Install LigoWave DLB Wireless Networking Equipment

Contents

NOTE See Setup a DLB 5, DLB 5-15b, or DLB 5-15ac to change from default Dynamic IP method to Static. This bulletin covers the optional use of the LigoWave DLB 5-15ac, either with another DLB 5-15ac, a DLB 5, or DLB 5-15b. When this equipment is utilized with the older DLB 5 or DLB5-15b, they must be upgraded to firmware compatible with the DLB 5-15ac. Firmware upgrades are free downloads from the LigoWave web site.

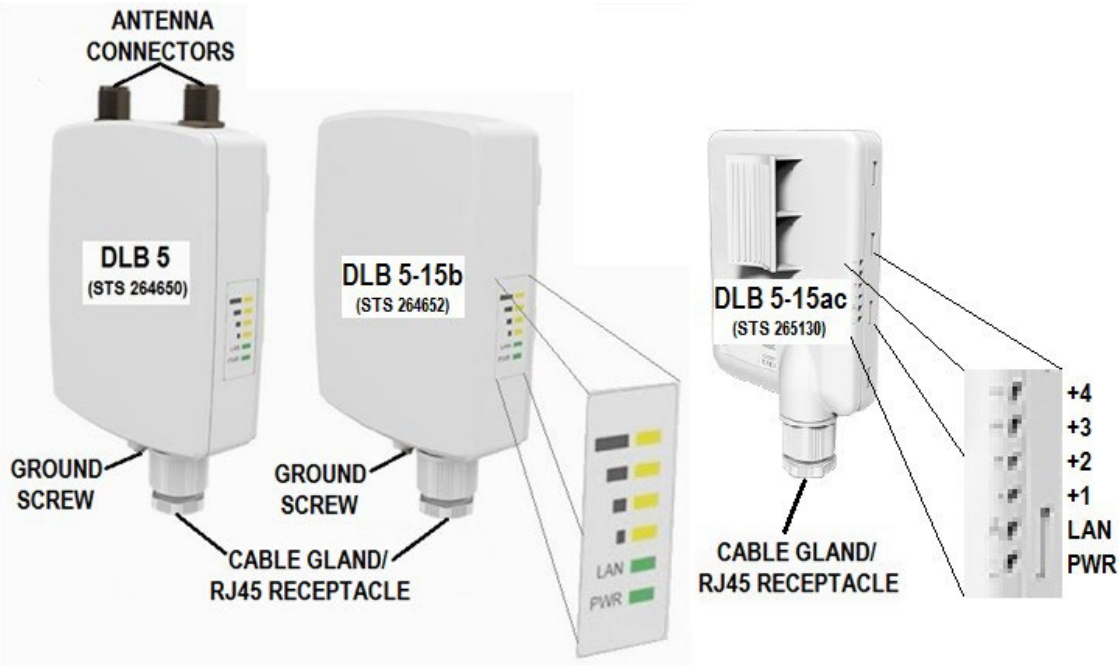

Figure 1. LigoWave DLB Radios

LigoWave DLB Equipment Description

An existing network need not be in place to use this wireless networking equipment. If there is a network card (standard with most PC purchases) in the PC and a network card in the FMU, a simple wireless network may be created using the LigoWave equipment described in this bulletin.

The DLB 5, DLB 5-15b, and DLB 5-15ac units have Signal Strength Indicator LEDs, a LAN Connect LED, and a Power Indicator LED (see Figure 1). All have an RJ45 POE connector at the bottom of the housing protected from the weather by a cable gland. The DLB 5 and DLB 5-15b have a backplate that may be removed for installation with included hardware either on a pole or a flat surface. The DLB 5-15ac uses a pole mount or mount bracket as shown in which is provided with the DLB 5-15ac kits.

The DLB 5 has two external antenna connectors on the top of the housing, and no internal antenna. Applications may call for either one or two 7 dBi external omni antennas. When the DLB 5 is provided with one 7dbi external omni antenna for one of the antenna connectors, a threaded metal dust cap is provided for the other antenna connector.

Omni vs. Directional Antennas

Omni antennas broadcast on a plane completely encircling the antenna with 360-degree coverage as shown in Figure 2. Using omni coverage, all the FMUs inside the shaded circle are covered. Those outside the circle are just outside the range of the LigoWave radio with the omni antenna. The DLB 5-15b and DLB 5-15ac have an internal directional antenna and no external antenna connectors.

For most point-to-point applications the DLB 5-15b and DLB 5-15ac may be used at both ends of a wireless network. The directional antenna broadcasts in a cone shape similar to Figure 3. The FMUs inside the shaded cone are covered.

Those outside the cone are not covered. The closer the FMUs are to the LigoWave radio, the narrower the cone area.

