wirelessSEISMIC

RT System 2

Deployment Guide

June 21, 2012

Part Number: 90-0018

R00.e

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1

Overview

1.1 About this Guide

This document provides information on how to deploy the RT System 2 in the field. See the *RT System 2 Installation Guide* for instructions on setting up the recording truck equipment and software.

1.2 Who Should Use this Guide

The expected users of this document are as follows:

- Crew (Layout/Troubleshooters)
- Technician (LIU)
- Bosses (Line Crew)

1.3 Related Documents

RT System 2-related documents are as follows:

- **RT System 2 Documents Guide** (90-0026) – Lists all of the RT System 2 documents with a brief description of each.
- **RT System 2 Glossary** (90-0032) – Lists and defines RT System 2 terms and acronyms. Includes some general seismic and geologic terms and acronyms.
- **RT System 2 Installation Guide** (90-0028) – Provides instructions for setting up the recording truck hardware, and installing and updating software and firmware.

1.4 Getting Help

To get help on the RT System 2 Central Recording System, consult the online help. You can find the help documents by clicking the help icon in the user interface, or by navigating to the following directory:

`C:\wsi\rt\vx.y.z\server\help\index.htm`

Where `vx.y.z` is the version number (for example, v2.0.0).

To get help on the RT System 2 deployment, consult this document.

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If you cannot find the answers you need, please contact Wireless Seismic, Inc. Customer Support at:

13100 Southwest Freeway, Suite 150
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(832) 532-5048

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2

Layout

This chapter describes how to prepare (mobilization) and layout (install) the ground electronics. See the *RT System 2 Installation Guide* for instructions on setting up the recording truck equipment and software.

2.1 Prerequisites

In preparation for mobilization, define the following:

- Survey
- Backhaul plan

2.2 Getting Ready

Collect all of the following:

NOTE

Please refer to "Antenna Specifications" on page 81 for the list of supported antennas. Use of accessories other than those specified in this document is not supported or warrantied.

- RT System 2 ground equipment (05-0007):
  - 5 Mbps WRUs (10-0017)
  - LIUs (see *"Backhaul Components" on page 26*)
  - One of the following antennas:
    - 9 dBi antenna (65-0067)
    - 7 dBi antenna (6060-001-01)
    - 5 dBi antenna (65-0023)
    - 2 dBi antenna (65-0025)
  - Geophones
  - WRU Batteries (0400-001-01)
  - WRU Dummy Batteries (55-0009)
  - Antenna Extenders
  - Fiber Backhaul
  - Tools
  - Manuals

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- Consumables
- Spares (15-0003)
  - Mast Parts
  - Base Parts
  - Guy Lines
  - Antennas
  - Batteries
  - Cables
  - Connectors

NOTE

The batteries (when fully discharged) require 8 hours of continuous charging in the battery charger connected to an AC source; therefore, the battery charger should be located at the staging area or in town.

2.3 Preparing the Equipment

Ensure that the central recording system has the latest software available installed (see the *RT System 2 Release Notes* for version numbers, see the *RT System 2 Installation Guide* for installation and update instructions).

Ensure that the ground equipment has the latest firmware available installed (see the *RT System 2 Release Notes* for version numbers, see the *RT System 2 Installation Guide* for installation and update instructions).

Ensure that the industry standard best practices are followed for securing the equipment for transport.

2.4 Laying Out the Equipment

You can lay out the ground equipment while the central recording system hardware and software is being prepared.

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The WRU is shown in the following figure:

Figure 2–1 WRU

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The LIU is shown in the following figure:

Figure 2–2 LIU

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An example geophone is shown in the following figure

Figure 2–3 WRU with Geophone

2.4.1 Prerequisites

You can attach the batteries, antennas, and geophones to the ground equipment prior to going into to the field, or as you place each unit. If you are assembling as you place the units, ensure that you have sufficient quantities for each unit, plus a few spares.

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Figure 2–4 Assembling WRUs

The RT System 2 shall be used with only the supplied antennas (*Table A–1 Antenna Specifications, on page 81*) attached to the WRU with an integrated type N male connector.

- The RT System 2 antennas shall be installed and handled by professionals specifically designated for this purpose.
- Changes or modifications not expressly approved by Wireless Seismic, Inc. can void the users's authority to operate the equipment.

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WARNING

In order to comply with FCC radio frequency (RF) exposure requirements, the RT System 2 units must be installed so that a minimum separation distance of 20 cm is maintained between the antenna(s) and the body of all persons at all times during normal operation.

WARNING

AVERTISSEMENT

Afin de se conformer aux normes de la FCC en matière d'exposition aux radiofréquences (RF), les unités RT System 2 doivent être installées de manière à garder en permanence une distance minimale de 20 cm entre la ou les antennes et le corps de toute personne en mode de fonctionnement normal.

2.4.2 Assembling the Ground Equipment

This section describes the process to assemble the ground equipment prior to deployment.

To assemble the ground equipment:

1. Gather the equipment:
   - WRU
   - Antenna
   - Geophone
   - Batteries
2. Gather any special tools:
   - Optional: Nylon grip pliers
   - Optional: Loctite® 222
3. Attach one or more batteries to the WRU.
   - Press the battery into the connector.
   - Flip the bail over the molded area on the end of the battery.
   - Press the lever until the catch snaps to lock it in place.

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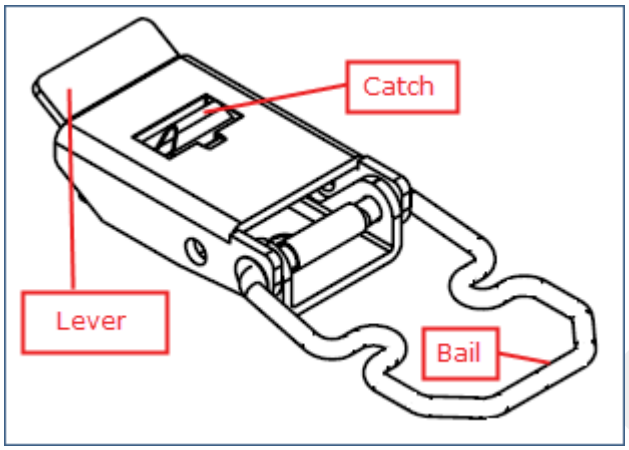

Figure 2–5 Battery Latch

Figure 2–6 Installing the Battery

4 Attach the geophone to the WRU.

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Figure 2–7 Installing the Geophone

5 Attach the antenna to the WRU. Ensure that the antenna connection is clean, and the antenna is snug and does not wobble.

TIP

The antenna screws on to the WRU in a clockwise direction. It should twist on easily; do not use force. To ensure that the threads are properly aligned, turn the connector counter-clockwise until you hear a click indicating that the threads are aligned, then turn clockwise to tighten.

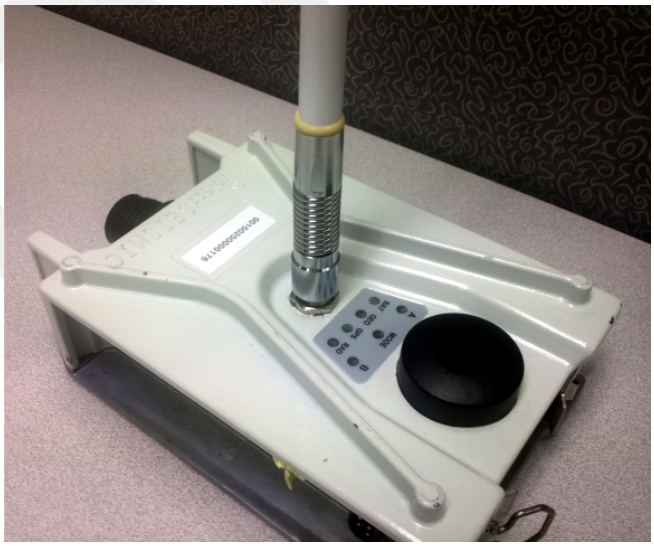

Figure 2–8 Antenna with Spring Relief

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TIP

When determining which antenna to use (5 dBi, 7 dBi, 9dBi), consider the distance between WRUs, and how much vegetation is in the area.

For distances of 10 m to 30 m, use a 5 dBi antenna.

Distances of 30 m or greater, use a 7 dBi antenna.

For sudden elevation changes, such as cliffs, use a 2 dBi or 5 dBi antenna.

In special situations such as tall grass and dense vegetation, or distances of 55 m or greater, use a 9 dBi antenna.

2.4.3 Placing the WRU in the Field

This section describes the process to ready the ground equipment for interaction with the central recording system (deployment).

To deploy the WRU:

1 Prerequisites:

- The WRU is assembled with battery, geophone, and antenna

NOTE

If you are using a WRU as a Repeater, the deployment instructions are the same, except a geophone is not required. Repeaters are added to the line segment in the Spread Manager. See the RT System 2 Operator Guide for more information.

If a geophone is not connected, you can skip the geophone test. See "D. LED Indicators" on page 91 for more information on skipping the test and the relevant LED status indicators.

2 Pick up the WRU and point the geophone connector end towards the ground as shown in the following figure. After a few seconds, all of the LEDs illuminate:

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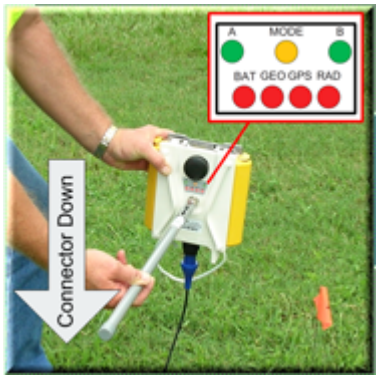

Figure 2–9 Power on the Unit

3 Place the unit flat on the ground as shown in the following figure:

Figure 2–10 Place the Unit

4 The unit will begin a series of internal and external tests. The LEDs on the top of the unit indicate the current test and whether the unit passes or fails each test.

NOTE

See *"D. LED Indicators" on page 91* for an explanation of the LED status and error conditions.

If a WRU self test fails, the WRU will continue to the next test.

You can skip a self-test by tipping the WRU geophone down and then returning it to the upright position (flat on the ground).

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2.4.4 Placing the LIU in the Field

The LIU is part of the backhaul configuration. See *"3. Backhaul" on page 23* for more information.

