SMC
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USER GUIDE

SMCWCB-N

EZ Connect™ N
Draft 11n Wireless Cardbus Adapter

EZ Connect™ N Draft 11n Wireless Cardbus Adapter User Guide

From SMC's EZ line of low-cost workgroup LAN solutions

SMC®
N e t w o r k s

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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's authority to operate this equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE

Federal Communication Commission (FCC) Radiation Exposure Statement

This EUT is compliance with SAR for general population/uncontrolled exposure limits in ANSI/IEEE C95.1-1999 and had been tested in accordance with the measurement methods and procedures specified in OET Bulletin 65 Supplement C. 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 device complies with the essential requirements of the R&TTE Directive 1999/5/EC. The following references have been applied in order to prove presumption of compliance with the R&TTE Directive 1999/5/EC:

- EN 300 328
- EN 301 489-1
- EN 301 489-17
- EN 60950-1

Contents

EZ CONNECT™ N DRAFT 11N WIRELESS CARDBUS ADAPTER

Introduction

The EZ Connect N Draft 11n Wireless Cardbus Adapter is a 300 Mbps wireless network adapter with the implementation of MIMO (multiple-input/multiple-output) technology. This adapter is also backwards compatible with IEEE 802.11b,g. It seamlessly integrates with existing WLAN and Ethernet networks to support high-bandwidth applications such as HDTV or DVD video streams. 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.

It is recommended that using this card in conjunction with an 802.11n wireless access point for better multimedia transmission. Furthermore, 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

- IEEE802.11n draft v1.0 compliant
- Wireless speeds up to 300 Mbps
- Increased speed and coverage - up to 5 times the speed of IEEE 802.11g
- Fully backwards compatible with 802.11b/g wireless networks
- Allows you to stream HD video, listen to digital music, play online games, transfer large files, make VoIP calls and surf the Internet simultaneously
- WEP 64/128-bit and WPA/WPA2 wireless encryption
- Wi-Fi Multimedia (WMM) for wireless quality-of-service
- EZ Installation Wizard for easy installation
- Supports Windows 2000/XP
- WLAN management utility

System Requirements

- 2.4 GHz 802.11n draft wireless network or 2.4 GHz 802.11b/g wireless network
- Microsoft Windows 2000 or Windows XP
- Notebook with:
    - 300 MHz CPU or above
    - Available PCMCIA Type II or Type III slot
    - 20MB of available hard disk space
    - CD-ROM drive

Package Contents

- EZ Connect™ N Wireless Cardbus Adapter (SMCWCB-N)
- Installation CD containing:
    - EZ Installation Wizard
    - Manual
- Warranty registration card

Please inform your dealer if there are any incorrect, missing, or damaged parts. If possible, retain the carton, including the original packing materials. Use them again to repack the product if there is a need to return it for repair.

Hardware Description

The Wireless Cardbus Adapter supports wireless connection speed up to 300 Mbps. This card is fully compliant with specifications defined in IEEE 802.11b, IEEE 802.11g and IEEE 802.11n draft v1.0 standards. It can be installed in any notebook with a Type II or TYPE III PCMCIA slot. It supports Windows 2000/XP.

LED Indicators

The Wireless Cardbus Adapter includes two status LED indicators, as described in the following table.

LED	Status	Description
Link	On	Indicates a valid connection with an access point.
	Flashing	Indicates that the Wireless Cardbus Adapter is scanning for available networks.
Activity	Flashing	Indicates that the Wireless Cardbus Adapter is transmitting/receiving data.

Installation

The CD labeled "Driver and Utility CD" that comes with the package contains the software drivers and utilities available for the Wireless Cardbus Adapter.

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

IMPORTANT: Do not insert the Wireless Cardbus Adapter until instructed.

1. Put the EZ Installation & Documentation CD in to your CD-ROM drive. The CD will auto run. If the CD does not auto run browse to your CD drive & double-click the **SMCWCB_N.exe** file

