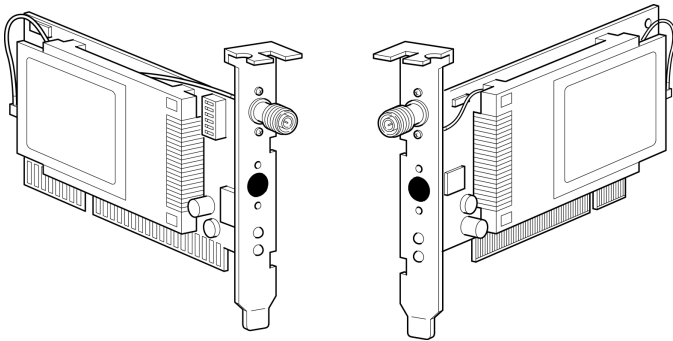




***User's Guide***  
***4800B Series***  
***Aironet Wireless LAN Adapter***  
ISA4810B, ISA4820B, PCI4810B, PCI4820B

DOC-710-005312-A0

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# About the Technical User's Guide

This guide covers the installation, configuration, control, and maintenance of your Aironet 4800B Series PCI/ISA Card Wireless LAN Adapter. The Guide is arranged as follows:

**Section 1 – Installation** – describes installation of the PCI/ISA Card.

**Section 2 – Drivers for Special Installations** – describes installation and configuration of the various network drivers.

**Section 3 – Utilities** – provides detailed procedures for using the utilities to load new firmware versions, as well as how to perform link tests and site surveys.

**Section 4 – Error Messages and Troubleshooting** – provides detailed descriptions of the LED messages and error codes, as well as general procedures for correcting common problems.

**Appendix A – Aironet Wireless LAN Adapter Overview** – provides a general introduction to the 4800B Series PCI/ISA Card, direct sequence radio technology, and the various configurations you can use when operating the 4800B Series PCI/ISA Card in your infrastructure.

**Appendix B – Specifications** – provides radio and physical specifications.

**Appendix C – Channels** – provides channel identifiers and channel center frequencies for various area regulatory agencies.

**Appendix D – Declarations of Conformity** – provides conformity information about the 4800B Series Wireless LAN Adapter.

**Appendix E – Technical Support** – provides contact information for Aironet.

## ***Typographical Conventions***

When reading the User's Guide and Technical Reference Manual, it is important to understand the symbol and formatting conventions used in the documentation. The following symbols are used in the guide.

<b>Convention</b>	<b>Type of Information</b>
	Indicates a note which contains important information.
	Indicates procedures which, if not observed, could result in loss of data or damage to the equipment.
<b>Bold type</b>	An action you must perform, such as typing a character or making a selection with your mouse.



## ***Section 1***

# **Installing the Wireless LAN Adapter**

This section describes the procedures for installing the Wireless LAN Adapter.

Here's what you'll find in this section:

- Before You Start
- Installing the Wireless LAN Adapter
- Attaching the Antenna

## ***Before You Start***

For the Wireless LAN Adapter to be used with a computing device, the device must be equipped with a PCI or ISA expansion slot. Check the documentation that came with your computer for details on the differences between PCI and ISA expansion slots.

Ask your system administrator for the following information, which you may need to provide during driver installation:

- Your Wireless Client Name
- Your Wireless SSID
- For Windows 98 networking, your computer name and workgroup name
- For your network account, your user name and password
- Your IP address (unless using a DHCP server)

After unpacking the Wireless LAN Adapter, make sure the following items are present and in good condition:

- Aironet 4800B Series PCI or ISA Wireless LAN Adapter
- Standard 2 dBi dipole antenna
- Aironet 4800 Series for Windows 95 & NT CD
- Aironet 4800 Series for Windows 98 CD

If any item is damaged or missing, contact your Aironet supplier. Save all shipping and packing material in order to repack the unit should service be required.



**NOTE:** Any remote antenna and its associated wiring are ordered and packed separately.

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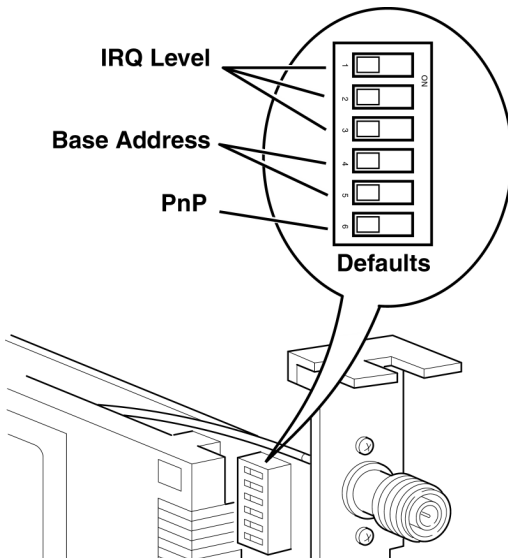


## Configuring the DIP Switches (ISA Only)

The Aironet 4800B Series ISA Wireless LAN Adapter contains DIP switches for setting the Plug and Play Mode (PnP), Base Address, and Interrupt Levels (IRQ). The switches have been factory set for PnP before shipment (this is the recommended setting).

**i NOTE to NT Users:** If you are installing your ISA Wireless LAN Adapter in a computer running NT, complete the driver installation before installing the ISA card in your computer. During driver installation, windows will appear that recommend a Base Address and an IRQ Level for your ISA card. Make a note of these settings, adjust the DIP switches accordingly, and install the card in your computer to complete your setup.

Expansion cards cannot share the same Base Address or IRQ. Check the switch settings on the ISA Wireless LAN Adapter to ensure they do not conflict with other expansion cards in the computer.



## Base Address

The Base Address is controlled through DIP switches 4 and 5.

DIP Switch	
6	
On (Non-PnP)	Off (PnP)



**NOTE:** When PnP is selected, the information in the table below will read "Don't Care".

---

DIP Switch		Base Address
5	4	
On	On	140
On	Off	180
Off	On	300
Off	Off	340

## IRQ Level

The IRQ level is selected through DIP switches 1-3. The table below shows the switch position settings required for different IRQ levels.



**NOTE:** When PnP is selected, the information in the table below will read “Don’t Care.”

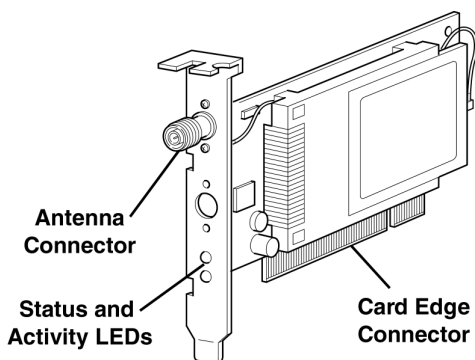
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DIP Switch			IRQ Level
3	2	1	
On	On	On	5
On	On	Off	7
On	Off	On	9
On	Off	Off	10
Off	On	On	11
Off	On	Off	12
Off	Off	On	14
Off	Off	Off	15

## ***Installing the Wireless LAN Adapter***

This section provides instructions for installing an Aironet client card on a computer using Windows 95 or 98, and on a computer using Windows NT 4.0.

Before you begin, examine the PCI or ISA Card. The antenna connector and Status and Activity LEDs will face out of your computer, and will be visible when you put the cover back on. The bottom edge of the card is the connector you will insert into an empty expansion slot in your computer.



**CAUTION:** The following procedures and physical connections apply generally to normal and conventional PCI or ISA expansion slots. In the cases of custom or non-conventional equipment, be alert to possible differences in PCI/ISA expansion slot configurations.

---



**NOTE:** If you are installing an ISA Wireless LAN Adapter, install the Aironet driver for your operating system, configure the DIP switches on the card, and then install the ISA card in your computer as the last step in your installation.

---

## Card Installation Steps

1. Turn off the computer and all its components.
2. Remove the computer cover.
3. Remove the screw from the top of the CPU back panel above an empty expansion slot. This screw is used to hold the metal bracket on the back panel.



**CAUTION:** Static electricity can be destructive. Discharge by touching a metal part of a grounded unit before removing the Wireless LAN Adapter from the anti-static packaging.

---

4. Tilt the Wireless LAN Adapter to allow the antenna connector and LED lights to slip through the opening in the CPU back panel.
5. Press the Wireless LAN Adapter into the empty slot until its connector is firmly seated.



**CAUTION:** Do not force the Wireless LAN Adapter into the slot. Forcing it will damage both the Wireless LAN Adapter and the slot. If the Wireless LAN Adapter does not go in easily, remove the card and re-insert.

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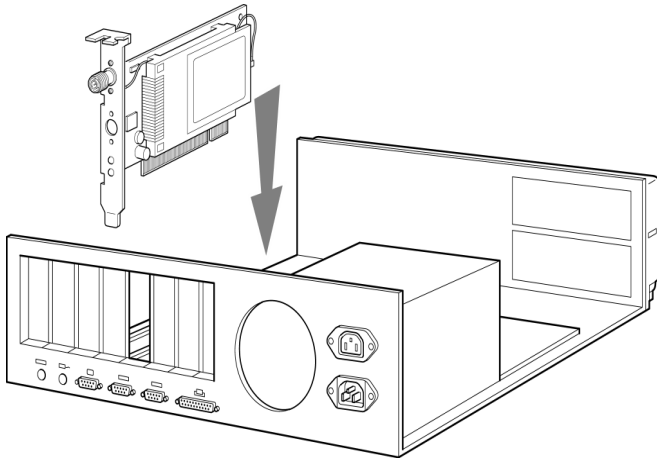


**NOTE:** Most Pentium PCs have two types of slots: ISA and PCI. ISA slots are black and PCI/ISA slots are white. Refer to your PC manufacturer's documentation for proper identification of slots.

