TOSHIBA

WN4301A-LF-JT

Wireless LAN PC Card

User's Manual

Contents

Introduction

The WN4301A-LF-JT is a Wireless LAN PC Card, support a 54 Mbps wireless network adapter that seamlessly integrates with existing Ethernet networks to support applications such as mobile users or temporary conferences. This solution offers a high data rate and reliable wireless connectivity with considerable cost savings over wired LANs (which include long-term maintenance overhead for cabling). Just install enough wireless access points to cover your network area, plug wireless cards into your notebooks, and start networking.

Using this card in conjunction with a wireless access point, gateway or wireless router, you can create an instant network that integrates seamlessly with 10/100 Mbps Ethernet LANs. Moreover, moving or expanding your network is as easy as moving or installing additional access points – no wires!

Features

- Up to 54 Mbps data rate
- Wireless connection without the hassles and cost of cabling
- Greater flexibility to locate or move networked PCs
- Integrates with or replaces wired LANs at dramatically lower cost than wired alternatives
- Seamless connectivity to wired Ethernet LANs augments existing networks quickly and easily
- Easy installation and user-friendly configuration
- Complementary Code Keying (CCK) ensures backward compatibility to the existing 802.11b WLAN infrastructure
- Auto fallback data rate under noisy environment
- Orthogonal Frequency Division Multiplexing (OFDM) technology provides robust, interference-resistant wireless connection
- Supports a wide range of systems (Windows 98/Me/2000/XP)
- Enhances your network security with 64/128-bit WEP data encryption
- Domain Channel Selection (DCS) allows access to the channels prescribed by the regulation of different countries

Applications

Offers a fast, reliable, cost-effective solution for wireless client access to the network in applications like these:

- *Remote access to corporate network information*

  E-mail, file transfer, and terminal emulation

- *Difficult-to-wire environments*

  Historic or old buildings, asbestos installations, and open areas where wiring is difficult to employ

- *Frequently changing environments*

  Retailers, manufacturers, and banks who frequently rearrange the workplace and change location

- *Temporary LANs for special projects or peak times*

  Trade shows, exhibitions, and construction sites that need a temporary setup for a short time period. Retailers, airline, and shipping companies that need additional workstations for peak periods. Auditors who require workgroups at customer sites

- *Access to databases for mobile workers*

  Doctors, nurses, retailers, office workers who need access to databases while being mobile in the hospital, retail store or office campus

- *SOHO users*

  SOHO (Small Office Home Office) users who need easy and quick installation of a small computer network

System Requirements

Before you install the Wireless LAN PC Card, check your system for the following:

- A laptop with a PCMCIA Type II or Type III slot
- Windows 98/Me/2000/XP
  (Prepare the Windows OS installation CD for use during driver and utility installation)
- A minimum of 1500 Kbytes of free disk space for installing the driver and utility program
- Other IEEE 802.11b/g-compliant devices installed in your network

Package Checklist

The Wireless LAN PC Card package includes:

- 1 Wireless PC Card
- 1 driver and utility CD with documentation
- Warrenty card

Please inform your dealer if there are any incorrect, missing, or damaged parts. Please retain the original packing materials, in case there is a need to return the product.

Hardware Description

The Wireless LAN PC Card supports up to 54Mbps connections to Ethernet networks. This wireless card is fully complient with the specifications defined in IEEE 802.11g. It can be installed in any notebook with a Type   PCMCIA slot. And this card supports Windows 98/ME/200/XP.

LED Indicators

The Wireless LAN PC Card includes two status LED inducators, as described in the following figure and table.

Link

Activity

| LED	Status	Description
LINK	On	Indicates a valid connection
	Flashing	Indicates that the card is scanning for available networks
ACT	Flashing	Indicates that the card is transmitting or receiving packets

Hardware Installation

Warnings:
Network cards are sensitive to static electricity. To protect the card, always touch the metal chassis of your computer or the ground before handling the card.

To install the card:

1. Turn on your notebook.

2. Install the driver and utility program into your system. Drivers can be found on the driver and utility CD. See the following section for more information on driver and utility installation.

3. Find an available Type II PCMCIA slot in your notebook.

4. With the card's 68-pin connector facing the PCMCIA slot, slide the card completely into the slot as shown below.
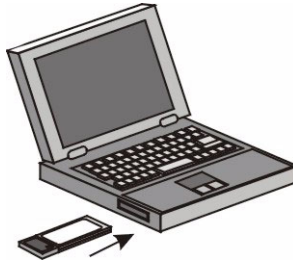
Driver and Utility Installation

The driver and utility CD that comes with the package contains the software drivers and utilities available for the WN4301EP 802.11b/g Wireless LAN PC Card.

For Windows XP, see "Windows XP Installation" on page 7.

