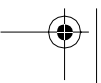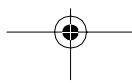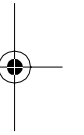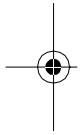# For More Information

You can find the most recent software and user documentation for all Raylink products on our Web site.

Web site: www.raylink.com

If you encounter problems when installing or using this product, contact our technical support staff at 800-457-6811.
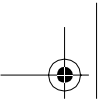
For More Information

# Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Any changes or modifications made to this equipment may void a user's authority to operate this equipment. 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 with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference with 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 taking 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 to an outlet on a circuit different from that to which the receiver is connected.

*Note: Changes not expressly approved by Raytheon Electronics may void the user's authority to operate this equipment. Refer to the manual for specifications on cabling types.*

# Industry Canada Statement

This device complies with RSS-210 of Industry Canada. Operation is subject to the following conditions:

**1.** This device may not cause interference.

**2.** This device must accept any interference, including interference that may cause undesired operation of the device.

This device requires a user license unless it is totally installed inside a building. Users must obtain this license from Industry Canada.

Raytheon International Canada, 400 Phillip Street, Waterloo, Ontario N2J 4K6 Canada, (519) 885-8605

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# *Table of Contents*

Table of Contents

# *Preface*

The Raylink Access Point is a wireless LAN-to-Ethernet bridge that provides direct, transparent access to an existing wired Ethernet LAN infrastructure. Designed for use with the Raylink PC Card, the Raylink Access Point enables wireless LAN-equipped portable computers to access servers and devices resident on wired local area networks (WLANs).

The Raylink PC Card provides plug-and-play wireless connectivity for any portable computer equipped with a PC Card Type II slot. Designed for interoperability, the Raylink PC Card is designed to the proposed IEEE 802.11 standard for wireless LANs. The Raylink PC Card includes standard software NOS drivers for MS Windows for Workgroups, Novell NetWare, Windows 95, and Windows NT.

## Who Should Read This Manual

This manual is intended for the person who plans, installs, configures, and maintains the Raylink Access Point and the Raylink PC Card. This manual assumes that you have a working knowledge of basic PC functions and that you are familiar with local area networking (LAN) concepts.

Raylink Access Point's factory-installed configuration allows it to function without any preconfiguration; however, you must first attach it to the Ethernet network.

# Manual Organization

The following table briefly describes the content of each chapter and appendix in this manual. At the back of the manual there are also a glossary and an index.
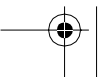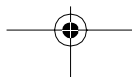
| Chapter/Appendix | Description |
| --- | --- |
| 1 | Provides an overview of the Raylink Access Point and Raylink PC Card, along with information on wireless LAN concepts. |
| 2 | Provides information on installing the Raylink PC Card hardware. |
| 3 | Provides information on installing the Raylink PC Card in a Windows 95 environment. |
| 4 | Provides information on installing the Raylink PC Card in a Windows 3.1.x environment. |
| 5 | Provides information on installing the Raylink PC Card in a Windows NT environment. |
| 6 | Provides information on installing the Raylink PC Card in a Novell Netware environment. |
| 7 | Provides information on installing the Raylink Access Point hardware. |
| 8 | Provides information on configuring the Raylink Access Point. |
| 9 | Provides information on managing the Raylink Access Point. |
| 10 | Provides the product specifications for the Raylink Access Point and the Raylink PC Card. |
| 11 | Provides troubleshooting information for the Raylink Access Point and the Raylink PC Card. |

| Chapter/Appendix | Description |
| --- | --- |
| A | Provides information on network cabling specifications. |
| B | Provides warranty information for the Raylink Access Point and the Raylink PC Card. |

Preface
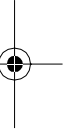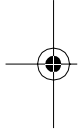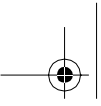
CHAPTER 1

# *Getting Started with the Raylink Access Point*

This chapter provides information on the Raylink Access Point and the Raylink PC Card, along with an overview of wireless local area networks (WLANs), including ad hoc (peer-to-peer) and infrastructure networks. In addition, information is also provided on spread spectrum technology, which is used by Raylink products, and Raylink security. This chapter also provides planning information and explains how to position one or more Raylink Access Points.

## Raylink Access Point

The Raylink Access Point is a wireless LAN-to-Ethernet bridge that provides direct, transparent access to an existing wired Ethernet LAN infrastructure. Designed for use with the Raylink PC Card, the Raylink Access Point enables wireless LAN-equipped portable computers to access servers and devices resident on wired LANs. The Raylink Access Point optimizes the performance and reliability of wired-to-wireless packet transfers by incorporating advanced authentication, association, and bridging algorithms. The Raylink Access Point includes a Raylink PC Card with integrated radio and antenna.

The Raylink Access Point supports the following features:

- Designed to IEEE 802.11 standard
- Roaming capability
- Optimized wired-to-wireless data transfer
- In-building coverage up to 500 feet (1,000 feet line of sight)

- 2 Mbps optimized data transfer
- Easy-to-install design for wall or desktop mounting
- Built-in 10BaseT Ethernet support
- Antenna diversity to reduce fading and multipath effects
- Network operating system independent

The Raylink Access Point is useful for the following applications:

- Extensions to wired LANs
- Roaming workers
- Factory floors
- Difficult-to-wire buildings
- Temporary workgroups

With overlapping Raylink Access Points, mobile computer users can roam from one Raylink Access Point to another while maintaining a seamless live network connection.

# Raylink PC Card

The Raylink PC Card provides plug-and-play wireless connectivity for any portable computer equipped with a PC Card Type II slot. Designed for interoperability, the Raylink PC Card is designed to the proposed IEEE 802.11 standard for wireless LANs. The Raylink PC Card is used with a Raylink Access Point to connect a mobile device to an existing wired Ethernet LAN infrastructure.

The Raylink PC Card provides superior performance and range through its additional signal processing features in the physical layer to reduce bit errors and the occurrence of packet retransmission. The receiver also increases operational transmission range through a maximum likelihood sequence estimator capability, providing greater distance from the wired Raylink Access Point while maintaining a quality communications link.

A high-performance spread spectrum transceiver delivers robust and error-free communications at a maximum data rate of 2 Mbps. The

Raylink PC Card has an automatic backoff to 1 Mbps data rate if necessary as specified by the proposed IEEE 802.11 specification.

The Raylink PC Card includes standard software Network Operating System (NOS) drivers for MS Windows for Workgroups, Novell NetWare, Windows 95, and Windows NT.

The Raylink PC Card supports the following features:

- PCMCIA Type II extended one-piece design
- 2.4–2.4835 GHz frequency-hopping spread spectrum technology
- Low power consumption, which conserves battery life
- Indoor range of 500 feet in a typical office environment (1,000 feet line of sight)
- 1 and 2 Mbps data transfer rate
- No requirement for external circuitry or AC power
- Standard NOS drivers
- Rotating diversity antenna, which delivers unparalleled range and performance improvements with better noise immunity
- Upgradeable software via the PCMCIA interface

The Raylink PC Card is useful for the following applications:

- Wireless extensions to Ethernet networks
- Ad hoc (peer-to-peer) wireless LANs
- File transfer/print sharing
- POS terminals
- Inventory management
- Test and management control

# Wireless LAN Networks

A wireless LAN (WLAN) is a flexible data communication system implemented as an extension to, or as an alternative for, a wired LAN within a building or campus. Using radio frequency (RF) technology,

WLANs transmit and receive data over the air, minimizing the need for wired connections. Thus, WLANs combine data connectivity with user mobility and, through simplified configuration, enable movable LANs.

With wireless LANs, users can access shared information without looking for a place to plug in, and network managers can set up or augment networks without installing or moving wires. Wireless LANs offer the following advantages over traditional wired networks:

| Advantage | Description |
|---|---|
| Mobility | Provides LAN users with access to real-time information anywhere in their organizations. |
| Installation speed and simplicity | Eliminates the need to install cable in walls and ceilings. |
| Installation flexibility | Allows the network to go where wire cannot. |
| Reduced cost of ownership | Reduces overall installation expenses and life-cycle costs. |
| Scalability | Allows various configurations to meet the needs of specific applications and installations. Configurations are easily changed and range from ad hoc (peer-to-peer) networks for a small number of users to full infrastructure networks for thousands of users. Full infrastructure networks allow roaming over a broad area. |

Wireless LANs provide all the functionality of wired LANs, but without the physical constraints of the wire itself. Wireless LAN configurations include independent networks, offering peer-to-peer connectivity, and infrastructure networks, supporting fully distributed data communications.

Point-to-point local-area wireless solutions, such as LAN-LAN bridging and personal area networks (PANs), may overlap with some WLAN applications, but address different user needs. A wireless LAN-LAN bridge is an alternative to cable that connects LANs in two separate buildings. A wireless PAN typically covers the few feet surrounding a

user's work space and makes it possible to synchronize computers, transfer files, and access local peripherals.

The following factors should be considered when designing and building wireless LAN systems:

| Factor | Points to Consider |
|---|---|
| Range/Coverage | The distance over which radio frequency waves can communicate is a function of product design and the propagation path. Interactions with typical building objects, including walls, metal, and people, affect energy propagation, which in turn affects the range and coverage of a particular system. The range for typical WLAN systems varies from less than 100 feet to more than 300 feet. Coverage may be extended using roaming. |
| Throughput | Factors that affect throughput include airwave congestion (number of users), propagation factors such as range and multipath, type of WLAN system used, and the latency and bottlenecks on the wired portions of the WLAN. Users of traditional LANs generally experience little difference in performance when using a wireless LAN. |
| Multipath effects | Radio signals take multiple paths from a transmitter to a receiver. Reflections of the signals cause them to become stronger or weaker, which affects data throughput. |
| Interoperability with wired infrastructure | Standards-based interoperability makes the wireless portion of a network completely transparent to the rest of the network. |
| Simplicity/Ease of use | Lack of cabling makes moves, adds, and changes trivial operations. |
| Security | Security provisions are typically built into wireless LANS, making them more secure than most wired LANs. |

| Factor | Points to Consider |
|---|---|
| Cost | It is generally cheaper to install and maintain a wireless LAN than a traditional wired LAN for two reasons: a WLAN (1) eliminates the direct costs of cabling and (2) simplifies moves, adds, and changes, thereby reducing the indirect costs of user downtime and administration overhead. |
| Scalability | WLANS can be extremely simple or quite complex. |
| Safety | The output power of WLAN systems is very low. |

# Typical Wireless LAN Configurations

In a typical WLAN configuration, a transmitter/receiver (transceiver) device, called an access point, connects to the wired network from a fixed location using standard Ethernet cable. At a minimum, the access point receives, buffers, and transmits data between the WLAN and the wired network infrastructure. A single access point can support a small group of users and can function within a range of less than one hundred to several hundred feet.

The Raylink Access Point (or the antenna attached to the Access Point) is usually mounted high, but it can be mounted essentially anywhere that is practical as long as the desired radio coverage is obtained.

End users access the WLAN through the wireless LAN adapters, which are implemented as PC cards in notebook computers as ISA cards in desktop computers, or are integrated within hand-held computers. WLAN adapters provide an interface between the client network operating system (NOS) and the airwaves (using an antenna). The nature of the wireless connection is transparent to the NOS.

There are two types of WLANs: ad hoc (peer-to-peer) network or infrastructure network. The following sections provide more information on these types of WLANs.

