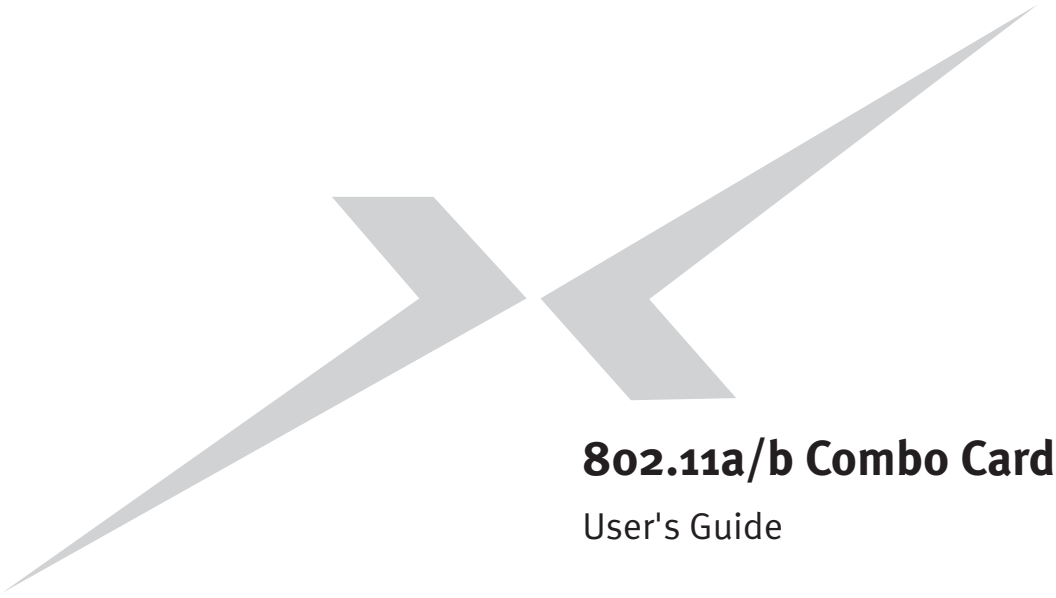
Proxim

ORiNOCO



802.11a/b Combo CardBus Card

User's Guide

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Trademarks

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Limited Warranty, Disclaimer, Limitation Of Liability

For a period of three (3) years from the date of purchase by the retail customer, Proxim warrants the ORiNOCO 802.11a/b Combo CardBus Cards (Model 8460) against defects in materials and workmanship. Proxim will not honor this warranty if there has been any attempt to tamper with or remove the product's external foil label.

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

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

In no event shall Proxim Corporation be responsible or liable for any damages arising:

- From the use of the product
- From the loss of use, revenue or profit of the product
- As a result of any event, circumstance, action, or abuse beyond the control of Proxim Corporation

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

Warranty Return Policy

If you have a problem with an ORiNOCO 802.11a/b Combo CardBus Card (Model 8460), please call Proxim Technical Support at 1-408-731-2640. Proxim Technical Support will assist with resolving any technical difficulties you may have with your Proxim product.

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

FCC WARNING

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

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

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

For Indoor Use Only

These products are for indoor use only.

Uniquement pour usage d'intérieur.

Somente para uso interno.

Solamente para el uso interior.

Per uso al coperto solamente.

Für Innen Verwendung nur.

Nemlig indendørs hjælp bare.

For indoor bruk bare.

För indoor användning enda.

Voor overdekt toepassing uitsluitend.

Indoor käyttöä varten vain.

Για την εσωτερική χρήση μόνο.

Product Approvals

Proxim will only ship products that are type approved in the destination country.

Refer to Proxim's Web site at **http://www.proxim.com/support/80211acertifications/** for a list of countries that have approved Proxim's 802.11a and 802.11a/802.11b combo products. This Web site also details any special requirements that govern the use of 802.11a products in a particular country.

An 802.11a or 802.11a/802.11b combo product purchased for use in one country may not necessarily comply with the RF regulations in another country.

Table of Contents

Chapter 1

Introduction

Congratulations on your purchase of an ORiNOCO 802.11a/b Combo CardBus Card, a high performance wireless LAN adapter card that complies with the IEEE 802.11a and 802.11b wireless standards. This means that the card is interoperable with IEEE 802.11b and 802.11a equipment from any manufacturer. The card cannot use both standards simultaneously but it can automatically switch between the two standards. In addition, the card supports a third mode of operation, 2X™ mode*, which provides data rates of up to 108 Mbps.

The ORiNOCO 802.11a/b Combo CardBus Card supports Windows XP, Windows 2000, Windows Millennium Edition (ME) and Windows 98 Second Edition (SE). Computers with an ORiNOCO 802.11a/b Combo CardBus Card installed “look” like standard network nodes to the operating system.

The ORiNOCO 802.11a/b Combo CardBus Card can be used with other 802.11a or 802.11b devices to form a stand-alone wireless Ad Hoc network* or used in conjunction with an Access Point infrastructure to provide mobile clients with wireless access to an Ethernet network.

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

*Available features vary by region/country.

The Product Package

Each ORiNOCO 802.11a/b Combo CardBus Card Model 8460 comes with the following:

- One 802.11a/b Combo CardBus Card with two integral antennas (antennas are inside the casing and not visible to the user)
- One ORiNOCO Installation CD-ROM containing Proxim software and utilities and this user's guide in Portable Document Format (PDF)
- One *ORiNOCO 8460 802.11a/b Combo CardBus Card Quick Start Guide*

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

System Requirements

To begin using an ORiNOCO 802.11a/b Combo CardBus Card, you must have the following minimum requirements:

- A computer that meets the following specifications:
  - Windows XP, Windows 2000, Windows Millennium Edition (ME) or Windows 98 Second Edition (SE) installed
  - PC Card expansion slot (32-bit CardBus)
  - At least 64 MB of memory
  - A 300 MHz processor or higher
- At least one other IEEE 802.11a-compliant or 802.11b-compliant device
  - Customers in Europe who want to use the card in 802.11a mode need an 802.11a-compliant Access Point (peer-to-peer Ad Hoc mode is not available in Europe)

The IEEE 802.11 Specifications

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

In 1999, the IEEE modified the 802.11 standard to support direct sequence devices that can operate at speeds of up to 11 Mbps. The IEEE ratified this standard as "802.11b." 802.11b devices are backwards compatible with 2.4 GHz 802.11 devices (that operate at 1 or 2 Mbps).

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

Since both 802.11a and 802.11b are based on the same common standard (IEEE 802.11), 802.11a and 802.11b devices have many of the same parameters. This user's guide uses the generic term **802.11** to refer to parameters that apply to both 802.11a and 802.11b devices.

In addition to supporting 802.11a and 802.11b mode, the ORiNOCO 802.11a/b Combo CardBus Card supports a third operating mode: 2X™ mode. 2X mode is an extension of the 802.11a standard that allows data rates of up to 108 Mbps; the ORiNOCO Utility refers to this mode as **802.11a 2X**. Note that 2X mode is not part of the 802.11a standard (so devices in 2X mode are not interoperable with 802.11a devices in Turbo mode from other vendors), and 2X is not available in all countries.

Note: An 802.11a device and an 802.11b device cannot communicate with each other. Also, a device in 802.11a 2X mode and a device operating in 802.11a mode (2X disabled) cannot communicate.

Chapter 2

Installation

This chapter describes how to install an ORiNOCO 802.11a/b Combo CardBus Card and software in a computer running Windows XP, Windows 2000, Windows Millennium Edition (ME) or Windows 98 Second Edition (SE).

Note: Run the ORiNOCO Installation program before installing the 802.11a/b card in the computer.

Pre-installation Considerations

Review the following pre-installation considerations before installing a 802.11a/b Combo CardBus Card.

U.S. Regulatory Warnings

FCC Guidelines

This device has been tested for compliance with FCC RF Exposure (SAR) limits in a typical laptop configuration with a PCMCIA slot on either the right or left side of the laptop.

In order to comply with the SAR limit established in the ANSI C95.1 standard, it is recommended when using a PC card adapter that the integrated antenna is positioned more than 2.5 centimeters from nearby persons during extended periods of operation. If the antenna is positioned less than 2.5 centimeters from nearby persons, it is recommended that the user limit exposure time.

This device and its antenna must not be co-located or operated in conjunction with any other antenna or transmitter.

Radio Frequency Interference Requirements

The ORiNOCO 802.11a/b Combo CardBus Card, Model 8460, operates in multiple frequency ranges including the 5.15 to 5.35 GHz band (when in 802.11a or 2X mode); the device is restricted to indoor use due to their operation in the 5.15 to 5.25 GHz frequency range. FCC 15.407(e) requires that these devices be used indoors in the frequency range of 5.15 to 5.25 GHz to reduce the potential or harmful interference to co-channel Mobile Satellite systems. Therefore the devices should be used indoor only for channel 36, 40, 44, and 48 and when 2X mode is enabled, channel 42 and 50.

High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.725 to 5.850 GHz band. These radar stations can cause interference with and/or damage the ORiNOCO 802.11a/b Combo CardBus Card.

DECLARATION OF CONFORMITY

We, Proxim Corporation,
935 Stewart Drive
Sunnyvale, CA 94085 USA
408-731-2700
declare under our sole responsibility that the ORiNOCO 802.11a/b Combo CardBus Card, Model 8460, complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Windows ME and Windows 98 SE Installation CD Requirement

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

You should not need a Windows CD when installing an 802.11a/b card in a Windows XP or Windows 2000 computer.

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

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

Note to Customers Using a Laptop Without a CD-ROM Drive

If you are installing the 802.11a/b card in a laptop that does not have a CD-ROM drive or if your CD-ROM drive is an external device that shares a single CardBus slot with network adapter cards, you should follow the steps below prior to installing the 802.11a/b card:

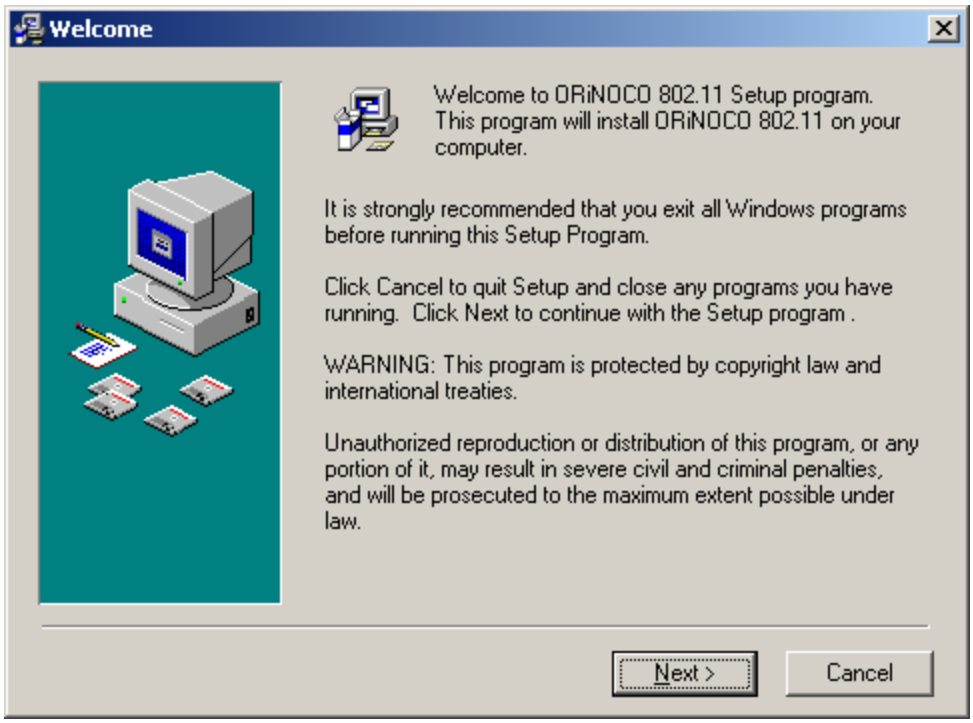
1. Windows 98/ME users: Confirm that the Windows cabinet (CAB) files are installed on the computer. The CAB files are typically located in *C:\WINDOWS\OPTIONS\INSTALL* or *C:\WINDOWS\OPTIONS\CABS*.
2. Windows 98/ME users: If the computer does not have the CAB files installed, copy the *Win98* or *Win9x* folder found on the Windows CD-ROM to a temporary folder on the computer.
3. Copy the contents of the ORiNOCO Installation CD-ROM to a temporary folder on the computer. Alternatively, you may download the software from Proxim's Web site at **http://www.proxim.com/support/.**
4. Follow the installation instructions contained in this chapter. When the instructions call for either the Windows CD or the ORiNOCO Installation CD, search the CAB files or the temporary folders you created in Steps #2 and 3.
5. When the installation is complete, remove the temporary folders you created in Steps #2 and 3 from the computer's hard drive.

Installation Instructions

The instructions below describe how to install an ORiNOCO 802.11a/b Combo CardBus Card by running the ORiNOCO Installation program before inserting the card into the computer. The ORiNOCO Installation program installs the ORiNOCO Utility first, and then it installs the CardBus Card and driver. If you inserted the card before running the ORiNOCO Installation program, see “Card Inserted Before Running the Installation Program” on page 40 for instructions.

Follow these steps to install an ORiNOCO 802.11a/b Combo CardBus Card in a Windows 98 SE, Windows ME, Windows 2000 or Windows XP computer.

1. Turn on the computer and logon to Windows, if applicable.
2. Insert the ORiNOCO Installation CD into the computer’s CD-ROM drive.
3. If the ORiNOCO Installation program does not launch automatically, run *SETUP.EXE* from the ORiNOCO Installation CD to launch the program, shown in the following example.



4. Click **Next** to continue.
5. Select a destination folder for the ORiNOCO Utility files and click **Next** to continue.
6. Enter a name for the utility’s Program Manager group and click **Next.**
7. Click **Next** to install the utility.
8. Click **Finish** to view additional information about the utility.

Note: To avoid viewing the additional information, uncheck the **Read ORiNOCO configuration instructions** box before clicking **Finish**.

9. Click **Finish** to complete the ORiNOCO Utility installation and to continue the installation of the 802.11a/b Combo CardBus Card.

