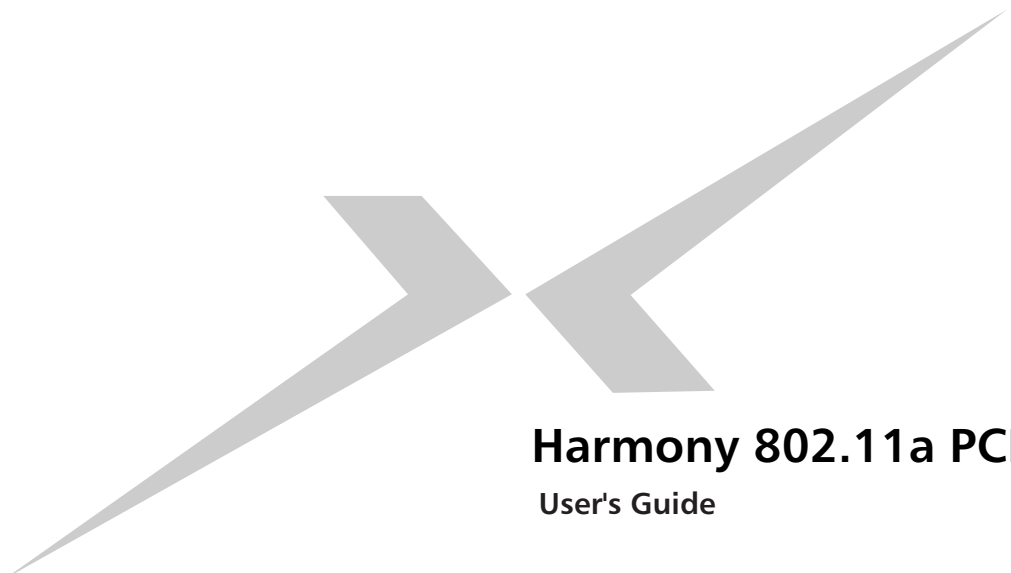


***proxim***

**Harmony**



**Harmony 802.11a PCI Card**  
User's Guide

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For a period of three (3) years from the date of purchase by the retail customer, Proxim warrants the Harmony 802.11a PCI Card (Model 8150) against defects in materials and workmanship. Proxim will not honor this warranty if there has been any attempt to tamper with or remove the product's external foil label.

This warranty does not cover and Proxim will not be liable for any damage or failure caused by misuse, abuse, acts of God, accidents, or other causes beyond Proxim's control, or claim by any entity other than the original purchaser.

If, after inspection, Proxim determines there is a defect, Proxim will repair or replace the Harmony 802.11a PCI Card at no cost to you. To return defective merchandise to Proxim please call Proxim Technical Support 1-408-731-2640 to obtain a Return Merchandise Authorization (RMA) number.

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- As a result of any event, circumstance, action, or abuse beyond the control of Proxim, Inc.

Whether such damages be direct, indirect, consequential, special or otherwise and whether such damages are incurred by the person to whom this warranty extends or a third party.

## Warranty Return Policy

If you have a problem with the Harmony 802.11a PCI Card (Model 8150), please call Proxim Technical Support at 1-408-731-2640. Proxim Technical Support will assist with resolving any technical difficulties you may have with your Proxim product.

After calling Proxim Technical Support, if your product is found to be defective, you may return the product to Proxim after obtaining an RMA (Return Merchandise Authorization) number. The product must be returned in its original packaging. The RMA number should be clearly marked on the outside of the box. Proxim cannot be held responsible for any product returned without an RMA number, and no product will be accepted without an RMA number.

## FCC WARNING

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

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

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

*Harmony 802.11a PCI Card Model 8150 User's Guide*

Part # 7360.0153

Rev. A

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# Chapter 1

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## Introduction

Congratulations on your purchase of the Harmony 8150 802.11a PCI Card. The Harmony 8150 802.11a PCI Card is a long range, high performance, wireless LAN adapter card that complies with the IEEE 802.11a standard. In addition, the PCI Card supports 2X™ mode, which provides data rates of up to 108 Mbps.

The Harmony 802.11a PCI Card supports Windows 2000, Windows Millennium Edition (ME), and Windows 98 Second Edition (SE). Computers with the Harmony 802.11a PCI Card installed “look” like standard network nodes to the operating system.

The Harmony 8150 802.11a PCI Card complies with the IEEE 802.11a standard for wireless networking devices. This means that the PCI Card is interoperable with IEEE 802.11a equipment from any manufacturer when operating in 802.11a mode.

The Harmony 802.11a PCI Card can be used with other 802.11a devices to form a stand-alone wireless Ad Hoc network or used in conjunction with a Harmony infrastructure to provide mobile clients with wireless access to an Ethernet network.

Proxim is the pioneer in wireless broadband networking. Proxim’s unmatched expertise in spread spectrum radio networking technology, combined with the company’s extensive experience serving the communication needs of the mobile computing user, have kept Proxim at the forefront of the wireless LAN market.

## The Harmony Family

The Harmony 802.11a PCI Card Model 8150 is a member of a product family that provides a complete wireless networking solution.

- The **Harmony Access Point Controller Model 7560** centralizes the management, security, and filtering capabilities of a wireless LAN. The Access Point (AP) Controller communicates with Harmony Access Points over the Ethernet network to provide wireless network access for mobile clients. The AP Controller can support multiple APs, even if each AP complies with a different wireless standard.
- The **Harmony Access Point** is a networking bridge that operates at Layer 2 of the OSI networking model. Working in conjunction with a Harmony AP Controller, the AP forwards packets between its radio and the Ethernet network. Three models of the Harmony AP are available to support the IEEE 802.11a, IEEE 802.11b or OpenAir wireless standards: the **802.11a Access Point Model 8570**, the **802.11b Access Point Models 8550/8551** and the **OpenAir Access Point Model 7550**.
- The optional **Harmony Power System Model 7562** provides DC power to Harmony APs over the unused pins of a twisted pair Ethernet cable.
- The **Harmony 802.11a CardBus Card** is a wireless LAN adapter that fits into a 32-bit CardBus slot in a laptop computer and complies with the IEEE 802.11a standard.
- The **Harmony PC Card** is a wireless LAN adapter that fits into a PCMCIA Type II slot in a laptop computer. Two models are available to support the IEEE 802.11b (**8430 Series**) and OpenAir (**7430 Series**) wireless standards.
- The **Harmony CompactFlash Card** is a wireless LAN adapter that fits into a CompactFlash slot in a Pocket PC. Two models are available to support the IEEE 802.11b (**Model 8630**) and OpenAir (**Model 7630**) wireless standards.
- The **Harmony 802.11b PCI Card Model 8110** is an 802.11b-compliant wireless LAN adapter that fits into a standard PCI expansion slot.
- The **Harmony OpenAir USB Adapter Model 7230** is an OpenAir-complaint wireless LAN adapter that connects to a Windows 98/ME/2000 computer's Universal Serial Bus (USB) port.

## The Product Package

Each Harmony 802.11a PCI Card Model 8150 comes with the following:

- One 802.11a PCI Card with two integral antennas (one antenna has a longer cable than the other)
- One Harmony 802.11a PCI Card Installation CD-ROM containing Proxim software and utilities and this user's guide in Portable Document Format (PDF)
- One *Harmony 8150 802.11a PCI Card Quick Start Guide*
- One warranty registration card

If any of these items are missing or damaged, please contact your reseller or Proxim Technical Support.

## **System Requirements**

To begin using the Harmony 802.11a PCI Card, you must have the following minimum requirements:

- A computer that meets the following specifications:
  - Windows 2000, Windows Millennium Edition (ME), or Windows 98 Second Edition (SE) installed
  - PCI (Peripheral Components Interconnect) expansion slot
  - At least 64 MB of memory
  - A 300 MHz processor or higher
- At least one other IEEE 802.11a-compliant device



## Chapter 2

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### Installation

This chapter describes how to install the Harmony 802.11a PCI Card and software in a computer running Windows 2000, Windows Millennium Edition (ME), or Windows 98 Second Edition (SE).

#### **Pre-installation Considerations**

Review the following pre-installation considerations before installing the Harmony 802.11a PCI Card.

#### **Regulatory Warnings**

##### **FCC Guidelines**

It is the responsibility of the installer and users of the Harmony 802.11a PCI Card Model 8150 to guarantee that the antennas are operated at least 20 centimeters from any person. This is necessary to insure that the product is operated in accordance with the RF Guidelines for Human Exposure which have been adopted by the Federal Communications Commission.

##### **Radio Frequency Interference Requirements**

The Harmony 802.11a PCI Card Model 8150 operates in the frequency range of 5.15 to 5.35 GHz; it is restricted to indoor use due to its operation in the 5.15 to 5.25 GHz frequency range. FCC 15.407(e) requires that the device be used indoors in the frequency range of 5.15 to 5.25 GHz to reduce the potential or harmful interference to co-channel Mobile Satellite systems. Therefore the device should be used indoor only for channel 36, 40, 44, and 48 and when 2X mode is enabled, channel 42 and 50. High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz band. These radar stations can cause interference with and/or damage the Harmony 802.11a PCI Card.

## **Windows ME and Windows 98 SE Installation CD Requirement**

Before beginning the installation of the 802.11a PCI Card, confirm that you have a Windows 98 SE or Windows ME installation CD available (depending on the computer's operating system). Windows 98/ME users may be prompted to insert a Windows CD during the installation.

You should not need a Windows CD when installing an 802.11a PCI Card in a Windows 2000 computer.

