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Harmony 802.11b Access Point Model 8550 User's Guide
Part # 7360.0133
Rev. A-3

Warranty Return Policy

If you have a problem with the Harmony 802.11b Access Point Model 8550, 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.

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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.

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1. Introduction

Thank you for choosing Proxim's Harmony 802.11b Access Point Model 8550, a member of Proxim's Harmony wirefree infrastructure family. The Harmony product line is the first wirefree networking solution to support all current and future wireless LAN standards, including OpenAir, IEEE 802.11b, and future 10 Mbps frequency hopping and 5 GHz technologies, within a single, homogeneous architecture. Harmony provides centralized management, configuration, and security for a wireless LAN.

Harmony protects current and future wirefree infrastructure investments by supporting all leading and forthcoming wireless LAN protocols. Existing RangeLAN2 and OpenAir-compatible products and existing IEEE 802.11b devices are all compatible with Harmony. Customers can seamlessly transition to new LAN standards by adding low-cost access points without changing the management interface or disturbing existing users.

Harmony's SmartArchitecture™ is the first wirefree management system to provide one-click, system-wide security updates and remote office infrastructure management through a single Web-based interface.

Harmony Access Points can be connected to any portion of the Ethernet network, eliminating the need for special wirefree subnets common in other installations. Also, Harmony clients can roam seamlessly anywhere there is wirefree coverage, without the need for extra client software. In addition, Harmony SmartAttach™ software simplifies installation by automatically discovering and configuring new access points upon connection to the Ethernet network.

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

The Harmony Family

The Harmony 802.11b Access Point Model 8550 is a member of a product family that provides a complete wirefree networking solution.

- ❑ The **Harmony Access Point Controller Model 7560** centralizes the management, security, and filtering capabilities of a wireless LAN. The Access Point Controller communicates with Harmony Access Points over the Ethernet network to provide wirefree network access for mobile clients. The Access Point Controller can support multiple Access Points, even if each Access Point follows a different wireless standard.
- ❑ The **Harmony Access Point** is a networking bridge that operates at Layer 2 of the OSI networking model. Working in conjunction with a Harmony Access Point Controller, the Access Point forwards packets between its radio and the Ethernet network. Two models of the Harmony Access Point are available to support either the OpenAir or IEEE 802.11b wireless standards: the **OpenAir Access Point Model 7550** and the **802.11b Access Point Model 8550**. Note that the Harmony Power System operates only with the 802.11b Access Point.
- ❑ The **Harmony PC Card** is a wireless LAN adapter that fits into a PCMCIA Type II slot in a laptop computer. Two models of the Harmony PC Cards are available to support either the OpenAir or IEEE 802.11b wireless standards.
- ❑ The optional **Harmony Power System Model 7562** provides remote DC power to Harmony 802.11b Access Points over the unused pins of a twisted pair Ethernet cable.

System Requirements

To begin using the Harmony 802.11b Access Point, you must have the following minimum requirements:

- At least one Harmony Access Point Controller
- An Ethernet (10Base-T) LAN switch or hub
- At least one 802.11b PC Card

The Product Package

Each Harmony 802.11b Access Point comes with:

- One Harmony 802.11b Access Point Model 8550
- One power adapter (12V, 1 Amp)
- One *Harmony 802.11b Access Point Model 8550 User's Guide*
- One warranty registration card

2. Installation

This chapter describes the installation procedure for the Harmony 802.11b Access Point and includes a description of the LEDs found on the unit.

Installation Procedure

Follow these steps to install the Harmony 802.11b Access Point Model 8550.

Note:

You must install a Harmony Access Point Controller before installing a Harmony Access Point.

1. Determine the best location for the Harmony 802.11b Access Point. Keep in mind the following considerations:
 - ❑ The length of the Ethernet cable that connects the Access Point to the network must not exceed 100 meters.
 - ❑ Try to place the Access Point on a flat, sturdy surface as far from the ground as possible, such as on top of a desk or bookcase, keeping clear of metal obstructions and away from direct sunlight.
 - ❑ Try to centrally locate the Access Point so that it will provide coverage to all of the mobile devices in the area.
 - ❑ If you are not using the Harmony Power System to supply power to the Access Point, the distance between the Access Point and a power outlet cannot exceed the length of the power adapter's cable.