## Ad Hoc (Peer-to-Peer) Network

The simplest WLAN configuration is known as an ad hoc (peer-to-peer) network. An ad hoc network contains a group of portable computers with wireless adapters (Figure 1-1). These portable computers need to have the same workgroup name, ESSID, and password (if applicable). Any time two or more wireless adapters are within range of each other, they can establish an independent network. These on-demand networks typically require no administration or preconfiguration.
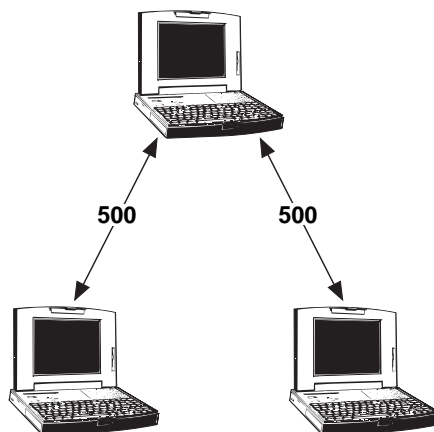


**Figure 1-1.** Ad Hoc Network

Access points can extend the range of ad hoc networks by acting as
repeaters, effectively doubling the distance between wireless PCs (Figure
1-2).
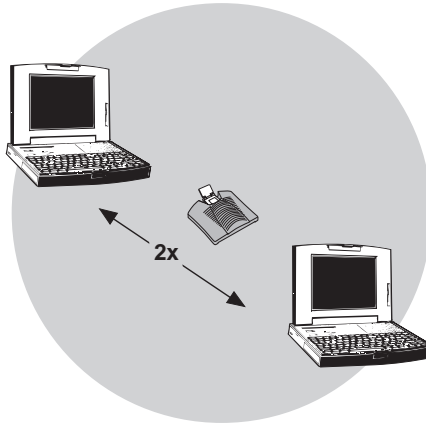


**Figure 1-2.**  Extended Ad Hoc Network

# Infrastructure Network

There are two types of infrastructure networks: infrastructure WLAN and
overlapping infrastructure WLAN.

### Infrastructure WLAN

In an infrastructure network, multiple access points link the WLAN to the
wired network and allow users to share network resources efficiently
(Figure 1-3). The access points not only provide communication with the

wired network but also mediate wireless network traffic in the immediate neighborhood. Multiple access points can provide wireless coverage for an entire building or campus.
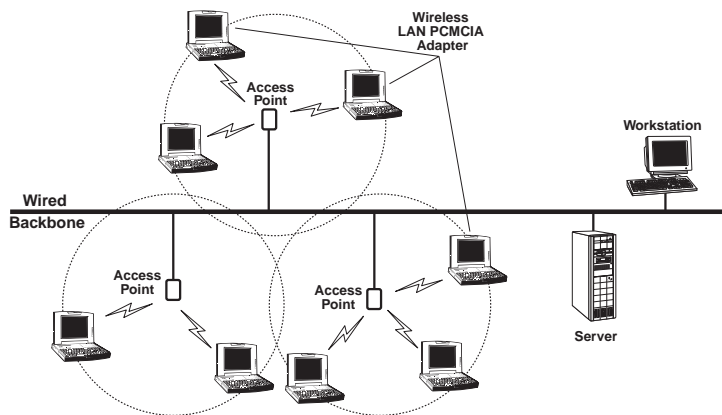


**Figure 1-3.** Infrastructure Network

## Overlapping Infrastructure WLAN (Roaming)

Wireless communication is limited by how far signals carry for the given power output. WLANs use cells, called microcells, similar to the cellular telephone system to extend the range of wireless connectivity. At any point in time, a mobile PC equipped with a WLAN adapter is associated with a single access point and its microcell, or area of coverage. Individual microcells overlap to allow continuous communication within a wired

network (Figure 1-4). These microcells handle low power signals and hand off users as they roam through a given geographic area.
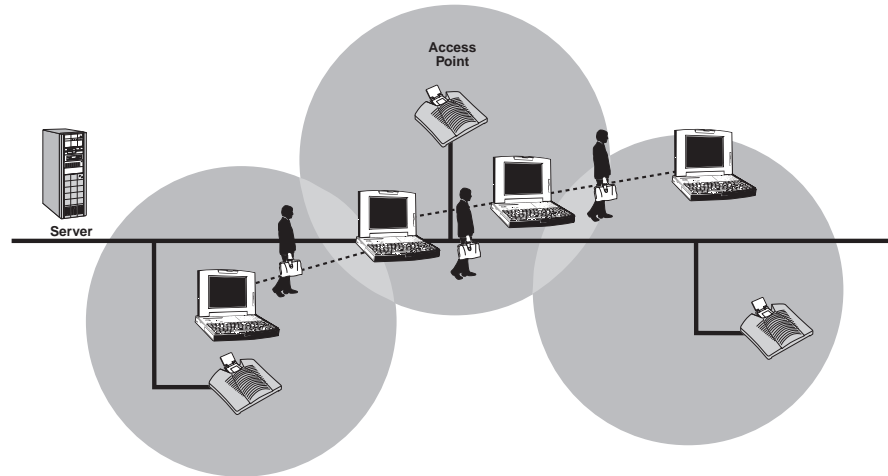
**Figure 1-4.** Microcells and Roaming

# Spread Spectrum Technology

Spread spectrum technology, used by most wireless LAN systems, is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communications systems. Spread spectrum is designed to trade off bandwidth efficiency for reliability, integrity, and security. There are two types of spread spectrum technologies: frequency hopping and direct sequence. Raylink uses frequency-hopping spread spectrum technology.

Frequency-hopping spread spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be a short-duration impulse noise.

Direct-sequence spread spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or

chipping code). The longer the chip, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without the need for retransmission. To an unintended receiver, DSSS appears as low-power wideband noise and is rejected (ignored) by most narrowband receivers.

# Raylink Wireless LAN Security

Raylink wireless LAN products give mobile users access to all their networking resources from anywhere within a building or campus environment. This section describes how security is implemented in the Raylink Wireless Access Point and Raylink PC Card.

## User Association—ESSID

In addition to the radio transmission technique used for spread spectrum technology, Raylink provides an ESSID (extended service set identification), which allows system administrators to dictate who can access the wireless network. Only wireless devices with matching ESSIDs are allowed to communicate with each other.

Raylink Access Points and PC Cards specify ESSID settings during setup. Raylink offers the capability of providing a 31-character alphanumeric ESSID, which allows for $6x10^{53}$ possible choices.

## User Authentication—Password Control

Raylink wireless LAN products provide password protection at the Raylink Access Point level to allow users access to the corporate LAN. This provides for an additional layer of security before the user is authenticated by the corporate network. Only wireless devices with matching passwords are allowed to access the corporate LAN.

Raylink Access Points and Raylink PC Cards specify passwords during setup. The Raylink Access Point provides for a 15-character alphanumeric password that allows for $8 \times 10^{26}$ possible choices.

## Distance—Physical Security

Owing to FCC regulations, wireless LAN devices must comply with power requirements that affect the transmission range of data between distances of 500 and 1,000 feet. This range limits the area within which outsiders can attempt to access the wireless network.

## Encryption

The highest level of security is achieved by the addition of an encryption product on the network as a whole. This encryption product runs at the application level. Using either hardware or software, the data in the packets is scrambled before it is sent over the LAN. Only stations with the correct decryption key can unscramble and read the data.

The IEEE 802.11 committee is responsible for setting the standards for wireless LANs. Raylink wireless LAN products are compatible with the IEEE 802.11 standard. The IEEE wireless standards organization has created and defined the wired equivalency privacy (WEP) algorithm to address network security. To prevent eavesdropping, the WEP algorithm uses a pseudo random number generator, which is initialized by a shared secret key.

Based on RSA'S RC4, the WEP algorithm contains the following properties:

- Reasonably strong: A brute-force attack is difficult because every frame is sent with an initialization vector that restarts the pseudo random number generator.
- Self-synchronizing: Owing to the possibility of lost packets (a possibility with any LAN), the WEP algorithm resynchronizes at each message.

WEP will be added in future versions of the Raylink product. WEP is an optional feature within the IEEE 802.11 standard.

# Planning Information

This section provides planning information and explains how to position one or many Raylink Access Points for your users.

## Basic Raylink Access Point Cell

The Raylink Access Point gives mobile users within the Access Point's cell coverage area access to your wired network's resources. The Access Point uses an omni-directional antenna to obtain the following coverage (Figure 1-5):

- 500 feet of coverage in all directions if barriers, such as walls and metal objects, exist between the Access Point and the Raylink PC Card

- 1,000 feet of coverage with an unobstructed line-of-sight between the Access Point and the PC Card
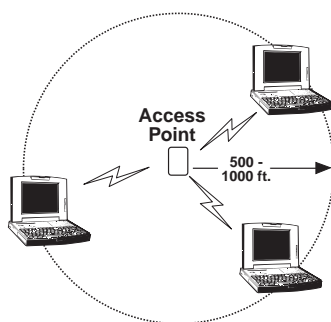


**Figure 1-5.**  Access Point Coverage

## Coverage Factors

Although radio frequencies transmit through walls and barriers, it's best to mount the Access Point in a high, central location, away from moving objects and metal structures.

## Multiple Raylink Access Points (Overlapping Coverage—Roaming)

To let users roam from one cell to another seamlessly and without data loss, you can create a configuration using multiple access points with overlapping coverage. With this configuration, a mobile user can move within a building or campus environment while maintaining continuous access to your network resources (Figure 1-6).
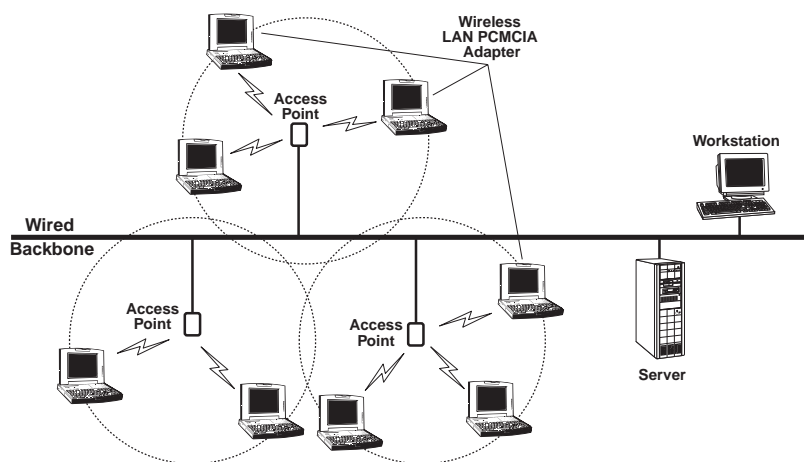


**Figure 1-6.** Wireless Infrastructure Network

*Note: A multiple Access Point configuration requires each Access Point to have the same ESSID and password (if applicable) and different hopping sequences.*

# CHAPTER 2  *Installing the Raylink PC Card Hardware*

This chapter explains how to install the Raylink PC Card in a PC card Type II compatible computer, such as a laptop or notebook computer. The Raylink PC Card is also compatible with any desktop personal computer (PC), provided the desktop PC uses a PC card socket adapter (also known as an ISA adapter) or a front bay type adapter. These adapters enable the user to connect any type of PCMCIA-compliant peripheral card to a desktop PC. Figure 2-1 shows an example of an ISA adapter card.
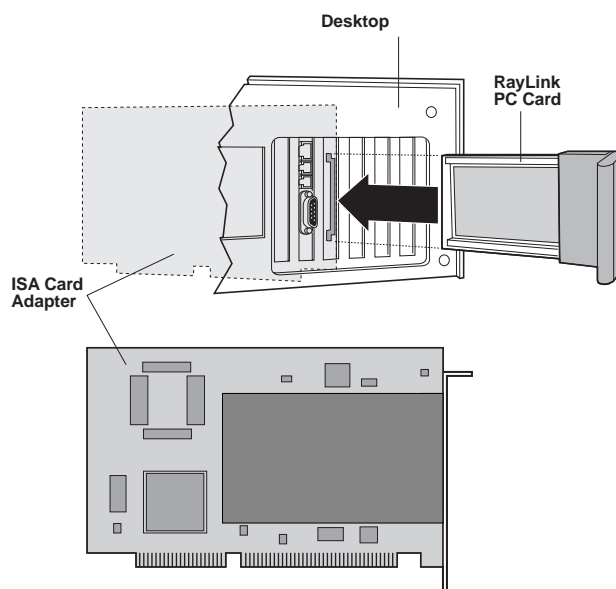


**Figure 2-1.**  PC Desktop Socket Adapter

PCMCIA cards are used in laptop PCs and include devices such as wireless local area network (WLAN) cards, modems, wired network cards, disk drivers, and memory cards.