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3

Backhaul

3.1 Overview

In network communications, the *backhaul* is the part of the network that contains the links and equipment between the core network and the sub networks.

Wireless mesh networking is a method where each radio node in the network captures and disseminates its own data as well as serves as a relay for other radio nodes in the network sending data along a path, *hopping* from one node to the next.

Power over Ethernet (PoE) is a technology that passes electrical power along an Ethernet cable. PoE is used where DC power is not available and USB unsuitable. Power can be supplied at the end of a network span or somewhere in the middle.

PoE *switches* supply power at the end of a span. The RT System 2 Line Interface Unit acts as a switch with PoE.

PoE *injectors* supply power somewhere between the PoE switch and the powered device. They inject power and do not affect the data. A discrete PoE injector is used when configuring the Fluidmesh radios.

The RT System 2 Central Recording System is a fully connected mesh network of Wireless Remote Units (WRUs) that communicate in a relay pattern (bucket-brigade or string-of-pearls) with a Line Interface Unit (LIU) on the 2.4 GHz Industrial, Scientific, and Medical (ISM) radio band.

The LIU is composed of the following discrete components:

- Line Interface Unit (LIU) box
- 12 V DC, 5 A capable Battery or Power Supply
- Cables
- Mast, mast base, and guy-wires
- 5.8 GHz backhaul radios
- Antennas

The LIU communicates with the Central Software System (CSS) computer in the central recording truck along a backhaul on the 900 MHz or 5.8 GHz ISM radio band. Some smaller systems may not require a backhaul.

The Central Software System (CSS) communicates with the field units via the backhaul radios. The backhaul radios act as access points for the LIUs.

The following figure illustrates the possible LIU components:

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CAUTION

Ensure that the LIU box has a grounding cable attached that is connected to a grounding rod to avoid causing damage to the internal electronics during use. See "LIU Ground" on page 28 for an illustration.

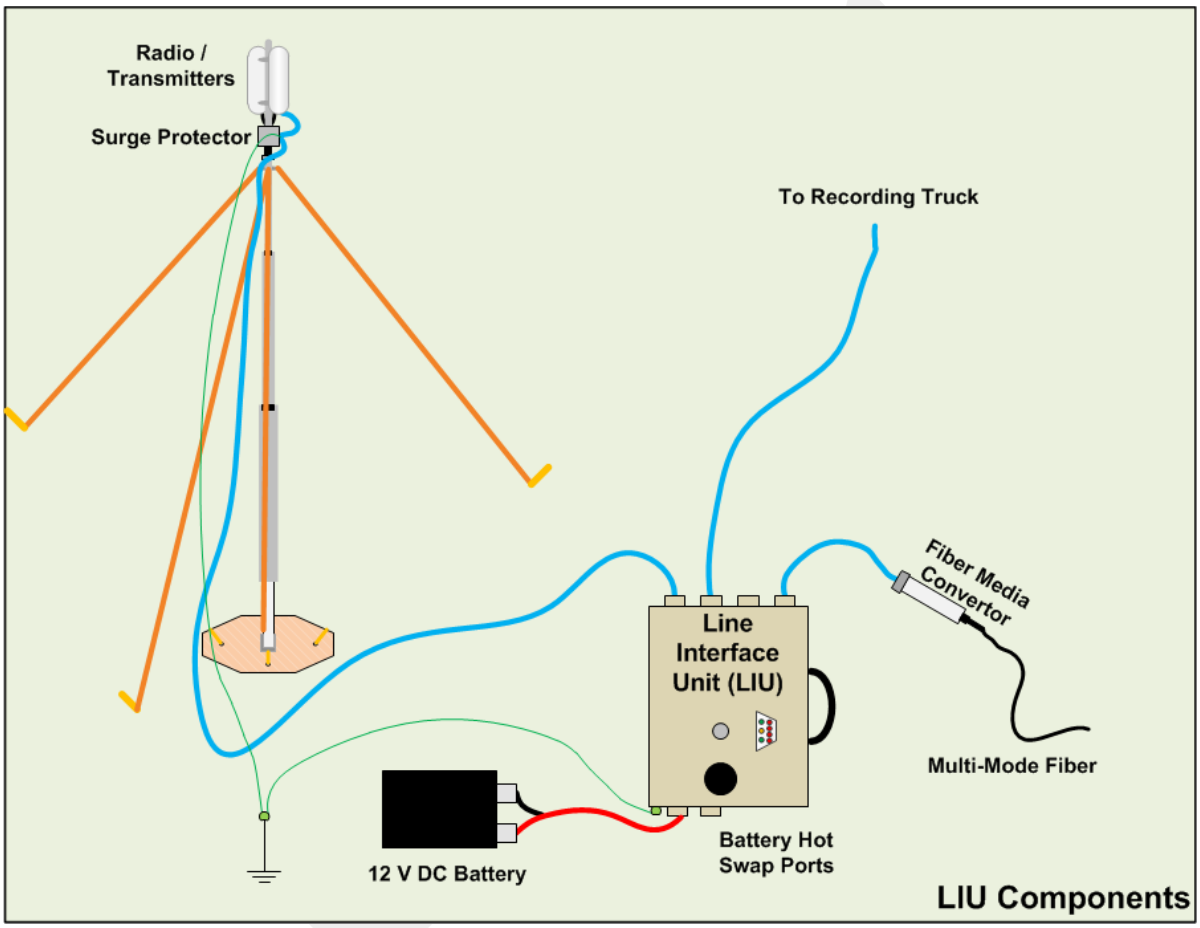

Figure 3–1 Possible LIU Components

The following figure illustrates the central recording truck components:

TBD

Figure 3–2 Central Recording Truck Components

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The following figure illustrates the components and data flow for a four-line, single-backhaul line with two root nodes example:

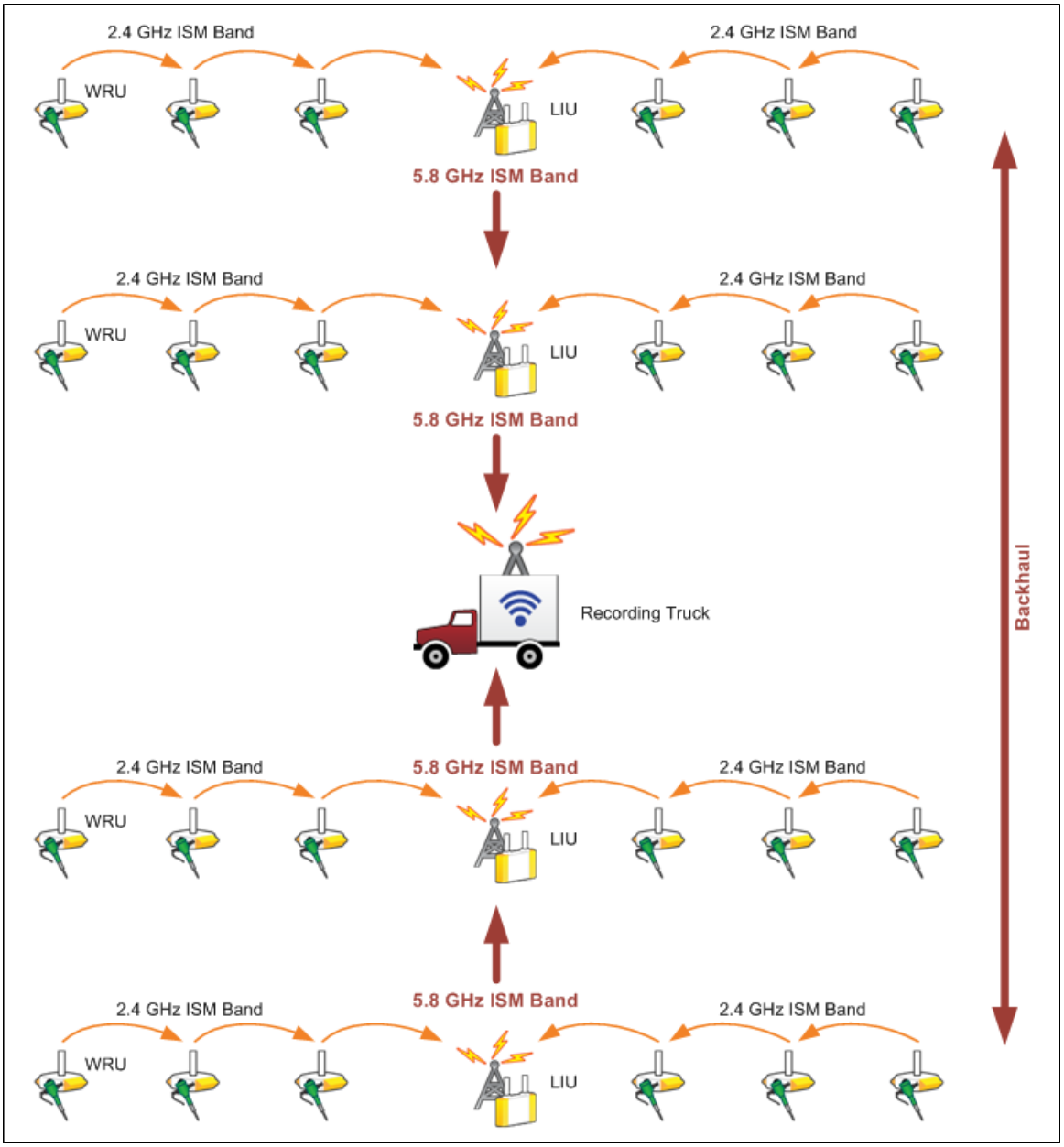

Figure 3–3 Single Backhaul Data Direction

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3.2 Backhaul Components

The backhaul components are either *remote* backhaul components or *central* backhaul components. Remote components are the components that are not physically located next to the recording truck. Central components are physically located at the recording truck. Both remote and central backhauls are composed of the following:

- Line Interface Unit (LIU) Kit
- Antenna
- Radio Kit
- Mast Kit

3.2.1 LIU Components

The following table lists the LIU kit components:

Table 3–1 Line Interface Unit Kit (15-0041)

Remote Backhaul Components		Central Backhaul Components	
Item	**Reference**	**Item**	**Reference**
LIU (10-0016)	*"LIU" on page 26*	LIU (10-0016)	*"LIU" on page 26*
12 V DC Battery or power supply (not included)	*"Battery and Power Supply" on page 28*	12 V DC Battery or power supply (not included)	*"Battery and Power Supply" on page 28*
Cable, LIU to Battery (60-0034)	*"Cables" on page 28*	Cable, LIU to Battery (60-0034)	*"Cables" on page 28*
Cable, Ethernet (60-0036, 60-0037, 60-0038)	*"Cables" on page 28*	Cable, Ethernet (60-0036, 60-0037, 60-0038)	*"Cables" on page 28*
Cable, LIU-to-PC (60-0039)	*"Cables" on page 28*	Cable, LIU-to-PC (60-0039)	*"Cables" on page 28*

3.2.1.1 LIU

The data transmitted by the WRUs is collected by the Line Interface Unit (LIU). The LIU acts as the interface between the network of WRUs and the backhaul equipment. The LIU has an Ethernet port that can be connected directly to a computer, or more commonly, to an armored fiber optic cable or a backhaul radio. Backhaul radios operate in the 900 MHz or 5.8 GHz bands. A second array of WRUs can be deployed on the other side of the LIU, symmetrically or asymmetrically around the LIU. The LIU is shown in the following figure:

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Figure 3–4 Line Interface Unit (LIU)

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Before the Central Software System can communicate with the LIU, you must set up the backhaul.