Warning!

It is the responsibility of the installer and users of the Harmony 802.11b Access Point Model 8550 to guarantee that the antenna is operated at least 20 centimeters from any person. This is necessary to insure that the product is operated in accordance with the RF Guidelines for Human Exposure which have been adopted by the Federal Communications Commission.

2. Place the Access Point in the desired location. An optional wall mount is available for the Access Point. Refer to the section entitled “Mounting Option” later in this chapter for details.
3. Attach one end of an Ethernet cable to the Access Point and attach the other end to the 10Base-T port of a network hub, switch, router, or patch panel.

Note:

The Harmony 802.11b Access Point does not support 100Base-TX; it only supports 10Base-T.

4. If you are not using the Harmony Power System to supply power to the Access Point or want to connect the Access Point to both the Power System and an AC power source, attach one end of the AC power adapter, included in the product package, to the back of the Access Point and the other end to a power outlet.

Note:

Use the Access Point only with the power adapter supplied by Proxim in the product package. Using another power supply may damage the Access Point. If you want to use the Access Point in conjunction with the Harmony Power System, refer to the Harmony Power System Model 7562 User’s Guide for instructions.

All three LEDs on the top of the Access Point will light up when the unit is powered on. Next, the Status LED will turn amber and then green to indicate that the unit is operational. Note that the Status LED will remain amber if the Access Point cannot find an AP Controller to partner with.

In addition, the green Link LED will turn on to indicate that the Access Point has a network connection.

5. The AP Controller will automatically detect and configure the Access Point over the network. Refer to Chapter 4 and the *Harmony Access Point Controller Model 7560 User’s Guide* for more information on how to configure an Access Point.

Mounting Option

The Harmony 802.11b Access Point is designed to sit on a desktop. In addition, an optional mounting bracket is available for purchase so that the unit may be mounted to a wall or ceiling.

Follow these steps to attach the mounting bracket to the Access Point:

1. Remove the two rubber feet on the bottom of the Access Point. Note that the rubber feet are attached to the unit with an adhesive.
2. Underneath the rubber feet there are three unthreaded mounting holes that accept M5 thread forming screws. Align the holes of the mounting bracket with these holes.
3. Locate the screws provided with the mounting bracket.
4. Insert the screws into the three holes of the mounting bracket and Access Point (that is, the holes aligned in Step #2 above).
5. Tighten the screws with a screwdriver to attach the mounting bracket to the Access Point.

LED Indicators

There are three LEDs on the top panel of the Harmony 802.11b Access Point, as shown in Figure 1.

- Status LED:** This LED, located on the left side (with the unit orientated so that you can read the Proxim logo), is green when the unit is powered up and operational. The LED is amber during initialization and when the Access Point is not partnered with a Harmony AP Controller. This LED will blink red in a repeating pattern if a problem occurs with the unit during operation. See Chapter 6 for a discussion of these patterns.
- Radio LED:** This LED, located in the center of the three LEDs, blinks green when the Access Point receives data packets over its radio.

- ❑ **Ethernet LED:** This LED, located on the right side, blinks green when the Access Point receives data packets over the 10Base-T Ethernet port.