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## Section 1: Installing the Wireless LAN Adapter

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6. Reinstall the screw to the top of the CPU back panel.
7. The Aironet 4800B Series PCI or ISA Wireless LAN Adapter comes with one 2 dBi dipole antenna. With the unit powered off, attach the antenna to the antenna connector on the Wireless LAN Adapter.



**NOTE:** Do not over-tighten the antenna connector; finger-tight is sufficient. Position the antenna vertically for best omni-directional signal reception.

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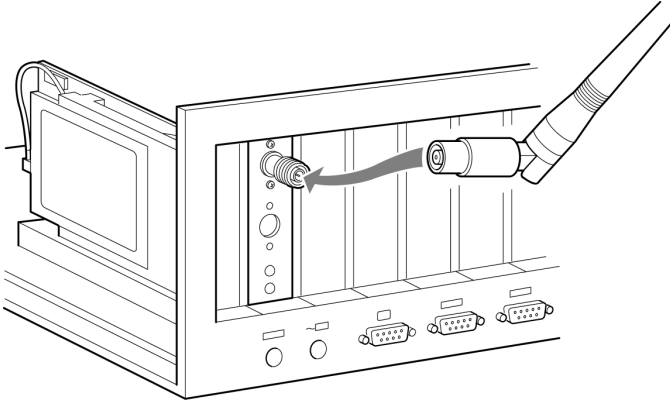


**NOTE:** Due to FCC and DOC Regulations, the antenna connector on the Aironet 4800B Series PCI or ISA Wireless LAN Adapter is of reverse polarity to the standard TNC connectors.

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## Section 1: Installing the Wireless LAN Adapter

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## Driver Installation Steps

### Installing the Driver for Windows 98

If the operating system on your computer is Windows 98, follow these steps (if 95, see page 12; if NT, see page 15):

1. Windows 98 automatically detects the Aironet 4800B Series PCI/ISA Wireless LAN Adapter, briefly opens a New Hardware Found window, and starts collecting information for a driver information database.
2. When Windows 98 is ready to configure the new hardware, it opens the Add New Hardware Wizard dialog box. The dialog box states that Windows will search for new drivers for PCI/ISA Network Controller.
3. Click "Next." A dialog box appears asking what you want Windows to do.
4. Select "Search for the best driver for your device (Recommended)" and click "Next."
5. Select "CD-ROM drive," unselect all the other options, insert the Aironet 4800B Series for Windows 98 CD, and click "Next."



**NOTE:** If your computer doesn't have a CD-ROM drive, go to the Aironet website ([www.aironet.com](http://www.aironet.com)) and download the drivers for your computer's operating system. Copy the drivers to a 3.5" floppy disk, and use the floppy disk in place of the CD.

---

After the hardware wizard finds the installation files on the CD, it displays the search results: "Windows driver file search for the device: PC4800 DS Wireless PCI (or ISA) LAN Adapter."

6. Click "Next" to copy the required files.

During the installation, you may be prompted with dialog boxes asking you to enter a path to the required Aironet or Windows 98 files.



If the Windows 98 files are installed on your computer, the Windows 98 files will usually be located in the folder C:\Windows\Options\Cabs. Click "OK" to copy the required files.

If Windows 98 prompts for the Windows CD, insert the Windows 98 CD into your CD-ROM drive. If your CD-ROM drive is drive D, the path in the dialog box should be D:\WIN98. Click "OK" to copy the required files.



**NOTE:** If the DIP switches on your ISA card are set for non-PnP, an Adapter Properties window appears at this point in the installation. Use the Adapter Properties window to assign a unique Client Name for the ISA card and the SSID of the Access Point with which the card will communicate.

---

7. The Add New Hardware Wizard window appears stating that Windows has finished installing the software that your new hardware device requires.
8. Click "Finish."
9. The Systems Settings Change window states: "To finish setting up your new hardware, you must restart your computer. Do you want to restart your computer now?" Remove the CD and click "Yes" to reboot the computer.
10. When the computer restarts, double-click the My Computer icon on your desktop.
11. In the My Computer window, double-click the Control Panel icon.
12. In the Control Panel window, double-click the Network icon.
13. Select the PC4800 DS Wireless PCI (or ISA) LAN Adapter. Click the Properties button.
14. On the PC4800 DS Wireless PCI (or ISA) LAN Adapter Properties window, click the Advanced tab.

15. In the Advanced window, select Client Name. Type your computer's unique client name in the Value dialog box.
16. Select SSID. Type your Access Point's SSID in the Value dialog box. Click OK.
17. In the Network window, click OK.
18. The Systems Settings Change window states: "To finish setting up your new hardware, you must restart your computer. Do you want to restart your computer now?" Click "Yes" to reboot the computer.

The driver installation is complete.

Contact your IS department if you have a problem connecting to the network. Proxy server, network protocols, and further authentication information might be needed to connect to the network.

### **Installing the Driver for Windows 95**

If the operating system on your computer is Windows 95, follow these steps (if 98, see page 10; if NT, see page 15):

1. Windows 95 automatically detects the Aironet 4800B Series PCI/ISA Wireless LAN Adapter, briefly opens a New Hardware Found window, and starts collecting information for a driver information database.
2. When Windows 95 is ready to configure the new hardware, it opens the Update Device Driver Wizard dialog box. The dialog box states that Windows will complete the installation of the PCI/ISA Network Controller.
3. Insert the Aironet 4800 Series for Windows 95 and Windows NT CD and click Next.



**NOTE:** If your computer doesn't have a CD-ROM drive, go to the Aironet website ([www.aironet.com](http://www.aironet.com)) and download the drivers for your computer's operating system. Copy the drivers to a 3.5" floppy disk, and use the floppy disk in place of the CD.

---

4. The Update Device Driver Wizard displays the following message: "Windows was unable to locate a driver for this device." Click the Other Locations button.
5. The Select Other Location window appears. Click the Browse button.
6. Select your CD-ROM drive and click OK. At the Select Other Location window, click OK.
7. The Update Device Driver Wizard window tells you that it found the driver. Click Finish.
8. When prompted with "Please insert the disk labeled 'Windows 95 CD-ROM', and then click OK", just click OK and do one of the following:
  - If the Windows 95 files are installed on your computer, the Windows 95 files will usually be located in the folder C:\Windows\Options\Cabs. Type C:\Windows\Options\Cabs in the "Copy files from:" dialog box. Click "OK" to copy the required files.
  - If Windows 95 prompts for the Windows CD, insert the Windows 95 CD into your CD-ROM drive. If your CD-ROM drive is drive D, the path in the dialog box should be D:\WIN95. Click "OK" to copy the required files.
9. The Systems Settings Change window states: "To finish setting up your new hardware, you must restart your computer. Do you want to restart your computer now?" Remove the CD and click "Yes" to reboot the computer.
10. When the computer restarts, double-click the My Computer icon on your desktop.

11. In the My Computer window, double-click the Control Panel icon.
12. In the Control Panel window, double-click the Network icon.
13. Select the PC4800 DS Wireless PCI (or ISA) LAN Adapter. Click the Properties button.
14. On the PC4800 DS Wireless PCI (or ISA) LAN Adapter Properties window, click the Advanced tab.
15. In the Advanced window, select Client Name. Type your computer's unique client name in the Value dialog box.
16. Select SSID. Type your Access Point's SSID in the Value dialog box. Click OK.
17. In the Network window, click OK.
18. The Systems Settings Change window states: "To finish setting up your new hardware, you must restart your computer. Do you want to restart your computer now?" Click "Yes" to reboot the computer.

The driver installation is complete.

Contact your IS department if you have a problem connecting to the network. Proxy server, network protocols, and further authentication information might be needed to connect to the network.

## Installing the Driver for Windows NT 4.0

If the operating system on your computer is Windows NT 4.0, follow these steps (if 98, see page 10; if 95, see page 12):



**NOTE to NT Users:** If you are installing your **ISA** Wireless LAN Adapter in a computer running NT, complete the driver installation before installing the ISA card in your computer. During driver installation, windows will appear that recommend a Base Address and an IRQ Level for your ISA card. Make a note of these settings, adjust the DIP switches accordingly, and install the card in your computer to complete your setup.

---

When Windows NT 4.0 starts, it will not detect your Aironet 4800B Series PCI/ISA Card Wireless LAN Adapter. You will need to do the following to install the drivers:

1. Insert the Aironet 4800B Series for Windows 95 & NT 4.0 CD into your CD-ROM drive.



**NOTE:** If your computer doesn't have a CD-ROM drive, go to the Aironet website ([www.aironet.com](http://www.aironet.com)) and download the drivers for your computer's operating system. Copy the drivers to a 3.5" floppy disk, and use the floppy disk in place of the CD.

---

2. Right-click on the Network Neighborhood icon on your desktop and select Properties. (If your desktop doesn't have a Network Neighborhood icon, open the Control Panel, right-click the Network icon there, and select Properties.)
3. Click the Adapters tab.
4. Click "Have Disk" at the Select Network Adapter window.
5. Enter D:\ in the Copy files from box. (D:\ is probably the drive letter of your CD-ROM drive. Your

drive letter may be different from this example.)  
Click OK.