Windows 98/Me/2000 Installation

Note: You may find that the instructions here do not exactly match your version of Windows. This is because these steps and screenshots were created from Windows 98. Windows Millennium Edition and Windows 2000 are similar, but not identical, to Windows 98.

1. Turn on the notebook.

2. Place the driver and utility CD into the CD-ROM drive of your notebook. The program will auto-run, and the InstallShield Wizard window will appear.

3. Click on the Easy option to start the installation.
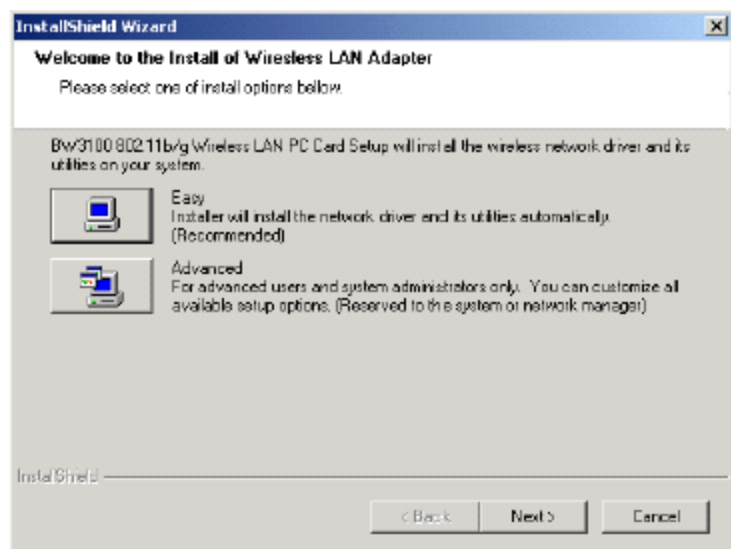
4. This message will then appear prompting you to insert the card into your notebook.

Note: For Windows 98, your system may ask you for the Windows OS CD at this time. If so, insert the CD and click OK.

5. This screen will appear, though the driver is fully compatible with Windows 2000, it has not yet been Logo tested by Microsoft. Click Yes to continue with the installation.
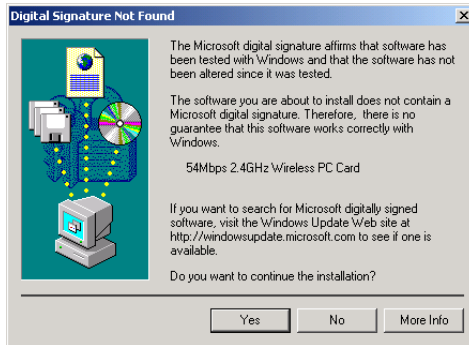
Note: Do not click No, as this will cancel the installation and the driver will not be installed properly.
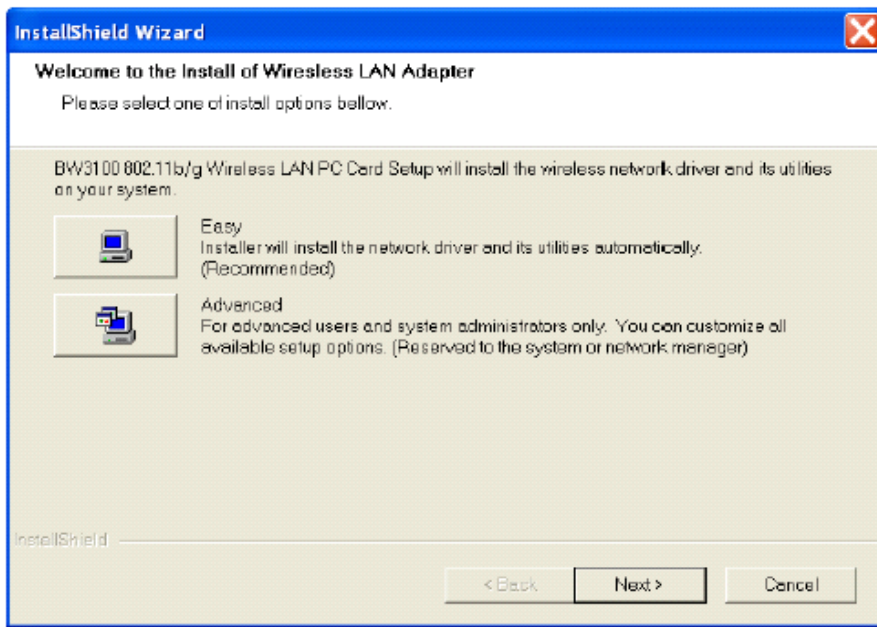
6. The InstallShield wizard will start copy driver files into your system, this may take a few minutes. The Country Select window will then appear, click OK to exit the window. The installation process in now completed.