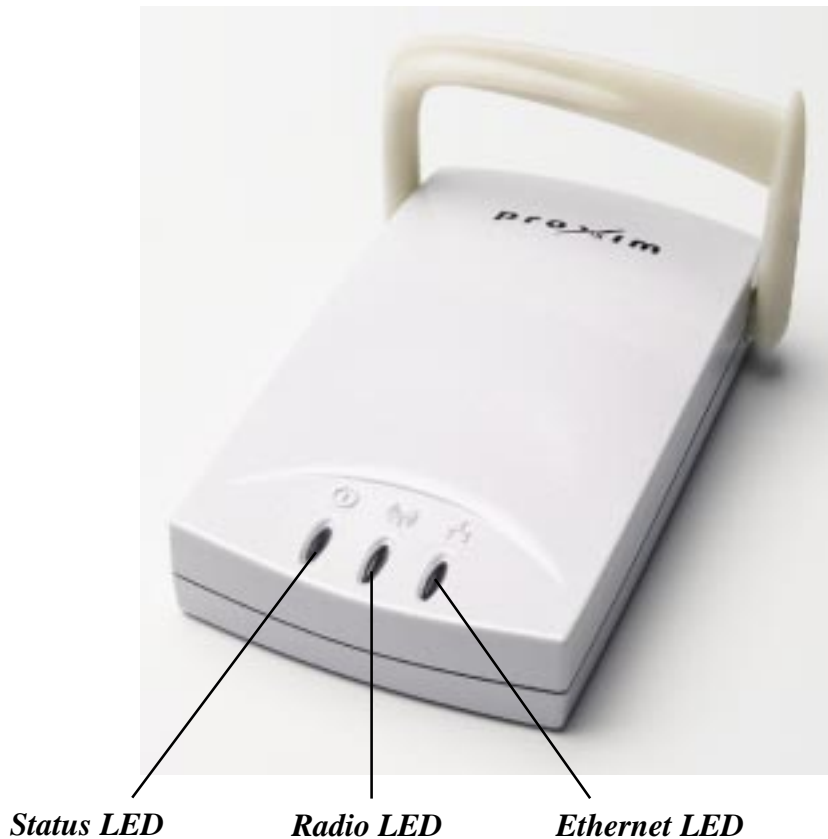


Figure 1
Harmony 802.11b Access Point's Top Panel LEDs

There is also one LED on the back panel of the Harmony 802.11b Access Point.

- ❑ **Link LED:** This LED, located between the power connector and the 10Base-T port, will turn green when the Access Point has a physical connection to the Ethernet network.

Power Requirements

The Harmony 802.11b Access Point requires power from either a Harmony Power System or from an external power supply.

The voltage range for the Access Point's power connector is 10-26 VDC.

The Harmony 802.11b Access Point ships with a UL listed, Class 2 power supply (12V, 1 Amp).

3. Wirefree Operation

Harmony Architecture

The Harmony wirefree infrastructure family provides network connectivity to mobile clients without the use of wires or cabling.

Each Harmony network must include at least one Access Point Controller. The AP Controller centralizes the management, security, and filtering capabilities of a wireless LAN. In a traditional wireless LAN, each Access Point duplicates this functionality adding additional, unnecessary cost to the network infrastructure. By consolidating these functions into one or more AP Controllers, additional Access Points can easily be added to the network as it grows. Also, as new wireless standards are introduced in the future, additional Access Points may be added at a lower cost than with a traditional Access Point infrastructure.

The AP Controller handles all of the configuration and management of an Access Point. On a Harmony network, each Access Point acts as an intermediary between its mobile clients and the AP Controller, converting radio signals into Ethernet packets and vice versa.

A single AP Controller can support a maximum of 10 Access Points (an AP Controller can support more than 10 Access Points but a maximum of 10 APs per AP Controller is the recommended configuration for best performance). A network subnet can support up to 10 AP Controllers to form a Harmony system that can be managed using a single user interface. The number of clients that can be supported by one Access Point depends on the amount of information that each client exchanges with the network. Therefore, the number of clients that can be supported by one Access Point will vary based on the applications in use and how frequently network information is accessed.

When a Harmony 802.11b Access Point is connected to the network for the first time, the AP Controller automatically configures it with the AP AutoConfigure Default settings. In addition, an Access Point may be manually configured via the AP Controller's Web browser interface. Refer to the *Harmony Access Point Controller Model 7560 User's Guide* for information on how to access the Web browser interface.

