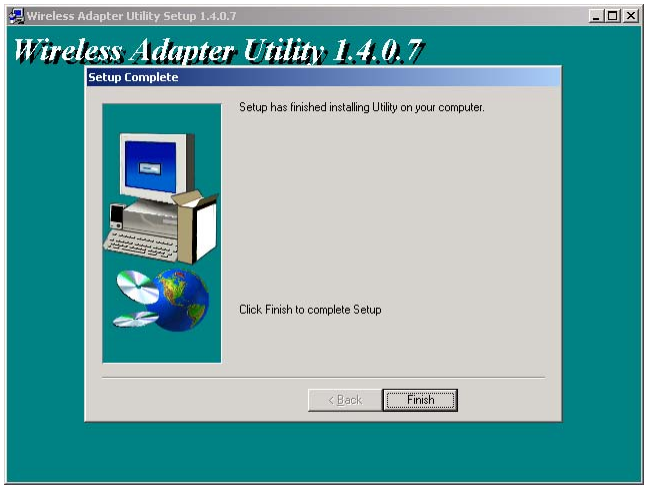
TNET1130 WLAN Adapter Driver 4.0.41
TNET1130 WLAN Adapter Driver 4.0.41
Select Program Folder
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing Folders list. Click Next to continue.
Program Folders:
Wireless Adapter\TNET1130 Driver
Existing Folders:
Accessories
Administrative Tools
Startup
< Back
Next >
Cancel

TNET1130 WLAN Adapter Driver 4.0.41
TNET1130 WLAN Adapter Driver 4.0.41
Setup Complete
Setup has finished installing TNET1130 Driver on your computer.
Setup can launch the Read Me file and TNET1130 Driver. Choose the options you want below.
Click Finish to complete Setup.
< Back
Finish

The original window will reappear. Click **Install Utility**. Then, as before, click **Next** in each window that appears, and at the end click **Finish**. This process is illustrated below.

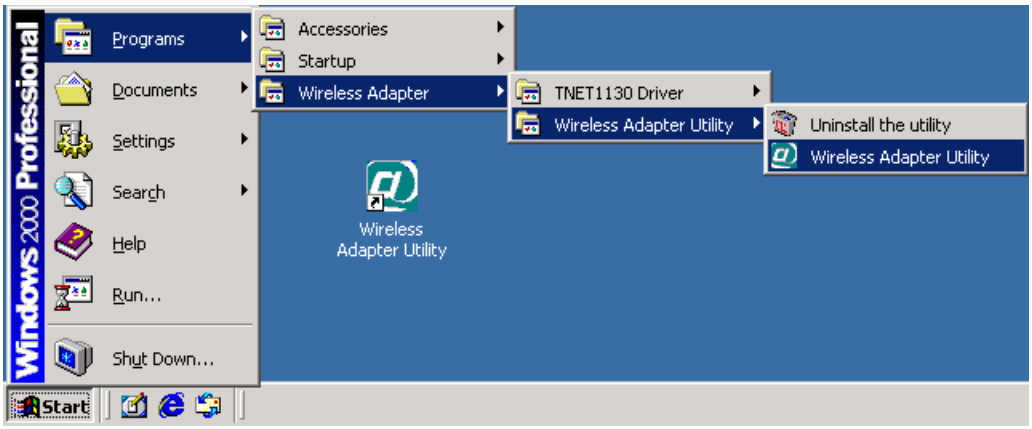






The original window will reappear. Click **Exit** and remove the CD-ROM.

Commands for starting the utility, and for uninstalling the utility and the driver, will be added to the **Start** menu, and a shortcut icon for starting the utility will be added to your desktop display, as shown below.



5 Adapter Installation

Before inserting the adapter in the computer for the first time, be sure to install the driver and utility as described above. Also take note of the following tips and cautions:

- If the adapter is inserted or removed while the computer is running, the operating system may beep very loudly even if the sound control has been set to **Mute** or **Muted**.
- If the adapter will be connected to an extender card installed in a desktop computer, make sure the extender card is firmly bolted to the computer's housing before inserting or removing the adapter. Shifting or rocking of a loose extender card can result in momentary loss of contact, which can permanently damage sensitive electronic components.
- Microsoft® Windows lets you "stop" (deactivate) the adapter before removing it. It is strongly recommended that you use this function and avoid removing the adapter while it is operating.

The location of the MiniPCI slot depends on the make and model of the computer. There may be a button next to it for physically ejecting an adapter from the slot. See your computer manual for details. Remember that the adapter should be "stopped" (deactivated) through the operating system before being ejected while the computer is on.

When inserting the adapter, make sure it goes in straight, so there is no resistance until its metal body is almost all the way in. When the adapter is fully inserted, its metal body will be completely inside the slot, and most of its plastic outer end will extend outside the computer.

The first time you insert the adapter, Windows will start up a program for installing a driver. Although the driver has already been placed on the system, Windows needs to confirm its location. The window that appears in Windows 2000 is shown below.

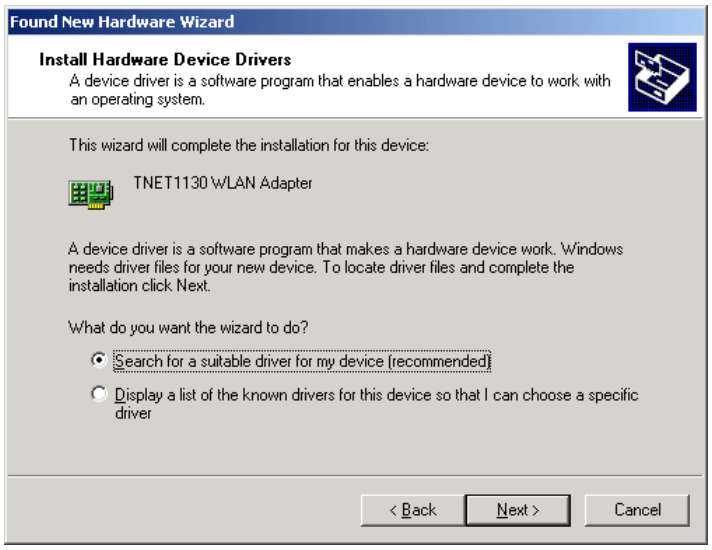
In Windows ME, click **Next** in each window that appears, and then click **Finish**.

In Windows XP, click **Next** until a message about “Windows logo testing” appears. Indicate that you wish to continue with installation. Click the **Finish** button when it appears.

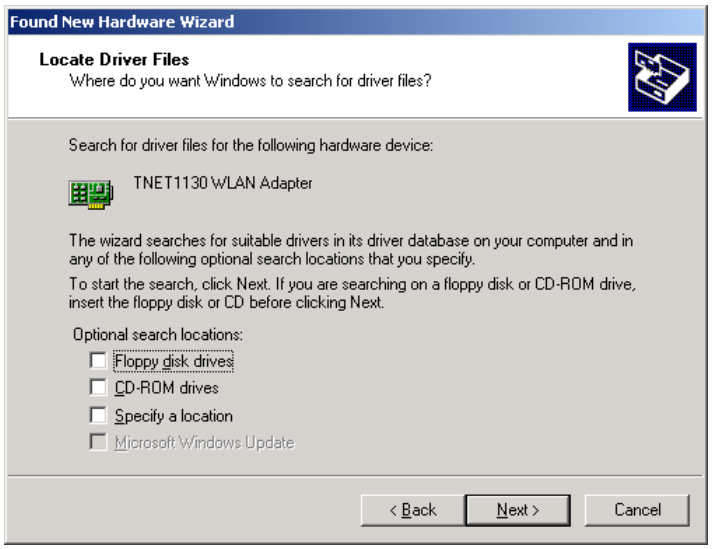
In Windows 98, click **Next** until you are prompted to insert your Windows CD-ROM. Follow the on-screen instructions. Click the **Finish** button when it appears. You will be prompted to restart the computer. Allow the system to restart.

In Windows 2000, you must make sure a certain option is unchecked. The full procedure is illustrated and explained below.

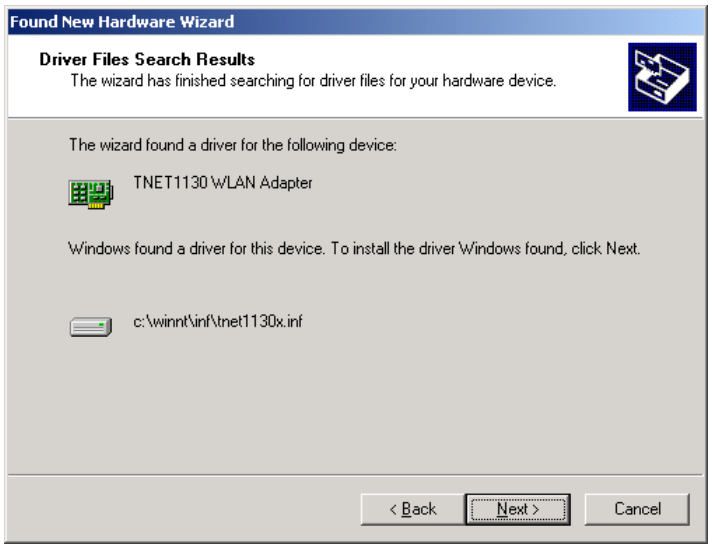
After you click **Next** in the window shown above, the following window will appear.



