

ParkerVision[®]



Wireless to the



miniPCI1500 **Wireless PC LAN Card**



USER'S GUIDE

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May include one or more of the following patents: US6421534, US6049706, US6266518, US6061555, US6061551, US6353735, US6091940, US6370371 Additional Patents Pending.
Designed and manufactured in the USA.

FCC INTERFERENCE STATEMENT

FCC ID: JFE-D2D00005

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

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operations.

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not used in accordance with the instructions, may cause harmful interference to radio communications.

If this equipment does cause harmful interference to radio/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 of more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

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“FCC RF exposure requirements: This device can be used in laptop computer(s) with the following configuration; an internal miniPCI port, and embedded antennas located in the upper area of the display. When in operation, the upper display area of the laptop should be opened upright and located such that it is more than 20 cm. away from people and their person. This device can be used in laptop computer(s) with substantially similar physical dimensions, construction, and electrical and RF characteristics. This transmitter is restricted for use with the specified antenna(s) tested in the application for Certification. The embedded antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.”

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Continued Next Page



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QUESTIONS. Should you have any questions concerning this agreement, or if you desire to contact ParkerVision for any reason, please use the address information enclosed in this Hardware Device to contact ParkerVision, or visit ParkerVision on the World Wide Web at <http://www.parkervision.com/>.

PACKAGE CONTENTS

- D2D™ Wireless LAN Card
- Manual and Driver on CD ROM
- Quick Installation Guide
- Latest software always on-line at www.parkervision.com

SYSTEM REQUIREMENTS

- Microsoft™ Windows XP or 2000
- Minimum 300MHz processor or better
- Minimum 128 Mb Ram

ParkerVision miniPCI1500 Wireless PC LAN Card works with any PC laptop with available internal mini PCI bus interface, 300 MHz or better processor & 128 Mb of RAM, running Microsoft™ Windows 2000 or XP. **This product is available for purchase in the U.S. only.**

CUSTOMER SUPPORT

You can access customer support 24 hours a day online at www.parkervision.com. This is the quickest way to access:

- Answers to Frequently Asked Questions
- Troubleshooting Guides
- Updated Drivers
- Manuals

You can also request help by sending an email to support@parkervision.com or calling customer support directly at 1-800-231-1759.



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INTRODUCTION

All ParkerVision Wireless products are designed and manufactured by ParkerVision. Products are fully compliant with IEEE 802.11b standards and are optimized to provide maximum possible speed and bandwidth through your Internet connection for fastest uploads and downloads.

The distance capabilities of your wireless network equipment directly affect your signal quality. Distance capabilities are usually stated in terms of outdoor, open field reach. However, this reach is greatly diminished indoors by walls, doors, construction techniques and appliances that may block the radio signal. A wireless network card that tests outdoors at 200 feet could, in an indoor environment, provide 20 feet in one direction and as little as 5 or 10 feet in another direction. Factors such as building materials, floor plans and furnishings can greatly impact the signal range, quality and rate of data transmission. The extent to which your signal is affected varies greatly depending on your environment.

Wireless network products powered by D2D technology will provide better performance than other products because they can achieve open field distances of up to one mile, (when a D2D enabled card is used in conjunction with a D2D enabled base station). The D2D card alone provides 3 to 7 times the distance of other leading brands. This is sufficient to reach all rooms in most homes or small offices.

Part I

Getting Started

The following chapters are structured as a step-by-step guide to help you connect, install and setup your ParkerVision miniPCI1500 Wireless PC LAN Card.

Chapter 1: Getting to Know Your ParkerVision miniPCI1500 Wireless PC LAN Card

This chapter introduces the main features of the ParkerVision miniPCI1500 Wireless PC LAN Card

1.1 Introduction

The ParkerVision miniPCI1500 Wireless PC LAN Card is an 11 Mbps IEEE 802.11b wireless Mini PCI card and has a standard Mini PCI adapter which fits into any standard Mini PCI Type notebook computer slot. Its maximum 11 Mbps data rate gives equivalent Ethernet speed to access corporate networks, home networks, or the Internet in a wireless environment. The ParkerVision miniPCI1500 Wireless PC LAN Card gives you wireless communication with any 802.11b-compliant product, allowing you to stay connected anywhere within a coverage area.

1.2 Features of the ParkerVision miniPCI1500 Wireless PC LAN Card

The following are the essential features of the ParkerVision Wireless PC LAN Card .

- *Supports data rate of 1,2, 5.5 and 11 Mbps*
- *Range of one mile in an open environment, when used with a ParkerVision wireless access point*
- *Supports Point-to-Point and Point-to-Multi-point access*
- *Seamless connectivity to wired Ethernet and computer Network LAN*
- *Helps to augment existing networks quickly and easily*
- *Direct Sequence Spread Spectrum (DSSS) technology provides robust, interference-resistant, and secure wireless connections capabilities*
- *Network connectivity minus the cost of cabling*
- *Supports Windows 2000/XP*
- *Supports Plug and Play*
- *Ease of installation*
- *Flexibility and mobility to locate or move networked computers*

1.3 Applications

The ParkerVision miniPCI1500 Wireless PC LAN Card offers fast, reliable and cost-effective solutions for wireless networks. They include:

- Remote Access capability to Corporate Networks for email, file transfer and terminal emulation access.
- Difficult to Wire Environments - For use in historical or old buildings, asbestos installations and open areas where wiring is impossible to deploy.
- Frequently Changing Environments - For retailers, manufacturers and those who frequently

rear-range the workplace or change locations.

- Temporary LAN's for Special Projects or During Peak Time - For trade shows, exhibitions and construction sites where a temporary network is required. For retailers, airline and shipping companies who need additional workstations during peak periods. For auditors requiring workgroups at customer sites.
- Database Access for Mobile Users - Doctors, nurses, retailers who need to access their databases on the move in a hospital, retail store, office or campus.
- SOHO (Small Office and Home Office) Users - SOHO users who need easy and quick installation of a small computer network.
- High Security Connection - Flexible, secure and quick installations, with WEP Encryption.

Chapter 2: Software Installation

This chapter will guide you through the installation of the ParkerVision Software.