2. Click **Install Driver/Utility** to start the installation Wizard.

3. To install to the default folder location click **Next**. It is recommended to use the default folder location unless you are an advanced user. To change the installation folder click the **Browse** button and specify a new location. Click **Next** to continue.
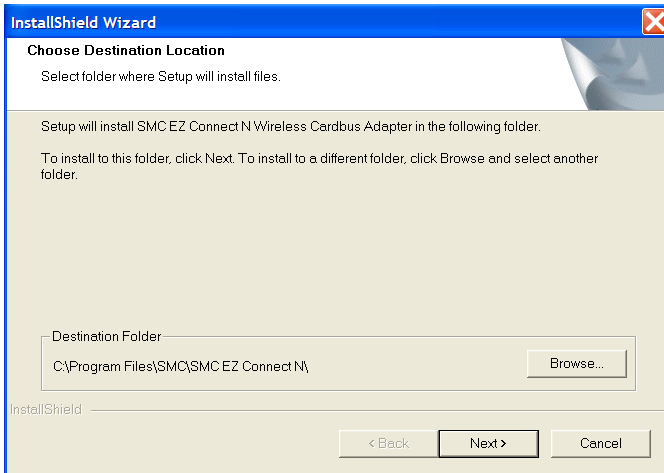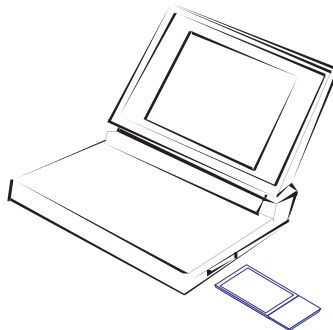

4. When instructed insert the Wireless Cardbus Adapter.
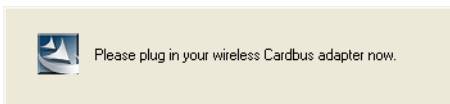
Warnings: Network cards are sensitive to static electricity. To protect the card, always touch the metal chassis of your notebook or the ground before handling the card.
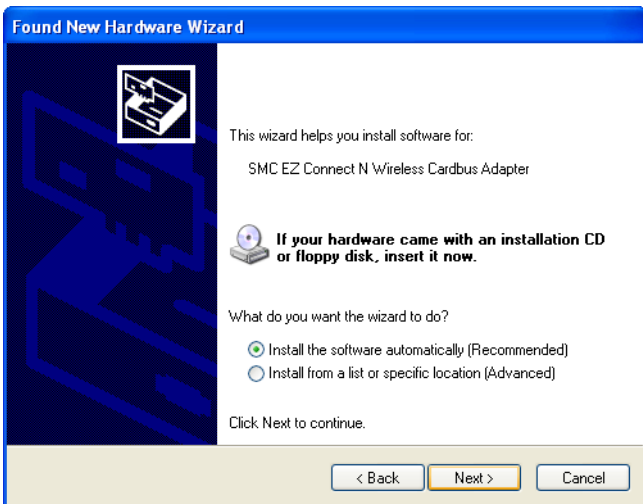
5. Slide the card completely into the PCMCIA slot.

Note: The PCMCIA slot allows you to "hot swap" PC Cards any time.

6. The **Found New Hardware Wizard** will appear. Click **No, not this time**, then **Next**.

Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy

Can Windows connect to Windows Update to search for software?

○ Yes, this time only
○ Yes, now and every time I connect a device
○ No, not this time

Click Next to continue.

< Back   Next >   Cancel

7. Choose the **Install the software automatically (Recommended)** option, and click **Next**.

Found New Hardware Wizard

This wizard helps you install software for:

SMC EZ Connect N Wireless Cardbus Adapter

💿 **If your hardware came with an installation CD or floppy disk, insert it now.**

What do you want the wizard to do?

⊙ Install the software automatically (Recommended)
○ Install from a list or specific location (Advanced)
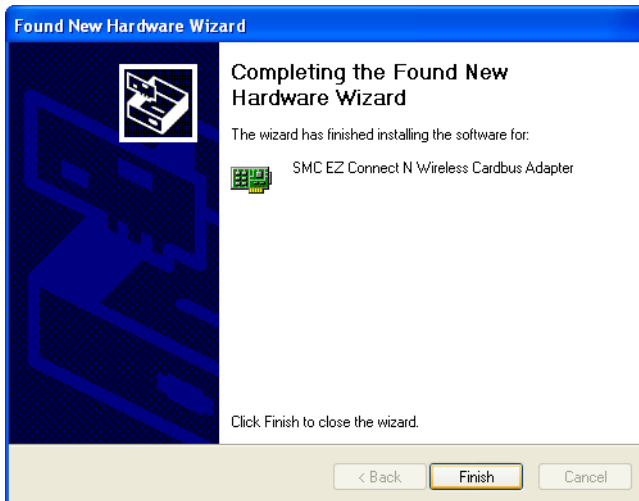
Click Next to continue.

< Back   Next >   Cancel

8. A **Hardware Installation** warning may appear. Click **Continue Anyway** to proceed with the installation.
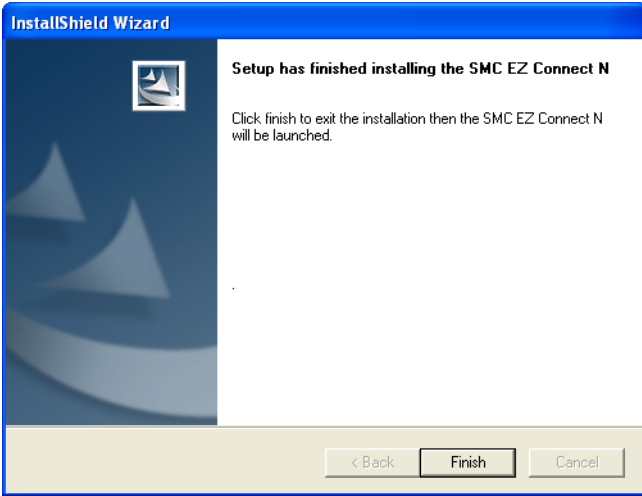

Note: Do not select STOP Installation, as this will cancel the installation process, and the drivers will not be installed properly.