Windows XP Installation

1. Insert the driver and utility CD into your CD-ROM drive. The program will auto-run, and the InstallShield Wizard window will appear.

2. Click the Easy button, this will start to install driver and utility into your system.

InstallShield Wizard

Welcome to the Install of Wiresless LAN Adapter

Please select one of install options bellow.

BW3100 802.11b/g Wireless LAN PC Card Setup will install the wireless network driver and its utilities on your system.

Easy
Installer will install the network driver and its utilities automatically.
(Recommended)

Advanced
For advanced users and system administrators only. You can customize all available setup options. (Reserved to the system or network manager)

InstallShield

[< Back]   [Next >]   [Cancel]

3. This message will then appear prompting you to insert the card into your notebook.

Please plug in your WLAN adapter now.
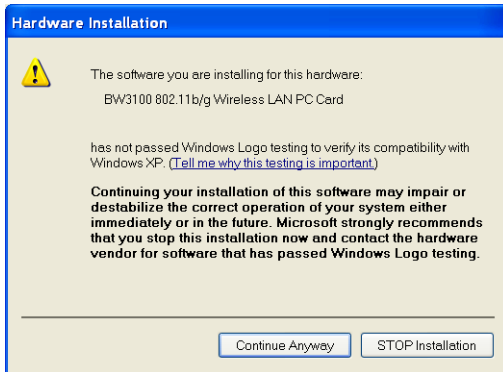
4. After inserting the card, the Found New Hardware Wizard window appears. Select Install the software automatically, then click Next.

5. This screen will then appear, though the driver is fully compatible with Windows XP, it has not yet been Logo tested by Microsoft. Click Continue Anyway.

Note: Do not click STOP Installation, as this will cancel the installation process, and the driver will not be installed properly.

6. The Wizard will start to install the software into your system. This may take a few minutes.

7. When the wizard has finished installing the driver, the following screen will appear. Click Finish to exit the window.

8. Select the country in which you are using the Wireless LAN PC Card. The installation process in now completed.

Utility Configuration

Using Wireless Card Manager

Note: The screen shots shown here were created using Windows XP, they may not look exactly the same with your version of Windows. However, the functions are the same.

A shrotcut icon will appear on the desktop after the driver and utility software installation. Double-click on the icon to launch the card manager, or you can access it from the Start menu.
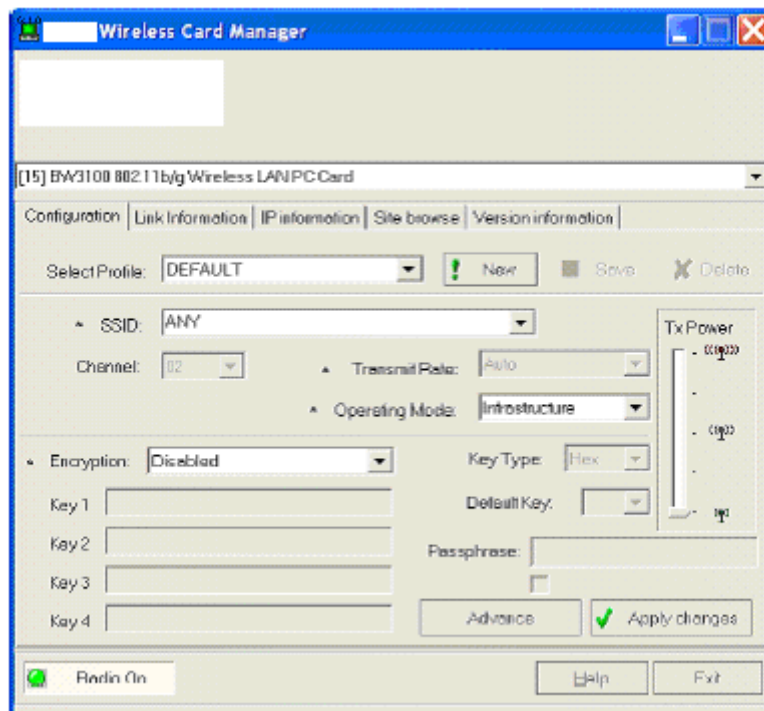
The Wireless Card Manager includes 5 tabs:

Configuration - Allows you to monitor network status and set parameters for the WN4301AEP 802.11b/g Wireless LAN PC card.

Link Information - Shows statistics for the card.

IP information - Shows the Internet address of the card.

Site browse - Scans/shows all the wireless devices in range.

Version information - Displays the version information of the driver and utility.

At the bottom of each screen, there are 3 items that can be selected:

- Radio On - This allows you to turn on/off the transmission/reception of the card.
- Help - Click here to access the help file.
- Exit - Click here to exit the utility program.