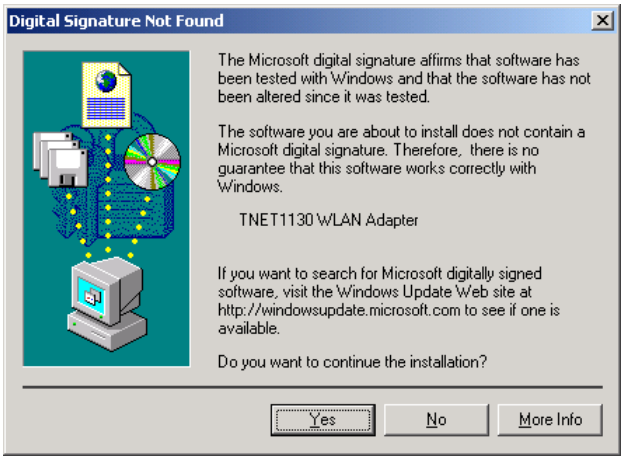
Click **Next**. The window shown below will appear.



If the check box next to **Specify a location** is checked, click it to clear it. Then click **Next**. The window shown below will appear. Windows will indicate that it found the driver.



Click **Next**. A message about a "digital signature" will appear.



Click **Yes**, and then click **Finish** in the window shown below.

6 Driver Operation and Adapter Removal

The driver is automatically loaded into the computer's memory whenever the system detects the adapter. When the adapter is not present, the driver is not loaded. The "removable device" icon in the system tray (also known as the "PC Card" or "Unplug/Eject" icon) lets you unload the driver and deactivate the adapter for safe removal.

- **To unload the driver and deactivate the adapter:** Click the "removable device" icon using the mouse's main button (usually the button on the left), move the pointer onto the menu that appears, and choose the command to "stop" (or, in Windows XP, "safely remove") the TNET1130 WLAN adapter.

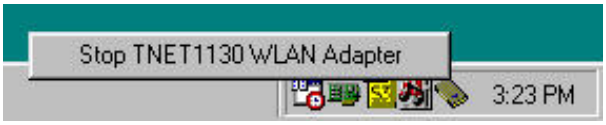


Figure 7. Tray icon menus (1): main button

  This will unload the driver and deactivate the adapter. The adapter's activity LED will go dark. (The power LED will continue to shine. This is normal, and not a cause for worry.) A message indicating that you can safely remove the adapter will appear. Choose **OK** to continue.

  You should then remove the adapter from the slot. The driver will automatically be reloaded when the adapter is re-inserted.

- **To hide the tray icon without unloading the driver:** In Windows ME and 2000, click the "removable device" icon with the mouse's secondary button (usually the button on the right) and choose **Unplug or eject hardware** from the menu that appears. Select the adapter from the list of hardware devices and uncheck the option **Show Unplug/Eject icon on the taskbar**.

  In some versions of Windows you can, instead, open the **Start** menu, go to **Settings**, choose **Control Panel**, open the **PC Card (PCMCIA)** icon, select the adapter, uncheck the **Show control on taskbar** box, and choose **OK**.

  In Windows 98, click the tray icon using the mouse's secondary button (usually the button on the right) and choose **Disable PC Card Tray Icon**.

Whenever you wish to remove the adapter while the computer is running, it is strongly recommended that you choose **Stop** (or **Safely Remove**) **TNET1130 WLAN Adapter** or **Unplug or eject hardware** and deactivate the adapter before physically removing it.

Uninstalling the Driver: "Uninstalling" the driver means removing the driver files from your hard disk. You should uninstall the driver before installing a newer version. To do this, open the **Start** menu, go to **Wireless Adapter** and then to **TNET1130 Driver**, and click **Uninstall the driver**.

7 Utility Startup and Shutdown

The Wireless Adapter Utility is used to connect to wireless networks and use the adapter's special features.

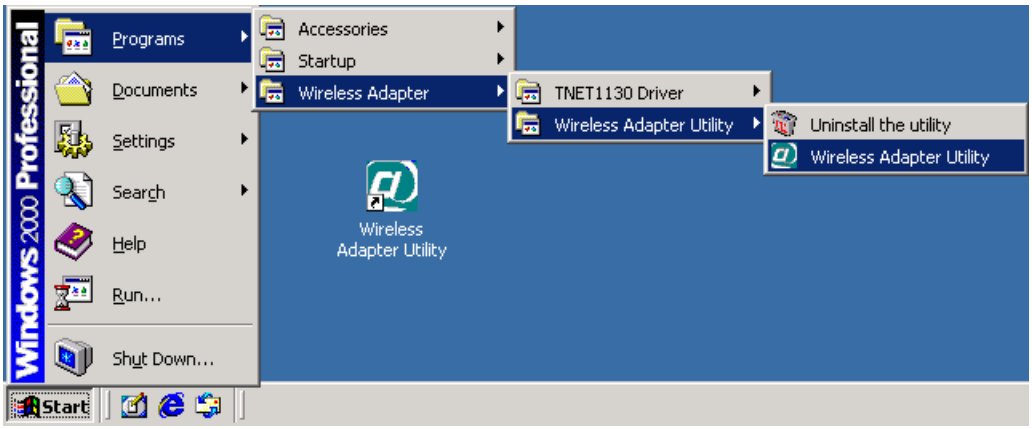


Figure 9. Utility icons in the Start menu and on the desktop

7.1 Controlling the Utility

The Wireless Adapter Utility behaves slightly differently from most programs with icons on the desktop and in the **Start** menu. Take note of the following so you will know what to expect when you start using the utility:

- **Startup:** You can start the utility up in either of two ways:
  - by opening the **Start** menu, going to **Programs**, choosing the **Wireless Adapter Utility** folder, and choosing the **Wireless Adapter Utility** command, or
  - by choosing the **Wireless Adapter Utility** icon on the desktop.
- **Tray icon:** When the utility is running, its icon, a stylized white "at" sign on a colored background, appears in the system tray (usually located at the right end of the task bar).

  This icon has three states: **(1)** A blue-green background shows that you are connected to a wireless network. **(2)** A red background shows that the adapter and driver are working, but a wireless connection has not been established. **(3)** A black background shows that the utility cannot communicate with the driver.

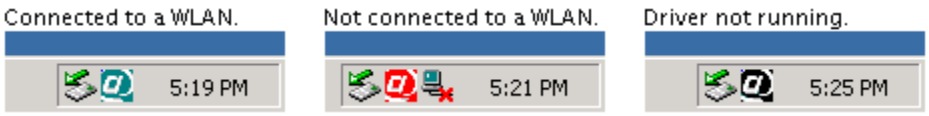


Figure 10. Utility icon in the system tray

- **Window controls:** It is important to understand the effects of the utility window's **OK** button, **Cancel** button, and other controls. These are explained below.

OK button: Clicking **OK** *applies* (sends to the adapter) any changes you have made in the adapter settings shown in the utility window. It also hides the window, whether you have made changes or not. Pressing the **Enter** key is the same as clicking **OK**.

Cancel button: Clicking **Cancel** discards any unapplied changes you have made in the adapter settings shown in the utility window. It also hides the window, whether you have made changes or not. Pressing the **Esc** key is the same as clicking **Cancel**.

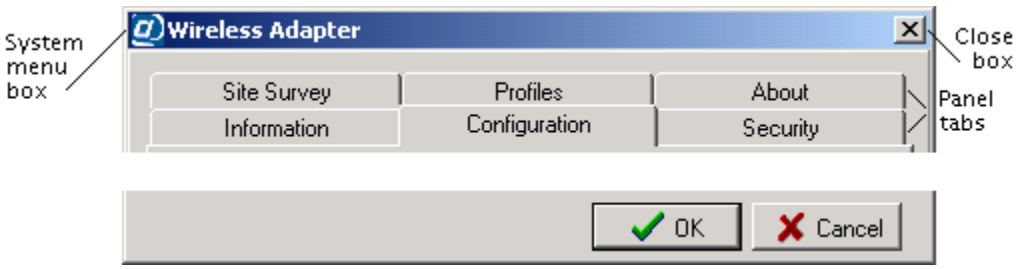


Figure 11. Utility window controls

To apply or discard changes but keep the window visible, click a tab other than the tab of the panel currently shown. If there are unapplied changes, you will be asked if you want to apply them. Click **Yes** to apply them, **No** to discard them.

To hide the window without applying or discarding any changes, click the window's Close box (in the top right corner), or open the window's System menu (in the top left corner) and choose **Close**. Pressing **Alt+F4** is the same as clicking the Close box or choosing **Close**.