The IEEE 802.11b Specification

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

In 1999, the IEEE created the 802.11b standard. 802.11b is essentially identical to the 802.11 standard except 802.11b provides for data rates of up to 11 Mbps for direct sequence spread spectrum devices. Under 802.11b, direct sequence devices can operate at 11 Mbps, 5.5 Mbps, 2 Mbps, or 1 Mbps. This provides interoperability with existing 802.11 direct sequence devices that operate only at 2 Mbps.

Direct sequence spread spectrum devices spread a radio signal over a range of frequencies. 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. If operating multiple 802.11b Access Points in the same vicinity, the distance between the center frequencies must be at least 25 MHz to avoid interference. See Appendix B to determine the center frequency used by each Channel.

In the United States, the 802.11b standard allocates 11 operating Channels for direct sequence devices. Channels 1, 6, and 11 are independent and do not overlap with each other. To avoid interference between 802.11b Access Points, Proxim recommends that you configure the Access Points using only Channels 1, 6, and 11.

The 802.11b operating parameters are described in Chapter 4.

Roaming Between Harmony 802.11b Access Points

If there are multiple Harmony 802.11b Access Points on the network, then a mobile client may seamlessly roam from one Access Point to another.

Each Access Point creates its own wirefree cell or coverage area. This is also known as a Basic Service Set (BSS). A mobile device can communicate with a particular Access Point if it is within the Access Point's coverage area.

If the cells of multiple Access Points overlap, then the mobile client may switch from one Access Point to another as it travels throughout the facility. During the hand-off from one Access Point to another, the mobile client maintains an uninterrupted connection to the network. This is known as “roaming.”

Multiple Access Points connected to a common Ethernet network form an Extended Service Set (ESS). All members of an Extended Service Set are configured with an ID, known as the SSID or ESSID. Mobile clients must be configured with the same SSID as the Access Points on the network; a client can only roam between Access Points that share the same SSID.

Roaming Guidelines

- An 802.11b PC Card can only roam between 802.11b Access Points. An 802.11b PC Card cannot communicate with Harmony OpenAir Access Points.
- All Harmony 802.11b Access Points must have the same SSID.
- All workstations with Harmony 802.11b PC Cards must have the same SSID as the Access Points that they will roam between.
- If WEP encryption is enabled, then all 802.11b Access Points and PC Cards must use the same encryption level and WEP Key(s) to communicate.
- The Access Points' cells must overlap to ensure that there are no gaps in coverage and to ensure that the roaming client will always have a connection available.
- All Access Points in the same vicinity should use a unique, independent Channel. There are three independent Channels for 802.11b Access Points.
- Access Points that use the same Channel should be installed as far away from each other as possible to reduce potential interference.

- ❑ Proxim strongly recommends that you perform a site survey to determine the best location for each Access Point in the facility, as described in Proxim's free one-day technical training class. See Proxim's web site at **<http://www.proxim.com/support/>** for more information on the technical training class.

- ❑ An 802.11b Access Point and an OpenAir Access Point installed in the same vicinity will interfere with each other. If you use both 802.11b and OpenAir Access Points on your network, Proxim recommends that you test for potential interference first before deploying the equipment.

4. Configuration Parameters

The first time a Harmony 802.11b Access Point is connected to the network, the AP Controller will automatically configure the Access Point using the AP AutoConfigure Default settings.

In addition, a Harmony 802.11b Access Point may be manually configured via the Harmony system's Web browser interface. Refer to the *Harmony Access Point Controller Model 7560 User's Guide* for information on how to access the Web browser interface.

This chapter describes the configuration parameters for a Harmony 802.11b Access Point.

You may configure the following parameters for a Harmony 802.11b Access Point using the Web browser interface:

- Basic Settings
- Security Settings
- Advanced Settings

Each of these options is discussed in detail below.

Basic Settings

The Basic Settings tab allows you to configure the following parameters.

AP Name

You can assign a name to the Harmony 802.11b Access Point. The AP Name cannot exceed 63 characters. The AP Controller assigns an AP Name to each Access Point that it automatically detects and configures. By default, the AP Name is the device's physical address.