Make sure that you install the software onto your computer BEFORE you install the ParkerVision miniPCI1500 Wireless PC LAN Card!

Note: The ParkerVision miniPCI1500VWireless PC LAN Card works with Windows XP and 2000 Operating Systems.

2.1 Installing the ParkerVision Software

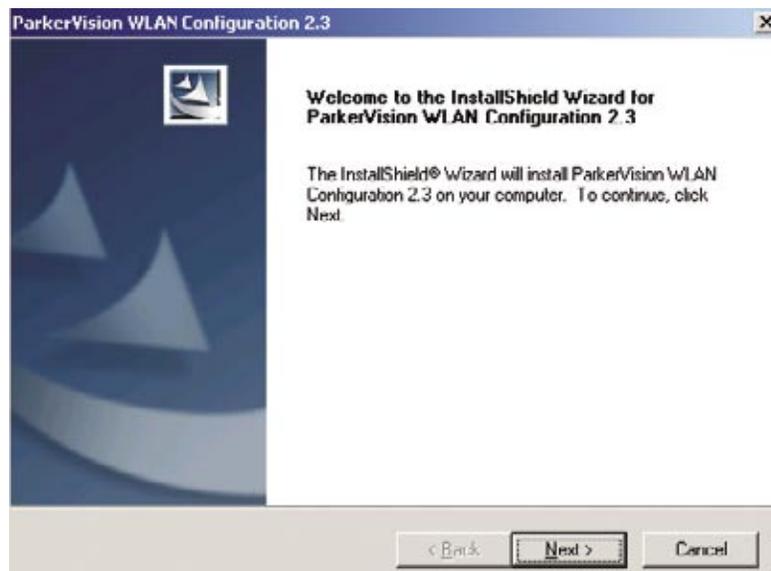
**STEP
1**

Insert the CD ROM into the CD ROM drive.

Most systems will begin an auto-run setup sequence once the CD is inserted. The InstallShield Wizard screen will appear.

Note: If your computer displays a message regarding this software not being certified for use with XP, you can safely answer yes and allow the installation to proceed. This software has been tested to work with Windows XP.

Click **NEXT** to continue.



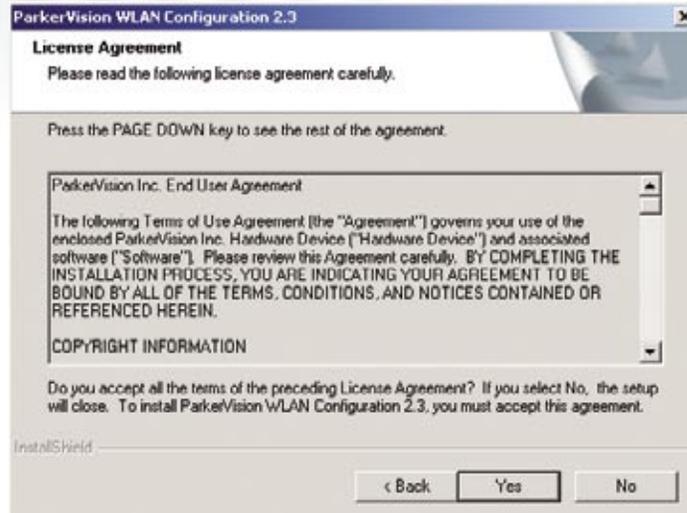
If the InstallShield does not automatically start, click the “My Computer” icon, navigate to the CD-ROM drive, and find the file “setup.exe” on the CD.

Double click this file, and the installation process should begin as shown above.

2.1 Installing the ParkerVision Software - Continued

**STEP
2**

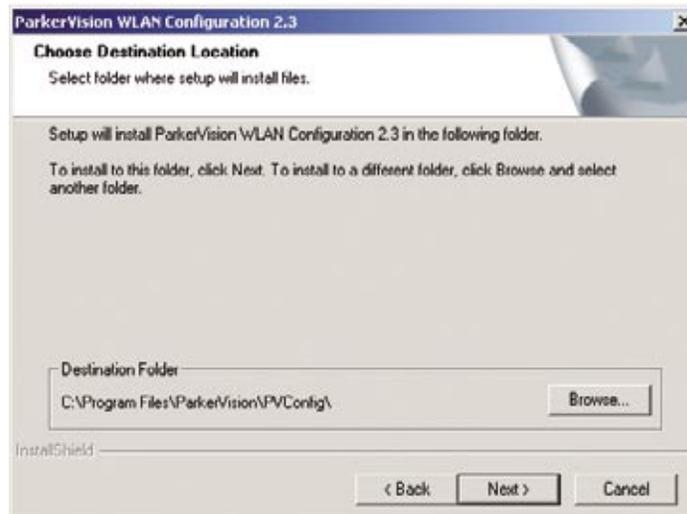
The License Agreement screen will appear. The License Agreement must be accepted to continue. Click **YES** to continue.



**STEP
3**

Select the install folder.

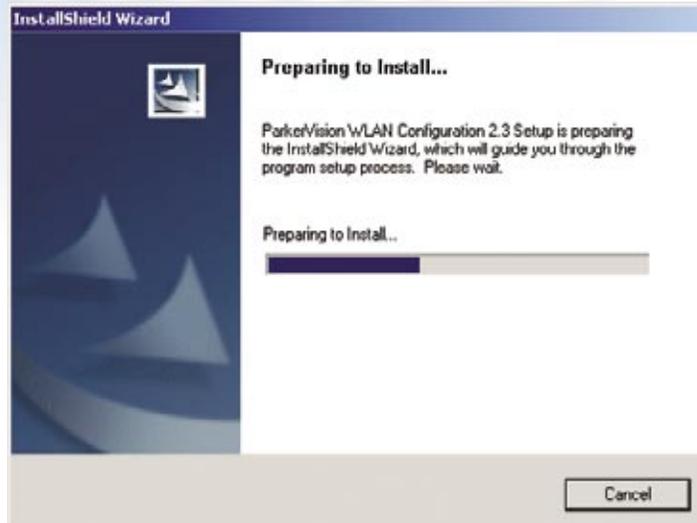
Click **NEXT** to install the ParkerVision software in the default folder as shown. We do not recommend using an alternate location.