Complete installation of the Raylink PC Card should take 10–20 minutes.

# Before You Begin

Read this section to make sure you have everything you need to install the Raylink PC Card.

## Raylink PC Card Package Contents

Open the Raylink PC Card container and remove the contents, which should include the following:

- Raylink PC Card
- Raylink Installation and Utilities disk

## System Requirements

To install and use the PC Card, you need the following:

- A computer with a PC card slot for Type II cards
- Windows 95, Windows 3.1.x, Windows NT, Novell Netware, or Novell Personal Netware installation files. (Often these files are stored on your computer. If not, you will need the CD-ROM or installation disks.)

## Overview of the Installation Steps

To install the PC Card, follow these basic steps:

1. Install the hardware (PC Card).

**2.** Install the Raylink driver for your operating system.

**3.** Configure the LAN adapter.

**4.** Configure your operating system.

**5.** Configure the network.

This chapter covers step 1 and explains how to install the hardware. For information on steps 2–5 above, refer to the chapter listed below that addresses your operating system.

| Operating System | Refer to: |
|---|---|
| Windows 95 | Chapter 3 |
| Windows 3.1.x | Chapter 4 |
| Windows NT | Chapter 5 |
| Novell Netware | Chapter 6 |

# Installing and Removing the Raylink PC Card

*Note:  The Raylink PC Card is "hot-swappable." This means you do not need to turn off your computer before installing or removing it.*

To install the Raylink PC Card, complete the following steps:

**1.** With the Raylink logo facing up, insert the **Raylink PC Card** into the PCMCIA slot on your PC until it is firmly seated.

*Caution:  Don't force the Raylink PC Card into the slot; this could damage your computer.*

**2.** Raise the **hinged antenna** attached to the card until the antenna extends straight up.

**3.** If your PC was turned off, **power it up** now.

When you are ready to remove the Raylink PC Card using Windows 95, complete the following steps:

1. Double-click the **PC Card icon** located at the far right end of the Windows 95 task bar.

2. Select **Wireless LAN Adapter**.

3. Click the **Stop** button.

4. You will see a message saying you may safely remove this device. Click **OK**.

*Note:   If you are unfamiliar with removing PCMCIA cards from your PC, consult your computer documentation. Some PCs contain a lever mechanism to release the card. Do not force the removal of the Raylink PC Card.*

**CHAPTER 3**  *Installing the Raylink PC Card in a Windows 95 Environment*

This chapter explains how to install the Raylink driver and configure the LAN adapter and network for computers running Windows 95.

## Determining Your Version of Windows 95

To complete the next step in the installation process, installing the Raylink driver, you need to determine which version of Windows 95 you are running. To do that, complete the following steps:

1. Click the **Start** button on the Windows 95 taskbar and select **Settings** → **Control Panel**.

2. Double-click **System**. You will see one of the following Windows 95 versions listed:

| Revision | Operating System |
| --- | --- |
| 4.00.950 | Windows 95A |
| 4.00.950 A | Windows 95A |
| 4.00.950 B | Windows 95B |

# **Installing the Raylink Driver**

Depending on your operating system—Windows 95A or Windows 95B— follow the steps below for installing the Raylink driver.

## Windows 95A Environment

After you insert the Raylink PC Card into the PC, Windows 95 notifies you that it has discovered new hardware and prompts you to select a driver to install.

1. Insert the Raylink software disk into the PC's floppy drive (**A:** or **B:**).

2. In the New Hardware Found dialog box, select **Driver from disk provided by hardware manufacturer**. Click **OK**.

3. Windows 95 prompts you to identify the location of the Raylink driver. Enter the following command in the textbox: **A:** or **B:** (depending on your floppy drive). Click **OK**.

## Windows 95B Environment

Once you insert the Raylink PC Card into the PC, Windows 95 opens a Device Driver Installation wizard.

1. Insert the Raylink disk into your PC's floppy drive (**A:** or **B:**). Windows 95 displays a message saying it has found the Raylink driver. Click **Finish**.

2. Windows begins copying files and then displays a message saying it cannot find the file called netwlan.inf on the Windows 95 CD-ROM. From the pull-down menu, select the floppy drive (**A:** or **B:**). Click **OK**.

*Note:   Even though the dialog box prompts you to insert the Windows 95 CD-ROM, select the floppy drive.*

# Configuring the LAN Adapter

At this point, Windows 95 displays the LAN Adapter Properties dialog box. You have the option of specifying the appropriate parameters for your network. In most cases, you can simply accept the default values by clicking OK, but you may want to check with your system administrator to make sure you are using the correct values for your network.

The following table describes the LAN adapter properties, along with their default settings.

| Property | Default Value | Description |
|---|---|---|
| AuthenticationPassword | Not Present | If set, this password is required each time a Raylink PC Card user wants to join the wireless network. The authentication password can be between 2 and 15 characters long and is case-sensitive. |
| AuthenticationType | OPEN | When a password is not required, the authentication type is set to OPEN. When a password is required, the authentication type is set to PASSWORD. |
| ConfigurationOption | A | Option A is used for Raylink PC Cards. Option B is used for OEM PC Cards. |
| Countrycode | USA | The options are USA, Europe, Japan, and Korea. Canada uses the USA option. |

| Property | Default Value | Description |
| --- | --- | --- |
| ESSID_for_Adhoc | ADHOC_ESSID | Used to determine whether to allow the Raylink PC Card to join an existing ad hoc network with the corresponding ID or to start a new ad hoc network. The ESSID can consist of 1 to 31 alphanumeric characters and is case-sensitive. Spaces are not allowed. |
| ESSID_for_Infrastructure | ESSID1 | Used to determine whether to allow the Raylink PC Card to join an existing infrastructure network with a Raylink Access Point. The ESSID can consist of 1 to 31 alphanumeric characters and is case-sensitive. Spaces are not allowed.<br><br>*Note: Infrastructure requires the presence of a Raylink Access Point.* |
| NetworkType | ADHOC_AFTER_IN FRASTRUCTURE | **Ad hoc**: Use only in peer-to-peer networking between Raylink PC Cards.<br><br>**Infrastructure**: Use only with a Raylink Access Point that bridges the Raylink PC Card to the wired infrastructure.<br><br>**Adhoc_after_Infrastructure**: With this setting, the card first looks for an infrastructure network with a Raylink Access Point. If the infrastructure is not available, an ad hoc peer-to-peer network will be automatically joined or created. |

To view or change the LAN adapter properties in the future, complete the following steps:

1. Click the **Start** button on the Windows 95 taskbar and select **Settings → Control Panel**.

2. Double-click **Network**.

3. Select **Wireless LAN Adapter**. Click **Properties**.

4. Click the **Advanced** tab.

# Configuring Windows 95

Windows 95 proceeds with installation and starts to load files from the Windows 95 directory. Follow the steps below for your operating environment.

*Note:  If a file being copied is older than the file currently on your computer, you should keep your existing file.*

## Windows 95A Environment

As a Windows 95A user, complete the following steps:

1. The Windows 95 files are often found in the *c:\windows\options\cabs* directory. (Check with your system administrator for the correct location.) If the system prompts you to identify the location of files, enter the correct drive and directory or select it from the pull-down menu. Click **OK**.

2. If the installation cannot locate the necessary Windows 95 files, you will need the Windows 95A Installation Disk 4 or the Windows 95A CD-ROM. If the system prompts you to identify the location of files, enter the letter of the drive that contains the Windows 95 software. Click **OK**.

3. Once the files are loaded, click **No** when asked to restart.

## Windows 95B Environment

As a Windows 95B user, complete the following steps:

1. Windows 95 prompts you to insert the Windows 95 installation disks or CD-ROM. Do not insert the Windows 95 installation disks or CD-ROM. Click **OK**.

2. The Windows 95 files are often found in the *c:\windows\options\cabs* directory. (Check with your system administrator for the correct location.) If the system prompts you to identify the location of files, enter the correct drive and directory or select it from the pull-down menu. Click **OK**.

3. If the installation cannot locate the necessary Windows 95 files, you will need the Windows 95B installation disks or CD-ROM. If the system prompts you to identify the location of files, enter the letter of the drive that contains the Windows 95 software. Click **OK**.

4. Once the files are loaded, click **No** when asked to restart.

# Configuring the Network

Before rebooting your PC, set or verify the network parameter settings. Check with your system administrator for the settings that apply to your network environment.

1. Click the **Start** button on the Windows 95 taskbar and select **Settings → Control Panel**.

2. Double-click **Network**.

## Installing the Client

Depending on your network type, you may need to install one or more clients.

| Network Type | Client to Install |
|---|---|
| Ad hoc network | Client for Microsoft Networks |
| Infrastructure network | Client that supports TCP/IP, NetBEUI, and/or IPX/SPX protocols. (Refer to Windows 95 installation instructions.) |

To install the client for Microsoft Networks, do the following:

1. Click the **Add** button.
2. Select **Client**. Click the **Add** button.
3. Under Manufacturer, select **Microsoft**.
4. Under Network Clients, select **Client for Microsoft Networks**. Click **OK**.

## Sharing Resources

To share resources (files, folders, printers) with other users, do the following:

1. Click the **File and Print Sharing** button.
2. Select the option **I want to be able to give others access to my files.**
3. Select the option **I want to be able to allow others to print to my printer(s).**
4. Click **OK**.

## Installing Protocols

To add protocols, such as NetBEUI or TCP/IP, complete the following steps. If you are unsure of which protocol to add, check with your system administrator.

**1.** From the Network dialog box, click the **Add** button.

**2.** Select **Protocol**. Click the **Add** button.

**3.** Under Manufacturer, select **Microsoft**.

**4.** Under Network Protocols, select **NetBEUI** (or **TCP/IP**). Click **OK**.

## Setting Up the Network Identification

To be sure your PC can be identified on the network, do the following:

**1.** From the **Network** window, click the **Identification** tab.

**2.** Specify a unique name that identifies your computer on the network.

**3.** Enter the case-sensitive name of your **workgroup**. The **workgroup** name associates all computers, printers, and other resources in the group or network. *All ad hoc networked computers must have the same workgroup name.*

**4.** (Optional) Provide a **computer description**.

# What to Do Next

This section tells you how to enable file and print sharing on your PC and how to access the wireless Network Neighborhood.

## Sharing Specific Files and Printers
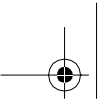
To access network resources using the Network Neighborhood, you must indicate which specific resources, such as file directories and printers, you want to share. Use **Start → Programs → Windows Explorer** to enable

file sharing on your PC. Use **Settings** $\rightarrow$ **Printer** to enable print sharing on your PC.

## Verifying the Installation

Complete the following steps to reboot your PC and verify that the Raylink PC Card is working properly.

1. Shut down and then restart your PC.
2. To view other computers in your workgroup, double-click the **Network Neighborhood** icon from the Windows 95 desktop.
3. To view other workgroups in your network environment, double-click the **Entire Network** icon.

**Chapter 3:** Installing the Raylink PC Card in a Windows 95 Environment
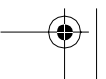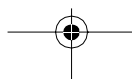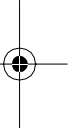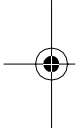
**CHAPTER 4** *Installing the Raylink PC Card in a Windows 3.1.x Environment*

This chapter explains how to install and configure the Raylink PC Card on a laptop running Windows 3.1.x (Windows for Workgroups). The laptop must have a Type II PC Card (PCMCIA) slot. Complete installation should take about 10–20 minutes.

## Overview of the Installation Steps

*Note: Ensure that you have card and socket services installed before installing the PC Card.*

To install the PC Card, follow these basic steps:

1. Install the hardware (PC Card) (see Chapter 2).
2. Install the driver.
3. Configure the LAN adapter.
4. Complete the installation and reboot your machine.

The following instructions cover steps 2-4 in detail.

## Installing the Raylink Driver

In a DOS-based environment such as Windows for Workgroups, you must use card and socket services with the Raylink PC Card. If card and socket

services are not available on your computer, contact your PC manufacturer or your system administrator.