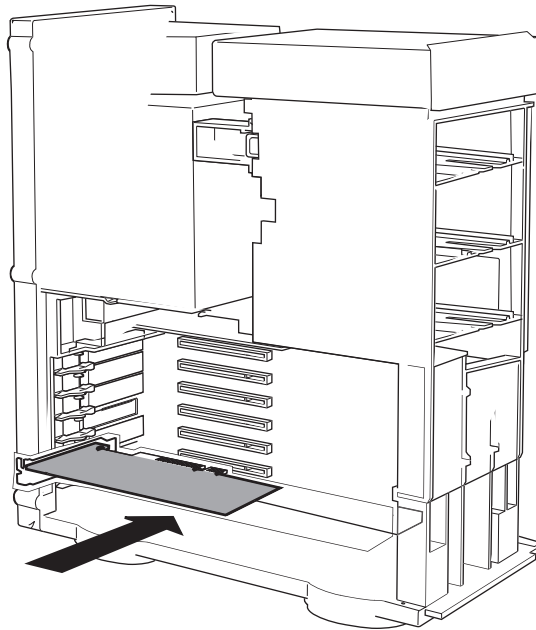
If you do not have a Windows 98/ME CD, it is possible that you already have the Windows installation files on your hard disk. These Windows installation files are known as Windows Cabinet or CAB files. The Cabinet files are commonly located in *C:\WINDOWS\OPTIONS\INSTALL\* or *C:\WINDOWS\OPTIONS\CABS\*.

**Note:** Windows 98/ME users may need the Windows CD or Cabinet files to complete the installation of the 802.11a PCI Card. Proxim recommends that you do not proceed with the installation until you have confirmed that you have one of these Windows installation media available.

## Hardware Installation

Follow these steps to install the Harmony 802.11a PCI Card in a computer's PCI slot:

1. Turn off your computer and unplug its power cord from the wall outlet for safety purposes.
2. Remove the computer cover.
3. Locate an unused PCI slot and refer to your PC's manual for instructions on how to remove the plate that covers the slot (if applicable).
4. Align the Harmony 802.11a PCI Card over the empty slot.
5. Firmly insert the card into the slot, as illustrated below.



6. Secure the card's metal bracket to the computer following the directions provided in your PC's manual.
7. Replace the computer cover.
8. Plug the computer's power cord back into the wall outlet.
9. Place the antenna with the longer cable on top of your desk, computer, or monitor.
10. Turn on the computer.

## Software Installation

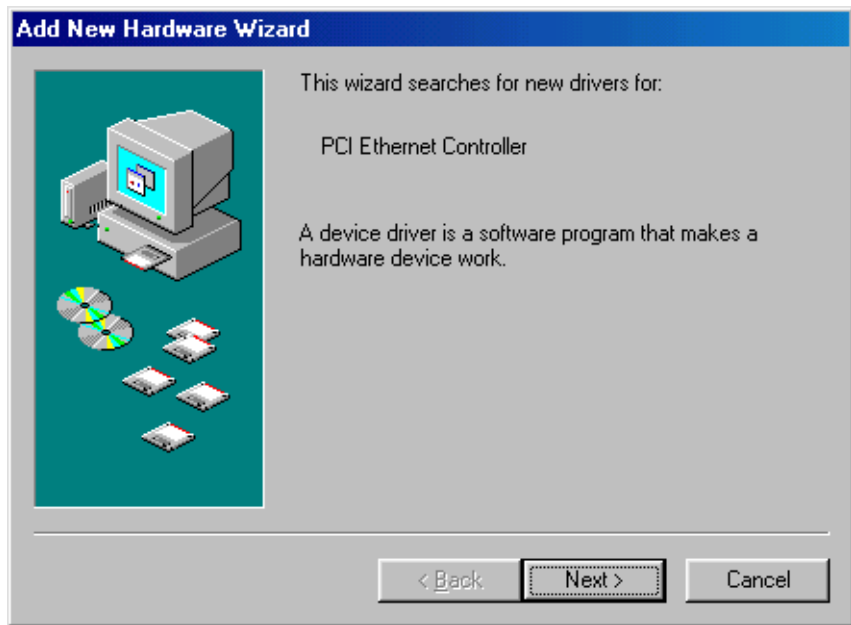
### Windows ME/98 SE Installation Steps

The first time you turn on the computer after inserting the Harmony 802.11a PCI Card, the Add New Hardware Wizard will appear automatically, as shown in the following examples.

Windows ME users should see this screen:



Windows 98 SE users should see this screen:



Follow these steps to install the Harmony 802.11a software in a computer running Windows Millennium Edition (ME) or Windows 98 Second Edition (SE):

1. Insert the Harmony Installation CD into the CD-ROM drive.
2. Windows 98 SE users: Click **Next** to continue.
3. Select **Automatic search for a better driver (Recommended)** (Windows ME) or **Search for the best driver for your device (Recommended)** (Windows 98 SE) and click **Next**.
4. Windows 98 SE users: Check the box labeled **CD-ROM drive** and click **Next** to continue.
5. Windows 98 SE users: The Add New Hardware Wizard will prompt you once it has located the driver. Click **Next** to install the driver.
6. Insert the Windows installation CD if prompted. If you do not have a Windows installation CD, see “Windows ME and Windows 98 SE Installation CD Requirement” on page 6.
7. Click **Finish** to close the Add New Hardware Wizard.
8. Restart the computer when prompted.
9. Proceed to the Harmony Utility installation instructions on page 11.

## Windows 2000 Installation Steps

The first time you turn on the computer after inserting the Harmony 802.11a PCI Card, the Add New Hardware Wizard will appear automatically, as shown in the following example.



Follow these steps to install the Harmony 802.11a software in a computer running Windows 2000:

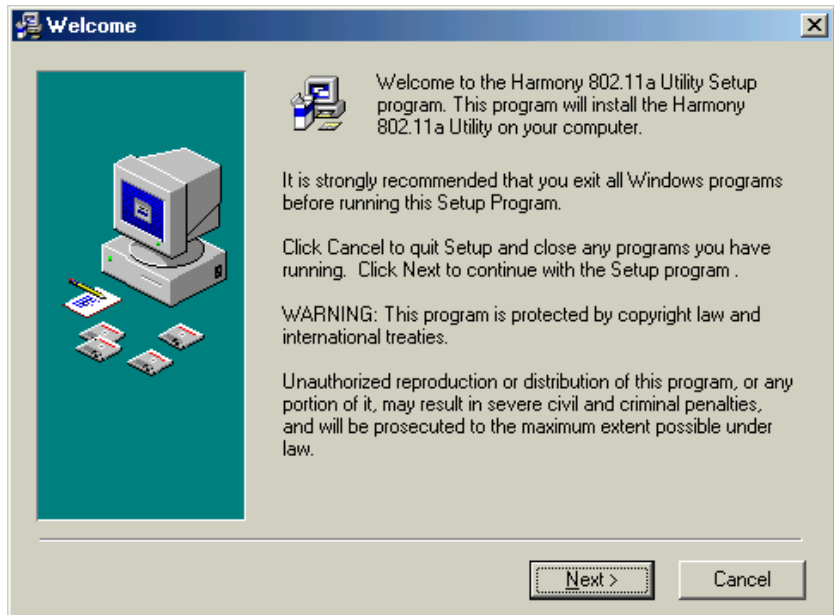
1. Insert the Harmony Installation CD into the computer's CD-ROM drive.
2. Click **Next** to continue.
3. Select **Search for a suitable driver for my device (recommended)** and click **Next**.
4. Place a check mark next to the **CD-ROM drives** option and click **Next**.
5. The New Hardware Wizard will prompt you once it has located the driver. Click **Next** to install the driver.
6. Click **Yes** to continue if the New Hardware Wizard prompts you that the driver does not contain a Microsoft Digital Signature.
7. Click **Finish** to close the New Hardware Wizard.
8. If prompted, restart the computer.
9. Proceed to the Harmony Utility installation instructions on page 11.

## Harmony Utility Installation Steps

Follow these steps to install the Harmony Utility:

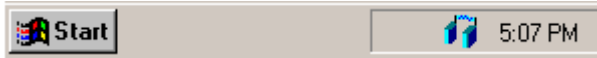
**Note:** Install the Harmony Utility after you have installed the Harmony 802.11a PCI Card in a Windows 98 SE, Windows ME, or Windows 2000 computer.

1. Turn on the computer and logon to Windows, if applicable.
2. Insert the Harmony Installation CD into the computer's CD-ROM drive.
3. Run *SETUP.EXE* from the Harmony Installation CD to launch the Harmony Utility Setup program, shown in the following example.



4. Click **Next** to continue.
  5. Select a destination folder for the Harmony Utility files and click **Next** to continue.
  6. Enter a name for the utility's Program Manager group and click **Next**.
  7. Click **Next** to install the utility.
  8. Click **Finish** to view additional information about the utility.
- Note:** To avoid viewing the additional information, uncheck the **Read Harmony configuration instructions** box before clicking **Finish**.
9. Click **Finish** to complete the Harmony Utility installation.

The Harmony Utility's Status Monitor icon will appear in Windows System Tray, as shown below.



The Harmony 802.11a PCI Card is now ready for use. Use the Harmony Utility (described in Chapter 5) to configure the card and determine if it is communicating with other 802.11a devices.

If you have one or more 802.11a Access Points, configure the Harmony 802.11a PCI Card's Network Mode setting to Infrastructure. If your network consists of only 802.11a client adapters, configure the Network Mode setting to Ad Hoc. For more information on Ad Hoc and Infrastructure networks, see Chapter 3 beginning on page 13 and "Network Mode" on page 18.

## Related Topics

- See Chapter 4 beginning on page 17 for a discussion of the 802.11a configuration parameters.
- Refer to Chapter 5 beginning on page 23 for information on how to use the Harmony Utility.
- See "Configuring Networking Clients and Protocols" on page 40 for information on how to configure a networking protocol like TCP/IP (so you can configure the 802.11a PCI Card's IP settings).