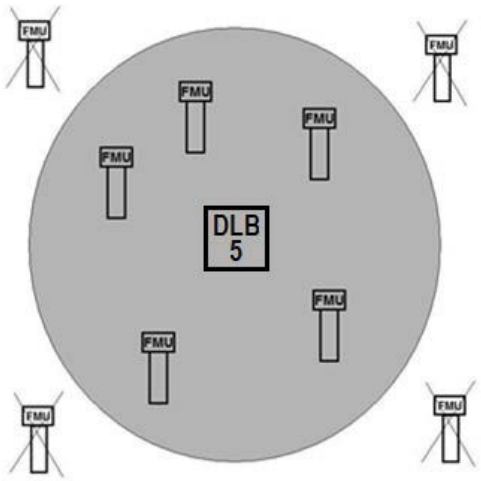

Figure 2DLB 5 Omni Antenna Coverage

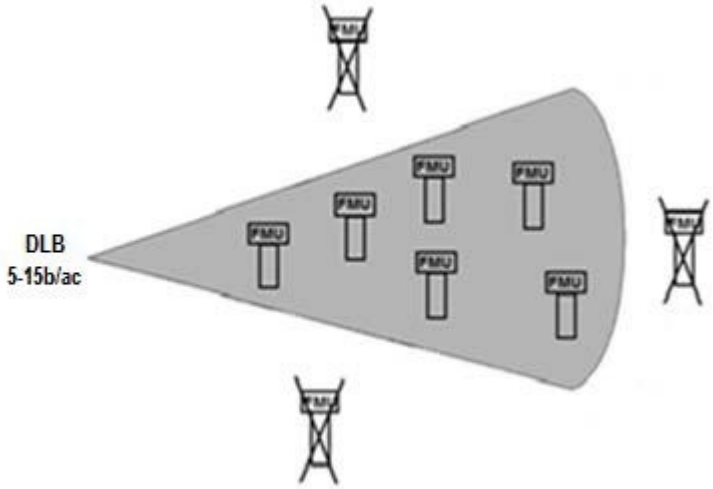

Figure 3 DLB 5 - 15 b/ac Directional Antenna Coverage

Part Numbers

NOTE In applications where two DLB 5 are communicating with each other, each must have two 7dBi omni antennas installed. When a DLB 5 is communicating to a DLB 5-15b or DLB 5-15ac, it should have a single 7 dBi omni antenna on the V connector and a metal dust cap on the H connector (See Setup a DLB 5, DLB 5-15b, or DLB 5-15ac).

Kit part numbers originating with the Deliberant APC equipment have been carried over to the LigoWave DLB equipment. Individual part numbers have changed. The following part numbers apply to LigoWave and Deliberant components and kit parts:

Complete Kits (Both Ends, Syntech Part Numbers):

Part #	Description
941H0219	One-part number for two individual kits; kit includes one each 941H0218 and one each 941H0218A, both with directional antennas
941H0219A	One-part number for two individual kits; kit includes one each 941H0218 with directional antenna, and one each 941H0218B with omni antennas
941H0221	One-part number for two individual kits; kit includes one each 941H0220 and one each 941H0220A, both with directional antennas

Individual Kits (One End Only, Syntech Part Numbers):

Part #	Description

941H0218	Kit w/DLB5-15b for FMU (includes mount bracket, attach hardware, and fittings to route Cat 5 cable from inside FMU to outside FMU)
941H0218A	Kit w/DLB 5-15b for building (includes mount bracket and attach hardware)
941H0218B	Kit w/DLB 5 for access point (includes mount bracket, attach hardware, 7 dBi omni antenna, and dust cap)
941H0218C	Kit w/DLB 5 as separate access point between two DLB 5-15b or DLB 5-15a (includes mount bracket, attach hardware, two 7 dBi omni antennas)
941H0220	Kit w/DLB 5-15ac for FMU (includes mount bracket, attach hardware, and fittings to route Cat 5 cable from inside FMU to outside FMU)
941H0220A	Kit w/DLB 5-15ac for building (includes mount bracket and attach hardware)

Replacement Parts (Syntech Part Numbers):

Part #	Description
264650	DLB 5
259144	N Connector Dust Cap
264652	DLB 5-15b
265130	DLB 5-15ac
251550	7dbi Omni Antenna
257257	Mount Bracket
265132	24VDC POE Adapter and Power Supply

Setup Procedures

There are setup procedures for a PC (Laptop and/or Central Controller), LigoWave, and the FuelMaster software.

Login to a DLB 5, DLB 5-15b or DLB 5-15ac with a PC/Laptop

NOTE When a DLB 5 or DLB 5-15b is being paired with a DLB 5-15ac, the DLB 5 and DLB 5-15b will require firmware upgrades.

These radios default to Dynamic IP method. Unlike the previous Deliberant applications, every radio must be changed to the Static IP method.

LigoWave indicated some users had experienced problems with Internet Explorer, and more reliable connections were possible with Firefox and Google Chrome.

As you connect to these devices to configure them, power only one device at a time, unless instructed to do otherwise. Setup procedures use a wired connection to the device, and every unit defaults to an IP address of 192.168.2.66. If the PC or laptop being used for the setup also has wireless, you might disable wireless until these setup procedures are complete. Wireless from your PC/laptop could connect to another device as you apply settings, and unknowingly change the wireless radio setup.

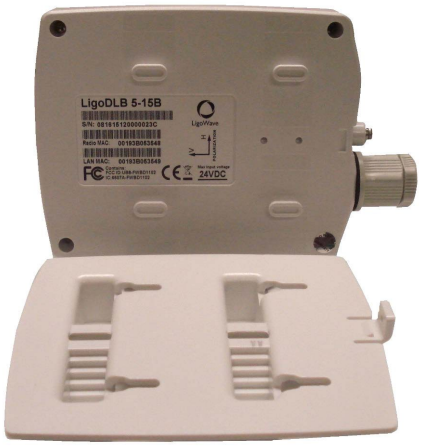

Figure 4 Exposing ID Label

1. (DLB 5/DLB 5-15b) Remove the screw at the bottom of the backplate, and slide the backplate off to expose the ID label (Figure 4).
2. Record the Serial Number and Radio MAC address from the ID label.
3. Run a patch cable from the power injector POE connector to the radio.
4. Run another patch cable from the LAN connector on the power injector to an active RJ-45 LAN receptacle in the PC/laptop.
5. Plug the power supply into a 110 VAC outlet. A green power-on light should illuminate on the power supply, and after it boots, the PWR and LAN LEDs should illuminate on the radio.
6. Type the URL **http://192.168.2.66/** into your browser address box. A Login window will open (Figure 5).