Configuration

This utility allows you to configure the WN4301AEP 802.11b/g Wireless LAN PC Card parameters.
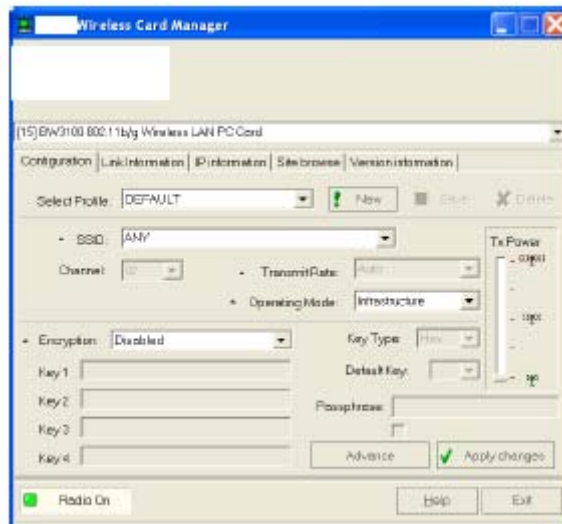
Select Profile — Specify a profile name for a specific configuration of parameters.

New — You can set up a new profile by clicking New.

Save — To save a profile after configuring the settings, click Save.

Delete — To delete a profile, select the profile from the drop-down menu for Select Profile, then click Delete.

SSID — Input a SSID string for the wireless network to which you want to connect. This should be set to the same value as the SSID of the access point or wireless router to which you are connected. To roam among multiple access points with different BSSIDs, set this value to ANY to allow connection to any access point.

Channel — If you are setting up an ad hoc wireless LAN (see "Network Topologies" on page 18), set the channel to the same radio channel as that used by the other wireless clients in your group. However, if you are connecting to a network via an access point, then the channel is automatically set by the access point.

Note: The available channels are limited to local regulations.
FCC: 11 channels
MKK: 14 channels

Transmit Rate — Indicates the data transmission rate. Select an appropriate transmission speed. Lower speeds will give better range.

Operating Mode — Set the operation mode to 802.11 ad hoc for connections that do not have any access points, or to infrastructure for connections with an access point (see "Network Topologies" on page 18 for more information).

**TX Power** — Move the slider bar to adjust the transmission power.

Encryption — Select 64 bit or 128 bit to enable the WEP (Wired Equivalent Privacy) function. This function is implemented in the card to prevent unauthorized access.

Key Type — Select ASCII or Hex.

**Default Key** — Choose one key to use for encryption.

Passphrase — Check this box to automatically generate keys for encryption.

Advance — Click this button to set the packet burst duration function. Move the slider bar to adjust the packet transmission speed. The larger the number, the faster the speed.
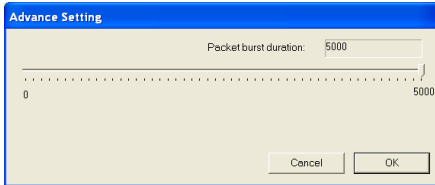
How to set up WEP:

The WEP mechanism is based on the RC4 encryption algorithm. The security keys are provided to ensure data confidentiality. WEP security protects your wireless LAN against eavesdropping and unauthorized access by intruders. If WEP is in use, all clients on the same network must use the same WEP key settings in order to communicate with each other.
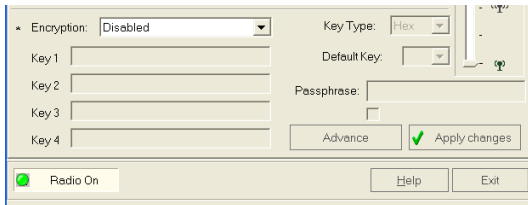
To use the WEP function, take the following steps:

Step 1. Select 64 bit or 128 bit in the Encryption field.

Step 2. To automatically generate keys, check the Passphrase box, then type in a string of characters (a maximum of 32 digits) into the field. If you are using an auto-generated key, you must use the same passphrase and key on every station within the same network. Please note that when Encryption is set to 64 bit, 4 keys will be generated. When 128 bit Encryption is selected, only one key will be auto generated.

Step 3. In the Default Key field, select one number to use as the default key from the drop-down menu.

Step 4. Click Apply changes to allow the settings to take effect.

Or

Step 1. Select 64 bit or 128 bit in the Encryption field.

Step 2. Select ASCII or Hex in the Key Type field.

Step 3. In the Default Key field, select one number to use as the default key from the drop-down menu.

Step 4. Manually type in a string of characters in the corresponding Key # field that you have selected in step 3.

Step 5. Click Apply changes to allow the settings to take effect.

