SENAO

Wireless LAN Card

SL-2011 CD

User's Manual

Before operating the unit, please read this manual thoroughly,
and retain it for future reference.

Manufactured by
ISO-9001
Certified Factories

Contents

Chapter 1 Introduction

This chapter describes the general features, applications and network configurations of SL-2011CD wireless LAN products.

1-1 Package Contents

The PC Card package contains the following items
1. One PC Card
2. Two PC Card Driver and Utility Diskettes
3. One User's Manual

1-2 System Requirements

Installation of the PC Card requires:
1. PC/AT compatible computer with PCMCIA Type II slot.
2. Windows 95/98 or Windows NT4.0 operating system environment.
3. Minimum 1.3M bytes free disk space for installing the PC Card driver and utility program.

1-3 Features

1. Comply with IEEE802.11b standard
2. Secure and robust Direct Sequence Spread Spectrum (DSSS) technology
3. Data rate up to 11Mbps
4. Wide coverage range up to 250 meters in open space
5. Built-in antenna and connector for external antenna (optional) ensure optimal RF performance
6. Plug and Play PC Card type II interface
7. Support operation with Windows 95/98 and Windows NT4.0 operating systems
8. Multi-channel frequency selection from license-free 2.4GHz ISM band

1-4 Applications

The SL-2011CD wireless LAN products are easy to install and highly efficient. The following list describes some of the many applications made possible through the power and flexibility of wireless LANs:

1. Difficult-to-wire environments

There are many situations where wires can not or not easily be laid. Historic buildings, older buildings, open areas and across busy streets make the installation of LANs either impossible or very expensive.

2. Temporary workgroups

Consider situations in parks, athletic arenas, exhibitions, disaster-recovery, temporary office and construction sites where one wants a temporary WLAN established and removed.

3. The ability to access real-time information

Doctors/nurses, point-of-sale employees, and warehouse workers can access real-time information while dealing with patients, serving customers and processing information.

4. Frequently changed environments

Show rooms, meeting rooms, retail stores, and manufacturing sites where frequently rearrange the workplace.

5. Small Office and Home Office (SOHO) networks

SOHO users need a cost-effective, easy and quick installation of a small network.

6. Wireless extensions to Ethernet networks

Network managers in dynamic environments can minimize the overhead caused by moves, extensions to networks, and other changes with wireless LANs.

7. Wired LAN backup

Network managers implement wireless LANs to provide backup for mission-critical applications running on wired networks.

8. Training/Educational Facilities

Training sites at corporations and students at universities use wireless connectivity to ease access to information, information exchanges, and learning.

1-5 Network Configurations

To better understand how the SL-2011CD wireless LAN products work together to create a wireless network, it might be helpful to depict a few of the possible SL-2011CD network configurations. The SL-2011CD wireless LAN products can be configured as:

1. Ad-hoc (or peer-to-peer) for departmental or SOHO LANs.
2. Infrastructure for enterprise LANs.
3. IP Sharing for 56K/ISDN TA/Cable/XDSL Modem - Connect Internet and your SOHO network.

Ad-hoc (peer-to-peer) Mode

This is the simplest network configuration that several computers equipped with the PC cards that form a wireless network whenever they are within range of one another. In ad-hoc mode, each client, is peer-to-peer, would only have access to the resources of the other client and requires no the access point. This is the easiest and least expensive way for the SOHO to set up a wireless network.

Infrastructure Mode

The infrastructure mode requires the use of an access point (AP). In this mode, all wireless communications between two computers have to be via the AP no matter the AP is wired to Ethernet network or stand-alone. If used in stand-alone, the AP can extend the range of independent wireless LANs by acting a repeater, which effectively doubling the distance between wireless stations.

If wired to an Ethernet network, the AP serves as a bridge and provides the link between the server and the wireless clients. The wireless clients can move freely throughout the coverage area of the AP while remaining connected to the server. Since the AP is connected to the wired network, each client would have access to server resources as well as to other clients.

Access points have a finite range, on the order of 50 meters indoor and 100 meters outdoors. In a very large facility such as an enterprise, a warehouse, or on a college campus, it will probably be necessary to install more than one access point to cover an entire building or campus. In this scenario, access points hand the client off from one to another in a way that is invisible to the client, ensuring unbroken connectivity. Wireless clients can roam seamlessly between different coverage areas and remain connected to the network.