2.1 Installing the ParkerVision Software - Continued

**STEP
4**

The following screen will appear and the software will be installed onto your computer.



**STEP
5**

RESTART YOUR COMPUTER.

Select **FINISH** to restart your computer and complete the installation of the software.

**STEP
6**

Please insert the ParkerVision miniPCI1500 Wireless PC LAN Card into your computer's Mini PCI slot. See Page 15 for additional information on installing the ParkerVision Mini PCI card into your computer. Double click the ParkerVision icon on your desktop.

The ParkerVision Utility is now running in the background and has placed an icon in the lower right System Tray. Double-click on this icon in the System Tray as shown to the right.

**Double Click this icon
in the System Tray**



NOTE: Windows 2000 users can now go to CHAPTER 3 of this manual to complete the hardware installation and configuration process.

For Windows XP Users:

Double clicking the ParkerVision icon may cause the following message to appear:

*"Windows Zero Configuration was detected.
Please disable Windows Wireless Network Control."*

If you see this message, for best performance, you will now want to TURN OFF or Disable Windows' control of wireless networking. Proceed to the next page and follow the steps shown to complete this process.

2.2 IMPORTANT INFORMATION FOR WINDOWS XP USERS

For Windows XP Users Only: In order to achieve the best possible performance of the miniPCI1500 Wireless LAN card in your computer it is necessary to make a change in the way Windows XP handles you wireless networking connections.

After your miniPCI1500 LAN card is installed and configured in your wireless network, you will want to follow the instructions below to make this change in the Windows configuration.

Step 1: Find the wireless networking connection icon in the System Tray, located in the lower right hand corner of your screen, or at the far end of your Start Bar if you have it docked to a location different from the screen bottom.

Double Click this icon to access the Wireless Network Connection Properties



Step 2: Double Click this icon, which will bring up the Properties Dialog for the wireless network connection that your computer is part of.

Double Click the Advanced Button



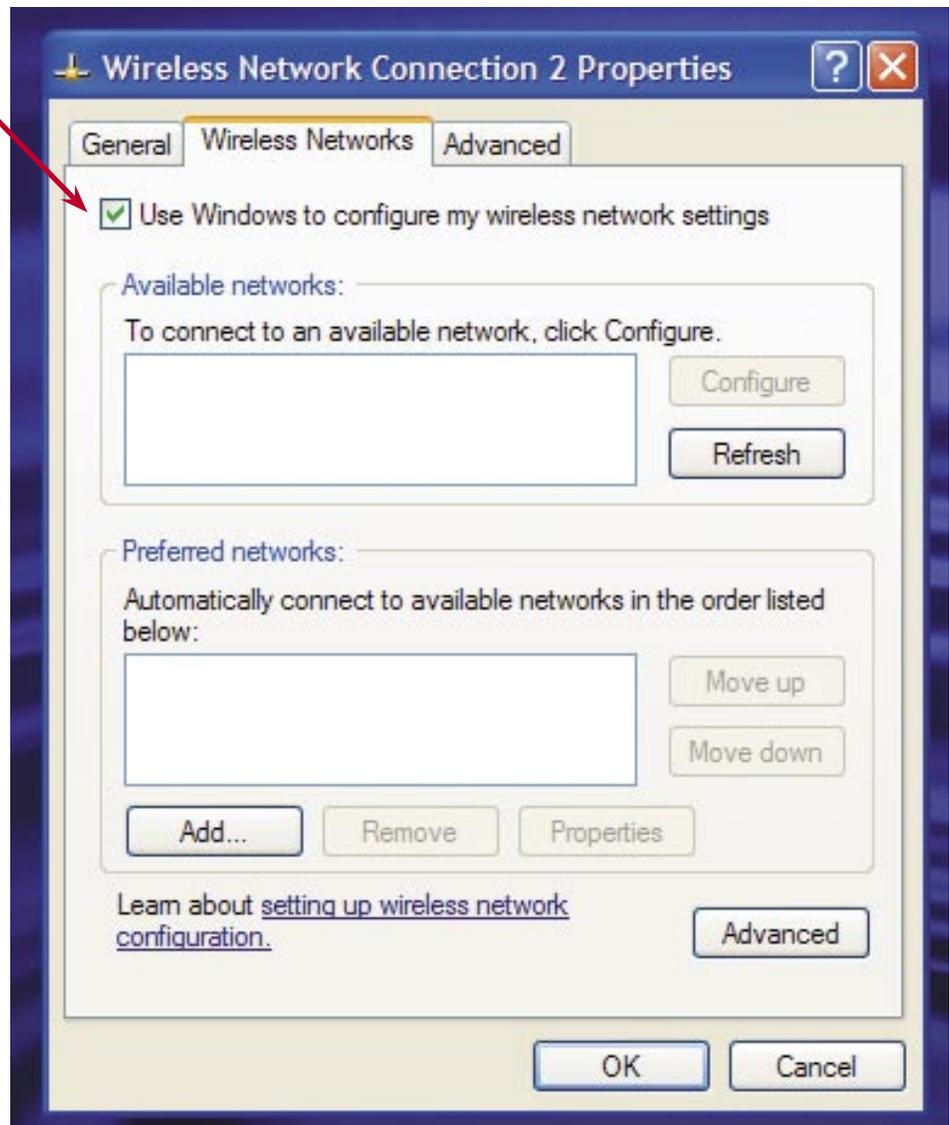
2.2 IMPORTANT INFORMATION FOR WINDOWS XP USERS - Continued

Step 3: Selecting the “Advanced” button on the previous screen will bring up the window shown below. Select the “Wireless Networks” tab, and not the box to the left of the line “Use Windows to configure my wireless network settings.”

Step 4: If this box has a check mark in it, click in the box to REMOVE THE CHECK MARK.

Step 5: Click OK to close this Window.

Click Here to
Remove the
Check Mark



Chapter 3 : Hardware Installation

This chapter will guide you through the installation of the ParkerVision miniPCI1500 Wireless PC LAN Card into your computer

3.1 System Requirements

- Mini PCI slot
- Windows 2000/XP Operating System
- 500 Kbytes free hard disk space (minimum) for driver and utility program installation.
- 128 MB RAM

3.2 Installing the ParkerVision miniPCI1500 Wireless PC LAN Card

Follow the procedure shown next to install the ParkerVision miniPCI1500 Wireless PC LAN Card. Refer to the appendix for important safety instructions.