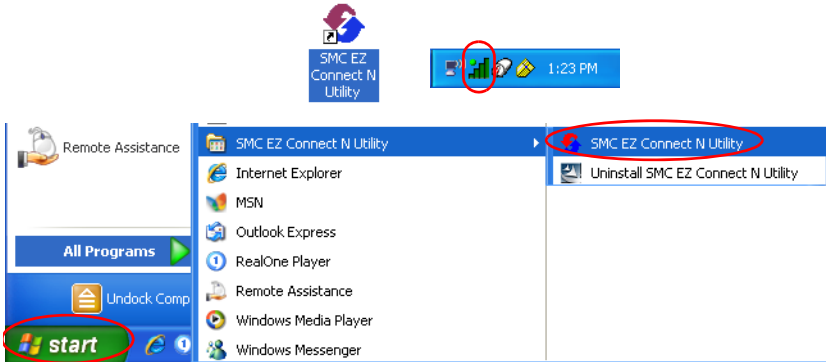9. Click **Finish** to close Hardware Wizard.

10.Click **Finish** to complete the Driver/Utility installation. You are now ready to configure your wireless network.

Utility Configuration

Double-click the shortcut icon on the desktop, or from the task bar to launch the utility. You can also access the utility program from the Start menu.

The configuration utility includes the following five tabs:

Configuration — Allows you to configure wireless LAN profiles.

Link Information — Shows link status information.

IP Information — Shows IP configuration information and bandwidth utilization.

Site Survey — Scans/Shows available wireless networks.

Version Information — Shows software version information.

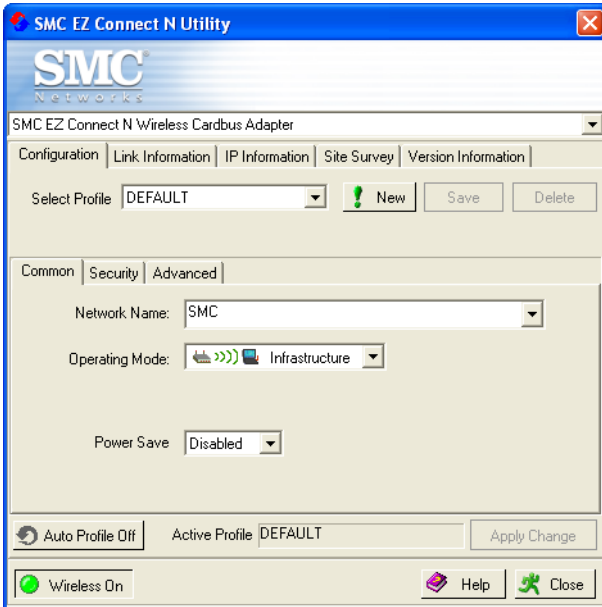At the bottom of the screen, there are three boxes that can be selected:

Wireless On/Off — Click this button to turn on/turn off the radio signal of the adapter.

Help — Click this button to view the help file.

Close — Click this button to exit the utility.

Configuration

This utility allows you to set the parameters for the wireless adapter.

Select Profile — To specify a profile for a specific configuration of parameters.

New — Click this button to create a new profile.

Save — Click this button to save a profile after configuring the settings.

Delete — Select the profile from the drop-down menu, and click this button to delete the profile.

Auto Profile On/Off — Click this button to turn on/off the Auto Profile feature.

Active Profile — The profile settings that you are using for the current connection.

Common Tab

Network Name (SSID) — The network name is the Service Set ID (SSID) of a wireless network. Enter the SSID of the wireless network to which you want to connect, or select the SSID from the drop-down list.

Operating Mode — Select Infrastructure mode if you are connecting to a wireless access point or a router. Select Ad Hoc mode to make a peer-to-peer connection directly with other wireless clients. In Ad Hoc mode you will also be required to select the wireless channel. Be sure to use the same channel for the access point and all clients in your network.

Power Save — Enable or disable the power saving feature.