IP Sharing

In infrastructure mode, in addition to acting as a bridge between an Ethernet and wireless network, the AP can be configured as an IP sharing device for Internet access. You don't have to buy an expensive router. Nor you have to buy several modems and setup phone lines. Just share one AP, one Modem, single dial-up account, and one phone line, dozens of network users can go surfing the Internet concurrently.

Chapter 2 Hardware Installation

This chapter describes how to install the PC Card into the PC Card slot of your computer.

2-1 Hardware Description

The PC Card is a standard PC Card that fits into any PCMCIA Card Type II slot.

2-2 Installing the PC Card

1. Shut down your computer.
2. Insert the PC Card into the PC Card slot of your Computer.
3. Slide in the PC Card until it seats snugly.

2-3 Removing the PC Card

When removing the card, use the release lever or button on your card slot to release the card.

2-4 Optionally Available

1. ISA to PC Card-bus adapter
   The ISA to PC Card-bus adapter enable you to install the PC Card into a computer without a PC Card slot, for example a desktop computer.

Chapter 3 Software Installation

This chapter describes how to install the PC Card drivers and software under Windows 95, Windows 98 and Windows NT v4.0 environment.

3-1 Installing Windows 95 Drivers

The PC Card is a Plug and Play device (Windows 95 supports "Plug & Play" for PC Cards). Once you insert the PC Card into your computer, Windows 95 will automatically detect the card, and prompt you to install the driver. Just follow the instructions to install the driver.

Before Installing the Drivers

During the installation, Windows 95 may need to copy Windows systems files from the Windows 95 installation diskette or CD-ROM. Therefore you will need a copy of the Windows 95 installation diskette or CD-ROM at hand before installing the driver. On many systems, instead of a CD, the necessary installation files are archived on the hard disk in C:\WINDOWS \OPTIONS\CABS directory.

Installation Procedure:

1. Insert the PC Card into the PCMCIA slot of your computer.

2. Turn on your computer.

3. Windows will automatically detect your PC Card. Once Windows has identified the PC Card, it then prompts "Update Device Driver Wizard".

4. Insert the "SL-2011CD Driver & Utility" diskette into the floppy disk drive A, and click "Next". Windows will find the PC Card driver. Then click "Finish".

5. If it's the first time for you to setup a network on this computer, Windows will ask you to enter a computer name and workgroup name as.

6. Click "OK" to bring out the "Network/Identification" window as shown. The description field may be left blank. Enter a computer name, workgroup name and click "Close".

7. Windows may attempt to copy part of software from original Windows 95

CD-ROM. Please insert the Windows 95 CD-ROM, and then click "OK".

8. In the "Copying Files" dialog box. Enter the location of "Windows 95 CD-ROM", and click "OK".

9. The computer will load the PC Card Driver from floppy drive A automatically. In the "Copying Files" dialog box. Enter the location (e.g. "A:\") of the PC Card driver.

10. After finishing loading, the computer will display a dialog box titled "System Settings Change". Remove the " Driver & Utility" diskette from floppy disk drive A. Click "Yes" to restart your computer.

3-2 Installing Windows 98 Drivers

The PC Card is a Plug and Play device (Windows 98 operating systems support "Plug & Play" for PC Cards). Once you insert the PC Card into your computer, Windows 98 will automatically detect the card, and prompt you to install the driver. Just follow the instructions to install the driver.

Before Installing the Drivers

During the installation, Windows 98 may need to copy Windows systems files from the Windows 98 installation diskette or CD-ROM. Therefore you will need a copy of the Windows 98 installation diskette or CD-ROM at hand before installing the driver. On many systems, instead of a CD, the necessary installation files are archived on the hard disk in C:\WINDOWS \OPTIONS\CABS directory.

Installation Procedure:

1. Insert the PC Card into the PCMCIA slot of your computer.

2. Turn on your computer.3. Windows will automatically detect your PC Card. Once Windows has
identified the PC Card, it then prompts a dialog box titled "Add New Hardware Wizard". Then click "Next".

4. Select the "Search for the best driver for your device", and click "Next".

5. Insert the "SL-2011CD Driver & Utility" diskette into the floppy disk drive. Select "Floppy disk drives". Then click "Next".