Step 1. Locate available Mini PCI slot in your notebook computer. Access is typically from the bottom side of the computer. It may be necessary to remove a panel that is secured in place with screws. REFER TO THE USER MANUAL THAT CAME WITH YOUR NOTEBOOK COMPUTER TO COMPLETE INSTALLATION.

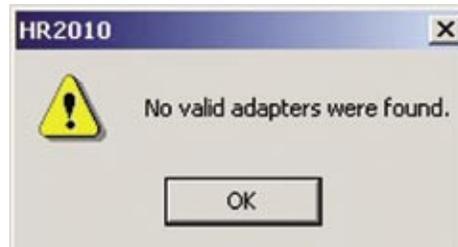
Step 2. Insert the ParkerVision miniPCI1500 Wireless PC LAN Card completely into the Mini PCI slot, and attach the antennas to the ParkerVision miniPCI1500 card.

Never force, bend or twist the ParkerVision miniPCI1500 Wireless PC LAN Card into the location.



The Mini PCI slot supports "hot swapping" of Mini PCI adapter, allowing you to insert or remove the ParkerVision miniPCI1500 Wireless PC LAN Card from the slot whenever you like, even when power to your computer is on. However, you should always disable the ParkerVision miniPCI1500 Wireless PC LAN Card prior to card removal to allow Windows to log off from the network server.

Windows will automatically detect the ParkerVision miniPCI1500 Wireless PC LAN Card and the **FOUND NEW HARDWARE** Wizard Dialog Box will appear. Follow the on-screen instructions to install the ParkerVision Wireless driver. If the Wireless LAN Card is not inserted properly, the following error message will appear:



To confirm proper installation of the ParkerVision miniPCI1500 Wireless PC LAN Card:

- Right-Click **MY COMPUTER** from the Windows desktop.
- Click **PROPERTIES**.
- Open **DEVICE MANAGER**.
- Select the **HARDWARE** folder tab, and then click the **DEVICE MANAGER** button.
- Double-click **NETWORK ADAPTERS**. No special markers should appear next to the miniPCI1500 Wireless LAN Card selection.
- Double-click miniPCI1500 Wireless PC LAN Card. Refer to the tab labeled **GENERAL**. The **DEVICE STATUS** Window will indicate that the device is working properly.

For Windows 2000 users, a DIGITAL SIGNATURE NOT FOUND message may appear. Simply select YES to proceed.

For Windows XP users, a WINDOWS LOGO TESTING NOT FOUND dialog box may appear. Click CONTINUE ANYWAY to proceed. ParkerVision Wireless D2D software has been tested to work with Windows XP, and the installation should be continued with confidence.

Part II

Advanced Management

The following chapters will show you how to manage and configure advanced parameters of your ParkerVision miniPCI1500 Wireless PC LAN Card.

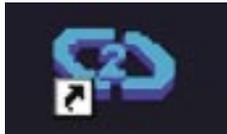
Chapter 4 : ParkerVision Wireless D2D Management Utility

This chapter will guide you through configuring the Management Utility for the LAN Card

4.1 Configuration

ParkerVision Wireless D2D Management Utility will assist in setting up and customizing your wireless network. The D2D Management Utility will provide you with information regarding signal quality and link conditions as well as let you modify various wireless parameters.

To access the ParkerVision Wireless D2D Management Utility double-click the miniPCI1500 shortcut found on the desktop. The D2D Management Utility can also be accessed by double-clicking the ParkerVision icon that appears in the Windows System Tray (bottom-right corner of the task bar). The shortcut as well as the icon are shown below.



Desktop
Icon



SysTray
Icons

The shortcut is automatically placed on the desktop after driver installation is complete. Clicking the access icon (tool button) in the lower-right corner will open the D2D Management Utility. The ParkerVision icon will appear in the System Tray only if the option is selected from the D2D Management Utility.

The **System Tray (SysTray)** can be found on one end of the task bar on the Microsoft Windows desktop. Icons for memory-resident applications that execute continuously in the background will be found here. These may include such things as the time-clock, anti-virus software, and speaker volume as shown above.

4.2 Configuration - Using the D2D/ParkerVision Management Utility

The D2D Configuration Dialog Box is displayed as shown below and consists of four primary sections. From here, different connections may be detected, configured, and stored.

Available Connections Section

SSID	Type	Channel	Signal	WEP
Wireless_M	AP	1	Excellent	On

Current Connections Section

SSID	Status	Channel	Type	WEP	Speed
Wireless_M	Associated	1	AP	64 Bits	11 Mbps

SIGNAL MAX 85% Sent 108 Recd 11

Profiles

Name	SSID	Channel	WEP
Profile000	linksys	6	Off
Profile001	matix1	4	128 Bit
Profile002	Wireless	1	64 Bit
Profile003	hampton2	8	Off
Profile004	hampton1	3	Off
Profile005	Wireless_M	1	64 Bit
Profile006	TechTest	6	128 Bit

Access Tray Section

Connect Edit

Start in System Tray

www.direct2data.com Options Help Done

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The above sections are covered individually on the pages that follow.

4.3 AVAILABLE CONNECTIONS SECTION - Continued



The top-most section of the D2D Configuration Dialog Box shows the available connections. The available connections will be displayed from a scan performed when the software was started, or when the scan button was clicked.

To begin using the ParkerVision miniPCI1500 Wireless PC LAN Card immediately, highlight the desired available connection and select **CONNECT.**

The following describes information found in the **AVAILABLE CONNECTIONS** area of the configuration Dialog Box.

- **SSID:** Identifies the name of the network in use through the access point that is being utilized.
- **TYPE:** Indicates the operating mode of the ParkerVision miniPCI1500 Wireless PC LAN Card. These modes are AP (Access Point/ Infrastructure) and Ad-Hoc. The next section of the manual covers this in more detail.
- **CHANNEL:** Indicates the wireless channel that is currently in use.
- **SIGNAL:** Indicates the radio frequency signal strength.
- **WEP:** Indicates the encryption status (security setting) of the device. If WEP is off, there is no encryption. If it is on, settings options include 64-bit and 128-bit WEP.
- **LAST SCAN:** Gives the date and time stamp for the last successful scan.
- **CONNECT:** Connects to the selected network.
- **SCAN:** Performs a check to find wireless channels available for connection.

