# Legra Radio LR11b Installation Guide

Preliminary

009-10602-A
June 2003

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 instructions, may cause harmful interference to radio communications. However, there is no guarantee that the 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 the receiving antenna

- Increase the separation between the equipment and receiver

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

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

FCC Caution: To assure continued compliance, (example - use only shielded interface cables when connecting to computer or peripheral devices). Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. 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.

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Preliminary

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*Legra Systems Inc. Proprietary and Confidential*

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# Introduction

## Intended Audience

The *Legra Radio LR11b Installation Guide* is intended for network or computer technicians responsible for installing the LR11b. The following assumptions are made:

- The user will read this guide prior to installation.

- The user is familiar with concepts and terminology of wireless local area networking (WLAN).

## Objective

The *Legra Radio LR11b Installation Guide* describes the Legra Radio hardware features, physical and performance characteristics, and explains how to install the Legra Radio.

For information about configuring the LR11b and associated components, see .

# About this Guide

The *Legra Radio LR11b Installation Guide* is organized into the following chapters:

| Chapter | Description |
|---|---|
| **Chapter 1, Overview** | Contains an overview of the Legra Radio physical and functional characteristics, including the LEDs and supported standards. |
| **Chapter 2, Installation** | Contains the warnings, installation instructions, and unpacking information for installing the LR11b. |
| **Chapter 3, Mounting Instructions** | Contains instructions for installing the LR11b on the contained mounting brackets. |
| **Appendix A, Specifications** | Lists the physical and environmental specifications of the LR11b and regulatory approvals. |

# Documentation Conventions

This document uses the following conventions for Warnings, Cautions, and Notes:

**WARNING**

A Warning means danger. The reader is in a situation that could result in bodily injury. Follow standard practices for preventing accidents.

**CAUTION**

A Caution means that the reader should take care to avoid damage to the equipment.

| NOTE | A note means that the reader should take note. Notes contain helpful suggestions or references to related documents. |
| --- | --- |

# Related Documents

The following documents provide additional information about the LR11b and associated components:

| Number | Title |
| --- | --- |
| 009-20418-A | Legra Switch LS2012 User Guide |
| 009-60422-A | Legra Manager LM6000 User Guide |
| 009-20505-B | Legra Switch LS2012 Installation Guide |
| 009-60610-A | Legra Manager LM6000 Installation Guide |
| 009-10610-A | Legra Radio LR11b Quick Start Guide |

You can download the above documents in the Support section of the the Legra Systems Inc. web site:

http://www.legra.com/

# Documentation Feedback

You can submit feedback about Legra documentation at the following email address:

techpubs@legra.com

# Technical Assistance

You can reach Legra technical support at the Legra web site:

http://www.legra.com

# 1

# Overview

This chapter describes:

- Key Features

- Additional Tools/Items

- Unpacking the Legra Radio

- Setup Overview

# Key Features

The Legra Radio LR11b (Figure 1-1) access point provides wireless high-speed data communications between a switch and end user stations equipped with 802.11b wireless adapters. You can connect a Legra Radio directly to a Legra Switch with a category 5 Ethernet cable, or third-party switch.



**Figure 1-1  Legra Radio LR11b**

The Legra Radio can be powered by Power over Ethernet (PoE) provided through the RJ-45 Ethernet connector (Figure 1-2). When

connected to a Legra Switch, the Legra Radio downloads software from the Legra Switch.



**Figure 1-2  Legra Radio Aft Connectors**

You can also connect the Legra Radio to a third-party vendor's switch and manage the Legra Radio from a Legra Switch through your network. During the Radio's initial configuration, you must imprint the Legra Switch's DNS information on the Legra Radio. For more information, see "Imprinting a Legra Radio" on page 20.

If your third party switch does not support PoE, you can use an inline power injector to power the Legra Radio, or connect a Legra power brick to the 5V DC Power Socket.

## *Power over Ethernet (PoE) Compatibility*

The Legra Radio is Power over Ethernet ready in accordance with IEEE 802.3af. The Legra Radio has a RJ-45 10/100 Ethernet connector

(Figure 1-2). Using a category 5 cable, you can connect the Legra Radio directly to 10/100 Ethernet port on the Legra Switch LS2012, or a third party switch that supports PoE.