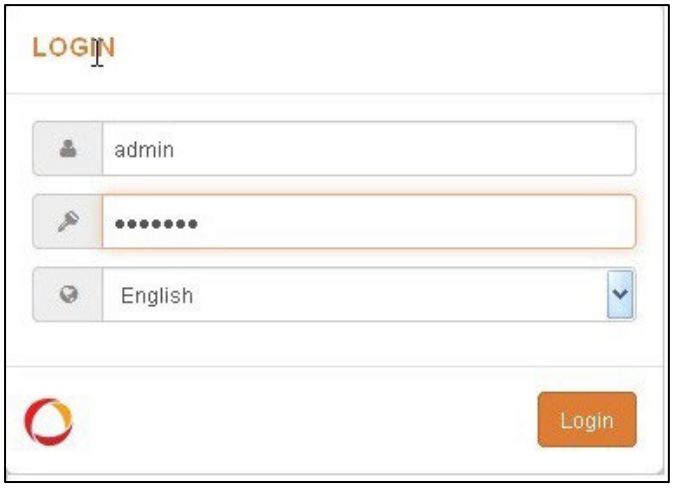

Figure 5 LigoWave Login

7. Type **admin** into the top line, and **admin01** into the second line. Ensure English is selected. The Login username and password may be changed at SYSTEM CONFIGURATION>User accounts.
8. Select **Login**. An OPERATING COUNTRY window will open (Figure 6).

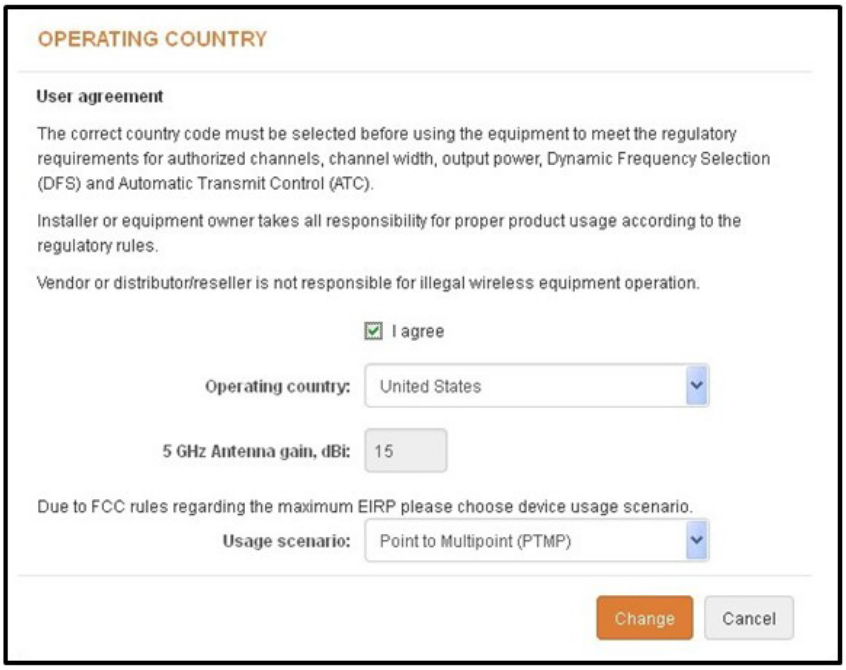

Figure 6 Operating Country

NOTE	To eliminate the need for FCC licensing, the signal strength of each wireless radio must remain below a maximum Effective Isotropic Radiated Power (EIRP). For a detailed explanation, see **Adjusting Effective Isotropic Radiated Power (EIRP)** at the end of this bulletin.

9. After reading the User agreement, select **I agree**. Options will be offered to change the Operating country and Usage scenario. The correct country selection will automatically determine authorized channels, channel width, output power, Dynamic Frequency Selection (DFS), and Automatic Transit Control (ATC).

10. Enter the dBi of the antenna used with the DLB 5. If using the antenna supplied by Syntech, enter **7**. The DLB 5-15b and DLB 5-15ac will display 15 in the antenna gain box, while the DLB 5 will display 0.

NOTE	If Point-to-Point was configured for one access point and one station, the access point must be reconfigured to Point-to-Multipoint to connect to two or more stations.

11. Select **Usage scenario**. Point-to-point covers the use of one access point and one station. Point-to-multipoint covers the use of one access point and multiple stations. If you must change from Point-to-Point to Point-to-Multipoint after the firmware program has been accessed, the radio must be reset to factory defaults, and configuration started over with the new setting.

12. Select **Change** to move to the next screen. A “Please wait….” box will open and then display your firmware inputs and initial firmware sceen (Figure 7).