4.4 CURRENT CONNECTION SECTION

SSID	Status	Channel	Type	WEP	Speed
Wireless_M	Associated	1	AP	64 Bits	11 Mbps

SIGNAL MAX 85% Sent Recd 108 11

This section shows the connection that is currently active, giving the status of each category described in the **AVAILABLE CONNECTION SECTION** on the previous page. The **SPEED** indicates the rate of data transfer as dictated by the access point to which the wireless LAN card is connected.

4.5 ACCESS TRAY SECTION

Start In System Tray
www.direct2data.com Options Help Done
 ©2003 ParkerVision, Inc.

If the **START IN SYSTEM TRAY** option is toggled, the **ParkerVision** icon will appear in the system tray on start-up.

- Click the **www.parkervision.com** button to access the ParkerVision Wireless home page.
- Click the **HELP** option to view the user manual.
- Click **DONE** to exit the D2D Management Utility.
- Click **OPTIONS** to set the options shown below.

Options [X]
 SSID: direct2data
 Channel: 1
 Connect: Access Point
 WEP: 64 Bit
 Default: Key 1
 Key 1: [XXXXXXXXXX]
 Key 2: [XXXXXXXXXX]
 Key 3: [XXXXXXXXXX]
 Key 4: [XXXXXXXXXX]
 OK Cancel

- **SSID** is broadcast by the access point or in Ad-Hoc by all members in the connection. Occasionally SSID is hidden and the user needs to input the correct name.
- **Channel** can be set by the user when in Ad-Hoc. In AP Mode, the access point sets the channel.
- **Connect** to access point or Ad-Hoc.
- Select the appropriate **WEP** encryption option: **Off, 64-bit, or 128-bit.**

Most **PUBLIC** locations leave **WEP** off.

PRIVATE Ad-Hoc connections will default to WEP 64-bit enabled. The exact key must match the AP or Ad-Hoc member, i.e. Key 1: 3451237890. Connection is established even if the key is incorrect, however, data will not be allowed to transfer with the correct key. Four unique keys can be remembered, one is selected as the default for use when WEP is enabled. Verify with your IT professional the setting for your network.



4.6 MORE ON AD-HOC AND AP MODES

Ad-Hoc Mode (Peer-to-Peer Workgroup)

The Institute of Electrical and Electronics Engineers (IEEE) standard for wireless LAN's (WLAN's), 802.11 offers two methods for configuring a wireless network — Ad-Hoc and infrastructure (access point). In an Ad-Hoc network, computers are brought together as needed. In this instance, there are no fixed points to the network — each node can generally communicate with any other node. There is no access point involved in this configuration. This enables the set up and use of a small wireless workgroup and allows workgroup members to exchange data or share printers as supported by Microsoft Networking in the various Windows operating systems. To set up an Ad-Hoc workgroup operating with standard protocols:

- Set all stations to connect in Ad-Hoc mode (or Peer-to-Peer workgroup mode).
- Set all stations to use the same network name (or SSID).
- Set all stations to use the same wireless channel for communication.
- Set all stations to either disable the WEP encryption key, or set all stations to use an identical WEP encryption key.

AP Mode (Infrastructure Mode)

With a wireless access point (AP), you can put the ParkerVision Wireless PC LAN into AP (Infrastructure) mode. It provides wireless connectivity to multiple wireless network devices within a fixed range or area of coverage, interacting with a wireless node by way of an antenna. In AP Mode, the wireless access point converts airwave data into wired Ethernet data, acting as a bridge between the wired LAN and wireless clients. Connecting multiple access points via a wired Ethernet backbone can further extend the wireless network coverage. As a mobile computing device moves out of the range of one access point, it moves into the range of another. As a result, wireless clients can freely roam from one access point domain to another and still maintain seamless network connection. To set up an AP network operating with standard protocols, do the following:

- Set all wireless stations to connect in AP mode.
- Set all stations to use the same network name (or SSID).
- Set all wireless access points to use the same network name (or ESSID).
- Set all stations to disable the WEP encryption key, or set all stations to use an identical WEP encryption key as used by the access point.
- Set up wireless channels used by individual access points. (It is not necessary to set channels on the stations as the stations will automatically scan through all channels for the nearest access point.
- You should consult your access point documentation for the available options.

4.7 MORE ON SSID

Service Set Identification (SSID)

The Service Set Identification (SSID) is a thirty-two alphanumeric character (maximum) string identifying the wireless local area network. ParkerVision Wireless refers to the SSID as network name. For stations to communicate with each other, all stations must be configured with the same SSID. A wireless LAN consisting of nodes operating in Ad-Hoc configuration without an access point is called a Basic Service Set (BSS). All nodes in a BSS must use the same Basic Service Set ID (BSSID). In an Access Point (AP) configuration, multiple BSS can be configured to form an Extended Service Set (ESS). In this configuration, the access points are configured with the same Extended Service Set ID (ESSID). Wireless clients configured with the same ESSID can freely roam from one access point domain to another and still maintain a seamless connection to the network.

4.8 MORE ON WEP ENCRYPTION

Authentication and WEP Encryption

Wireless links are vulnerable to information theft. To provide a certain level of security, IEEE 802.11 standard has defined two types of authentication methods, Open System and Shared Key. Open System authentication is a null algorithm. Shared Key authentication is an algorithm where both the transmitting node and the receiving node share an authentication key to perform a checksum on the original message. By default, IEEE 802.11 wireless devices operate in an open system network. Wired Equivalent Privacy (WEP) data encryption is utilized when the wireless nodes or access points are configured to operate in Shared Key authentication mode. ParkerVision Wireless utilizes the following 802.11b solutions: the standard based 64-bit WEP data encryption and 128-bit WEP data encryption. The 64-bit WEP data encryption method allows for a five-character (40 bits) KEY. Additionally, 24 factory-set bits are added to the 40-bit input to generate a 64-bit encryption key. (The 24 factory-set bits are not user configurable.) This encryption key will be used to encrypt/decrypt all data transmitted via the wireless interface. The 128-bit WEP data encryption method consists of 104 configurable bits. Similar to the 64-bit WEP data encryption method, the remaining 24 bits are factory set and not user configurable.