6. In the Select OEM Option box, select the "Aironet PCI/ISA4800 PCI/ISA Wireless LAN Adapter" option. Click OK.
7. The Aironet Wireless Communications, Inc. Adapter Setup window appears. Select Client Name. Type your computer's unique client name in the Value dialog box.
8. Select SSID. Type your Access Point's SSID in the Value dialog box. Click OK.
9. Click Close.
10. When asked to shutdown and restart your computer, remove the CD-ROM disk and click Yes.

The driver installation is complete.

Contact your IS department if you have problems connecting to the network. Proxy server, network protocols, and further authentication information might be needed to connect to the network.



**NOTE:** If your ISA Wireless LAN Adapter will not send or receive data after installation, use Windows NT Diagnostics to check the assigned IRQ Level and I/O Port. If there is a conflict, use the Advanced button in the Network Properties window to adjust the settings.

---

### **Installing the Aironet 4800B Series PCI/ISA Card Wireless LAN Adapter Utilities**

To install the WinDGS, LinkScope, and WEPKey utilities, follow these steps:

1. Insert the Aironet 4800B Series CD for your operating system into your computer's CD-ROM drive.
2. Click Start > Run and type D:\utils\setup.exe where "D" is your CD-ROM's drive letter.

3. Follow the setup instructions on the screen to complete the installation.

Refer to Section 2 of this User Guide for details on using each utility.





## Section 2

# Using the WinDGS Utilities

WinDGS is used to perform user level diagnostics on your Aironet Wireless LAN Adapter Card in the Windows 95, 98, or Windows NT operating system environment.

**To install the WinDGS, LinkScope, and WEPKey utilities, follow these steps:**

1. Insert the Aironet 4800B Series CD for your operating system into your computer's CD-ROM drive.
2. Click Start > Run and type D:\utils\setup.exe where "D" is your CD-ROM's drive letter.
3. Follow the setup instructions on the screen to complete the installation.

## WinDGS Commands Menu

The Commands Menu includes:

- Select Card
- Load New Firmware
- Edit Properties
- Statistics
- Status
- Link Test
- Site Survey
- Radio Off/On
- Exit



## **Select Card**

This allows another installed Aironet Wireless LAN Adapter Card to be chosen. The property screens will change to reflect the parameters specific to each card type.

## **Load New Firmware**

The firmware is contained in the card's flash memory. Flash memory allows for easy updating of the firmware as necessary.

### **Upgrading Firmware for Windows 95, 98, and NT**

The WinDGS program is used to load new firmware.

To load new firmware:

1. Make sure the PCI/ISA Card is up and running.
2. Select **Commands**.
3. Select **Load New Firmware**.
4. Select **Look In....** Use the drop down button to select the appropriate path and image file.
5. Select **Open**. This will flash the card with the selected image.

## **Edit Properties**

WinDGS allows you to change the configuration parameters of your currently installed Aironet 4800B Series Wireless LAN Adapter. See "Using Edit Properties" on page 27 for details on this command.

## **Statistics**

The Statistics screen shows the current statistics from the PCI/ISA Card. Statistics are updated at the rate specified by the Screen Update Timer. Clear the current statistics by clicking on **Reset**. Exit the Statistics screen by clicking on

**OK**, or by clicking on the **X** in the upper right hand corner of the dialog box.

## **Status**

The Status screen shows the current status from the PCI/ISA Card. Status is updated at the rate specified by the Screen Update Timer. Exit the Status screen by clicking on **OK**, or by clicking on the **X** in the upper right hand corner of the dialog box.

## **Link Test**

You can use WinDGS to assess the performance of RF links. TCP/IP protocol must be installed on your system to run this link test. See the Windows 95/98/NT Help section for more information on installing and setting up TCP/IP. An IP address must also be configured for the Access Point.

1. From the link test command menu, enter the following parameters:
  - **IP address of Aironet Access Point:**  
This parameter specifies the IP address of the Access Point with which you want to test the RF link. Set this value before running the link test.
  - **Number of Packets:**  
This parameter specifies the number of packets the link test will attempt to send. The display will show the number of packets of the specified size that are successfully transmitted and received. This parameter is ignored if Continuous Link Test is selected.
  - **Packet Size:**  
This size specifies the size of the data packet to be sent to the Aironet Access Point. Be aware that the TCP/IP stack that comes with Windows 95 will fragment packets greater than 512 bytes. Therefore, the number of packets transmitted will not match the

number of packets received (even if none are lost) if the packet size is greater than 512 bytes.

- **Continuous Link Test:**  
Selecting this item causes the link test to run continuously until Stop, OK, or Cancel is selected. The Number of Packets parameter is ignored if Continuous Link Test is selected.
2. Once the parameters have been entered, click on the Start button at the bottom of the dialog box to start the link test. When the link test is running, necessary statistics will be displayed and updated periodically.
  3. To stop the link test, click on Stop, OK, or Cancel at the bottom of the dialog box. Once the link test has sent the number of packets specified, the Stop button will toggle back to a Start button.

### **Using Windows Windows 95 or Windows 98 to Perform a Link Test Through Telnet**

You can perform a link test outside the WinDGS Utility through a telnet session. Follow these steps:

1. Install the drivers.
2. Configure the drivers for network operation.
3. Ensure unique IP assignments of mobile/portable PCI/ISA Card devices and Aironet Access Point.
4. Set up an Aironet Access Point for the intended operation (set fragmentation thresholds, RTS thresholds, etc.)
5. Start the operating system on the mobile station.
6. Configure the adapter.
7. Make sure the mobile station is associated to the Aironet Access Point.
8. Start a telnet session on the mobile station to the Aironet Access Point. Depending on the system in use, the telnet application may have logging and note taking capability. If so, enable these modes.

9. Navigate through the Aironet Access Point menu to the link test option. See the appropriate Access Point Technical Reference Manual for more information.
10. Set up the test options to accurately model the system.
11. Set the test for continuous operation with a 1-second delay.
12. Begin traversing the area around the Aironet Access Point to determine its coverage. If logging and notes are not possible with the telnet application, maintain a manual log.

The telnet session packets are interspersed with test packets which may increase the round-trip time for some frames. The link test will show progress changes as the test is being conducted.

The first-time delivery success rate for the packet may not be important for transaction-based systems, and can result in a slightly larger range. Using longer packets can provide some degree of safety margin in the range estimate.



**NOTE:** Roundtrip time will be affected by the telnet session maintenance.

---

## Site Survey

To perform a meaningful site survey, you need to conduct a test that will accurately model the intended use of the system. It is important to perform a site survey using equipment which is similar to the equipment that will be implemented. Common survey items include:

- Transmit power
- Antenna type(s)
- Antenna location(s)
- Packet (fragment) size
- Interference

You should always conduct a site survey with all variables set to the operational values. You should also try to perform the survey during the time the RF link will generally be functioning with all other systems and noise sources operational. For efficiency, you should execute the site survey application entirely from the mobile station.

The link test tool helps determine the RF network coverage. The results of the link test will help eliminate low RF signal level areas that can result in loss of connection between the PCI/ISA Card and the Aironet Access Point.

It is important to remember the information being displayed is from the Aironet Access Point's viewpoint. Therefore, packets sent are from the Aironet Access Point to the PCI/ISA Card client. Packets received are from the PCI/ISA Card to the Aironet Access Point. Signal quality is an estimate of the signal strength recorded at the time of packet reception by the radio.



**NOTE:** If your Wireless LAN Adapter contains new firmware, you can use WinDGS's Active Mode Survey. See "Using the Site Survey Active Mode Feature" on page 34 for details.

---

The Overall Link Quality rating on the Site Survey window indicates the ability of the Aironet Wireless LAN Adapter to successfully communicate with an Access Point. Ratings are Excellent, Good, Fair, and Poor. The rating is derived from the Current Signal Strength and Current Signal Quality.

- Excellent: Both values are greater than 75%
- Good: Both values are greater than 40%, but one or both are less than 75%
- Fair: Both values are greater than 20% but one or both are less than 40%
- Poor: One or both values are less than 20%

### **Radio Off/On**

Radio Off/On allows you to selectively turn off or on the power to the radio. Turning the radio off prevents all RF energy from being transmitted by the PCI/ISA Card.

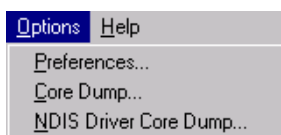
### **Exit**

Closes all windows and exits WinDGS.

## **Options Menu**

The Options Menu includes:

- Preferences
- Core Dump
- NDIS Driver Core Dump



### **Preferences**

The WinDGS Preferences allow you to customize various parameters that control the operation of WinDGS. For example, you can set the rate at which the values are updated in the status and statistics screens via the Screen

Update Timer. You can also set the Save Properties Options, which controls what is done with changes to the current settings.

### **Screen Update Timer**

The Screen Update Timer controls how often the statistics and status screens are updated. The screen can be updated in one second increments, from once a second to once every 60 seconds. The default is once every five seconds. You can use either the edit box or the slider to change this value.

### **Status Bar Options**

Use the Status Bar Options to include seconds on the clock display on the WinDGS main screen.

### ***Core Dump***

Core Dump allows you to perform a core dump of the Wireless LAN Adapter's firmware. Enter file names for core dumps 1 and 2, or accept the defaults (C:\Aironet\WinDGS\Core4800.1 and Core4800.2). Click the Do Core Dump button to perform the dump.