10. Insert the card into the computer's Cardbus slot when prompted, as shown below.

11. Follow the on-screen instructions to install the card. Note the following:
    - If prompted to identify the location of the file *Prox11ab.sys* or *Ntpr11ab.cat*, direct the installation wizard to search the ORiNOCO Installation CD.
    - Windows XP users: If prompted, select **Install the software automatically (Recommended)** and click **Next**.
    - Windows 98/ME users: Insert the Windows installation CD if prompted. If you do not have a Windows installation CD, see "Windows ME and Windows 98 SE Installation CD Requirement" on page 10.
12. Restart the computer if prompted. Otherwise, click **Close** when prompted that the ORiNOCO 802.11a/b Combo CardBus Card has been properly configured.

Note: If the ORiNOCO Device Setup program or Windows Networking reports that the card has not been properly configured, follow the on-screen instructions and refer to "Troubleshooting" beginning on page 40 for suggestions.

13. The ORiNOCO Utility's Status Monitor icon will appear in Windows Taskbar.
14. The ORiNOCO 802.11a/b Combo CardBus Card is now ready for use. The card will automatically search for an 802.11a or 802.11b network to communicate with. Use the ORiNOCO Utility (described in "Configuration & the ORiNOCO Utility" beginning on page 18) to configure the card.

If you have one or more 802.11a or 802.11b Access Points, configure the card's Network Mode to Infrastructure. If your network consists of only 802.11a or 802.11b client adapters, set Network Mode to Ad Hoc.

Note: 802.11a products sold in Europe do not support Ad Hoc mode.

For more information on Ad Hoc and Infrastructure networks, see Chapter 3 beginning on page 13 and "Network Type" on page 20.

Related Topics

- Refer to "Configuration & the ORiNOCO Utility" beginning on page 18 for information on the card's configuration parameters and for information on how to use the ORiNOCO Utility.
- See "Configuring Networking Clients and Protocols" on page 41 for information on how to configure a networking protocol like TCP/IP (so you can configure the card's IP settings).

Chapter 3

Wireless Topologies

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

Ad Hoc

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

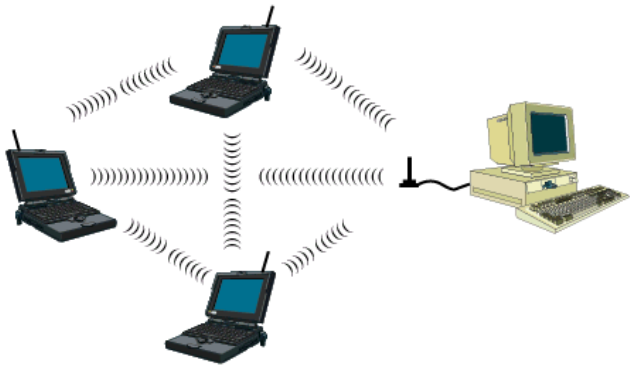


Figure 1 Ad Hoc

The ORiNOCO 802.11a/b Combo CardBus Card can communicate with either an 802.11a or an 802.11b Ad Hoc network (but it can not dynamically switch between the two). Therefore, you must manually configure the card to use one radio mode or the other. Follow these steps to configure the card as a member of an Ad Hoc network:

1. Launch the ORiNOCO Utility and select the **Configuration** tab.
2. Set **Network Type** to **Ad Hoc**.
3. Select a **Mode**: if you want the card to join an 802.11a Ad Hoc network, select **802.11a**; if you want the card to join an 802.11b Ad Hoc network, select **802.11b**. You cannot use the **Auto** option when Network Type is set to Ad Hoc.

Note: 802.11a products sold in Europe do not support Ad Hoc mode.

4. Set the card's **SSID** to match the SSID used by the Ad Hoc network.
5. Select the **Advanced** tab.
6. Select the **Channel** used by the Ad Hoc network.
7. Click **Apply** or **OK** to save these changes.

Note: See Chapter 4 for additional information on the ORiNOCO Utility and these parameters.

Infrastructure

Many companies have an existing Ethernet or wired LAN infrastructure and want to be able to extend that capability to wireless nodes. This is accomplished by installing one or more Access Points on the Ethernet network. You can also add a Harmony Access Point Controller to the network to simplify Access Point management and take advantage of additional features. See the *Harmony Access Point Controller User's Guide* for more information.

Connecting to a Single AP

Figure 2 depicts an ORiNOCO network that uses a single Access Point (AP); in this example, the Access Point is an 802.11a AP.

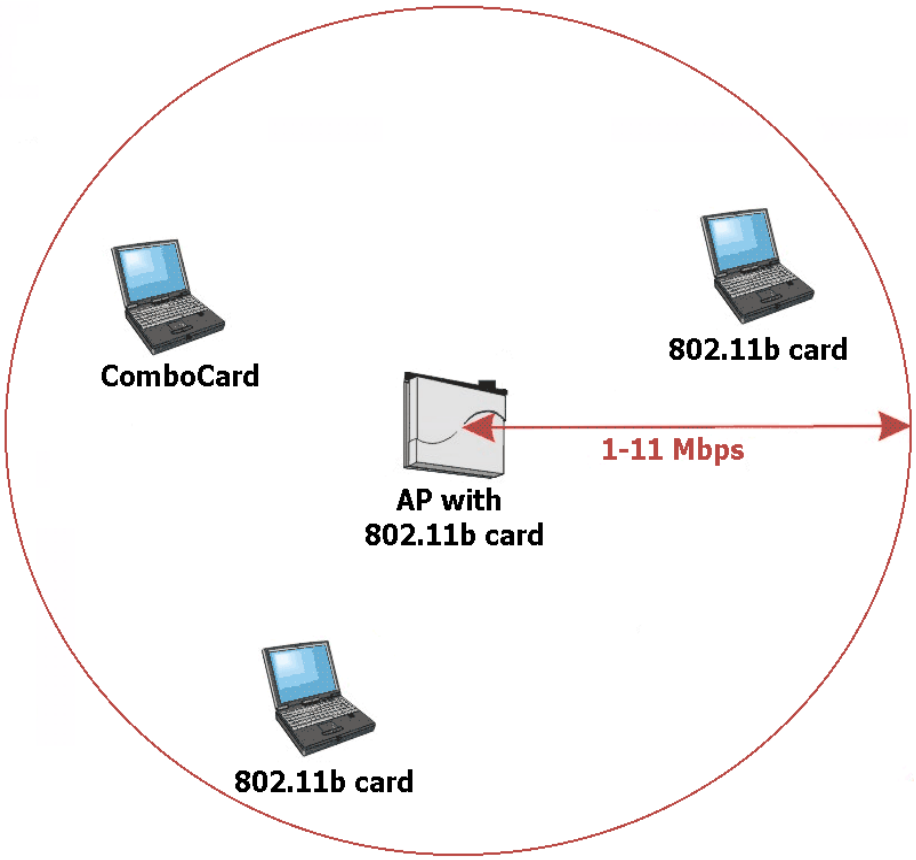


Figure 2 Single 802.11a AP

Roaming Between Multiple APs

For larger environments, the ORiNOCO 802.11a/b Combo Card may roam from one Access Point to another while maintaining the same network connection. The Access Points establish coverage areas or cells similar in concept to those of a cellular phone network. The card will connect to any Access Point that is within range.

The ORiNOCO 802.11a/b Combo Card supports roaming between APs of the same type (for example, from one 802.11a AP to another) or roaming between APs of different types (from one 802.11a AP to an 802.11b AP). Figure 3 illustrates roaming between APs of the same radio type.

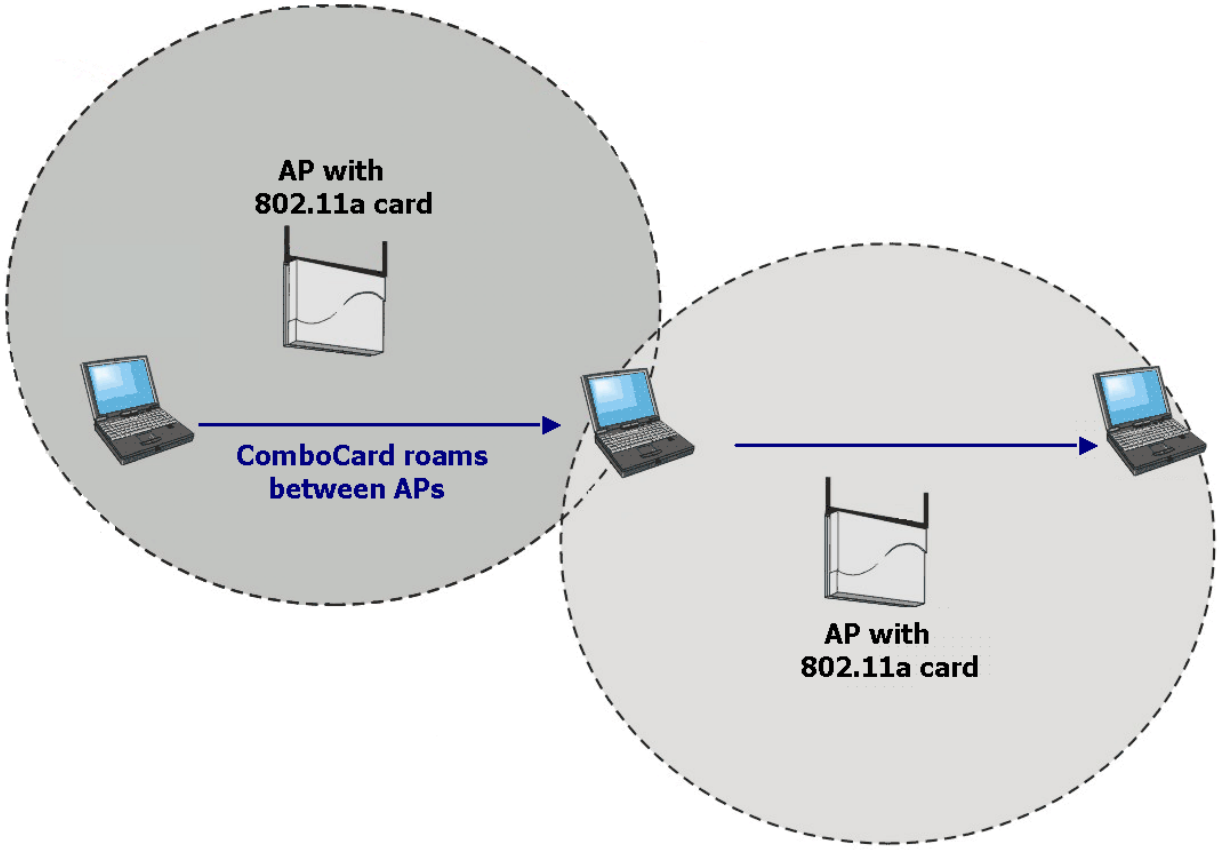


Figure 3 Roaming Between APs of the Same Radio Type

Figure 4 illustrates roaming between APs of different radio types.

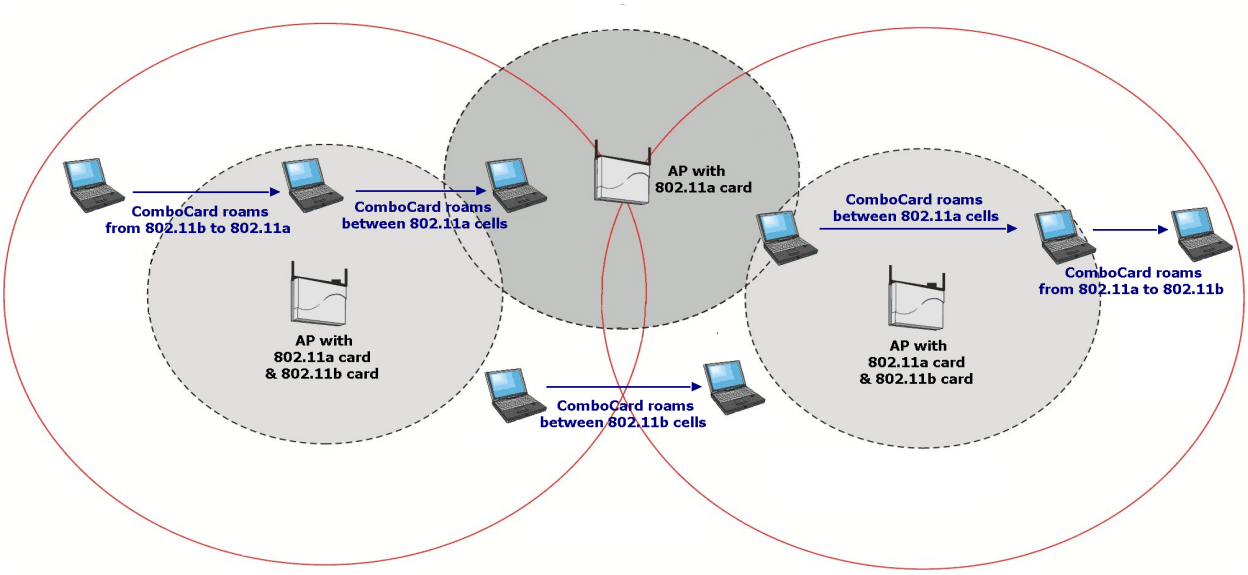


Figure 4: Roaming Between APs of Different Radio Types

In either case, each Access Point within a roaming network must have a unique, independent Channel, but all must have the same SSID and security settings (if applicable).

Mobile clients equipped with an 802.11a/802.11b card are configured to operate in Infrastructure mode and have the same SSID and security settings as the Access Points. Alternatively, the mobile client may use an SSID of “any” to associate with any available Access Point, regardless of the Access Point’s SSID.

As the mobile client seamlessly switches from cell to cell, its network connectivity is preserved. The user can move freely between the Access Points in the network. When the roaming client leaves the transmission range of one Access Point, the card automatically detects the other Access Point(s) in the same vicinity to continue the network connection.

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

See Figures 3 and 4 for an example of roaming Infrastructure networks. In addition, if your network has a Harmony Access Point Controllers, you can install ORiNOCO Access Points on different IP subnets from the AP Controller, allowing mobile users to roam across routers. For more information on the Harmony AP Controller and Access Points, refer to the *Harmony Access Point Controller User’s Guide*.