## Chapter 3

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### Wireless Topologies

Harmony wireless products look and operate similar to Ethernet products. The only difference is that a radio replaces the wire between various nodes. This means that all of your existing applications that operate over Ethernet will work with Harmony without any special wireless networking software. The Harmony 802.11a PCI Card supports several network topologies, which are described in this chapter.

#### Ad Hoc

With wireless LANs, one or more computers easily establish an ad hoc network when the units are in range of each other. Each computer can dynamically connect and reconnect to the others with no additional configuration, using off-the-shelf peer-to-peer network operating systems, as illustrated in Figure 1.

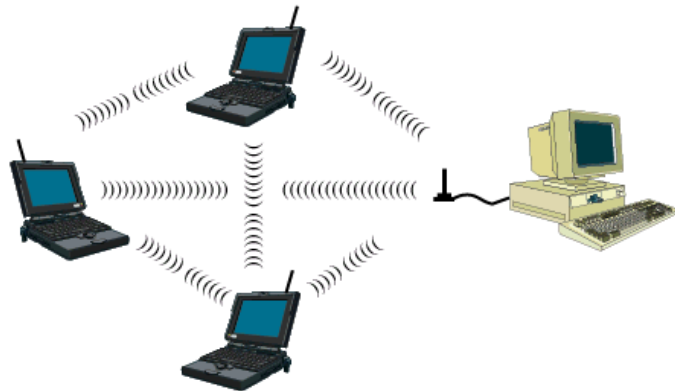


Figure 1 Ad Hoc

To use the Harmony 802.11a PCI Card as a member of an Ad Hoc network with other 802.11a-compatible cards, configure the card to operate in Ad Hoc mode. See Chapter 4 for information on how to configure the 802.11a parameters.

## Infrastructure

Many companies have an existing Ethernet or wired LAN infrastructure and want to be able to extend that capability to wireless nodes. This is accomplished by installing a Harmony Access Point Controller and one or more Harmony 802.11a Access Points on the Ethernet network. The Harmony Access Point Controller and 802.11a Access Points work together to provide wireless clients with access to network resources.

### Connecting to a Single AP

Figure 2 depicts a Harmony network that uses a single Access Point (AP).

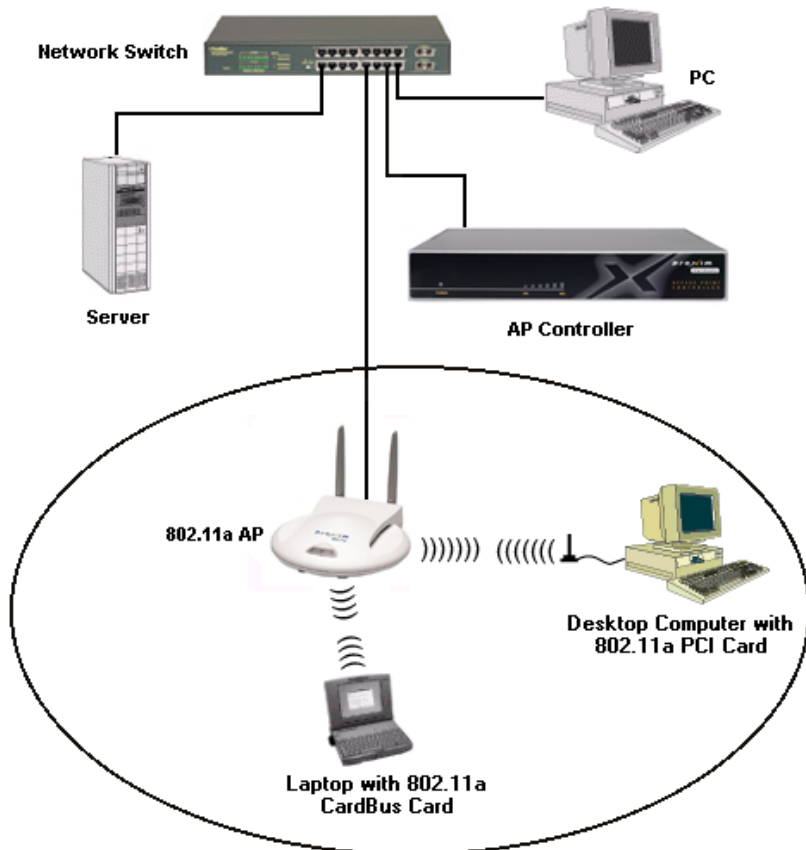


Figure 2 Single AP

## Roaming Between Multiple APs

For larger environments, a Harmony 802.11a client devices may roam from one Harmony 802.11a Access Point to another while maintaining the same network connection. The 802.11a Access Points establish coverage areas or cells similar in concept to those of a cellular phone network. The mobile clients will connect to any 802.11a Access Point that is within range.

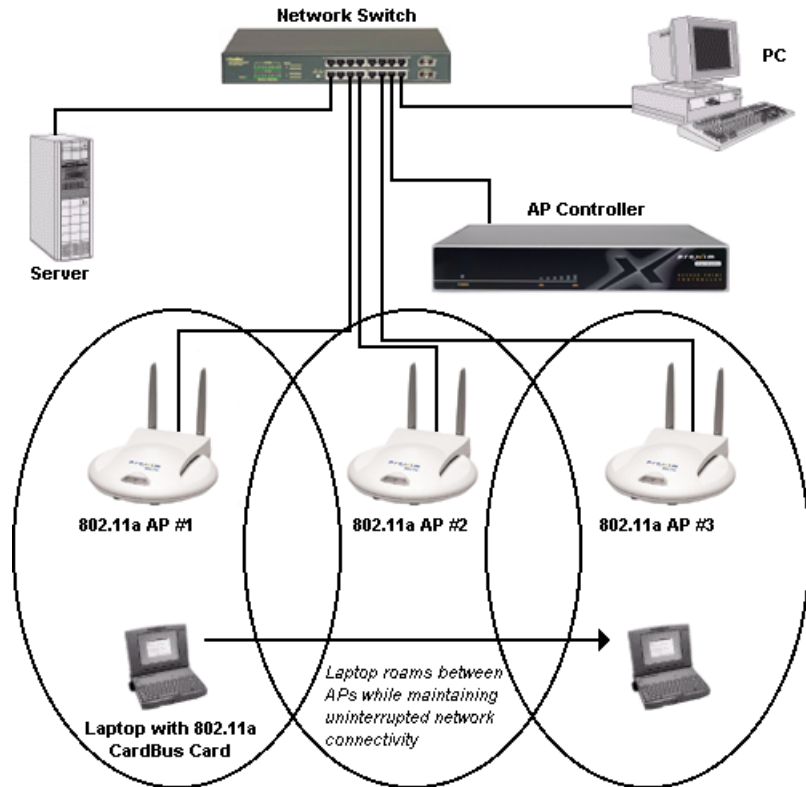


Figure 3 Roaming

Each Harmony 802.11a Access Point within a roaming network must have a unique, independent Channel, but all must have the same SSID and WEP Keys (if WEP is enabled).

Mobile clients, equipped with Harmony 802.11a CardBus Cards or PCI Cards, are configured to operate in Infrastructure mode and have the same SSID and WEP Keys as the Access Points. Alternatively, the mobile client may use an SSID of “any” to associate with any available Access Point, regardless of the AP’s SSID.

As the mobile client seamlessly switches from cell to cell, its network connectivity is preserved. The user can move freely between the Harmony 802.11a Access Points in the network. When the roaming client leaves the transmission range of one 802.11a Access Point, the software automatically polls the other 802.11a Access Point(s) in the same Extended Service Set (ESS) to continue the network connection.

**Note:** The cells must overlap to ensure that there are no gaps in coverage so that the roaming client will always have a connection available.

See Figure 3 for an example of a roaming Infrastructure network. In addition, Harmony 802.11a Access Point may be installed on different IP subnets from the AP Controller, allowing mobile users to roam across routers. For more information on the Harmony AP Controller and Access Points, refer to the *Harmony Access Point Controller Model 7560 User's Guide*.

### **Guidelines for Roaming**

- A Harmony 802.11a client can only roam between Harmony 802.11a Access Points. An 802.11a client cannot communicate with Harmony 802.11b or OpenAir Access Points.
- All Harmony 802.11a Access Points must have the same SSID.
- All workstations with Harmony 802.11a client adapters installed must use either an SSID of “any” or the same SSID as the Access Points that they will roam between.
- If WEP encryption is enabled, then all 802.11a Access Points and clients must use the same encryption level and WEP Key(s) to communicate.
- The Access Points’ cells must overlap to ensure that there are no gaps in coverage and to ensure that the roaming client will always have a connection available.
- All Access Points in the same vicinity should use a unique, independent Channel.
- Access Points that use the same Channel should be installed as far away from each other as possible to reduce potential interference.

## Chapter 4

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### Configuration Parameters

This chapter provides information on the 802.11a wireless standard and describes the Harmony 802.11a PCI Card's configuration parameters.

#### **The IEEE 802.11a Specification**

In 1997, the Institute of Electrical and Electronics Engineers (IEEE) adopted the 802.11 standard for wireless devices operating in the 2.4 GHz frequency band. This standard includes provisions for three radio technologies: direct sequence spread spectrum, frequency hopping spread spectrum, and infrared. Devices that comply with the 802.11 standard operate at a data rate of either 1 or 2 Mbps.

In 1999, the IEEE modified the 802.11 standard to support devices operating in the 5 GHz frequency band, calling this new standard "802.11a." 802.11a devices are not backwards compatible with 2.4 GHz 802.11 or 802.11b devices. 802.11a radios use a radio technology called Orthogonal Frequency Division Multiplexing (OFDM) to achieve data rates of up to 54 Mbps.

In addition, the Harmony 802.11a PCI Card supports 2X™ Mode. This mode is not part of the IEEE 802.11a specification but it allows data rates of up to 108 Mbps. See "2X Mode" on page 19 for details.