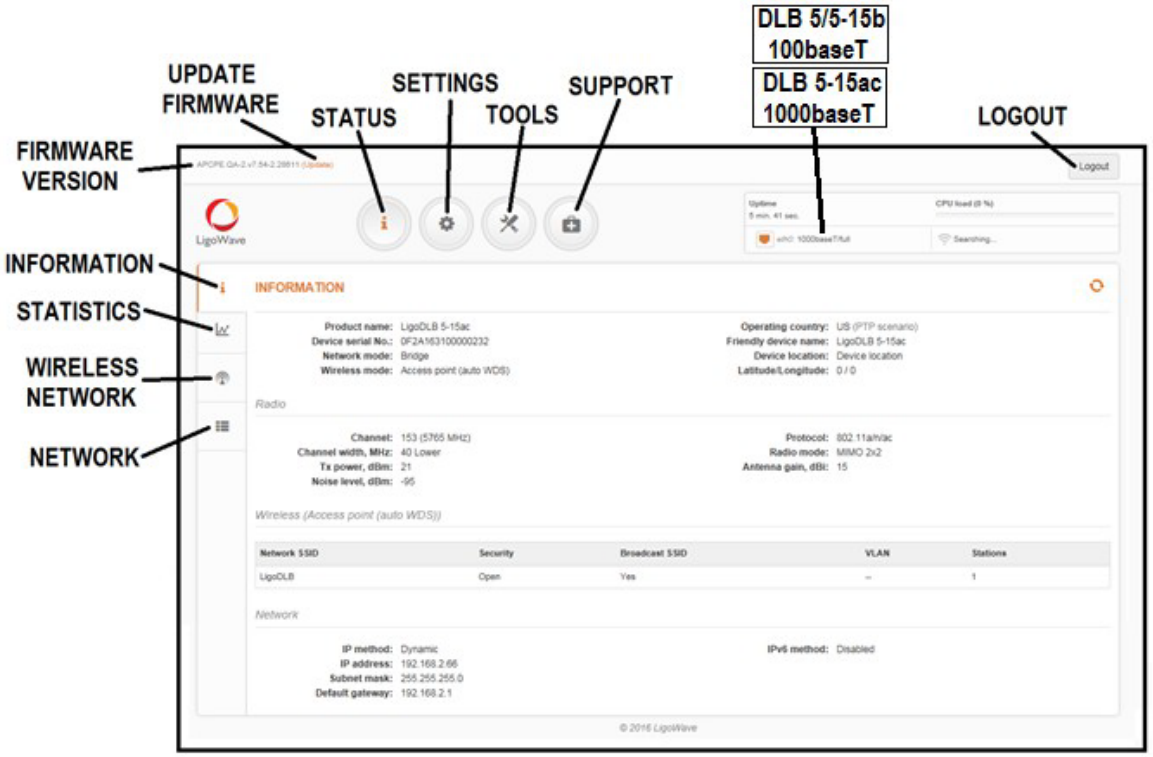

Figure 7 Information Window

Setup DLB 5, DLB 5-15b, or DLB 5-15ac

Figure 8

Following are procedures for setting up a DLB 5, DLB 5-15b, or DLB 5-15ac. Some procedures such as updating firmware, loading a stored configuration file, changing an IP address, setting up wireless network security, and saving a backup configuration file may not be required for everyone or every application. They are preceded by headings in parentheses, and may be omitted if not required.

NOTE If the DLB 5 is used with a DLB 5-15b or DLB 5-15ac, one external antenna will be supplied. If used with another DLB 5, two external antennas will be supplied.

At the time of this writing, a repeater configuration was not successfully tested. See Troubleshooting for a workaround.

(DLB 5 Only) If used in a network link to a DLB 5-15b or DLB 5-15ac, install the single omni antenna on the antenna V (vertical) connector (see Figure 8), and the metal dust cap on the H (horizontal) antenna connector. If used in a network link with other DLB 5s, install omni antennas on both antenna connectors.

NOTE DLB 5 and DLB 5-15b must be upgraded to firmware v7.54-1 (LigoDLB-5_APCPE.QM-1.v7.54- 1.26046.img) when pairing with DLB 5-15ac.

DLB 5-15ac must be running firmware v7.54-2 (LigoDLB_5_ac_APCE.QA-2.v7.54-2.28611.img) when pairing with DLB 5 or DLB 5-15b. If pairing DLB 5-15ac with another DLB 5-15ac, no firmware upgrade should be required.

If a change is made on any page, a Save changes button will appear in the upper right corner of the window. Select **Save changes** to ensure changes are saved. If Save changes doesn't appear after making a change, clear the cache (rebooting will

clear the cache) or change browsers, then repeat the procedure to ensure changes are saved.

(Update firmware) The firmware version is displayed in the upper left corner of each firmware screen (Figure 7) which opens when logging in with a PC/laptop. To download a new version of the firmware, go to https://www.ligowave.com/downloads.

(Load a stored configuration file) If a configuration file was previously saved, the radio may be configured using this file. Perform the following:

a. Select **Settings** > **System** icon. A SYSTEM CONFIGURATION window will open.

b. Under System functions, select **Restore** . A File Upload window will open.

c. Browse to and then open the desired *.cfg file. The device will be configured with the information contained in the selected *.cfg file.

d. Select **Save changes**, then **Logout**. The device is configured.

Select **Settings**. A WIRELESS CONFIGURATION window will open. See Figure 19.

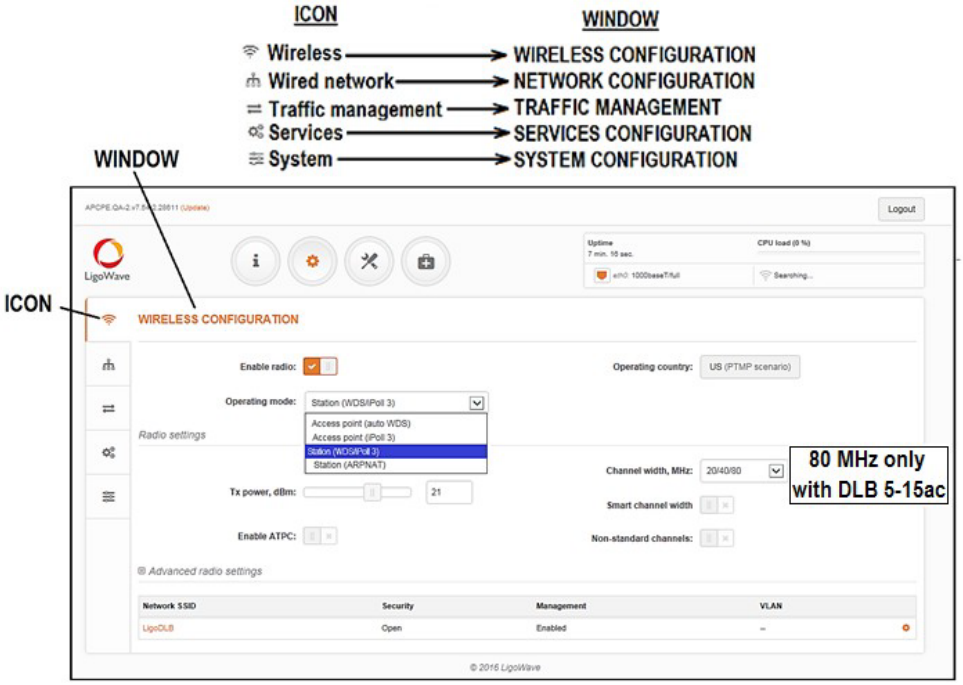

Figure 9 Settings Window

Select an operating mode. When a change is made, other settings in this window may change to be compatible with the selected operating mode. Available Operating Modes: WIRELESS CONFIGURATION>Operating modes (see Figure 9):