Note: When setting up WEP without using the Passphrase function, if the Key Type is set to Hex, only hexadecimal characters (range: 0~9 and A~F) can be used. When Encryption is set to 64 bit, 10 Hex characters can be entered in the Key field. And for 128 bit Encryption setting, a maximum of 26 Hex characters cna be entered to generate the key string. If the Key Type is set to ASCII, and Encryption is set to 64 bit, then 5 ASCII characters can be used in the Key field. And for 128 bit Encryption, 13 ASCII characters can be used.

Wireless PC Card

Link Information

This screen displays current connection information of the WN4301AEP 802.11b/g Wireless LAN PC Card.
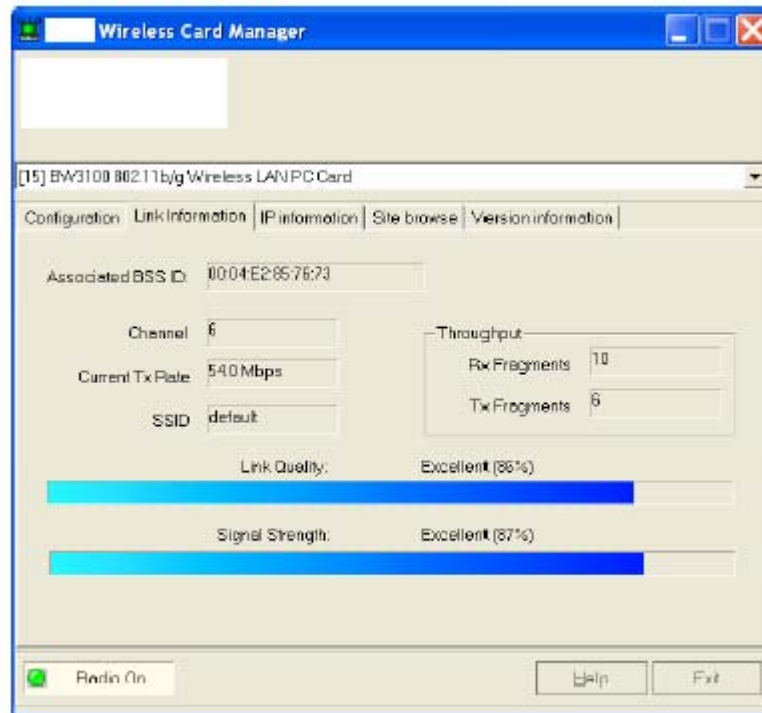
Associated BSS ID — The MAC address of the access point to which the card is connected in an infrastructure mode. In an ad hoc network, the BSS ID is a random number generated by the first station that communicates with other clients in the network.

Channel — This is the radio channel through which the access point communicates to clients in its BSS. A Basic Service Set (BSS) consists of a group of wireless stations and an access point. When a wireless card is operating in the infrastructure mode, the card will set itself to the same channel as that used by the access point.

For ad hoc mode, set the channel to the same as that used by the other wireless clients within the same group.

Current Tx Rate — The data transmission rate.

SSID — The Service Set Identification of the wireless network to which the card is connected.

Rx Fragments — The number of received fragments.

**Tx Fragments** — The number of transmitted fragments.

Link Quality — Shows the link quality or the current wireless connection.

Signal Strength — Indicates the relative strength of the connection between the card and the connected wireless device.

IP information

This screen displays IP information for your notebook. Now that you have configured your card to connect to wireless networks, you need to obtain new network settings.
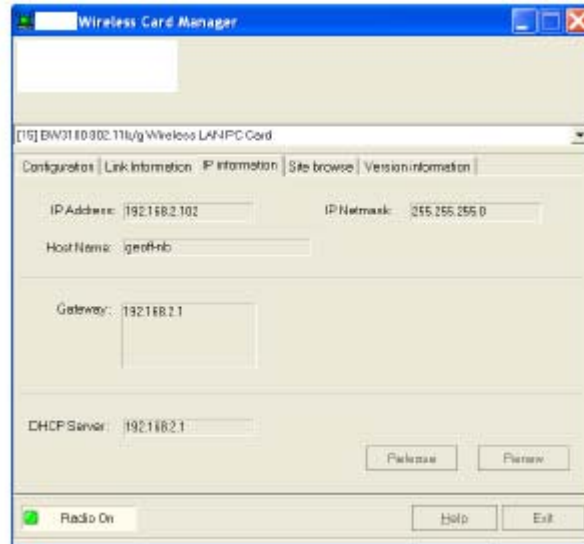
IP Address — Internet address of the notebook.

IP Netmask — A mask used to determine to what subnet an IP address belongs.

Host Name — The notebook's name on the network.

Gateway — The IP address of the Gateway of your network.

**DHCP Server** — The IP address of the DHCP server.

Release — Click this button to release the current IP settings of the card.