## 802.11a Software Parameters

The following configuration parameters are available for the Harmony 802.11a PCI Card. Refer to Chapter 5 for instructions on how to change these configuration settings using the Harmony Utility.

### Network Mode

Network Mode configures the Harmony 802.11a PCI Card to operate in either Ad Hoc mode or Infrastructure mode. This parameter's default setting varies based on the driver version installed.

When set to Ad Hoc, all Harmony 802.11a devices must have the same SSID, Channel, and WEP Keys (if WEP is enabled) to communicate. An Ad Hoc network is a wireless network that consists of only 802.11a client adapters (i.e., a network that does not have an Access Point).

When set to Infrastructure mode, an 802.11a PCI Card must have the same SSID and WEP settings (if WEP is enabled) as the Access Points on the network to communicate. An Infrastructure network is any network that includes one or more 802.11a Access Points.

### SSID

The SSID (Service Set ID), which is also referred to as the ESSID (Extended Service Set ID), is a text string that all members of the same 802.11a network share.

The SSID may be up to 32 alphanumeric characters long, including spaces. Also, when configured to "any," a Harmony 802.11a PCI Card can communicate with any available Access Point regardless of the Access Point's SSID.

In an Infrastructure network, the SSID must match on all Harmony 802.11a Access Points and 802.11a clients (unless the clients' SSID is "any"). Devices that do not share the same SSID cannot communicate.

In an Ad Hoc network without an Access Point, each 802.11a device must have the same SSID to participate in the network. A node cannot use the "any" SSID to join an Ad Hoc network.

## Power Saving Mode

The Harmony 802.11a PCI Card supports optional power management to conserve battery life. Power Saving Mode is only available if the PCI Card is operating in Infrastructure mode.

When Power Saving Mode is set to Normal or Maximum, the Harmony 802.11a PCI Card enters a “doze” mode where the card becomes inactive and only wakes up periodically to receive control messages from the Access Point. The card wakes up more often in Normal mode than in Maximum mode so a card in Normal mode will respond sooner to network requests than a node in Maximum mode. However, Maximum mode draws less power than Normal mode.

When an Access Point receives a packet destined for a dozing client, it buffers the packet and includes a notification within its control message to alert the client that a packet is waiting for it. Once the card receives the control message, it polls the Access Point to request that the buffered packet be sent to it.

## 2X Mode

The Harmony 802.11a PCI Card supports **2X™** mode, a high-speed operating mode that can provide data rates of up to 108 Mbps, twice the speed of standard 802.11a devices. By default, 2X mode is disabled.

When 2X mode is disabled, the PCI Card complies with the IEEE 802.11a standard, can operate on one of eight Channels, and can achieve speeds of up to 54 Mbps.

When 2X mode is enabled, the PCI Card does not comply with the IEEE 802.11a standard, can operate on one of three Channels, and can achieve speeds of up to 108 Mbps.

**Note:** You must configure all devices in the same network to use 2X mode. A device in 2X mode cannot communicate with a device in 802.11a mode.

## Channel

802.11a devices spread a radio signal over a range of frequencies. The IEEE 802.11a specification allocates the available frequencies in the 5 GHz band into a series of operating Channels that are identified by a Channel number and a center carrier frequency.

A PCI Card configured for Infrastructure mode receives a Channel assignment from its Access Point. You cannot configure the Channel for a PCI Card configured for Infrastructure mode.

For an Ad Hoc network, nodes must use same Channel in order to communicate. You can configure the PCI Card to scan multiple Channels to locate an Ad Hoc network or you can configure the card to use a specific Channel. See “Station Configuration” on page 26 for details. Note that if you wish to install multiple Ad Hoc networks in the same vicinity, Proxim recommends that you configure each network with a unique Channel to avoid interference between networks.

The number of available Channels varies by country.

In the United States, the Harmony 802.11a PCI Card with integral antennas can use eight Channels in 802.11a-compliant mode: Channel 36 (5.18 GHz), Channel 40 (5.20 GHz), Channel 44 (5.22 GHz), Channel 48 (5.24 GHz), Channel 52 (5.26 GHz), Channel 56 (5.28 GHz), Channel 60 (5.30 GHz), and Channel 64 (5.32 GHz).

In the United States, the Harmony 802.11a PCI Card with integral antennas can use three Channels in 2X mode: Channel 42 (5.21 GHz), Channel 50 (5.25 GHz), and Channel 58 (5.29 GHz).

**Note:** See “Radio Frequency Interference Requirements” on page 5 for important regulatory information concerning Channel selection.

## Maximum Send Rate

The IEEE 802.11a specification supports eight data rates: 54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, and 6 Mbps. Harmony’s 2X mode supports eight data rates: 108 Mbps, 96 Mbps, 72 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, and 12 Mbps.

As a mobile client travels further and further away from an 802.11a Access Point (when in Infrastructure mode) or from other 802.11a nodes (when in Ad Hoc mode), the data rate automatically decreases in order to maintain a usable radio connection.

In an Infrastructure network a client that is close to an Access Point may operate at 108 Mbps, but a client that is far away from the Access Point may operate at 12 Mbps.

By default, the Harmony 802.11a PCI Card automatically adjusts the transmit rate depending on the mode of operation (802.11a-compliant or 2X). However, you can manually set a maximum rate that the PCI Card will use.

For example, if you configure the Max Send Rate for 36 Mbps, the Harmony 802.11a PCI Card will only operate at speeds of 36 Mbps or less.



## **RTS/CTS**

The 802.11a standard supports optional RTS/CTS communication based on packet size. By default, RTS/CTS communication is disabled.

Without RTS/CTS, a sending radio listens to see if another radio is already using the medium before transmitting a data packet. If the medium is free, the sending radio transmits its packets. However, there is no guarantee that another radio is not transmitting a packet at the same time, causing a collision.

When RTS/CTS occurs, the sending radio first transmits a Request to Send (RTS) packet to confirm that the medium is clear. When the receiving radio successfully receives the RTS packet, it transmits back a Clear to Send (CTS) packet to the sending radio. When the sending radio receives the CTS packet, it sends the data packet to the receiving radio. The RTS and CTS packets contain a reservation time to notify other radios that the medium is in use for a specified period. This helps to minimize collisions.

While RTS/CTS adds overhead to the radio network, it is particularly useful for large packets that take longer to resend after a collision occurs.

You may configure a Harmony 802.11a PCI Card to never use RTS/CTS (i.e., disable RTS/CTS) or to use RTS/CTS for packets over a certain size.

For example, if the RTS/CTS Threshold is set to 1000 Bytes, then a sending radio will use RTS/CTS before transmitting any packet 1000 Bytes or larger.

The RTS/CTS Threshold parameter supports a range between 1 and 2345 Bytes. When set to 1, a sending radio will use RTS/CTS before transmitting any packet.

## **Wired Equivalent Privacy**

The IEEE 802.11a standard specifies an optional encryption feature, known as Wired Equivalent Privacy or WEP, that is designed to provide a wireless LAN with a security level equal to what is found on a wired Ethernet network.

WEP encrypts the data portion of each packet exchanged on the 802.11a network using a 40-bit, 128-bit, or 152-bit encryption algorithm to prevent unauthorized devices from intercepting confidential data.

To use WEP Encryption, all 802.11a devices within the same Extended Service Set (ESS) or Ad Hoc network must have WEP enabled and must have the same WEP Keys. A device that has the wrong WEP Keys or does not have WEP enabled will not be able to exchange data with the network.

## WEP Key

An 802.11a device with WEP enabled uses a WEP Key to encrypt and decrypt information. If the WEP Keys do not match on two radios, no data communication will take place between these devices.

The Harmony 802.11a PCI Card can support up to four WEP Keys (all four Keys must have the same Key Size). The Harmony 802.11a PCI Card can decrypt information that was encrypted with any of its four WEP Keys. A Harmony 802.11a PCI Card will only use the Default Key to encrypt outgoing information.

For 40-bit encryption, a WEP Key is 10 hexadecimal digits (0-9 and A-F); for 128-bit encryption, a WEP Key is 26 hexadecimal digits (0-9 and A-F); and for 152-bit encryption, a WEP Key is 32 hexadecimal digits (0-9 and A-F).

**Note:** When WEP is enabled, Proxim recommends that you configure all 802.11a devices in the Extended Service Set with the same WEP Keys in the same order (but the devices not need to use the same default Key).

## Chapter 5

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### Harmony Utility

The Harmony 802.11a PCI Card includes a software utility that simplifies the management and configuration of a PCI Card. Chapter 2 describes how to install the utility. This chapter describes how to use the Harmony Utility after it has been installed.

#### Status Monitor Icon

After you have installed the Harmony Utility, the Status Monitor icon will appear in Windows System Tray.

If the Harmony 802.11a PCI Card cannot locate an Access Point or an Ad Hoc network (either because the 802.11a settings do not match or the other devices are out of range), the icon will appear as follows:



When the Harmony 802.11a PCI Card is associated with an Access Point or has joined an Ad Hoc network, the icon will appear as follows:



Also, you can view additional information about the card's network status when the mouse cursor is placed over it, as shown below.



Right-click the icon and select **Run 802.11 Configuration Utility** to launch the 802.11a Configuration Utility. Double-clicking the icon also launches the utility.