Security Tab

Go to the security tab to set the security features for your adapter.
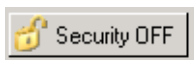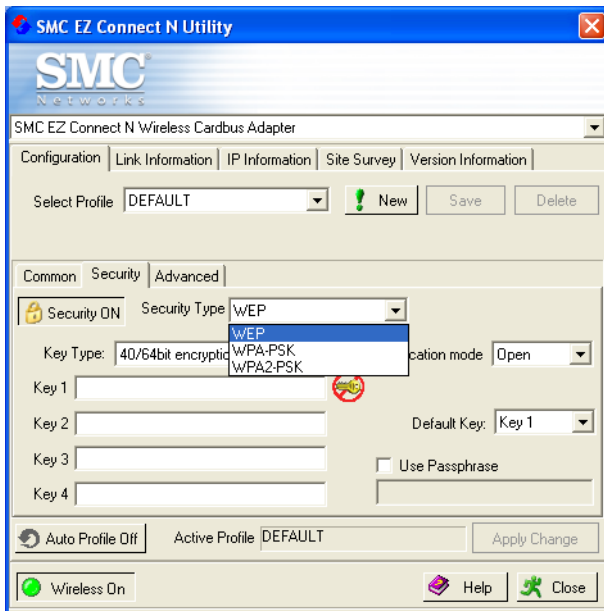
 Click on this security button to turn on/turn off the security function.

Turn on the security function, and set wireless encryption keys for your Wireless Cardbus Adapter.

To prevent unauthorized access to your wireless network, WEP 64-bit/128-bit, WPA-PSK and WPA2-PSK encryption types are supported.

WEP

Security Type — WEP (Wired Equivalent Privacy) is provided with the Wireless Cardbus Adapter. WEP security protects your wireless LAN against eavesdropping and intrusion by hackers.

Key Type — Select 40/64-bit encryption, 40/64-bit encryption (ASCII), 128-bit encryption, or 128-bit encryption (ASCII).

Authentication Mode — Choose Open or Shared.

Default Key — Choose one key, 1~4, for encryption.

Use Passphrase — Check this box to auto-generate keys for encryption. First, check this box, then enter a string of characters into the space. Encryption keys will be generated automatically.

When Key Type is set to 128-bit, only one key will be generated. If Key Type is set to 64-bit, four keys will be generated. Note that you must use the same passphrase and default key on all the other clients in your network.

How to set up WEP:

If you are transmitting sensitive data across wireless channels, you should enable Wired Equivalent Privacy (WEP) encryption. WEP provides a basic level of security, preventing unauthorized access to the network and encrypting data transmitted between wireless clients and the access point. WEP uses static shared keys (fixed-length hexadecimal or alphanumeric strings) that are manually distributed to all clients that want to use the network. WEP is the security protocol initially specified in the IEEE 802.11 standard for wireless communications. For more robust wireless security, the Wireless Cardbus Adapter provides Wi-Fi Protected Access (WPA-PSK) and WPA2-PSK for improved data encryption and user authentication.

Only one key is needed for WEP to function. However, the IEEE 802.11 standard specifies that there must be four keys for each device. For security purposes, the key should be changed on a regular basis. Multiple keys are supported to allow the user to change keys with minimal disruption of the network.

To set up the WEP function, take the following steps:

1. Select 40/64-bit encryption, 40/64-bit encryption (ASCII), 128-bit encryption,or 128-bit encryption (ASCII) in the Key Type field.

2. To automatically generate keys, check the Use Passphrase box, and type in a string of characters in this field.

3. In the Default Key field, select one key as the default key that you want to use for encryption.

4. Click Apply Change to allow the settings to take effect.

Or

1. Select 40/64-bit encryption, 40/64-bit encryption (ASCII), 128-bit encryption,or 128-bit encryption (ASCII) in the Key Type field.

2. In the Default Key field, select one key as the default key that you want to use for encryption.

3. Manually type in a string of characters in the corresponding key number field that you selected in step 2.

4. Click Apply Change to allow the settings to take effect.

When setting up WEP without using the Use 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, a maximum of 10 Hex characters can be entered in the Key field. When encryption is set to 128-bit, a maximum of 26 Hex characters can be used. If the Key Type is set to ASCII, and encryption is set to 40/64-bit, then 5 ASCII characters can be used in the Key field. For 128-bit encryption, 13 ASCII characters can be used.