NOTE

See "D. LED Indicators" on page 91 for an explanation of the LED status and error conditions.

Ensure that the LIU is grounded. Attach a ground wire to the case, and to a nail that is driven into the ground.

CAUTION

Attach the LIU ground wire and the Surge Protector ground wire to the same nail.

The ground wire is illustrated in the following figure:

Figure 3–5 LIU Ground

3.2.1.2 Battery and Power Supply

Power is supplied to the LIU components by way of a 12 V DC battery or power supply.

TIP

The backhaul power requirements vary depending on the hardware in use and period of use. For example, you may be using one or two radios. Supply enough power to ensure there is enough power for the entire duration of the time you are using the backhaul.

3.2.1.3 Cables

The following cables are used in the backhaul:

- LIU to Battery (60-0034)
- Ethernet Cable, 30 ft (65-0036)
- Ethernet Cable, 60 ft (60-0037)
- Ethernet Cable, 120 ft (60-0038)
- Cable, LIU-to-PC (60-0039)
- Fiber Optic Cable

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- Media Converter (60-0017)
- Cable, Backhaul Jumper (60-0033)
- Cable, Fiber Optic, Armored, 250 m (60-0026)
- Cable, Fiber Optic, Armored, 300 m (60-0024)
- Cable, Fiber Optic, Armored, 500 m (60-0023)
- Cable, Fiber Optic, 500 m (60-0018)

3.2.2 Antennas

The following table lists the supported antennas for the LIUs and the WRUs. The remote and central backhauls use the same antennas:

Table 3–2 Antenna Specifications

Model	Frequency (MHz)	Gain	Vertical Beam Width	Weight	Dimension (Length x Diameter)
WSI 65-0067	2400-2485	9 dbi	14°	0.8 lbs 0.5 kg	27 x 0.6 in 690 x 15 mm
WSI 6060-001-01	2400-2485	7 dBi	18°	0.6 lbs 0.3 kg	21 x 0.6 in 540 x 15 mm
WSI 65-0023	2400-2485	5 dBi	25º	0.5 lbs 0.2 kg	12 x 0.6 in 355 x 15 mm
WSI 65-0025	2400-2485	2 dBi @ 2.4	120°	1.6 oz 45.4 g	7.6 x 0.5 in 193 x 12.7 mm
WSI 65-0082	2400-2485	7.4 dBi	20º	5.4 oz 153 g	18.5 x 0.75 in 470 x 19 mm
WSI 65-0131	2400-2485	4 dBi	50º	3.2 oz 90 g	8.7 x 0.75 in 221 x 19 mm

The Fluidmesh radios have built-in antennas (see *"Radio Kit Components" on page 29* for details).

There is an *auto-power-leveling* feature built into the firmware. It works in conjunction with the RSSI parameters to keep the power at a defined level.

3.2.3 Radio Kit Components

The following table lists the Radio Kit components:

Table 3–3 Radio Kit Components

Item	Reference
Radio, Fluidmesh® FM1100 (75-0014)	*"FM1100 Radio" on page 31*

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Table 3–3 Radio Kit Components (cont.)

Item	Reference
Radio, Fluidmesh® FM3100 (75-0014)	*"FM3100 Radio" on page 31*
Radio Install Kit (15-0036)	*"Radio Install Kit" on page 32*

Refer to the Fluidmesh datasheet for FCC information and other technical specifications on the FM1100 and FM3100 radios. See one of the following locations for details:

- http://www.fluidmesh.com/press-room/product-literature/doc_details/160-fluidmesh-mito-series
- *"C. Fluidmesh Radio Specifications" on page 85*

The Fluidmesh radios can operate on at 4.9 GHz, and 5.1 - 5.8 GHz. The preferred frequency is configured through a user interface (see *"Configure the Radios" on page 38* for instructions).

Each radio is assigned a color that represents the channel assignment, allowing field personnel to quickly orient the radios in the proper direction. An example is shown in the following figure:

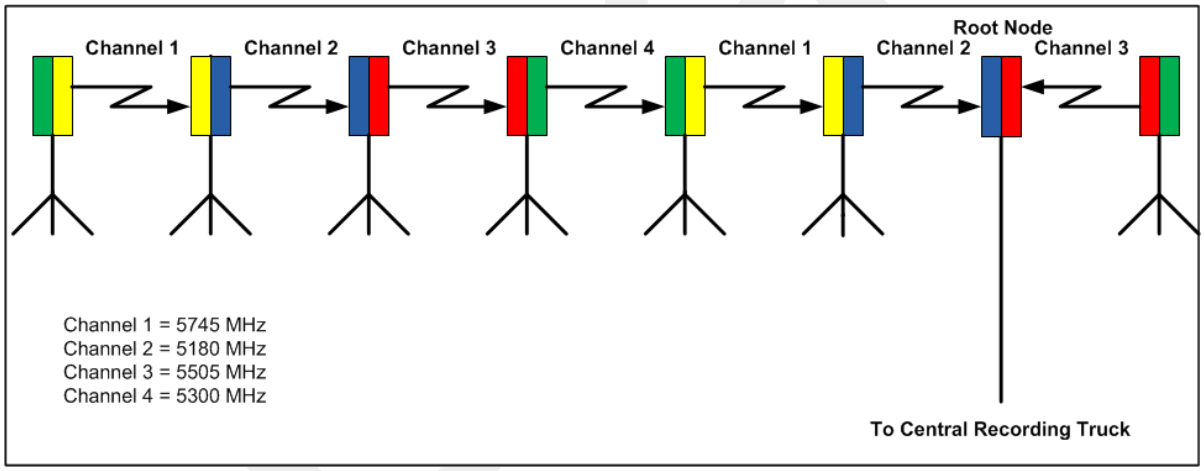

Figure 3–6 Channel Color Example

The Fluidmesh default IP address is 192.168.0.10.

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3.2.3.1 FM1100 Radio

The FM1100 radio is used on the masts for the remote backhauls and is shown in the following figure. Attach the radio to the mast with a hose clamp.

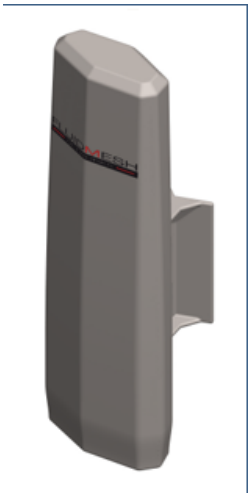

Figure 3–7 FM1100 Radio

3.2.3.2 FM3100 Radio

The FM3100 is used on the masts for the central backhaul unit and is shown in the following figure. Attach the radio to the mast with a hose clamp.

Figure 3–8 FM3100 Radio

Draft

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3.2.3.3 Radio Install Kit

The following table lists the Radio Install Kit components. The remote and central backhauls use the same install components.

Table 3–4 Radio Install Kit

Item	Reference
Surge Protector (75-0021)	*"Surge Protector Connections" on page 32*
Wire, 18 AWG PVC Green (65-0077)	—
Nail, 12 inch (70-0062)	—
Hose Clamp, 0.5 inch (70-0084)	—
Ethernet Cable, CAT5E, 3 foot, shielded (65-0104)	—

The following figure illustrates the inside of the Surge Protector.

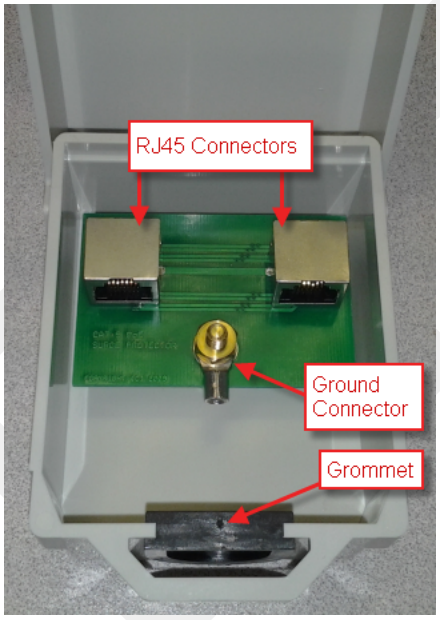

Figure 3–9 Surge Protector Connections

NOTE

Install one Surge Protector for each Ethernet cable that runs down the mast and connects to another component.

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To install the Surge Protector:

1. Remove the rubber grommet from the case and cut some slots in it.
2. Thread two Ethernet cables and a ground wire through the grommet and place the grommet back in the case.
3. Plug the Ethernet cables into the shielded RJ45 jacks. It does not matter which cable goes to which jack; the unit provides bidirectional protection.
4. Attach the ground wire to the ground lug.
5. Close the case and attach it to the mast with a hose clamp.
6. Attach one of the Ethernet cables to the radio.
7. Attach the other Ethernet cable to the LIU.
8. Attach the ground wire to a nail and press the nail into the ground.

CAUTION

Attach the LIU ground wire and the Surge Protector ground wire to the same nail.