If your third party switch does not support PoE, you can use an inline power injector or a Legra power brick (sold separately) to provide power to the Legra Radio.

## Radio Characteristics

The Legra Radio uses a radio modulation technique known as Orthogonal Frequency Division Multiplexing (OFDM), and a shared collision domain (CSMA/CA). Data is transmitted over a half-duplex radio channel operating at up to 11 Megabits per second (Mbps), and with a maximum operating range up to 500 meters (1640 feet).

## MAC Addresses

The Legra Radio is preconfigured with two Media Access Control (MAC) addresses: one for the ethernet network connection, and one for the wireless connection with an end user station. You can view the MAC addresses on the labels located on the bottom of the Legra Radio. The ethernet MAC Address also appears in the LM6000 Network Management System (NMS) and Legra Switch LS2012 User interface when you configure your network.

## LED Indicators

The Legra Radio includes four status LED indicators, as described in Figure 1-3 and Table 1-1.

**Figure 1-3  Legra Radio LEDs**

**Table 1-1      LED Status Descriptions**

| LED | Color | Status | Description |
|-----|-------|--------|-------------|
| **Power** | Green | Solid On | Indicates that power is being supplied. |
| | | Flashing | Indicates imprinting of LS2012 parameters in progress |
| | Amber | Slow Flashing | Imprinting information incomplete |
| | | Fast Flashing | Initialization failure |
| **LAN** | Green | Flashing | Indicates that the Legra Radio is transmitting or receiving data on a 10/100 Mbps Ethernet LAN from the switch. Flashing rate is proportional to network activity. |
| **Switch** | Green | On | Indicates LS2012 connection. |
| | | Off | No LS2012 connection. |
| | | Slow Flashing | Searching for LS2012 connection. |
| | | Fast Flashing | Software upgrade in progress. |

**Table 1-1      LED Status Descriptions  (Continued)**

| LED | Color | Status | Description |
|-----|-------|--------|-------------|
| **WLAN** | Green | On | Indicates a valid 802.11b wireless link. |
| | | Off | No WLAN Activity |
| | | Flashing | Indicates that the Legra Radio is transmitting or receiving data through wireless links. Flashing rate is proportional to network activity. |

# Additional Tools/Items

You will need the following to install and connect your Legra Radio:

- Category 5 Ethernet cable (100 meters maximum) to connect the radio to a Legra or third party switch.

- 3/16-inch drill for installing wall anchors.

- Power Drill for installing wall anchors.

- Phillips head screwdriver

# Unpacking the Legra Radio

This section describes the contents of the Legra Radio LR11b packaging.

### To unpack the Legra Radio

**1**   Open the box and carefully remove the contents. Save the packing materials.

**2**   Ensure that all items listed in "Package Contents" on page 8 are included in the shipment. Check each item for damage. If any item is damaged or missing, notify your Legra Systems representative.

## Package Contents

The Legra Radio package includes items shown in Table 1-2.

**Table 1-2      Legra Radio LR11b Package Contents**

| Picture | Item | Qty |
|---|---|---|
|  | Legra Radio LR11b | 1 |

**Table 1-2      Legra Radio LR11b Package Contents  (Continued)**
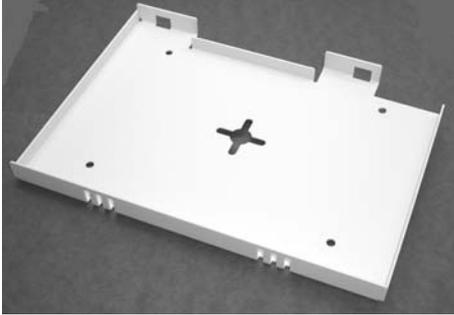
| Picture | Item | Qty |
|---|---|---|
|  | Mounting Bracket | 1 |
|  | Wall Anchors | 4 |
|  | Screws | 4 |
|  | Legra Radio Quick Start Guide | 1 |
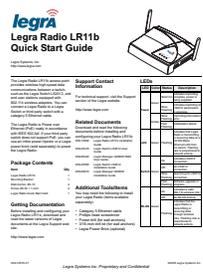
# Setup Overview

The LR11b radio is the last group of the Legra devices that the you should install.