WPA-PSK/WPA2-PSK Encryption Type
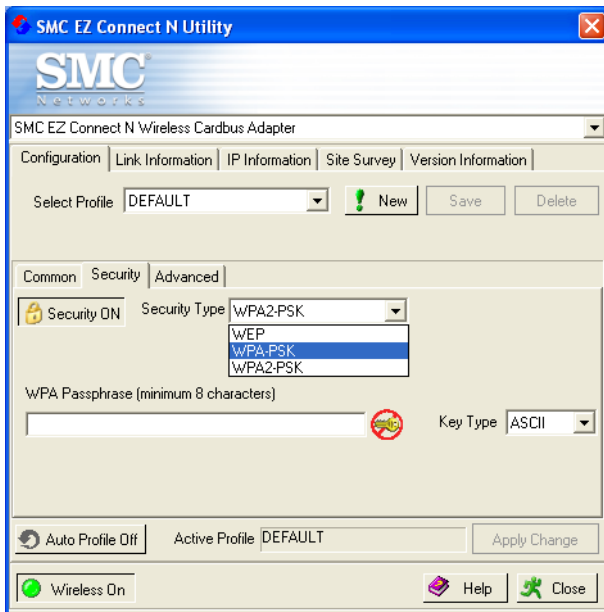
Wi-Fi Protected Access is a standards-based, interoperable security enhancement that strongly increases the level of data protection and access control for existing and future wireless LAN systems. It will be forward-compatible with IEEE 802.11i standard. WPA/WPA2 employs a combination of several technologies to provide an enhanced security solution for 802.11 wireless networks, including TKIP (Temporal Key Integrity Protocol) for data protection and 802.1x for authenticated key management. WPA/WPA2 provides a simple operating mode that uses just a pre-shared password for network access. The Pre-Shared Key (PSK) mode uses a common password for user authentication that is manually entered on the access point and all wireless clients on the network.

To use the WPA-PSK/WPA2-PSK function, take the following steps:

1. Select **Security Type**, WPA-PSK/WPA2-PSK from the drop-down menu.

2. Type in the **WPA/WPA2 Passphrase** (Pre-Shared Key).

13

3. Select ASCII or Hex in the **Key Type** field.

4. Click Apply Change to allow the settings to take effect.

If there is no authentication server on your SOHO network, you can issue the Pre-Shared Key to the adapter that is connected to the access point. Be sure to use the same key for the wireless access point and the connected adapter.

Notes:1. Manual Pre-Shared Key supports up to 64-Hex characters.

2. Type 8 - 63 Hex characters for the Pre-Shared Passphrase.

3. Do not use a key that is long and complex for your clients to type accurately, as you might forget it.

4. A Hex (hexadecimal) digit is a number or letter in the range 0-9 or A-F.

Advanced
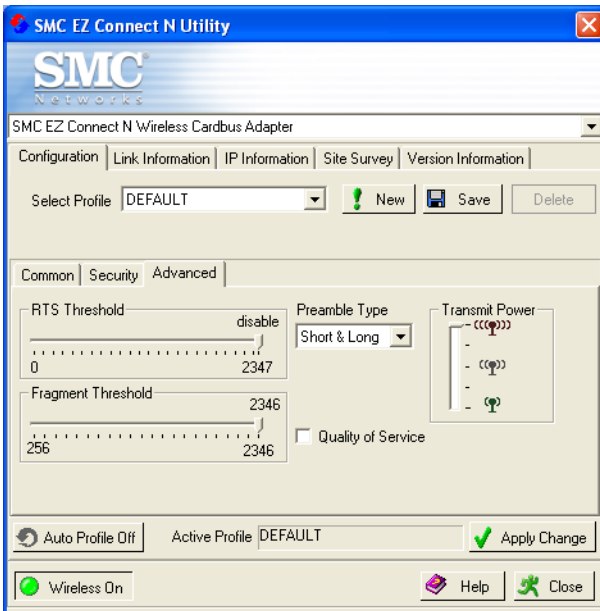
RTS Threshold – This sets the packet size threshold at which a Request to Send (RTS) signal must be sent to the receiving station prior to the sending station starting communications. Devices contending for the wireless medium may not be aware of each other. The RTS/CTS mechanism can solve this problem. The larger the threshold, the faster the speed.

Fragment Threshold – Sets the minimum packet size that can be transmitted from the adapter without being fragmented. Fragmentation can increase the reliability of

transmissions because it increases the probability of a successful transmission due to smaller frame size. The larger the threshold, the faster the speed.

Preamble Type – The preamble is used to acquire the incoming signal and synchronize the receiver. If all the clients in your service area support the short preamble or can automatically set the preamble type, then setting the preamble on the access point to short can boost your throughput. (Options: Short & Long, Long only, Short only; Default: Short & Long)

Transmit Power – Move the slider bar up and down to select an appropriate transmission power. Lower power reduces interference, higher power gives more range.

