System Requirements

An LG*Cell* system has location, space, power, and safety requirements for installation. The Dual Band LG*Cell* requirements for space and power are different from those for a single-band system and are noted below.

System Location

The LGC*ell* Main Hub and Expansion Hub mount into a standard 19" equipment rack in a wiring, telecom, or electrical closet, which may contain other Ethernet, telephony, or miscellaneous equipment.

- Standard wiring closet temperatures: 0-45° C
- Does not require special air conditioning

Space Requirements

The LGC*ell* Main Hub and Expansion Hubs are installed into a standard 19” rack.

- The Main Hub height is 1.7” (44.5 mm). The Dual Band Main Hub is 3.5” (88.9 mm) high.
- The Expansion Hub height is 1.7” (44.5 mm). The Dual Band Expansion Hub is 3.5” (88.9 mm) high.
- Allow at least one inch (25 mm) clearance between each hub, between any existing equipment in the rack, and between the bottom shelf of the rack and the hub.

Power Requirements

The LGC*ell* requires AC voltage/current. LGC Wireless recommends connecting it to a UPS (Uninterruptable Power Supply), which may exist in the wiring closet. Dual-Band equipment requires twice as much power as single-band equipment.

- LGC*ell* operates with 88-264 VAC 50/60 Hz.
- The Main Hub uses a maximum of 1.6 A of electrical current.
- The Expansion Hub uses a maximum of 1.6 A of electrical current.
- The RAUs are powered from the Expansion Hubs via the UTP/STP cable and they use 12V DC.

Underwriters Laboratory Installation Guidelines

Use the following guidelines when rack mounting the LGC C*ell*:

1 Do not exceed the maximum ambient air temperature of 45° C during operation. Provide sufficient airflow and cooling within the rack to prevent heat build-up from exceeding this limit.

2 Be careful when servicing these products. If you are removing the system from the rack, turn it off and remove the power cord first. There are no user serviceable parts inside the hubs or RAUs.

3 Do not compromise the amount of airflow required for safe operation of the equipment when installing it in a rack. Both the Main Hub and the Expansion Hub draw in air on the left side and exhaust heated air at the rear. The hubs pass approximately 6 cu. ft. of air per minute through themselves and only dissipate a maximum of 25 watts of heat from their internal circuitry.

4 The AC input current consumption of the hubs is rated at 1.6 A at 110 VAC. The internal power supply has internal fuses that are not user replaceable. Consider the worst-case power consumption shown on the product labels when provisioning the rack's AC power source and distribution.

Fiber Port Safety Precautions

Suggested safety precautions for working with LG*Cell* Fiber Ports follow. For information about LG*Cell* compliance with safety standards, see *Appendix C – Compliance Information*.

- **Viewing fiber:** Observe the following warning about viewing fiber ends and ports.

Do not stare with unprotected eyes at the connector ends of the fibers or the ports of the hubs. Invisible infrared radiation is present at the front panel of the Main Hub and Expansion Hub. Do not remove the Fiber Port dust cover unless the port is in use. Do not stare directly into a Fiber Port.

- **Test fiber cables:** When you use test fiber optical cables, connect the optical power source last and disconnect it first.
- **Fiber ends:** Cover any unconnected fiber ends with an approved cap. Do not use tape.
- **Broken fiber cables:** Do not stare with unprotected eyes at any broken ends of the fibers. Report any broken fiber cables and have them replaced.
- **Cleaning:** Use only approved methods for cleaning optical fiber connectors.
- **Modifications:** Do not make any unauthorized modifications to this fiber optical system or associated equipment.

- **Live work:** Live work is permitted on the LG*Cell* as it is a Class 1 hazard.
- **Signs:** No warning signs are required.
- **Test equipment:** Use Class 1 test equipment.

Cable and Connector Requirements

The LGC*ell* equipment operates over standard TIA/EIA 568-A specification, Category 5 (CAT 5), or better, Unshielded Twisted Pair (UTP) or Shielded Twisted Pair (STP) and standard 62.5µm/125µm Multi-Mode Fiber cable (MMF), at a wavelength of 1300 nanometers (nm).

These cables are widely used industry standards for Local Area Networks (LANs). The regulations, guidelines, and standards for cable installation are identical to those specified by the TIA/EIA 568-A standard for LANs. See *Appendix B – TIA/EIA 568-A Cabling Standard.*

LGC Wireless recommends Plenum rated CAT 5 UTP/STP and MMF cable and connectors for conformity to building codes and standards.