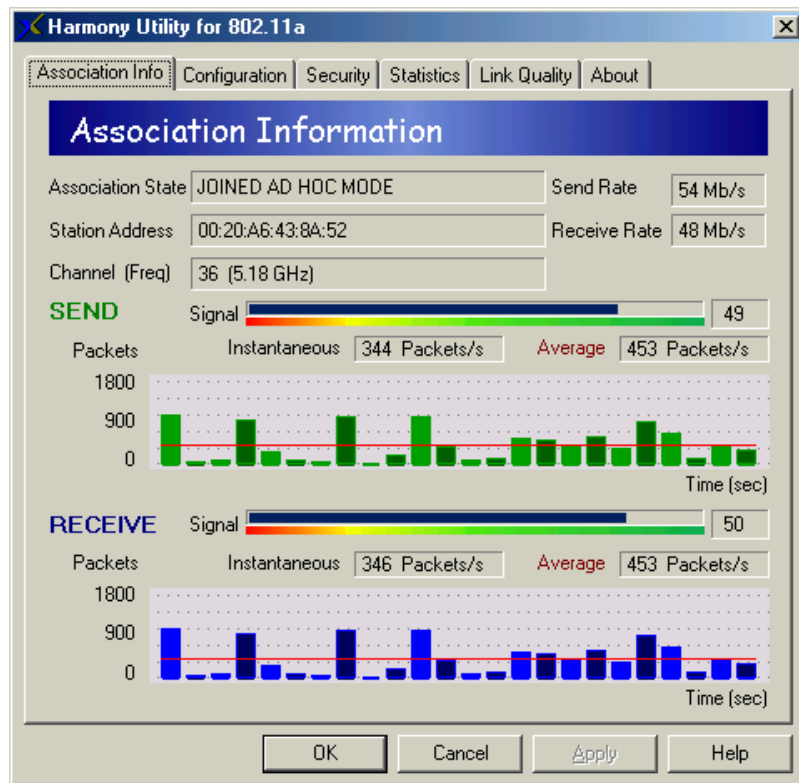
To close the Status Monitor, right-click the icon and select **Remove Status Monitor From Task Bar** from the drop-down menu.

## Configuration Utility

The Harmony Utility includes several tools for diagnostic and configuration purposes. Each of the Harmony Utility's screen is described below. For additional information about the Harmony Utility, click **Help** on any screen to view on-line Help documentation.

## Association Information

The Association Information screen, shown in the example below, displays information about the PCI Card's connection with the 802.11a network.



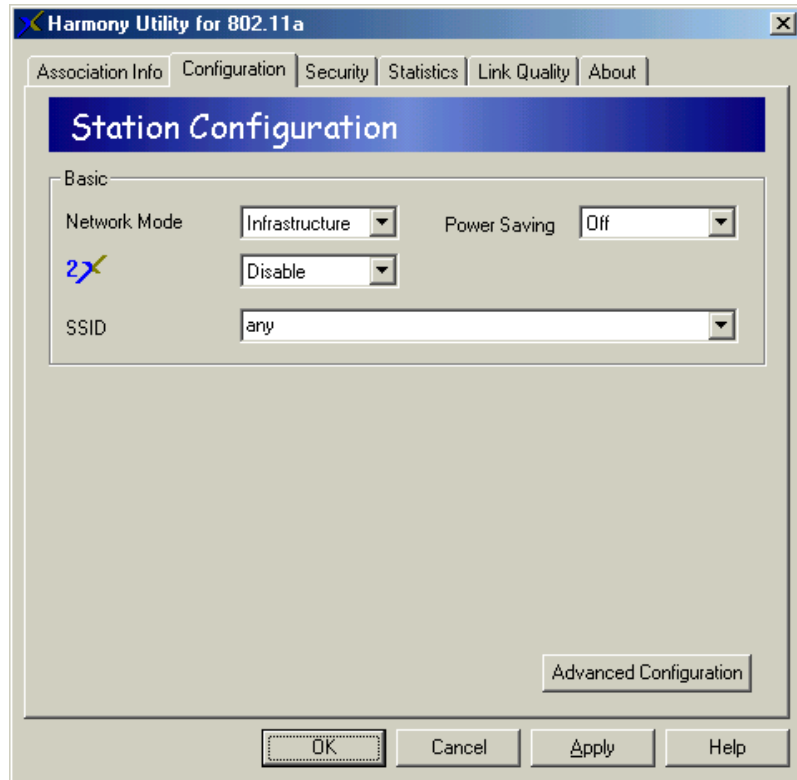
The Association Information screen reports the following statistics:

- Association State:** This field reports if the card is communicating with an Access Point (AP) or Ad Hoc network. When communicating with an AP, this field reports "ASSOCIATED AP" and displays the AP's physical address. When communicating with an Ad Hoc network, this field displays "JOINED AD HOC MODE." If the card cannot locate an AP or Ad Hoc network, this field displays "NOT JOINED."

- **Station Address:** This field displays the PCI Card's physical address (also known as MAC address). This address is configured at the factory.
- **Channel (Freq):** This field displays the current Channel and center frequency that the PCI Card is using. See "Channel" on page 20 for details.
- **Send Rate:** This field reports the PCI Card's current transmit rate.
- **Receive Rate:** This field reports the data rate at which the PCI Card is currently receiving packets sent by another 802.11a device.
- **Send Signal Strength:** The Signal bar displays the signal strength for the last acknowledgment (ACK) received by the PCI Card. Signal strength is reported in decibels (dB). The color-coded chart below the Signal bar indicates the relative strength of the signal: a signal in the red or orange section indicates a weak connection; a signal in the yellow or light green section indicates a good connection; a signal in the darker green section indicates an excellent connection.
- **Instantaneous Packets/Sec Sent:** This statistic displays the current rate at which the PCI Card is transmitting packets to another 802.11a device. This information is represented as the number of packets sent per second by the card and is plotted on the graph located below the Packets/sec field. Note that this statistic will remain zero unless the PCI Card is transmitting data to another 802.11a device.
- **Average Packets/Sec Sent:** This statistic displays the average number of packets transmitted by the PCI Card each second since the Configuration Utility was launched.
- **Receive Signal Strength:** The Signal bar displays the signal strength for the last packet received by the PCI Card. RSSI is reported in decibels (dB). The color-coded chart below the Signal bar indicates the relative strength of the signal: a signal in the red or orange section indicates a weak connection; a signal in the yellow or light green section indicates a good connection; a signal in the darker green section indicates an excellent connection.
- **Instantaneous Packets/Sec Received:** This statistic displays the current rate at which the PCI Card is receiving packets from another 802.11a device. This information is represented as the number of packets received per second by the card and is plotted on the graph located below the Packets/sec field. Note that this statistic will remain zero unless the PCI Card is receiving data from another 802.11a device.
- **Average Packets/Sec Received:** This statistic displays the average number of packets received by the PCI Card each second since the Configuration Utility was launched.

## Station Configuration

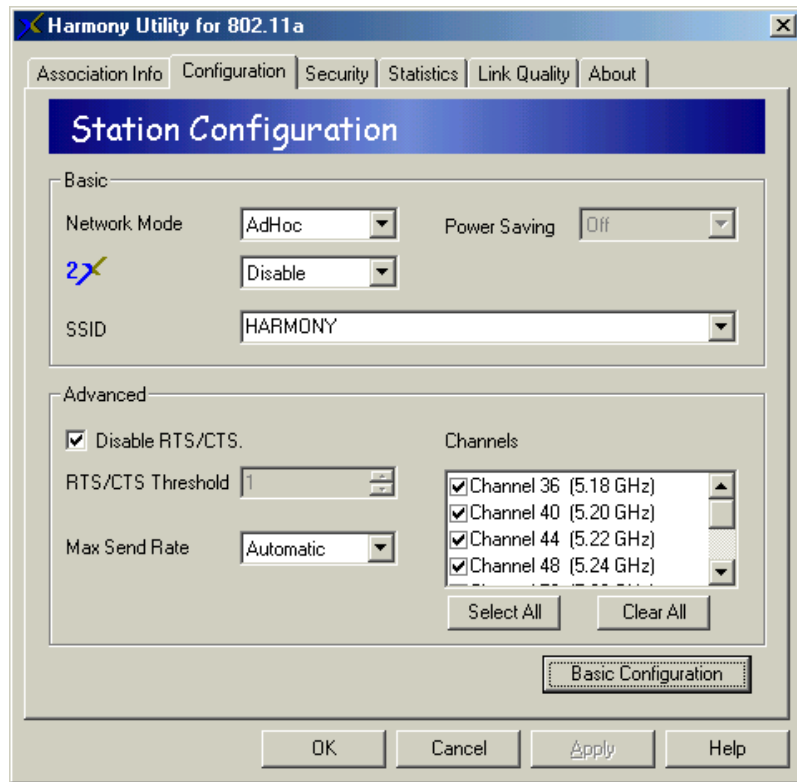
Click the **Configuration** tab to view the Station Configuration screen, shown below.



Edit the configuration parameters as necessary and click **Apply** to save your changes. To change the operating Channel, Maximum Send Rate and RTS/CTS settings, click the button labeled **Advanced Configuration** to display these parameters, as shown in the example on the next page.

The configuration parameters are described in Chapter 4 beginning on page 17.