Link Information

The Link Information screen displays the information on the current wireless network to which you are connected.
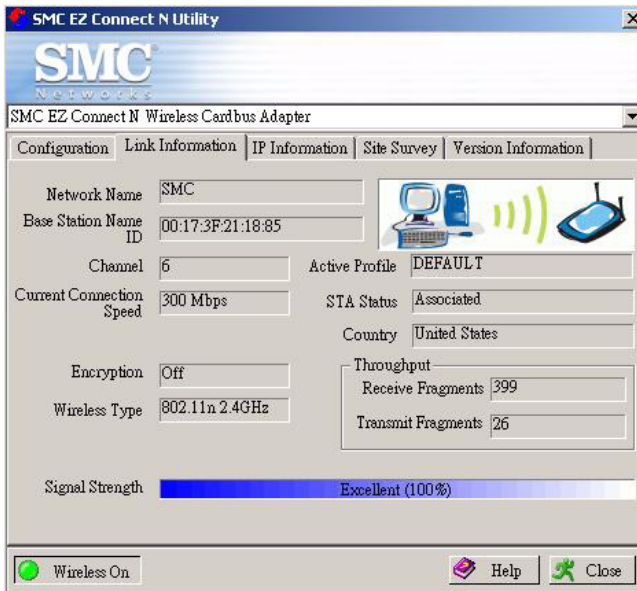
Network Name — This is the Service Set ID (SSID) for the wireless network to which you want to connect.

Base Station Name ID — The MAC address of the access point to which the card is connected in an infrastructure network. In an ad hoc network, this ID is a random number generated by the first station that communicates with other stations in the network. The BSS ID of the other stations will then be set to the same value.

Channel — This is the radio channel through which the access point communicates to stations within the same network. A Basic Service Set (BSS) consists of a group of wireless PCs and an access point that is directly connected to the wired LAN. To establish an ad hoc network, make sure the **Channel** is set 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, the adapter will automatically use the same channel as that used by the access point.

Note: The available channel settings are limited by local regulations that determine the number of available channels.

Current Connection Speed — Shows the speed of the current wireless connection. The Wireless Cardbus Adapter supports up to 300 Mbps connections to your WLAN networks. This card is fully compliant with specifications defined in IEEE 802.11b, IEEE 802.11g and IEEE 802.11n draft v1.0 standards.

Encryption — This shows the encryption type of your wireless network.

Wireless Type — This adapter supports 802.11b, 802.11g and 802.11n modes.

Active Profile — Displays the profile that you are using for the current connection.

STA Status — This is the station status.

Country — Shows the country where you are using the adapter.

Throughput — Shows the total number of data packets transmitted and received.

Signal Strength — Shows the relative strength of the wireless connection.

IP Information

This screen displays IP information for your laptop. Now that you have configured your adapter to connect to wireless networks, your laptop needs to obtain new network settings. To release the current network settings, click on **Release**, then click on **Renew** to obtain new IP settings.
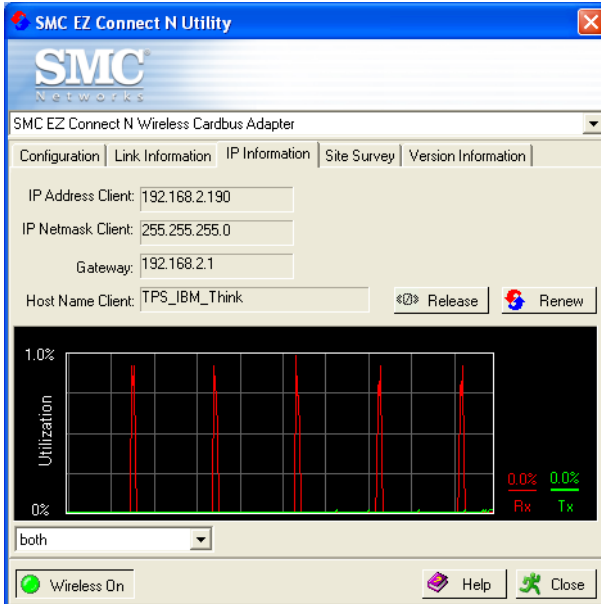
**IP Address Client** — Internet address of the computer.

IP Netmask Client — A netmask is a set of four number blocks separated by periods. Each number is normally represented as the decimal equivalent of an eight-bit binary number, between 0 and 255. Every IP address consist of two parts (the network address and the host number). The netmask is used to determine the size of these two parts. The positions of the bits that are set in the netmask are considered to represent the space reserved for the network address, while the bits that are cleared are considered to represent the space set aside for the host number.

Gateway — The IP address of the Gateway.

Host Name Client — The computer's name on the network.