Part III

Additional Information

This part includes Troubleshooting, Appendices, and the Index.

Chapter 5 : Troubleshooting

This chapter covers potential problems and the possible remedies. After each problem description, some instructions are provided to help you diagnose and solve the problem.

5.1 Problems During Driver Installation

PROBLEM	CORRECTIVE ACTION
The ParkerVision miniPCI1500 Wireless PC LAN Card is not working after the driver installation	<p>Make sure the driver software is installed BEFORE you insert your wireless LAN card into your computer. Failure to install the software first may result in the LAN card being recognized incorrectly.</p> <p>Insert the Mini PCI adapter into your notebook computer's slot again.</p> <p>Make sure the antennas are connected snugly</p> <p>Make sure there is no hardware conflict between your ParkerVision miniPCI1500 Wireless PC LAN Card and other hardware in your computer. If there is a conflict, you need to set your I/O and IRQ manually.</p>
Windows does not auto-detect the ParkerVision miniPCI1500 Wireless PC LAN Card	<p>Restart your computer.</p> <p>Do a manual scan of your computer hardware.</p> <p>In Windows 2000, click Start, Settings, Control Panel, System, Hardware, Hardware Wizard.</p> <p>In Windows XP, click Start, Control Panel, Performance and Maintenance, System, Hardware, Device Manager. Then Right-click on your computer name and select Scan for Hardware Changes.</p> <p>Check your Mini PCI adapter and make sure there is no hardware conflict.</p> <p>Try the second Mini PCI slot if one is available on your computer.</p> <p>Contact ParkerVision Customer Support</p>

Chapter 5 - Troubleshooting - Continued

5.2 Problems With the Utility Configuration

PROBLEM	CORRECTIVE ACTION
While starting the configuration utility, the program starts up and terminates immediately with no errors.	<p>The D2D/ParkerVision software may not recognize that the card has been inserted. Try removing and re-inserting the card. Make sure that Windows is recognizing the card when it is inserted.</p> <p>Note for Windows XP users: Another reason the utility may terminate results from Windows XP controlling the card services at installation time. You may check this with the following steps: Click Start, Control Panel. From Control Panel, select Network, then Wireless Network Settings, and uncheck the "Use Windows to configure my wireless network settings." More information on this can be found in this manual in Section 4.11.</p>

5.3 Problems With Access Point Settings

PROBLEM	CORRECTIVE ACTION
Problems with AP settings.	<p>Make sure that the access point (AP) and the associated computer are turned on.</p> <p>Check to see if the access point is displayed in the available connections section of the D2D/ParkerVision Management Utility.</p> <p>From a Windows Command Prompt, use the Ping Command to test connectivity to the access point. Consult your access point manual for the appropriate IP Address.</p> <p>Consult your access point Manual for additional troubleshooting tips.</p>

Chapter 5 - Troubleshooting - Continued

5.4 Problems Communicating With the Computer

PROBLEM	CORRECTIVE ACTION
The ParkerVision miniPCI1500 Wireless PC LAN Card client cannot communicate with the other computer on the Ethernet when the Infrastructure mode is configured.	<p>Make sure that the AP and the associated computer are on.</p> <p>Make sure your computer and the AP use the same SSID.</p> <p>Make sure both computers are associated with the access point.</p> <p>Use the Windows Ping Command to test communications to the access point's IP Address. Consult your access point documentation for the address settings. If you can Ping the access point, you should then attempt to Ping the second computer. The IPCONFIG command will display a computer assigned IP Address when entered from a Windows Command Prompt.</p> <p>Use the Site Survey utility to verify operating radio channel has low interference. Change the AP and all the stations within the BSS to another radio channel if interference is high.</p> <p>Make sure that the computer and the AP share the same security option and key.</p>
ParkerVision Status Utility Button displays No Signal.	Move your computer closer to the AP within the transmission range.
There is too much radio interference (for example microwave oven or cordless telephone) around your wireless network.	Relocate or reduce the radio interference.

Appendix A : Network Configuration

The ParkerVision miniPCI1500 Wireless PC LAN Card supports the same network configuration options of Legacy Ethernet LAN's as defined by the IEEE 802 standard.

The ParkerVision miniPCI1500 Wireless PC LAN Card can be configured as:

- Ad-hoc for departmental or SOHO LAN's.
- Infrastructure for enterprise LAN's.
- LAN-interconnection for point-to-point link as a campus backbone.