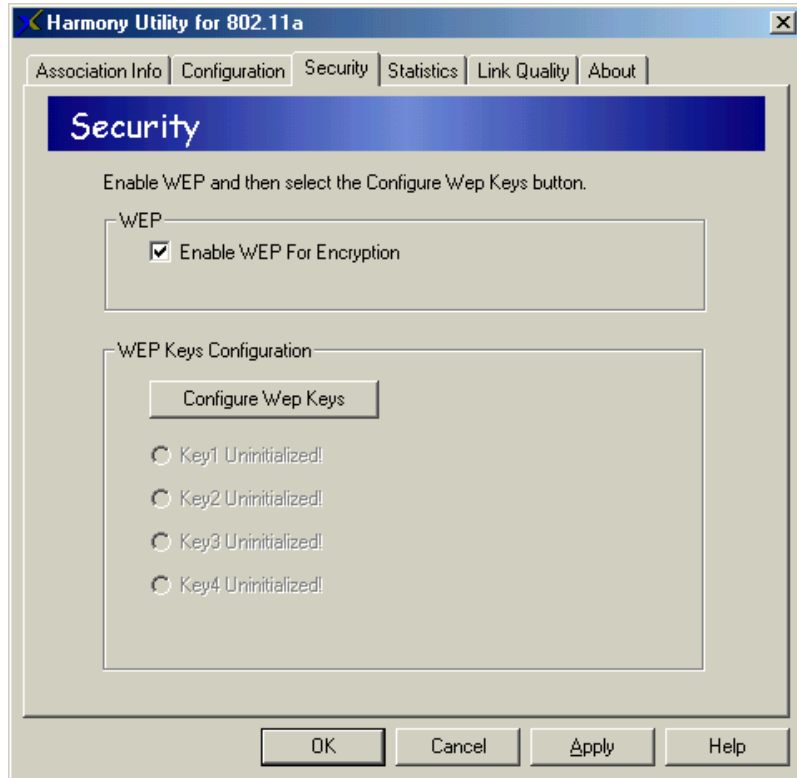
Note that the Channel selection box is unavailable when the Network Mode is set to Infrastructure. When Network Mode is set to Ad Hoc, you can configure one or more Channels for the PCI Card to scan. If you select multiple Channels, the PCI Card will scan each Channel looking for an Ad Hoc network to join that uses the same SSID as the PCI Card.



## Security

Click the **Security** tab to view the WEP Configuration screen. From within this screen, you can enable WEP and configure the PCI Card's WEP Keys. Follow these steps to enable WEP:

1. Place a check mark in the **Enable WEP for Encryption** box if you want the PCI Card to use WEP to encrypt data, as shown below.



2. Click **Configure WEP Keys**.
3. Select a **Key Size** from the drop-down menu (40 Bit, 128 Bit, or 152 Bit).



4. Enter one to four WEP Keys in the fields provided, as shown in the following example.

WEP Keys Configuration

Wep Keys Setting

Key Size: 40 Bit Wep Keys will use the same size for all keys. Blank spaces will be padded with 0's.

Key 1: 12 34 56 78 90

Key 2: 09 87 65 43 21

Key 3: AB CD EF 12 34

Key 4: 12 34 5A BC ED

Read Keys From File ... Write Keys To File ...

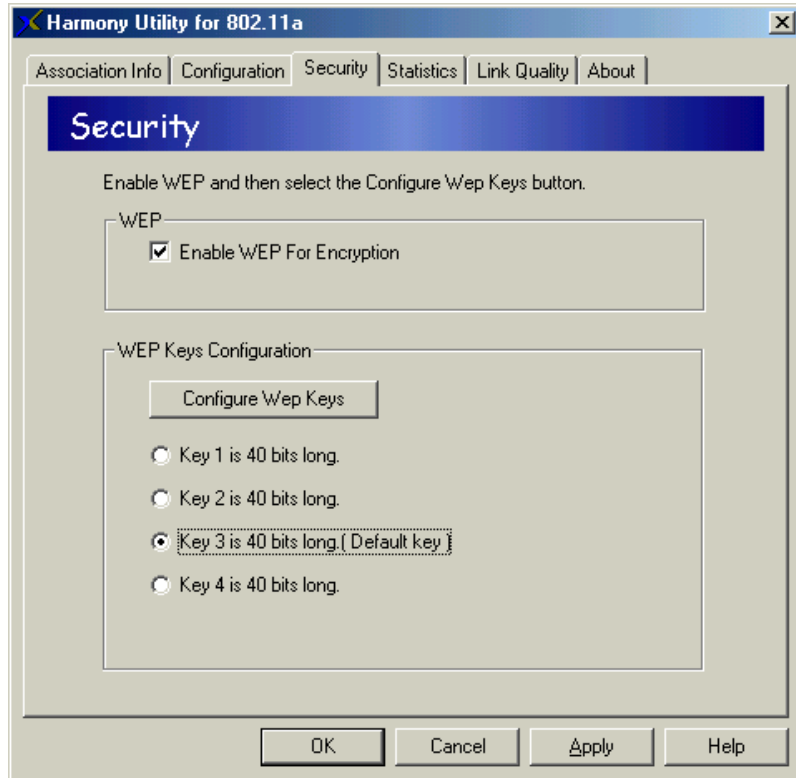
OK Cancel

5. Use only hexadecimal digits (i.e., 0-9 and A-F). For 40-bit encryption, enter 10 digits for each Key; for 128-bit encryption, enter 26 digits for each Key; for 152-bit encryption, enter 32 digits for each Key.
6. To simplify WEP configuration on other 802.11a devices, click **Write Keys to File...** to save the WEP Keys you configured in Step #5 to a text file. Later you can upload these Keys from the text files to other 802.11a devices on the network.

**Note:** If you already have a WEP Key text file that you generated while configuring another 802.11a device, click **Read Keys From File...** to upload those Keys to the PCI Card.

7. Click **OK** to save the WEP Keys.
8. Select one of the Keys you configured as the **Default Key**.

In the following example, Key 3 is the Default Key.



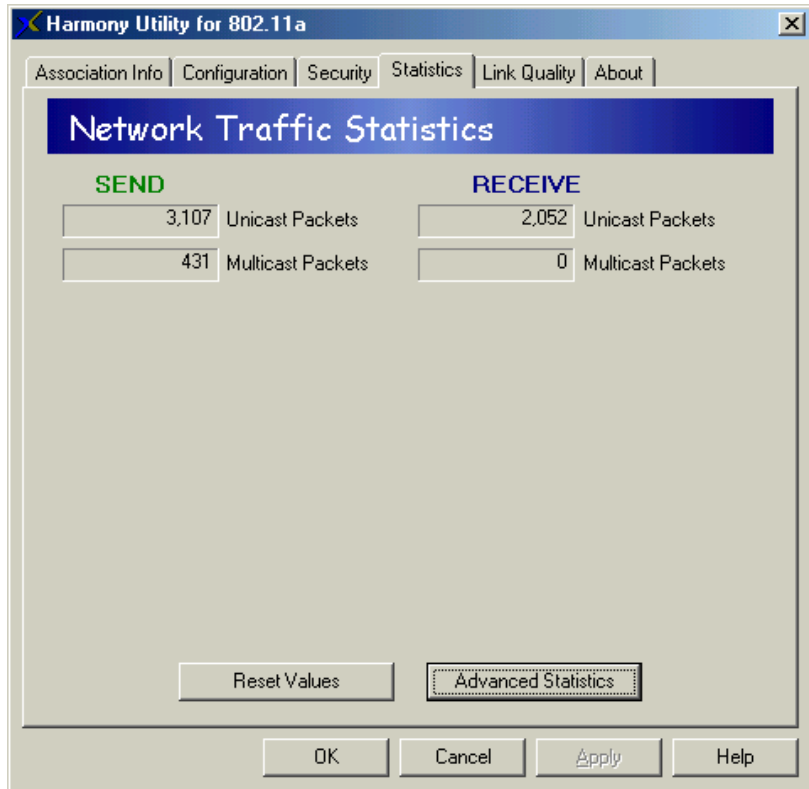
The Harmony 802.11a PCI Card can decrypt information that was encrypted with any of its four WEP Keys but it will only use the Default Key to encrypt outgoing information.

9. Click **Apply** or **OK** to save the new WEP settings.
10. If you need to change a WEP Key at a later date, click **Configure WEP Keys** and enter one to four new WEP Keys. Note that any Keys you entered previously will not be visible (stars appear in place of the digits).

See “Wired Equivalent Privacy” on page 21 for more information on the WEP parameters.

## Network Traffic Statistics

Click the **Statistics** tab to view information about the number of packets sent and received by the PCI Card, as shown below.



The default Statistics screen displays the following statistics:

- **Unicast Packets Sent:** This statistic reports the number of packets transmitted by the PCI Card that were destined for a single network node.
- **Multicast Packets Sent:** This statistic reports the number of packets transmitted by the PCI Card that were destined for more than one network node.
- **Unicast Packets Received:** This statistic reports the number of packets received that were destined only for the PCI Card.
- **Multicast Packets Received:** This statistic reports the number of packets received that were destined for more than one network node.

You can view additional statistics by clicking **Advanced Statistics**, as shown on the next page.

The advanced Statistics screen displays the following additional statistics:

- **Unicast Bytes Sent:** This statistic reports the total number of bytes contained in the unicast packets transmitted by the PCI Card.
- **Multicast Bytes Sent:** This statistic reports the total number of bytes contained in the multicast packets transmitted by the PCI Card.
- **Single Retries:** After the PCI Card sends a packet, it waits for an acknowledgment from the receiving radio to confirm that the packet was successfully received. If an acknowledgment is not received within a fixed period of time, the PCI Card will retransmit the packet. This statistic reports the number of packets that required one retry before the PCI Card received an acknowledgment.
- **Multiple Retries:** This statistic reports the number of packets that required more than one retry before the PCI Card received an acknowledgment.
- **Transmit Retry Limit:** This statistic reports the number of packets that were not successfully transmitted because the PCI Card did not receive an acknowledgment within the maximum number of retries.

The screenshot shows the 'Statistics' tab of the Harmony Utility for 802.11a. The window title is 'Harmony Utility for 802.11a'. The 'Statistics' tab is selected, and the 'Network Traffic Statistics' section is displayed. The statistics are organized into two columns: 'SEND' and 'RECEIVE'. Each column has a header and several rows of data, each with a text box for the value and a label for the metric. At the bottom, there are buttons for 'Reset Values', 'Basic Statistics', 'OK', 'Cancel', 'Apply', and 'Help'.