Physical Address

A Harmony 802.11b Access Point's physical address is assigned at the factory and cannot be changed by the end user. The physical address or MAC address is a 48-bit unique identifier assigned to each networking device. The physical address is commonly written as six pairs of two hexadecimal digits separated by colons (for example, 00:60:b3:6e:00:77).

Enable AP

When enabled, the Access Point operates normally and provides mobile clients with access to the Ethernet network. When disabled, the Access Point cannot partner with an AP Controller or communicate with mobile clients.

Partnered APC

Each Access Point is partnered with one of the AP Controllers (APCs) on the network.

If you do not wish to specify which AP Controller the Access Point should partner with, then select the Any option. Otherwise, you can select an AP Controller from the list of available devices and the Access Point will partner with it.

Channel

By default, an AP Controller will automatically provide a Channel assignment to a Harmony 802.11b Access Point. The Harmony system will assign Channel 6 to the first 802.11b Access Point, Channel 1 to the second 802.11b Access Point, Channel 11 to the third 802.11b Access Point, Channel 6 to the fourth 802.11b Access Point, and so on.

If necessary, you may manually configure the Channel assignment of an 802.11b Access Point. To minimize interference, use only Channels 1, 6, and 11. If you have more than three Access Points on the network, make sure that units that share the same Channel are as far away from each other as possible, based on the results of your site survey of the facility.

**Note:**

Proxim recommends that you manually assign Channels if you have more than three Harmony 802.11b Access Points on one network.

Supported Clients

802.11b products can operate at 11 Mbps, 5.5 Mbps, 2 Mbps or 1 Mbps. This allows 802.11b devices to communicate with any existing 802.11 direct sequence devices that operate only at 1 or 2 Mbps.

By default, the Harmony 802.11b Access Point will support both 802.11b and 2 Mbps 802.11 direct sequence clients. If you want the Harmony 802.11b Access Point to only support 11 Mbps 802.11b clients, select the 11 Mbps clients only option.

SSID

The SSID is a string of up to 32 ASCII characters that must match on all communicating 802.11b devices within the same network. SSID stands for Service Set ID. The SSID is also referred to as the “ESSID” or “Extended Service Set ID.”

All Harmony 802.11b Access Points and Harmony 802.11b PC Cards must have the same SSID to allow a mobile client to roam between Access Points.

By default, the SSID is set to “proxim.”

IP Addressing

An Access Point can receive an IP address assignment in one of three ways:

- From a Dynamic Host Configuration Protocol (DHCP) server on the network
- From an AP Controller if there is no DHCP server on your network
- Manually via the Harmony system’s Web browser interface

If you do not have a DHCP server on the network and the AP Controller has not been assigned a static IP address, then it will assign IP addresses in the 169.254.0.0 network to the Harmony Access Points.

If you want the Access Point to receive an IP address via the first or second method described above, then choose the Use DHCP option within the Access Point's configuration screen (accessed via the Harmony system's Web browser interface). Note that Use DHCP is the Access Point's default setting.

Otherwise, select Specify IP and enter a static IP address, subnet mask, and default gateway in the fields provided.

Click <Save> within the Access Point's configuration screen to save these changes. Note that you will need to recycle power on the AP if you change any of its IP parameters.

Security Settings

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

WEP encrypts the data portion of each packet exchanged on the 802.11b network using either a 40-bit or 128-bit encryption algorithm. In addition, WEP is also used in conjunction with the optional Shared Key Authentication algorithm to prevent unauthorized devices from associating with an 802.11b network.

WEP Encryption

The Harmony 802.11b Access Point offers four configuration options for WEP Encryption: Do Not Use WEP, Use WEP for Authentication Only, Use WEP for Encryption Only, and Use WEP for Authentication and Encryption.

When set to Do Not Use WEP, the Access Point does not encrypt any data or authentication packets.

When set to Use WEP for Authentication Only, the Access Point uses WEP only during authentication; this corresponds to Shared Key Authentication.