Site Survey

The Site Survey screen displays available wireless networks. Choose one of them to connect to by double-clicking on an entry.
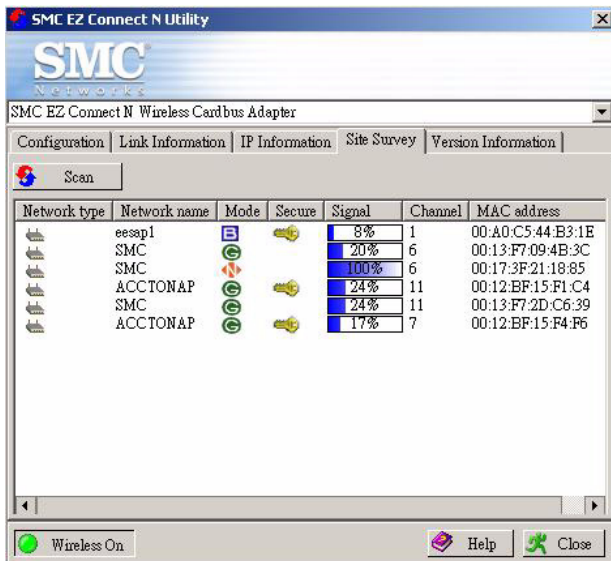
Network Type — Shows the network type. See "Configuration" on page 10.

Network name — Service Set ID (SSID) of the wireless network. See "Configuration" on page 10.

Mode — Shows the wireless connection mode. If the network is operating in 802.11b mode a "B" will be displayed, in 802.11g mode a "G" displayed and in 802.11n mode an "N" displayed.

Secure — A symbol of a key will be displayed when encryption is enabled for the corresponding SSID. If no key is displayed security is not present.

**Signal** — Displays the signal strength of the wireless network.

Note: The signal strength does not automatically refresh. To update click the Scan button.

Channel — Displays wireless channel configured on the wireless device.

MAC address — This is the MAC address of the listed wireless devices.

Version Information

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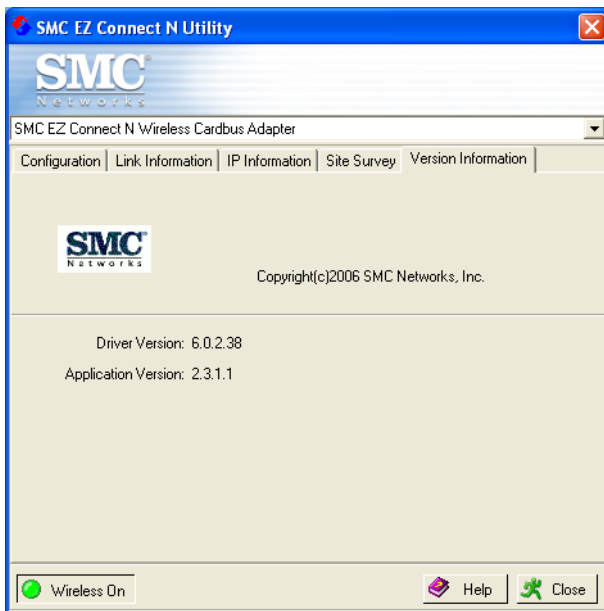
Network Configuration and Planning

This Wireless Solution supports a stand-alone wireless network configuration, as well as an integrated configuration with Ethernet LANs.
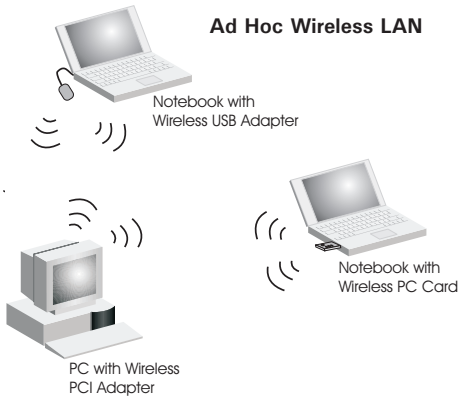
The Wireless Cardbus Adapter can be configured as:

• Ad hoc for departmental or SOHO LANs
• Infrastructure mode for networked 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

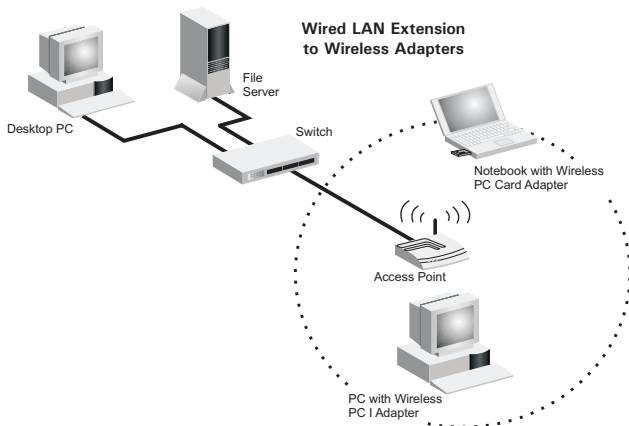PC with Wireless
PCI Adapter

Infrastructure Wireless LAN

The Wireless Cardbus Adapter 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 signal 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.