DLB 5/DLB 5-15b	DLB 5/DLB 5-15b	DLB 5-15ac
Access point (auto WDS)	Access point (auto WDS)	Access point (auto WDS)
Access point (iPoll2)	Access point (iPoll3)	Access point (iPoll3)
Station (WDS/iPoll2)	Access point (iPoll2)	Station (WDS/iPoll3)
Station (ARPNAT)	Station (WDS/iPoll2/iPoll3)	Station (ARPNAT)
	Station (ARPNAT)	

NOTE	Transmit power [Tx power (dBm)] defaults to 20 in DLB 5 and DLB 5-15b, and 21 in DLB 5-15ac regardless if configured Point-to-Multipoint, or Point-to-Point. When Point-to-Multipoint is configured, 20/21 is also the maximum power level. When Point-to-Point is configured, 29 is the maximum power level for DLB 5 and DLB 5-15b, and 30 for DLB 5-15ac.

Move the **Tx power (dBm) slider** to increase or reduce the power if it must be changed. This defaults to **21** (unless automatically changed to comply with FCC regulations).

NOTE	The Network SSID must match on all radios assigned to the same network. It is particularly important to look at this setting if the DLB radios are used with the older APC radios. The Network SSID defaults to LigoDLB (case sensitive) unless the radio was upgraded from a DLB Hotspot to one of the other firmware versions. The Hotspot SSID is Infinity.

Select **Settings** in the bottom right of the WIRELESS CONFIGURATION window if the SSID must be changed. A window will open to permit the change (Figure 10).

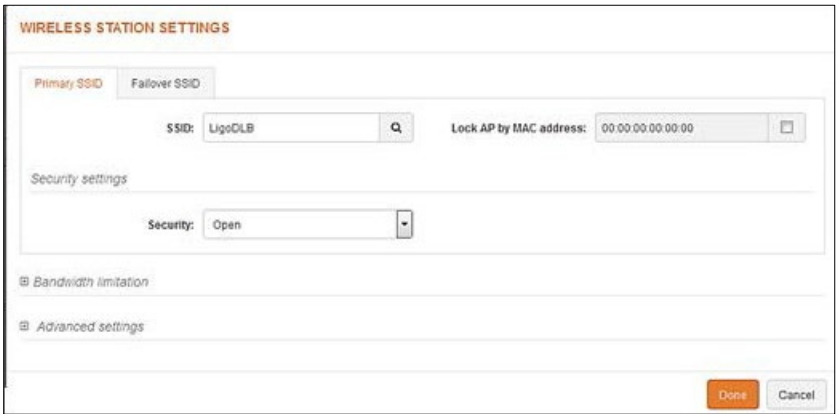

Figure 10 Wireless Network Security Setup

NOTE	Personal WPA/WPA2 and Enterprise WPA/WPA2 are available in all modes. Other settings are not. Whatever security method is chosen must be set the same in all radios installed in the network.

(Setup wireless network security) If wireless network security is needed, perform the following:

a. Select **Settings**. A WIRELESS STATION SETTINGS window (Figure 10) will open to offer the security options.

b. Select the desired **security method** from the drop-down menu.

c. Additional security requirements (example: Passphrase) will appear depending upon the security method chosen. Supply the required information and, if applicable, encryption method.

d. Select **Done**.

13. (Turn Off Client Isolation) If you are working with an application requiring a Station to communicate to a Station (example: using Access Point like a repeater between two

Stations that are not line of sight with each other), turn off Client Isolation in the Access Point:

14. With a connection to the Access Point, go to the WIRELESS CONFIGURATION window, and select the gear symbol in the lower right hand corner of the window. A WIRELESS AP SETTINGS window will open as shown in Figure 11.