When you are connected to a wireless network, hiding the utility window has no effect on the connection. (The connection will be broken, however, if settings unsuitable for the network are applied.)

- **Redisplaying the utility:** To redisplay the utility when it is hidden, double-click its icon in the system tray, or carry out either of the procedures for starting it up (this will not cause a second copy of it to start up).

- **Shutting down the utility:** To shut the utility down completely, click its icon in the system tray with your pointing device's secondary button (most often the button on the right), move the pointer onto the menu that pops out, and choose the **Exit** command.

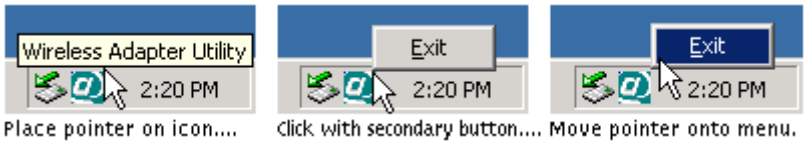


Figure 12. Shutting down the utility

Shutting down the utility will not break any existing connection to a wireless network.

8 Operation

This chapter explains how to establish wireless connections using your adapter and the Wireless Adapter Utility. It is assumed here that —

- you have completed installation of the driver, utility, and adapter;
- you know how to start the utility, hide and redisplay its window, and shut it down (see section 5.2, "Controlling the Utility"); and
- you are within range of at least one wireless device that will accept a connection from you.

Any wireless connection, even a connection to a single device, is treated in this chapter as a connection to a wireless network. There is, in fact, no difference in the steps required to connect wirelessly to a single device or a whole network, and a connection to a single device works in all the same ways as a connection to a network with many devices on it.

6.1 Understanding Connection Profiles

The utility makes connecting to wireless networks simpler by the use of *connection profiles*. A connection profile is a group of settings used to join a particular wireless local-area network (WLAN). Connection profiles are referred to simply as *profiles* in the rest of this guide.

For a low-security WLAN, you often can create a profile with two clicks, save it with another click, and *apply* it (that is, use the settings in it to join the WLAN) with one more click. For some WLANs, however — especially high-security WLANs — you must input settings supplied by the WLAN operator to create a profile and join the WLAN for the first time.

A profile is automatically saved for each WLAN that you join. The next time you want to join that WLAN, you can do so by simply applying the profile. There is no limit to the number of profiles you can save. You can also save multiple profiles for a single WLAN, if it requires different settings at different times (this is done on some WLANs for security reasons). You can create, edit, and delete profiles at any time, whether you are connected to a WLAN or not.

6.2 Understanding the Utility's Panels

The utility has six tabbed panels. When the program starts up, the **Information** panel is shown, and a dotted rectangle on the tab shows that the panel name is selected. For convenience on laptop computers, you can switch panels with the right, left, and up arrow keys when a panel name is selected.

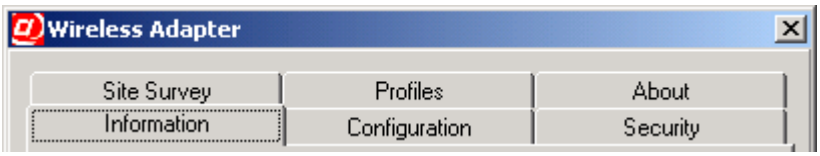


Figure 13. The utility's panel tabs

The utility's panels are explained briefly below. The order of the explanations matches the order in which the right and left arrow keys take you through the panels.

The **Information** panel shows if you are connected to a WLAN. When you have a connection, information about it appears here. This panel can also display important error messages. A **Rescan** button, present only when this panel appears, is for attempting to reconnect if the radio link has gone down.

The **Configuration** panel shows the adapter's current settings (except for security settings), and lets you change them. Changes are applied (that is, sent to the adapter) when you switch panels or click **OK**. This lets you test changes to the current profile before editing and resaving the profile itself.

The **Security** panel shows the adapter's current Wired Equivalent Privacy (WEP) settings, and lets you change them. WEP is a form of encryption that can help prevent snooping. To join a WLAN that uses WEP, you must obtain WEP settings from the WLAN operator. WEP settings are part of the current profile, and can be changed and tested like the settings in the **Configuration** panel.

The **Site Survey** panel shows the results of searches for WLANs. A search is carried out at startup, any time you click the **Search** button, and whenever necessary to establish or maintain a connection. You can double-click a WLAN in the search results to display a dialog box for creating a profile for that WLAN. When you click that dialog box's **OK** button, the profile is saved, and you are asked if you want to join the WLAN.

The **Profiles** panel lists existing profiles. Click a profile to enable buttons that let you edit, apply, or remove it. Double-clicking a profile is another way of applying it. The **New** button is for creating a profile manually (this may be necessary for joining a WLAN that does not allow automatic detection). After creating or editing a profile, you are asked if you want to apply it.

The **About** panel contains a copyright notice and information about the operating system, the utility, the driver, and the adapter. The final item, "regulatory domain," is the country or region whose laws the adapter's radio transmission characteristics conform to.

6.3 Connecting for the First Time

Connecting to a WLAN is often referred to as *joining* the network. Another term you might often see is *associate:* a station is said to "associate with" (or to) an access point in an infrastructure WLAN, or with other stations in an ad-hoc WLAN. The term *join* is used below for brevity.

Joining a WLAN is like connecting a cable to a wired network. Additional steps might be needed to make full access to network resources possible. Such steps are outside the scope of this guide.

These instructions assume that the adapter is inserted and in operation, that you have successfully installed the driver and utility, and that you are within radio range of the WLAN you want to join.

If the WLAN is set up for the easiest possible access, you can join as follows: **(1)** Start the utility. **(2)** Go to the **Site Survey** panel. **(3)** Double-click the line showing information about the WLAN. **(4)** Click **OK** to save the profile created by the utility. **(5)** Click **Yes** to confirm that you want to connect.

This process is described in greater detail below.

1. **Start up the Wireless Adapter Utility.**

   The utility's **Information** panel will appear. In most cases, the first time you run the utility, this panel will show that you have not joined a WLAN.

   If the WLAN you want to join allows automatic detection, the utility can create a profile containing all or most of the settings required for joining. You will need little or no information from the network operator.

   If the WLAN does not allow automatic detection, you will have to obtain configuration and security information from the operator. Then, to create a profile and join the WLAN, go to the **Profiles** panel, click **New**, input all the information, and click **OK**.

   It is assumed here that the WLAN allows automatic detection. If it does, information about it will appear on your screen in the next step.

2. **Go to the Site Survey panel. Note the information shown in the SSID and WEP columns.**

   An SSID (Service Set Identifier) is a name assigned to a WLAN by the operator. If more than one WLAN is listed, the SSIDs should help you identify the one you want to join. (The SSID is sometimes called the network [or domain] name [or ID].)

   WEP is Wired Equivalent Privacy, a means of encrypting digital radio transmissions to prevent snooping. Look to see if WEP is disabled or enabled on the WLAN; this affects what you must do in this step and the next.

   - *If WEP is disabled*, the utility can create a profile containing all the settings required for joining the WLAN. **Go straight to step 3.**

   - *If WEP is enabled*, encryption is used for security on the WLAN, and you will need to know **(1)** the encryption method (64-, 128-, or 256-bit WEP), **(2)** the format of the "key" or keys ("hex" or "ASCII" — that is, numeric or textual), **(3)** the key or keys, and in some cases, **(4)** the "authentication mode" ("open" or "shared").

     The encryption method is sometimes called the "key length," and 64-bit WEP is sometimes called "40-bit WEP." If you have received a key or keys but are not sure of the method and format, see the additional explanations in step 3.

3. **Double-click the WLAN that you want to join.**

   A window titled **New Profile** will appear. It will show a suggested name for the profile and, in a panel titled **Configuration**, adapter settings that the utility has determined are suitable for joining the WLAN.

   The name and most of the settings should be left unchanged. If you need to conserve battery power on a laptop computer, you can set the **Power Saving Mode** control to **Maximum Power Save**. This will make the adapter turn its receiver off and on periodically when you are connected to this WLAN. As a result, the connection might sometimes seem slower than usual.

- *If WEP is disabled on the WLAN*, **go straight to step 4.**

- *If WEP is enabled on the WLAN*, go to the **New Profile** window's **Security** panel.

  To enable WEP in this profile, pull down the **Method** list and select **64-Bit**, **128-Bit**, or **256-Bit**. Controls for selecting the "key input method" (that is, key format) and for entering keys will appear.

  If you are unsure of how to set the **Method** and **Key Input Method** controls, you can determine the correct settings from the length and contents of the WLAN's key or keys. Read the following two paragraphs very carefully.