LGC*ell* Standard Equipment

- LGC*ell* Main Hub
- LGC*ell* Expansion Hub
- Remote Antenna Units (RAUs) with an in-building antenna
- Four screws for mounting the RAUs
- Four rack mount screws per hub to mount hubs into a 19" rack
- *Installation and Reference Guide*

LGC*ell* Equipment Installation

The following are procedures for installing an LG*Cell* system. Pre-testing the system is not required. The installation procedures are based on the following assumptions:

- The LGC*ell* equipment has been unpacked and inspected.
- Locations for the Main Hub, Expansion Hubs, and RAUs have been identified.
- 19" rack space is available in the wiring closets.
- AC power is available for the LG*Cell*.
- MMF and UTP/STP have been pulled into place (based on previous design) and terminated.

LG*Cell* system installation includes the following tasks:

- Installing Main Hub
- Installing Expansion Hubs
- Installing Remote Antenna Units (RAUs) and antennas
- Connecting RF cables
- Connecting CAT 5 cables
- Connecting MMF cables
- Optimizing the system

These procedures tell you how the LG*Cell* should respond during various phases of the installation. If it is not responding as it should, see *Section 6, Common Problems, Troubleshooting, and Frequently Asked Questions*.

Equipment Inspection

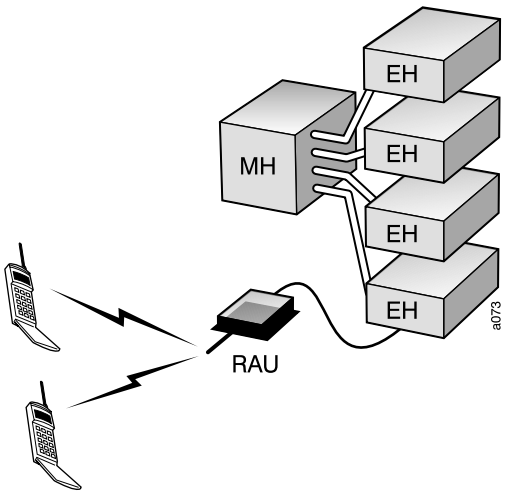
Check that all standard equipment was shipped. (See *LGCell Standard Equipment*, on page 5.) If the equipment is damaged or parts are missing, contact LGC Wireless immediately, at 1-800-530-9960 in the U.S. or, for international customers, at +1-408-487-2400.

Most problems during installation are caused by improperly terminated UTP/STP and MMF.

LGC*ell* Configuration

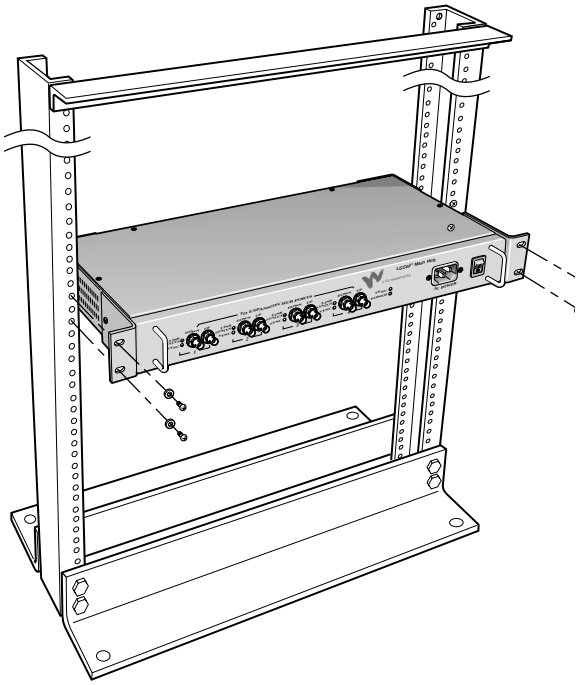
If you are installing a Dual-Band LG*Cell* system, use the following steps, from here through “RF Cable Connection” on page 16 of this chapter.

This diagram illustrates how the LGC*ell* is configured. The rest of this section contains configuration and installation procedures.



Main Hub Installation

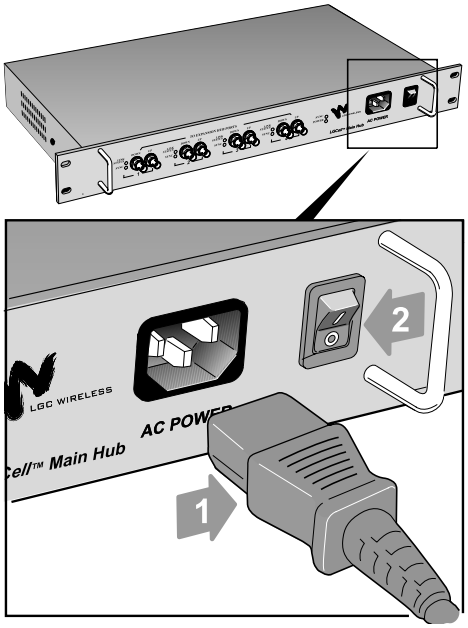
Your installation may have one or more Main Hubs, each located in the same or different wiring closet. Use the following procedures for all Main Hubs.