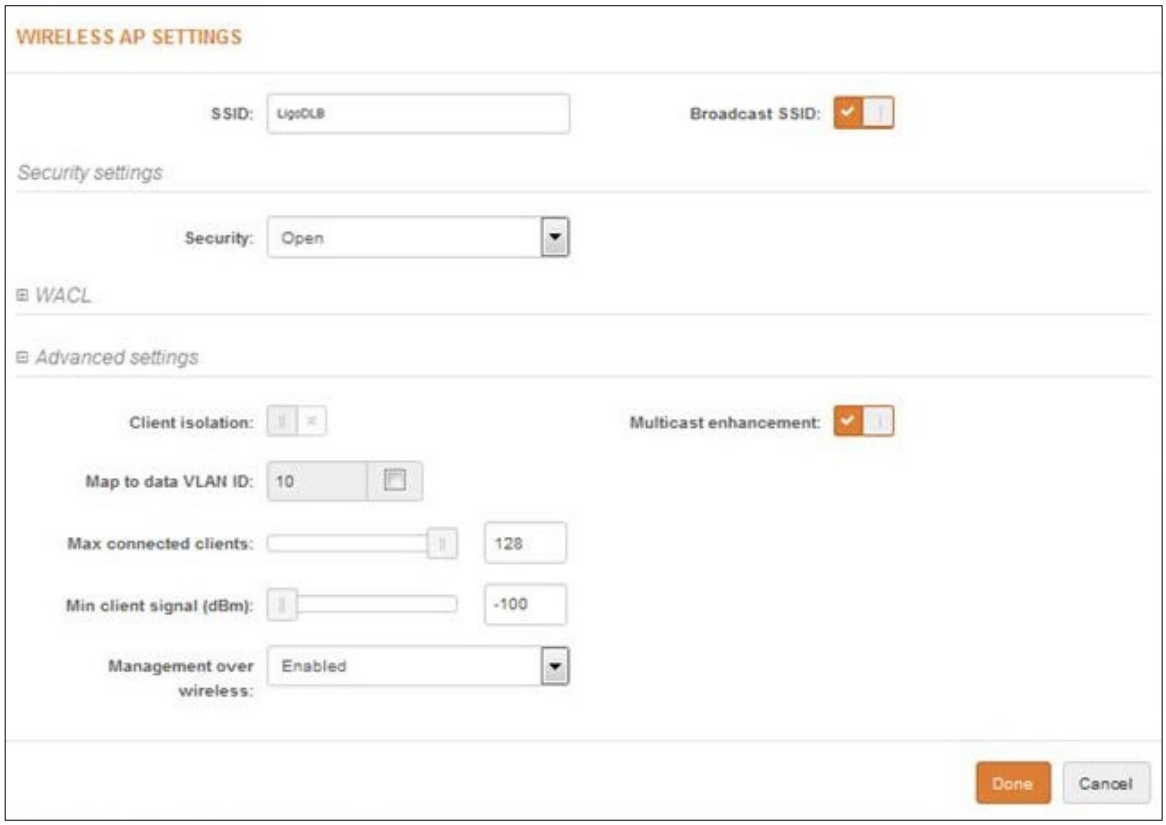

Figure 11 Wireless AP Settings

15. Select Advanced settings in the lower left-hand corner. The WIRELESS AP SETTINGS window will expand. Under Advanced settings, look at Client isolation. If there is a checkmark in the box to the right, click on the checkmark. The checkmark will change to a greyed-out box. Client isolation is turned off.
16. If it is desired to turn on Client isolation, click on the greyed-out checkmark box. The checkmark box will be highlighted, and Client isolation will be turned on.
17. Select **Done**.
18. (Change IP Method). Change the DLB radios default IP method to Static in every radio (Figure 12):
    a. Select **Settings > Wired Network** icon. A NETWORK CONFIGURATION window will open.
    b. Under IPv4 configuration, select Static in the **IP method dropdown menu.**
    c. Select **Save Changes (top right)**. A CHANGES window will open with a summary of the changes to be made. Select **Save**. A progress window will open with a "Please wait... "prompt while the changes are being saved.