### ***NDIS Driver Core Dump***

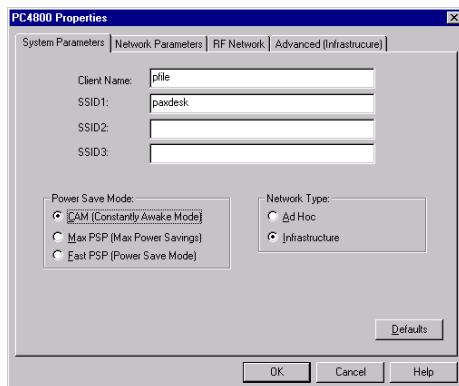
NDIS Driver Core Dump allows you to perform a core dump of the Wireless LAN Adapter's drivers. Enter a file name for the core dump, or accept the default (C:\Aironet\WinDGS\Core4800.cor). Click the Do Core Dump button to perform the dump.



## Using Edit Properties

The Edit Properties screen, which you access from the Commands menu, includes four “pages,” which you select by clicking the tabs at the top of the window:

- System Parameters
- Network Parameters
- RF Network Parameters
- Advanced (Infrastructure or Ad Hoc)



Each sub-screen is described below.

### ***System Parameters***

System parameters include:

- Name
- SSID
- Network Type (Infrastructure or Ad Hoc)
- Constant Awake Mode (CAM)
- Power Save Mode
- Fast Power Save Mode
- Maximum Power Save Mode

#### **Name**

The station name is displayed in the table of connected devices on the Access Point. It provides a logical name to determine which machines are connected without

having to memorize every MAC address. The name can be up to 16 characters.

### **SSID**

The Service Set Identifier (SSID) controls access to a given wireless network. This value **MUST** match the SSID of any/all Access Points that you want to communicate with. If the value does not match, access to the system is not granted. The SSID can be up to 32 characters (case sensitive).

### **Network type (Infrastructure Mode)**

This mode is used to set up a connection to a wired network, such as Ethernet or Token Ring. This mode requires an Access Point to gain access to the wired network.

### **Network type (Ad Hoc Mode)**

This mode is used to set up a small, temporary network between two or more computers. For example, you might set up an ad hoc network between computers in a conference room so users can share information in a meeting.

### **Constant Awake Mode (CAM)**

Constant Awake Mode is the normal mode for desktop machines or other machines where power consumption is not an issue. It keeps the radio powered up continuously so there is little latency for responding to messages. This mode is recommended for devices where high availability is desired.

### **Power Save Mode**

Power Save Mode is recommended for devices where power consumption is a major concern, such as small battery powered devices. If the client node is powered from an AC line, PSP should not be used. Power Save Mode causes the Access Point to buffer incoming mes-

sages. The Aironet 4800B Series Wireless LAN Adapter must wake up periodically and poll the Access Point to see if there are any buffered messages waiting. The PCI/ISA Card can request each message and then go back to sleep.

### **Fast Power Save Mode**

Fast Power Save Mode (Fast PSP Mode) switches between PSP and CAM based on network traffic. When retrieving a high number of packets, Fast PSP Mode will switch to CAM to retrieve the packets. Once the packets are retrieved, it switches back to PSP.

### **Maximum Power Save Mode**

Maximum Power Save Mode (Max PSP Mode) can only be used in conjunction with PSP or Fast PSP Modes. This mode allows the Aironet 4800B Series Wireless LAN Adapter to conserve the most power while still maintaining an infrastructure connection. Using Max PSP Mode conserves power but will reduce throughput.

## ***RF Network Parameters***

RF Network Parameters include:

- **Fragment Threshold:** This parameter defines a threshold above which the RF packet will be split up or fragmented. If a packet is fragmented or transmission of part of it is interfered with, only the portion that was unsuccessful would need to be re-sent. The throughput will generally be lower for fragmented packets since the fixed packet overhead consumes a higher portion of the RF bandwidth.
- **Data Retries:** This parameter defines the number of times a packet will be re-sent if the initial transmission is unsuccessful. If the network protocol automatically re-tries itself, set this to a small value. A “bad” packet status will be sent up the protocol stack more quickly so the application can re-transmit the packet.

- **Data Rate:** This parameter determines the data rate used to transfer all management frames by the client device when associated within a given Basic Service Set (BSS). When operating in Infrastructure Mode, this parameter should be set to correspond to the Access Point setting. When operating in Ad Hoc Mode, all stations should have the same setting.

Model	Allowable Selections
4800B Series	Auto Rate Selection, 1 Mbps Only, 2 Mbps Only, 5.5 Mbps Only, or 11 Mbps Only

- **Authentication type:** This parameter controls the validation of the WEP Key. Shared Key Authentication validates that the client is using the same WEP Key as the Access Point. The Access Point sends a known, un-encrypted “challenge packet” to the client. The client then encrypts the challenge packet and sends it back to the Access Point. The Access Point then attempts to decrypt the encrypted challenge packet, and sends an Authentication response packet indicating the success or failure of the decryption back to the client. Open Authentication does not check for a matching WEP Key. The Shared Key selection is not available if the client’s WEP Key is not set.
- **Modulation:** This parameter determines the type of radio modulation that the Wireless LAN Adapter uses at the 5.5 Mbps and 11 Mbps data rates. Older versions of firmware use MOK modulation, while newer firmware versions use the IEEE 802.11 Standard CCK modulation. The modulation that the PCI/ISA4800B Series card uses *must* match the modulation of the Access Point (in an Infrastructure Mode configuration) or other Wireless LAN Adapters (in an Ad Hoc Mode configuration). Otherwise, the radio will not communicate with the other devices.
- **Use Short Radio Headers:** Select this checkbox to use short radio headers when transmitting. Short radio

headers improve throughput performance. Long radio headers ensure compatibility with all models of Aironet Wireless LAN adapters. The PCI/ISA4800B Series Wireless LAN Adapter supports short radio headers, but earlier models of Aironet's Wireless LAN Adapter (4800 and 4800A) require long headers.

- **Channel:** Use this parameter to select the radio channel the PCI/ISA card will use. Channel 6 (2437 MHz) is the default setting.
- **Transmit Power:** Use this parameter to set the transmit power of the card to 1 mW, 5 mW, 20 mW, 50 mW, or 100 mW.
- **Allow Association To Mixed Cells:** Select this checkbox to allow the PCI/ISA Wireless LAN Adapter to communicate with mixed cells. A mixed cell is a radio network in which some devices use WEP and some do not.
- **Enable WEP:** Select this checkbox to enable WEP (Wired Equivalency Protocol). The checkbox will be inaccessible (grayed-out) until you set a WEP key using the WEPKey utility (see page 40).

### ***Advanced (Infrastructure)***

The following parameters are contained in both the Infrastructure and Ad Hoc Modes:

- Antenna Mode
- Specified Access Point
- RTS Threshold
- RTS Retry Limit

#### **Antenna Mode**

Three options are available for the type of antenna you have connected to the Aironet 4800B Series Wireless LAN Adapter:

- **Antenna Diversity:** PCI/ISA Wireless LAN Adapters are not configured for antenna diversity.
- **Right Antenna Only (J1):** This is the default setting. The PCI/ISA Card will not attempt to communicate using the left hand antenna port since no antenna is connected to it.
- **Left Antenna Only (J2):** PCI/ISA Wireless LAN Adapters are not configured to use the left antenna port.

### Specified Access Point

This parameter is the MAC address of the preferred Access Point you want to associate with. It is important to note that if you specify the Access Point, you MAY associate to another Access Point if the Specified Access Point is not found. If you roam out of range, you will probably associate with another Access Point. Setting a Specified Access Point will slow down the roaming process. Thus, for normal operation for the majority of users, leave this field blank.

### RTS Threshold

This parameter controls what size data packet the low level RF protocol issues to an RTS packet. There are several trade-offs to consider when setting this parameter. Setting this parameter to a small value causes RTS packets to be sent more often, consuming more of the available bandwidth, therefore reducing the apparent throughput of other network packets. However, the more often RTS packets are sent, the quicker the system can recover from interference or collisions. Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.

### RTS Retry Limit

This parameter controls the number of times the PCI/ISA Card will re-send the RTS packet if it does not receive a CTS from the previously sent RTS packet.

Setting this to a large value will decrease the available bandwidth whenever interference is encountered, but will make the system more immune to interference and collisions. Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.

### ***Advanced (Ad Hoc/IBSS)***

In Ad Hoc Mode, you can also modify the following parameters:

- Channel
- Beacon Period
- Wake Duration

#### **Channel**

This parameter specifies the channel identifier the unit will use if it must start its own network. For all other situations, the radio will scan for the proper frequency. See **Appendix C** for channel identifier parameters.

#### **Beacon Period**

This parameter specifies the duration between beacon packets that are used by IEEE 802.11 systems to synchronize the “hops” (change to another frequency). The beacon packet contains timing information and hop pattern information that is broadcast over the airwaves. Any station that can hear the beacon packet can then synchronize their internal timer so that it can hop at the correct time. The default beacon period is one-half of the dwell period so two beacons are transmitted per hop dwell period (default is 100 Kµsec). Refer to the IEEE 802.11 Standard for more information on the timing and scanning mechanism.

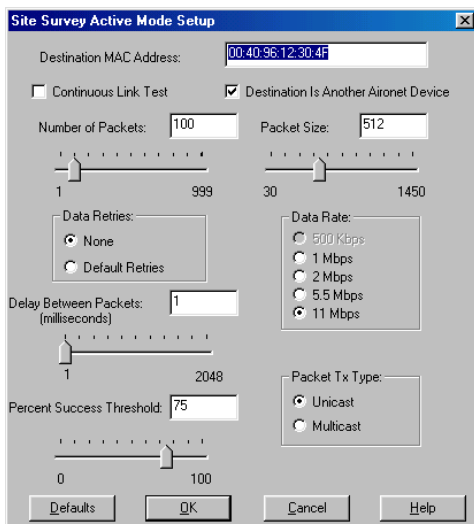
#### **Wake Duration**

This parameter specifies the amount of time per Hop Dwell Period that the adapter stays awake listening for data packets. This is only used in Power Save Mode.