TIP

See "Possible LIU Components" on page 24 for an illustration that shows the Surge Protector installed on a mast.

3.2.4 Mast Kit Components

The following table lists the Mast Kit components. The remote and central backhauls use the same mast kit components.

The Weighted Base (70-0070) is a separate component (see *"Base" on page 34*).

Table 3–5 Mast Kit

Fiberglass Kit (15-0004)	Aluminum Kit (15-0033)	Reference
Mast, fiberglass (55-0008)	Mast, aluminum (70-0081)	*"Mast" on page 34*
Base (55-0007)	Base (55-0007)	*"Base" on page 34*
Bag (70-0058)	Bag (70-0058)	*"Bag" on page 36*
Backpack Kit (15-0014)	Backpack Kit (15-0014)	*"Backpack Kit" on page 36*
• 1 each backpack (70-0059)	• 1 each backpack (70-0059)	*"Backpack Kit" on page 36*
• 3 each guy lines, rope, orange, 15.25 meters (70-0057)	• 3 each guy lines, rope, orange, 15.25 meters (70-0057)	*"Backpack Kit" on page 36*
• 3 each tent stake, steel, 12 in (70-0061) (hard ground stakes)	• 3 each tent stake, steel, 12 in (70-0061) (hard ground stakes)	*"Backpack Kit" on page 36*

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Table 3–5 Mast Kit (cont.)

Fiberglass Kit (15-0004)	Aluminum Kit (15-0033)	Reference
• 3 each tent stake, plastic, orange, 16 in (70-0060) (soft ground stakes)	• 3 each tent stake, plastic, orange, 16 in (70-0060) (soft ground stakes)	*"Backpack Kit" on page 36*
• 5 ea nail, 12 in (70-0062)	• 5 ea nail, 12 in (70-0062)	*"Backpack Kit" on page 36*
• 3 each guy line holder (70-0063)	• 3 each guy line holder (70-0063)	*"Backpack Kit" on page 36*
• 1 each hammer, 2.5 lb (70-0064)	• 1 each hammer, 2.5 lb (70-0064)	*"Backpack Kit" on page 36*
• 1 each pry bar, 15 in (70-0065)	• 1 each pry bar, 15 in (70-0065)	*"Backpack Kit" on page 36*
• 2 each flagging roll, orange (70-0066)	• 2 each flagging roll, orange (70-0066)	*"Backpack Kit" on page 36*
• 1 each compass sighting (70-0067)	• 1 each compass sighting (70-0067)	*"Backpack Kit" on page 36*
• 5 each hose clamp, 2 in (70-0068)	• 5 each hose clamp, 2 in (70-0068)	*"Backpack Kit" on page 36*

3.2.4.1 Mast

Lightweight, telescoping backhaul masts are used to elevate the backhaul components above obstructions and to enable radio communications to accommodate typical cross-line distances. The mast can be installed by a single person. The following figures show the mast:

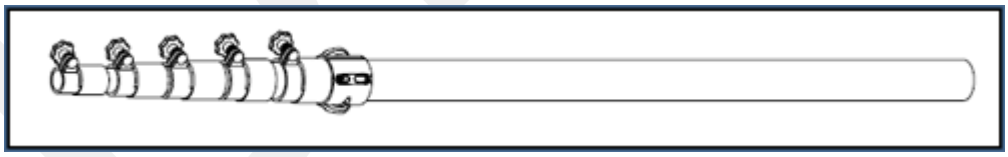

Figure 3–10 Fiberglass Mast (55-0008)

3.2.4.2 Base

There are two base options; one that requires the use of guy wires for stabilization and one that uses weights for stabilization.

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The following figures show the base that utilizes guy-wires:

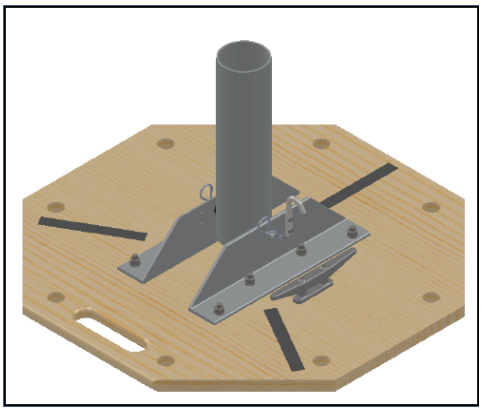

Figure 3–11 Base (55-0007)

The following figure shows the assembled mast:

Figure 3–12 Assembled Backhaul Mast

The following figure shows the base that uses a weighted system. This base is optimal in urban or rocky environments:

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Figure 3–13 Weighted Base (70-0070)

3.2.4.3 Bag

The antenna mast bag is a rip stop nylon yellow bag, 11 inches x 70 inches with a handle and draw string at one end.

3.2.4.4 Backpack Kit

The backpack is used to carry all of the equipment needed to install the mast and radios, and may also be use to carry the LIU. See *"Mast Kit" on page 33* for a list of components.

3.3 Turn off the Windows Firewall

This section describes how to turn off the Windows firewall.

To turn off the Windows firewall:

→ **Windows 7 computer** → **Start** →**Control Panel**

1 Click one of the following:

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- **Category View** – Windows Firewall
- **Icon View** – System and Security ⟶ Windows Firewall

2 Click **Turn Windows Firewall on or off**:

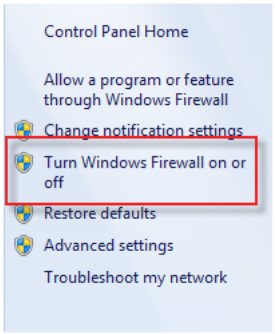

Figure 3–14 Windows Firewall On or Off

3 Select **Turn off Windows Firewall for all networks**:

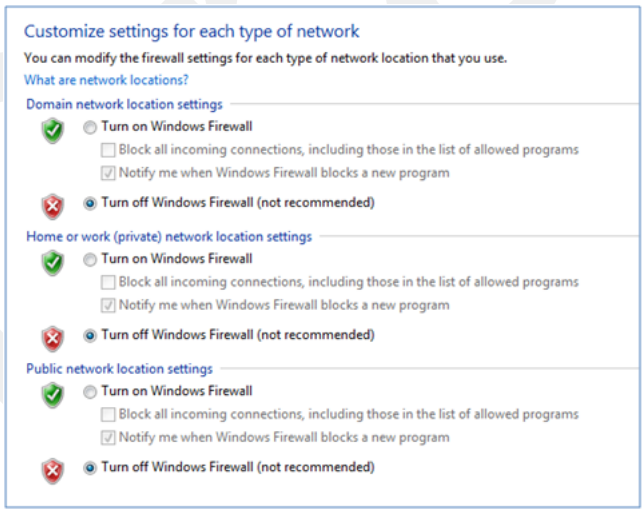

Figure 3–15 Windows Firewall Off

4 Click **OK**.

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3.4 Configure the Radios

The FMQuadro™ Web Interface is used to configure the radio channels. The radio licenses are pre-configured by Wireless Seismic, Inc. This section describes how to connect the radios to a computer and configure them.

NOTE

The expected configuration in the RT System 2 system is as follows:

FM1100 = mesh point (remote backhaul)

FM3100 = mesh end (central backhaul)

Check the radios before connecting them to any switch.

3.4.1 Create a Private Network

Create a private network between the computer and the Fluidmesh radio.

NOTE

All Fluidmesh units are preconfigured from the factory with an IP address of 192.168.0.10.

Wireless Seismic, Inc. reconfigures each Fluidmesh radios to have a unique IP address, identifiable by the sticker placed on the radio.

If the radio is exposed to excessive static electricity, any post-factory-configured IP address may reset to this factory-configured IP address.

1. Prerequisites:
   - Windows computer
   - Browser with Adobe Flash
   - AC Power
   - PoE Injector
   - Two Ethernet Cables
2. Power on the computer.
3. Connect the components (see *Figure 3–16 Fluidmesh Radio Private Network on page 39*):
   - Plug the PoE injector into an AC outlet.
   - Connect the computer to the PoE injector with an Ethernet cable.
   - Connect the Fluidmesh radio to the PoE injector with an Ethernet cable. The radio powers up.
     - FM1100 – Connect to LAN 1
     - FM3100 – There is only one connector

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CAUTION

Power up only one radio at a time. Never place two powered-up radios next to each other. It is possible to damage the radio receivers if multiple radios are powered up in close proximity.

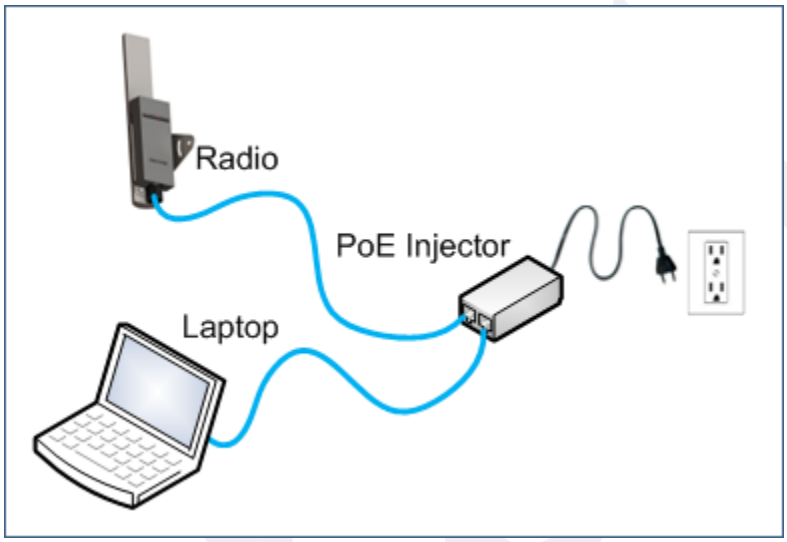

Figure 3–16 Fluidmesh Radio Private Network

4 Verify that the radio powers up. The LED indicators have the following meanings:

Table 3–6 Fluidmesh Radio LEDs

LED	State	Description
Power	On / Green	On whenever the radio has power
LAN	On / Green	On whenever the radio has an Ethernet connection
Signal Strength (1)	On / Red	Booting Core system
Signal Strength (2)	On / Orange	Booting wireless system
Signal Strength (3)	On / Green	Booting routing engine
Signal Strength (4)	On / Green	Booting unit configuration

5 Click the Windows Start icon.

6 Select **Control Panel**. The **Control Panel** window opens.

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7 Select **Network and Internet**.