Shared Key Authentication requires that two 802.11b devices must have the same WEP Keys in order to communicate. In addition, both devices must be configured to support

Shared Key Authentication. If one device is configured to use Shared Key Authentication but a second device is not, then the two devices will not communicate, even if both devices have the same WEP Keys.

When set to Use WEP for Encryption Only, the Access Point only uses WEP to encrypt data. Two 802.11b devices must have the same WEP Keys to exchange data. For authentication purposes the Access Point uses Open System Authentication, which is an authentication procedure that does not use WEP to prevent unauthorized devices from associating with an 802.11b network.

When set to Use WEP for Authentication and Encryption, the Access Point uses WEP during authentication and when exchanging data.

**Note:**

When the Harmony 802.11b Access Point is configured to Use WEP for Authentication and Encryption, all of the other 802.11b devices on the same network must use WEP both during authentication (Shared Key Authentication) and to encrypt data.

All 802.11 Access Points and 802.11b PC Cards within an ESS must have the same encryption level and use the same WEP Key to communicate.

WEP Key Size

The Harmony 802.11b Access Point supports both 40 and 128 bit encryption using the Wired Equivalent Privacy (WEP) algorithm. 128 bit encryption is available only in the United States.

Each Access Point can store four 40-bit and four 128-bit WEP Keys.

WEP Keys

An 802.11b device with WEP enabled uses a WEP Key (also known as an Encryption Key) to encrypt and decrypt information. If the WEP Keys do not match on two radios, no communication will take place between these devices.

Use the same WEP Key(s) on all of the 802.11b devices on your network.

Note:

In order to communicate when WEP is enabled, all 802.11b devices on the same network must use the same default WEP Key.

For 40 bit encryption, the WEP Key is expressed as 5 sets of two hexadecimal digits (0-9 and A-F). The Harmony 802.11b Access Point can support up to four 40-bit WEP Keys. You must select one of these keys as the default key that the Access Point will use to encrypt and decrypt authentication packets and data.

For 128 bit encryption, the WEP Key is expressed as 13 sets of two hexadecimal digits (0-9 and A-F). The Harmony 802.11b Access Point can support up to four 128-bit WEP Keys. You must select one of these keys as the default key that the Access Point will use to encrypt and decrypt authentication packets and data.

Advanced Settings

The Advanced Settings tab allows you to configure the parameters described below.

Supported Rates

The IEEE 802.11b specification supports four data rates: 11 Mbps, 5.5 Mbps, 2 Mbps, and 1 Mbps. As a mobile client travels further and further away from an 802.11b Access Point, the data rate automatically decreases in order to maintain a usable radio connection. Therefore, 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 Harmony 802.11b Access Point supports all four data rates. However, you can prevent the Access Point from using a specified data rate by unchecking the appropriate box.

For example, if your application requires that the Harmony 802.11b PC Card maintains an 11 Mbps data rate, you can uncheck the 5.5 Mbps, 2 Mbps, and 1 Mbps options. The Access Point and PC Card will always attempt to operate at 11 Mbps but this may

greatly reduce the size of the coverage area provided by the Access Point. Once the PC Card moves outside the range that provides 11 Mbps operation, the PC Card will lose connectivity with the network.

RTS/CTS

The 802.11b 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 of time. This helps to minimize collisions.

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

You may configure a Harmony 802.11b Access Point to always use RTS/CTS, never use RTS/CTS, or use RTS/CTS for packets over a certain size.

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

The RTS/CTS Threshold parameter supports a range between 0 and 1513 Bytes (which is the largest Ethernet packet).

If set to 0, then a sending radio will use RTS/CTS before sending any packet. If set to 1513, then a sending radio will not use RTS/CTS for any packets except those that are 1513 Bytes.

5. Performance Hints

This section provides the user with ideas for how to improve the performance of a Harmony 802.11b network.

Microwave Ovens

Microwave ovens operate in the same frequency band as the Harmony 802.11b Access Point. Therefore, if you use a microwave within range of the Access Point you may notice network performance degradation. However, both your microwave and your Access Point will continue to function.