## Using the Site Survey Active Mode Feature

If your 4800 Series Wireless LAN Adapter contains the latest firmware, and if you have the latest drivers on your system, you can use the Site Survey Active Mode feature to set up a customized link test.

When you select Site Survey from the Commands menu and click the Setup button at the bottom of the window, the Setup window appears. Each setting is described below.



### ***Destination MAC Address***

This parameter specifies the Access Point that will be involved in the test. The default is the MAC address of the AP the Aironet Wireless LAN Adapter is currently associated with.

### ***Continuous Link Test***

If you click this check box, the Active Mode test will run repeatedly until you press the OK or Stop buttons on the Site Survey page. (The test will loop repeatedly for the num-



ber of packets you specify on the Number of Packets setting.)

### ***Destination is Another Aironet Device***

Click this check box if the Access Point you named in the Destination MAC Address field is an Aironet Access Point.

### ***Number of Packets***

This parameter sets the quantity of packets that will be sent during the test.

### ***Packet Size***

This parameter sets the size of the packets that will be sent during the test. You should use a packet size that will be typical during normal use of the system.

### ***Data Retries***

This parameter sets the number of times a transmission will be retried if an ACK is not returned by the destination device. Click None for no retries, or Default Retries for the firmware's default value for retries.

### ***Data Rates***

This parameter sets the bit rate at which packets will be transmitted. No rate shifting will occur during the test.

### ***Delay Between Packets***

This parameter sets the delay (in milliseconds) between successive transmissions.

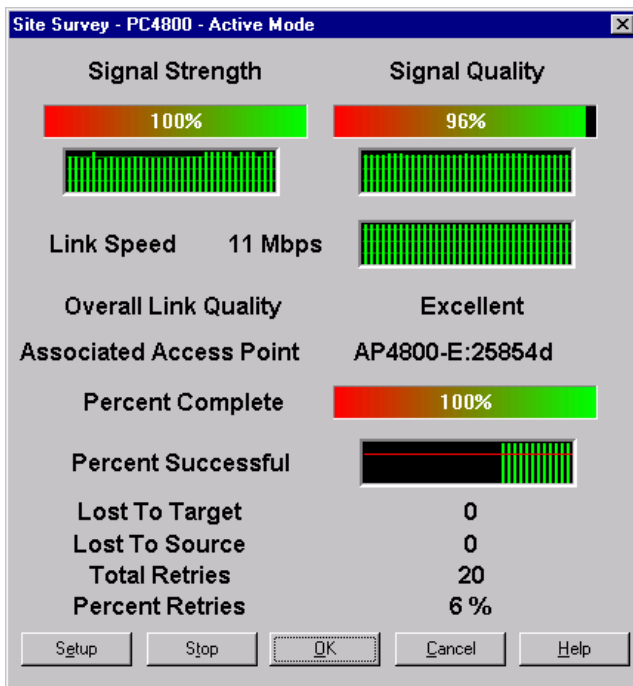
## ***Packet Tx Type***

This parameter sets the packet type that will be used during the test. If you select Unicast, the system will expect an ACK back from the destination, and retries can occur. If you select Multicast, no packet retries will occur during the test.

## ***Percent Success Threshold***

This parameter controls the red line on the “Percent Successful” histogram. Percentages greater than or equal to this value will show up as green bars, while percentages below this value will show up as yellow bars on the Percent Successful histogram.

When the Site Survey Active Mode is running, this window appears:



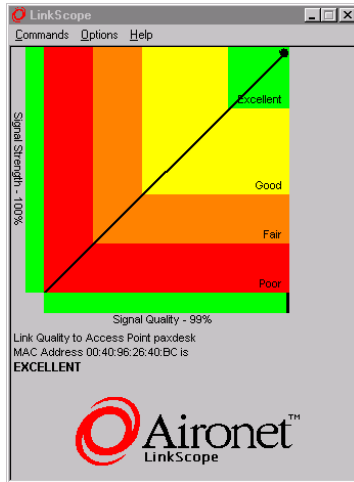
## Using the Linkscope Utility

The Linkscope utility provides a graphical display of:

- Signal Quality
- Signal Strength

Linkscope determines the performance of the RF link between a PCI/ISA Card and an Aironet Access Point. Any Windows 95, Windows 98, or Windows NT unit associated to an Aironet Access Point can run the linkscope test.

Signal strength is displayed along the vertical axis of the graphical display. Signal quality is displayed along the horizontal axis. The combined result is represented by a diagonal line. The Aironet Access Point associating with the PCI/ISA Card is indicated along the bottom of the display as well as its MAC address.



### Commands

The Commands pull-down menu includes the following commands:

#### Select Card

Use Select Card if you have more than one Wireless LAN Adapter installed on your computer. A window appears that allows you to choose the card you want to examine with Linkscope.

#### Exit

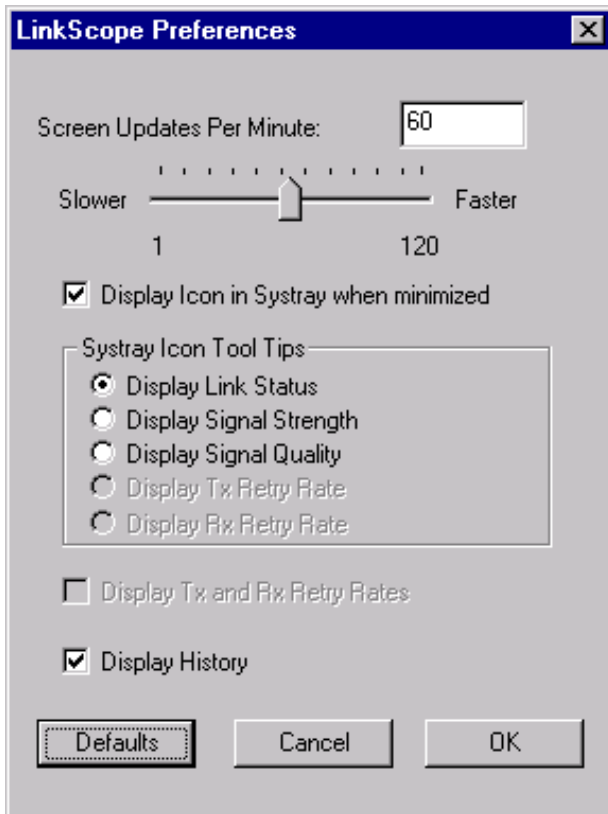
Use Exit to close the Linkscope utility.

## Options

The Options pull-down menu includes the following options:

### Preferences

When you select Preferences, this window appears:



Three parameters are available on the Preferences window:

- **Screen Updates Per Minute:** This parameter sets the screen update frequency on the Linkscope

main window. Type a value in the entry field or use the slider bar to adjust the setting.

- **Display Icon in Systray when Minimized:** Select this checkbox to display a Linkscope icon at the bottom of your screen when Linkscope is minimized. The Icon type options allow you to choose the information that appears when you hold your mouse pointer on the icon.
- **Display Tx and Rx Retry Rates:** Select this checkbox to display Tx and Rx rates on the Linkscope main screen.
- **Display History:** Select this checkbox to display the signal history on the Linkscope main screen. At each screen update, a black dot appears for that status.

## Using the WEPKey Utility

This section briefly explains how to use the Aironet WEP-Key Utility to configure a WEP key on the Aironet client card.

### ***WEP Overview***

WEP-40 and WEP-128 are optional IEEE 802.11 features that provide data confidentiality equivalent to the confidentiality of a wired LAN that does not use cryptographic techniques to enhance privacy. WEP (Wired Equivalent Privacy) makes the wireless LAN link in a system only as secure as the wired link.

As specified in the standard, WEP uses the RC4 algorithm with a 40-bit key for WEP-40 and a 128-bit key for WEP-128. When WEP is enabled, each station (client and Access Point) has a key. The key scrambles the data before it is transmitted over the airwaves. If a station receives a packet that is not scrambled with the appropriate key, the station discards the packet and never delivers it to the host.

### ***Using WEPKey***

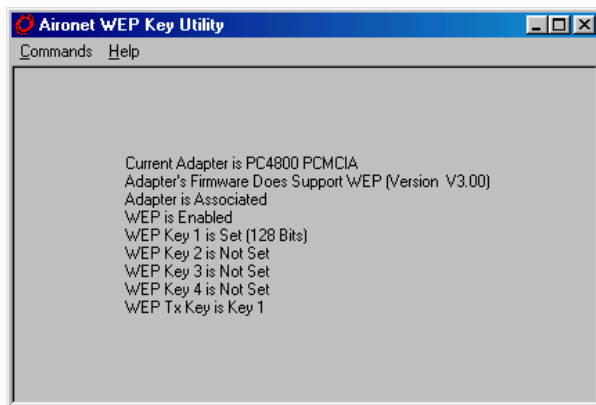
1. Install the Aironet WEPKey Utility (along with WinDGS and LinkScope) from the Aironet Wireless LAN Adapter Utility disk.
2. Start the application with one of these steps:
  - Double-click the WEPKey icon on the Desktop, or
  - From the Windows Start Menu, select Programs | Aironet | WEPKey, or
  - From a DOS Window, change to the C:\Aironet\WinDGS directory (or to the directory you selected when installing WinDGS) and type `wepkey`.