Renew — Click this button to obtain new IP settings for the card.

Site browse

Site browse scans and displays all wireless devices within the wireless LAN pc card's signal range. Doulbe click on an entry, without a key icon, can connect automatically to that wireless device.
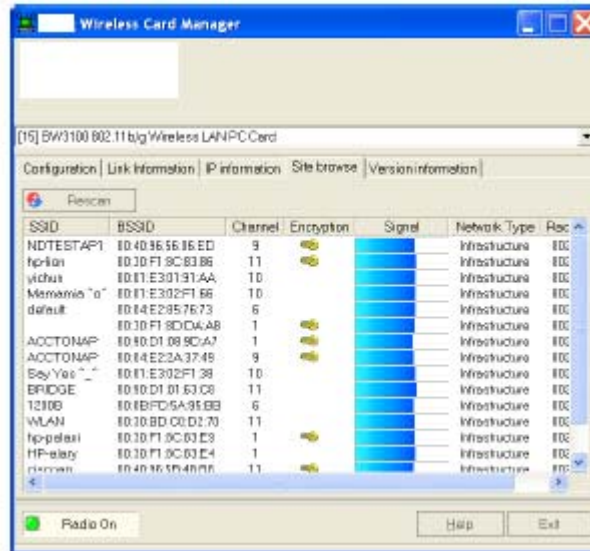
Rescan — Click this button to scan for available network connections.

SSID — Service Set ID (see "Configuration" on page 11 for details).

BSSID — Basic Service Set ID (see "Link Information" on page 14 for more information).

Channel — The radio channel on which the wireless device operates.

Encryption — The key icon indicates that the encryption function has been enabled.

Signal — Shows the signal strength from the adapter to the listed wireless devices.

Network Type — This indicates the operating mode of the listed wireless devices (see "Configuration" on page 11 for more information).

Radio Type — Shows the wireless network is operating in the 802.11g or 802.11b. The EPSON WN4301AEP 802.11b/g Wireless LAN PC Card has backward compatibility, so, an 802.11g adapter can connect directly with an 802.11b wireless device (and vice versa).

Version information

This screen displays the information on the current version of the driver and utility.
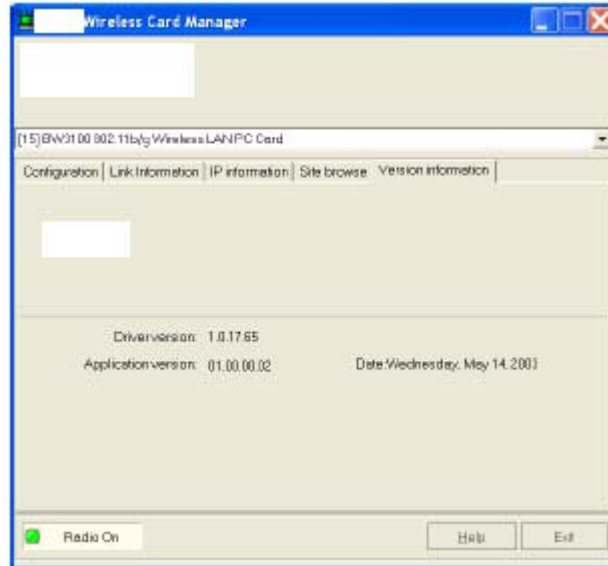
Network Configuration and Planning

This Wireless Solution supports a stand-alone wireless network configuration, as well as an integrated configuration with Ethernet LANs.

The Wireless LAN PC Card can be configured as:

- Ad hoc for peer-to peer communications
- Infrastructure for connections with wireless LANs

Network Topologies

Ad Hoc Wireless LAN

An ad hoc wireless LAN consists of a group of computers, each equipped with a wireless adapter, connected via radio signals as an independent wireless LAN. Computers in a specific ad hoc wireless LAN must be configured to the same radio channel. An ad hoc wireless LAN can be used for a branch office or SOHO operation.

Ad Hoc Wireless LAN

Notebook with
Wireless USB Adapter

Notebook with
Wireless PC Card

PC with Wireless
PCI Adapter
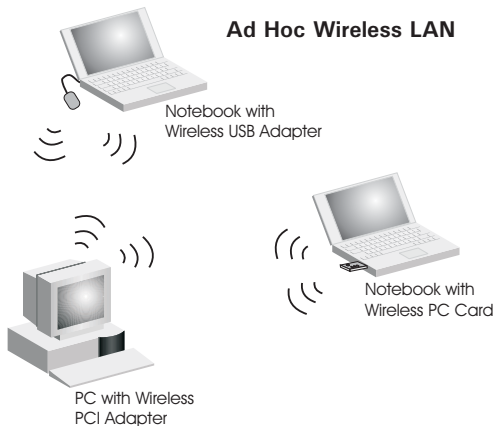
Infrastructure Wireless LAN

The Wireless 802.11g/b Card can also provide wireless workstations with access to a wired LAN. An integrated wired and wireless LAN is called an Infrastructure configuration. A Basic Service Set (BSS) consists of a group of wireless PC users, and an access point that is directly connected to the wired LAN. Each wireless PC in this BSS can talk to any computer in its wireless group via a radio link, or access other computers or network resources in the wired LAN infrastructure via the access point.