You should use an extended memory manager such as EMM386.EXE and set arguments to exclude the 0XD0000-0XDFFFF memory range to prevent conflicts with other devices. In a text editor, edit your CONFIG.SYS file to include the following statement:

```
DEVICE=C:\WINDOWS\EMM386.EXE NOEMS X=D000-DFFF
```

After inserting the PC Card into the PCMCIA slot of the computer, follow these steps:

1. Start Windows. In Program Manager, select **Network** and then **Network Setup**.
2. If no network is installed, click **Networks**. Select **Install Microsoft Windows Network**, and then click **OK**.
3. Click **Sharing** to select the type of file and printer sharing you want.

*Note:  If you choose to share files, you must specify which ones. In File Manager, find the files or directories to be shared, and select **Disk** $\rightarrow$ **Share As**. Similarly, to enable sharing of printers, use the Print Manager.*

4. Click **Drivers** and then **Add Adapter**. On the page that opens, select **Unlisted or Updated Adapters**, and then click **OK**.
5. Insert the **Raylink PC Card Installation and Utilities disk** in the floppy drive.
6. In the box that appears, specify the location:
   **A:\ndis2**
7. The system displays **WLAN Client Driver**. Click **OK**.

# Configuring the LAN Adapter

1.  In the **Network Drivers** window, click **Setup** to open the WLAN Client Driver dialog box. Follow the instructions below to configure the adapter for your site.
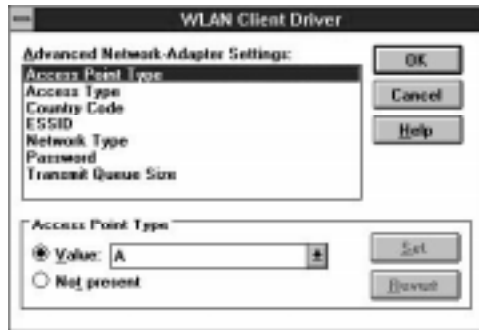


2.  **Fill in the Advanced Network Adapter settings** in this dialog box by selecting each of the listed parameters in turn and setting its value (click the **Value** or **Not present** radio button at the bottom of the window). After entering a value, click **Set**.

    For more information, view the table on LAN adapter properties and their default settings on page 4-5.

3.  After you have specified all properties, click **OK**.

4.  In the Network Driver Window, click **Close**.

5.  In the Network Setup Window, click **OK**.


*Note:   If you see a query box prompting you to replace existing files (such as Microsoft NetBEUI files) with the new files, click **Yes to All**.*

## Access Point Type

A               This is used when a Raylink PC Card is being
                installed.

B               This is used for OEM PC cards.

## Access Type

Open            Select this option if no password is to be required.

Password        Select this option to require use of a password to log
                into the wireless network.

## Country Code

Choose the country code (geographic region) of the wireless LAN from
the drop-down menu. The options are USA, Europe, Japan, and Korea.
Canada uses the USA option.

## ESSID

You may have to ask your Access Point system administrator for this
ESSID or agree on an ad hoc ESSID with the other members of your peer-
to-peer network. The ESSID must contain between 1 and 31 alphanumeric
characters, with no spaces. It is case-sensitive.

## Network Type

| Infrastructure | For use only with an Access Point that connects the Raylink PC Card to the wired infrastructure. |
| Adhoc | For use only in peer-to-peer networking between Raylink PC Cards. |

## Password

If you have set Access Type to Password, **specify a password**. The password must contain between 2 and 15 characters and cannot contain any spaces. If you have set Access Type to Open, set the Password option to **Not present**.

*Note: This password must be the same as the Access Point password.*

## Transmit Queue Size

Set this option to **Not present**.

| Property | Default Value | Description |
|---|---|---|
| AuthenticationPassword | Not Present | If set, this password is required each time a Raylink PC Card user wants to join the wireless network. The authentication password can be between 2 and 15 characters long and is *case-sensitive*. |

| Property | Default Value | Description |
|---|---|---|
| AuthenticationType | OPEN | When a password is not required, the authentication type is set to OPEN. When a password is required, the authentication type is set to PASSWORD. |
| ConfigurationOption | A | Option A is used for Raylink PC Cards.<br>Option B is used for OEM PC Cards. |
| Countrycode | USA | The options are USA, Europe, Japan, and Korea. Canada uses the USA option. |
| ESSID_for_Adhoc | ADHOC_ESSID | Used to determine whether to allow the Raylink PC Card to join an existing ad-hoc network with the corresponding ID or to start a new ad-hoc network. The ESSID can consist of 1 to 31 alphanumeric characters and is *case-sensitive*. Spaces are not allowed. |
| ESSID_for_Infrastructure | ESSID1 | Used to determine whether to allow the Raylink PC Card to join an existing infrastructure network with a Raylink Access Point. The ESSID can consist of 1 to 31 alphanumeric characters and is *case-sensitive*. Spaces are not allowed.<br><br>*Note: Infrastructure requires the presence of a Raylink Access Point.* |

| Property | Default Value | Description |
|---|---|---|
| NetworkType | ADHOC_AFTER_IN FRASTRUCTURE | **Ad hoc**: Use only in peer-to-peer networking between Raylink PC Cards.<br><br>**Infrastructure**: Use only with a Raylink Access Point that bridges the Raylink PC Card to the wired infrastructure.<br><br>**Adhoc_after_Infrastructure**: With this setting, the card first looks for an infrastructure network with a Raylink Access Point. If the infrastructure is not available, an ad-hoc peer-to-peer network will be automatically joined or created. |

# Completing the Installation

After you close the Network Setup window, a box should appear in which you must verify User Name, Workgroup, and Computer Name.

*Note:  The workgroup is the same as a domain on a Windows NT machine; when connecting a Windows 3.1.x and a Windows NT computer in a peer-to-peer network, make sure these names are the same. All ad hoc networked computers must have the same workgroup name.*

*Note:  If this box does not appear, you can set the information by completing the following steps:*

1. In **Program Manager**, open **Main → Control Panel → Network.**
2. Enter the **workgroup name** and click **OK**.
3. A dialog box opens, prompting you to restart the computer. If the workgroup information has been verified, click **Restart Computer**. If it has not, click **Continue** and follow the steps above before restarting your computer.

# What to Do Next

After restarting your computer, verify that the Raylink PC Card is working properly by logging into the network and using it as you usually do. Launch a browser, for example, or mount printers, drives, or other network resources.
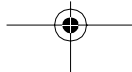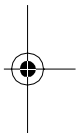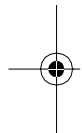
**CHAPTER 5** *Installing the Raylink PC Card in a Windows NT Environment*

This chapter explains how to install and configure the Raylink PC Card on a laptop running Windows NT 4.X Server or Windows NT 4.X Workstation. The laptop needs to have a Type II PC card (PCMCIA) slot. Complete installation should take about 10–20 minutes.

## Overview of the Installation Steps

To install the PC Card, follow these basic steps:

1. Install the hardware (PC Card) (see Chapter 2).
2. Install the driver.
3. Configure the LAN adapter.
4. Complete the installation and reboot your machine.

The following instructions cover steps 2-4 in detail.

## Installing the Raylink Driver

After inserting the PC Card into the PCMCIA slot of the computer, follow these steps:

1. From the **Start** menu, select **Settings** → **Control Panel**.
2. In **Control Panel**, open **Network**. Click the **Adapters** tab, and click **Add** to open the **Select Network Adapter** window.

3. Click **Have Disk**.

4. Insert the **Raylink PC Card Installation and Utilities disk** in the floppy drive.

5. In the box that appears, specify this location:

   **A:\Winnt**

   The Select OEM Option window opens, displaying this message: **Raytheon WLANDRV PCMCIA Adapter Driver**.

6. Click **OK**.

# Configuring the LAN Adapter

After you install the Raylink driver, the WLAN PCMCIA Adapter Setup window opens. The following instructions tell you how to configure the adapter for your site.
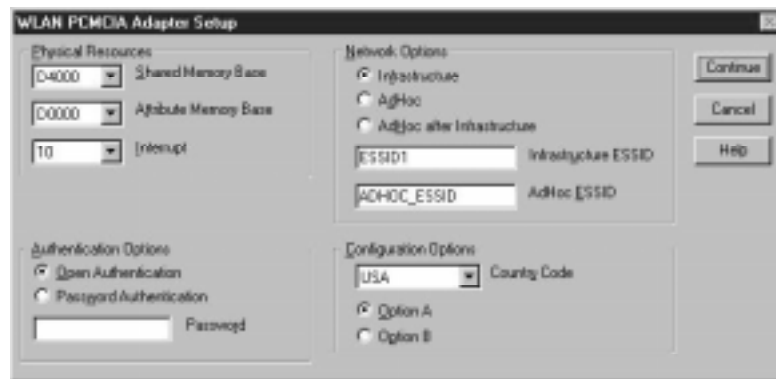


Fill in the appropriate settings in this window for:

- Physical Resources
- Authentication Options
- Network Options
- Configuration Options

Once you have entered all the settings on the WLAN PCMCIA Adapter Setup window, click **Continue**.

For more information on LAN adapter properties, see the table of default LAN adapter settings on page 5-6.

## Physical Resources

Make selections for the following options in the WLAN PCMCIA Adapter Setup window.

Shared Memory Base
A memory location that is currently free. You can see which locations are already in use by taking the following steps:

1. Select **Start → Programs → Administrative Tools** (Common).

2. Select **Windows NT Diagnostics**.

3. Under the **Resources** tab, click **Memory** to see which memory addresses are in use.

Attribute Memory Base
Follow steps 1–3 above to find another unused memory location.

Interrupt (IRQ)
1. Under the **Resources** tab of the Windows NT Diagnostics window, click **IRQ** to see which IRQs are currently in use.

2. Choose any IRQ that is not in use and enter it here. Click **OK** to close the Windows NT Diagnostics window.

## Authentication Options

Make selections for the following options in the WLAN PCMCIA Adapter Setup window.

| | |
|---|---|
| Open Authentication | Select this option if no password is to be required. |
| Password Authentication | Select this option to require that a password be used to log into the wireless network. |
| Password textbox | If Password Authentication is chosen, a dialog box appears, prompting you for a password. The password must contain between 2 and 15 characters and cannot contain any spaces. |
| | *Note: If you select the Infrastructure network type, this password must be the same as the Access Point password.* |

## Network Options

Make selections for the following options in the WLAN PCMCIA Adapter Setup window.

| | |
|---|---|
| Infrastructure | For use only with an Access Point that connects the PC Card to the wired infrastructure. |
| Adhoc | For use only in peer-to-peer networking between PC Cards. |
| Adhoc after Infrastructure | For use in an infrastructure network or when the infrastructure network is not available. After looking for an Access Point and failing to find one, the software automatically joins or creates an ad hoc peer-to-peer network. |

| | |
|---|---|
| Infrastructure ESSID | You may have to ask your Access Point system administrator for this ESSID. |
| Ad hoc ESSID | You may have to ask your system administrator for this ESSID or agree on an ad hoc ESSID with the other members of the ad hoc network. The ad hoc ESSID can consist of 1 to 31 alphanumeric characters, with no spaces. It is case-sensitive. |

## Configuration Options

Make selections for the following options in the WLAN PCMCIA Adapter Setup window.

| | |
|---|---|
| Country Code | Choose the country code from the drop-down menu. The options are USA, Europe, Japan, and Korea. Canada uses the USA option. |
| Option A | This is used when a Raylink PC Card is being installed. |
| Option B | This is used for OEM PC cards. |

*Note:  If a Bus Location dialog box opens, be sure to choose the values below, and then click **OK**.*

Type:  **PCMCIA**

Number:  **0**

| Property | Default Value | Description |
| --- | --- | --- |
| AuthenticationPassword | Not Present | If set, this password is required each time a Raylink PC Card user wants to join the wireless network. The authentication password can be between 2 and 15 characters long and is *case-sensitive*. |
| AuthenticationType | OPEN | When a password is not required, the authentication type is set to OPEN. When a password is required, the authentication type is set to PASSWORD. |
| ConfigurationOption | A | Option A is used for Raylink PC Cards. Option B is used for OEM PC Cards. |
| Countrycode | USA | The options are USA, Europe, Japan, and Korea. Canada uses the USA option. |
| ESSID_for_Adhoc | ADHOC_ESSID | Used to determine whether to allow the Raylink PC Card to join an existing ad-hoc network with the corresponding ID or to start a new ad-hoc network. The ESSID can consist of 1 to 31 alphanumeric characters and is *case-sensitive*. Spaces are not allowed. |

| Property | Default Value | Description |
| --- | --- | --- |
| ESSID_for_Infrastructure | ESSID1 | Used to determine whether to allow the Raylink PC Card to join an existing infrastructure network with a Raylink Access Point. The ESSID can consist of 1 to 31 alphanumeric characters and is *case-sensitive*. Spaces are not allowed. |
| | | *Note: Infrastructure requires the presence of a Raylink Access Point.* |
| NetworkType | ADHOC_AFTER_IN FRASTRUCTURE | **Ad hoc**: Use only in peer-to-peer networking between Raylink PC Cards. |
| | | **Infrastructure**: Use only with a Raylink Access Point that bridges the Raylink PC Card to the wired infrastructure. |
| | | **Adhoc_after_Infrastructure**: With this setting, the card first looks for an infrastructure network with a Raylink Access Point. If the infrastructure is not available, an ad-hoc peer-to-peer network will be automatically joined or created. |

# Completing the Installation

Before closing the Network window, you need to verify the network protocols and network identification:

1. Display the **Identification** tab. Verify that the **Computer Name** and the **Domain** or **Workgroup** are correct.