1 Mount the Main Hub

Mount the Main Hub to the rack in the assigned wiring closet location, using four screws provided.

For air circulation, be sure to leave at least one inch (25 mm) space between all hubs and between any other equipment in the rack. If mounting a hub on the rack's bottom shelf, also leave at least one inch (25 mm) clearance from the bottom.

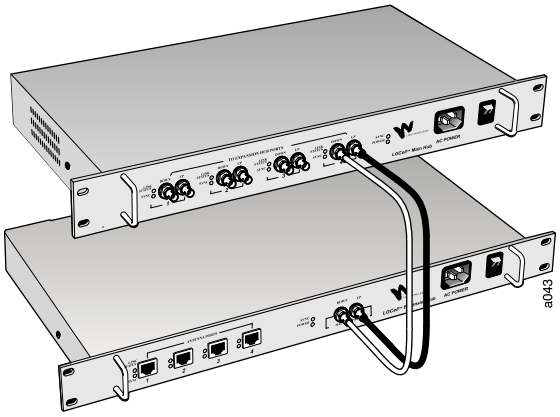


2 Connect Power and Power Up

After mounting the Main Hub, connect the AC power cord to the Main Hub. Plug the power cord into an outlet providing AC power (88-264 VAC). See 1 in graphic.

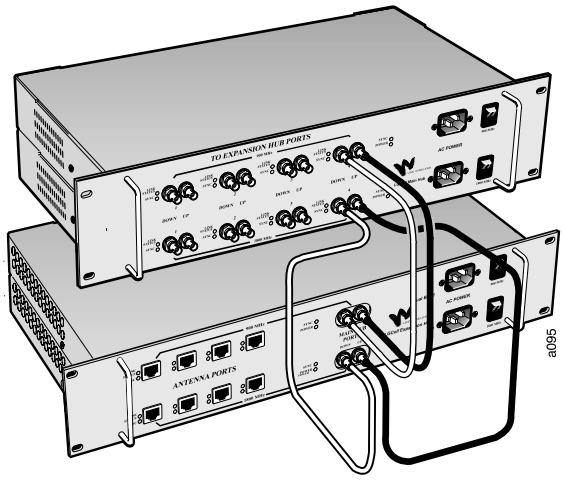
Power up the Main Hub by flipping the power switch from position **0** to position **1**. See 2 in graphic.

The **POWER** and **SYNC** LEDs on the front panel should be green (lit).



3 Connect the MMF cables

Using the procedure below, connect all MMF cables (two per port) to the MMF ST-female connectors (labeled **DOWN** and **UP**) on the Main Hub front panel. Use any available Main Hub port.



The connections for the Dual Band system are shown here. Make sure you connect the 900 MHz Main Hub to the 900 MHz Expansion Hub and the 1800 MHz hubs together.

Be sure the MMF cable ST-connectors are clean and free of dust or oils. If the fiber connector front face is not free of dust or oils, follow the manufacturer's recommendations for cleaning it.

The MMF cable is labeled with either **1** or **2,** or is color-coded. This distinguishes the connectors for proper connection between the Main Hub and Expansion Hubs.

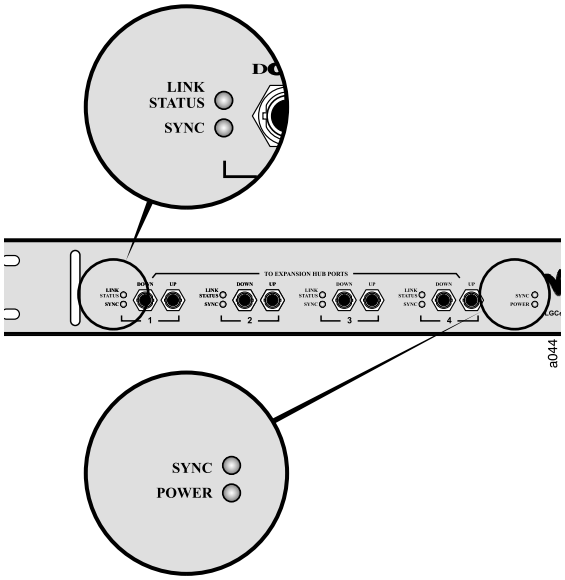
If the fiber jumper is labeled with **1** or **2**:

- Connect **1** to **UP** on Main Hub
- Connect **1** to **UP** on Expansion Hub
- Connect **2** to **DOWN** on Main Hub
- Connect **2** to **DOWN** on Expansion Hub

If the fiber jumper is color-coded (for example, "blue" or "red"):

- Connect "blue" to **UP** on Main Hub
- Connect "blue" to **UP** on Expansion Hub
- Connect "red" to **DOWN** on Main Hub
- Connect "red" to **DOWN** on Expansion Hub

Be sure to record which number or color is connected to **UP** and to **DOWN**. This information is needed when connecting the other end of the MMF cables to the Expansion Hub ports.



4 Check Main Hub LEDs

The **POWER** and **SYNC** LEDs should be green. If not, reset the Main Hub.

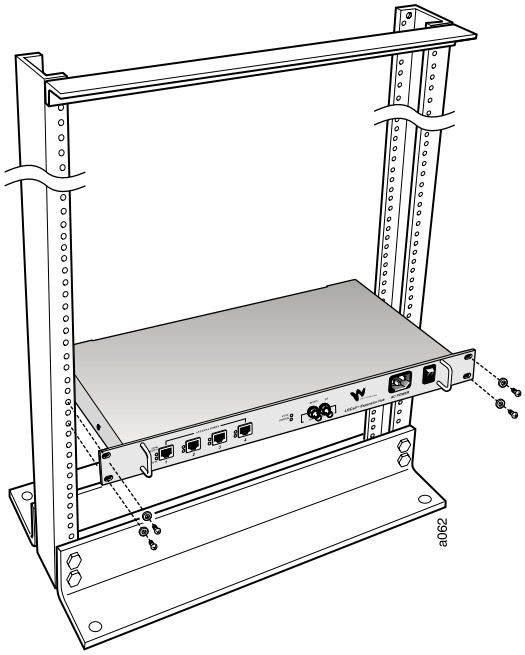
If the **POWER** and **SYNC** LEDs do not light green, see *Section 6, Common Problems, Troubleshooting, and Frequently Asked Questions*.

The **LINK STATUS** and **SYNC** LEDs on the ports where the fiber is connected should be red. This indicates that the other end of the MMF cable is not yet connected to the Expansion Hub ports.

Expansion Hub Installation

The Expansion Hubs may be located in the same or different wiring closets, and they may be located in a different wiring closet than the Main Hub.

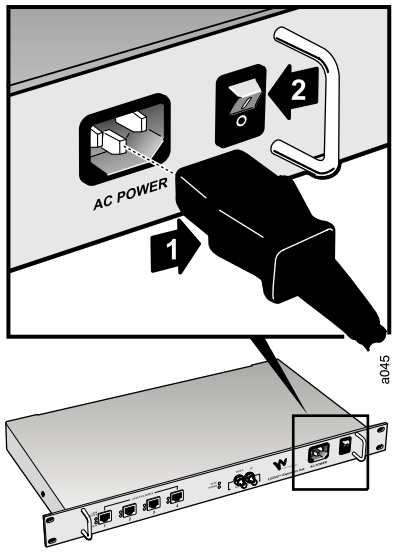
Use the following procedures for all Expansion Hubs.



1 Mount the Expansion Hubs

Mount the Expansion Hubs onto the rack in the assigned wiring closet location, using four screws per hub.

For air circulation, be sure to leave at least one inch (25 mm) space between all hubs and between any other equipment in the rack. If mounting a hub on the rack's bottom shelf, also leave at least one inch (25 mm) clearance from the bottom.

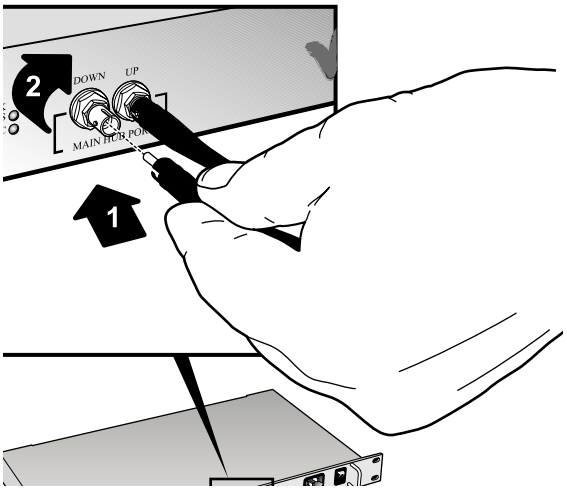


2 Connect Power and Power Up

Connect the AC power cord to the Expansion Hub. Plug the power cord into an outlet providing AC power (88-264 VAC). See 1 in graphic.