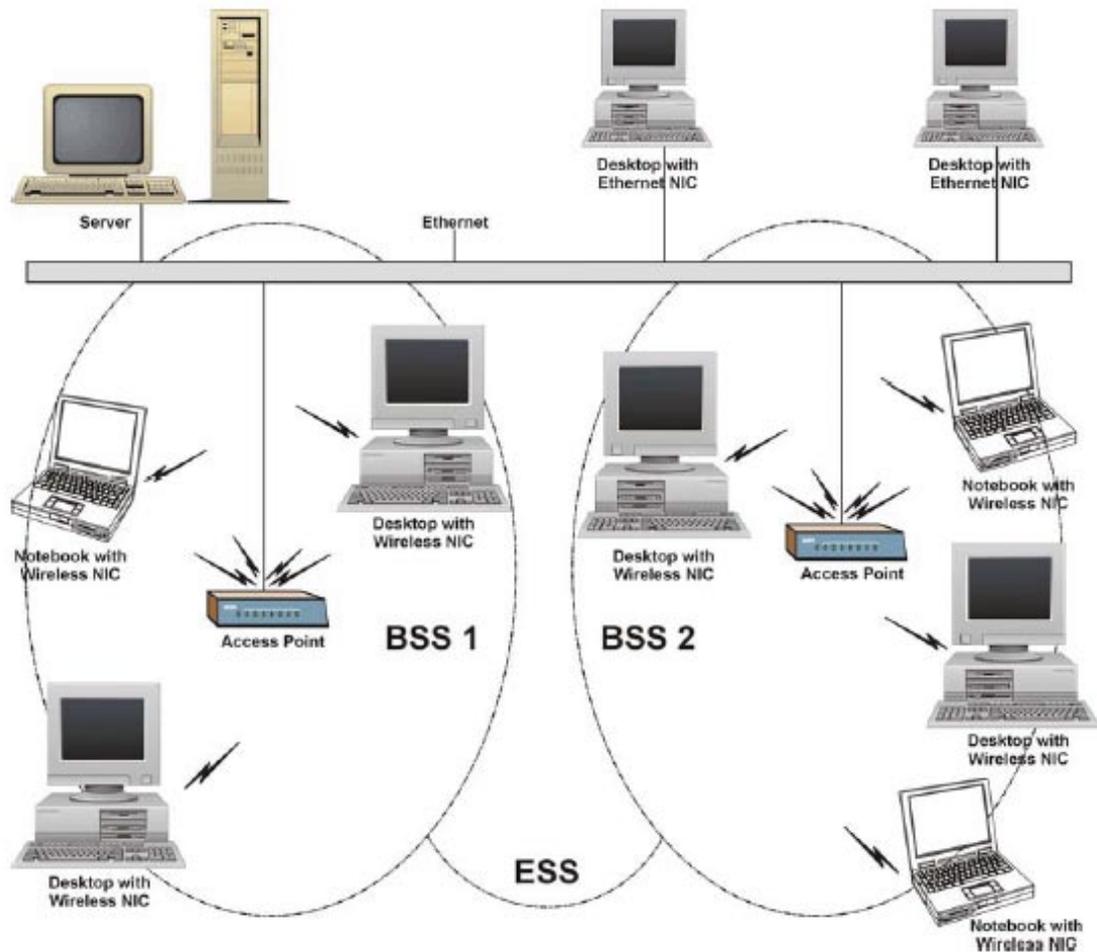
Ad-hoc Wireless LAN Topology



Ad-hoc Wireless LAN Topology - Continued

An Ad-hoc wireless LAN is a group of computers, each equipped with one wireless adapter, and connected as an independent wireless LAN. Computers in a specific Ad-hoc wireless LAN must be configured on the same radio channel. An Ad-hoc wireless LAN is available at a departmental scale for a branch or SOHO operation.

Wireless LAN Topology Infrastructure

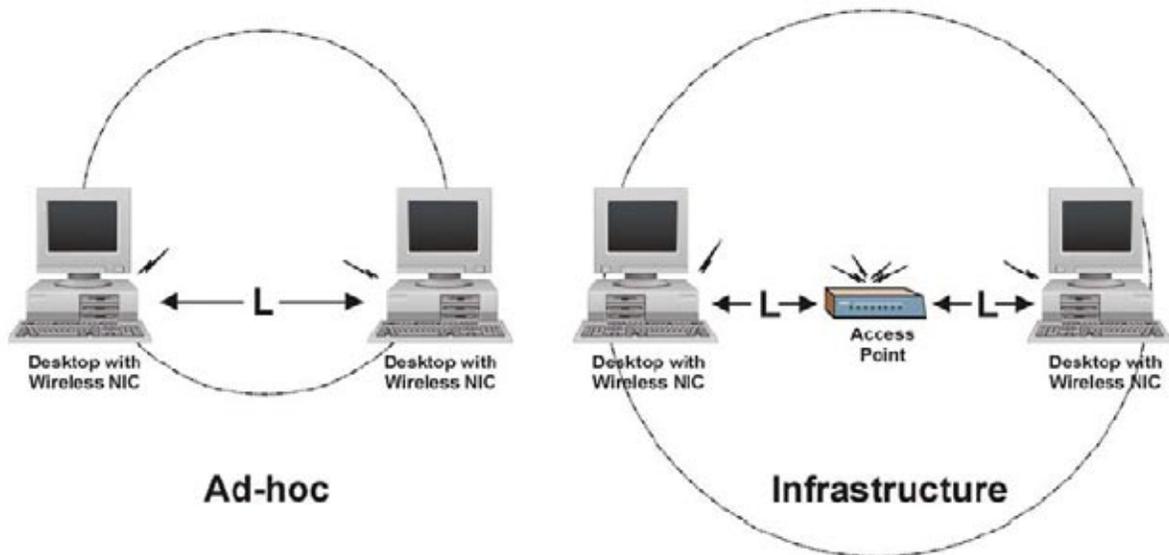


Ad-hoc Wireless LAN Topology - Continued

The ParkerVision miniPCI1500 Wireless PC LAN Card provides access to a wired LAN for wireless computers. An integrated wireless and wired LAN is called an Infrastructure configuration. A group of wireless LAN computer users and an access point constitute a Basic Service Set (BSS). Each wireless-equipped computer in this BSS can talk to any computer in the wired LAN infrastructure via the access point.

Infrastructure configuration will extend the accessibility of a wireless station to the wired LAN. Multiple access points will allow roaming and it will increase the transmission range. The access point is also able to forward data within its BSS. The effective transmission range in an Infrastructure LAN is doubled.