The following login screen appears:



Passwords are case sensitive, and can contain up to 256 characters. The default password is **Aironet** (upper-case *A* followed by lower-case *ironet*).

3. Enter the correct password and click OK. The main screen appears:



The Commands pull-down menu provides options that allow you to select a wireless adapter card, change the password, and enter a WEP key.

To enable or disable WEP, set the WEP key with the WEP key utility, and then open WinDGS. At the WinDGS main screen, select Edit Properties from the Commands pull-down menu. Click the RF Network tab. The Enable WEP checkbox is in the bottom left corner of the window.

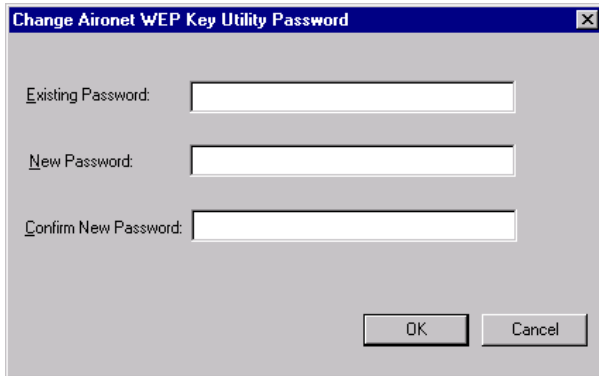
4. If you have more than one adapter card installed on your computer, you can use the WEPKey utility to select the card you want to use. To select an adapter card, choose Select Card from the Commands pull-down menu. This screen appears:



Highlight the card you want to use, and click OK to select it.

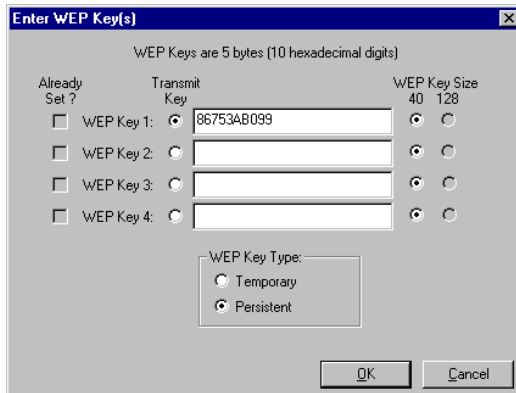
5. To change the default password, select Change Password from the Commands pull-down menu. This screen appears:





Passwords are case sensitive, and can contain up to 256 characters. The default password is **Aironet** (upper-case *A* followed by lower-case *ironet*).

6. To enter a WEP key, choose Enter WEP Key from the Commands pull-down menu on the main screen. This screen appears:



You can create up to four WEP keys. Ten characters are required for WEP-40 keys. Twenty-six characters are required for WEP-128 keys.

Select the size of each key by clicking the 40 or 128 button beside each key entry field.

Click the Transmit Key button next to the key you want to use.

A check appears in the Already Set box next to existing keys. To protect key security, existing key codes do not appear in the key entry fields. You can write over existing keys, but you cannot edit them or delete them.

There are two types of WEP keys: Temporary and Persistent. You should choose Persistent if you want the card to retain the WEP key when you reboot the machine.



**NOTE:** Entering a WEP key does not enable WEP. To enable or disable WEP, set the WEP key with the WEPKey utility, and then open WinDGS. At the WinDGS main screen, select Edit Properties from the Commands pull-down menu. Click the RF Network tab. The Enable WEP checkbox is in the bottom left corner of the window.

---

7. If you purchase WEP as an upgrade for your Wireless LAN Adapter, you need to enter the WEP Option Code. Aironet or your Aironet reseller will give you the Option Code when you purchase the feature.

Select Option Code from the Commands pull-down menu. This screen appears:

Enter Option Code:

Factory MAC Address: 00:40:96:26:43:DD

Option Code:

OK Cancel

Type the Option Code and click OK. You can then set up WEP keys and use the WinDGS utility to enable WEP.

8. You can exit the WEPKey utility by selecting Exit from the Commands menu.



## Section 3

# Error Messages and Troubleshooting

The PCI/ISA Wireless LAN Adapter provides LED messages and error codes. This section provides the general procedures for correcting common problems encountered when installing the PCI/ISA Card.

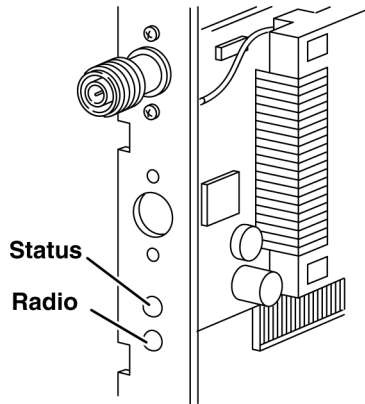
### *Indicator LEDs*

The PCI/ISA Card has two indicator LEDs (green and amber) on the back panel, below the antenna connector.

The green indicator is the Link Integrity/Power LED. It lights when the card is receiving power and flashes slowly when the PCI/ISA Card is linked with the network.

The amber indicator is the Link Activity LED. It flashes when the PCI/ISA Card is receiving or transmitting data, and flashes in a pattern to indicate an error condition.

See Tables 3.1 and 3.2 for an explanation of the LED Messages.



**Table 3.1 – Green LED Operating Messages**

<b>Green LED</b>	<b>Condition</b>
Off	No power or error
Flashing Quickly	Power on, self-test OK, scanning for network
Flashing Slowly	Associated with an infrastructure network

**Table 3.2 – Amber LED Operating Messages**

<b>Amber LED</b>	<b>Green LED</b>	<b>Condition</b>
Flashing	Continuously on or flashing slowly	PCI/ISA Card is transmitting or receiving data while associated with an Access Point
Flashing in a Pattern	Continuously on	Indicates an error condition

## ***If Your Radio Fails to Establish Contact***

- Change your location or the location of the antenna by a few feet and try again.
- Make sure the antenna is securely attached.
- Make sure the PCI/ISA Card is securely inserted in the expansion slot.
- Make sure the receiving equipment is turned on and operating.
- Make sure the receiving equipment is properly connected to the host computer.
- Check that all parameters are set properly for both the PCI/ISA Card and the Aironet Access Point.

If the radio fails to establish contact, contact Aironet Technical Support for additional assistance:

**Phone** - (330) 664-7903  
**Fax** - (330) 664-7990  
**e-mail** - [techsupp@aironet.com](mailto:techsupp@aironet.com)  
<http://www.aironet.com>





## *Appendix A*

# **Aironet Wireless LAN Adapter Overview**

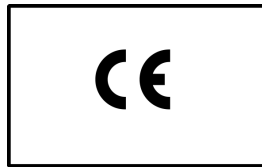
The Aironet 4800B Series PCI/ISA Wireless LAN Adapter is a PCI/ISA Card radio module that provides transparent wireless data communications between fixed, portable, or mobile devices and other wireless devices or a wired network infrastructure. Host devices can be any device equipped with a PCI/ISA Card expansion slot.

The PCI/ISA Card is fully compatible when used in a device supporting Plug-and-Play (PnP) technology.

## Safety Information

The FCC with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. The Aironet products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio according to the instructions found in this manual will result in exposure substantially below the FCC's recommended limits.

- Do not touch or move antenna(s) while the unit is transmitting or receiving.
- Do not hold any component containing the radio so that the antenna is very close or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.
- Do not operate radio or attempt to transmit data unless the antenna is connected; if the antenna is not connected, the radio may be damaged.



### Dipole Antenna

Always orient the antenna so that it is at least 15 cm (six inches) away from your body.

### High Gain Antennas

High gain wall mount or mast mount antennas are designed to be professionally installed and should be located at a minimum distance of 30 cm (12 inches) or more from your body. Please contact your professional installer, VAR, or antenna manufacturer for proper installation requirements.

## **Other Devices in the Wireless Network**

Refer to the User's Guide and Technical Reference manual for the Access Point, Universal Client, or Bridge for additional information.

## ***Radio Characteristics***

The PCI/ISA Card operates in the 2.4 GHz license-free Industrial Scientific and Medical (ISM) band. Data is transmitted over a half-duplex radio channel operating up to 11 Mbps.

## ***Direct Sequence Radio Technology***

The Aironet 4800B Series PCI/ISA Wireless LAN Adapter uses Direct Sequence Spread Spectrum (DSSS) transmission originally developed for military "anti-jamming" and "low probability of intercept" radio systems. The signal is transmitted over a wide frequency range, using multiple frequencies simultaneously. This protects the data transmission from interference.

If a particular frequency encounters a level of noise and/or interference, there is enough redundancy built into the signal on other frequencies that the Aironet 4800B Series PCI/ISA Wireless LAN Adapter will usually still be successful in its transmission.

## ***Data Transparency and Protocols***

The Aironet 4800B Series PCI/ISA Wireless LAN Adapter transports data packets transparently as they move through the wireless infrastructure. The PCI/ISA Card operates similarly to a standard network product except the wire is replaced with a radio connection. No special wireless networking functions are required. All existing applications, which operate over a network, will operate using the Aironet 4800B Series PCI/ISA Wireless LAN Adapter.

## ***Protocols Supported***

The Aironet 4800B Series PCI/ISA Wireless LAN Adapter can be used in a variety of infrastructure configurations. Aironet Access Points provide connections to Wired Networks. When using the Aironet standard device drivers, the PCI/ISA Card is fully compliant with the following operating systems:

<b>Drivers</b>	<b>Operating System</b>
NDIS3	Windows 95
NDIS4	Windows NT
NDIS5	Windows 98, Windows 2000

## ***Radio Ranges***

This section provides general guidelines on factors that influence network performance (see **Section 2: Using the WinDGS Utilities**).