Power up the Expansion Hubs by flipping the power switch from position **0** to position **1**. See 2 in graphic.

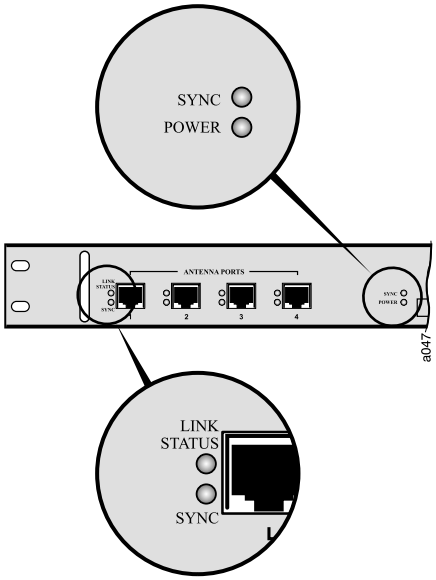
The **POWER** LED on the Expansion hub should be green (lit).



3 Connect the MMF cables

Connect all MMF cables from the Main Hub to the Expansion Hubs. The **SYNC** LED should be green.

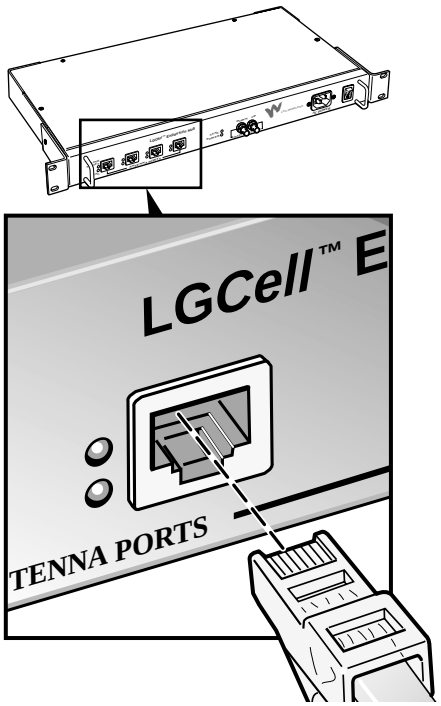
For proper connection between the Main Hub ports and the Expansion Hub ports, refer to the numbering or color coding you recorded when installing the Main Hub.



4 Check Expansion Hub LEDs

Connect all MMF cables from the Main Hub to the Expansion Hubs.

The **LINK STATUS** and **SYNC** LEDs on each Expansion Hub port should be red when the UTP/STP cable is not yet connected to the RAUs.



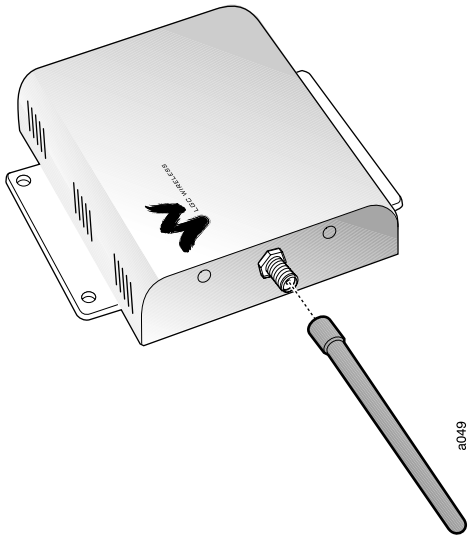
5 Connect UTP/STP cables from RAUs

Connect all UTP/STP cables coming from the RAUs to any available RJ-45 connector on the Expansion Hub.

The Expansion Hub fiber port **LINK STATUS** and **SYNC** LEDs should be green or off.

The **LINK STATUS** and **SYNC** LEDs on each Expansion Hub port should remain red until the RAU is connected on the other end.