Effective Transmission Range Example



Appendix B : Hardware Specifications

General ParkerVision miniPCI1500 Wireless PC LAN Card Specifications

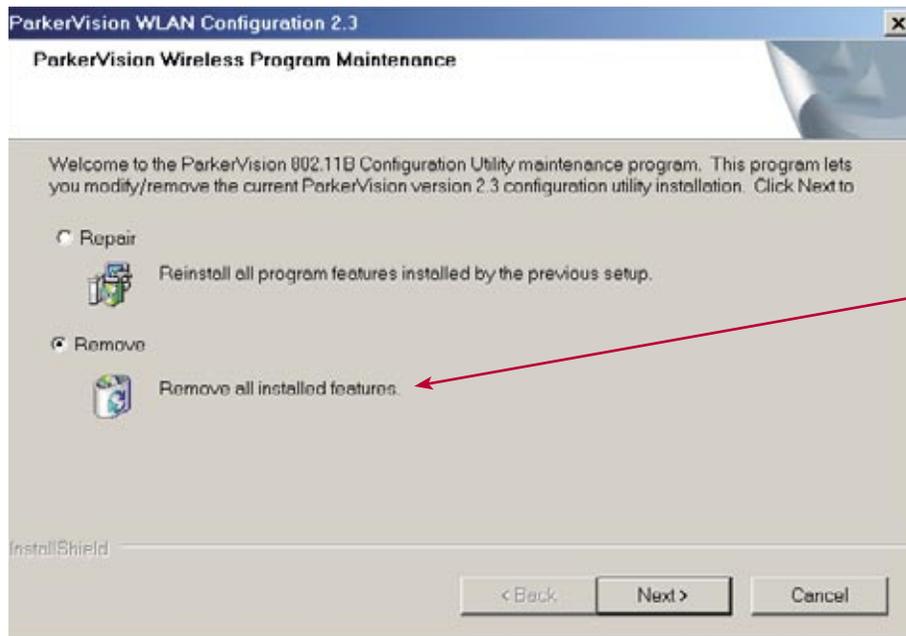
Operating Systems Supported	Windows 2000 and XP
Standards	IEEE 802.11b
Host Interface	PC Card Slot Extended
Data Rates	1, 2, 5.5, 11 Mbps, with Auto-Fall-back Support
Modulation	BPSK, QPSK, CCK
Range (typical)	Open Environment: 1 Mile* Closed Environment: 450 Feet*
Frequency Range	ISM Band (2.4 to 2.4835 GHz)
Channels	1-11 United States (Approved for use only in the United States)
Wireless Security (WEP)	Off, 64-bit, 128-bit

* A ParkerVision WR1500 Access Point is required to achieve absolute maximum range.

Appendix C : Uninstalling the ParkerVision Software

Should you wish to uninstall the ParkerVision Software from your Windows 2000 or XP computer, the following steps should be followed:

Step 1: Locate the file **miniPCI1500 Uninstall.exe**. This file is generally located in the folder in which the ParkerVision software was installed, as shown in the example below. Select this file to run the uninstall program.

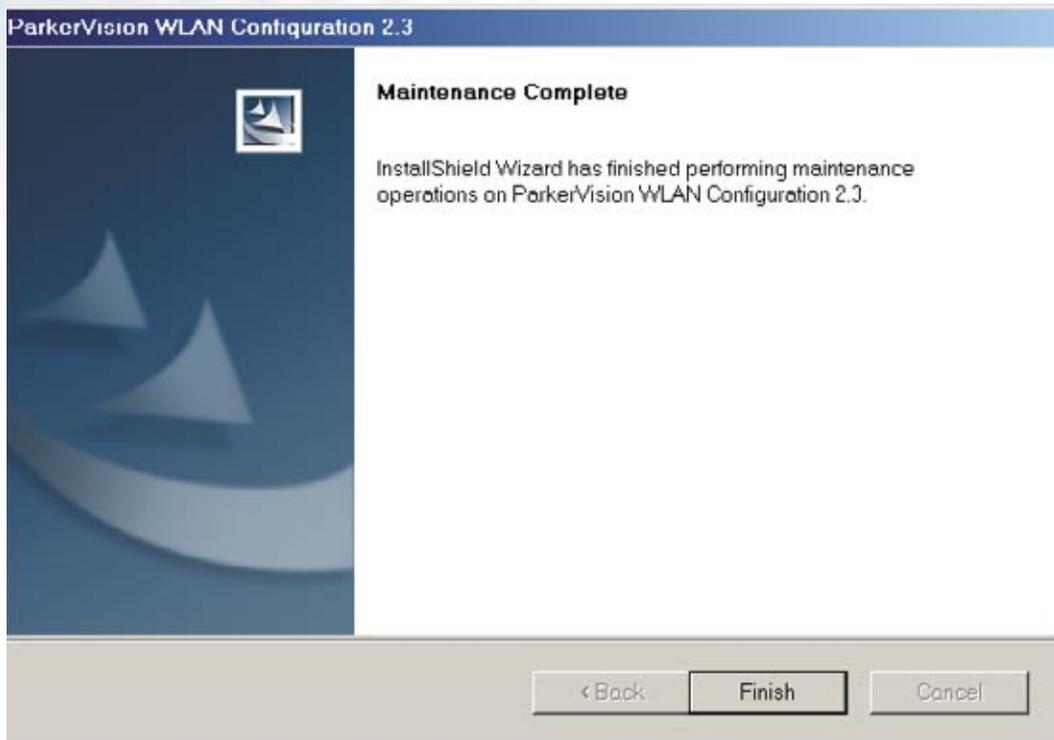


Click **REMOVE
ALL INSTALLED
FEATURES.**

Select **NEXT** to uninstall the software.

Uninstalling the ParkerVision Software - Continued

Step 2: After the remaining files associated with the ParkerVision/D2D software are removed, you will see the following dialog box:



Click **Finish** to complete the uninstall of the ParkerVision software.

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Glossary

Channel: The radio channel of a wireless network, 1 through 11.

Connect: Connect to an available network, or connect to a network using a specific profile.

Delete: Delete a named profile.

Done: Save changes and close the window.

Edit: Edit a named profile.

Name: Profile name, such as, "Work" or "Home".

Options: Used to create ad hoc and infrastructure networks, and start the ParkerVision-D2D user interface in the system tray.

Password: Enter a password, if required, to connect to a wireless network.

Profile: A record that contains information about a wireless network such as SSID, WEP keys, channel, and type of connection, e.g. AP or ad hoc.

Scan: Activates a search of all channels (1 through 11) searching for wireless networks.

Scanning...: Active indication of the scanning activity. If the radio seems to be in a state of continuous "Scan", it is likely that there are no wireless networks available.

Signal: Signal strength.

Status: State of the wireless connection, either connected or not connected.

Speed: The speed of the connection measured in Mbps, (Megabits per second).

SSID: Service Set Identifier. An identification broadcast, (or not), by an access point or ad hoc node.

Type: Type of network, either infrastructure/access point, (AP), or ad hoc.

WEP: Wired equivalent privacy. A means of encrypting the radio signals, can be 40 bit, 64 bit, or 128 bit encryption.