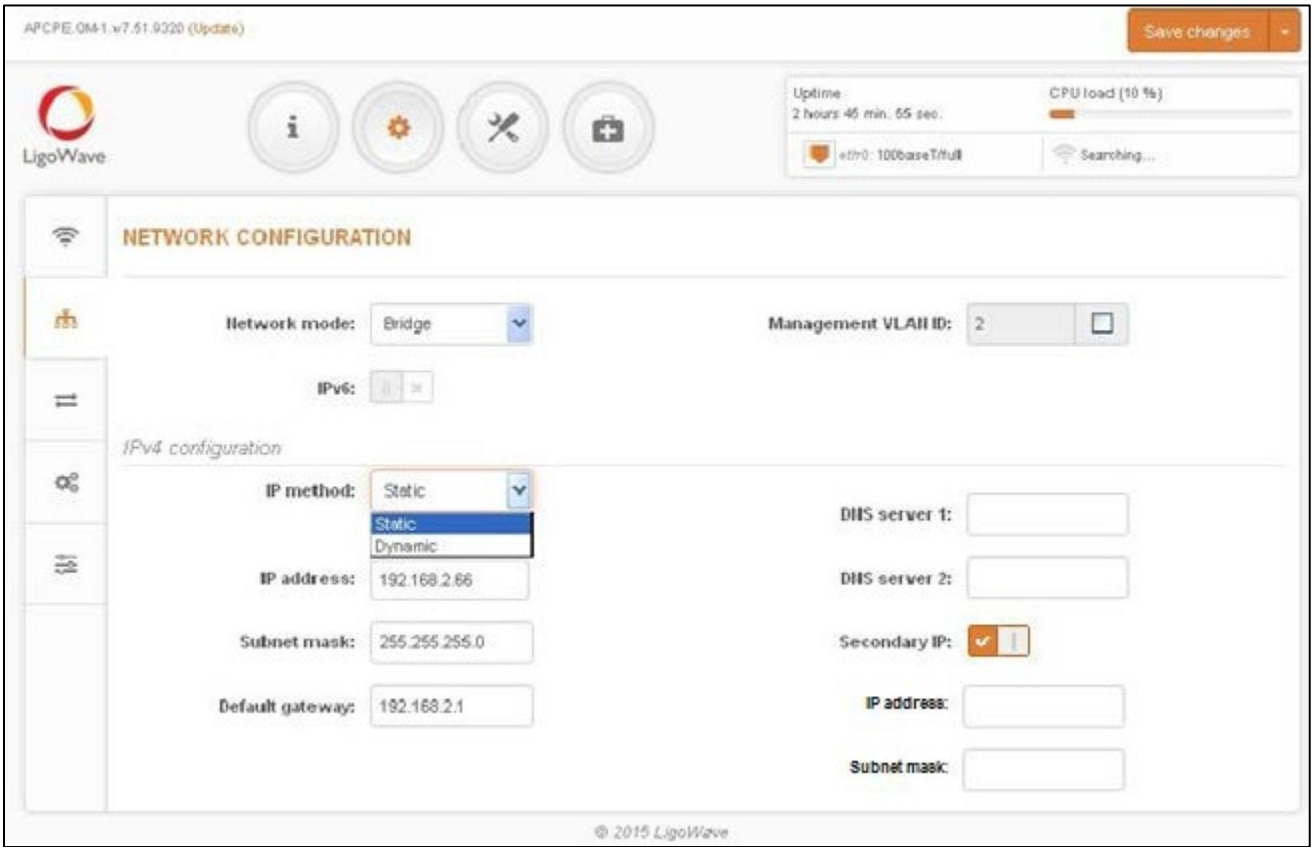

Figure 12 Network Configuration

19. (Change IP address) If an IP address change is necessary, perform the following (Figure 9):
    a. Select Settings > Wired Network icon. A NETWORK CONFIGURATION window will open.
    b. Under IPv4 configuration, change the IP address, Subnet mask, Default gateway, DNS server 1, DNS server 2, as needed.
    c. Select **Save Changes**.
20. (Configure a Secondary IP) This setting can be very useful if your PC/laptop is normally used with a different subnet than what you have set in the LigoWave radios. You won't have to reconfigure the network settings in your PC/laptop to connect to these radios.
    a. In the **Settings > NETWORK CONFIGURATION** window (Figure 12), toggle the Secondary IP box on. IP Address: and Subnet mask: boxes will appear.
    b. In the appropriate boxes, enter the desired **IP address** and **subnet mask**.
    d. Select **Save Changes**.
21. (Save backup configuration file) If a backup configuration file is to be saved, perform the following:
    a. Select **Settings > System icon**. A SYSTEM CONFIGURATION window will open.
    b. Under System functions, select **Backup** next to Backup Configuration. A window will open with the file name used by the firmware, and prompt you to Open or Save. Select **Save > OK**. The *.cfg file will be saved in the Downloads folder.

c. Select **Save changes**. The backup file is created and saved to the Downloads location.

22. Logout from the LigoWave program.
23. Repeat steps 1 through 15, as required, for additional LigoWave radios.
24. Remove power from the power supply, and disconnect the cables connected to the radio(s). complete.

Install/Mount LigoWave

Most installations will have two devices, an Access Point on the building for connection to a PC or network switch, and a Station on or near the FMU. If used with a Passive Mobile application, the Access Point will mount on the FMU, and Stations will mount on the building and Passive Mobiles (see Product Bulletin 200 for Deliberant, Product Bulletin 230 for LigoWave).

The radios may be mounted outdoors, but the power injector, power supply, and other connections must be out of the weather.

In the absence of a repeater configuration, connectivity may be achieved by mounting an Access Point (with two antennas) where the Repeater would be, and Stations at each end. The network will still communicate from a Station through the Access Point to a second Station, and in reverse.

Everything but the Cat 5 (or 6) patch cables are supplied with the LigoWave equipment. The patch cables should not exceed 100 meters (330 feet) in length. If the cable length exceeds 100 meters, Syntech recommends a network switch be placed inline every 200 feet, and an additional patch cable be routed from the network switch to the FMU network card. The network switch will boost signal strength to allow cable runs which may exceed 100 meters. No more than three network switches should be used to extend the cable length.

Install DLB 5, DLB 5-15b, or DLB 5-15ac Access Point

The power supply must be installed indoors and plugged into a 110 VAC power receptacle. A patch cable from the PC LAN connector or network LAN cable is plugged into the power injector LAN connector, and another patch cable is run from the POE connector outdoors to the wireless device.

The DLB radios are designed for outdoor installation, and have a weatherproof cable gland (Figure 13) to keep the patch cable connection dry. Mounting hardware supplied with the kits permit installation on any flat surface or on a pole. The DLB 5 access point must have an external antenna to communicate with a DLB 5-15b or DLB 5-15ac station. The DLB 5-15b and DLB 5-15ac have a directional antenna and whether an access point or station, must be aligned to be line-of-sight with other radio. A suitable location at the PC/network end must be found for mounting the access point. The access point must be configured for operation in conjunction with the station, FMU, and PC/network connection. Perform the following.

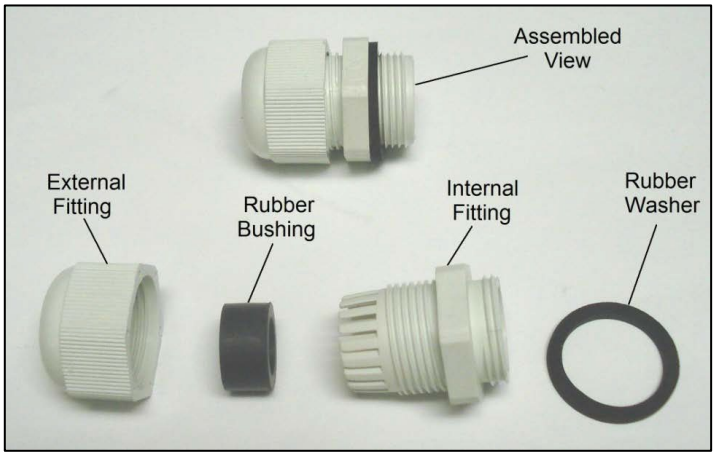

Figure 13 Weatherproof Cable Gland

NOTE	An antenna alignment may be performed with a PC connection to the access point after both the access point and station are installed and powered. The DLB 5 uses omni-directional antennas, and should not require antenna alignment, but the internal antenna of the DLB 5- 15b or DLB 5-15ac as either an access point or station is directional and will require antenna alignment after installation to achieve the best signal strength.

1. Find a suitable location for mounting the access point which will achieve line-of-sight with the station and minimize the length of the patch cable to the PC or network. As much as possible, avoid interference with other wireless devices operating on the same frequencies. Also, mount the access point so it will be protected from snow/ice falling from an overhanging roof.
2. (DLB 5) Install a 251550 omni antenna on the V antenna connector (refer back to Figure 8) and a 259144-dust cap on the H antenna connector if communicating with a DLB 5-15b or DLB 5-15ac. Install two 251550 on the DLB 5 if communicating with another DLB 5.
3. Mount the access point on the building with the POE connector facing down. Mounting hardware to include the 257257 Mount Bracket (Figure 14) is supplied with the access point.

Figure 14 257257 Mount Bracket

4. Mount the power supply indoors where it may be protected from weather and plugged into a 110 VAC power receptacle.
5. Route a patch cable from the PC LAN (or network switch) connector to the power injector LAN connector.