**1** Install and configure the Legra Manager LM6000. For more information, see the *Legra Manager LM6000 Installation Guide*.

**2** Install and configure Legra Switch LS2012. For more information, see the *Legra Switch LS2012 Installation Guide*.

**3** Unpack the Legra Radio LR11b. For more information, see "Unpacking the Legra Radio" on page 8.

**4** Plan the locations of your Legra Radios. For more information, see "Installation Guidelines" on page 16.

**5** Imprint any Legra Radios to be indirectly connected to a LS2012. For more information, see "Imprinting a Legra Radio" on page 20.

**6** Install your Legra Radios."Mounting Instructions" on page 17.

**7** Configure and enable the Legra Radios through the LS2012 user interface or LM6000 Network Management System (NMS).

## *LR11b Radio Configuration*

When a LR11b radio is initially connected to a switch, the Legra Radio's interface is inactive. The following steps describe how to provision and activate the interface.

**1**  If the Legra Radio is connected to a third party switch, configure your network so that IP packets are routed to and from the Legra Radio to the Legra Switch across your network.

**2**  Determine the radio channel settings for the Legra Radios. You can use the LM6000's Automatic Optimizer to calculate the channel of the connected LR11b radios. After performing the calculation, the LR11b radios are operational.

**3**  Make any modifications to the calculated channels and transmission power.

**4**  Enable the radio interface on the Legra Radios from the LS2012 user interface or LM6000 NMS.

# 2

# Installation

This chapter describes:

- Safety Information

- Installation Guidelines

# Safety Information

The following sections describe important safety information. Following the safety guidelines and warnings when installing and operating your Legra Radio.

## *FCC Safety Compliance Statement*

The Legra Radio complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. The Legra Radio should be installed and operated with a minimum distance of 20 centimeters (8 inches) between the transmitter and your body. The Legra Radio must not be co-located or operating in conjunction with any other antenna or transmitter.

## *General Safety Guidelines*

- Do not touch or move the antennas during operation.

- Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.

- Use in specific environments:

  › The use of wireless devices in hazardous locations is limited to the constraints posed by the local codes, the national codes and the safety directors of such environments.

  › The use of wireless devices in hospitals is restricted to the limits set forth by each hospital.

## *Warnings*

Comply with the following warnings when installing and using your Legra Radio.

**WARNING**

To comply with FCC radio frequency (RF) exposure limits, the Legra Radio antennas should be located at a minimum of 8 inches (20 cm) or more from the body of all persons when in use.

**WARNING**

Do not locate the Legra Radio antennas near overhead power lines or other electric light or power circuits, or where the Legra Radio antennas can come into contact with such circuits.

**WARNING**

Do not work on the Legra Radio or connect or disconnect cables during periods of lightning activity.

**WARNING**

Read the installation instructions before you connect the Legra Radio to its power source.

**WARNING**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).

# Installation Guidelines

Use the following guidelines when determining the location of the LR11b radios:

- In general, the best location is in the center of your wireless coverage area within line of sight of all wireless devices.

- The higher off of the floor you install the Legra Radio, the better the performance.

- Metal objects can obstruct the radio signal. Install your Legra Radio away from large steel structures such as shelving units and filing cabinets to ensure that the steel objects do not obstruct the radio signals to and from your Legra Radio.

- Operation of electromechanical devices, such as room fans or microwave ovens, can interfere with the radio signal. Locate your Legra Radio away from electromechanical devices to ensure that the radio signal is not interfered with during operation.

- Each Legra Radio should to be mounted with the provided mounting hardware.

- Legra Radios are connected to the LS2012 using standard category 5 cabling (less than 100 meters).

- If your third party switch does not use PoE or an inline power injector, use a power brick to power the Legra Radio. The power brick must be located within a 2 foot radius of the Legra Radio.

# 3

# Mounting Instructions

This chapter describes:

- Overview

- Installing the Mounting Bracket

- Attaching the Legra Radio to the Mounting Bracket

- Removing the Legra Radio from the Mounting Bracket

- Imprinting a Legra Radio

- Connecting Power to the Legra Radio

# Overview

You can install the Legra Radio on horizontal or vertical flat surfaces, such as walls or ceilings. The Legra Radio includes a separate mounting bracket. You can install the mounting bracket with screws, or wall anchors and screws. Use the mounting bracket as a template to mark the locations for the attaching hardware.