The infrastructure configuration not only extends the accessibility of wireless PCs to the wired LAN, but also extends the effective wireless transmission range for wireless PCs by passing their signals through one or more access points.

A wireless infrastructure can be used for access to a central database, or for connection between mobile workers, as shown in the following figure.
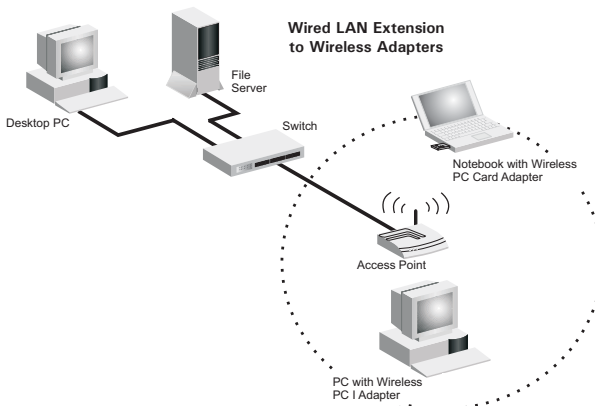
Setting the Communication Domain

Stationary Wireless PCs

The Basic Service Set (BSS) is the communication domain for each access point. For wireless PCs that do not need to support roaming, set the domain identifier (SSID) for the wireless card to the SSID of the access point you want to connect to. Check with your administrator for the SSID of the access point that you are connecting.

Roaming Wireless PCs

A wireless infrastructure can also support roaming for mobile workers. More than one access point can be configured to create an Extended Service Set (ESS). By placing the access points so that a continuous coverage area is created, wireless users within this ESS can roam freely. All wireless adapters and access points within a specific ESS must be configured with the same SSID and to the same radio channel.
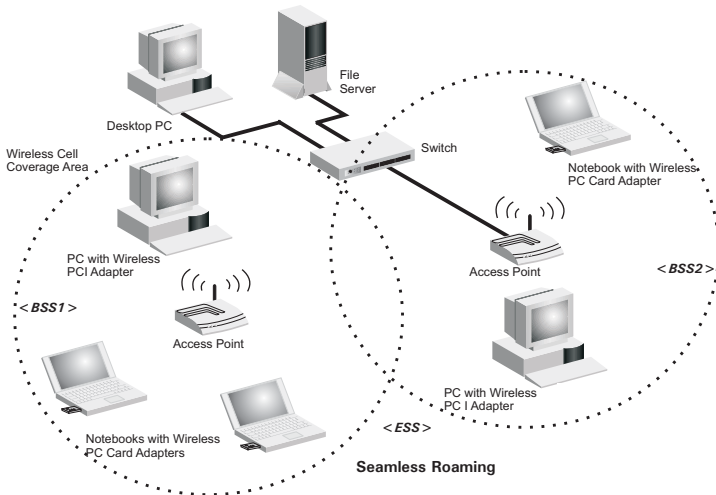
Troubleshooting

Check the following troubleshooting items before contacting Technical Support.

Adapter Installation Problems

If your laptop cannot find the Wireless PC Card or the driver software does not install correctly, check the following:

• Make sure the adapter is securely seated in the PCMCIA slot. Check for any hardware problems, such as physical damage to the card's connector.

• Try the card in another PCMCIA slot. If this also fails, test your laptop with another wireless card that is known to operate correctly.

• Make sure your laptop is using the latest BIOS.

• If there are other network adapters in the notebook, they may be causing conflict. Remove all other network adapters from the laptop and test the EPSON Wireless PC Card separately.

• Check for a defective notebook or PCMCIA connection by trying the adapter in another notebook that is known to operate correctly.

  If it still does not work, take out the wireless adapter, delete the driver and utility from your system. Then go to Control Panel and delete the adapter from your network configuration menu. Restart your notebook and reinstall the Wireless PC Card and the driver and utility software.

Network Connection Problems

If the Link LED on the Wireless PC Card does not light, or if you cannot access any network resources from the notebook, check the following:

• Make sure the correct software driver is installed for your operating system. If necessary, try reinstalling the driver.

• Make sure the notebook and other network devices are receiving power.

• The access point you want to connect to may be defective. Try connecting with another access point.