Guidelines for Roaming

- an ORiNOCO 802.11a/b Combo CardBus Card can roam between multiple 802.11a Access Points, multiple 802.11b Access Points, or between both 802.11a and 802.11b Access Points.
- To support roaming between 802.11a and 802.11b Access Points, the Combo CardBus Card's **Mode** must be set to **Auto**.
- Standard 802.11a clients can only roam between 802.11a Access Points.
- Standard 802.11b clients can only roam between 802.11b Access Points.
- All 802.11a or 802.11b Access Points that a client will roam between must have the same SSID.
- All workstations with Combo CardBus Cards installed must use either an SSID of "any" or the same SSID as the Access Points that they will roam between.
- All Access Points and Combo CardBus Cards must have the same security settings to communicate.
- The Access Points' cells must overlap to ensure that there are no gaps in coverage and to ensure that the roaming client will always have a connection available.
- Access Points in the same vicinity should each use a unique, independent Channel to avoid potential interference.
- Access Points that use the same Channel should be installed as far away from each other as possible to reduce potential interference.

Chapter 4

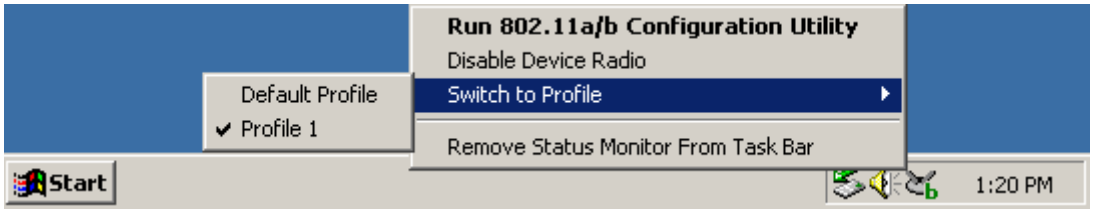
Configuration & the ORiNOCO Utility

Proxim provides a software utility that simplifies the management and configuration of an ORiNOCO 802.11a/b Combo CardBus Card. Chapter 2 describes how to install the utility. This chapter describes how to use the ORiNOCO Utility after it has been installed.

Status Monitor Icon

After you have installed the utility, the Status Monitor icon will appear in Windows Taskbar.

If the card is using the IEEE 802.11a standard, the icon is labeled *a*. If the card is using the IEEE 802.11b standard, the icon is labeled *b*. The example below illustrates the 802.11b icon:



Right-click the icon to view configuration options for the Status Monitor:

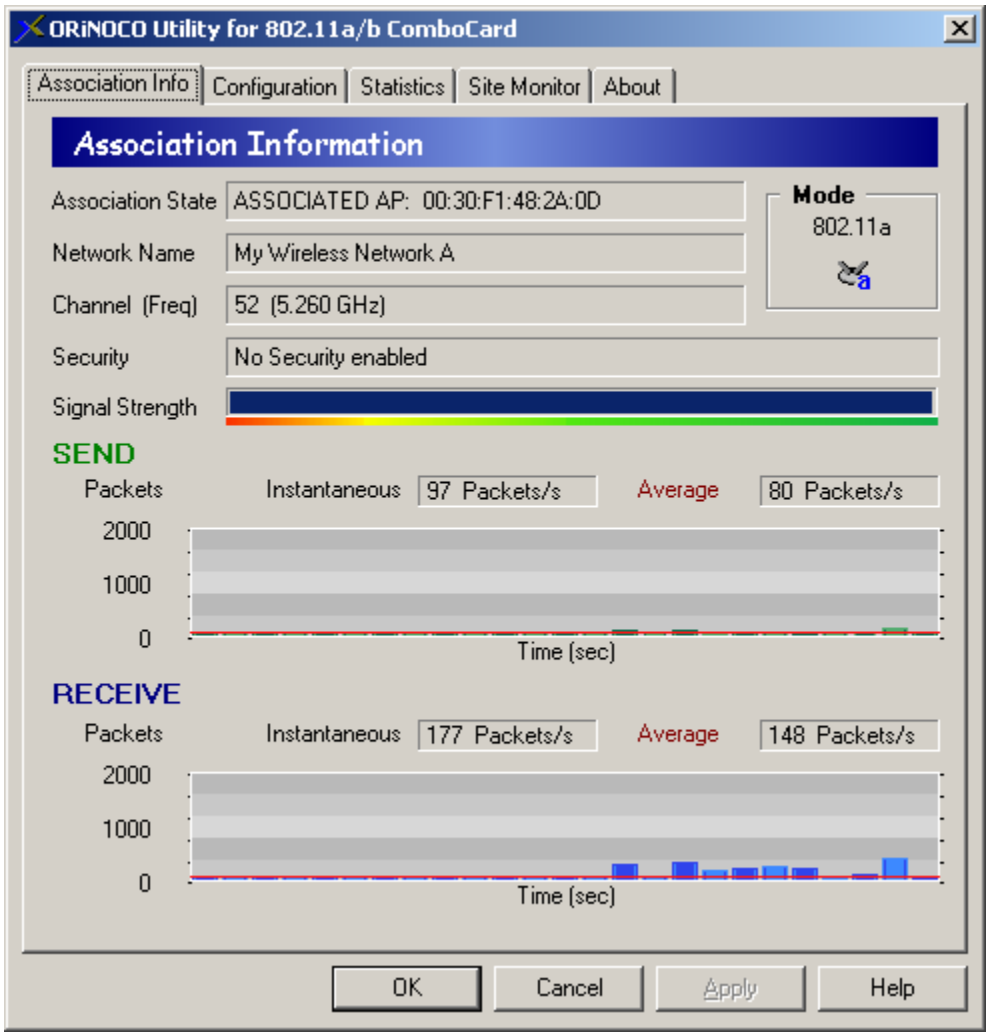
- Select **Run 802.11a/b Configuration Utility** from the drop-down menu to launch the ORiNOCO Utility. Double-clicking the icon also launches the utility.
- Select **Switch to Profile** and choose one of the profiles from the drop-down list to change the card's configuration settings. See "Profiles" on page 33 for more information.
- Select **Disable Device Radio** to turn off the card's radio. You should disable the radio if you intend to use a laptop equipped with the Combo CardBus Card on an airplane. A check mark appears next to this option when the radio is disabled. Select this option again to enable a disabled radio.
- Select **Remove Status Monitor From Task Bar** to close the Status Monitor.

Configuration Utility

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

Association Information

The Association Information screen, shown below, displays information about the card's connection with a wireless network.



The Association Information screen reports the following statistics:

- **Mode:** This field reports whether the card is in 802.11a mode or 802.11b mode.
- **Association State:** This field reports if the card is communicating with an Access Point (AP) or Ad Hoc network. When communicating with an AP, this field reports "ASSOCIATED AP" and displays the AP's physical address. When communicating with an Ad Hoc network, this field displays "JOINED AD HOC MODE." If no AP or Ad Hoc network is found, this field displays "NOT JOINED."
- **Channel (Freq):** This field displays the current Channel and center frequency that the card is using.

- **Security**: Reports the type of security that the card is using. Options include “No Security enabled (or 802.1x Security)”, “WEP Security”, and the “Harmony Security Protocol”. If using the Harmony Security Protocol, this field also reports the protocol’s status: “Not Authenticated,” “User Not Logged In,” “User Associated,” and “User is using Unique Encryption Key” (with time of login).
- **Signal Strength:** The Signal bar displays the signal strength for the last packet received by the card. Signal strength is reported in decibels (dB). The color-coded chart below the Signal bar indicates the relative strength of the signal: a signal in the red or orange section indicates a weak connection; a signal in the yellow or light green section indicates a good connection; a signal in the darker green section indicates an excellent connection.
- **Instantaneous Packets/Sec Sent:** This statistic displays the current rate at which the card is transmitting packets to another 802.11a or 802.11b device. This information is represented as the number of packets sent per second by the card and is plotted on the graph located below the Packets/sec field. Note that this statistic will remain zero unless the card is transmitting data to another device.
- **Average Packets/Sec Sent:** This statistic displays the average of the Instantaneous Packets/Sec Sent data points displayed in the bar graph.
- **Instantaneous Packets/Sec Received:** This statistic displays the current rate at which the card is receiving packets from another 802.11a or 802.11b device. This information is represented as the number of packets received per second and is plotted on the graph located below the Packets/sec field. Note that this statistic will remain zero unless the card is receiving data from another device.
- **Average Packets/Sec Received:** This statistic displays the average of the Instantaneous Packets/Sec Receive data points displayed in the bar graph.

Configuration

Click the **Configuration** tab to view the Station Configuration screen.

This screen contains three configuration tabs: Basic, Security, and Advanced. In addition, you can also create, edit, and switch between user profiles from this screen. After you have made one or more changes to the configuration settings, click **Apply** or **OK** to save the changes. All of these parameters apply to the card regardless of whether it is in 802.11a mode or 802.11b mode, unless otherwise stated.

Basic

The Basic configuration screen is shown on the next page. You can configure the following parameters:

Network Type

Network Type configures an ORiNOCO 802.11a/b Combo CardBus Card to operate in either Ad Hoc mode or Infrastructure mode.

When set to **Ad Hoc**, all 802.11a or 802.11b devices must have the same SSID, Channel, and WEP Keys (if WEP is enabled) to communicate. An Ad Hoc network is a wireless network that consists of only wireless client adapters (i.e., a network that does not have an Access Point). If you set Network Type to Ad Hoc, then you must also select a Mode (802.11a or 802.11b) of operation. The card cannot operate in Auto mode when set to Ad Hoc.

Note: 802.11a products sold in Europe do not support Ad Hoc mode.

When set to **Infrastructure**, an 802.11a or 802.11b client must have the same SSID and security settings as the Access Points on the network to communicate. An Infrastructure network is any network that includes one or more 802.11a or 802.11b Access Points. By default, the Combo CardBus Card operates in Infrastructure.

Mode

Mode configures the ORiNOCO 802.11a/b Combo CardBus Card to operate in **802.11a**, **802.11b**, or **Auto** mode.

In 802.11a mode, the card complies with the IEEE 802.11a standard and provides data rates of up to 54 Mbps. In addition, the card will automatically detect if an Access Point is operating in 2X mode and automatically switches to 2X mode as necessary. (2X mode provides data rates of up to 108 Mbps.)

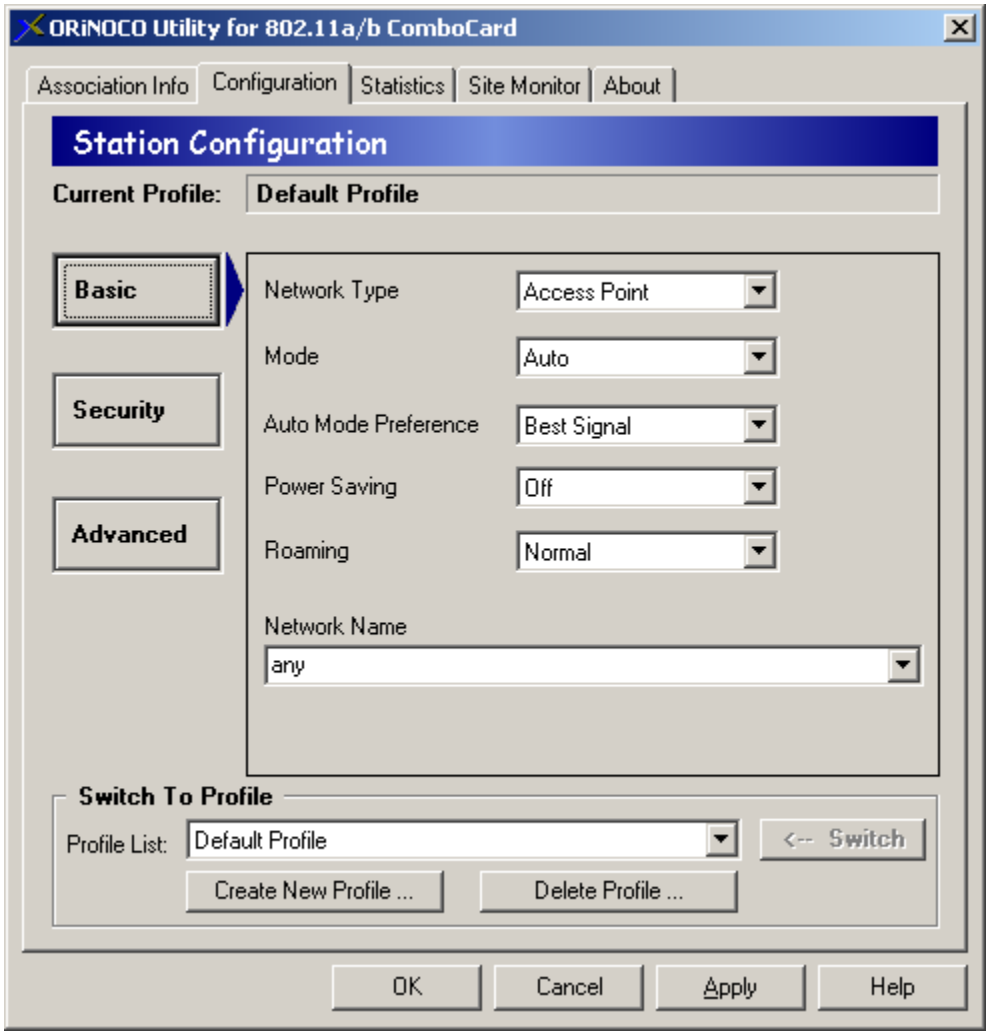
In 802.11b mode, the card complies with the IEEE 802.11b standard and provides data rates of up to 11 Mbps.

In Auto mode, the card can automatically switch between 802.11a and 802.11b modes based on the signals it receives from Access Points in its vicinity. If you set the card to Auto, you should also configure **Auto Mode Preference**.

Note: If you want the card to join an Ad Hoc network, you must manually configure the card to either 802.11a or 802.11b mode.

Auto Mode Preference

If you set **Mode** to **Auto**, you should also configure Auto Mode Preference. This parameter determines which type of network the card will search for first. Also, if the card receives signals from both an 802.11a AP and an 802.11b AP, the card will choose which AP to associate with based on this setting. Select 802.11a from the drop-down list if you want the card to choose 802.11a networks over 802.11b networks. Select 802.11b from the drop-down list if you want the card to choose 802.11b networks over 802.11a networks.