## *Installing the Mounting Bracket*

You can install the mounting bracket on a horizontal or vertical surface, such as a ceiling or wall.
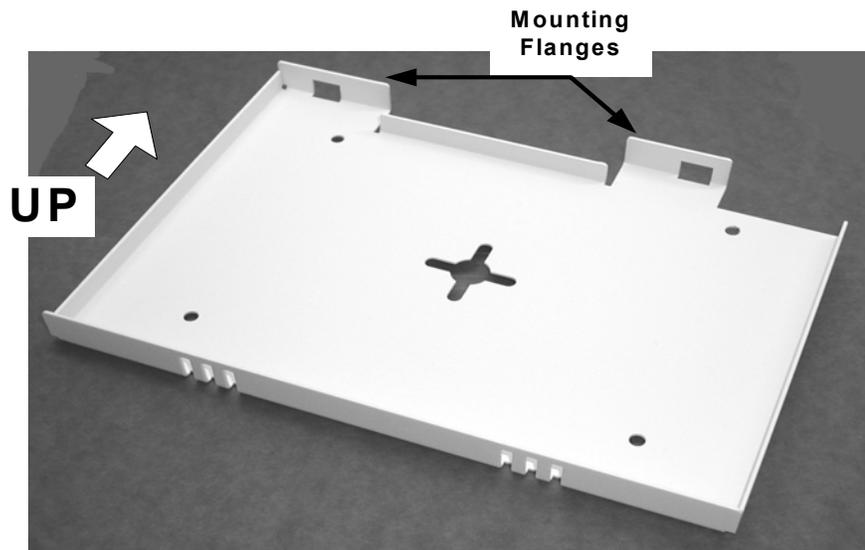


**Figure 3-1  Legra Radio LR11b Mounting Bracket**

Use the holes in the mounting bracket as a template to mark the locations of the attaching hardware. If necessary, you can use the provided wall anchors to secure bracket to the surface.

⚠
**CAUTION**

Do not install the Legra Radio upside down. Otherwise, damage to the unit may occur.

If you are installing the Legra Radio on a vertical surface, ensure that the top mounting flanges are oriented up or to the side. The bracket's mounting flanges support the weight of the Legra Radio.

*To install the mounting bracket*

**1**  Mark the locations of the four mounting holes using the mounting bracket as a template.

**2**  If using the wall anchors, install the wall anchors in the four mounting hole locations.

**3**  Install the mounting bracket using four screws.

The mounting bracket is installed.

## Attaching the Legra Radio to the Mounting Bracket

You can connect the Legra Radio to the mounting bracket with the following procedure.

*To attach the Legra Radio to the mounting bracket*

**1**  Install the Legra Radio's aft mounting slots on to the mounting flanges. Be sure that the LR11b hooks engage the bracket slots.

**2**  Press the front of the Legra Radio to secure it to the mounting bracket. You should hear the Legra Radio snap into place.

## Removing the Legra Radio from the Mounting Bracket

You can remove the Legra Radio from the mounting bracket with the following procedure.

### To remove the Legra Radio from the mounting bracket

**1** Push the Legra Radio from front toward the aft of the unit. This decouples the hooks from the bracket's mounting flanges.

**2** Pull the aft portion or the Legra Radio away from the bracket and remove the Legra Radio from the mounting bracket.

The Legra Radio is removed from the bracket.

## Imprinting a Legra Radio

You can physically connect your Legra Radio to a network device other than a Legra Switch. However, before connecting, you must imprint the Legra Radio with information from a Legra Switch LS2012. Imprinting transfers the Legra Switch's DNS information on to the Legra Radio, allowing you to route IP packets to and from the Legra Radio across your network to the remote Legra Switch.

The imprinting process begins when you plug the Legra Radio into a Legra Switch with a category 5 Ethernet cable. The Legra Switch sends Power over Ethernet and DNS information to the Legra Radio. The Legra Radio's Power LED blinks slowly during the imprinting process and becomes solid green when imprinting is complete.

When imprinting is complete, you can disconnect the Legra Radio, install it, and connect it to your network device. You must then configure your network so that the Legra Switch and Legra Radio transmit IP packets to one another through your network. You can remove the imprinted information when you hold down the RESET button for several seconds. After RESET, you must then connect the the Legra Radio to imprint information from another Legra Switch.