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. However, Proxim has developed some guidelines to estimate the range that users will see when the product is installed in their facility, but there are no hard and fast specifications.

Radio signals may reflect off of some obstacles or be absorbed by others depending on their construction. For example, with two 802.11b radios, you may achieve up to 1000' in open space outdoors where the two antennas have line of sight, meaning they see each other with no obstacles. However, the same two units may only achieve up to 300' of range when used indoors.

The IEEE 802.11b specification supports four data rates: 11 Mbps, 5.5 Mbps, 2 Mbps, and 1 Mbps. Operation at 1 Mbps provides greater range than operation at 11 Mbps. The Harmony 802.11b Access Point will automatically adjust the data rate to maintain a usable radio connection.

Therefore, a client that is close to the Access Point may operate at 11 Mbps while a client that is on the fringe of coverage may operate at 1 Mbps. As described in Chapter 4, you can configure the data rates that the Access Point will use. Note that if you limit the range of data rates available to the Access Point, you may reduce the effective range of the Harmony 802.11b products.

Proper antenna placement can help improve range. Here are some guidelines:

- ❑ The antenna should be placed so that it emits its signal in the appropriate direction. The Harmony 802.11b Access Point comes with an integral diversity antenna. For best results, place the antenna in the up or vertical position.
- ❑ Place the antenna as high as possible. In an office environment, try to place it above cubicle walls.
- ❑ Do not place a sheet of metal (like a filing cabinet) between two antennas.

6. Troubleshooting

The Harmony 802.11b Access Point is designed to be very easy to install and operate. However, if you experience difficulties, use the information in this chapter to help diagnose and solve problems. Also, refer to the *Harmony Access Point Controller Model 7560 User's Guide* for additional troubleshooting suggestions. If you cannot resolve a problem, contact Proxim Technical Support, as described in Appendix D, "How to Reach Technical Support."

How to Obtain Help with Your LAN Installation

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

LED Error Codes

The Status LED, located on the top of the Harmony 802.11b Access Point, will flash red in a repeating pattern to indicate the following errors:

- 1 blink:** Memory error
- 2 blinks:** Flash write error
- 3 blinks:** Ethernet initialization error
- 4 blinks:** Radio initialization error

If you see any of the above flashing sequences, recycle power to the Access Point. If the flashing sequence persists after you have reset the unit, make a note of which of the above patterns you have and contact Proxim Technical Support.

Common Problems and Solutions

Problem 1:

The Harmony 802.11b Access Point is not automatically recognized by the Harmony AP Controller.

Solution 1:

Follow these steps:

1. Confirm that the Link LED is on; this means that the Access Point has a network connection. If the LED is not on, try another Ethernet cable.
2. Try recycling power to the unit. The Access Point will try to contact an AP Controller during boot-up. Therefore, if you are using the external AC power supply, you should connect the Access Point to the Ethernet network before turning on the unit.
3. If neither of the above solves the problem, try to manually add the Access Point as described in the *Harmony Access Point Controller Model 7560 User's Guide*.

Problem 2:

My Harmony 802.11 PC Card will not associate with the Harmony 802.11b Access Point.

Solution 2:

Follow these steps:

1. Try to bring the devices closer together; the PC Card may be out of range of the Access Point.
2. Confirm that the Access Point and PC Card have the same SSID.

3. Confirm that the Access Point and PC Card have the same Encryption settings, if enabled.
4. Confirm that the Access Point's Status LED is green or use the Harmony system's Web browser interface to confirm that it is partnered with an AP Controller. A PC Card cannot associate with an Access Point unless the Access Point is partnered with an AP Controller.

Problem 3:

The Status LED is amber.

Solution 3:

The Status LED will turn solid amber under two conditions:

- The unit is initializing
- The unit has successfully initialized but could not find an AP Controller to partner with

Open the Harmony system's Web browser interface to determine if the Access Point has successfully partnered with an AP Controller. If the Access Point is not partnered with an AP Controller, refer to the steps in Solution #1 above. Also, confirm that the AP is enabled. A disabled Access Point cannot partner with an AP Controller.