Remote Antenna Unit (RAU) Installation



1 Connect Antennas

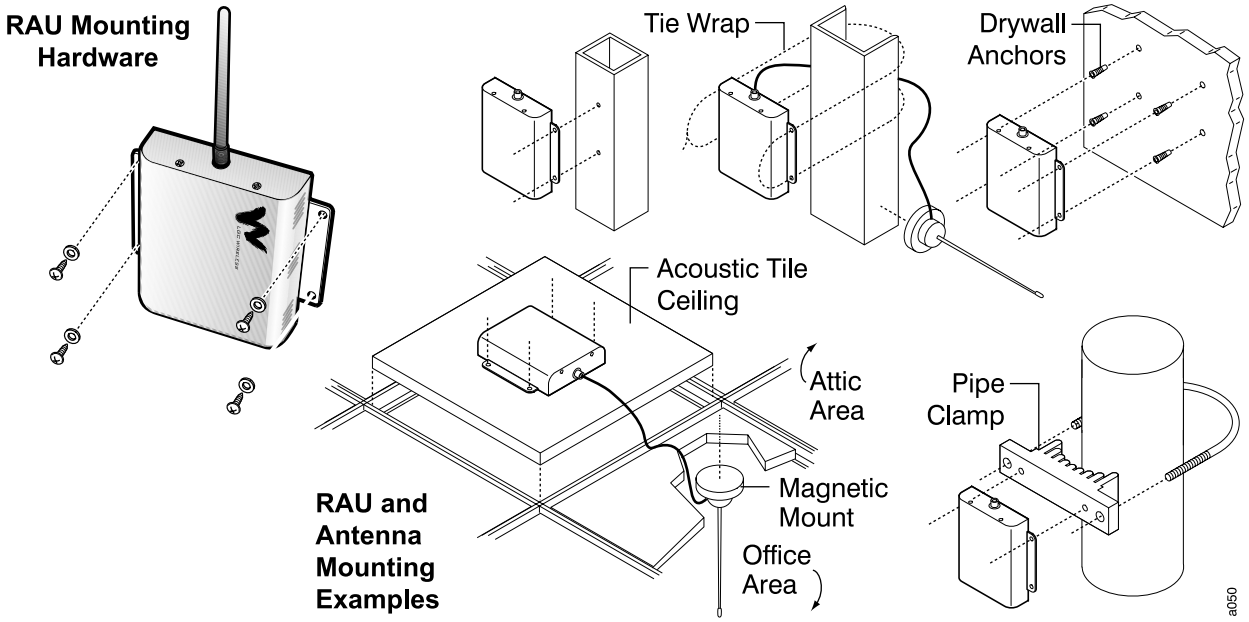
Connect an accessory antenna to each RAU SMA connector. (The illustration shows the RAU with an optional Rubber Duck antenna.)

When connecting to the SMA connector on the antenna, **DO NOT** over-tighten the connector. Firmly hand-tightening the connector is adequate.