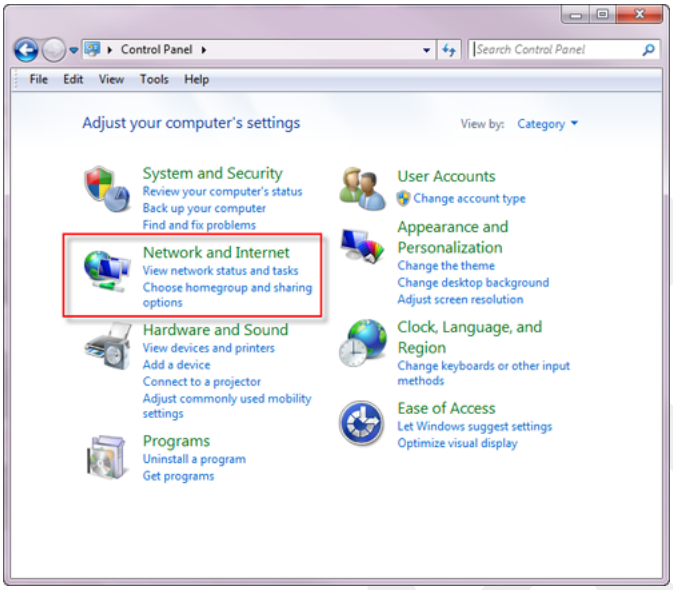

Figure 3–17 Control Panel, Network and Internet

8 Select **Network and Sharing Center**.

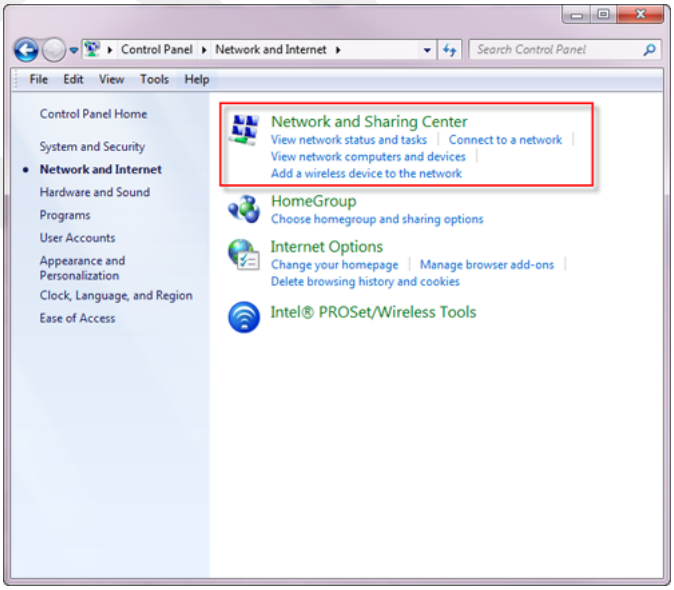

Figure 3–18 Control Panel, Network and Sharing Center

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9 In the left pane, select **Change adapter settings**.

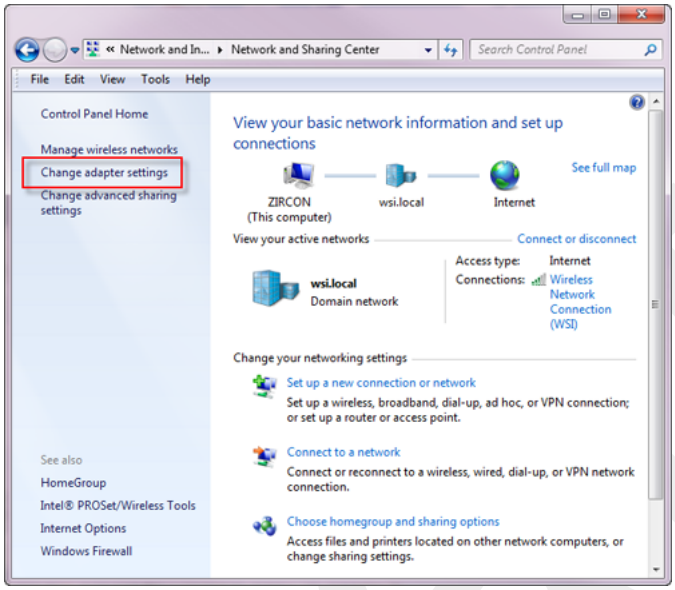

Figure 3–19 Control Panel, Change Adapter Settings

10 Right-click **Local Area Connection** and select **Properties**. The **Properties** window opens.

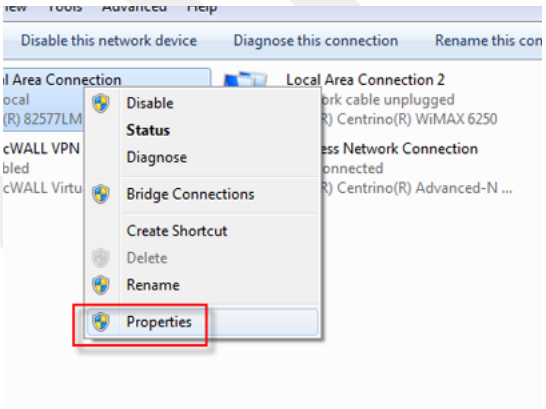

Figure 3–20 Control Panel, LAN Properties

11 Select **Internet Protocol Version 4 (TCP/IP v4)** and click **Properties**.

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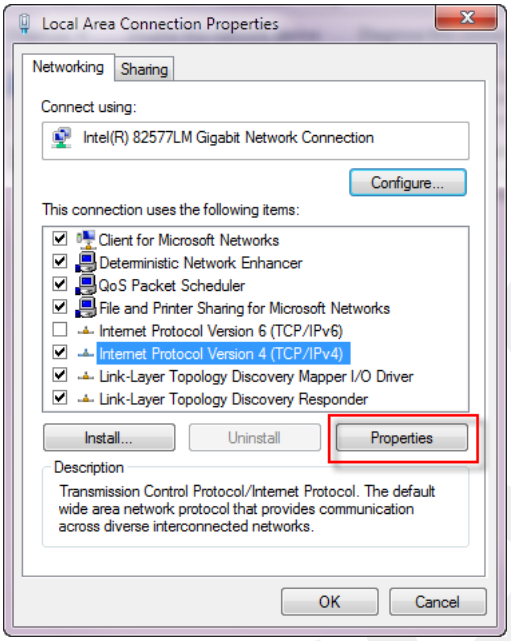

Figure 3–21 Control Panel, Networking Properties

12 Select **Use the following IP address**.

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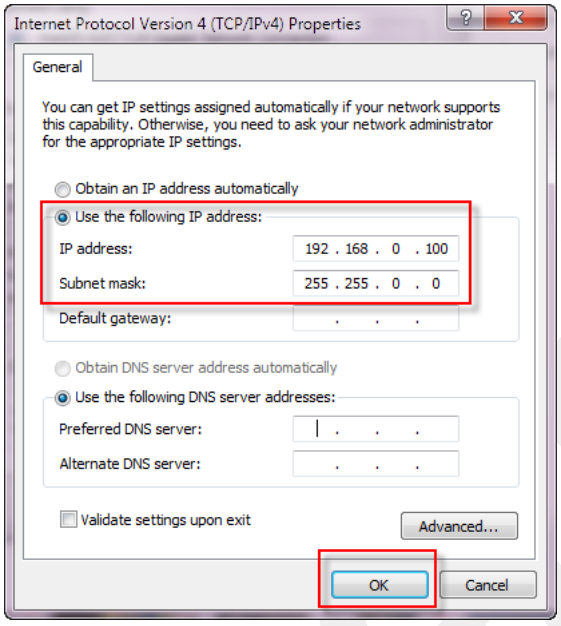

Figure 3–22 Control Panel, IP Address

13 Enter the following:

- IP address: 192.168.0.100 (this number does not have to be 100, just something other than 10, and a number between 1 and 255)
- Netmask:255.255.255.0

NOTE

If the radio already has an IP address, you will need to enter different numbers. For example:

Radio IP address: 10.200.x.x

Computer IP address: 10.x.x.x

Subnet Mask: 255.0.0.0

You may need to disable and enable (right-click) the LAN connection if it displays Network cable unplugged in the Network Connections window.

If the radio gets reset, the default IP address is 192.168.0.10.

14 Click **OK**.

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15 Click **Close**.

3.4.2 Setting NIC Priority

If you have more than one network interface card (NIC) in your computer, make sure that the LAN card has the highest priority; the computer attempts to use the NICs in the order listed.

To set NIC priority:

→ **Windows computer**

1. Click the Windows Start icon.
2. Select **Control Panel**. The **Control Panel** window opens.
3. Select **Network and Internet**.
4. Select **Network and Sharing Center**.
5. In the left pane, select **Change adapter settings**.
6. In the toolbar, click **Advanced**, and then **Advanced Settings**.

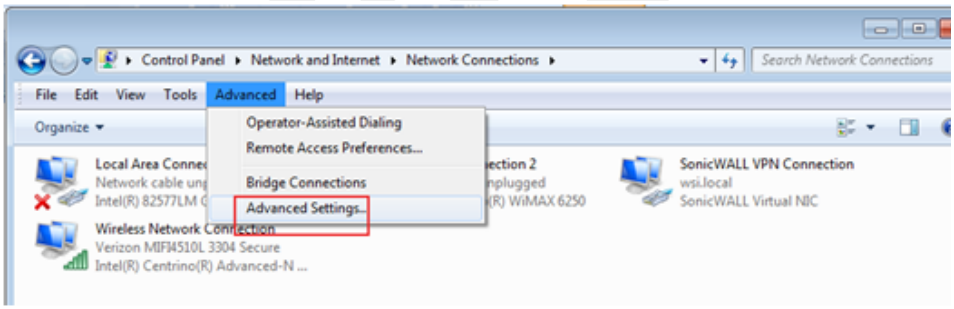

Figure 3–23 Advanced Network Settings Menu

7. Select **Local Area Connection** and then click the up arrow repeatedly until **Local Area Connection** is the first item.