6. Windows will find the driver. Click "Next".

7. Windows may attempt to copy part of software from original Windows 98 CD-ROM. Please insert the Windows 98 CD-ROM, and then click "OK".

8. In the "Copying Files" dialog box. Enter the location of "Windows 98 CD-ROM", and click "OK".

9. After finishing loading, the computer will display "windows has finished installing the software that your new hardware device requires".

10. Click "Complete" to bring out a dialog box titled "System Settings Change". Remove the "Driver & Utility" diskette from floppy disk drive A. Click "Yes" to restart your computer.

3-3 Installing Windows NT Drivers

Unlike Windows 95/98, Windows NT 4.0 does not support "Plug & Play"; therefore, you need to install the driver of the PC Card manually.

Before Installing the Drivers

During the installation, Windows NT may need to copy Windows systems files from the Windows NT installation diskette or CD-ROM. Therefore you will need a copy of the Windows NT installation diskette or CD-ROM at hand before installing the driver.

1. Insert the PC card into your computer.
2. Power up and log in with "administrator privileges".
3. Enable the PC Card controller.

3-1 Click the "Start" button, select "Settings" and then click "Control Panel".

3-2 In the "Control Panel", double-click the "PC Card" icon to open the "PC Card Device" window.

3-3 Double-click the "PC Card Sockets" to enable it.

3-4 Click "OK" and close the "PC Card Device" window.

4 Run "NT Diagnostics" to avoid a device conflict. During the driver installation, Windows NT prompts you to confirm or modify the factory-set device values for the "PC Card I/O" and "IRQ". To make sure that you use available I/O port and IRQ values, perform the following:

4-1 Click the "Start" button, select and click "Program/Administrative Tools/Windows NT Diagnostics".

5 Enable network support

5-1 Click the "Start" button, select "Settings", and then click "Control Panel".

5-2 In the "Control Panel" window, double-click "Network" icon to open the "Network" window.

- If no network has been installed yet, you will be prompted to install it now. Click "Yes" to install Windows NT Networking, and follow the instructions as they appear on your screen.

- If networking support was already installed, you will see a window with multiple tabs. Select the "Adapters" tab, and then click the "Add" Button. When prompted for the driver, follow the "Installing Procedure" in next paragraph.

Installation Procedure

To install the PC Card on a computer running Windows NT 4.0, proceed as follows:

1. Insert the "PC Card Driver diskette for Windows NT 4.0" into the floppy drive A.
2. Click the "Start" button, select "Settings" and then click "Control Panel".
3. In the "Control Panel" window, double-click the "Network" icon to open the "Network" Window.
4. Select "Adapters" tab, and then click the "Add" button.
5. In the "Select Network Adapter" dialog box, select the "Have Disk".
6. In the "Insert Disk" window, enter "A:", then click "OK".
7. In the "Select OEM Option", click "OK".
8. In the window labeled "WLAN Card Setup", you will be asked to select or enter values for the driver parameters I/O base, IRQ Level etc.,. You must select conflict-free values for the driver parameters. The default values were chosen carefully, but are not guaranteed to be conflict-free. You can use the Windows NT Diagnostics in the Administrative Tools

group to see what I/O ports and IRQ are being used. Do not select values that conflict with those in use. You will also find in the setup window several other parameters for the PC Card to configure. Please refer to "Chapter 4 Configuration" for the description of these Parameters.

9. Click "OK" to return to "Network/Adapters" window.

10. Click "Close" to open the "Microsoft TCP/IP Properties" window. Windows NT will ask for the IP address assignment method. Select "Obtain an IP address from a DHCP server" or "Specify an IP Address".

11. Click "Apply" and then "OK" to bring out the "Network Settings Change" window.

12. Click "Yes" to restart your computer to complete the driver installation process.

3-4 Uninstalling the PC Card

If the PC Card installation is unsuccessful for any reason, the best way to solve the problem may be to completely uninstall the PC Card and its software and repeat the installation procedure again.

Removing the PC Card Driver

1. Click the "Start" button, select "Settings", and then click "Control Panel".

2. In the "Control Panel" window, double-click "System" icon, then select "Device Manager".

3. Double-click the "Network adapters", then select "WLAN Card" component and click "Remove" to uninstall the PC Card driver files.