Power Saving

The ORiNOCO 802.11a/b Combo CardBus Card supports optional power management to conserve battery life. When Power Saving Mode is set to **Normal** or **Maximum**, the card enters a "doze" mode where it becomes inactive and only wakes up periodically to receive control messages from the Access Point. The card wakes up more often in Normal mode than in Maximum mode so a card in Normal mode will respond sooner to network requests than a node in Maximum mode. However, Maximum mode draws less power than Normal mode.

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

When set to **Off**, the card does not use the Power Saving mechanism.

Roaming

The Roaming parameter allows you to determine how tolerant the Combo CardBus Card is to radio phenomena that can cause the unit to roam from one Access Point to another in order to maintain a strong wireless connection.

In areas with many Access Points that provide heavy overlapping coverage, set this parameter to **Fast** to maintain high throughput for each wireless adapter.

In most networks, set Roaming to **Normal**. Wireless adapter throughput will not change noticeably, and an overabundance of Access Points is not required.

If the coverage area provided by Access Points is sparse, set Roaming to **Slow**. The card will not roam until it is nearly out of range of the Access Point with which it is associated.

SSID

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

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

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

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

By default, the card's SSID is set to "any".

Security

The ORiNOCO 802.11a/b Combo CardBus Card offers four security options: No Security, Use WEP for Authentication and Encryption, Use the Harmony Security Protocol, and 802.1x.

The Security configuration screen is shown on the next page. You can configure the following parameters:

WEP Encryption and Authentication

The IEEE 802.11 standards specify an optional encryption feature, known as Wired Equivalent Privacy or WEP, that is designed to provide a wireless LAN with a security level equal to what is found on a wired Ethernet network. WEP encrypts the data portion of each packet exchanged on an 802.11 network using a 64-bit, 128-bit, or 152-bit encryption key (also known as a WEP Key).

Note: 152-bit encryption is only available in 802.11a mode.

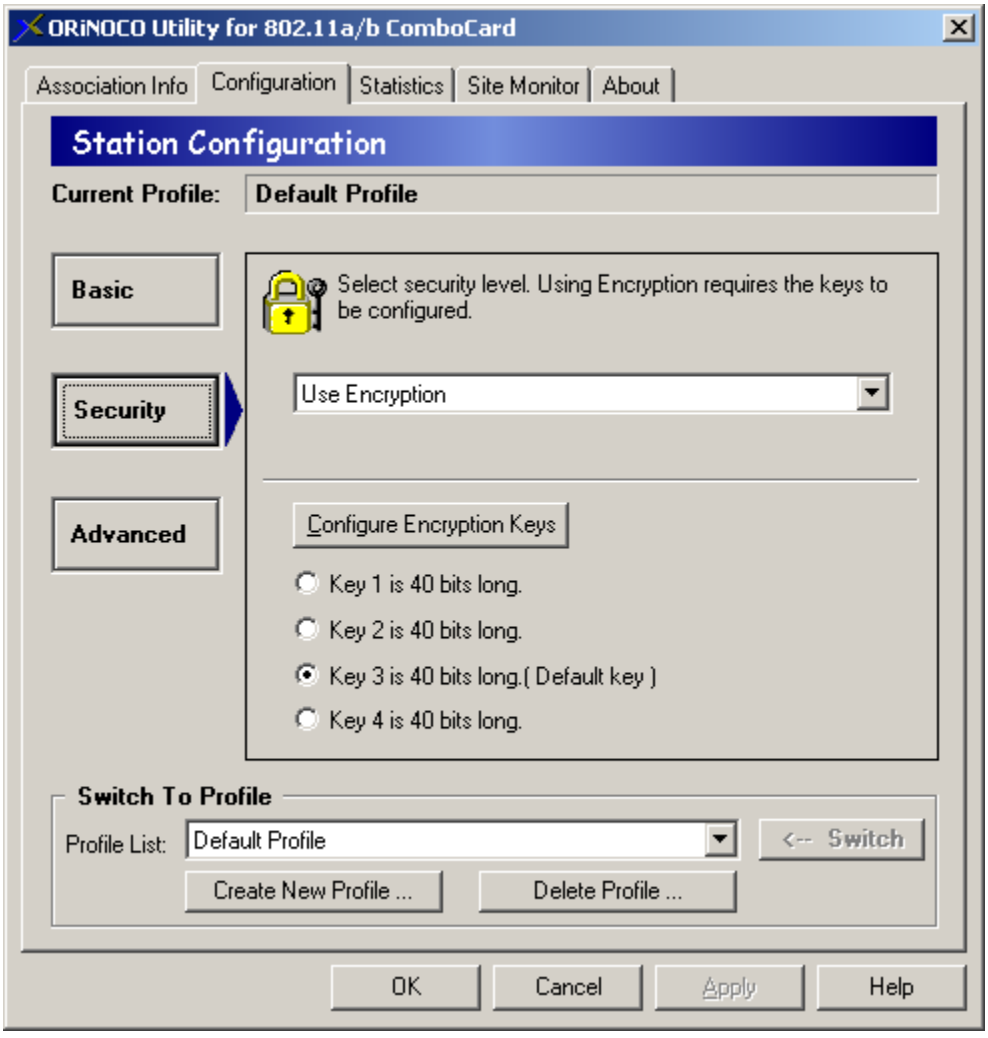
In addition, the card uses WEP with Shared Key Authentication to prevent unauthorized devices from associating with the 802.11 network.

When WEP is enabled, two 802.11 devices must have the same WEP Keys and both devices must be configured to support WEP in order to communicate. If one device is configured to use WEP for Authentication and Encryption but a second device is not, then the two devices will not communicate, even if both devices have the same WEP Keys.

The ORiNOCO 802.11a/b Combo CardBus Card can support up to four WEP Keys (all four Keys must have the same Key Size). The card can decrypt information that was encrypted with any of its four WEP Keys, but it will only use the Default Key to encrypt outgoing information.

For 64-bit encryption, a WEP Key is 10 hexadecimal digits (0-9 and A-F); for 128-bit encryption, a WEP Key is 26 hexadecimal digits (0-9 and A-F); and for 152-bit encryption, a WEP Key is 32 hexadecimal digits (0-9 and A-F).

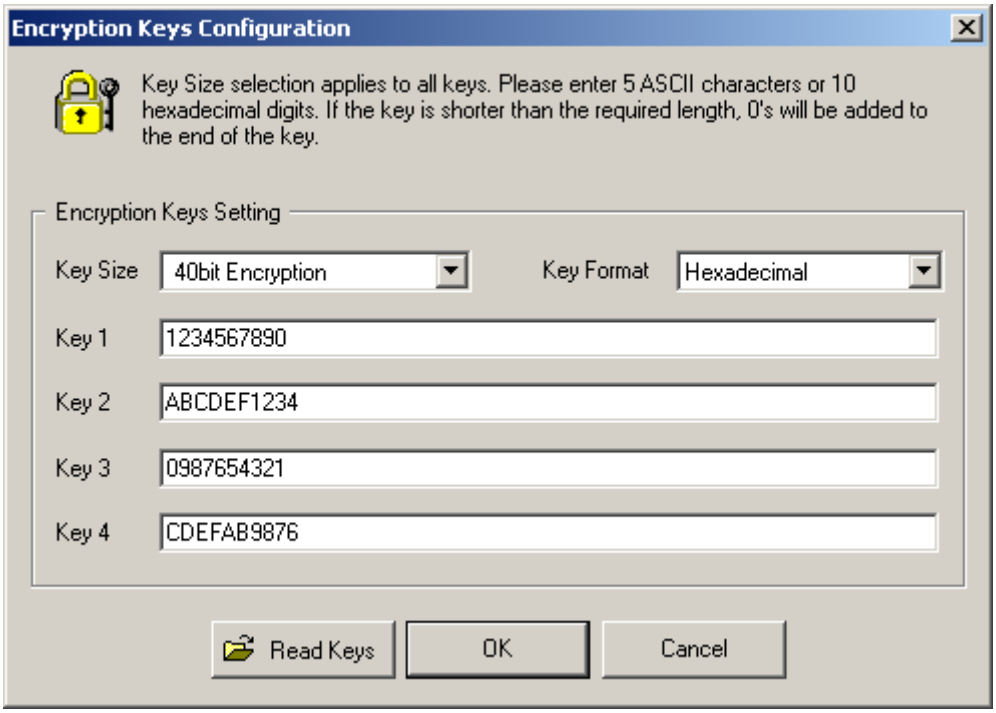
Note: When WEP is enabled, Proxim recommends that you configure all 802.11 devices in the Extended Service Set with the same WEP Keys in the same order (but the devices do not need to use the same default Key).



Follow these steps to enable WEP for Authentication and Encryption:

1. Select **Use WEP for Authentication and Encryption** from the Security Level box.
2. Click **Configure WEP Keys**.
3. Select a **Key Size** from the drop-down menu (64 Bit, 128 Bit, or 152 Bit).

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



5. Use only hexadecimal digits (i.e., 0-9 and A-F). For 64-bit encryption, enter 10 digits for each Key; for 128-bit encryption, enter 26 digits for each Key; for 152-bit encryption, enter 32 digits for each Key.

Note: If you created a text file that contains the WEP Keys, click **Read Keys** to upload those Keys to the card. See "**Read Key File Format**" on page 24 for formatting information.

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

Read Key File Format

If you have multiple clients to configure, you can avoid having to enter each WEP Key manually by creating a text file that contains the Keys. Once you have the text file, you can upload the Keys to a client by clicking the **Read Keys** button found on the WEP Keys Configuration screen.

To create the text file, use a text program such as Microsoft Notepad or WordPad. The text file should have a ".txt" extension. The first line of the text file must read "[WEP_KEY_VALUE]". Then, enter one to four Keys in the following format: "key#=‹key value›", where # indicates the Key number (1-4) and *‹key value›* is the specified Key's hexadecimal digits.

Each Key must be contain hexadecimal digits only (0-9 and A-F), and you must use the same number of digits for each Key. The number of digits depends upon the Key Size you select in the WEP Keys Configuration screen:

- For 64 Bit, use 10 digits per Key.
- For 128 Bit, use 26 digits per Key.
- For 152 Bit, use 32 digits per Key.

The following example illustrates the WEP Key file format for 64-bit encryption:

```
[WEP_KEY_VALUE]
key1=1234567890
key2=0987654321
key3=ABCDEF1234
key4=ABCDEFABCD
```

Harmony Security Protocol

The Harmony Security Protocol automates encryption management, assigning a unique and dynamic WEP Key to each user. The Harmony Security Protocol includes the following features:

- Uses 152-Bit WEP Encryption
- Generates a unique WEP Key for each user that is valid only for the current network session
- Periodically renews the user's Harmony session and assigns a new WEP Key without requiring any end user interaction
- Incorporates the end user's logon prompt into Microsoft Windows' standard logon procedure on the client device

Each Harmony device plays a role in the Harmony Security Protocol: the AP Controllers maintain a database of user name and passwords to authenticate users; the Access Points block all network traffic to or from a client until after the user has been successfully authenticated by the Harmony System; and the Harmony client adapters include a software utility that incorporates the Harmony logon prompt into the standard Windows logon procedure.

When the Harmony Security Protocol is enabled on a client adapter, the user is prompted to enter his or her Harmony User Name and Password during boot up, either immediately before or after the Windows logon prompt (depending on the device configuration).

Once the user has been authenticated by the Harmony System, the wireless client receives a unique 152-bit WEP Key from the Harmony System, and it can begin to exchange data with the Ethernet network. Refer to the *Harmony Access Point Controller User's Guide* for more information on the Harmony Security Protocol.

Harmony Security Protocol Guidelines

- If you want to use the Harmony Security Protocol on your network, you must enable the protocol on all of your network's Harmony Access Points and clients.
- At this time, the Harmony Security Protocol's client application supports Windows 98 SE, ME, 2000 Professional, and XP. The protocol does not support Windows 2000 Server or NT 4.0.
- The Harmony Security Protocol is only available for clients that are operating in Infrastructure mode.
- A network administrator who manages the network's Harmony Access Point Controller(s) must assign each user a Harmony User Name and Password and enter this information into the Harmony System's User Database. Refer to the *Harmony Access Point Controller User's Guide* for details.
- If you enable the Harmony Security Protocol, you do not need to configure WEP Keys on a wireless client (the Harmony System will generate keys for you).

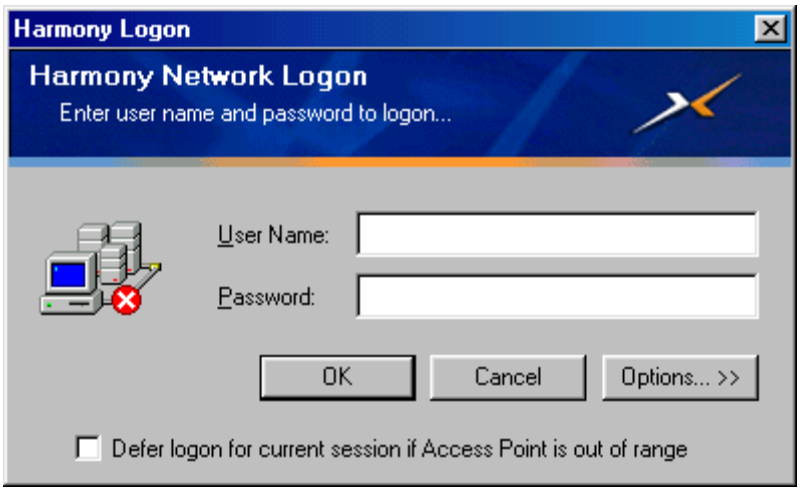
Follow these steps to enable the Harmony Security Protocol:

1. Select **Use Harmony Security Protocol** within the Security Level box.
2. Place a check mark in the **Log on to Harmony Security before Windows Logon** box if you want to connect to the wireless network before logging on to the Windows operating system.

Note: You should enable the **Log on to Harmony Security before Windows Logon** option if your computer connects to a Windows Domain Controller, connects to a Novell network, automatically reconnects to shared network drives during Windows logon, or runs networking software (e.g., PC Anywhere) before connecting to the network.