*To imprint LS2012 information on a Legra Radio*

**1** Connect a category 5 Ethernet cable to the Legra Switch 10/100 Ethernet port.

**2** Connect the cable to the Legra Radio's RJ-45 Ethernet Port.

The green Legra Radio Power LED blinks slowly. The LED turns solid green when imprinting is complete.

The Legra Radio is imprinted.

## Connecting Power to the Legra Radio

Use one of the following methods to provide power to the Legra Radio:

• Power over Ethernet (PoE)

• Inline Power Injector

• Power Brick

### Power over Ethernet (PoE)

If you connect a Legra Radio directly to a Legra Switch, the Legra Radio operates on PoE from the Legra Switch. After you connect a category 5 Ethernet cable to your Legra Switch, additional power connections are not required.

You can also connect your Legra Radio to a third party switch. If the third party switch does not support PoE, use an inline power injector or power brick to power the Legra Radio. If the third party switch supplies Power over Ethernet, additional power connections are not required.

### Inline Power Injector

If your third party switch does not support PoE, you can place a power injector inline between the switch port and the Legra Radio. See your power injector documentation for installation and usage instructions.

### Power Brick

If a power injector cannot be used, use a power brick (Figure 3-2) to power the Legra Radio.

**Power Brick**

**Power Cord**

**Mounting Bracket**

**Figure 3-2  Legra Radio Power Brick (Sold Separately)**

The power brick connects to a wall outlet at one end and the Legra Radio 5V DC Power Socket at the other. The power brick must be located within a 2 foot radius of the Legra Radio.

The Legra power brick and mounting bracket are sold separately. Contact your Legra System Inc representative for more information.

# A

# Specifications

**Table A-1     Performance Specifications**

| Name | Description |
|---|---|
| **802.11b** | FCC/IC: 1-11<br>ETSI: 1-13<br>France: 10-13<br>Spain: 10-11<br>MKK: 1-14 |
| **Maximum Clients** | 64 |
| **Operating Range** | Up to 500 m (1640 ft) |
| **Data Rate** | Normal Mode: 1, 2, 5.5, 11 Mbps per channel |
| **Network Configuration** | Infrastructure |
| **Operating Frequency** | 5.15 ~ 5.25 GHz (lower band) US/Canada, Japan |
| | 5.25 ~ 5.35 GHz (middle band) US/Canada |
| | 5.725 ~ 5.825 GHz (upper band) US/Canada |
| **Power supply** | Input: 100-240 AC, 50-60 Hz<br>Output: 5 VDC, 3 A |
| **Output Power** | 16 dBm minimum |

**Table A-2     General Specifications**

| Characteristic | Specification |
|---|---|
| Physical Size | 20.5 × 13.6 × 4 cm, (8.07 × 5.35 × 1.58 in) |
| Weight | 280 grams (9.9 oz) |
| LED Indicators | See "LED Indicators" on page 4. |

### Table A-2    General Specifications

| Characteristic | Specification |
|---|---|
| Network Management | Legra Manager LM6000 Network Management System<br>Legra Switch LS2012 User Interface |
| Operating Systems | Windows 98/Me/NT/2000/XP |
| Temperature | Operating: 0 to 50 ºC (32 to 122 ºF)<br>Storage: 0 to 70 ºC (32 to 158 ºF) |
| Humidity | 5% to 95% (non-condensing) |

### Table A-3    Compliances

| Category | Standard |
|---|---|
| Compliances | IEC 61000-4-2/3/4/6/11 |
| Emissions | FCC Class B<br>RCR STD-33A |
| Safety | CSA/NTRL (CSA 22.2 No. 950 & UL 1950)<br>EN60950 (TUV/GS), IEC60950 (CB) |
| Standards | IEEE 802.3 10BASE-T<br>IEEE 802.3u 100BASE-TX<br>IEEE 802.11a/b<br>IEEE 802.3af PoE |

# Contact Information

Legra Systems, Inc.
3 Burlington Woods Drive
Burlington, MA 01803-4543


Tel: (781) 272-8400
Fax: (781) 272-8401
Website: http:\\www.legra.com