### **Site Survey**

Because of differences in component configuration, placement and physical environment, every network application is a unique installation. Before installing the system, users should perform a site survey to determine the optimum utilization of networking components and to maximize range, coverage and network performance.

Here are some operating and environmental conditions you should consider:

- **Data Rates.** Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. There will be a decrease in receiver threshold sensitivity as the radio data rate increases.

- **Antenna Type and Placement.** Proper antenna configuration is a critical factor in maximizing radio range. As a general guide, range increases in proportion to antenna height.

For a detailed explanation of antenna types and configurations along with guidelines on selecting antennas for specific environments, see the Aironet Antenna Guide.

- **Physical Environments.** Clear or open areas provide better radio range than closed or filled areas. Also, the less cluttered the work environment, the greater the range.
- **Obstructions.** A physical obstruction such as metal shelving or a steel pillar can hinder the performance of the PCI/ISA Card. Avoid locating the computing device in a location where there is a metal barrier between the sending and receiving antennas.
- **Building Materials.** Radio penetration is greatly influenced by the building material used in construction. For example, drywall construction allows greater range than concrete blocks. Metal or steel construction is a barrier to radio signals.

### **Link Test**

The link test tool is used to determine RF coverage. The test results help the installer eliminate low RF signal level area that can result in loss of connection.

## ***Radio Antenna***

Optional antennas are offered for the PCI/ISA Card. Consult the Aironet Antenna Guide for more information.

## ***Security Features***

The Aironet 4800B Series PCI/ISA Wireless LAN Adapter employs Direct Sequence Spread Spectrum Technology,

previously developed for military “anti-jamming” and “low probability of intercept” radio systems.

The Aironet Access Point must be set to the same Service Set Identifier (SSID) as all other Aironet devices on the wireless infrastructure. Units with a different SSID will not be able to directly communicate with each other.

### ***Terminology***

When configuring your system, and when reading this manual, keep in mind the following terminology:

**Association:** Each root unit or repeater in the infrastructure contains an association table that controls the routing of packets between the Access Point and the wireless infrastructure. The association table maintains entries for all the nodes situated below the Access Point on the infrastructure including repeaters and client nodes.

**End Node:** A client node that is located at the end of the Network Tree.

**Infrastructure:** The wireless infrastructure is the communications system that combines Access Points, mobile nodes and fixed nodes. Access Points within the infrastructure can be either root units, which are physically wired to the LAN backbone, or can act as wireless repeaters. Other RF enabled devices serve as fixed nodes or mobile client nodes.

**Parent/Child Node:** Refers to the relationships between nodes in the wireless infrastructure. The complete set of relationships is sometimes described as a Network Tree. For example, the Access Point (at the top of the tree) would be the parent of the end nodes. Conversely, the end nodes would be the children of the Access Point.

**Power Saving Protocol (PSP) and Non-Power Saving Protocol:** The Power Saving Protocol allows computers (usually portable computers) to power up only part of the time to conserve energy. There are three levels of Power

Saving: Max PSP, the most energy conserving mode; Fast PSP, which sacrifices some power-saving in exchange for data transfer speed; and CAM (Constant Awake Mode), in which the client node never sleeps. Client nodes powered from an AC line should use CAM.

**Repeater:** A repeater is an Access Point that extends the radio range of the infrastructure. A repeater is not physically attached to the wired LAN, but communicates via radio to another Access Point, which is either a root unit or another repeater.

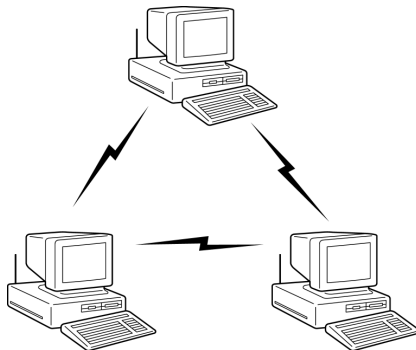
**Root Unit:** The root unit is an Access Point that is located at the top, or starting point, of a wireless infrastructure. A root unit provides the physical connection to the wired LAN (such as Ethernet or Token Ring) and contains configuration information in its association table that covers all nodes that access the wired network (backbone). All Access Points directly attached to the wired LAN backbone are root units.

## System Configurations

The Aironet 4800B Series PCI/ISA Wireless LAN Adapter can be used in a variety of network system configurations. Aironet Access Points provide connections to your network or act as repeaters increasing wireless communication range. The maximum communication range is based on how you configure your wireless infrastructure.

Examples of some common system configurations are shown on the pages that follow, along with a description of each.

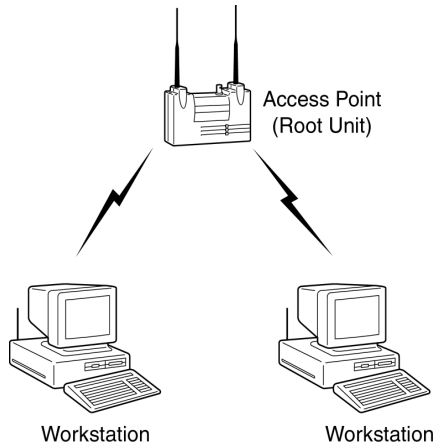
**Figure A.1 - Ad Hoc Wireless LAN**



An ad-hoc wireless LAN is the simplest wireless LAN configuration. In a wireless LAN using an ad hoc network operating system (such as Windows 95), all devices equipped with the PCI/ISA Card can be linked together and communicate directly with each other.

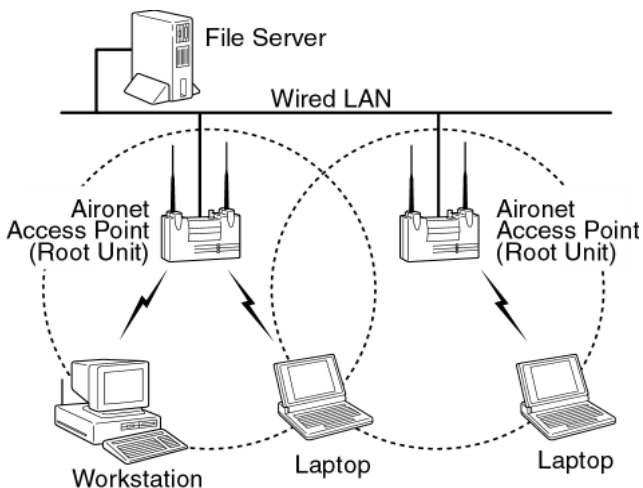


**Figure A.2 - Wireless Infrastructure**



In a wireless infrastructure, an Aironet Access Point is used as a stand-alone root unit. The root unit is not attached to any wired LAN, but functions as a hub linking all stations together. This configuration is similar to the ad hoc network, except the Aironet Access Point serves as the focal point for communications. This increases the effective communication range over the ad hoc LAN since both stations are not required to be in direct communication range of each other.

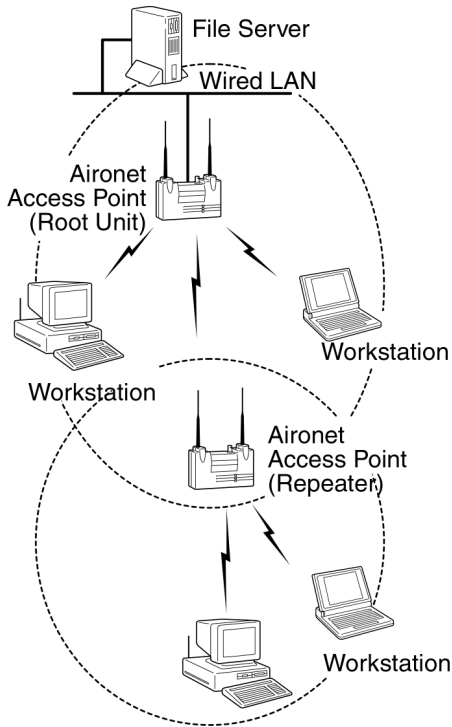
**Figure A.3 - Wireless Infrastructure with Workstations Accessing a Wired LAN**



A Micro-Cellular Network can be created by placing two or more Aironet Access Points on a LAN.

The Aironet roaming protocols allow remote workstations to move from one microcell domain to another. The process is seamless and transparent. The connection to the file server or host is maintained without disruption. This configuration is useful with portable or mobile stations allowing them to be directly connected to the wired network, even while moving about (roaming). When an infrastructure is configured using multiple Aironet Access Points and/or repeaters, a mobile station is automatically associated and re-associated to the Aironet Access Point which provides the best performance. This is referred to as seamless roaming.

Figure A.4 - Extended Infrastructure Using Repeaters

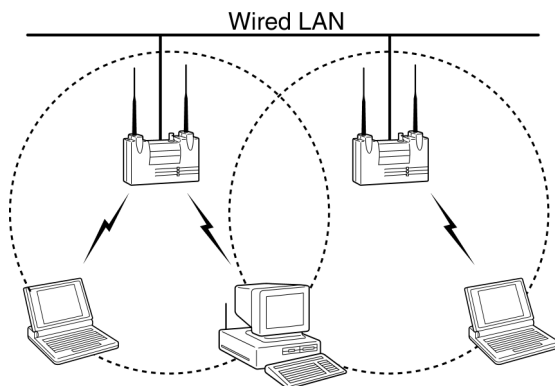


An Aironet Access Point can be configured as a stand-alone repeater to extend the range of your infrastructure, or to overcome an RF blocking obstacle. The repeater forwards traffic between the Aironet 4800B Series PCI/ISA Wireless LAN Adapter equipped workstations and devices and the wired LAN by sending packets to either another repeater or to another Aironet Access Point attached to the wired LAN. The data is sent through whichever route provides the greatest performance for the client. Multiple repeater hops can be supported in the path to the wired LAN.