• If you cannot access a Windows or NetWare service on the network, check that you have enabled and configured the service correctly. If you cannot connect to a particular server, be sure that you have access rights and a valid ID and password.

• If you cannot access the Internet, be sure you have configured your system for TCP/IP.

If your wireless station cannot communicate with a computer in the Ethernet LAN when configured for Infrastructure mode, check the following:

• Make sure the access point that the station is associated with is powered on.

• If you still cannot connect, change the access point and all the stations within the BSS to another radio channel.

• Make sure the SSID is the same as that used by the access point for a station with roaming disabled, or the same as that used by the access points in the extended service set (ESS).

Compliances

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 or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, (example - use only shielded interface cables when connecting to computer or peripheral devices) any changes or modifications not expressly approved by the party responsible for compliance could void the user' authority to operate this equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE
FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment, under 47 CFR 2.1093 paragraph (d)(2).This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

CE Mark Declaration of Conformance for EMI and Safety (EEC)

This information technology equipment complies with the requirements of the Council Directive 89/336/EEC on the Approximation of the laws of the Member States relating to Electromagnetic Compatibility and 73/23/EEC for electrical equipment used within certain voltage limits and the Amendment Directive 93/68/EEC. For the evaluation of the compliance with these Directives, the following standards were applied:

RFI Emission:	• Limit class B according to EN 55022:1998
	• Limit class B for harmonic current emission according to EN 61000-3-2/1995
	• Limitation of voltage fluctuation and flicker in low-voltage supply system according to EN 61000-3-3/1995
Immunity:	• Product family standard according to EN 55024:1998
	• Electrostatic Discharge according to EN 61000-4-2:1995 (Contact Discharge: ±4 kV, Air Discharge: ±8 kV)
	• Radio-frequency electromagnetic field according to EN 61000-4-3:1996 (80 - 1000 MHz with 1 kHz AM 80% Modulation: 3 V/m)
	• Electrical fast transient/burst according to EN 61000-4-4:1995 (AC/DC power supply: ±1 kV, Data/Signal lines: ±0.5 kV)
	• Surge immunity test according to EN 61000-4-5:1995 (AC/DC Line to Line: ±1 kV, AC/DC Line to Earth: ±2 kV)
	• Immunity to conducted disturbances, Induced by radio-frequency fields: EN 61000-4-6:1996 (0.15 - 80 MHz with 1 kHz AM 80% Modulation: 3 V/m)
	• Power frequency magnetic field immunity test according to EN 61000-4-8:1993 (1 A/m at frequency 50 Hz)
	• Voltage dips, short interruptions and voltage variations immunity test according to EN 61000-4-11:1994 (>95% Reduction @10 ms, 30% Reduction @500 ms, >95% Reduction @5000 ms)
LVD:	• EN 60950 (A1/1992; A2/1993; A3/1993; A4/1995; A11/1997)

Specifications

Functional Criteria

Data Rate	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54 Mbps
Operating Range	Up to 18 m (60 ft) at 54 Mbps
	Up to 40 m (132 ft) at 11 Mbps

Radio Signal

Radio Technology	Orthogonal Frequency Division Multiplexing (OFDM) Complementary Code Keying (CCK)
Operating Frequency	USA (FCC): 2412~2462 MHz
	Canada (IC): 2412~2462 MHz
	Europe (ETSI): 2412~2472 MHz
	Spain: 2457~2462 MHz
	France: 2457~2472 MHz
	Japan: 2412~2484 MHz
Operating Channel	USA, Canada: 11 channels ETSI: 13 channels Spain: 2 channels France: 4 channels Japan: 14 channels
Sensitivity	-68 dBm (typical)
Output Power	+10 dBm (minimum)

Physical Characteristics

Power Consumption	TX: 480 mA, RX: 420 mA, Power Saving: 20mA
Dimensions	12.8 x 5.3 cm (5.04 x 2.09 in.)
Antenna	Built in dual antenna
LED Indicator	Link, Power/Activity
Host Interface	PCMCIA Type II

Standards Conformance

Wireless Standard	IEEE 802.11b, IEEE 802.11g

Environmental

Temperature	Operating: 0 to 55 °C (32 to 131 °F)
	Storage: -20 to 70 °C (-4 to 158 °F)
Humidity	5 to 90% (non-condensing)
Vibration/Shock/Drop	IEC 68-2-34, IEC 68-2-27, IEC 68-2-32

Wireless LAN PC Card

Certification

Emissions	EN 50081-1, EN 55022 Class B
	EN 50082-1, EN 61000-4-2/3/4/6/11
	FCC Part 15(B), ETSI 300-328,
	ARIB STD33 & T66

Software Drivers

NDIS Drivers	Windows 98
	Windows Me
	Windows 2000
	Windows XP