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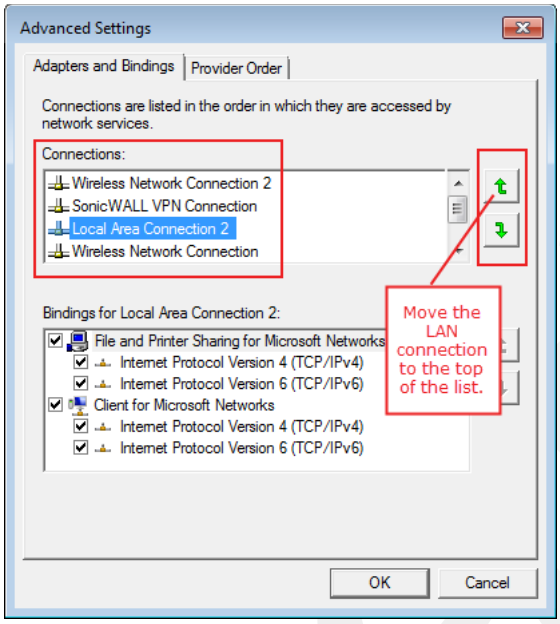

Figure 3–24 LAN Hierarchy

8 Click **OK**.

3.4.3 Configure the Radio

Configure the radios by logging into the software located on the radio. FM1100s are configured as mesh *points*, and FM3100s are configured as mesh *ends*.

To configure the radio:

→ **Windows computer**

1 On the computer, point a browser to the following URL:

http://192.168.0.10

TIP

Use Mozilla Firefox or Google Chrome. Internet Explorer does not refresh correctly.

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NOTE

If the radio has an IP address other than the default IP address, you will need to enter that number. For example, 10.101.0.22.

2 Log in to the radio Web interface using the following:

- **UserName**: admin
- **Password**: admin

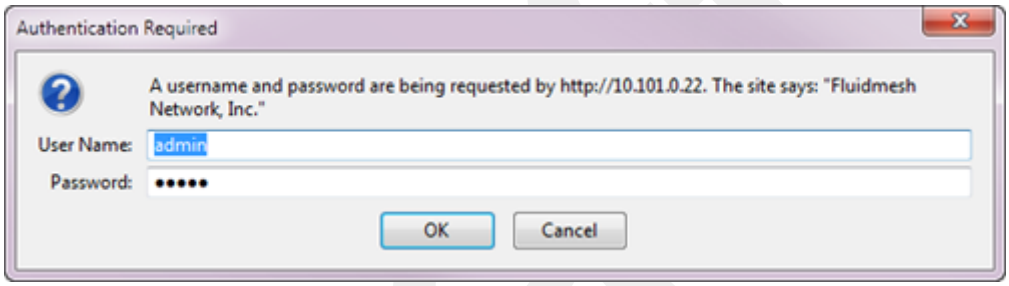

Figure 3–25 Radio Login Window

3 The following figure shows the home window when **mesh end** is selected as the **Mode**. The FM1100 configuration includes an additional left-pane option: **Power Over Ethernet**. Click **MeshWizard™**.

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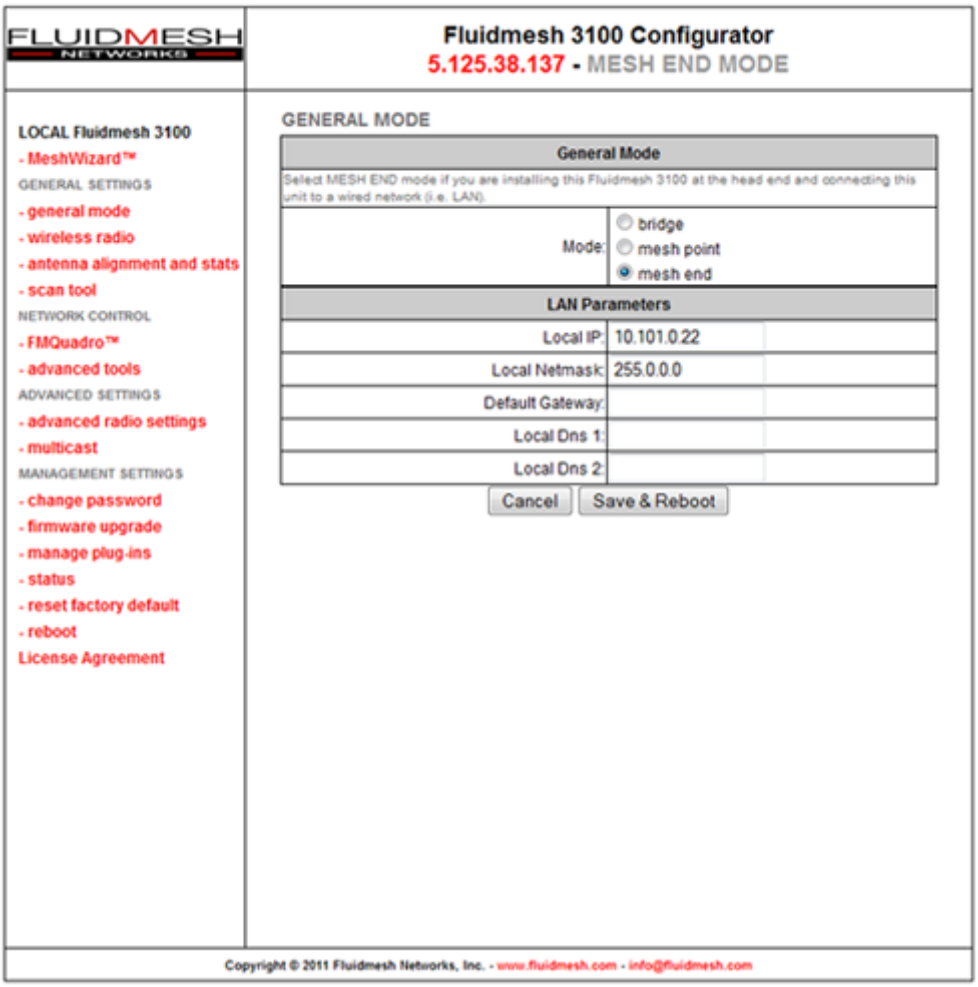

Figure 3–26 Radio Home Window, Mesh End

4 Click **I Agree** to accept the licence agreement if prompted.

5 Click **Wizard**.

6 Select or enter the following:

- **Mode**
  - **FM1100** – Mesh Point
  - **FM3100** – Mesh End
- **IP Address** – Use next class A address available (10.2.0.1 - 10.2.0.255)
- **Netmask** – 255.0.0.0
- **Default Gateway**
  - **FM1100** – Not shown or available

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- **FM3100** – Leave blank

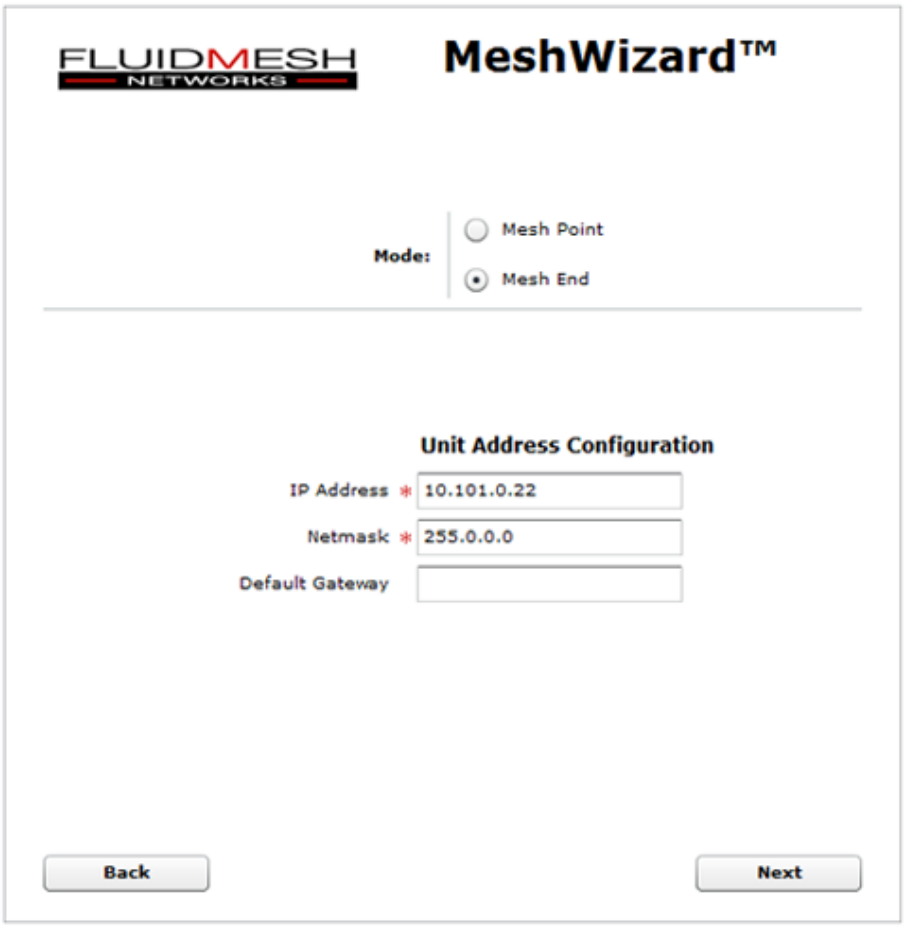

Figure 3–27 Fluidmesh MeshWizard Interface

7 Click **Next**.

8 Select one of the following frequencies (see *Figure 3–6 Channel Color Example on page 30*):

- Channel 1 = 5745 MHz (Yellow label)
- Channel 2 = 5180 MHz (Blue label)
- Channel 3 = 5505 MHz (Red label)
- Channel 4 = 5300 MHz (Green label)

9 Click **Next**.

10 Verify the settings. Click **Save&Reboot**.

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11 FM1100 only:

- Click **poe pass-through** in the **ADVANCED SETTINGS** area of the left pane. This option allows the LAN 2 port on the radio to deliver passive PoE to a second FM1100 on the mast using one short Ethernet cable.
- Select **Enable** for the **Status**.
- Click **Apply**.