3. Click **Apply** or **OK** to save the new security settings.

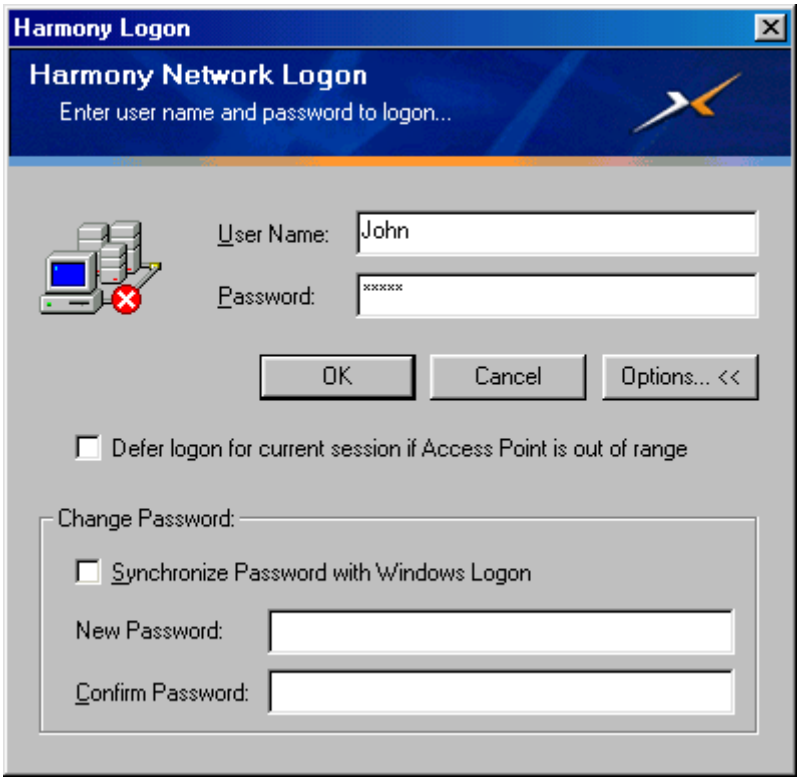
4. Log off Windows or restart the computer.
5. Log on to Windows when prompted (if the **Log on to Harmony Security before Windows Logon** option is disabled).
6. The Harmony logon prompt will appear. Enter your Harmony User Name and Password in the fields provided.
   The Windows 98/ME logon prompt is shown below.



Note: The Harmony logon prompt will not appear if your Windows User Name and Password match your Harmony User Name and Password, you are within range of a properly configured Access Point, and the **Log on to Harmony Security before Windows Logon** option is disabled.

7. If you are not in range of a Harmony Access Point, place a check mark in the box labeled **Defer logon for current session if Access Point is out of range**. The Harmony software will store your User Name and Password and automatically initiate the logon procedure without any user intervention once the card has associated with an Access Point.

8. If desired, click **Change Password** (Windows XP/2000 Professional) or **Options...** (Windows 98/ME) to modify your Harmony user account. The Windows 98/ME logon prompt is shown below.



- Enter a new password twice in the fields provided to change your Harmony Password. The Password can be up to 32 characters and is case sensitive.
- To reset your Harmony Password to match your Windows Password, check the box labeled **Synchronize Password with Windows Logon**.

9. Click **Logon** to log on to the Harmony System.
10. Log on to Windows when prompted (if the **Log on to Harmony Security before Windows Logon** option is enabled).

See “Common Technical Support Questions” on page 44 for troubleshooting suggestions if you have difficulty logging onto the network.

802.1x

802.1x is an IEEE security standard for authenticating users on local area networks based on the Extensible Authentication Protocol (EAP). For more information on this standard, refer to the IEEE Web site at **http://www.ieee.org/**.

On a wireless LAN with 802.1x enabled, an Access Point will block all traffic from a wireless client until after the user has been authenticated by the network’s RADIUS (Remote Authentication Dial-In User Service) server. Proxim supports the following RADIUS servers for use with Harmony products:

- Microsoft Windows 2000 Internet Authentication Service (IAS) Server
- Funk Odyssey Server

Note: You may also need to install additional components based upon the server’s requirements and EAP authentication type. For example, EAP-TLS requires a Certificate Authority (CA) and that digital certificates be installed on the RADIUS server and each wireless device.

EAP is a flexible protocol which does not specify an authentication type. The available authentication types will vary based upon your RADIUS server and your client software; many offer advanced features such as mutual authentication between client and server and data encryption. For data encryption, a RADIUS server generates a unique WEP Key for each user following authentication. This WEP Key is used to encrypt unicast packets between the Access Point and wireless client. To encrypt broadcast packets, the Access Point and its clients use the AP's configured Global WEP Keys.

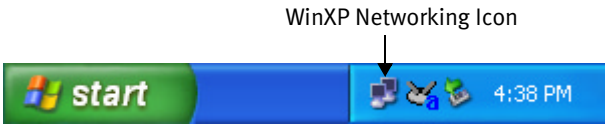
The ORiNOCO Utility does not include configuration settings for 802.1x. To enable 802.1x support and configure 802.1x settings (like EAP authentication type), you need to use a client utility provided by a RADIUS server manufacturer, like Microsoft or Funk Software. Refer to Microsoft's (**http://www.microsoft.com/**) and Funk Software's (**http://www.funk.com/**) Web sites or the documentation that came with your 802.1x solution for details.

Note: Confirm that the ORiNOCO Utility's **Security Level** is set to **No Security** before enabling 802.1x support using a third-party client utility.

As of the release of this user's guide, Microsoft provides 802.1x support for Windows XP users only as part of the operating system. To enable 802.1x on a Windows XP computer, you need to disable the ORiNOCO Configuration options.

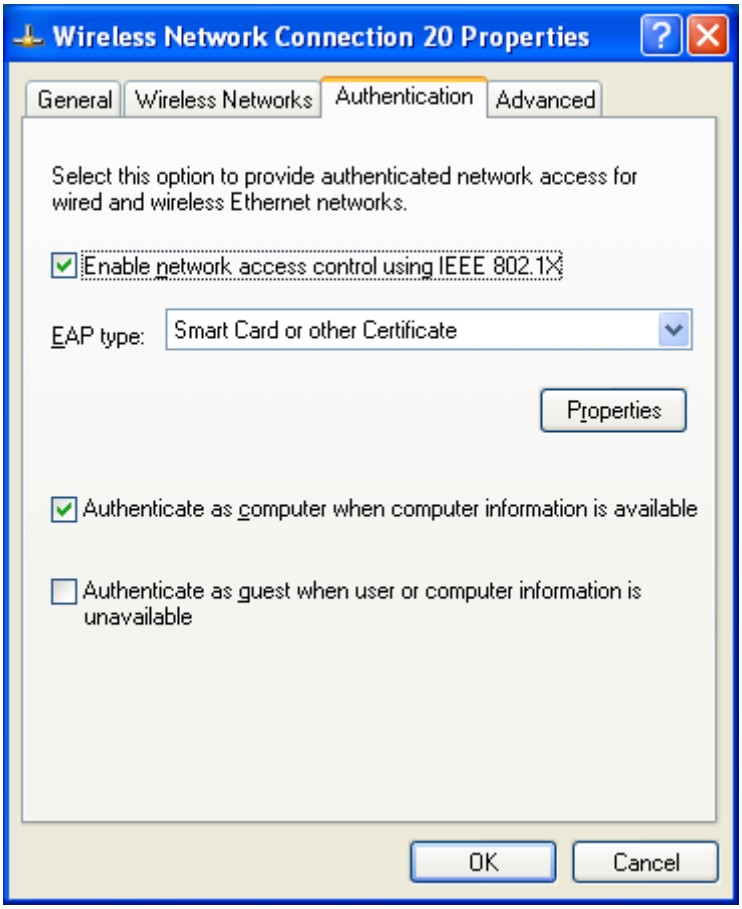
Follow these steps to enable 802.1x on a Windows XP computer:

1. Open the ORiNOCO Utility.
2. Click the **Configuration** tab.
3. Remove the check mark from the box labeled **Enabled ORiNOCO Configuration (Disable Windows XP Settings)**. This will disable the ORiNOCO Configuration options.
4. Click **OK** to save this change and close the ORiNOCO Utility.
5. Click the networking icon in the Windows Taskbar to open Windows XP's built-in wireless network utility.



6. Click **Properties** (if associated with an AP) or **Advanced** (if not associated).

7. Click the **Authentication** tab.



8. Configure the 802.1x settings. Contact your network administrator or refer to Windows XP's on-line Help if you need assistance configuring these settings.

Note: Depending on the network's EAP authentication type, your network administrator may need to provide you with a smart card or install a digital certificate on your computer.

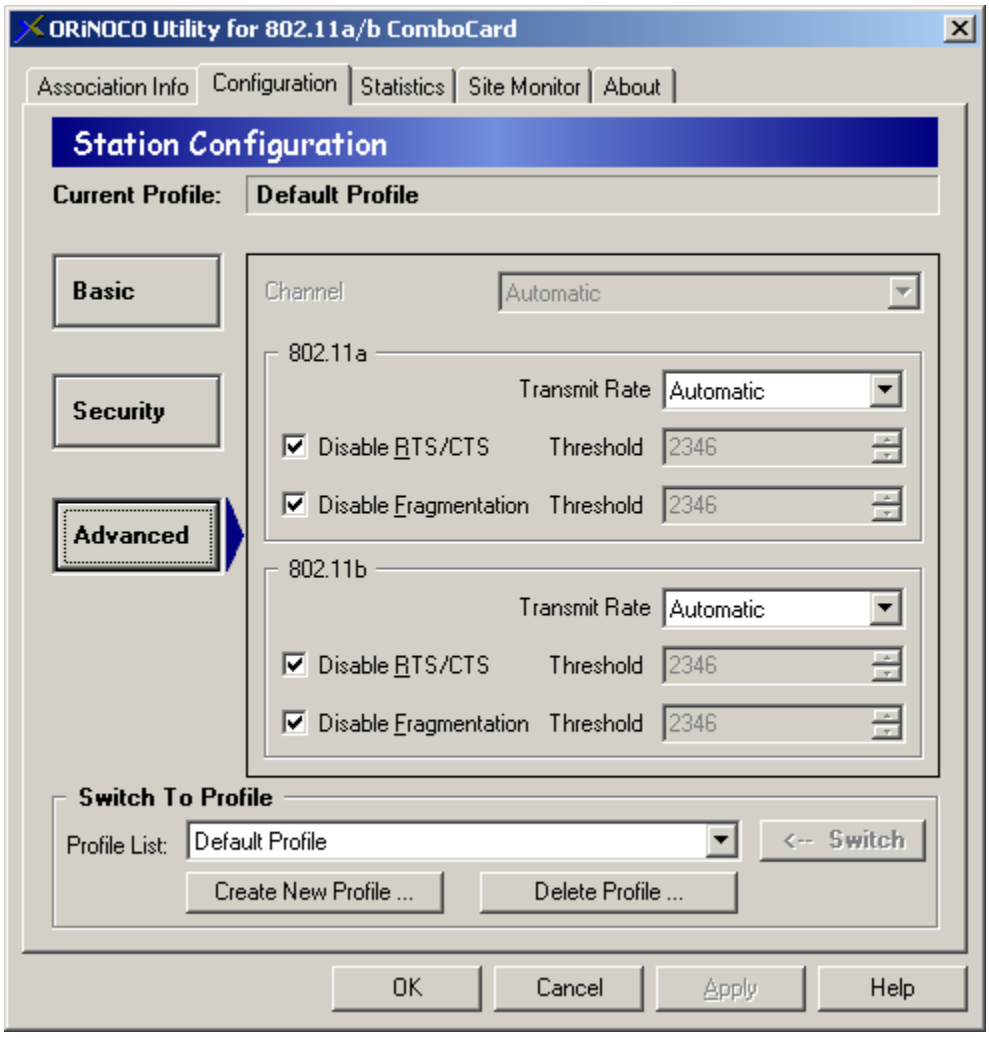
9. Click the **Wireless Networks** tab.
10. Access the Wireless Network Properties for your network.
    - If your network is listed in **Available networks**, highlight it and click **Configure**.
    - If your network is listed in **Preferred networks**, highlight it and click **Properties**.
    - If your network is not listed, click **Add** and enter the network's SSID.
11. Configure the network's WEP settings.

Note: If your EAP type supports dynamic WEP keys, place a check mark next to the **Data encryption (WEP enabled)** and **The key is provided for me automatically** options.

12. Click **OK** twice to exit the network's properties window.

Advanced

The Advanced configuration screen is shown below.



You can configure the following parameters:

Channel

In a wireless network, the **Channel** specifies the range of frequencies that the network members use to communicate. 802.11a and 802.11b devices both communicate by spreading a radio signal over a range of frequencies, but they operate at different frequencies and employ different communication techniques. 802.11a devices operate in the 5 GHz band; 802.11b devices operate in the 2.4 GHz band.

When the card's Network Type is set to Infrastructure, it automatically receives a Channel assignment from its Access Point (the AP can be using either 802.11a or 802.11b). Therefore, Channel is not a configurable parameter when the card is in Infrastructure mode.

When the card's Network Type is set to Ad Hoc, you must manually set the Channel the card will use. This should be the same Channel as the other Ad Hoc devices are using. To set the Channel, click the **Advanced** configuration tab and select a Channel number from the **Channel** drop-down menu. The list of available Channels will vary depending on the card's operating mode (802.11a or 802.11b).

Note: Auto mode is not available when the card's Network Type is Ad Hoc. You must force the card to operate in either 802.11a or 802.11b mode.

The available Channels associated with each mode are listed below.

802.11a

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

The number of available Channels varies by region.

For United States and Canada: The ORiNOCO 802.11a/b Combo CardBus Card can use one of thirteen Channels in 802.11a-compliant mode: Channel 36 (5.18 GHz), Channel 40 (5.20 GHz), Channel 44 (5.22 GHz), Channel 48 (5.24 GHz), Channel 52 (5.26 GHz), Channel 56 (5.28 GHz), Channel 60 (5.30 GHz), Channel 64 (5.32 GHz), Channel 149 (5.745 GHz), Channel 153 (5.765 GHz), Channel 157 (5.785 GHz), Channel 161 (5.805 GHz), and Channel 165 (5.825 GHz). When the card is operating in the optional 2X mode, it can use one of five Channels: Channel 42 (5.21 GHz), Channel 50 (5.25 GHz), Channel 58 (5.29 GHz), Channel 152 (5.760 GHz), and Channel 160 (5.800 GHz). If you wish to install multiple Ad Hoc networks in the same vicinity, configure each network with a unique Channel to avoid interference between networks. Keep in mind that each Channel in 2X mode overlaps multiple Channels in 802.11a mode. For example, if an Infrastructure network in 2X mode is using Channel 50, do not configure nearby Ad Hoc networks in 802.11a mode for Channel 42, 48, 52, or 56.