Problem 4:

The Status LED is blinking amber.

Solution 4:

The Status LED will blink amber if the Access Point requires a new firmware image. The Access Point receives new firmware images from the AP Controller. Refer to the *Harmony Access Point Controller Model 7560 User's Guide* for information on upgrading Access Point firmware.

Problem 5:

The throughput seems slow.

Solution 5:

1. To achieve maximum throughput, verify that your antennas are well-placed, not behind metal, and do not have too many obstacles between them. If you move the client closer to the Access Point and throughput increases, you may want to consider adding a second Access Point and implementing roaming.
2. Check the AP Controller's filter settings to confirm that it is not forwarding unnecessary Ethernet traffic to mobile clients.

Problem 6:

How do I upgrade the firmware on an Access Point?

Solution 6:

The Access Point receives new firmware images from the AP Controller. Refer to the *Harmony Access Point Controller Model 7560 User's Guide* for details.

A. Parameters

Parameter Name	Range	Default
AP Name	1-63 characters	unit's physical address
Enable AP	Enabled, Disabled	Enabled
Partnered APC	-	Any
Channel	1-11; 1, 6, and 11 are independent	Assigned by AP Controller
Supported Clients	11 Mbps clients only, Allow 2 Mbps clients	Allow 2 Mbps clients
SSID	1-32 characters	proxim
IP Address	Use DHCP, Specify IP	Use DHCP
WEP Encryption	Do Not Use WEP, Use WEP for Authentication Only, Use WEP for Encryption Only, Use WEP for Authentication and Encryption	Do Not Use WEP
WEP Key Size	40 bit, 128 bit	40 bit
WEP Key(s)	10 hexadecimal digits for 40 bit encryption, 20 hexadecimal digits for 128 bit encryption	Blank
Supported Rates	Any combination of 11 Mbps, 5.5 Mbps, 2 Mbps, 1 Mbps	All rates supported
RTS/CTS	Always on, Always off, Based on packet size	Always off

B. IEEE 802.11b Direct Sequence Channels

The IEEE 802.11b standard specifies 14 Channels within the 2.4 GHz frequency band. The following table lists the center frequency for each Channel.

If operating multiple Access Points in the same vicinity, the distance between the center frequencies must be at least 25 MHz to avoid interference. There are three independent Channels that do not overlap: 1, 6, and 11.

Note that the available Channels differ from country to country. In the United States, only Channels 1 through 11 are available.

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

C. Harmony 802.11b Access Point Specifications

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

Network Interfaces	Ethernet 10Base-T (Twisted-Pair)
Data Rate	11, 5.5, 2, and 1 Mbps — IEEE 802.11b 10 Mbps — Ethernet
Media Access Protocol	IEEE 802.11b
Ethernet compatibility	IEEE 802.3
Frequency Band	2.4-2.5 GHz Worldwide (Depends on country) (spread spectrum direct sequence)
Channels	2 to 14 (Depends on country) 11 for the United States; 3 independent Channels
Output Power	16 dBm or 40 mW
Operating Temperature	0°C to +50°C
UL Listed Power Supply	The 802.11b Access Point requires power from either a Harmony Power System or from an external power supply. The Harmony 802.11b Access Point includes a UL listed, Class 2 power supply.

D. How to Reach Technical Support

If you're having a problem using the Harmony 802.11b Access Point, gather the following information and contact Proxim Technical Support:

- What Harmony products are installed on the network?
- What were you doing when the error occurred?
- What error indication did you see?
- Can you reproduce the problem?

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

Tel: 800-477-6946 or 408-731-2640

Fax: 408-731-3676

Web: <http://www.proxim.com/>

E-mail: support@proxim.com

Mail: Proxim, Inc.
Attn: Technical Support
510 DeGuigne Drive
Sunnyvale, CA 94085

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