## Coverage Options

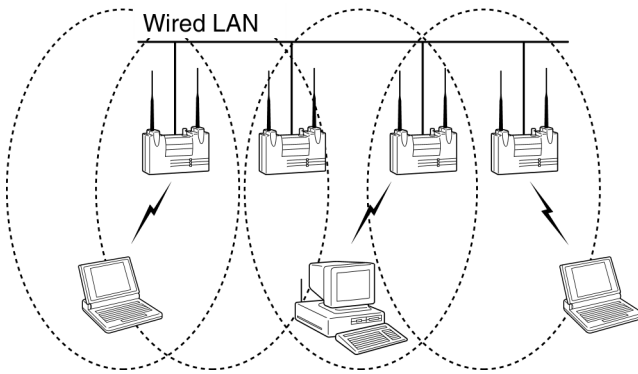
The system architecture options of the wireless station and Access Points provide for a variety of coverage alternatives and flexibility. The system can be designed to provide a wide coverage area with minimal overlap (Figure 1.5) or coverage with heavy overlap (Figure 1.6). The latter improves system performance and protection against downtime in the event of a component failure.

**Figure A.5 - Minimal Overlap Coverage Option**



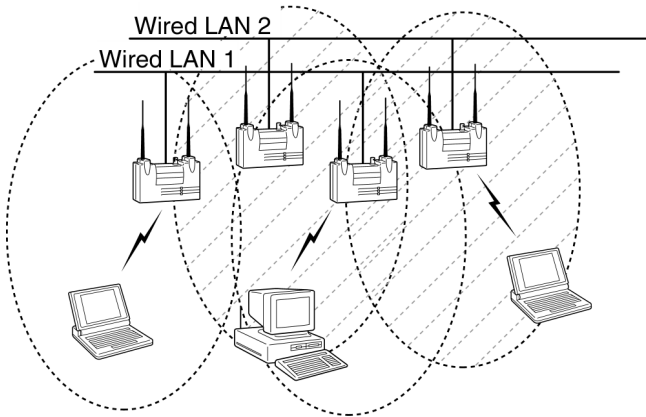
By arranging the Access Points so the overlap in coverage area is minimized, a large area can be covered with minimal system cost. The total bandwidth available to each mobile station will depend on the amount of data each mobile station desires to transfer and the number of stations located in each cell. Seamless roaming is supported as a mobile station moves in and out of range of each Access Point, thereby maintaining a constant connection to the wired LAN. Each device in the radio network must be configured with the same Service Set Identifier (SSID) to provide the roaming capability.

Figure A.6 - Heavy Overlap Coverage Option



By arranging the Access Points so the overlap in coverage area is nearly maximized, a large number of mobile stations can be supported in the same wireless infrastructure. However, units in overlapping coverage areas on the same frequency will detect adjacent cell traffic and delay transmissions that would cause collisions. This reduces the aggregate radio system throughput. Heavy cell overlap is not recommended for maximum system throughput. Due to the redundancy in coverage overlap, system access is not lost in the event of an Access Point failure. Upon failure of the Access Point, the station will automatically roam to an operational Access Point. With this architecture, each device in the RF (Radio Frequency) network must be configured with the same Service Set Identifier (SSID) to provide the roaming capability.

**Figure A.7 - Multiple Overlapping Systems Coverage Option**



Multiple systems can operate in the same vicinity. The architecture provides multiple channels, which can exist in the same area with virtually no interference to each other. In this mode, each system must be configured with different Service Set Identifiers (SSID) and different channels, which prevent clients from roaming to Access Points of a different wireless system.

## ***Appendix B***

# **PCI/ISA Card Specifications**

## ***LAN Drivers Supported***

**Table B.1 – Supported Drivers:**

<b>Drivers</b>	<b>Operating System</b>
NDIS3	Windows 95
NDIS4	Windows NT
NDIS5	Windows 98, Windows 2000

## Radio Specifications

Table B.2 – Radio Specifications

Item	Specification	Description
Radio Type	Direct Sequence Spread-Spectrum (DSSS)	2.4 GHz ISM Band
Operating Frequency	2400-2497 MHz	North American, ETSI, and Japan channel coverage, factory configurable
FCC ID	LOZ102038	FCC approval
Channeling	1 MHz increments	Programmable for IEEE 802.11
Type of Modulation	BPSK 1 Mbit/s QPSK 2 Mbit/s CCK 5.5 and 11 Mbits/s	Nominal 10 MHz BW (-6 db)
Power Output (North American Configuration)	30 mW	Meets FCC Part 15.247 requirements
Mating Antenna Connector		R-TNC



## ***Power Requirements***

**Table B.3 – Power Requirements**

<b>Specification</b>	<b>Value</b>
Operational Voltage	5.0V $\pm$ 0.25 Volts
Receive Mode Current	280 mA (350 mA typically)
High Power Transmit Mode Current (30 mW)	490 mA (450 mA typically)
Sleep Mode Current	110 mA typically

## ***Physical Specifications***

**Table B.4 – Physical Characteristics**

<b>Item</b>	<b>Description</b>
Size	5.8" L x 3.2" W x .5" H (14.7 cm L x 8.1 cm W x 1.3 cm H)
Weight	4.6 oz.
Operating Temperature	0° C to 55° C minimum (-22° F to 131° F)
Storage Temperature	-40° C to +85° C (-40° F to 185° F)
ESD	15kV (human body model)
Connectors	PCI/ISA Card edge
Status Indicators	Green and Amber LEDs – link association/activity



## Appendix C

# Channels

The channel identifiers and the channel center frequencies of each 22 MHz wide channel are shown in the table below, as appropriate for the various areas or regulatory agencies.

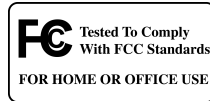
Channel Identifier	Center Frequency	Regulatory Domains				
		North America	ETSI	Spain	France	Japan
1	2412 MHz	X	X	-	-	X
2	2417 Mhz	X	X	-	-	X
3	2422 MHz	X	X	-	-	X
4	2427 Mhz	X	X	-	-	X
5	2432 Mhz	X	X	-	-	X
6	2437 Mhz	X	X	-	-	X
7	2442 MHz	X	X	-	-	X
8	2447 MHz	X	X	-	-	X
9	2452 MHz	X	X	-	-	X
10	2457 MHz	X	X	X	X	X
11	2462 MHz	X	X	X	X	X
12	2467 MHz	-	X	-	X	X
13	2472 MHz	-	X	-	X	X
14	2484 MHz	-	-	-	-	X



## Appendix D

# Declarations of Conformity

### Manufacturers Federal Communication Commission Declaration of Conformity Statement



**Models: PCI4810B, PCI4820B, ISA4810B, ISA4820B**

**FCC Certification number: LOZ 102038**

**Manufacturer:**

**Aironet Wireless Communications, Inc.  
3875 Embassy Parkway  
Akron, OH 44333-8357  
330-664-7900**

This device complies with Part 15 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.

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.

## Appendix D: Declarations of Conformity

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- Increase separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.

### User Warning

The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency.

## **Department of Communications—Canada**

### **Canadian Compliance Statement**

This Class B Digital apparatus meets all the requirements of the Canadian Interference - Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte les exigences du Règlement sur le matériel brouilleur du Canada.

This device complies with RSS-210 of Industry of Canada. 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.

The device is certified to the requirements of RSS-139-1 for 2.4 GHz spread spectrum devices. The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations. For further information, contact your local Industry Canada office.

**European Telecommunication Standards Institute**

**Statement of Compliance**

**Information to User**

This equipment has been tested and found to comply with the European Telecommunications Standard ETS 300.328. This standard covers Wideband Data Transmission Systems referred in CEPT recommendation T/R 10.01.

This type accepted equipment is designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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 radio communications.



***Declaration of Conformity***

***Aironet Model Number:  
PCI4810B, PCI4820B,  
ISA4810B, ISA4820B***

Radio CE Type Certificate Number: BCL/EC/98-008/G

Radio Type Approval Examination Number: R0170 SRD 3a

Application of Council Directive: 89/336/EEC

Application of Council Directive: 72/23/EEC

Standards which Conformity is Declared:

EN 55022 (B)

EN 55011 (B)

EN 50082-1

EN 60950

Manufacturer: Aironet Wireless Communication  
3875 Embassy Parkway  
Akron, OH 44333

*The undersigned hereby declares the above specified equipment conforms to the above Directives and standards.*



A handwritten signature in black ink, appearing to read "Michael Smedley", is written over a solid horizontal line.

Michael Smedley  
Director, Manufacturing Engineering  
Aironet Wireless Communications, Inc.



## ***Appendix E***

# **Technical Support**

### **Communications**

Use the following information to contact the Aironet Technical Support group:

Telephone: (330) 664-7903

Fax: (330) 664-7990

e-mail: [techsupp@aironet.com](mailto:techsupp@aironet.com)

### **Web Site**

For additional product information and technical support, including the capability to download new firmware and drivers, use the Aironet web site at:

<http://www.aironet.com>