  > "Hex" is hexadecimal (base 16) notation. A WEP key in hex format can contain only hex digits. The hex digits are the numerals 0 through 9 and the letters A through F (case does not matter: "A" has the same meaning as "a" in hex). The key must contain an exact number of hex digits: 10 for 64-bit WEP, 26 for 128-bit WEP, and 58 for 256-bit WEP. (A WEP key in hex format may be written with spaces or colons between pairs of digits. Be sure to count and type only the digits.)
>
> ASCII (American Standard Code for Information Interchange) means plain text. A WEP key in ASCII format can contain any characters you can type on your keyboard, including spaces. Case matters: "A" and "a" are treated as different characters. The key must contain an exact number of characters: 5 for 64-bit WEP, 13 for 128-bit WEP, and 29 for 256-bit WEP.

  64-bit WEP allows the use of one to four keys, and the **Default Key** control must be set to the key currently in use on the WLAN. If using 128- or 256-bit WEP, type the key into the **Key 1** box. Remember that 256-bit WEP can only be used by devices from the same product family as your adapter.

  The **Auth. Mode** (authentication mode) control is set by default to **Open**. In open authentication, a request to join a WLAN is never encrypted. If the WLAN uses "shared" authentication (where requests to join must be encrypted), set this control to **Shared**. (If **Auth. Mode** is set to **Auto**, the adapter will try both methods. Some WLANs allow this, and some do not.).

4. **Click OK.**

   The utility will save the profile and ask if you want to connect to the WLAN.

5. **Click Yes.**

   Connection is usually very quick. If your computer needs to obtain settings (such as an IP address) from a server on the network, this may take a few seconds. The utility's **Information** panel shows the state of the connection. It also displays your computer's IP address and other TCP/IP settings (this is for convenience only; these settings are not directly related to wireless networking).

7 Utility Reference

This chapter explains all the indicators and controls in each of the Wireless Adapter Utility's panels. The panels are explained in the order in which the right arrow key takes you through them when the program has just been started up: **Information**, **Configuration**, **Security**, **Site Survey**, **Profiles**, and **About**.

> ***Note:*** The **Configuration** and **Security** panels in the **Profile** and **New Profile** dialog boxes contain all the same controls as those in the utility's main window. For information on these panels, see sections 7.2 and 7.3 in this chapter.

7.1 The Information Panel

The **Information** panel shows the adapter's current connection status and the computer's current IP (Internet Protocol) address settings. The information shown is "read-only," that is, this panel does not let you directly change any settings.

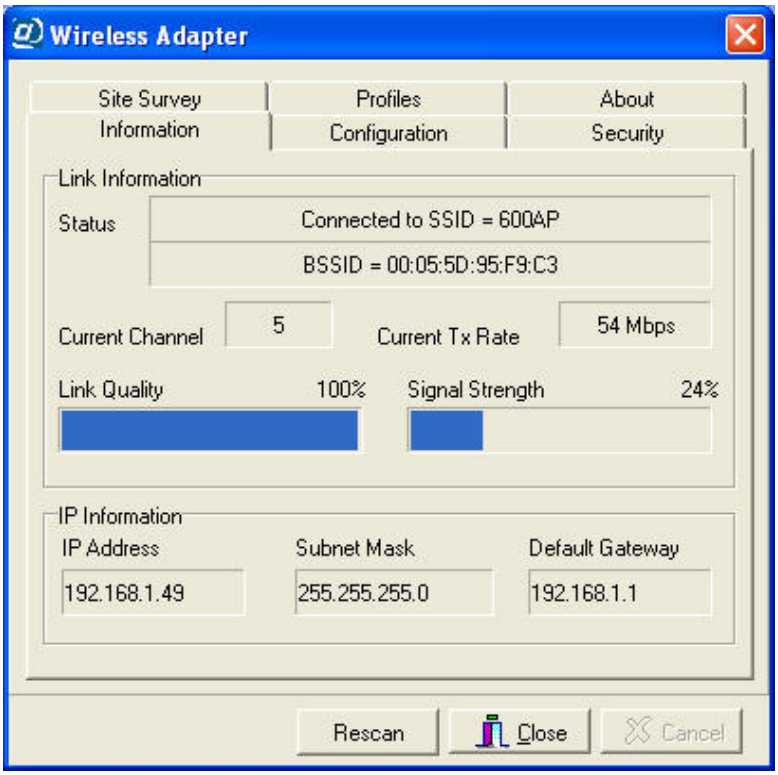


Figure 14. The Information Panel

Status display: When you are connected to a WLAN, the **Status** display consists of a box showing the SSID and a box showing the BSSID. At other times, it consists of a single box showing a status message such as "Not connected to network" or "Couldn't communicate with driver."

The SSID, a human-assigned name, defines the WLAN. It is sometimes called the network (or domain) name (or ID). Groups of devices using different SSIDs in the same area are considered to make up different WLANs. Your computer must be set to use the same SSID as all other machines on the WLAN. A "detectable" WLAN is one that broadcasts its SSID. SSID broadcasts (often called "beacons") enable the utility to show the WLAN in the Site Survey listing and automatically fill in the correct SSID when creating a profile.

The BSSID is a numeric, factory-set identifier identical to the medium access control (MAC) address (also called the MAC ID) of one of the devices on the WLAN. On an infrastructure WLAN, it is usually the MAC address of the access point; on an ad-hoc WLAN, it is usually the MAC address of one of the members. BSSIDs are shown in hexadecimal (base 16) notation.

The BSSID can change as you move between cells of a roamable infrastructure WLAN. On an ad-hoc WLAN, it may change as different stations take on the role of "coordinator" (this change is automatic).

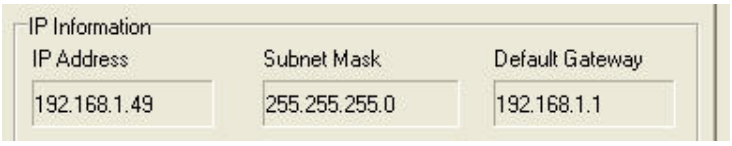
Current Channel display: A channel is one of 14 groups of adjacent frequencies in the radio band used for wireless networking. The channel can change as you move between cells of a roamable infrastructure WLAN; the adapter automatically detects and uses the channel used by the access point with the best signal. An ad-hoc WLAN always uses a single, fixed channel decided on by its users.

Current Tx Rate display: The Tx (transmission) rate is the communication speed in megabits per second (Mbps). If the **Transmission Rate** setting in the current profile is **Auto**, the figure shown here can vary as the adapter adjusts to changing interference levels, distance, etc.

When the adapter is operating in 4X mode, **+4X** appears after the transmission rate. 4X mode uses larger packets to reduce overhead and increase throughput; it does not change the number of bits transmitted per second.

Link Quality and Signal Strength display: Link quality can be compared to the clarity, and signal strength to the volume, of audible speech. Radio-frequency interference, reflection, and obstructions can reduce link quality even when signal strength is high. These figures are often useful in diagnosing problems on a wireless network.

IP Address, Subnet Mask, and Default Gateway display: This information is obtained from the operating system, and can be of use to technicians in diagnosing network problems. It can also help non-technical users determine when they are "on the Internet."



If your computer is set to obtain IP (Internet Protocol) settings automatically, the **IP Address** and **Subnet Mask** boxes will contain **0.0.0.0**, and the **Default Gateway** box will be blank, before you join a WLAN. After you join a WLAN and receive IP settings from a server on the network, the settings will appear in these boxes. This is a way of letting you know that you are "fully connected" and can access e-mail, the World Wide Web, and other Internet-based resources.

Rescan button: Click **Rescan** to try to re-establish a link that has gone down. You can also click **Rescan** to make the adapter "renegotiate" a link that has become slow; the connection will be re-established at the highest speed possible.

7.2 Configuration Panel

The descriptions in this section apply to the **Configuration** panels in the main window, the **New Profile** dialog box, and the **Profile** dialog box. These panels all contain the same controls.

Use the main window's **Configuration** panel to view the adapter's current settings and to make experimental or temporary changes. When you want to save a configuration, access the **New Profile** or **Profile** dialog box, either from the **Site Survey** panel (by double-clicking a listed WLAN) or from the **Profiles** panel (by clicking **New**, or by selecting a profile and clicking **Edit**).