2. Display the **Protocols** tab. Verify with your network administrator that the necessary network protocols are listed. (Typically these are NetBEUI for local networks and TCP/IP for wide area networks.)

3. In the Network window, on the **Adapters** tab, you should now see:

   **WlanDrv Adapter**

4. Click **OK**.

*Note: If a Microsoft TCP/IP Properties box opens, ask your network administrator whether you should choose DHCP or enter a TCP/IP address. Then click **OK**.*

At this time, a dialog box opens prompting you to restart the computer. Click **Yes**.

# What to Do Next

This section tells you how to enable file and printer sharing and how to access the wireless Network Neighborhood.

## Sharing Files and Printers

To access network resources using the wireless network, you must indicate which specific resources, such as file directories and printers, you want to share. Use **Start → Programs → Windows NT Explorer** to enable sharing of specific files or directories. Use **Start → Settings → Printers** to enable printer sharing.
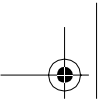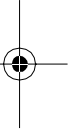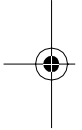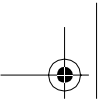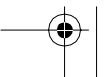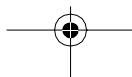
## Verifying the Installation

After restarting your computer, complete the following steps to verify that the PC Card is working properly:

1. To view other computers in your domain (workgroup), double-click the **Network Neighborhood** icon on the desktop.

2. To view other workgroups in your network environment, double-click **Entire Network**.
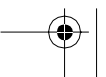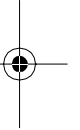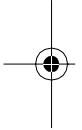
**CHAPTER 6**    *Installing the Raylink PC Card in a Novell Netware Environment*

This chapter explains how to install and configure the Raylink PC Card on a laptop running Novell NetWare Client for Version 4.X or 3.12. The laptop must have a Type II PC card (PCMCIA) slot. Complete installation should take about 10–20 minutes.

## Overview of the Installation Steps

*Note:  Ensure that card and socket services are installed before installing the PC Card.*

To install the PC Card, follow these basic steps:

1. Install the hardware (PC Card) (see Chapter 2).
2. Install Novell NetWare Client if it is not already installed on your computer.
3. Install the driver.
4. Set network parameters in NET.CFG.
5. Edit the STARTNET.BAT file.
6. Restart your machine.

The following instructions cover steps 2-6 in detail.

# Installing Both the Novell NetWare Client and the Raylink Driver

In a DOS-based environment such as Windows for Workgroups, you must use card and socket services with the Raylink PC Card. If card and socket services are not available on your computer, contact your PC manufacturer or your system administrator.

If you have not yet installed Novell NetWare Client on your computer, complete the following steps:

1. Run the **NetWare Client Install program** according to the instructions in the NetWare documentation.

2. Complete **steps 1, 2, and 3** on the NetWare Client Install opening screen.

3. At step 4, press **Enter**.

4. When the Insert the Driver Disk screen opens, remove the **NetWare disk** and insert the **Raylink PC Card Installation and Utilities disk**.

5. Specify the path **A:\Novell** (where **A:** is the floppy drive).

6. Select **Raylink PC Card** and press **Enter**.

7. On the **Settings screen**, verify the correct settings for your site with your network administrator. Press **Esc** to accept settings.

8. Continue the NetWare installation with **step 5**. Leave the PC Card Installation and Utilities disk in the floppy drive until prompted to insert the NetWare disk.

9. When the installation is complete, use an ASCII text editor to edit the **STARTNET.BAT** file (normally found in the \NWCLIENT directory). After LSL, add these lines:

   ```
   NESL

   RAYLINK
   ```

10. Copy the Novell file **NESL.COM** from the PC Card Installation and Utilities Disk (**A:\Novell**) to the directory where you installed Novell Client (**\NWCLIENT**).

Here is a sample STARTNET.BAT file:

```
@ECHO OFF
C:
```

```
CD \NWCLIENT
SET NWLANGUAGE=ENGLISH
LSL
NESL
RAYLINK
IPXODI
VLM
CD \
```

## Settings

The NET.CFG file contains the custom parameters for Novell networks. Changes to these parameters must be made manually, using a text editor.

Keyword options are shown in the following table. For more information see the sample NET.CFG file.

*Note:  If any of the keywords is not clear, look at the table describing the LAN adapter properties and their default settings on page 5-6. Note that the DOMAIN keyword corresponds to Countrycode in the table.*

| Keyword | Default | Options |
|---|---|---|
| AUTH_TYPE | OPEN | (OPEN, PASSWORD) |
| AUTH_PASSWORD | OPEN | (OPEN, 15 CHARACTERS MAXIMUM) |
| DOMAIN | USA | (USA, EUROPE, JAPAN, KOREA) |
| ESSID | ESSID1 | (NO MORE THAN 31 CHARACTERS) |
| NET_ENTRY | JOIN | (JOIN=INFRASTRUCTURE, START=AD HOC) |
| NET_TYPE | INFRASTRUCTURE | (INFRASTRUCTURE, AD HOC) |

| Keyword | Default | Options |
|---|---|---|
| CONFIGURATION | OPTION_A | (OPTION_A OPTION_B) |
| FRAME | ETHERNET_802.2 | (ETHERNET_802.2 ETHERNET_SNAP ETHERNET_802.3 ETHERNET_II) |

# Installing the Raylink Driver with an Installed Novell NetWare Client

If you have already installed NetWare Client on your computer, complete these steps to back up the existing STARTNET.BAT and NET.CFG files:

1. **In the File Manager**, go to the **\NWCLIENT** directory.
2. Select **File → Run**.
3. Enter the filename **SETUP**, which will begin an InstallShield installation sequence.

## Installation Sequence

1. In the first screen, select **Novell NetWare**. Click **Next**.
2. Verify that NET.CFG and STARTNET.BAT are in the \NWCLIENT directory. Click **Next**.
3. You can add a Raylink folder and icon or use an existing folder (choose from the list). Make your decision, and then click **Next**.
4. Select **Let Setup Modify the C:\CONFIG.SYS File**. Click **Next**.
5. Here you are presented with different installation options. Unless you are an expert, choose **Typical Installation**. Click **Next**.
6. At the prompt regarding the location of the network driver for Novell (**A:\Novell**), click **OK**.

After the installation completes, you can choose whether to restart your computer immediately.  Click **Finish**.

## Settings

The NET.CFG file contains the custom parameters for Novell networks. Modifications to these parameters must be made manually, using a text editor.

A sample NET.CFG file is shown here. You can also view keyword options.

```
         Link Driver RAYLINK
AUTH-_TYPE OPEN
AUTH_PASSWORD OPEN
DOMAIN USA
ESSID ESSID1
FRAME WIRELESS_802.3
NET_TYPE INFRASTRUCTURE


   NetWare DOS Requester
FIRSTNETWORK DRIVE = F
USE DEFAULTS = OFF
VLM = CONN.VLM
VLM = IPXNCP.VLM
VLM = TRAN.VLM
VLM = SECURITY.VLM
VLM = NDS.VLM
VLM = BIND.VLM
VLM = NWP.VLM
VLM = FIO.VLM
VLM = GENERAL.VLM
VLM = REDIR.VLM
```

```
VLM = PRINT.VLM
VLM = NETX.VLM
```

*Note:  If any of the keywords is not clear, look at the table on page 5-6
describing the LAN adapter properties and their default settings. Note that
the DOMAIN keyword corresponds to Countrycode in the table.*

# Completing the Installation

If you have not yet done so, restart your computer.

# Verifying the Installation

After restarting your computer, verify that the Raylink PC Card is working
properly by logging in to the network and using it as you usually do.
Launch a browser, for example, or mount printers, drives, or other
network resources.

**CHAPTER 7**    *Installing the Raylink Access Point*

This chapter describes how to install the Raylink Access Point. Complete installation should take about 10–20 minutes.

## Before You Begin

Read this section to make sure you have everything you need to install the Access Point.

### Raylink Access Point Package Contents

Open the Access Point container and remove the contents, which should include the following:

- Access Point
- Raylink PC Card (already installed)
- Power Adapter
- 9-pin serial cable
- Category 5 cable, which is a voice and data transmission LAN cable (100 Mbps) that meets the requirements of the EIA/TIA-568 and EIA/TIA TSB-36. This cable is also known as a straight-through 10BaseT cable.

## System Requirements

To install and configure the Access Point, you need the following items:

• ASCII/ANSI terminal or PC using terminal emulation software

• Ethernet connection

• Power connection

# Connecting Cables and Power

This section explains how to connect the cables and power for the Access Point. Figure 7-1 shows the back of the Access Point.

**The Access Point is an operating system-independent hardware device. No initial configuration is necessary. This means that if you choose to use factory defaults, you only need to connect the Ethernet and power cables.**
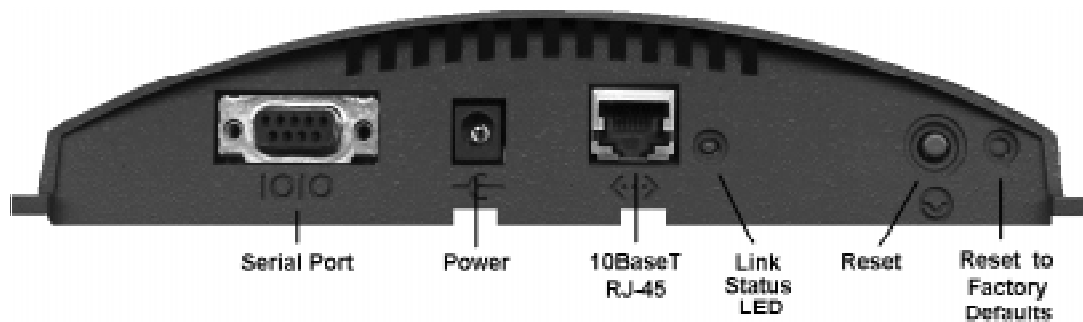


**Figure 7-1.** Access Point Cable and Power Connectors

## Connecting the Serial Cable

You need to connect the serial cable only if you plan to configure the Access Point (and not use the default configuration). Complete these steps:

1. Locate the 9-pin serial cable in the contents box.

2. Connect the male end of the cable to the Access Point's 9-pin, D-sub, PC-compatible serial port.

3. Connect the female end of the serial cable to the serial port on the local monitor. (The monitor can be any ASCII/ANSI terminal or PC using terminal emulation software.)

## Connecting the Ethernet and Power Cables

Connect the Access Point's 10BaseT (RJ-45) port to a standard Ethernet port using the straight-through 10BaseT cable provided in the package. Plug the power adapter into a standard 110v AC outlet. When all system components are properly connected, the System Status LED shows a solid green light.