Note: See “Radio Frequency Interference Requirements” on page 9 for important regulatory information concerning Channel selection.

For Europe: The ORiNOCO 802.11a/b Combo CardBus Card can use one of nineteen Channels: Channel 36 (5.18 GHz), Channel 40 (5.20 GHz), Channel 44 (5.22 GHz), Channel 48 (5.24 GHz), Channel 52 (5.26 GHz), Channel 56 (5.28 GHz), Channel 60 (5.30 GHz), Channel 64 (5.32 GHz), Channel 100 (5.500 GHz), Channel 104 (5.520 GHz), Channel 108 (5.540 GHz), Channel 112 (5.560 GHz), Channel 116 (5.580 GHz), Channel 120 (5.600 GHz), Channel 124 (5.620 GHz), Channel 128 (5.640 GHz), Channel 132 (5.660 GHz), Channel 136 (5.680 GHz), and Channel 140 (5.700 GHz).

For Japan: The ORiNOCO 802.11a/b Combo CardBus Card can use one of four Channels: Channel 34 (5.17 GHz), Channel 38 (5.19 GHz), Channel 42 (5.21 GHz), and Channel 46 (5.23 GHz). If you wish to install multiple Ad Hoc networks in the same vicinity, Proxim recommends that you configure each network with a unique Channel to avoid interference between networks.

For Singapore: The ORiNOCO 802.11a/b Combo CardBus Card can use one of four Channels: Channel 36 (5.18 GHz), Channel 40 (5.20 GHz), Channel 44 (5.22 GHz), or Channel 48 (5.24 GHz).

802.11b

The IEEE 802.11b specification allocates the 2.4 GHz frequency band into 14 overlapping operating Channels. Each Channel corresponds to a different set of frequencies; the center frequency for each of the 14 Channels is shown in the table below. Two 802.11b Channels must be separated by 25 MHz to be independent of each other (that is, to not overlap).

Channel	Center Frequency	Channel	Center Frequency
1	2.412 GHz	8	2.447 GHz
2	2.417 GHz	9	2.452 GHz
3	2.422 GHz	10	2.457 GHz
4	2.427 GHz	11	2.462 GHz
5	2.432 GHz	12	2.467 GHz
6	2.437 GHz	13	2.472 GHz
7	2.442 GHz	14	2.484 GHz

The number of available Channels varies by region.

For United States and Canada: The ORiNOCO 802.11a/b Combo CardBus Card can use Channels 1 through 11. However, only Channels 1, 6, and 11 are independent and do not overlap with each other. If you wish to install multiple Ad Hoc networks in the same vicinity, Proxim recommends that you install no more than three Ad Hoc networks in the same location and that you configure each network with a unique independent Channel (1, 6, or 11) to avoid interference between networks.

For Europe (except France and Spain): The ORiNOCO 802.11a/b Combo CardBus Card can use Channels 1 through 13. However, only Channels 1, 6, and 11 are independent and do not overlap with each other.

For France: The ORiNOCO 802.11a/b Combo CardBus Card can use Channels 10 through 13. All of these Channels overlap so you must test for interference before installing multiple networks in the same vicinity. For multi-cell environments, try to use the Channels that are farthest apart for best results (for example, use Channel 10 for one network and Channel 13 for another).

For Spain: The ORiNOCO 802.11a/b Combo CardBus Card can use Channels 10 and 11.

For Japan: The ORiNOCO 802.11a/b Combo CardBus Card can use Channels 1 through 14. However, only Channels 1, 6, and 11 are independent and do not overlap with each other.

Send Rate

The Send Rate specifies the data rate at which the ORiNOCO 802.11a/b Combo CardBus Card transmits packets. There are two Send Rate fields: one under the 802.11a heading and one under the 802.11b heading. The 802.11a value applies when the card is in 802.11a mode; the 802.11b value applies when the card is in 802.11b mode.

Note: Forcing the card to operate at a high data rate only will reduce the range of the product.

802.11a

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

As the Combo CardBus Card in 802.11a mode travels away from an 802.11a Access Point (when in Infrastructure mode) or from other 802.11a nodes (when in Ad Hoc mode), the data rate automatically decreases in order to maintain a usable radio connection. For example, in an Infrastructure network that is using 2X mode, a client that is close to an Access Point may operate at 108 Mbps, but a client that is far away from the Access Point may operate at 12 Mbps.

By default, the card automatically adjusts the transmit rate depending on the mode of operation (802.11a-compliant or 2X). However, you can also manually configure a specific send rate that the card will use. For example, if you configure the Send Rate to 36 Mbps, the card will transmit only at 36 Mbps.

802.11b

The IEEE 802.11b specification supports four data rates: 11 Mbps, 5.5 Mbps, 2 Mbps, and 1 Mbps. As the Combo CardBus Card in 802.11b mode travels further and further away from an 802.11b Access Point (in Infrastructure mode) or from other 802.11b nodes (in Ad Hoc mode), the data rate automatically decreases in order to maintain a usable radio connection. For example, in an Infrastructure network a client that is close to an Access Point may operate at 11 Mbps, but a client that is far away from the Access Point may operate at 2 Mbps.

By default, the card automatically adjusts the data rate. However, you can manually configure the card to operate in 11 Mbps mode only, 5.5 Mbps mode only, 2 Mbps mode only, and 1 Mbps mode only. In addition, to be compatible with existing 2 Mbps 802.11 solutions, you can configure the PC Card to automatically switch between 2 Mbps and 1 Mbps as necessary. For example, if your application requires that the card maintain an 11 Mbps data rate, you can configure it to send packets at 11 Mbps only.

RTS/CTS

The 802.11 standard supports optional RTS/CTS communication based on packet size. Without RTS/CTS, a sending radio listens to see if another radio is already using the medium before transmitting a data packet. If the medium is free, the sending radio transmits its packets. However, there is no guarantee that another radio is not transmitting a packet at the same time, causing a collision.

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

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

There are two RTS/CTS fields: one under the 802.11a heading and one under the 802.11b heading. The 802.11a value applies when the card is in 802.11a mode; the 802.11b value applies when the card is in 802.11b mode.

For both 802.11a and 802.11b modes, you may configure the ORiNOCO 802.11a/b Combo CardBus Card to never use RTS/CTS (i.e., disable RTS/CTS) or to use RTS/CTS for packets over a certain size. For example, if the RTS/CTS Threshold is set to 1000 Bytes, then a sending radio will use RTS/CTS before transmitting any packet 1000 Bytes or larger.

The RTS/CTS Threshold supports a range between 256 and 2345 Bytes for both 802.11a mode and 802.11b mode. If set to 256, then a sending radio will use RTS/CTS before transmitting all packets 256 Bytes or larger. If set to 2345, then a sending radio will fragment only those radio packets that are 2345 Bytes or larger.

Fragmentation

The ORiNOCO 802.11a/b CardBus Card supports an optional feature called Fragmentation. In harsh radio environments, wireless devices may have difficulty transmitting large packets that exceed a certain size. However, when Fragmentation is enabled, a wireless device can break up large packets into a number of smaller packets (called “fragments”) that can be successfully transmitted to another wireless device. The receiving device then reassembles the original packet once it has received all of the fragments.

There are Fragmentation fields: one under the 802.11a heading and one under the 802.11b heading. The 802.11a value applies when the card is in 802.11a mode; the 802.11b value applies when the card is in 802.11b mode.

For both 802.11a and 802.11b modes, you may configure the ORiNOCO 802.11a/b Combo CardBus Card to never use Fragmentation or to fragment only those packets that exceed a certain size. For example, if the Fragmentation Threshold is set to 1000 Bytes, then a sending radio will fragment any packet 1000 Bytes or larger before transmitting.

The Fragmentation Threshold supports a range between 256 and 2345 Bytes for both 802.11a mode and 802.11b mode. If set to 256, then a sending radio will fragment all packets 256 Bytes or larger. If set to 2345, then a sending radio will fragment only those radio packets that are 2345 Bytes or larger.

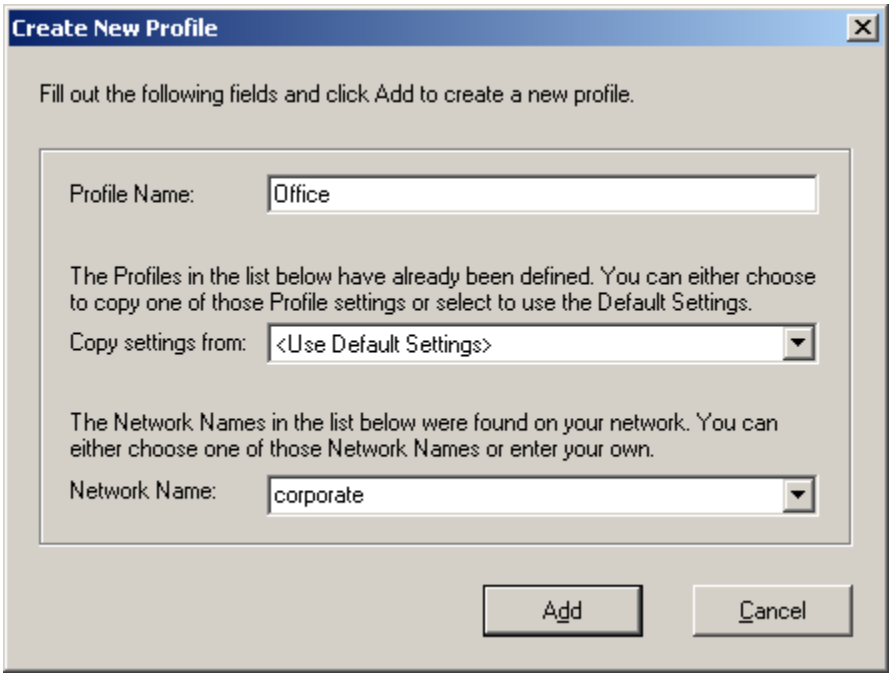
Profiles

If you use the ORiNOCO 802.11a/b Combo CardBus Card in a laptop computer that moves between several wireless networks, you can create an individual profile for each network to simplify configuration. For example, if you have an 802.11a network at the office and an 802.11b network at home, you can use the same laptop on both networks and switch between the each network’s unique configuration settings with a click of a button.

The **Switch to Profile** box appears at the bottom of the Station Configuration screen. The **Profile List** box reports the current profile in use. Any configuration changes that you apply are saved to the current profile. To switch to another profile, select it from the Profile List drop-down menu and click **Switch**. You can also switch profiles by right-clicking the Status Monitor icon in the Windows Taskbar.

Follow these steps to create a new profile:

1. Click **Create New Profile...**
2. Enter a name for the new profile in the **Profile Name:** field.
3. Select an existing profile to use as the basis for the new profile from the **Copy settings from Profile:** drop-down menu, as shown below.



4. Use the drop-down menu to select an SSID for the profile or enter a new SSID in the field provided.
5. Click **Add**.

Follow these steps to delete a profile:

1. Click **Delete Profile...**
2. Select the profile to delete from the drop-down menu.
3. Click **Delete**.

Note to Windows XP Users

Windows XP provides built-in support for wireless networks. Windows XP's wireless network management features are used in lieu of the ORiNOCO Utility. Support for the ORiNOCO Utility is enabled by default (i.e., Windows XP wireless settings are disabled).

To turn ORiNOCO Configuration on or off, check or uncheck the box labeled **Enabled ORiNOCO Configuration (Disable Windows XP Settings)** within the Station Configuration screen. (This option is only visible on Windows XP computers.)

When this option is disabled, the configuration parameters and the Available Networks features are unavailable.

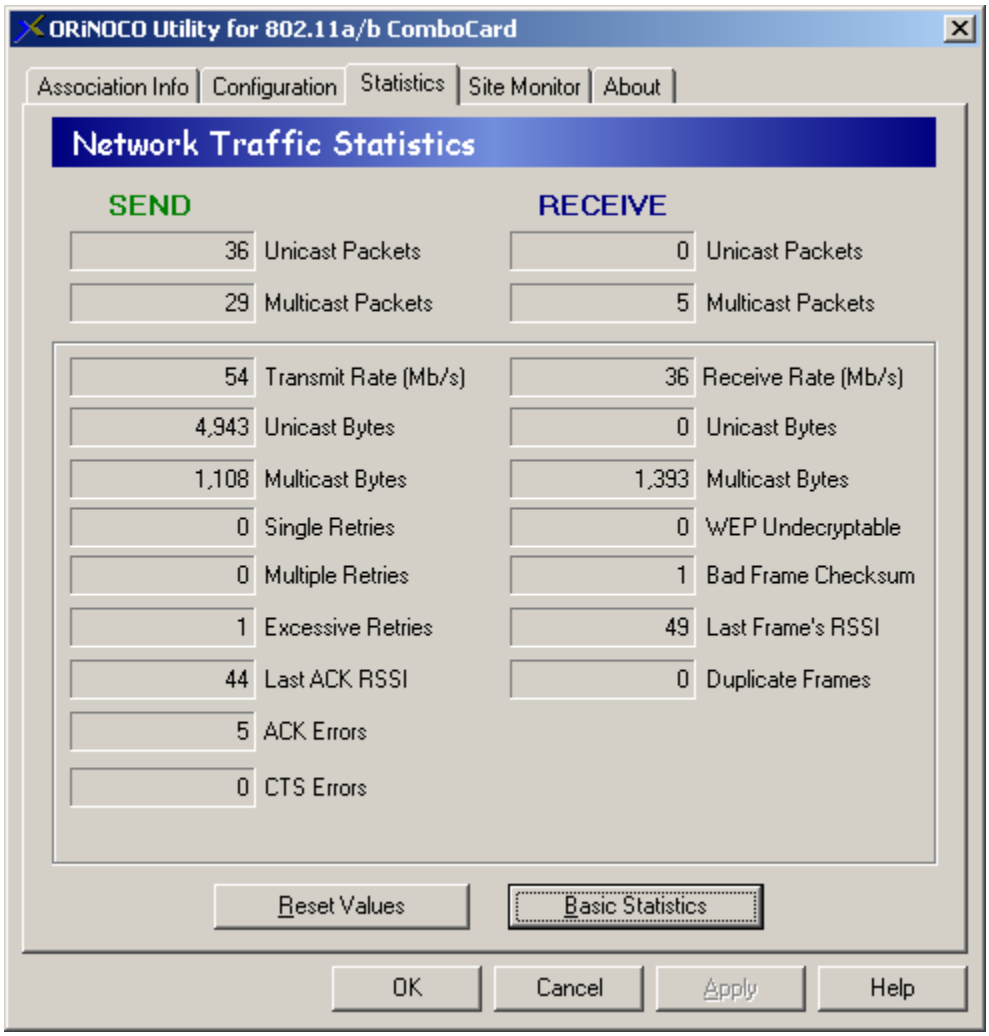
Statistics

Click the **Statistics** tab to view information about the number of packets sent and received by the ORiNOCO 802.11a/b Combo CardBus Card.