3.4.4 Restore your Network Settings

When have finished configuring all of your radios, restore your network settings as described in this section.

To restore network settings:

→ **Windows computer**

1. Click the Windows Start icon.
2. Select **Control Panel**. The **Control Panel** window opens.
3. Select **Network and Internet**.
4. Select **Network and Sharing Center**.
5. In the left pane, select **Change adapter settings**.
6. Right-click **Local Area Connection** and select **Properties**. The **Properties** window opens.
7. Select **Internet Protocol Version 4 (TCP/IP v4)** and click **Properties**.
8. Select **Obtain IP address automatically**.
9. Click **OK**.
10. Click **Close**.

3.4.5 Using the Fluidmesh Interface to Scan

TBD

3.4.6 Using the Fluidmesh Interface to Ping

TBD

3.5 Setting up the Backhaul Equipment

Use the following procedure to erect and secure the mast

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NOTE

There are many possible mast options; the following instructions are a general guideline.

To install the backhaul components and erect the mast:

1 Prerequisites:
- Gather the components
- Screwdriver
- Hammer

2 Refer to the deployment instructions to determine the location and compass heading to the next back haul site closer to central.

3 Use the compass to determine and mark that direction.

4 Use the following considerations while positioning the base:
- Locate the base such that the three guy lines and the mast clear obstructions during erection and while in operation.
- If the ground is sloped, position the base such that when the base is flush to the ground, the bracket orientation allows the mast to remain perpendicular to the ground as shown in the following figure:

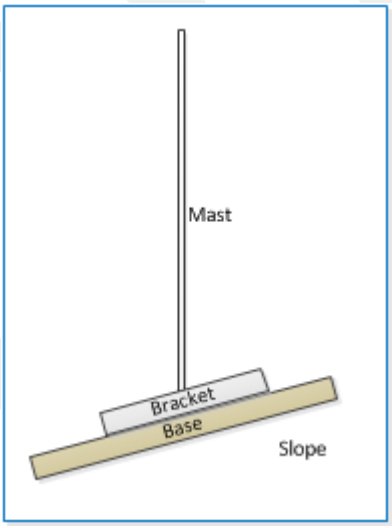

Figure 3–28 Mast on a Slope

- If the wind is blowing, the mast is more stable when the brackets are perpendicular to the wind as shown in the following figure:

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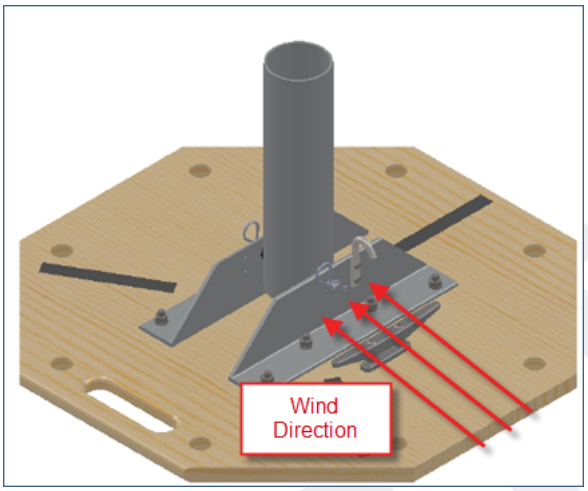

Figure 3–29 Base and Wind Orientation

5 Collect all of the mast components.

6 Secure the base with at least 2 nails or if using a weighted mast, with cement blocks.

7 Insert the mast into the base collar, extend and secure each section of the mast.

8 Attach the guy lines to the collar on the mast, or make loops in the lines and slip them over the mast.

9 Align one guy line so that it extends in the opposite direction from the mast while the mast is still on the ground.

10 Align the other two guy lines at 120 degrees (1/3 of a circle) from the first guy line.

11 Hammer guy line stakes into ground and secure guy lines at the indicated marks.

12 Attach the radio or radios at the top of the mast.

13 Uncoil an Ethernet cable, attach one end to a radio unit and the other end to the LIU. Form a service loop (extra cable) by looping the Ethernet cable over the top of the radio unit. If you are installing two radios on the mast, refer to *"Installing Two Radios on the Mast" on page 53* for cabling and configuration instructions.

14 Ensure that all directional antennas, when raised, are pointed correctly. The radio unit should be facing toward the recording truck.

15 While holding the free guy line, lift / walk the mast to a vertical position and secure the line into the cleat.

16 Adjust all lines to bring the mast to a vertical position.

17 Ensure that each line is firmly seated in each cleat, loosely wrap lines around mast and secure at the large cleat on the base.

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Figure 3–30 Securing Lines to Large Cleat

Figure 3–31 Backhaul Antenna Erected

18 Check to make sure that the antennas are aimed properly.

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3.6 Installing Two Radios on the Mast

When you are installing a remote backhaul, there can be two radios on the mast as shown in the following figure:

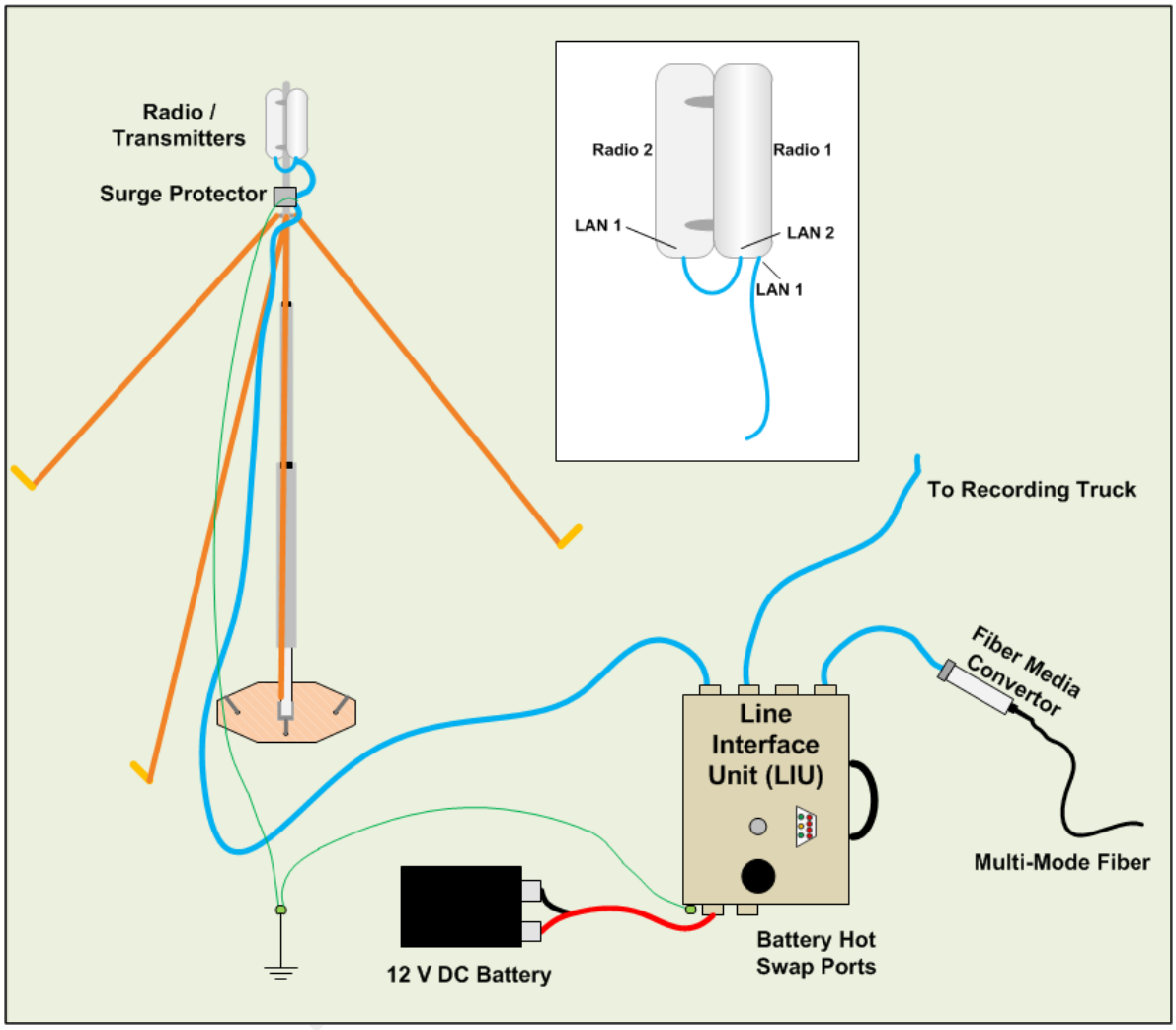

Figure 3–32 Two-Radio Installation

To install two radios on the mast:

1 Prerequisites:

- TBD
- The radios are configured to allow the PoE option (see *step 11 on page 49*).
- The radios are BOTH configured as mesh POINTS (see *step 6 on page 47*).

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2 Attach two radios to the mast. Refer to the deployment instructions for the location at which to aim the radio. One should point towards the recording truck (uplink), and the other should point towards the next remote backhaul location (downlink).

3 Connect the two radios with a short Ethernet cable: Radio1/LAN 2 to Radio 2/ LAN 1.

4 Connect Radio 1/LAN 1 to the LIU.

3.7 Removing the Backhaul Equipment

TBD

3.8 Use Cases or Example Deployments

This section shows a few example deployments.