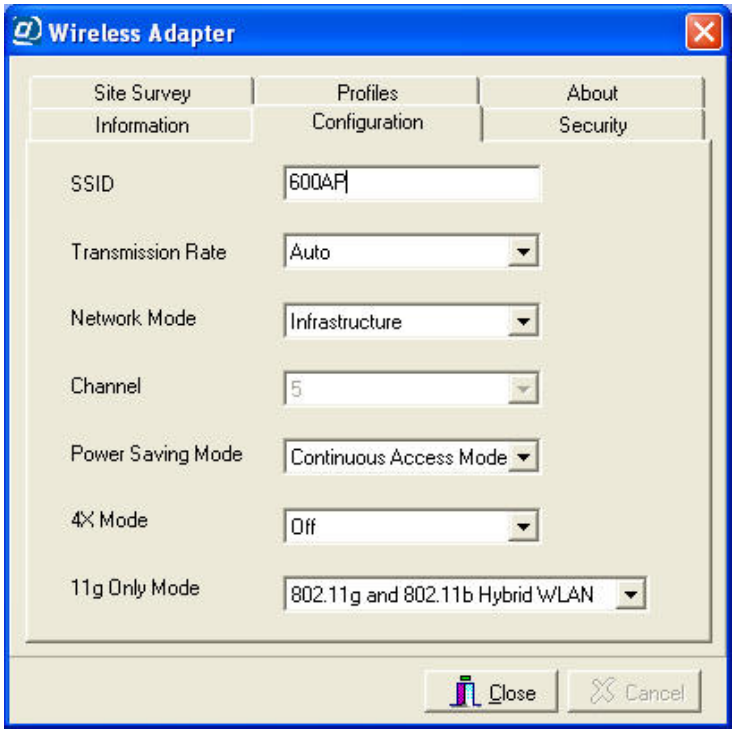
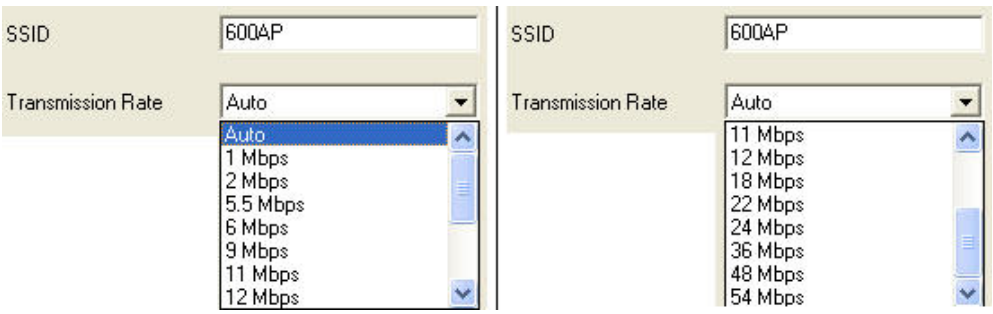


Figure 15. The main window's Configuration panel

Auto-detected configuration settings — those that appear in the **New Profile** or **Profile** dialog box just after you double-click a WLAN in the Site Survey listing — ordinarily should not be changed. Changing the auto-detected SSID or network mode setting will prevent you from establishing or maintaining a connection to the WLAN.

SSID control: The SSID is a name that a wireless device uses to indicate which WLAN it is on or wants to join. It is case-sensitive, can be up to 32 characters long, and can contain letters, numbers, and symbols. All devices on a WLAN must have exactly the same SSID setting. Other terms often used for SSID are *Extended Service Set Identifier* (*ESSID*), *domain ID*, *net ID*, *network name*, *extended network ID*, and *wireless network* (or *domain*) *name*. The set of devices that an SSID identifies is sometimes called a *communication domain* or *wireless domain*.

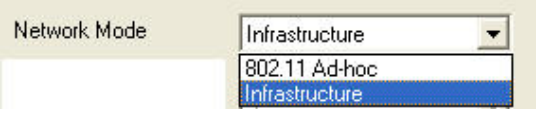


Transmission Rate control: The adapter can transmit at many different bit rates (measured in megabits per second, or Mbps), and it can automatically adjust its speed according to link quality, signal strength, and the capabilities of whatever device it is exchanging signals with. The default setting of the **Transmission Rate** control is **Auto**.

There is rarely a need to change the setting of this control. The benefits of a fixed, low speed (greater range) or a fixed, high speed (smaller range for greater security) can be obtained only if all the devices on the WLAN are set the same way. A setting of **Auto** offers the best combination of throughput, range, and resistance to interference.

A speed of 22 Mbps can be used only on connections to devices from the same product family as your adapter. Even if the **Transmission Rate** control is set to **22 Mbps**, the adapter will not use a higher speed than the device at the other end of the link can handle.

Network Mode control: This control can be set to **Infrastructure** or **802.11 Ad-hoc**. The default setting is **Infrastructure**. To establish and maintain a wireless connection, the adapter must be set to the same mode as all the other devices on the WLAN.



A WLAN with a connection to a wired network (such as the Internet) is certain to be working in infrastructure mode. An ad-hoc WLAN is usually a temporary, "on-the-spot" arrangement among a group of people who need to connect only with each other and do not need the resources of a wired network.

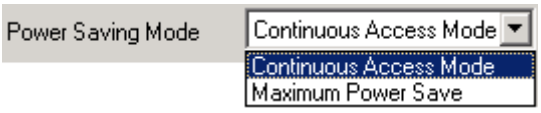
Some controls in the **Configuration** panel are disabled or enabled according to which network mode is selected. Infrastructure mode requires automatic channel switching. Packet length standards must be observed in 802.11 ad-hoc mode, ruling out the use of 4X mode. When you select high-speed ad-hoc mode, it is assumed that you want to use the highest possible speed.

Channel control: This control is enabled only when the network mode (see above) is set to ad-hoc (either 802.11 or high-speed). An infrastructure WLAN can include many access points using different channels, and to allow roaming, the adapter must be able to switch channels automatically. An ad-hoc WLAN uses a single fixed channel, and the adapter must be set to that channel to join the WLAN. Channel detection is automatic for any WLAN that appears in the Site Survey listing, so the setting of this control rarely needs to be changed.

The radio band used for wireless networking contains 95 frequencies spaced 1 MHz apart. These are organized into 14 staggered clusters of 23 adjacent frequencies each. Such a cluster is called a channel. There is much frequency overlap among channels. When overlapping channels are used in the same area, this causes interference, which reduces throughput. Which channels are available can differ from country to country (see appendix E).

On an infrastructure WLAN, access points with overlapping coverage areas should use non-overlapping channels. Non-overlapping channels are those with numbers that differ by 5 or more, for example, channels 1, 6, and 11, or channels 3, 8, and 13. An ad-hoc WLAN should use a channel that has little or no frequency overlap with any other channels being used in the same area.

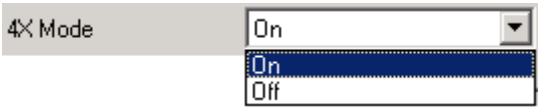
Power Saving Mode control: The **Power Saving Mode** control is a drop-down list that offers two settings: **Continuous Access Mode** and **Maximum Power Save**.



In Continuous Access mode, your adapter's receiver is always on. This is the default setting.

Maximum Power Save mode is a "doze" mode in which the adapter turns its receiver off but "wakes up" at fixed intervals to see if any communications are waiting for it. Before entering this mode, it tells the access point (or, on an ad-hoc network, the current coordinating station) that it is going to do so. The access point (or coordinating station) will "buffer" (temporarily store) communications destined for your machine. The adapter stays "awake" only long enough to check for and receive waiting communications.

4X Mode control: 4X mode is a means of reducing communication overhead and increasing throughput by allowing packets to be much longer than is normally allowed. This mode can be used only on connections to devices from the same product family as your adapter.



When the **4X Mode** control is set to **On**, the adapter uses 4X mode whenever possible. Detection of whether it can be used or not is completely automatic, so interoperation with devices from other product families is unaffected. When the control is set to **Off**, 4X mode is never used. The default setting is **On**.

7.3 The Security Panel

The descriptions in this section apply to the **Security** panels in the main window, the **New Profile** dialog box, and the **Profile** dialog box. These panels all contain the same controls.

Use the main window's **Security** panel (shown below, without its initially blank lower part) to view the adapter's current security settings, and to make experimental or temporary changes.

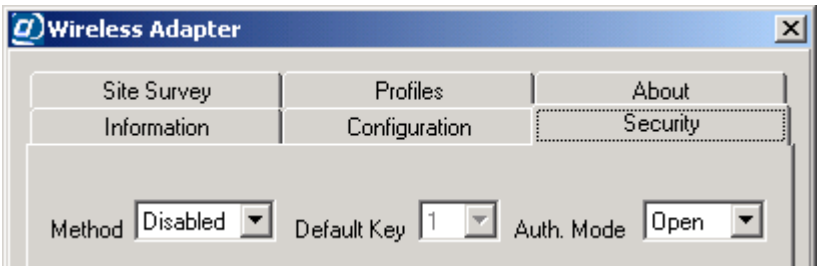


Figure 16. The main window's Security panel

When you want to save security settings, you must **(1)** access the **New Profile** or **Profile** dialog box, either from the **Site Survey** panel (by double-clicking a listed WLAN) or from the **Profiles** panel (by clicking **New**, or by selecting a profile and clicking **Edit**), and then **(2)** click the **New Profile** or **Profile** dialog box's **Security** tab.

When a WLAN is auto-detected, the adapter can detect only whether security (in the form of Wired Equivalent Privacy [WEP] encryption) is on or off ("enabled" or "disabled"). Where security is on (that is, WEP is enabled), you must obtain WEP settings from the WLAN operator and input them in the **Security** panel to be able to join the WLAN.