The default Statistics screen displays the following statistics:

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

You can view additional statistics by clicking **Advanced Statistics**; an example is shown below.



The advanced Statistics screen displays the following additional statistics:

Send

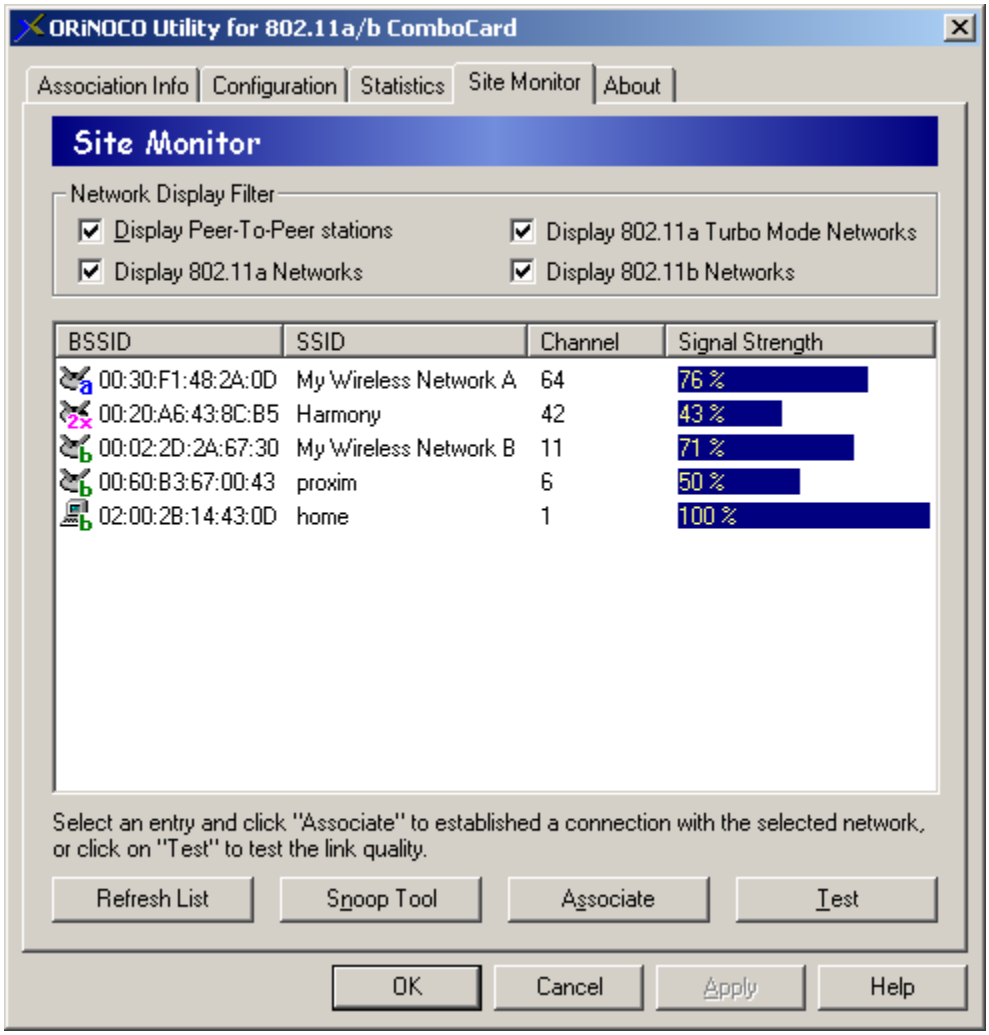
- **Send Rate:** This field reports the card's current transmit rate.
- **Unicast Bytes Sent:** This statistic reports the total number of bytes contained in the unicast packets transmitted by the card.
- **Multicast Bytes Sent:** This statistic reports the total number of bytes contained in the multicast packets transmitted by the card.
- **Single Retries:** After the card sends a packet, it waits for an acknowledgment from the receiving radio to confirm that the packet was successfully received. If an acknowledgment is not received within a fixed period of time, the card will retransmit the packet. This statistic reports the number of packets that required one retry before the card received an acknowledgment.
- **Multiple Retries:** This statistic reports the number of packets that required more than one retry before the card received an acknowledgment.
- **Excessive Retries:** This statistic reports the number of packets that were not successfully transmitted because the card did not receive an acknowledgment within the maximum number of retries.
- **Last ACK RSSI:** This statistic reports the RSSI (Received Signal Strength) for the last acknowledgment (ACK) received by the card. RSSI is reported in decibels (dB) and typically ranges from 0 to 75. In general, an RSSI less than 15 indicates a weak signal and an RSSI greater than 30 indicates a strong signal.
- **ACK Errors:** This statistic reports the number of unicast transmit attempts for which no acknowledgement (ACK) was received.
- **CTS Errors:** This statistic reports the number of Clear To Send (CTS) errors. When the card uses RTS/CTS before transmitting a packet, it first sends a Request to Send (RTS) message to the packet's recipient. The packet's recipient then returns a CTS message to the card. When the card receives the CTS, it sends the packet to the recipient. However, if the card does not receive a CTS within a fixed period of time, it will resend the RTS. After a fixed number of retries, the card will record a CTS Error if a CTS has not been received.

Receive

- **Receive Rate:** This field reports the data rate at which the card is currently receiving packets sent by another wireless device (either 802.11a or 802.11b).
- **Unicast Bytes Received:** This statistic reports the total number of bytes contained in the unicast packets received by the card.
- **Multicast Bytes Received:** This statistic reports the total number of bytes contained in the multicast packets received by the card.
- **WEP Undecryptable:** This statistic displays the number of packets that were discarded due to a problem during decryption, such as mismatched WEP Keys.
- **Bad Frame Checksum:** This statistic displays the number of received packets that failed the CRC (Cyclic Redundancy Check) of the Frame Check Sequence (FCS).
- **Last Frame's RSSI:** This statistic reports the RSSI (Received Signal Strength) for the last packet received by the card. RSSI is reported in decibels (dB) and typically ranges from 0 to 75. In general, an RSSI less than 15 indicates a weak signal and an RSSI greater than 30 indicates a strong signal.
- **Duplicate Frames:** This statistic displays the number of duplicate packets received by the card. When the card successfully receives a packet, it sends an acknowledgment (ACK) to the transmitting node. If the ACK does not reach the transmitting node within a specified period of time after it sent the packet (due to interference or some other type of delay), it will resend the packet to the recipient. In this case, the card then receives the packet a second time, records that it received a duplicate packet, and sends an ACK again.

Available Networks

Click the **Available Networks** tab to view the list of Access Points and/or Ad Hoc stations within range of the card. In the example below, the utility detected multiple 802.11a Access Points.



The Available Networks screen reports the following information for each Access Point or Ad Hoc node detected by the card:

- **BSSID:** This field reports the physical (or MAC) address of the detected Access Point or the Basic Service Set ID of the detected Ad Hoc node.
- **SSID:** This field reports the detected device's SSID or Service Set Identifier. See "SSID" on page 22 for more information.
- **Channel:** This field displays the Channel used by the detected device. See "Channel" on page 30 for more information.
- **Signal Strength:** This field displays the strength of the radio signal received from the detected wireless device.

Use the Network Display Filter settings to determine which devices appear in the Available Networks field. You can select one to four of the filters in any combination.

- To see Ad Hoc stations, place a check mark in the **Display Ad Hoc stations** box.
- To see 802.11a Access Points, place a check mark in the **Display 802.11a Networks** box.
- To see 802.11a Access Points in 2X mode, place a check mark in the **Display 802.11a 2x Networks** box.
- To see 802.11b Access Points, place a check mark in the **Display 802.11b Networks** box.

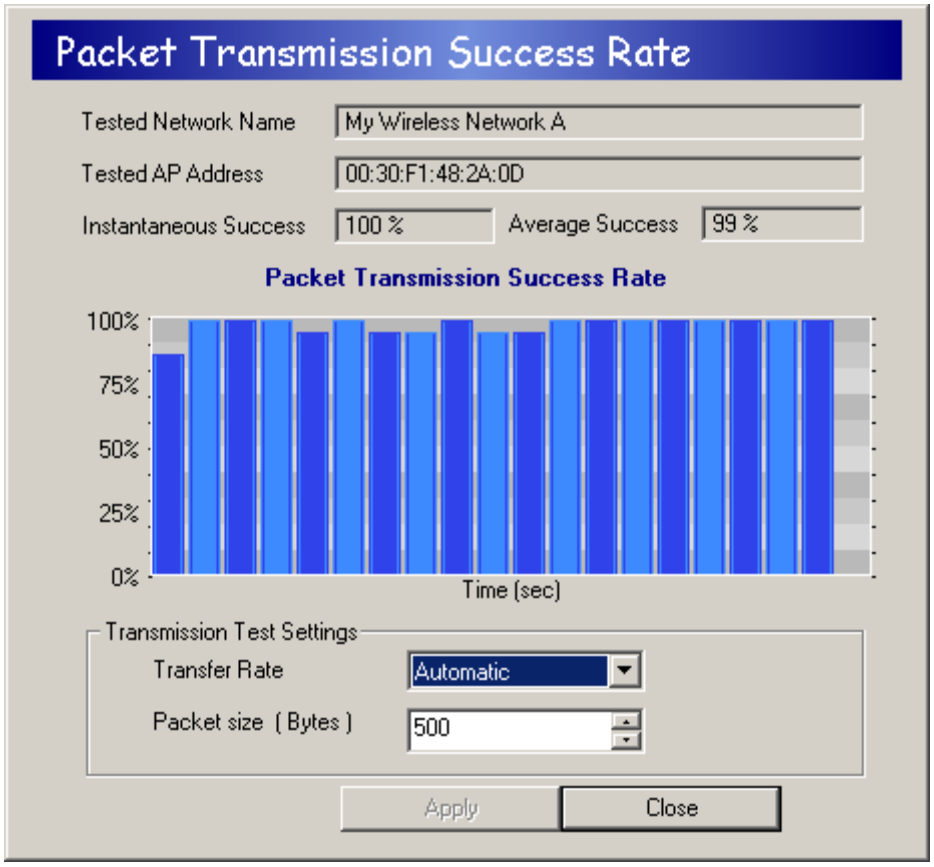
If you want the card to associate with one of the detected Access Points or join the same Ad Hoc network as one of the detected Ad Hoc nodes, highlight the node within the device list and click **Associate**. The card's Mode, Network Type, and SSID will automatically change to match the selected device's configuration settings.

In addition, you can use perform a **Transmission Success Rate** test with any of the detected Access Points by clicking the **Test** button.

Note: A drop-down menu appears when you right-click an entry within the Available Networks list. The menu contains **Associate** and **Test** options.

Packet Transmission Success Rate

Select one of the detected Access Points in the Available Networks screen and click **Test** to determine the link quality between the card and the selected device.



Note: Performing a Transmission Test will reset the card's statistics.

The Packet Transmission Success Rate screen displays the Network Name (i.e., SSID) and MAC address of the selected Access Point.

The card sends a series of packets to the selected device and monitors the number of replies it receives. This information is converted to a percentage and plotted on a graph.

In addition, the utility displays the current success rate in the **Instantaneous Success** field and the average success rate (since the beginning of the test) in the **Average Success** field.

By default, the card uses a packet size of 500 Bytes and automatically switches between all rates as necessary during the test (greater range generally means a lower transfer rate). However, you can also specify a transfer rate and/or a packet size (between 1 and 1500 Bytes) using the drop-down menu. If you change either the Transfer Rate or the packet size, click **Apply** for these changes to take effect. Click **Close** to exit the Packet Transmission Success Rate screen.

Note: You can only perform a transmission test with an Access Point; you cannot perform a transmission test with an Ad Hoc node.

Version Information

Click the **About** tab to view version information for the Combo CardBus Card's driver and utility.

Chapter 5

Troubleshooting

The ORiNOCO 802.11a/b Combo CardBus Card is designed to be very easy to install and operate. However, if you experience any difficulties, use the information in this chapter to help diagnose and solve the problem. If you still cannot resolve the problem, contact Proxim Technical Support as described in Appendix B, "Technical Support and Training," on page 49.

How to Obtain Help with Your LAN Installation

If you require assistance to install your LAN, Proxim can put you in touch with a reseller in your area. The reseller is an expert in the design, installation, and maintenance of LANs and will be able to examine your needs and recommend the most cost-effective solution for your LAN whether you are installing a new LAN or adding on to an existing one. For the location of the ORiNOCO reseller nearest you, contact Proxim at 1-800-229-1630 or 1-408-731-2700 and ask for the Sales Department.

Common Installation Problems

Chapter 2 describes how to install an ORiNOCO 802.11a/b Combo CardBus Card in a computer running Windows 98 Second Edition (SE), Windows Millennium Edition (ME), Windows 2000, Windows XP, or Windows NT. This section provides suggestions to resolve some of the common installation problems with an ORiNOCO 802.11a/b Combo CardBus Card.

Card Inserted Before Running the Installation Program

If you inserted the ORiNOCO 802.11a/b Combo CardBus Card into a Windows computer before running the ORiNOCO Installation program, you can install the card using Microsoft's Add New Hardware Wizard.

Follow these steps:

1. Turn on the computer and logon to Windows, if applicable.
2. Insert the card into an available CardBus slot.
3. Be patient while Windows automatically detects the card and launches the Add New Hardware Wizard.
4. Insert the ORiNOCO CD into the computer's CD-ROM drive.
5. Follow the on-screen instructions to install the card using the Add New Hardware Wizard.
   - Windows 98/ME users: Insert the Windows installation CD if prompted. If you do not have a Windows installation CD, see "Windows ME and Windows 98 SE Installation CD Requirement" on page 10.
   - Windows NT users: Proceed to Step #7 if the card is not automatically detected.
6. If prompted, restart the computer and logon to Windows.
7. Run *SETUP.EXE* from the ORiNOCO Installation CD to launch the ORiNOCO Utility Setup program.