Draft

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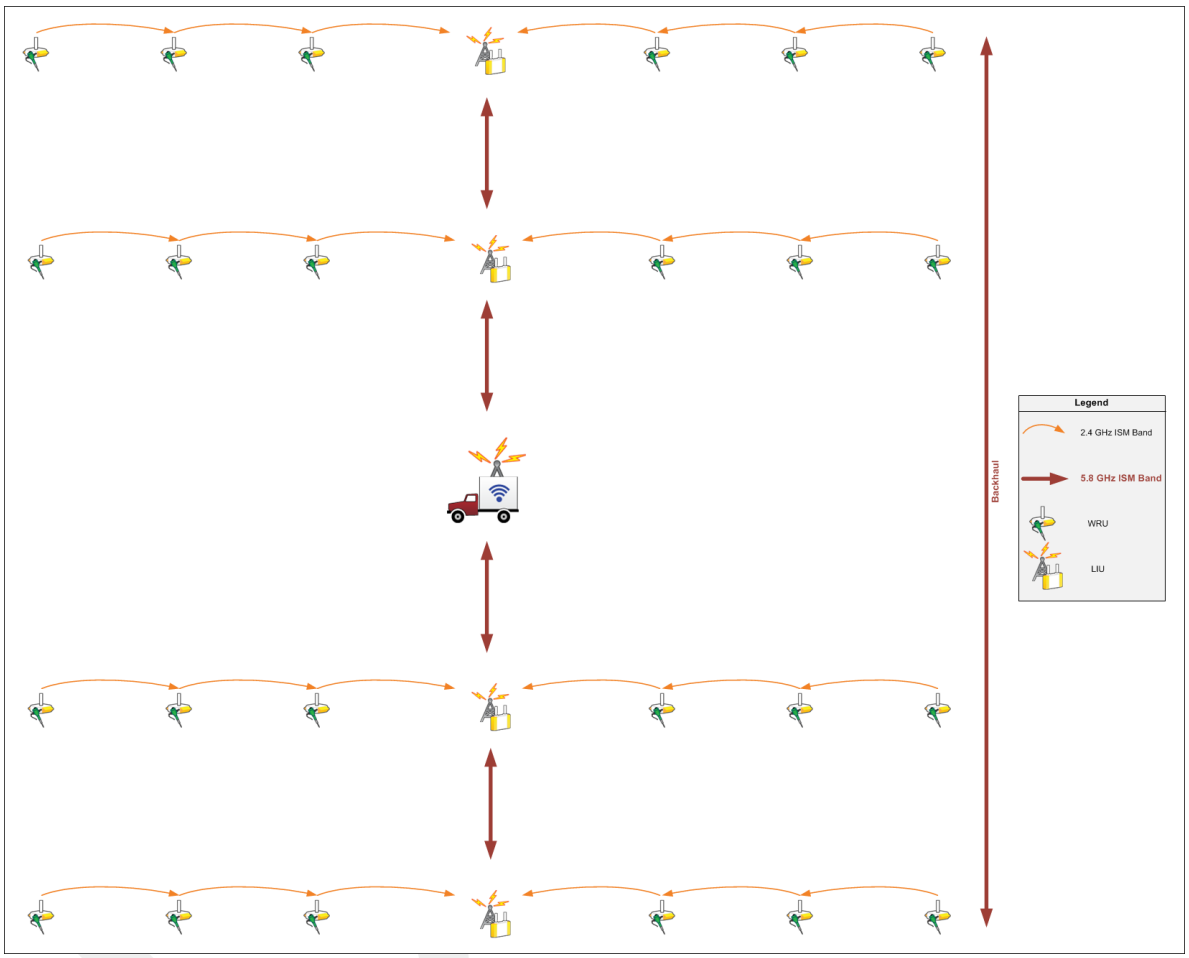

Figure 3–33 Single Backhaul

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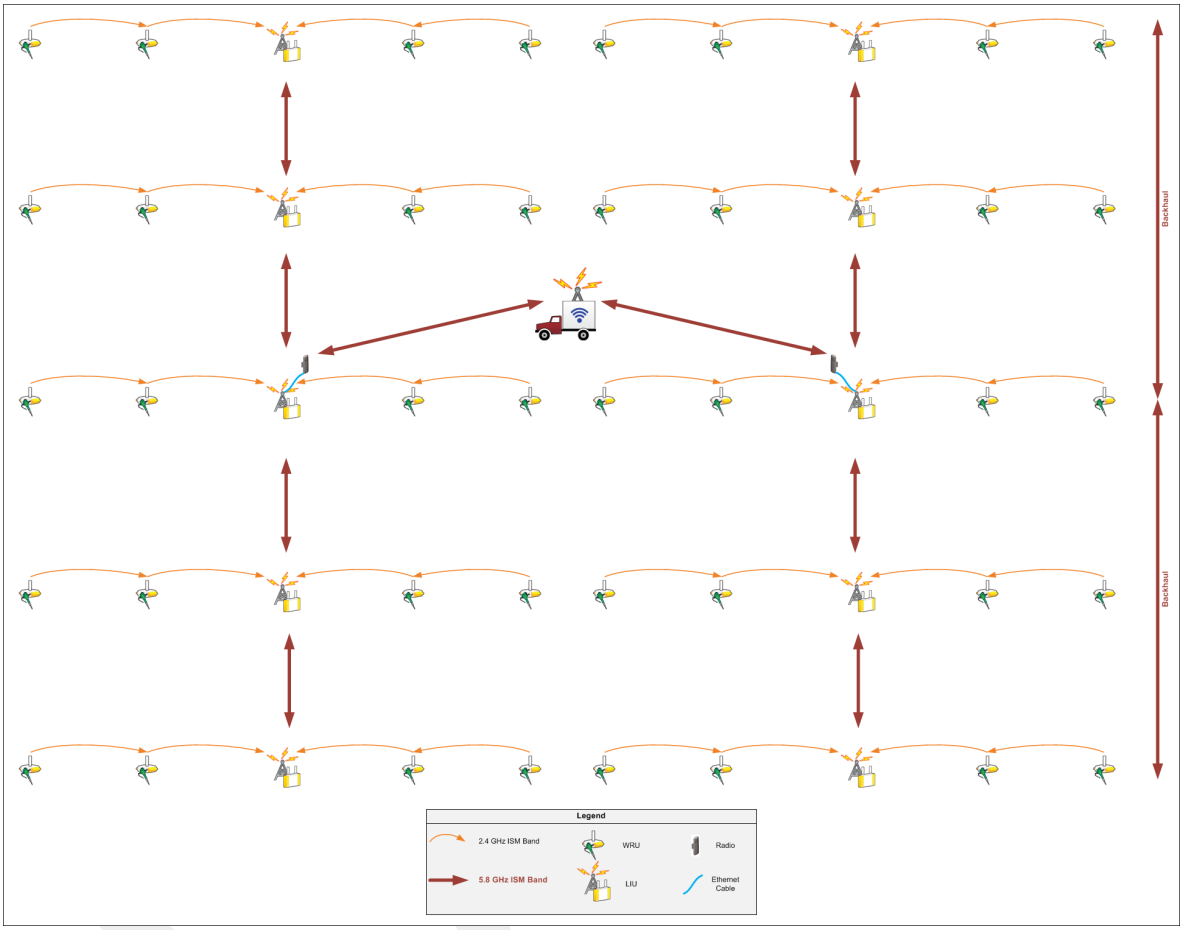

Figure 3–34 Dual Backhaul, Two Root Nodes

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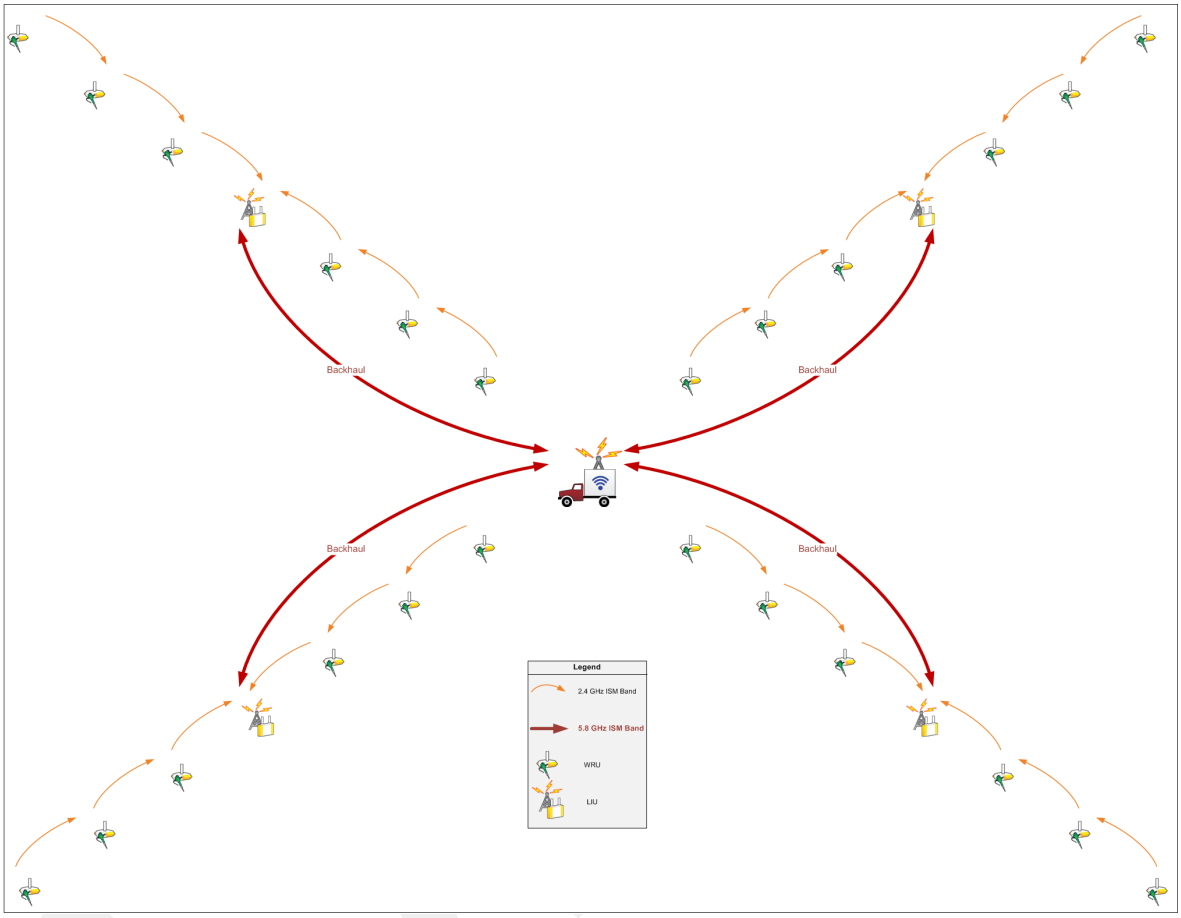

Figure 3–35 Single Backhaul, Star Configuration

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