If you encounter any problems, refer to Chapter 11, "Troubleshooting," for more information.

# Using the Default Configuration

The Access Point is an operating system-independent hardware device. You do not need to perform any initial configuration. However, if you want to change the ESSID, configure IP management, or change the hopping sequence (for multiple Access Points within a given area), refer to Chapter 8, "Configuring the Raylink Access Point."
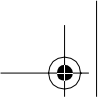
# Installing into an Existing Raylink Network

If you are installing a Raylink Access Point into an existing network, confirm that the ESSID and password are the same as those for the other Access Points on the network. In addition, if roaming is enabled, be sure the hopping sequence is set to a number different from that of the other Raylink Access Points on the WLAN. Refer to Chapter 8, "Configuring the Raylink Access Point," for more information.

# Mounting and Positioning the Raylink Access Point

Mount the Raylink Access Point in a high central location above most barriers, if possible. If appropriate, use the built-in mounting bracket and two screws (not supplied) to attach the Access Point. Connect the Ethernet and power cables. Raise the integrated hinged antenna straight up.
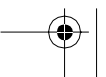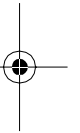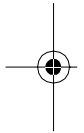
**CHAPTER 8**  *Configuring the Raylink Access Point*

This chapter explains how to configure the Raylink Access Point. The Access Point is an operating system-independent hardware device. You do not need to perform any initial configuration. However, if you want to change the ESSID, configure IP management, or change the hopping sequence (for multiple access points within a given area), you should complete the instructions in this chapter.

To configure the Access Point's parameters, you need a PC running terminal emulation software or an ASCII/ANSI terminal. After initial configuration, you can modify these parameters using SNMP Management, Telnet, or the local console.

## Configuring the Console Port

*Note:  Ensure that the serial cable is connected from the Access Point to the local monitor (see the section "Connecting the Serial Cable" in Chapter 7).*

Complete these steps to configure the access console port using a PC:

1. Make sure the PC is turned on.
2. Click the **Start** button on the Windows 95 taskbar and select **Accessories** → **HyperTerminal**.
3. Double-click the **HyperTerminal icon**.
4. Enter a **Name** for the **New Connection** in the textbox—for example, **Access Pt**. Click **OK**.

5. Under **Connect Using**, select **Direct to Com 1** from the pull-down listbox. Click **OK**. The COM1 Properties screen opens.

6. Enter the following information:

   Bits per second: **9600**

   Data bits: **8**

   Parity: **None**

   Stop bits: **1**

   Flow control: **None**

7. Click **OK**.

8. Ensure the power is connected to the Access Point. Press the **reset switch** on the back of the Access Point.

# Gathering Information

You need the following information to configure your Access Point:

• ESSID of all Raylink PC Cards allowed to use the network (default: ESSID1)

• Authentication Password (default: none)

# Configuring the Raylink Access Point's Parameters

Use the directions in this section to configure the Access Point using a local console or PC.

## Using the Basic Parameters

Once the Access Point is operational, the following menu is displayed:

```
Main Menu
1. View System Information
2. View Statistics
3. Set Administration Password
4. Installation
5. Administration
Enter Selection: _
```

To configure the Access Point, complete the following steps:

1. Select **4** for Installation. You will be prompted for the appropriate values or choices.

```
Installation Procedure
Simply follow the instructions
At the end of the installation procedure the system
will be re-booted.
Type 'N' to begin, or `A` return to abort: _
```

2. Enter **N** to begin.

```
Installation Procedure:
Set Extended Service Set ID

H = Help
A = Abort installation
P = Previous screen
N = Next screen
Enter an Extended Service Set ID as a string of
more than 2 and less than 32 characters,
or press return to accept the current one

Current Extended Service Set ID: ESSID1

Enter command or new data:
```

3. Enter an **Extended Service Set ID** (ESSID) for the Access Point.

This ID can be any ASCII character string between 2 and 31 characters and is *case-sensitive*. Spaces are not allowed. This ID is used to determine whether a Raylink PC Card is allowed to join the wireless LAN through the Access Point. To gain access, the Raylink PC Card must have the same ESSID.

*Note:  If multiple Access Points are being implemented and seamless roaming is desired, the same ESSID must be configured on each Access Point.*

```
Installation Procedure:
Set the Authentication Password
H = Help
A = Abort installation
P = Previous screen
N = Next screen
R = No password
Current authentication password:

Enter a command or a new
authentication password:
```

**4.** Choose one of the following options:

- Select **R** for no password, which allows any Raylink PC Card with a matching ESSID to gain access.

- Enter an **authentication password**. Each time a Raylink PC Card wants to join the wireless network using the Access Point, it is prompted for this case-sensitive password. This password can be any ASCII character string between 2 and 15 characters. Spaces are not allowed.

*Note:  If multiple Access Points are being implemented and seamless roaming is desired, the same authentication password must be configured on each Access Point.*

```
Installation Procedure:
Set Geographic Region
H = Help
A = Abort installation
P = Previous screen
N = Next screen
The selections are: 1 = North America,
   2 = Europe, 3 = Japan, 4 = Korea
Current Geographic Region: North America
Enter command or new data:
```

**5.** Enter the **geographic region** of the wireless LAN.

*Note:  If your location is not listed, contact your Raylink vendor.*

```
Installation Procedure:
Set Hopping Sequence
H = Help
A = Abort installation
P = Previous screen
N = Next screen
Enter a hopping sequence between 0 and 77  or
press return to accept the current one

Current Hopping Sequence: 19

Enter command or new data: _
```

**6.** Enter the **hopping sequence**.

When a Raylink PC Card synchronizes with the Access Point, the Access Point relays the hopping sequence. You can accept the default displayed or make a choice.

*Note:  If multiple Access Points are being implemented, configure the hopping sequence to be different on each Access Point. This decreases the possibility of frame collisions.*

```
Installation Procedure:
Set IP Address
H = Help
A = Abort installation
P = Previous screen
N = Next screen
R = No IP Address
Enter a command or the IP address
in the form XXX.XXX.XXX.XXX
Current IP Address: 000.000.000.000
Enter command or new IP address:
```

**7.** Enter the **IP address** of the Access Point. (Each Access Point needs a unique IP address.)

*Note:   If you do not plan to access or manage the Access Point on the network, use the default IP address. The Access Point cannot be managed using SNMP without an IP address.*

```
Installation Procedure:
Set IP Subnet Mask
H = Help
A = Abort installation
P = Previous screen
N = Next screen
R = Revert to default mask
Enter a command or the Subnet Mask
in the form XXX.XXX.XXX.XXX
Current Subnet Mask: 255.255.255.0
Enter command or new Subnet Mask: _
```

**8.** Enter the **IP subnet mask**.

*Note:   If you do not plan to access or manage the Access Point on the network, use the default IP subnet mask.*

**9.** Enter the **maximum number** (between 1 and 61) **of stations** (Raylink PC Cards) allowed to associate with this Access Point.

```
Installation Procedure:
Choose Configuration Option A or B
H = Help
A = Abort installation
P = Previous screen
N = Next screen
1 = Configuration Option A
2 = Configuration Option B
Configuration is currently set on: A
Enter command:
```

**10.** Enter the **configuration option**.

Configuration A is for the Raylink PC Card. Configuration B is for an OEM Card.

```
Installation Procedure:
Verify Input
H = Help
A - Abort installation
P = Previous screen
N = Complete the installation and
    reset the system
ESS ID:                ESSID1
Authentication Password:
Geographic Region:     North America
Hopping Sequence:      0
IP Address:            XXX.XXX.XXX.XXX
Subnet Mask:           255.0.0.0
Max num Associated sta: 61
Configuration Option:  A
Enter command:
```

**11.** Enter **N** to accept the system configuration as displayed.

The Access Point reboots with the new configuration and is now ready to be mounted and connected to your network.

*Note:  To view system information, use option 1 from the main menu.*

## Using Advanced Options

The following table describes the Raylink Access Point parameters, along with their default settings.

| Parameter | Default Value | Description |
|---|---|---|
| Extended Service Set (ESS) ID | ESSID1 | Used to determine if the Raylink PC Card, which is part of the Raylink Access Point, can join the wireless LAN. The ESSID can consist of 1 to 31 alphanumeric characters and is case-sensitive. Spaces are not allowed. |
| | | If multiple Access Points are being installed and seamless roaming is desired, the same ESSID must be configured on each Access Point. |
| AuthenticationPassword | Not Present | If set, this password is required each time a Raylink PC Card user wants to join the wireless LAN. The authentication password can be between 2 and 15 characters long and is case-sensitive. |
| Geographic Region | North America | Contains the geographic region of the wireless LAN. The options are North America, Europe, Japan, and Korea. |
| | | If your region is not listed, contact your Raylink supplier. |

| Parameter | Default Value | Description |
|---|---|---|
| Hopping Sequence | | Used when a Raylink PC Card synchronizes with a Raylink Access Point. The Raylink Access Point relays the hopping sequence. Values range from 0 to 77. See the section "Raylink Wireless LAN Security" in Chapter 1, "Getting Started with the Raylink Access Point," for more information on frequency hopping.<br><br>*Note: If multiple Raylink Access Points are running on the wireless LAN, each Access Point should have a different hopping sequence. This decreases the possibility of frame collisions.* |
| IP Address | None | If TCP/IP is being utilized, each Raylink Access Point needs a unique IP Address.<br><br>*Note: If the network you are connected to is strictly limited to IPX/SPX or NetBEUI packets, leave the IP Address at its default. In addition, the Raylink Access Point cannot be SNMP-managed without an IP Address.* |

| Parameter | Default Value | Description |
|---|---|---|
| IP Subnet Mask | 255.0.0.0 | If TCP/IP is being utilized, each Raylink Access Point needs a subnet mask.<br><br>*Note: If the network you are connected to is strictly limited to IPX/SPX or NetBEUI packets, leave the IP Address at its default. In addition, the Raylink Access Point cannot be SNMP-managed without an IP Address.* |
| Maximum Number of Stations | 61 | Used to determine the maximum number of stations (Raylink PC Cards) that are allowed to associate with this Raylink Access Point. Values range from 1 to 61. |
| ConfigurationOption | A | Option A is used for Raylink PC Cards.<br>Option B is used for OEM PC Cards. |

## Using Security

To take advantage of the built-in security features on the Raylink products, be sure to set the authentication password on both the Raylink Access Point and the Raylink PC Card. The password should be the same on all Raylink Access Points and Raylink PC Cards within the particular group on the wireless LAN.

In addition, the ESSID on both the Raylink Access Point and the Raylink PC Card should be the same within the particular group on the wireless LAN.

**CHAPTER 9**   *Managing the Raylink Access Point*

This chapter describes the management tasks associated with the Raylink Access Point. Before proceeding with this chapter, be sure the Raylink Access Point is installed and configured on your wireless LAN.

The advanced configuration options of the Access Point can be modified or monitored using a local console or Telnet.

## Using the Local Console

For information on setting up the local console, refer to the section "Configuring the Console Port" in Chapter 8, "Configuring the Raylink Access Point."

## Using Telnet

If you would like to use Telnet on Windows 95 or Windows NT 4.0, complete the following steps.

*Note:   To use Telnet, you should set the IP Address on the Raylink Access Point.*

1.  Click the **Start** button on the Windows 95 or Windows NT taskbar and select **Run**.
2.  Enter **c:\windows\telnet** in the text box. Press **OK**.