8. Follow the on-screen instructions to install the ORiNOCO Utility.

Refer to Chapter 5 beginning on page 18 for information on how to use the ORiNOCO Utility.

Windows 98/ME/2000/XP Troubleshooting

Card Not Listed in Device Manager

Follow these steps if you have installed the ORiNOCO 802.11a/b Combo CardBus Card but it does not appear as a network adapter in the Device Manager:

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

Card Not Installed Properly

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

If a yellow exclamation point ("!") appears next to the card's Device Manager entry, then the card is not working properly. Follow these steps:

1. Uninstall the card as described in "Uninstalling an ORiNOCO 802.11a/b Combo CardBus Card" on page 42.
2. Reinstall the card following the installation instructions in Chapter 2.

Configuring Networking Clients and Protocols

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

Windows XP/2000

Follow these steps to configure the card's networking clients and protocols in a Windows XP or 2000 computer:

1. Open the Control Panel's **Network and Dial-up Connections** (Windows 2000) or **Network Connections** (Windows XP) icon.
2. Scroll through the list of network connections and right-click the Local Area Connection that corresponds to the ORiNOCO 802.11a/b Combo CardBus Card.
3. Select **Properties** from the drop-down menu to view the connection's properties screen.
4. Select a client or protocol from the list of components and click **Properties** to configure its settings.

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

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

Windows ME/98 SE

Follow these steps to configure a card's networking clients and protocols in a Windows 98/ME computer:

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

   For example, if you want to assign the card a static IP address, highlight **TCP/IP** or **TCP/IP -> ORiNOCO Card** and click **Properties**.

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

Windows NT

Follow these steps to configure a card's networking protocols in a Windows NT computer:

1. Open the Control Panel's **Network** icon.
2. Click the **Protocols** tab.
3. Select a protocol from the list of installed components and click **Properties** to configure its settings.
4. Select the ORiNOCO 802.11a/b Combo CardBus Card from the list of installed adapters.
5. Configure the protocol as necessary.
6. Click **OK** or **Apply** save your changes.
7. Close the Network screen and restart the computer if prompted.

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

Uninstalling an ORiNOCO 802.11a/b Combo CardBus Card

Follow these steps if you need to uninstall the card:

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

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

Windows 98/ME computers:

- *C:\WINDOWS\INF\NTPR11AB.INF*
- *C:\WINDOWS\INF\OTHER\PROXIM,INC.NTPR11AB.INF*
- *C:\WINDOWS\SYSTEM32\DRIVERS\PROX11AB.SYS*
- *C:\WINDOWS\SYSTEM\PROX11AB.SYS*

Windows NT computers:

- *C:\WINDOWS\SYSTEM32\PROX11ABN4.DLL*
- *C:\WINDOWS\SYSTEM32\DRIVERS\PROX11ABN4.SYS*

Windows 2000 computers:

- *C:\WINNT\SYSTEM32\DRIVERS\PROX11AB.SYS*
- *C:\WINNT\INF\NTPR11AB.INF*
- *C:\WINNT\INF\NTPR11AB.PNF*

Windows XP computers:

- *C:\WINDOWS\SYSTEM32\DRIVERS\PROX11AB.SYS*
- *C:\WINDOWS\INF\NTPR11AB.INF*
- *C:\WINDOWS\INF\NTPR11AB.PNF*

10. Shut down the computer.
11. Remove the card from the computer.

Range

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

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

LED Indicators

The ORiNOCO 802.11a/b Combo CardBus Card includes two green LED indicators on the top of the card near the antenna.

These LEDs display the following behavior:

- Both LEDs are off when the card is not receiving power or when the ORiNOCO driver is not installed.
- The LEDs blink in an alternating pattern when the card is searching for an Access Point (in Infrastructure mode) or Ad Hoc network (in Ad Hoc mode).
- The LEDs blink in unison every second when the card has associated with an Access Point or joined an Ad Hoc network.
- When there is network activity, the LEDs blink at a faster rate; the LEDs will blink in unison more often as the card's Send or Receive Rate increases.

Common Technical Support Questions

This section discusses some of the most common problems using an ORiNOCO 802.11a/b Combo CardBus Card and offers possible solutions.

Symptom/Question	Possible Solution/Answer
I installed the adapter card in the computer before running *SETUP.EXE*. What should I do?	Follow the on-screen instructions to install the card using Microsoft's Add New Hardware Wizard. When prompted, point the Wizard to search the ORiNOCO Installation CD for driver files. Then, after you have installed the driver, run *SETUP.EXE* from the ORiNOCO Installation CD to install the ORiNOCO utility.
My office has an existing 802.11b network. Is the combo card compatible?	Yes, when it is operating in 802.11b mode.
I want to install an 802.11a network in my office that has an existing 802.11b network. Will the 802.11a network interfere with the 802.11b network?	No. 802.11a and 802.11b devices will not interfere with each other since they operate at different frequencies. 802.11a devices operate in the 5 GHz band, and 802.11b devices operate in the 2.4 GHz band.
Is an ORiNOCO 802.11a/b Combo CardBus Card compatible with 802.11a and 802.11b products from other vendors?	Yes, the card can interoperable with 802.11a-compliant or 802.11b-compliant products from other vendors. However, if you use 2X mode to achieve data rates up to 108 Mbps, the card is only compatible with 802.11a products from Proxim.
In throughput tests, the card doesn't seem to transfer data as quickly as I'd expect.	Data rate is the raw signaling rate of a networking device; it does not equal data throughput. Actual data throughput is always less than the data rate since some of the available bandwidth is used to send control messages and regulate activity over the wireless medium. Also, throughput will depend on several factors such as network overhead, the file transfer program in use, the computer's operating system, and the computer's processor speed.
How do I determine where to install Access Points to ensure that users can access the wireless network from anywhere in my facility?	Proxim recommends that you perform a site survey following the procedure outlined in Proxim's Introduction to Enterprise Wireless Networking Technical Training class. If you would like to learn more about the site survey procedure, you should consider signing up for a Proxim Technical Training class in your area. Refer to Proxim's Web site at **http://training.proxim.com/** for more information.
I've entered my Harmony User Name and Password but I can't log on to the network.	Either your User Name or Password is incorrect or you are not in range of an Access Point. To determine whether or not you are in range of an Access Point, click **Cancel** to access the Windows desktop and locate the Association State field within the ORiNOCO Utility. Then, log on to Windows again to bring up the Harmony logon prompt. If you are out of range of an Access Point, check the **Defer logon for current session if Access Point is out of range** box and click **Logon**. If your User Name or Password is incorrect, contact your network administrator for assistance.

Symptom/Question	Possible Solution/Answer
I deferred my Harmony logon until my computer was in range of an Access Point. However, once the card associated with an Access Point, I could not access the network.	Open the ORiNOCO Utility's Association Information screen and locate the Harmony Security Protocol field. If the field reports "User is not authenticated," then either your User Name or Password is incorrect. Try logging on to Windows again. If problems persist, contact your network administrator to confirm your User Name and Password.
My Harmony User Name and Password are synchronized with my Windows User Name and Password so the Harmony logon prompt does not appear after I logon to Windows. But now I want to change my Harmony Password. What can I do?	Change your Windows Password; the Harmony logon prompt will reappear after you log on to Windows once your Windows Password and Harmony Password no longer match. Otherwise, contact your network administrator who can change your Password via the Harmony System's User Database.
My computer can't reestablish a network connection when the Harmony Security Protocol is enabled.	You need to logon to Harmony Security first before logging on to Windows to gain immediate access to network resources. Open the Harmony Utility's Security screen and place a check mark next to the **Log on to Harmony Security before Windows Logon** option. Then, save your changes and logon to Windows again.
Does the card support IEEE 802.1x Authentication?	Yes, but you cannot configure 802.1x using the ORiNOCO Utility; you need to use a configuration utility supplied by your RADIUS server vendor. Also, Windows XP provides native support for the IEEE 802.1x standard.
How long will my battery last when using the ORiNOCO 802.11a/b Combo CardBus Card?	Battery life will vary from unit to unit and depends on many factors including battery type, length of battery life without the CardBus Card inserted, and how frequently the CardBus Card transmits and receives data. Frequent network activity will drain the battery faster than if the card were left idle in doze mode. Configuring the CardBus Card to use one of the Power Saving modes will prolong battery life. However, you should perform some tests under normal operating conditions to accurately determine a device's battery life with the Combo CardBus Card.

Appendix A

Technical Specifications

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

Technical Specifications

General

Compatibility ..... Fully interoperable with IEEE 802.11a compliant products in 802.11a mode; Fully interoperable with IEEE 802.11b compliant products in 802.11b mode

Warranty ..... 3-years parts and labor (return to factory)

LED Indicators ..... Two (2) LEDs indicate Power On, Sleep Mode, Transmit Activity, Association and Power Off

Network Information

Security ..... 40, 128 & 152-bit Wired Equivalent Privacy (WEP) data encryption; Harmony Security Protocol; 802.1x authentication

Network Architecture..... Supports Ad Hoc peer-to-peer networks and communication to wired infrastructure networks via Access Points

Installation & Diagnostics..... Complete configuration utility application included; Utility's site survey tool surveys other wireless units and reports packet throughput; Desktop icon continuously reports status

Operating System Support..... Windows 98SE, 2000, ME, XP, NT 4.0 (Service Pack 6 or later)

Roaming ..... Seamless among 802.11a compliant access points (in 802.11a mode) or 802.11b compliant access points (in 802.11b mode), including across subnets via Harmony AP Controller

Radio (802.11a Mode)

Media Access Protocol ..... IEEE 802.11a

Radio Data Rate ..... 54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, 6 Mbps in 802.11a mode; 108 Mbps, 96 Mbps, 72 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps in 2X mode

Frequency Band (802.11a) ..... 5.15-5.35 & 5.725-5.850 GHz and 5.470-5.725 GHz in Europe (extended European band)

Radio Type (802.11a)..... Orthogonal Frequency Division Multiplexing

Modulation ..... 64 QAM, 16 QAM, QPSK, BPSK

Channels..... Varies by country. See "Channel" on page 30.

Radio (802.11b Mode)

Media Access Protocol ..... IEEE 802.11b

Radio Data Rate ..... 11 Mbps, 5.5 Mbps, 2 Mbps, 1 Mbps

Frequency Band ..... 2.4 GHz frequency band; actual frequencies in use vary by country

Radio Type ..... Direct Sequence Spread Spectrum

Modulation ..... CCK, QPSK, BPSK

Channels..... Varies by country. See “Channel” on page 30.

Environmental

Operating Temperature ..... 0ºC to +60ºC

Storage Temperature..... -65ºC to 150ºC

Humidity ..... 5% to 95% non-condensing

Physical

Bus Interface ..... 32-bit CardBus

CardBus Card Voltage..... 3.3 Volts

Weight ..... 1.41 ounces (40 g)

Parameters

Parameter	Range	Default
Network Type	Ad Hoc*, Infrastructure	Infrastructure
Mode	Auto, 802.11a, 802.11b	Auto
Auto Mode Preference	802.11a, 802.11b	802.11a
Power Saving (Infrastructure only)	Off, Normal, Maximum	Off
Roaming	Fast, Slow, Normal	Normal
SSID	Up to 32 characters	any
Security Level	No Security or 802.1x, Use WEP for Authentication and Encryption, Use Harmony Security Protocol	No Security or 802.1x
Key Size	64 Bit, 128 Bit, 152 Bit (not available for 802.11b)	64 Bit
WEP Keys (When Security Level is set to Use WEP for Authentication and Encryption)	Up to 4 Keys: 10 hexadecimal digits per key for 64 Bit, 26 hexadecimal digits per key for 128 Bit, 32 hexadecimal digits per key for 152 Bit	Blank
Default Key	One of the four configured WEP Keys	WEP Key 1
Channel (Configurable in Ad Hoc mode; assigned by AP in Infrastructure mode)	**802.11a** **U.S. & Canada:** In 802.11a mode: Channels 36, 40, 44, 48, 52, 56, 60, 64, 149, 153, 157, 161 & 165; In 2X mode: Channels 42, 50, 58, 152 & 160 **Europe:** Channels 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136 & 140 **Japan:** Channels 34, 38, 42 & 46 **Singapore:** Channels 36, 40, 44 & 48 **802.11b** **U.S. & Canada:** Channels 1-11 **Europe (except France and Spain):** Channels 1-13 **France:** Channels 10-13 **Spain:** Channels 10-11 **Japan:** Channels 1-14	Depends on Mode and Network Type
Send Rate	**802.11a** Automatic or select one of the following: 54 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12 Mbps, 9 Mbps, and 6 Mbps in 802.11a mode; 108 Mbps, 96 Mbps, 72 Mbps, 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, and 12 Mbps in 2X mode* **802.11b** Automatic or select one of the following: 11 Mbps, 5 Mbps, 2 Mbps, 1 Mbps, and 1/2 Mbps auto select	Automatic
RTS/CTS	Enabled, Disabled	Disabled
RTS/CTS Threshold	1 to 2345 (for 802.11a) 1 to 1513 (for 802.11b)	blank
Fragmentation	Enabled, Disabled	Disabled
Fragmentation Threshold	256 to 2345	blank

*Ad Hoc mode not available for 802.11a products in Europe; 2X mode not available in Europe, Japan, or Singapore.

Appendix B

Technical Support and Training

If you are having a problem using an ORiNOCO 802.11a/b Combo CardBus Card and cannot resolve it with the information in Chapter 5, gather the following information and contact Proxim Technical Support:

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

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

Tel:	1-800-477-6946 (Toll-free in the U.S. and Canada) 1-408-731-2640 (International)
Fax:	1-408-731-3676
Web:	**http://www.proxim.com/**
E-mail:	support@proxim.com

Proxim Corporation
Attn: Technical Support
935 Stewart Drive
Sunnyvale, CA 94085

In addition, Proxim offers technical training courses across the United States throughout the year that are designed to teach customers how to maximize the benefits of Proxim products. These classes are taught by experienced Proxim Systems Engineers and have a technical focus. For class and registration information, visit Proxim's Web site at **http://training.proxim.com**.

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