Method control: The **Method** control is a drop-down list for selecting a WEP setting. Four settings are offered: **Disabled**, **64-Bit**, **128-Bit**, and **256-Bit**.

(So-called 40-bit WEP encryption is the same as that offered by the **64-Bit** setting. On all wireless networking products, only 40 bits of a 64-bit key, and 104 bits of a 128-bit key, are input by the user.)

The default setting is **Disabled**. Selecting any other setting enables the **Default Key** control and causes the **Key Input Method**, **Key 1**, **Key 2**, **Key 3**, and **Key 4** controls to appear.

Default Key control: On a WLAN that uses 64-bit WEP, each device can store one to four WEP keys. The WLAN can then switch among these keys from time to time for better security. The "default key" is the key currently in use on the WLAN. This control lets you switch quickly, without having to input the current key each time it is switched. The default setting is **Key 1**.

Auth. Mode control: "Authentication" is the process of determining whether a requesting station should be permitted to join the WLAN. A station authenticates itself by using the correct SSID in its request to join. If WEP is enabled, the WLAN may require that requests to join be

unencrypted ("open" authentication) or that they be encrypted ("shared" authentication), or it may allow stations to try both methods ("auto" determination of the authentication mode).

The default setting of the **Auth. Mode** control is **Open**. If WEP is enabled on the WLAN, the operator has a responsibility to tell you if you need to set this control to **Shared** or **Auto**.

Key Input Method control: This control determines how the utility will interpret the key or keys you type before it sends the actual bits to the adapter for use and storage. It can treat your input as "hex" or as "ASCII."

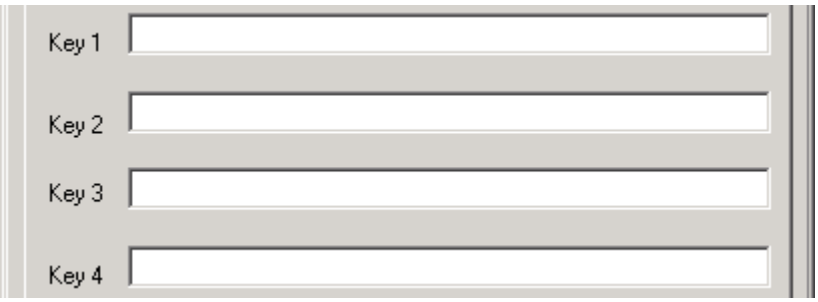
"Hex" is hexadecimal (base 16) numeric notation. When input in hex, a key can contain only hex digits, that is, the numerals 0 through 9 and the letters A through F — no spaces, symbols, punctuation marks, or letters other than A through F. Letters can be uppercase or lowercase; "A" is interpreted the same way as "a" in hex.

If 64-bit WEP is used and the key input method is hex, each key must contain exactly 10 hex digits. If 128-bit WEP is used and the key input method is hex, the key must contain exactly 26 hex digits. A 256-bit WEP key in hex format must contain exactly 58 hex digits.

"ASCII" (American Standard Code for Information Interchange) has become a synonym for plain text, that is, whatever characters you can type on your keyboard, including spaces.

If 64-bit WEP is used and the key input method is ASCII, each key must contain exactly 5 characters. If 128-bit WEP is used and the key input method is ASCII, the key must contain exactly 13 characters. A 256-bit WEP key in ASCII format must contain exactly 29 characters. Remember that 256-bit WEP can only be used by devices from the same product family as your adapter.

Key 1, Key 2, Key 3, and Key 4 controls: These boxes are for typing in the key or keys used for WEP encryption on the WLAN. If there is only one key, type it into the **Key 1** box.



To help ensure that your input is correct, the utility enforces the rules for length and acceptable characters of the key input method currently selected. To help maintain the security of the WLAN, after security settings are sent to the adapter or stored in a profile, only asterisks appear in the key input boxes when the settings are viewed again.

7.4 The Site Survey Panel

The **Site Survey** panel shows the results of searches for WLANs. A search is carried out automatically when the utility starts up and whenever necessary to establish or maintain a connection. You can start a search manually by clicking the **Search** button.

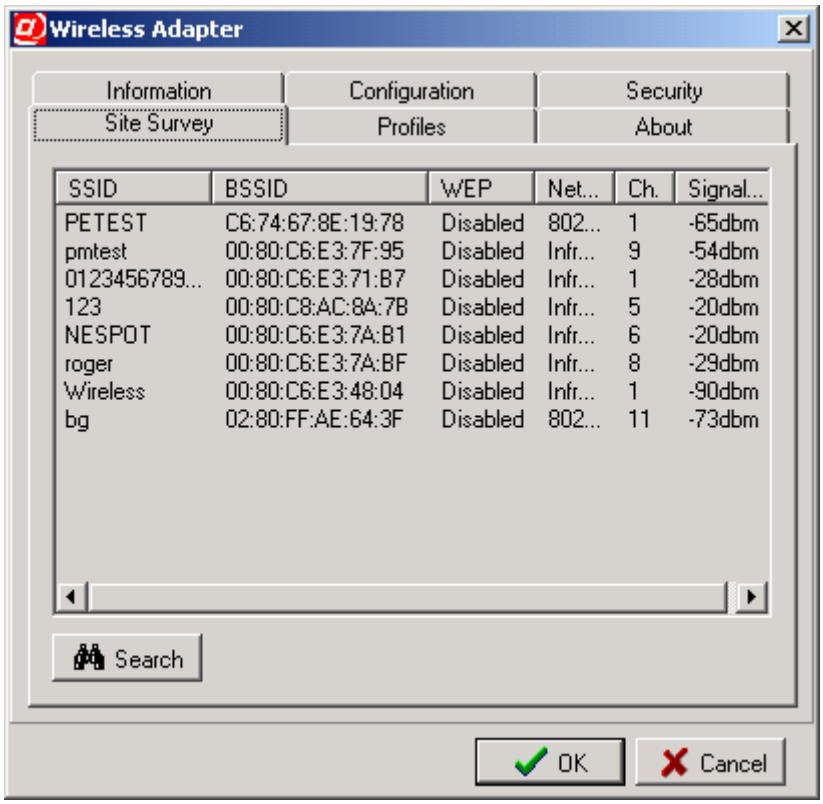


Figure 17. The Site Survey panel

Each WLAN found in a search appears on a line of its own in the Site Survey listing. The information shown is divided into the following columns:

SSID column: The SSID is a name, usually assigned by the network operator, that is shared by all members of the WLAN. It is sometimes called the network (or domain) name (or ID).

BSSID column: The BSSID is an automatically assigned numeric identifier. On an infrastructure WLAN, the BSSID shown is usually the medium access control (MAC) address of the closest access point; on an ad-hoc network, it is usually the MAC address of one of the members. BSSIDs are shown in hexadecimal (base 16) notation, with a colon [:] added between each pair of digits to aid readability.

WEP column: WEP stands for Wired Equivalent Privacy, an encryption method that can enhance network security. WEP can be enabled or disabled. If it is enabled, you must enable it with the correct settings on your machine to join the network.

Network Mode column: The network mode can be infrastructure, 802.11 ad-hoc, or high-speed ad-hoc. In infrastructure mode, all wireless stations communicate through an access point. In

ad-hoc mode, wireless stations communicate directly with each other. Only networking devices from the same product family as your adapter can operate in high-speed ad-hoc mode.

Ch. (Channel) column: A channel is one of 14 groups of adjacent frequencies in the band used for wireless networking. Not all channels are available in all countries. A station operating in infrastructure mode automatically finds the channel used by any access point it is within range of. An ad-hoc WLAN must use a single, fixed channel agreed upon by the members.

Signal Level column: This is the strength of the radio signal as measured at the adapter's antenna input. It is shown in dBm, that is, decibels referenced to 1 milliwatt (mW). Decibels are a logarithmic unit, so -10 dBm equals 0.1 mW, -20 dBm equals 0.01 mW, -30 dBm equals 0.001 mW, and so on. The closer the figure is to zero, the stronger the signal is (for example, "-13dbm" represents a stronger signal than "-78dbm").

The actions you can take in the **Site Survey** panel are described below.

- To change the order in which site survey results are displayed, click a column heading.

  For example, you can click the **WEP** column heading to have all WLANs where WEP is disabled listed above all WLANs where WEP is enabled. Click again to reverse the order.

- To see all of an item (for example, an SSID) that exceeds the width of its column, let the pointer rest on it for at least half a second.

  The full name will usually appear in a pop-up description box. In some columns, more text must be cut off than in others for the full name to pop up. You can also widen a column by dragging the right edge of the column header to the right.

- To search again for WLANs in your vicinity, choose the **Search** button.

  The utility will "listen" for about five seconds and then display the results.

- To join a listed WLAN (or just to create or edit a profile for it) double-click anywhere on the line showing information about it.