3. From the Telnet window, select **Connect** → **Remote System**.

4. Enter the **IP address** of the Raylink Access Point you would like to manage.

5. Click **Connect**.

6. Press **Return**.

# Using the Main Menu

Once you have connected to the Raylink Access Point using either the local console or Telnet, the following menu is displayed:

```
Main Menu
1. View System Information
2. View Statistics
3. Set Administration Password
4. Installation
5. Administration
Enter Selection: _
```

## Viewing System Information

To view system information, select **1** from the main menu. The current
Raylink Access Point configuration is displayed.

```
View System Information
Model Number:
Serial Number:
Hardware Revision:
Boot Software Version:    0.02
System Software Version: 00.97
ESS ID:                  RAYTHEON1
Hopping Sequence:        6
Geographic Region:       North America
MAC Address:             00:00:AD:C1:00:05
IP Address:              138.127.102.22
Subnet Mask:             255.255.252.0
SNMP:                    Disabled
Encapsulation Mode is:   Disabled
Protocol Filter Mode is: Enabled

Wireless Authentication is set to OPEN
Number of stations associated with this AP: 1
```

## Viewing Statistics

To view statistics, select **2** from the main menu. The current statistical information about the Raylink Access Point is displayed.

```
View Statistics
Ethernet Statistics:
  Status of link is Down
  Receive Packets 112 Errors   0
  Transmit Packets  84 Errors   0
  Collision Errors  1
Wireless Statistics:
  Status of link is Up
  Receive Packets   84 Errors   0
  Transmit Packets 112 Errors   0
Statistics are updated every 3 seconds
Press 'R' followed by return to reset the statistics
```

## Setting the Administration Password

To set the administration password, select **3** from the main menu. The administration password should be set on the Raylink Access Point to prevent unauthorized access.

```
Set the Administration Password
A = Abort
Enter a new administrator password: _
```

## Performing Installation

To perform an installation, select **4** from the main menu. Selection **4** is covered in detail in "Configuring the Raylink Access Point's Parameters" in Chapter 8, "Configuring the Raylink Access Point."

## Performing Administration Tasks

To perform various management tasks on the Raylink Access Point, select **5** from the main menu. Selection **5** requires the administration password. The administration menu is displayed.

# Using the Administration Menu

This section explains the selections on the Administration menu.

```
Administration Menu
1. Install IP Address
2. SNMP [Currently Disabled]
3. TFTP Software Upgrade
4. Xmodem Software Upgrade
5. Reset to Factory Defaults
6. Reset
7. Encapsulate Mode
8. Protocol Filter Mode
9. Return to main menu
Enter Selection:
```

1. To install the IP address, select **1** from the Administration menu. This allows you to enter or change the Raylink Access Point's IP Address.

2. To enable or disable SNMP management, select **2** from the Administration menu.

3. To set the Raylink Access Point into TFTP receive mode for a new software upgrade, select **3** from the Administration menu. See the next section, "Using TFTP to Upgrade the Software," for complete instructions.

4. To set the Raylink Access Point to receive an Xmodem software upgrade, select **4** from the administration menu. See the section, "Using Xmodem to Upgrade the Software," for complete instructions.

5. To restore the Access Point to the original factory settings, select **5** from the Administration menu. This restores the Access Point software to its original factory settings.

*Caution: If you use this command, all of the installation information is cleared and needs to be reconfigured.*

**6.** To reset the Access Point to use your changes, select **6** from the Administration menu.

**7.** To enable encapsulation mode, which accepts Windows 95 frame types, select **7** from the Administration menu. If you are not running Windows 95, set encapsulation mode to disabled (default).

**8.** To enable or disable the Protocol Filter, select 8 from the Administration menu. Enabled allows the Access Point to learn what protocols are on the wireless side and only allows packets with the same corresponding protocols to be transmitted across to the wireless side. Disabled allows all network traffic on the wired side to be transmitted across to the wireless side.

# Using TFTP to Upgrade the Software

*Note: TFTP is not part of Windows 95. Various suppliers of TFTP software use different syntax.*

Before upgrading the Raylink Access Point's software, you must know its IP Address.

To upgrade the software using Trivial File Transfer Protocol (TFTP), complete the following steps:

**1.** Verify that the Access Point is connected to the Ethernet backbone.

**2.** Select **3** from the Administration menu. This puts the Access Point into TFTP receive mode.

**3.** Using a PC or workstation running TCP/IP, ping the Access Point's IP Address (xxx.xxx.xxx.xxx). This ensures that the Access Point is reachable.

```
C:> ping IP address
```

**4.** Then, TFTP to the IP address of the Access Point as follows:

```
C:> tftp xxx.xxx.xxx.xxx
```

**5.** Set the channel to accept Binary by typing **bin** as follows:

```
tftp> bin
```

**6.** Using the Raylink software upgrade file, put it into the Access point as follows (be sure to include the memory location: **/mem/0**):

```
tftp> put xxxx.bin /mem/0
```

When the download is complete, the Access Point resets itself.

*Warning: Do not disconnect any cables or try to stop the process before the download is complete.*

# Using Xmodem to Upgrade the Software

To upgrade the software using Xmodem, complete the following steps:

**1.** Verify that the Access Point is connected to the Ethernet backbone.

**2.** Select **4** from the Administration menu. The Access Point is now in Xmodem receive mode.

```
┌─────────────────────────────────────────────────────────┐
│ ▭                              Terminal - (Untitled)      │
├─────────────────────────────────────────────────────────┤
│  File   Edit   Settings   Phone   Transfers   Help        │
├─────────────────────────────────────────────────────────┤
│                                                           │
│ Download data using Xmodem                                │
│ System will be reset after download is complete           │
│ Ready for XModem Transfer                                 │
└─────────────────────────────────────────────────────────┘
```

**3.** From the **Transfer menu** (in the Terminal emulation window), select **Send Binary File**.

| Send Binary File | | |
|---|---|---|
| **File Name:** | **Directories:** | **OK** |
| *.img | c:\ | **Cancel** |
| autoexec.bat | c:\ | **Network...** |
| autoexec.bnw | acroread | |
| command.com | adhoc | |
| config.bnw | ams | |
| config.sys | ccmobile | |
| dud | decnet | |
| wina20.386 | dos | |
| **List Files of Type:** | **Drives:** | |
| All files(*.*) | c: kwacbus | |
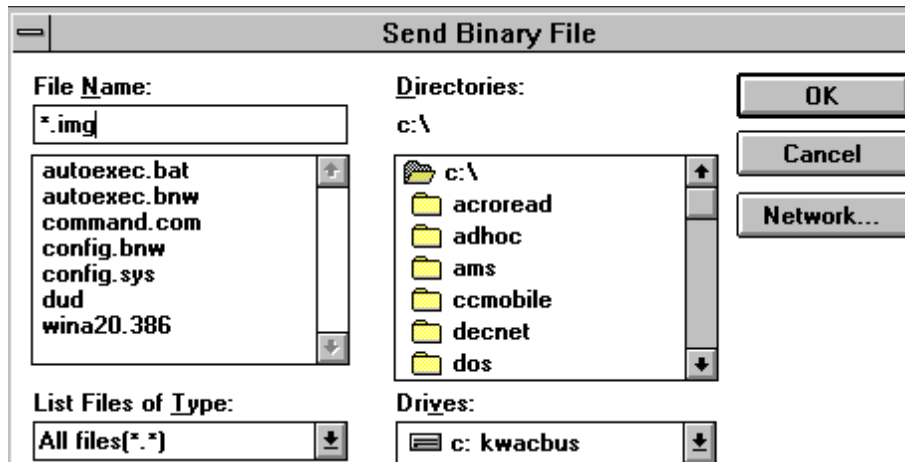
**4.** Select the filename. When the download is complete, the Access Point resets itself.

*Warning: Do not disconnect any cables or try to stop the process before the download is complete.*

# CHAPTER 10 *Product Specifications*

This chapter contains the product specifications for the Raylink Access Point and the Raylink PC Card.

## Raylink Access Point

The following table contains the specifications for the Raylink Access Point (with Raylink PC Card Installed):

| Property | Specifications |
|---|---|
| Physical Dimensions | 9.5 in x 8.25 in x 1.625 in |
| Temperature Range | |
|   Operating | 0 deg C to 55 deg C (32 deg F to 131 deg F) |
|   Storage | -20 deg C to +65 deg C (-4 deg F to 149 deg F) |

| Property | Specifications |
|---|---|
| RF Specifications | |
| Frequency | 2.400–2.4835 GHz (ISM2 unlicensed band) |
| Modulation technique | 2GFSK and 4GFSK (frequency-hopping spread spectrum) |
| Antenna | Rotating dual diversity antenna |
| Output power | 100mW |
| FCC regulations | No site license required; Certified Class B, Part 15 |
| Data communications | |
| Data rate | 1 Mbps and 2 Mbps |
| Media access protocol | IEEE 802.11 (CSMA/CA) |
| Transmission range (open air) | 1,000 ft |
| Transmission range (indoors) | 500 ft with obstructions |
| Node support | 61 active users |
| Network interface | |
| LAN interface | Ethernet 10Base-T (RJ-45) |
| Management | |
| Software download capability | TFTP |
| Local monitor | (RS-232) |
| Telnet | |
| SNMP/MIB II/Proprietary MIB/802.11 MIB | |

# Raylink PC Card

The following table contains the specifications for the Raylink PC Card:

| Property | Specifications |
| --- | --- |
| Physical dimensions | 2.2 in x 5.7 in x 0.8 in (includes extended antenna element) |
| Temperature range | |
| Operating | 0 deg C to 55 deg C (32 deg F to 131 deg F) |
| Storage | -20 deg C to +65 deg C (-4 deg F to 149 deg F) |
| Power consumption | 365 mA @ 5 volts |
| Transmit mode RF specification | |
| Frequency | 2.400 - 2.4835 GHz (ISM2 unlicensed band) |
| Modulation technique | 2GFSK and 4GFSK (frequency hopping spread spectrum) |
| Output power | 100 mW |
| FCC regulations | No site license required; Certified Class B, Part 15 |
| Data communications | |
| Data rate | 1 Mbps and 2 Mbps |
| Media access protocol | IEEE 802.11 (CSMA/CA) |
| Transmission range (open air) | 1,000 ft |
| Transmission range (indoors) | 500 ft with obstructions |

**Chapter 10:** Product Specifications
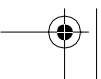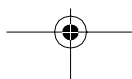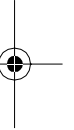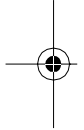
# CHAPTER 11　*Troubleshooting*

This chapter describes troubleshooting information for the Raylink Access Point and the Raylink PC Card.

For more information, consult the Raylink web site at www.raylink.com. Also, feel free to call **technical support** at **800-457-6811**.

## Identifying Problems with the Raylink Access Point

This section provides information on troubleshooting problems with the Raylink Access Point.

### Using the Raylink Access Point LEDs

Figure 11-1 shows the location of the status LEDs on the Raylink Access Point. The table that follows provides information on these LEDs.

**Chapter 11:** Troubleshooting
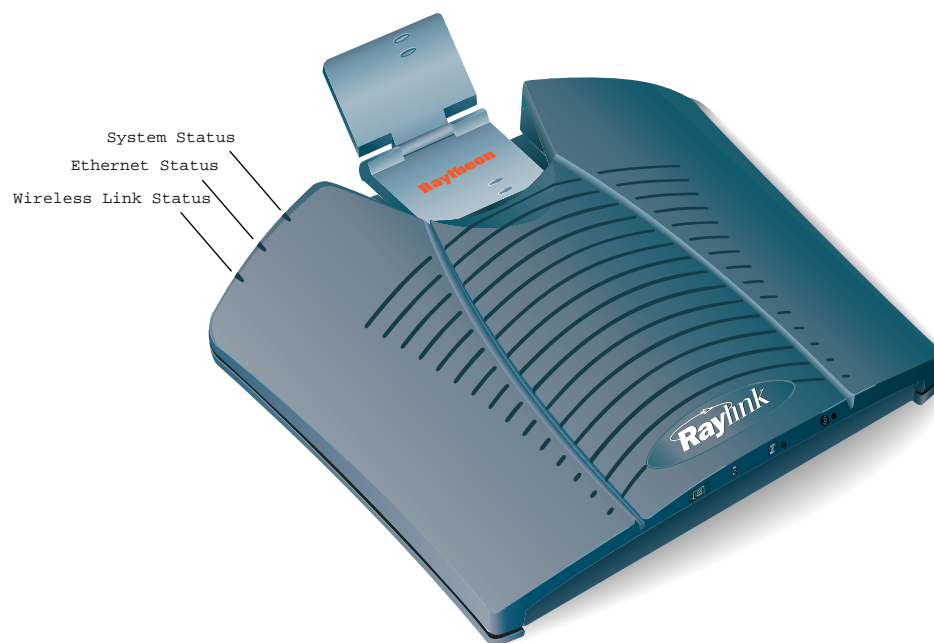


**Figure 11-1.** Raylink Status LEDs

| LED Name | State | Description |
| --- | --- | --- |
| System status | Solid red | Power-on-self-test |
| | Blinking red | Problem with the PCMCIA card |
| | Solid green | Normal operation |
| Ethernet status | Flashing amber | Receiving an Ethernet IEEE 802.3 packet |
| Wireless link status | Flashing amber | Receiving a wireless IEEE 802.11 packet |
| Link status (located near the RJ-45 connector on the rear of the Access Point) | Solid green | Valid Ethernet connection |

## Solving General Problems

If the Raylink Access Point LEDs are working but you cannot communicate with other PCs on the WLAN, check the following configuration parameters:

• Verify that the **ESSID** is the same on all computers and on the Raylink Access Point on the WLAN.