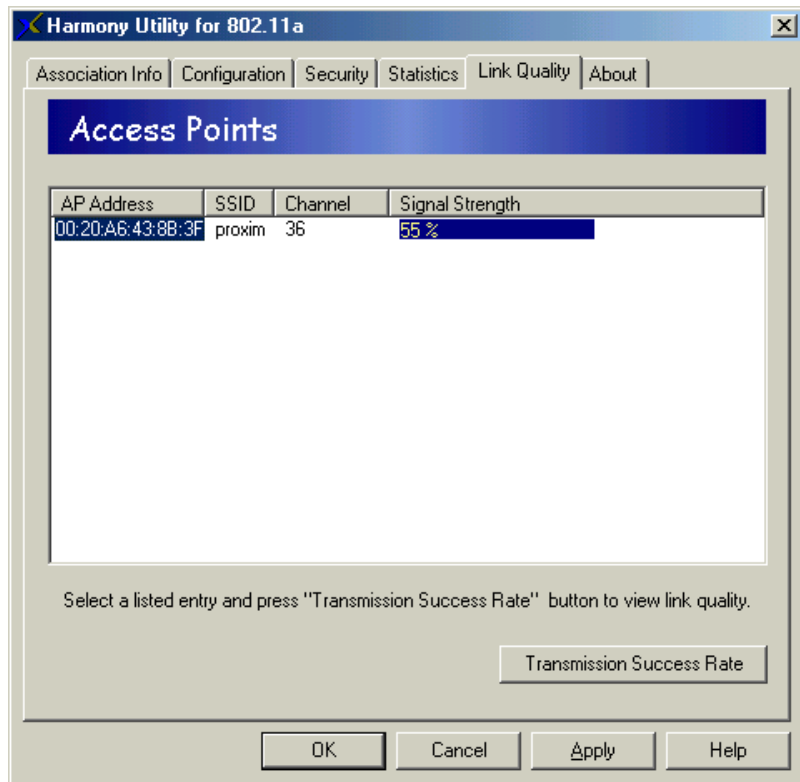
SEND		RECEIVE	
3,107	Unicast Packets	2,052	Unicast Packets
431	Multicast Packets	0	Multicast Packets
3,053,355	Unicast Bytes	197,403	Unicast Bytes
85,691	Multicast Bytes	0	Multicast Bytes
197	Single Retries	0	WEP Undecryptable
92	Multiple Retries	356	Bad Frame Checksum
289	Transmit Retry Limit	45	Last Frame's RSSI
47	Last ACK RSSI	2	Duplicate Frames
468	ACK Errors		
0	CTS Errors		

Buttons: Reset Values, Basic Statistics, OK, Cancel, Apply, Help

- **Last ACK RSSI:** This statistic reports the RSSI (Received Signal Strength) for the last acknowledgment (ACK) received by the PCI Card. RSSI is reported in decibels (dB) and typically ranges from 0 to 75. In general, an RSSI less than 15 indicates a weak signal and an RSSI greater than 30 indicates a strong signal.
- **ACK Errors:** This statistic reports the number of unicast transmit attempts for which no acknowledgement (ACK) was received.
- **CTS Errors:** This statistic reports the number of Clear To Send (CTS) errors. When the PCI Card uses RTS/CTS before transmitting a packet, it first sends a Request to Send (RTS) message to the packet's recipient. The packet's recipient then returns a CTS message to the PCI Card. When the PCI Card receives the CTS, it sends the packet to the recipient. However, if the PCI Card does not receive a CTS within a fixed period of time, it will resend the RTS. After a fixed number of retries, the PCI Card will record a CTS Error if a CTS has not been received.
- **Unicast Bytes Received:** This statistic reports the total number of bytes contained in the unicast packets received by the PCI Card.
- **Multicast Bytes Received:** This statistic reports the total number of bytes contained in the multicast packets received by the PCI Card.
- **WEP Undecryptable:** This statistic displays the number of packets that were discarded due to a problem during decryption, such as mismatched WEP Keys.
- **Bad Frame Checksum:** This statistic displays the number of received packets that failed the CRC (Cyclic Redundancy Check) of the Frame Check Sequence (FCS).
- **Last Frame's RSSI:** This statistic reports the RSSI (Received Signal Strength) for the last packet received by the PCI Card. RSSI is reported in decibels (dB) and typically ranges from 0 to 75. In general, an RSSI less than 15 indicates a weak signal and an RSSI greater than 30 indicates a strong signal.
- **Duplicate Frames:** This statistic displays the number of duplicate packets received by the PCI Card. When the PCI Card successfully receives a packet, it sends an acknowledgment (ACK) to the transmitting node. If the ACK does not reach the transmitting node within a specified period of time after it sent the packet (due to interference or some other type of delay), it will resend the packet to the recipient. In this case, the PCI Card then receives the packet a second time, records that it received a duplicate packet, and sends an ACK again.

## Link Quality

When the PCI Card is in Infrastructure mode, click the **Link Quality** tab to view the list of Access Points within range of the PCI Card, as shown in the following example. You can perform a link quality test with any of the detected Access Points by clicking the **Transmission Success Rate** button.



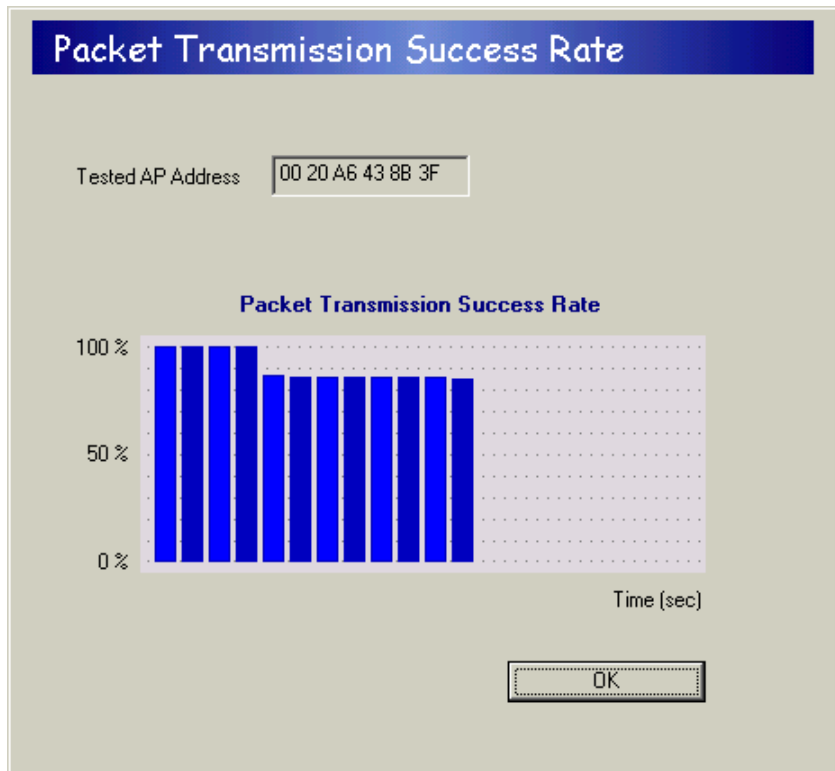
The Access Point screen reports the following information for each Access Point detected by the PCI Card:

- **AP Address:** This field reports the physical (or MAC) address of the detected Access Point.
- **SSID:** This field reports the detected Access Point's SSID or Service Set Identifier. See "SSID" on page 18 for more information.
- **Channel:** This field displays the Channel used by the detected Access Point. See "Channel" on page 20 for more information.
- **Signal Strength:** This field displays the strength of the radio signal received by the detected Access Point.

### Packet Transmission Success Rate

When the PCI Card is configured for Infrastructure mode, select one of the detected Access Points in the Access Points screen and click **Transmission Success Rate** to determine the link quality between the PCI Card and the selected device.

The PCI Card sends a series of packets to the selected Access Point and monitors the number of replies it receives. This information is converted to a percentage and plotted on the Packet Transmission Success Rate graph, as shown in the example below.



### Version Information

Click the **About** tab to view version information for the 802.11a driver and utility.





## Chapter 6

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### Troubleshooting

The Harmony 802.11a PCI Card is designed to be very easy to install and operate. However, if you experience any difficulties, use the information in this chapter to help diagnose and solve the problem. If you still cannot resolve the problem, contact Proxim Technical Support as described in Appendix B, “How to Reach Technical Support.”

#### **How to Obtain Help with Your LAN Installation**

If you require assistance to install your LAN, Proxim can put you in touch with an 802.11a reseller in your area. The reseller is an expert in the design, installation, and maintenance of LANs and will be able to examine your needs and recommend the most cost-effective solution for your LAN whether you are installing a new LAN or adding on to an existing one. For the location of the Harmony reseller nearest you, contact Proxim at 800-229-1630 and ask for the Sales Department.

## Common Installation Problems

Chapter 2 describes how to install the Harmony 802.11a PCI Card in a computer running Windows 98 Second Edition (SE), Windows Millennium Edition (ME), and Windows 2000. This section provides some suggestions to resolve many of the common installation problems with the Harmony 802.11a PCI Card.

### PCI Card Not Listed in Device Manager

Follow these steps if you have installed the 802.11a PCI Card but it doesn't appear as a network adapter in the Device Manager:

1. Open the Device Manager (located within the Control Panel's System icon).
2. Check the Other Devices category for a **PCI Ethernet Controller** or **Ethernet Controller** entry.
3. If the entry appears in the Other Devices category, highlight it and click **Remove**.
4. Close the Device Manager.
5. Restart the computer.
6. Follow the installation instructions in Chapter 2 to install the Harmony driver and utility.

### 802.11a PCI Card Not Installed Properly

If the Harmony Device Setup program or Windows Networking reports that the Harmony 802.11a PCI Card has not been properly installed or configured after you have completed the Harmony Installation program, open the Device Manager and locate the Harmony 802.11a PCI Card's entry in the Network adapters category.