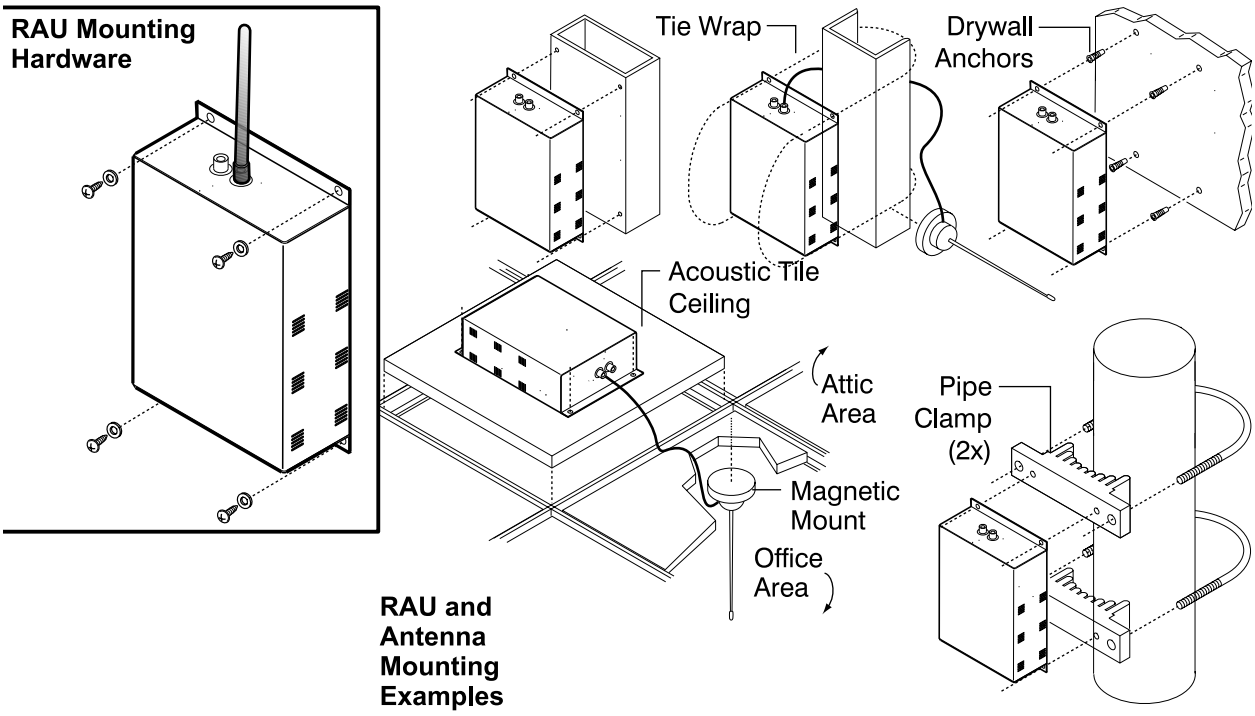
2 Mount RAUs and Antennas

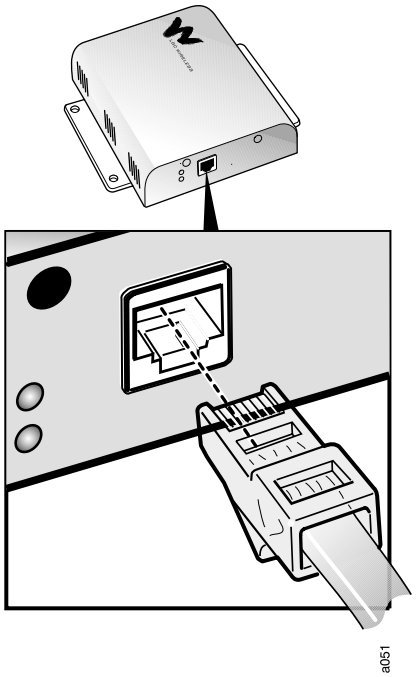
Mount all RAUs in their assigned locations, using the enclosed screws. The RAUs can mount above or below the ceiling, or to a wall.

For connecting and mounting an accessory directional antenna, refer to the instructions shipped with that antenna.



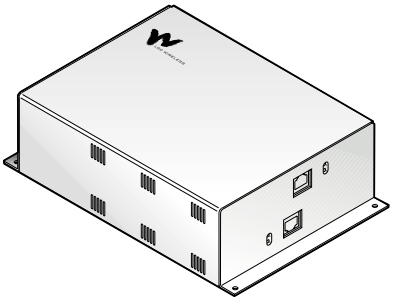
The Dual Band RAU mounting is shown below.



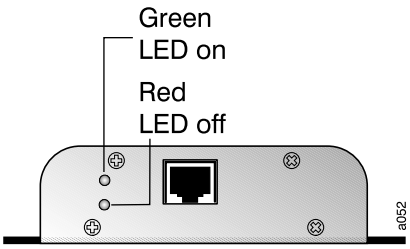


3 Connect UTP/STP Cable

Connect the UTP/STP cable coming from the Expansion Hub to the RJ-45 connector on the RAU.



For the Dual Band RAU, connect the 900 MHz Expansion Hub cable to the top connector and the 1800 MHz cable to the bottom connector.



4 Check LEDs

The green **POWER** LED should be on and the red **ALARM** LED should be off.

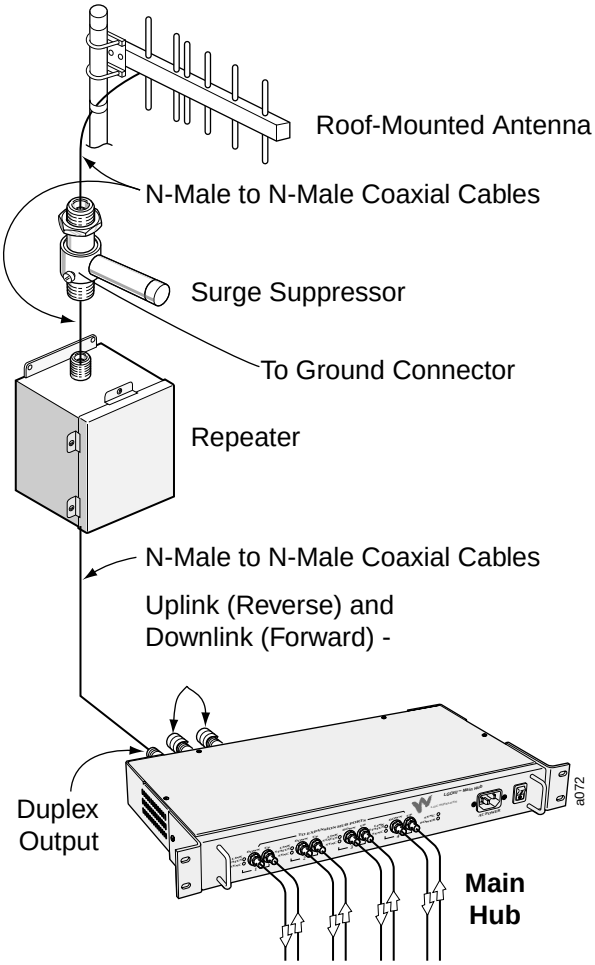
The green **LED** indicates that the RAU is receiving power from the Expansion Hub assigned to it.