• If the authentication password is set, verify that the **Authentication Password** is the same on all computers and on the Raylink Access Point on the WLAN.

# Identifying Problems with the Raylink PC Card

This section provides troubleshooting information for the Raylink PC Card.

## Using the LED Indicators

This section provides information on the Raylink PC Card LEDs.

| LED | Description |
|---|---|
| Flashing green LED (farthest from PC case) | Indicates the Raylink PC Card is receiving data over the wireless network. |

| LED | Description |
| --- | --- |
| No lights on the LED (closest to PC case) | Indicates one of the following states:<br>• The Raylink PC Card is not associated with another Raylink Access Point or PC Card.<br>• If roaming is enabled, the Raylink PC Card is out of range. |
| Solid green LED (closest to PC case) | Indicates one of the following states:<br>• The Raylink PC Card is associated with a Raylink Access Point in an infrastructure network.<br>• The Raylink PC Card is associated with a Raylink PC Card in an ad hoc network.<br>• The Raylink PC Card is the first Raylink PC Card in a network. |

## Solving Problems with Installation

The following section provides information for troubleshooting problems that might occur when installing the Raylink PC Card.

• If the LEDs are not working, verify that the Raylink PC Card is properly seated in the PCMCIA slot. Consult your computer's documentation for more information on using PCMCIA cards.

• If the LEDs are not working, ensure that the I/O base address and interrupt settings are not conflicting with other cards or systems. Consult your operating system's documentation for more information.

• If possible, install the Raylink PC Card in another computer. If the Raylink PC Card works in this machine, contact the reseller or manufacturer of the original computer.

• You may get an error message similar to the following:

xxxxx.DLL is in use

If you do get such a message, exit the install program and shut down any program(s) that might be running in the background such as Microsoft Office, Microsoft Notify, and so on. Retry the installation.

## Solving General Problems

This section provides general troubleshooting information.

• Use only drivers provided on the Raylink drivers diskette shipped with the Raylink PC Card unless you have received a later version from Raytheon or the Raylink web site (www.raylink.com).

• If problems occur when running Windows, consult the README files provided in Windows.

## Solving Hardware Conflicts

This section provides information on known hardware conflicts.

There is a problem with using the Raylink PC Card in a computer that has a T1 1130 Cardbus Controller and Windows 95B (OSR2). To determine if your system has this controller and is running Windows 95B, complete the following steps:

1. Click the **Start** button on the Windows 95 taskbar and select **Settings** → **Control Panel**.

2. Double-click **System**. If the revision listed is 4.00.950 B, you are running Windows 95B.

3. Select the **Device Manager** tab from the **System Properties** window.

4. Double-click the **PCMCIA Socket**. The Cardbus Controller is displayed.

5. If you are running Windows 95B and the T1 1130 Cardbus Controller is being used, you need to download the patch CARDBU.EXE from the Microsoft web site (www.microsoft.com) and apply it before installing the Raylink PC Card.

## Solving Problems with Windows NT

This section describes problems with the Raylink PC Card and Windows NT.

On a Windows NT computer, after installing and configuring the PC Card and driver and rebooting your machine, you may see a message indicating that the PC Card did not load properly. This is probably due to memory location conflicts.

The memory addresses you specified under Physical Resources in the WLAN PCMCIA Adapter Setup window may actually be in use, even though the Windows NT Diagnostics Resources window did not list them. Unfortunately, the only way to determine unused memory space is to try different addresses and IRQs until there is no conflict. It may be helpful to keep track of this information.

## Solving Problems with Microsoft Networking

This section provides troubleshooting information on Microsoft networking problems.

If the Raylink PC Card LEDs are working but you cannot communicate with others (ad hoc network) or with the wireless LAN (infrastructure network), verify that the following tasks have been performed:

- Make sure one or more clients are installed. For ad hoc networks, you need to install the Client for Microsoft Network**s**. For infrastructure networks, you may install a client that supports TCP/IP, NetBEUI, and/or IPX/SPX communications.

  Refer to the operating system-specific chapter in this manual for more information on installing clients.

- For network resources to be visible to the users of the network, resources must be shared. In an ad hoc network, these resources can be files, folders, and printers. In a server-based network, these resources are usually files and printers.

  Refer to your operating system-specific chapter in this manual for more information on enabling sharing of resources.

- In an ad hoc network, if your computer does not see other computers, check the following configuration parameters:

  - Verify that the **ESSID** is the same on all computers within the ad hoc network.

– If the authentication password is set, verify that it is the same on all computers within the ad hoc network.

– Verify that the **Workgroup name** is the same on all computers within the ad hoc network.

Refer to the operating system-specific chapter in this manual for more information on configuring the LAN adapter.

**Chapter 11:** Troubleshooting
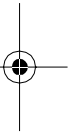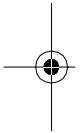
**APPENDIX A** *Network Cabling Specifications*

This appendix contains information on network cabling specifications.

| Cable | Description |
| --- | --- |
| Category 3 LAN and high-speed data cable (10 Mbps) | Meets the requirements of the EIA/TIA-568 and EIA/TIA TSB-36. |
| Category 4 extended distance LAN cable (16 Mbps) | Meets the requirements of the EIA/TIA-568 and EIA/TIA TSB-36. |
| Category 5 voice and data transmission LAN cable (100 Mbps) | Meets the requirements of the EIA/TIA-568 and EIA/TIA TSB-36 |
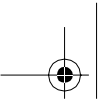
**APPENDIX A:** Network Cabling Specifications
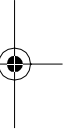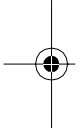
# APPENDIX B       *Warranty Information*

This appendix contains warranty information for the Raylink Access Point and the Raylink PC Card.

Raytheon warrants to the Buyer that the articles at the time of shipment under this order shall be free of defects in material and workmanship. Raytheon's liability for the articles shall be limited to replacing or repairing the defective article(s) or at Raytheon's option refunding the amount paid under this order for such defective articles returned to Raytheon's factory within one (1) year after shipment. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, AND RAYTHEON DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

## Limitation of Liability

NOTWITHSTANDING ANY OTHER PROVISIONS OF THIS ORDER, UNDER NO CIRCUMSTANCES SHALL RAYTHEON BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, INDIRECT, MULTIPLE, OR PUNITIVE DAMAGES, AND RAYTHEON'S TOTAL LIABILITY INCLUDING BUT NOT LIMITED TO LIABILITY FOR INDEMNITY, DEFENSE, AND HOLD HARMLESS OBLIGATIONS SHALL NOT EXCEED THE AMOUNT PAID TO RAYTHEON UNDER THIS ORDER, AND BUYER AGREES TO INDEMNIFY, DEFEND, AND HOLD HARMLESS RAYTHEON FOR ANY AMOUNTS IN EXCESS THEREOF. THE LIMITATIONS ON LIABILITY SET FORTH IN THIS ORDER SHALL APPLY EVEN IN

THE EVENT OF THE BREACH OF CONTRACT, ACTIVE OR
PASSIVE NEGLIGENCE OR OTHERWISE OF THE PARTY WHOSE
LIABILITY IS LIMITED AND SHALL EXTEND TO THE
DIRECTORS, OFFICERS, EMPLOYEES, AGENTS,
SUBCONTRACTORS AND RELATED ENTITIES OF SUCH PARTY.
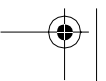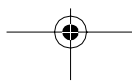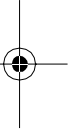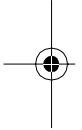
# *Glossary*

This glossary contains important terms that the user should be familiar with when using the Raylink Access Point and the Raylink PC Card.

## Access Point

A device that transports data between multiple wireless networks and/or a wired network (infrastructure).

## Ad Hoc Network

A group of PCs with wireless adapters. These PCs needs to have the same workgroup name, ESSID, and password (if applicable). Any time two or more wireless adapters are within range of each other, they can set up an independent network. These on-demand networks typically require no administration or preconfiguration. An ad hoc network is also known as a peer-to-peer network.

## Administration Password

Password used to allow modification of the Raylink Access Point's parameters.

## Authentication Password

Password used by the mobile user to sign into the Wireless LAN. In addition to the ESSID, the password must be entered to allow communication.

### Direct Sequencing

Direct-sequence spread spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without the need for retransmission. To an unintended receiver, DSSS appears as low-power, wideband noise and is rejected (ignored) by most narrowband receivers.

### Extended Service Set (ESS) ID

ASCII string used to identify a specific wireless LAN.   For components of the wireless LAN to communicate with each other, they must have the same ESSID. Different ESSIDs cannot synchronize with each other.

### Frequency-Hopping Spread Spectrum (FHSS)

Uses a narrowband carrier that changes frequency in a pattern known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be a short-duration impulse noise. Raylink uses frequency-hopping spread spectrum technology.

### IEEE

Stands for the Institute of Electrical and Electronic Engineers, which is the group responsible for establishing wireless networking standards.

### IEEE 802.X

A set of specifications for local area networks (LANs) from IEEE. Most wired networks conform to 802.3, the specification for CSMA/CD-based Ethernet networks, or 802.5, the specification for token ring networks. The IEEE specification for wireless LANs is 802.11. This standard provides for data rates of 1 and 2 Mbps and has a single MAC protocol for the following physical-layer technologies: frequency-hopping spread spectrum, direct-sequence spread spectrum, and infrared.

### Independent Network

A network that provides (usually temporarily) peer-to-peer connectivity without relying on a complete network infrastructure.

### Infrastructure Network

A wireless network centered around an access point. In this environment, the access point not only provides communication with the wired network but also mediates wireless network traffic in the immediate neighborhood.

### Microcell

A bounded physical space in which a number of wireless devices can communicate. Because calls may be overlapping as well as isolated, the boundaries of the cells are established by some rule or convention.

### Multipath

The signal variation caused when radio signals take multiple paths from transmitter to receiver.

### Radio Frequency (RF) Terms: GHz, MHz, Hz

The international unit for measuring frequency is hertz (Hz), which is equivalent to the older unit of cycles per second. One megahertz (MHz) is 1 million hertz. One gigahertz (GHz) is 1 billion hertz. For reference, the standard U.S. electrical power frequency is 60 Hz, the AM broadcast radio space frequency is 0.55–1.6 MHz, the FM broadcast radio frequency band is 88–108 MHz, and microwave ovens typically operate at 2.45 GHz.

### Raylink PC Card

Provides plug-and-play wireless connectivity for any portable computer equipped with a PC card Type II slot. Designed to the proposed IEEE 802.11 standard for wireless LANs.

### Roaming

Movement of a wireless node between two microcells. Roaming usually occurs in infrastructure networks built around multiple access points.

### Spread Spectrum Technology

A wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communications systems. Spread spectrum is designed to trade off bandwidth efficiency for reliability, integrity, and security. There are two types of spread spectrum technologies: frequency hopping and direct sequence. Spread spectrum technology is used by most wireless LAN systems.

### Wireless LAN (WLAN)

A wireless LAN (WLAN) is a flexible data communication system implemented as an extension to, or as an alternative for, a wired LAN within a building or campus.

### Wireless Node

A user computer with a wireless network interface card (adapter).

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