  The utility requires that a profile exist for a WLAN before you can join. A dialog box for creating or editing a profile will appear.

  By default, the utility uses the WLAN's SSID as the profile name. If no profile with that name exists, the **New Profile** dialog box will appear. If you already have a profile with that name, the **Profile** dialog box will appear. These dialog boxes both contain a **Configuration** panel and a **Security** panel.

  In either case, settings that are required for joining the WLAN and were auto-detected during the Site Survey search will automatically be filled in for you. You might wish to change the **Power Saving Mode** setting, and you might need to input or edit security settings. See section 7.2, "The Configuration Panel," and section 7.3, "The Security Panel," for details.

  When finished checking or editing the profile, click the dialog box's **OK** button. The profile will be saved, and you will be asked if you wish to join the WLAN.

7.5 The Profiles Panel

The **Profiles** panel lists existing profiles. The list is initially in order of creation, with the oldest profiles at the top.

After you have created profiles for a number of WLANs, you will probably use this panel more than any other. When you are within range of a WLAN that you have a profile for, just **(1)** start the utility, **(2)** click the **Profiles** tab, **(3)** double-click the profile, and **(4)** confirm that you want to apply the profile and join the WLAN. As long as the WLAN's settings have not changed, you will be connected, and you can hide or shut down the utility and start using the network.

The Apply function is also available, along with others, when you "left-click" or "right-click" a profile in the Profiles panel, as shown below.

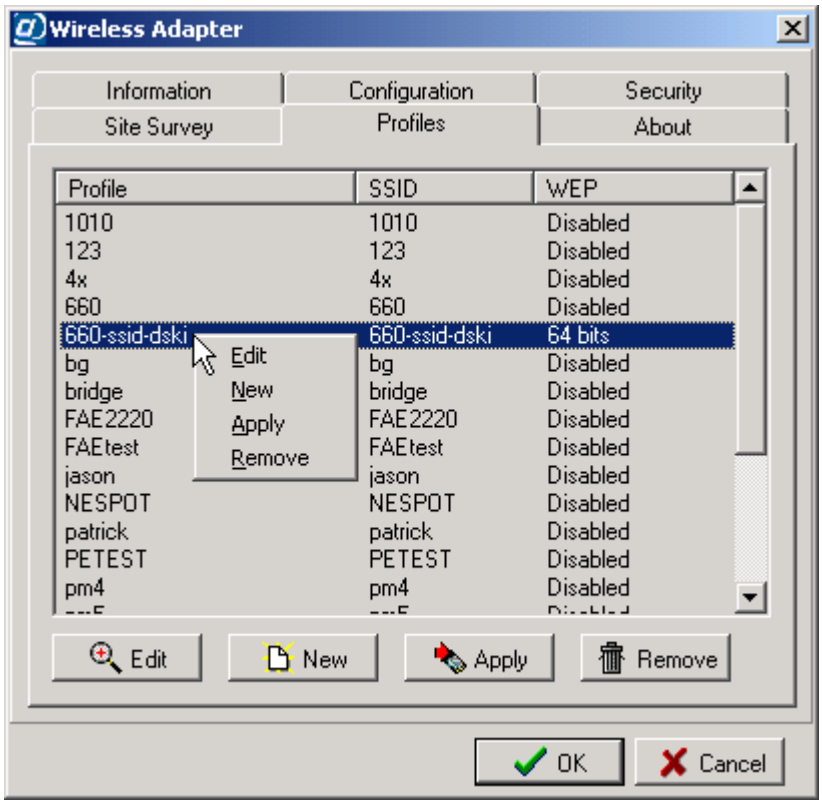


Figure 18. The Profiles panel

Each profile occupies a single line in the listing. There are three columns of information:

Profile column: The profile name appears here.

SSID column: This column shows the SSID of the WLAN the profile is for.

WEP column: This column shows the status of Wired Equivalent Privacy encryption in the profile: disabled, or set to 64, 128, or 256 bits.

The actions you can take in the **Profiles** panel are described below.

- To change the order in which profiles are listed, click a column heading.

  For example, you can click the **SSID** column heading to have the list arranged in alphabetical order of the SSIDs. Click the heading again for reverse alphabetical order.

- To see all of a profile name or SSID that exceeds the width of its column, let the pointer rest on it for at least half a second.

  The full name will usually appear in a pop-up description box. In some columns, more text must be cut off than in others for the full name to pop up. You can also widen a column by dragging the right edge of the column header to the right.

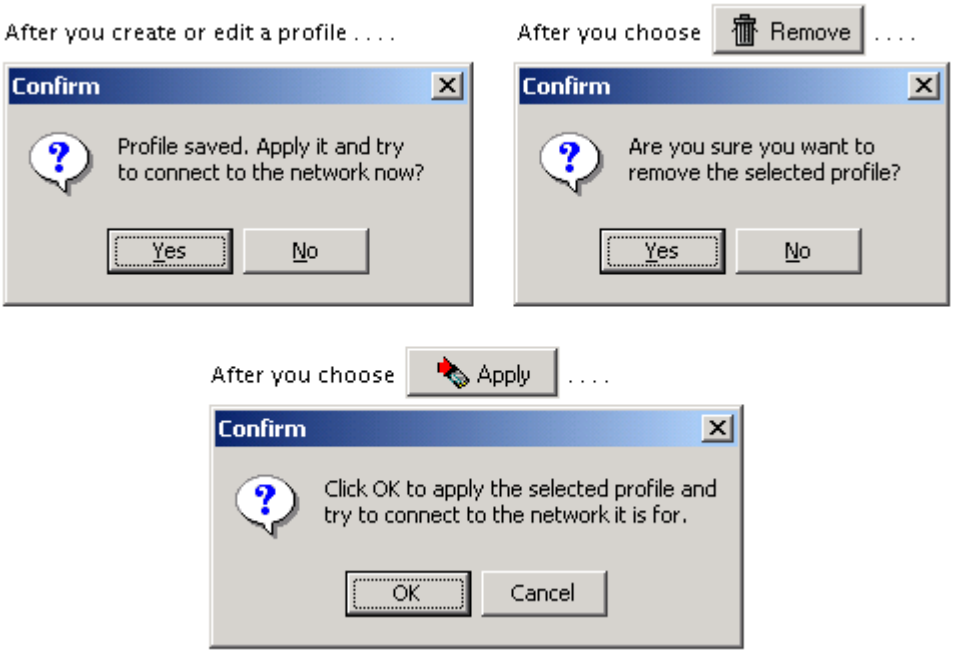
- To apply a profile as quickly as possible, double-click anywhere on the line showing information about it.

  To *apply* a profile is to send the settings in it to the adapter and try to join the WLAN the profile is for. You will be asked to confirm that this is what you want to do.

- To edit, apply, or remove a profile, click it with the mouse's main or secondary button and choose the appropriate button or command.

  Clicking a profile with your pointing device's main button (usually the button on the left) selects the profile and enables the **Edit**, **Apply**, and **Remove** buttons under the list. Clicking a profile with the secondary button (usually the button on the right) does all of this and displays a pop-up menu containing **Edit**, **New**, **Apply**, and **Remove** commands.

  The **Edit** and **New** buttons and commands display dialog boxes containing **Configuration** and **Security** panels identical in content and function to the panels of the same names in the utility's main window. See section 7.2, "The Configuration Panel," and section 7.3, "The Security Panel," for details. You are asked for confirmation after all major actions.



7.6 The About Panel

The **About** panel contains a copyright statement; gives hardware, software, and firmware version information; and shows the "regulatory domain" for the which the adapter was made. The regulatory domain is the country or region whose laws regarding radio transmissions the adapter's capabilities conform to.

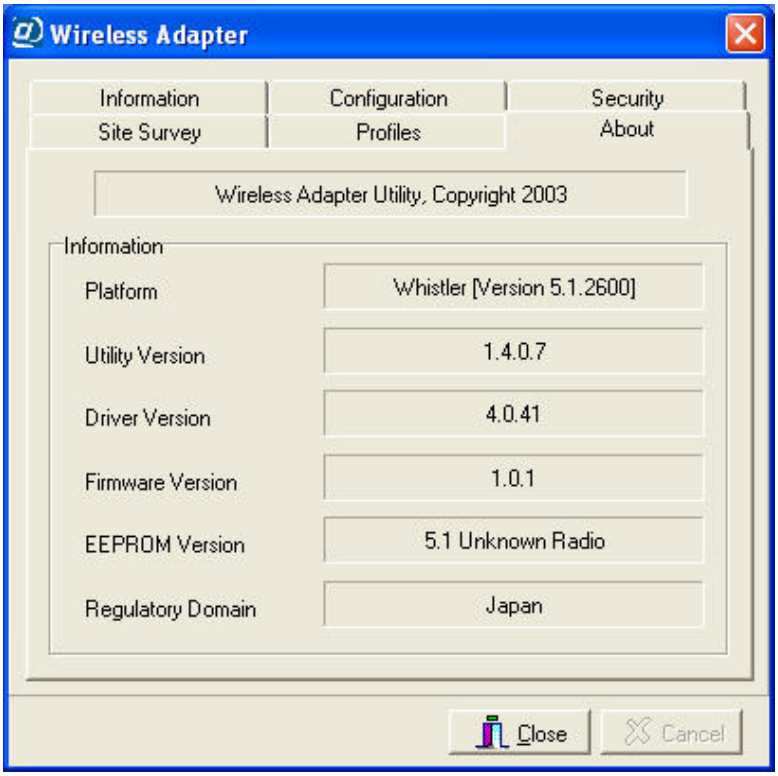


Figure 19. The About panel

This information can be helpful in the event that you require service or have an opportunity to upgrade the software. It is a good idea to keep a record of this information for future reference.