RF Cable Connection

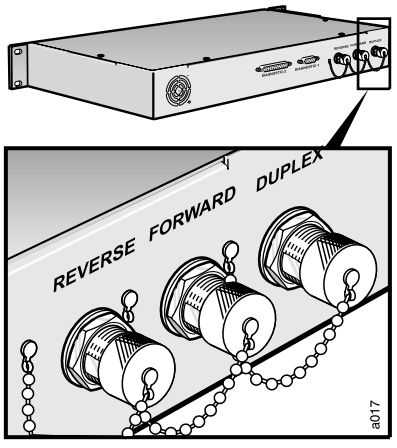
Before connecting any cables to the Main Hub, be sure the RF power level does not exceed the input rating for the Main Hub. (See "LGCell System Specifications" on page 16 in *Section 2, LGCell Equipment*.)

For coverage applications, LGC Wireless recommends that you insert a lightning arrestor or surge protector between a roof-mounted antenna and the Main Hub. If you use a repeater, insert the lightning arrestor or surge protector between the repeater and roof-mounted antenna.

The following illustration shows how to connect the LG*Cell* for coverage applications, with a repeater.



Duplex Connector

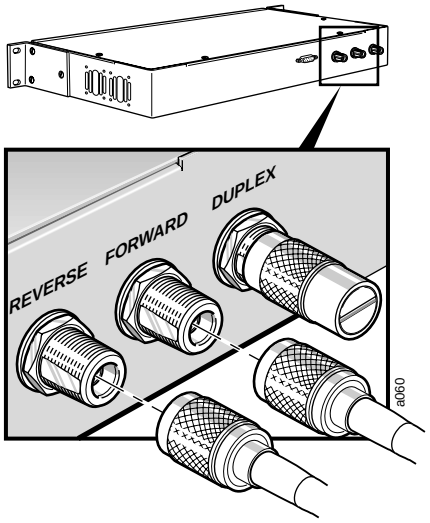


This N-type female connector is typically used to connect the LGC*ell* to a repeater, roof-mounted antenna, or MBS, as shown on the previous page.

Connect an N-type male RF coaxial cable to the duplex N-type female connector (labeled **DUPLEX**) on the Main Hub back panel. If an N-type male connectorized RF cable is not available, use an RF adaptor. Connect the other end of the coaxial cable to the roof-mounted antenna, MBS, or repeater.

The duplex ports have a variable gain. Please see the table for system gain under "Maximum Input RF Power per Carrier vs. Number of Carriers" on page 17 in *Section 2, LGCell Equipment.*

Downlink (Forward) and Uplink (Reverse) Connectors



Connect an N-type male RF coaxial cable to the downlink N-type female connector (labeled **FORWARD**) and an N-type male RF coaxial cable to the uplink N-type female connector (labeled **REVERSE**) on the Main Hub back panel.

Connect the other ends of the coaxial cable to the MBS. For diagrams of connecting LG*Cell* to specific MBS equipment, see *Section 5, Connectivity*.

For simplex MBSs, **be sure** the MBS **downlink** coaxial cable connector plugs into the downlink connector, and the **uplink** coaxial cable connector plugs into the uplink connector on the Main Hub.

Alarm Report Monitor

A separately orderable option for use with LG*Cell*, the Alarm Report Monitor is an alarm monitoring, reporting, and remote control system. Up to 255 remote-ARM monitoring units can monitor up to 2,040 LG*Cell* systems. Each remote-ARM unit communicates with the ARM software through a dial-up modem connection, using an external or internal modem. A database of these devices is set up in a PC, with a unique address for each device.

The ARM supports multiple users and tracks responsibility through log-in and log-out procedures, using four security levels to protect critical system functions. It features a graphic color status display, remote system reset control, alarm history and control logs, security code management, and journal printer and paging options.

For ARM installation instructions, see *Appendix E – Alarm Report Monitor (ARM2000)*.