If a yellow exclamation point ("!") appears next to the Harmony 802.11a PCI Card's Device Manager entry, then the card is not working properly. This is due either to an error during installation or to a system conflict.

Follow these steps:

1. Uninstall the Harmony 802.11a PCI Card as described in "Uninstalling the 802.11a PCI Card" on page 41.
2. Reinstall the Harmony 802.11a PCI Card following the installation instructions in Chapter 2.
3. If the card's Device Manager entry still has an exclamation point ("!") after you have reinstalled the card, highlight the entry and click **Properties**.
4. Click the **Resources** tab.

5. Determine if the Harmony 802.11a PCI Card has been assigned an Interrupt Request or if it is having a resource conflict with another device that is already using the Interrupt Request (IRQ), I/O Base Address, or Memory Range for which the Harmony 802.11a PCI Card is configured.
6. If the PCI Card has not been assigned an IRQ, check the PCI configuration settings within the BIOS Setup screen to assign the 802.11a PCI Card available resources. A computer's BIOS (Basic Input/Output System) automatically assigns resources to PCI cards during boot-up. The resources assigned to a PCI Card cannot be changed within Windows, only within the BIOS.
7. If problems persist, contact the PC's manufacturer to determine if an updated BIOS version is available that provides improved support for PCI devices.

## Configuring Networking Clients and Protocols

The Harmony 802.11a PCI Card will bind to any existing networking components, such as Client for Microsoft Networks and the Internet Protocol (TCP/IP). Refer to the steps below that correspond to your computer's operating system to configure the card's networking components.

### Windows 2000

Follow these steps to configure the Harmony 802.11a PCI Card's networking clients and protocols in a Windows 2000 computer:

1. Open the Control Panel's **Network and Dial-up Connections** icon.
2. Scroll through the list of Network and Dial-up Connections and right-click the Local Area Connection that corresponds to the Harmony 802.11a PCI Card.
3. Select **Properties** from the drop-down menu to view the connection's properties screen.
4. Select a client or protocol from the list of installed components and click **Properties** to configure its settings.

For example, if you want to assign the Harmony 802.11a PCI Card a static IP address, highlight **Internet Protocol (TCP/IP)** and click **Properties**.

**Note:** To add a new client or protocol, click **Install...** and follow the on-screen instructions.

### Windows ME/98 SE

Follow these steps to configure the Harmony 802.11a PCI Card's networking clients and protocols in a Windows 98/ME computer:

1. Open the Control Panel's **Network** icon.
2. Select a client or protocol from the list of installed components and click **Properties** to configure its settings.

For example, if you want to assign the Harmony 802.11a PCI Card a static IP address, highlight **TCP/IP** or **TCP/IP -> Harmony 802.11a Network Adapter** and click **Properties**.

**Note:** To add a new client or protocol, click **Add...** and follow the on-screen instructions.

## Uninstalling the 802.11a PCI Card

Follow these steps if you need to uninstall the Harmony 802.11a PCI Card:

1. Right-click the Status Monitor and choose **Remove Status Monitor From Task Bar**.
2. Open the Control Panel and double-click the **Add/Remove Programs** icon.
3. Select **Harmony 802.11a** from the list of installed programs and click **Add/Remove...** (Windows 98/ME) or **Change/Remove** (Windows 2000).
4. Select **Automatic** from the list of uninstall options and click **Next**.
5. Click **Finish** to continue.
6. Click **Remove** to remove the Harmony 802.11a Network Adapter.
7. Click **Close** after the Harmony 802.11a Network Adapter has been removed.
8. If prompted, click **Cancel** to prevent the computer from restarting.
9. Remove the following driver files, if present:

**Note:** By default, Windows will hide some of these file types. Confirm that you have configured Windows to show all files before assuming that these files are not present. The Hidden Files option is available under the Folder Options heading of the Windows Explorer's View or Tools menu.

### Windows 98/ME computers:

- *C:\WINDOWS\INF\NETPR11A.INF*
- *C:\WINDOWS\INF\OTHER\PROXIM,INC.NETPR11A.INF*
- *C:\WINDOWS\SYSTEM\PROX11A.SYS*

### Windows 2000 computers:

- *C:\WINNT\SYSTEM32\DRIVERS\PROX11A.SYS*
- *C:\WINNT\INF\NETPR11A.INF*
- *C:\WINNT\INF\NETPR11A.PNF*

10. Shut down the computer.
11. Remove the Harmony 802.11a PCI Card from the computer's PCI slot.

## Range

Every environment is unique with different obstacles, barriers, materials, etc., and, therefore, it is difficult to determine the exact range that will be achieved without testing. Radio signals may reflect off of some obstacles or be absorbed by others depending on their construction.

The IEEE 802.11a specification supports eight data rates: 54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, and 6 Mbps. Harmony's 2X mode supports eight data rates: 108 Mbps, 96 Mbps, 72 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, and 12 Mbps. Operation at 6 Mbps or 12 Mbps provides greater range than operation at 54 Mbps or 108 Mbps.

By default, the Harmony 802.11a PCI Card will automatically adjust the data rate to maintain a usable radio connection. Therefore, a client that is close to an Access Point may operate at 54 Mbps while a client that is on the fringe of coverage may operate at 6 Mbps.

Proper antenna placement can help improve range. Try to keep the PCI Card's integral antennas free of obstructions (particularly metal objects) and do not place a sheet of metal (like a filing cabinet) between 802.11a devices. Also, Proxim recommends that you use the Harmony Utility to evaluate the signal strength and link quality between 802.11a devices.

## Common Technical Support Questions

This section discusses some of the most common problems using the Harmony 802.11a PCI Card and offers possible solutions

Symptom/Question	Possible Solution/Answer
My office has an existing 802.11b network. Is the Harmony 802.11a PCI Card compatible?	No. 802.11a devices are not compatible with 802.11b devices.
I want to install a Harmony 802.11a network in my office that has an existing 802.11b network. Will the 802.11a network interfere with the 802.11b network?	No. 802.11a and 802.11b devices will not interfere with each other since they operate at different frequencies. 802.11a devices operate in the 5 GHz band, and 802.11b devices operate in the 2.4 GHz band.
Is the Harmony 802.11a PCI Card compatible with 802.11a products from other vendors?	Yes, the Harmony 802.11a PCI Card is interoperable with 802.11a-compliant products from other vendors. However, if you use 2X mode to achieve data rates up to 108 Mbps, the Harmony 802.11a PCI Card is only compatible with other 802.11a products from Proxim.
In throughput tests, the 802.11a PCI Card doesn't seem to transfer data as quickly as I'd expect.	Data rate is the raw signaling rate of a networking device; it does not equal data throughput. Actual data throughput is always less than the data rate since some of the available bandwidth is used to send control messages and regulate activity over the wireless medium. Also, throughput will depend on several factors such as network overhead, the file transfer program in use, the computer's operating system, and the computer's processor speed.
How do I determine where to install 802.11a Access Point to ensure that users can access the wireless network from anywhere in my facility?	Proxim recommends that you perform a site survey following the procedure outlined in Proxim's Harmony Technical Training class. If you would like to learn more about the site survey procedure, you should consider signing up for a Proxim class in your area. Refer to <a href="http://www.proxim.com/">http://www.proxim.com/</a> for more information.





## Appendix A

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### Technical Specifications

The following technical specification is for reference purposes only. Actual product's performance and compliance with local telecommunications regulations may vary from country to country. Proxim, Inc. will only ship products that are type approved in the destination country.

#### Technical Specifications

<b>Bus Interface</b> .....	PCI (Peripheral Components Interconnect)
<b>Data Rate</b> .....	54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, 6 Mbps in 802.11a mode; 108 Mbps, 96 Mbps, 72 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps in 2X mode
<b>Media Access Protocol</b> .....	IEEE 802.11a
<b>Ethernet Compatibility</b> .....	IEEE 802.3
<b>Frequency Band</b> .....	5.15-5.35 GHz (Orthogonal Frequency Division Multiplexing)
<b>Channels</b> .....	8 in U.S. (802.11a mode); 3 in U.S. (2X mode)
<b>Operating Temperature</b> .....	0°C to +60°C

## Parameters

Parameter	Range	Default
Network Mode	Ad Hoc, Infrastructure	Depends on driver version
Power Saving (Infrastructure only)	Off, Normal, Maximum	Off
2X Mode	Enabled, Disabled	Disabled
SSID	Up to 32 characters	Depends on driver version
Channel (Ad Hoc only)	In 802.11a mode: Channels 36, 40, 44, 48, 52, 56, 60, and 64; in 2X mode: Channels 42, 50, and 58	All selected
Disable RTS/CTS	On/Off	Off
RTS/CTS Threshold	1 to 2345	1
Maximum Transmit Rate	Select maximum transmit rate from among 54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, and 6 Mbps in 802.11a mode and from among 108 Mbps, 96 Mbps, 72 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, and 12 Mbps in 2X mode	Automatic (all rates in 802.11a mode)
Enable WEP for Encryption	Enabled, Disabled	Disabled
Key Size	40 Bit, 128 Bit, 152 Bit	40 Bit
WEP Keys	Up to 4 Keys: 10 hexadecimal digits per key for 40 Bit, 26 hexadecimal digits per key for 128 Bit, 32 hexadecimal digits per key for 152 Bit	Blank
Default Key	One of the four configured WEP Keys	WEP Key 1

## Appendix B

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### How to Reach Technical Support

If you are having a problem using the Harmony 802.11a PCI Card and cannot resolve it with the information in Chapter 6, gather the following information and contact Proxim Technical Support:

- What kind of network are you using?
- What were you doing when the error occurred?
- What error message did you see?
- Can you reproduce the problem?
- What version of the Harmony 802.11a driver are you using?

You can reach Proxim Technical Support by voice, fax, e-mail, or mail:

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