Appendix A: Technical Support

If you encounter a problem that cannot be solved by following the steps in the troubleshooting section, call your networking equipment supplier for help. Have the following information ready before you make the call:

- Full product name and, if possible, firmware version number
- Version numbers of all software products included in the package
- Operating system name and version
- Network type and configuration, and any recent configuration changes
- Actions that led to the situation that prompted the call
- LED status and any on-screen messages seen in connection with the problem

If it appears that a return or exchange will be required, you may be asked to provide the serial number of the product.

Support personnel may ask you to try to reproduce the problem. They may also ask you to run some simple tests using diagnostic tools included with the system. Proper preparation on your part can greatly reduce the amount of time needed to solve the problem.

Appendix B: Limited Warranty

Hardware

The manufacturer warrants its products to be free of defects in workmanship and materials, under normal use and service, for a period of 12 months from the date of purchase from the manufacturer or its authorized reseller, and for the period of time specified in the documentation supplied with each product.

Should a product fail to be in good working order during the applicable warranty period, the manufacturer will, at its option and expense, repair or replace it, or deliver to the purchaser an equivalent product or part at no additional charge except as set forth below. Repair parts and replacement products are furnished on an exchange basis and will be either reconditioned or new. All replaced products and parts will become the property of the manufacturer. Any replaced or repaired product or part has a warranty of ninety (90) days or the remainder of the initial warranty period, whichever is longer.

The manufacturer shall not be liable under this warranty if its testing and examination disclose that the alleged defect in the product does not exist or was caused by the purchaser's or any third party's misuse, neglect, improper installation or testing, unauthorized attempt at repair or modification, or any other cause beyond the range of the intended use, or by accident, fire, lightning, or other hazard.

Software

Software and documentation materials are supplied "as is," without warranty as to their performance, merchantability, or fitness for any particular purpose. However, the media containing the software is covered by a 90-day warranty that protects the purchaser against failure within that period.

Limited Warranty Service Procedure

Any product **(1)** received in error, **(2)** received in a defective or non-functioning condition, or **(3)** exhibiting a defect under normal working conditions, can be returned to the manufacturer by following these steps:

1. Prepare the following in printed or electronic form:
    - Dated proof of purchase
    - Product model number and quantity
    - Product serial number
    - Precise reason for return
    - Your name, address, email address, phone number, and fax number
2. Inform the distributor or retailer.
3. Ship the product back to the distributor/retailer with freight charges prepaid. The purchaser must pay the cost of shipping from the distributor/retailer to the manufacturer. Any package sent C.O.D. (Cash On Delivery) will be refused.

Charges: Usually, RMA (Returned Material Authorization) items will be returned to the purchaser via airmail, prepaid by the manufacturer. If any item is returned by another carrier, the purchaser will pay the difference. A return freight and handling fee will be charged to the purchaser if the manufacturer determines that the product is not defective or that the damage was caused by the user.

Warning

The manufacturer is not responsible for the integrity of any data on storage equipment (hard drives, tape drives, floppy diskettes, etc.). We strongly recommend that our customers back their data up before sending such equipment in for diagnosis or repair.

Service After Warranty Period

After the warranty period expires, all products can be repaired for a reasonable service charge. The shipping charges to and from the manufacturer's facility will be borne by the purchaser.

Return for Credit

In the case of a DOA item (an item that is "dead on arrival") or a shipping error, a return for credit will automatically be applied to the purchaser's account, unless otherwise requested.

Limitation of Liability

All expressed and implied warranties of a product's merchantability, or of its fitness for a particular purpose, are limited in duration to the applicable period as set forth in this limited warranty, and no warranty will be considered valid after its expiration date.

If this product does not function as warranted, your sole remedy shall be repair or replacement as provided for above. In no case shall the manufacturer be liable for any incidental, consequential, special, or indirect damages resulting from loss of data, loss of profits, or loss of use, even if the manufacturer or its authorized distributor/dealer has been advised of the possibility of such damages, or for any claim by any other party.

Appendix C: Specifications

Standards compliance	IEEE 802.11b, IEEE 802.11g, MiniPCI
Regulatory compliance	USA: FCC Part 15 Class B
Frequency band	2400.0 to 2497.0 MHz (Japan) 2400.0 to 2483.5 MHz (North America and Europe) 2445.0 to 2475.0 MHz (Spain) 2446.5 to 2483.5 MHz (France)
Transmitter power	17 dBm (typical)
Receiver sensitivity*	11 Mbps: 8% PER, -82 dBm (typical) 54 Mbps: 10% PER -68 dBm (typical)
* Minimum receiver input power level at which a packet error ratio (PER) of less than the indicated percentage can be maintained, given a packet length of 1024 bytes and conditions of 20° to 30° C.	
Input power	DC 3.3V ±5%
Power consumption	550 mA/3.3V (transmitting), 350 mA/3.3V (receiving)
Data rates	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48 and 54 Mbps with auto fallback; special user-selectable 22 Mbps option
RF spreading scheme	Direct-sequence spread-spectrum (DSSS)
Encoding and modulation methods	BPSK, QPSK, CCK, OFDM, and PBCC
Security	64- and 128-bit Wired Equivalent Privacy (WEP) encryption Special user-selectable 256-bit WEP option
Environmental requirements	Operating temperature: 0° to 50° C Storage temperature: -30° to 70° C Operating humidity: Tested to RH 85% at 40° C (104° F) for 48 hours
Accompanying software	Drivers for Microsoft® Windows 98/ME (NDIS 5.0), 2000 (NDIS 5.0), and XP (NDIS 5.1); configuration utility with connection profile management for multiple networks

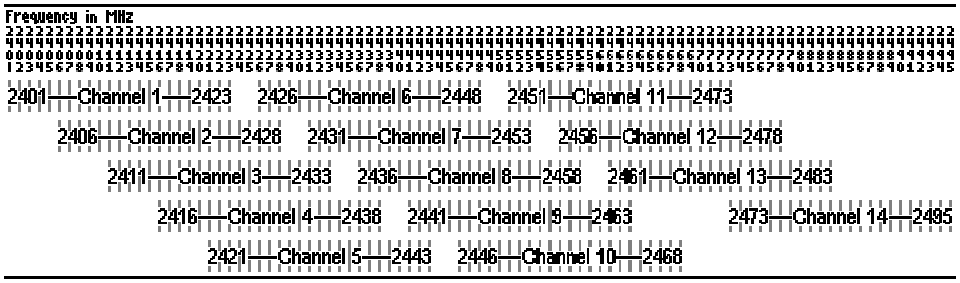
Appendix E: Channels and Regulations

The following table lists the IEEE 802.11b transmission channels and provides important notes on regulations regarding channel use.

Channel	Start, Center, and End Frequencies (MHz)	Non-overlapped Channels	Notes
1	2401 2412 2423	6-14	*1*
2	2406 2417 2428	7-14	*1*
3	2411 2422 2433	8-14	*1*
4	2416 2427 2438	9-14	*1*
5	2421 2432 2443	10-14	*1*
6	2426 2437 2448	1, 11-14	*1*
7	2431 2442 2453	1, 2, 12-14	*1*
8	2436 2447 2458	1-3, 13, 14	*1*
9	2441 2452 2463	1-4, 14	*1*
10	2446 2457 2468	1-5, 14	
11	2451 2462 2473	1-6	
12	2456 2467 2478	1-7	*2*
13	2461 2472 2483	1-8	*2*
14	2473 2484 2495	1-10	*3*

Notes:
1. Not used where the regulations of Spain or France are in effect.
2. Not used where the regulations of Spain or North America are in effect.
3. Used only where the regulations of Japan are in effect.

An illustration of IEEE 802.11b channel distribution and overlap appears below.



Wireless networking channels in the 2.4-GHz frequency band

FCC STATEMEMT:
This device is intended only for OEM integrators under the following conditions:
1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna.

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 points, routers, wireless ADSL modems, and similar equipment). The final end product must be labeled in a visible area with the following: "Contains TX FCC ID: IOU3050S01".

Manual Information for End Users
The end user must not have manual instructions to remove or install the device. The user manual for end users 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."