Removing the Card

When removing the card, use the release lever or button on your card slot to release the card.

Chapter 4 Configuration

This chapter describes how to configure the PC Cards and install the Driver Status program. To better understand how SL-2011CD wireless LAN products work together to create a wireless network, we recommend to see "Network Configurations" in Chapter 1, page 3, for various applications. The Driver Status program can be used to display the PC Cards status information about the current card settings, the connection status, real-time statistics and the current signal strength.

4-1 Configuring the PC Card

1. After finishing installing the driver and rebooting the computer as described in Chapter 3, the computer will show a dialog box titled "Enter Network Password" dialog box. Enter your password if it had been set or just click "Cancel".

2. Click "Start" button, select "Settings" and then click "Control Panel" to open the "Control Panel" window.

3. In Control Panel window, double-click the "Network" icon to open the "Network" dialog box.

4. Select "Configuration" tab and double click "WLAN Card" to bring out" WLAN Card Properties" dialog box.

5. Select "Advanced" tabs to show "Network ID", "Network Mode", and "Region Domain" properties.

6. Select "Network ID" property and enter a Network ID name. Default "Network ID" is "IEEE802.11". In ad-hoc network mode, (or ad-hoc network configuration), enter the same network ID group name (case sensitive) on each computer. In infrastructure network mode (infrastructure network configuration), enter the same network ID (case sensitive) as the AP's on each computer.

7. Select "Network Mode" property and use the pull-down menu to select "Ad-hoc" or "Infrastructure" mode depending on your applications. Default is infrastructure mode.

8. Select "Region Domain" property and use the pull-down menu to select proper countries you are locating as shown in the "Radio Characteristics/ Numbers of selectable sub-channels" of Appendix A,

page 40. Default "Region Domain" is FCC. Then click "OK" to return to "Network" dialog box.

9. If it is the first time for you to setup a network on this computer, you need to select "Identification" tab and enter an unique name and a working group name as shown in Figure 4-6, and then click "OK". If you would like to share files with other person, make sure you have the same workgroup name.

4-2 Installing Driver Status Utility

1. Click the "Start" button, then select "Run" to bring out "Run" dialog box.

2. Insert the "Driver & Utility" diskette into the floppy disk drive. Enter "A:\setup.exe" at "Open". Then click "OK".

3. The computer will load the utility from floppy drive A and start the "Driver Status Setup" program. In the "Welcome" dialog box, click " Next" to continue the setup procedures. Just follow the instructions to Install the utility.

4. In the "Choose Destination Location" dialog box, you can click "Browse" and select to install "Driver Status" program to a different folder or click "Next" to a default folder.

5. "Driver Status Setup" program will add the program icon to the "Program Folder". You may enter a new folder name or select one from the existing. Folder list. Click "Next" to select a default "Driver Status" program folder.

6. Click "Finish" to complete the installation of "Driver Status".

7. In "Reboot" windows, select "Yes" or "No" to restart the computer. If you select "Yes", be sure to remove the "SL- 2011CD Driver & Utility" diskette from the disk drive A.

The Driver Status program can be used to display the PC Cards status information about the current card settings (Network ID, Network Mode), the connection status (Scanning, Authentication, Connection), real-time statistics (Transmission packets, Receiving packets, Transmission Packet Error Rate) and the current signal strength (Received Signal Strength Indication).

After finishing installing the "Driver Status" program, the program will

automatically be executed and show a small "radio" icon at the right corner of "Taskbar" whenever the PC Card is inserted into the PC Card slot of your computer. Double-click the "radio" icon to open the "Wireless LAN" window.

Chapter 5 Troubleshooting

This chapter describes the problems and corresponding solutions that may occur when installing a PC Card.

Symptom	Solution
Windows does not detect the PC Card when installed	Verify that the PC Card is properly inserted into the PC Card slot. Check whether the computer has a Plug and Play BIOS. Windows 95/98 might not detect the PC Card if a previous installation of the PC Card was cancelled before it was finished. Remove the previous driver, and redo the installation again.
Driver fails to load	A resource conflict could exist. For Windows 95/98, use the "Device Manager" to resolve resource conflicts. Select "System" from the "Control Panel", then click on the "Device Manager" tab as shown in Figure 5-1. For Windows NT4.0, use the Service Monitor entries in the System Log to look for the conflicts. Use the NT diagnostics program to locate free resources.
Device conflict on a Windows system	A device conflict under Windows 95/98/NT may be related to the PC Card. For Windows 95/98, use the Computer properties to identify the used I/O port addresses and IRQ values as shown in Figure 5-1 and Figure 5-2.