Wired LAN Extension to Wireless Adapters

File Server

Desktop PC

Switch

Notebook with Wireless PC Card Adapter

Access Point

PC with Wireless PC I Adapter

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 to which you want to connect. Check with your administrator for the SSID of the access point to which you should connect.

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.
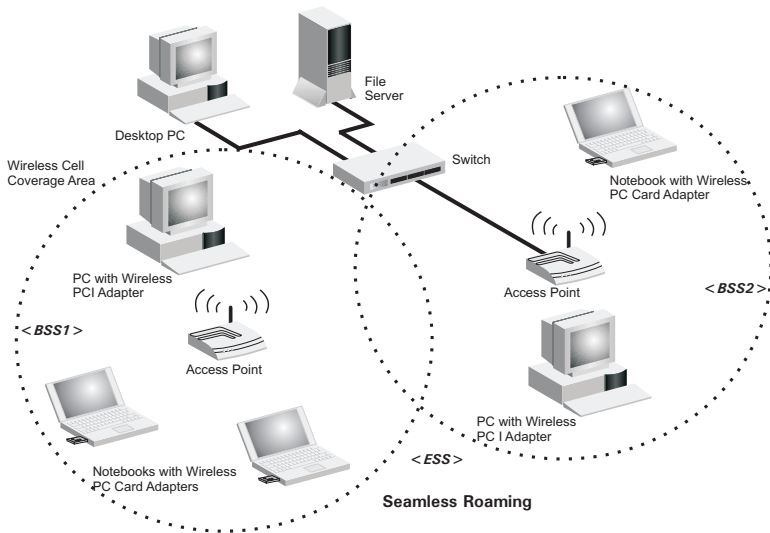
Troubleshooting

Check the following troubleshooting items before contacting technical support.

Adapter Installation Problems

If your computer cannot find the Wireless PC Card or the network driver 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 computer with another wireless card that is known to operate correctly.
- Make sure your computer is using the latest BIOS.
- If there are other network adapters in the computer, they may be causing conflict. Remove the other network adapters from the computer and test the wireless adapter separately.
- Check for a defective computer or PCMCIA connection by trying the adapter in another computer that is known to operate correctly.

If it still does not work, take out the wireless adapter. Then go to "Control Panel" and delete the adapter from your network configuration menu. Restart your PC and reinstall the card.

Network Connection Problems

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

- Make sure the correct software driver is installed for your operating system. If necessary, try reinstalling the driver.
- Make sure the computer and other network devices are receiving power.
- The access point you want to attach to may be defective. Try using 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).

Specifications

General Specifications

Functional Criteria

Wireless Network	IEEE802.11b: up to 11 Mbps
	IEEE 802.11g: up to 54 Mbps
	IEEE802.11n draft v1.0: up to 300 Mbps
Operating Range	Outdoor: Up to 300 m (984 ft)
	Indoor: Up to 100 m (328 ft)

Radio Signal

Signal Type	Direct Sequence Spread-Spectrum (DSSS)
Modulation	CCK, OFDM
Operating Frequency	USA (FCC) and Canada (IC): 2.412 ~ 2.462 GHz
	Europe (ETSI): 2.412 ~ 2.472 GHz
	Spain: 2.457 ~ 2.462 GHz
	France: 2.457 ~ 2.472 GHz
	Japan (STD-T66/STD-33): 2.412 ~ 2.484 GHz
Operating Channels	USA (FCC) and Canada (IC): 11 channels
	Europe (ETSI): 13 channels
	Spain: 2 channels
	France: 4 channels
	Japan (STD-T66/STD-33): 14 channels
Sensitivity	-68 dBm (typical)
Output Power	11b : 21.52 dBm
	11g : 25.01 dBm
	Draft 11n:
	MCS8 (20MHz) : 25.75 dBm
	MCS8 (40MHz) : 22.92 dBm

Physical Characteristics

Power Consumption	3.3 V, stand by mode: 0.24, sleep mode: 0.04. transmit mode: 0.36, receive mode: 0.23
Dimensions	Type II PC Card + antenna 12.8 x 5.3 cm (5.04 x 2.09 in.)
Antenna	Built-in dual antenna
LED Indicator	Link, Activity
Host Interface	PCMCIA, Type II

Standards Conformance

Wireless Standard	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n draft v1.0

Environmental

Temperature	Operating: 0 to 40 °C (32 to 104 °F)
	Storage: -10 to 70 °C (14 to 158 °F)
Humidity	5 to 90% (non-condensing)
Vibration/Shock/Drop	IEC 68-2-34, IEC 68-2-27, IEC68-2-32

Certification

CE Mark	EN 50081-1, EN 55022 Class B
	EN 50082-1, EN 61000-4-2
Emissions	FCC Part 15(B), ETS 300-328, VCCI

Software Drivers

Drivers	Windows 2000
	Windows XP

SMC Networks

SMCWCB-N