	For Windows NT4.0, use the Windows NT diagnostics program to detect the cause of the card conflict and to determine unused I/O port addresses and IRQ values. If there is a device conflict, select alternative settings for I/O Base Address or IRQ values. If you know which device is conflicting with the PC Card, you have the option of changing that device's I/O address or IRQ instead of changing the PC Card.

No resource conflicts were detected, but the wireless station does not attach to the network	Verify that the "Network ID" of the PC Card matches that of the access point. Use the "Network Configuration Properties Application" in the "Control Panel" to modify the "Network ID". Verify that the "Network Mode" of the PC Card is configured correctly.
Nonfunctioning card LED	The PC Card is not powered on. The cause may be: ◆ No Driver loaded or installed. ◆ Card — Driver mismatch which prevented the driver from loading. ◆ Device conflict which prevented the driver from loading. Actions: ◆ Verify that a driver has been installed. ◆ Determine if there is a conflict with another device.
Weak signal or intermittent connection.	For best use of the antenna: ◆ Keep the area around the antenna clear from materials that could block radio transmission, such as metal objects, electronic devices, and cordless telephones. ◆ If your signal is weak, change the direction of the antenna slightly. ◆If necessary, move your notebook computer a few inches to find a better signal. Use the RSSI (Received Signal Strength Indicator) display in the "Driver Status" utility to determine the best location and orientation for a network connection.

Appendix A Specifications

Radio Characteristics

Operating Frequency	2.4~2.4835GHz
Number of Channels	11
Number of selectable sub-channels	North America (FCC) 11
RF Technology	Direct Sequence Spread Spectrum
Data Rate	1,2,5.5,11 Mbps
Modulation Type	DBPSK/DQPSK
Spread Code	11 chips barker code
Chipping Rate	11 Mcps
Normal Output Power	15~16 dBm
RX Sensitivity@FER=0.08	-82dBm
Range (Office Environment)	50 meters
Range (Open Space)	250 meters

Physical and Power Specifications

Form Factor	Standard PC Card Type II
Dimensions (L x W x H)	126 x 60 x 8 mm
Weight	50 gram
Voltage	3.3 V
Power consumption	RX:330mA,TX:550mA
Temperature	Typical indoor environment 0~55 C
Relative humidity	20% to 90%

Regulations

Country	Regulation
USA	FCC Part15B
Canada	IC RS210

Networking Characteristics

Wireless Protocol	IEEE802.11b
Seamless Roaming	Compliant with IEEE802.11b
Media Access Protocol	Carrier Sense Multiple Access /Collision Avoidance
Error Detection	CRC32
Architecture	Supports Ad-hoc and Infrastructure networks
Supported Operation System	Win 95/98/NT4.0
Network Configuration	1) Network ID: Maximum 36 characters Default : IEEE802.11 2) Network Mode : Ad-hoc mode Infrastructure mode Default : Infrastructure 3) Region Domain : FCC (Channel 1~11) IC (Channel 1~11)

Driver Status Utility

Supported Operation System	Win 95/98
Diagnostics	(1) Network ID (2) Channel (3) Network Mode (4) Connection Status (5) Real Time Statistics a. Tx packets sent b. Rx packets received c. Tx Packet Error Rate d. RSSI

Appendix B Regulatory Compliance Information

Radio Frequency Interference Requirements
FCC ID:NI3-SL-2011CD
CANADA: xxxxxxx

This device complies with Part 15 of FCC Rules and Canada RSS-210. Operation is subject to the following conditions:
1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Interference Statement

Notice: The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 and Regulation. 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 instruction manual, may cause harmful interference to nearby TV's, VCR's, radio, computers, or other electronic devices. To minimize or prevent such interference, this equipment should not be placed or operated near these devices. If interference is experienced, moving the equipment away from them will often reduce or eliminate the interference.

However, there is no guarantee that interference will not occur in a particular installation. If the 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:

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

SENAO International is not responsible for any radio or television interference caused by unauthorized modification of the devices included