6. Run a second patch cable from the power supply POE connector outside the building to the access point.
7. Disassemble the weatherproof compression fitting. It consists of four components: a rubber washer to seal the threaded connection to the access point, an internal fitting that threads into the access point, a rubber bushing which may be stretched to fit over an RJ-45 connector, and an external fitting which threads onto the internal fitting. The patch cable may be routed through the compression fitting with an RJ-45 connector pre-installed.
8. Route the patch cable RJ-45 connector through the disassembled weatherproof compression fitting, one component at a time, and plug it into the access point RJ-45 receptacle.
9. Reassemble the weatherproof compression fitting. Install the rubber washer on the internal fitting, and thread the internal fitting into the access point.
10. Push the rubber bushing into the unthreaded end of the internal fitting, then thread the external fitting finger tight onto the internal fitting.
11. Seal any holes where the patch cable enters the building.
12. Plug the power supply into a 110 VAC power receptacle. A green power-on LED will illuminate on the power supply. The access point will also have a power indicator and LAN LED which will illuminate when power and LAN connections are made. Installation of the access point is complete.

Install DLB 5, DLB 5-15b, or DLB 5- 15ac Station

The power supply must be installed in the FMU and plugged into a 110 VAC power receptacle. The kit includes a 178802A replacement cable (Figure 15) which provides a power receptacle. A step preceded with (Install a 178802A Electrical Outlet Cable) provides instructions for installation. If the cable is already installed, omit the step. Patch cables must be run from the power supply to the FMU network interface card, and to the station. The station must be configured for operation in conjunction with the access point, FMU, and PC. Perform the following:

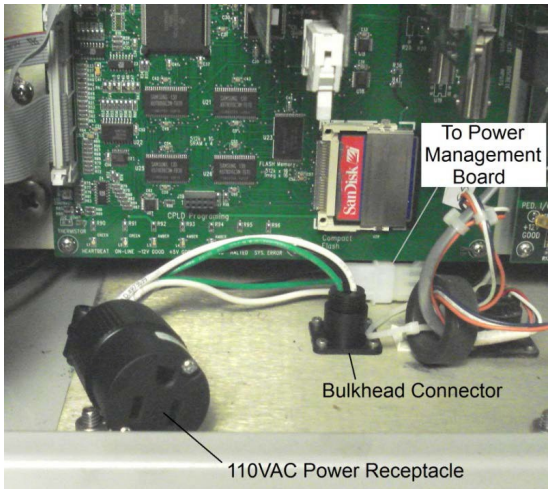

Figure 15 178802A Cable Installation

1. (Install a 178802A Electrical Outlet Cable) If a 110VAC power receptacle is not installed, perform the following:
   a. Verify FMU power is removed at the circuit breaker.
   b. Open the FMU pedestal and upper cabinet door, and remove the upper electrical access panel.
   c. Disconnect the power cable from the underside of the bulkhead power connector.
   d. Disconnect the bulkhead power cable from the Power Management Board AC power cable.
   e. Using a 3/32 hex and ¼ inch nut-driver or socket, remove the four screws and nuts securing the bulkhead connector to the bulkhead plate.
   f. Remove the bulkhead power cable, and install the 178802A cable by reversing the above removal procedures.
2. Find a suitable location for mounting the station where it may attain line-of-sight with the access point. Mounting hardware to include the 257257 Mount Bracket is provided for mounting the station on the FMU, any flat surface, or on a pole. Wherever it is mounted, it must accept input from a patch cord connected to the power supply in the FMU.
3. Loosely mount the station. After all connections are complete an antenna alignment procedure will be performed to attain maximum signal strength between the station and access point. The station mount will be secured after the antenna alignment procedure is performed.
4. Mount the power supply in the FMU. If mounting close to any circuit board, anchor the power supply with industrial Velcro or some other mounting method to prevent contact between the power supply and circuit board. Ensure the mounting location supports connection to a 110 VAC outlet and permits patch cables to be routed to the FMU network interface card and to the station.
5. Route a patch cable from the FMU network interface card to the power supply LAN connector.
6. Run a second patch cable from the power supply POE connector to the station. A Strain Relief (Figure 16) is provided with the kit to serve to weatherproof the POE cable exit from the FMU. The small end of the Barrel is ¾ inch, and is inserted from outside through a hole drilled/punched in the FMU upper cabinet. If the metal washer is discarded, and the rubber seal is split, an RJ-45 connector may be inserted through the strain relief.
7. Disassemble the weatherproof compression fitting provided with the station. It consists of four components: a rubber washer to seal the threaded connection to the station, an internal fitting that threads into the station, a rubber bushing which may be stretched to fit over an RJ-45 connector, and an external fitting which

Figure 16 Strain Relief

threads onto the internal fitting. The patch cable may be routed through the compression fitting with an RJ-45 connector pre-installed.

8. Route the patch cable RJ-45 connector through the disassembled weatherproof compression fitting, one component at a time, and plug it into the access point RJ-45 receptacle.
9. Reassemble the weatherproof compression fitting. Install the rubber washer on the internal fitting, and thread the internal fitting into the access point.
10. Push the rubber bushing into the unthreaded end of the internal fitting, and thread the external fitting finger tight onto the internal fitting.
11. Seal any holes where the patch cable exits the FMU.
12. Plug the power supply into a 110 VAC power receptacle.
13. Restore FMU power at the circuit breaker. A green power-on LED will illuminate on the power supply.
14. Reinstall the FMU electrical access panel, and close and lock FMU doors. The station installation is complete.

Install Repeater

Repeater option not presently available for the DLB series. See Troubleshooting for alternatives.

Antenna Alignment

Whenever a radio with a directional antenna (DLB 5-15b or DLB 5-15ac) has been installed, perform an antenna alignment to attain the best signal strength and confirm connectivity. This antenna alignment procedure requires two radios be installed and powered, and the access point to be addressable through a PC. If a DLB 5-15b or DLB 5-15ac is installed at both ends, both devices must be aligned toward one other. Perform the following:

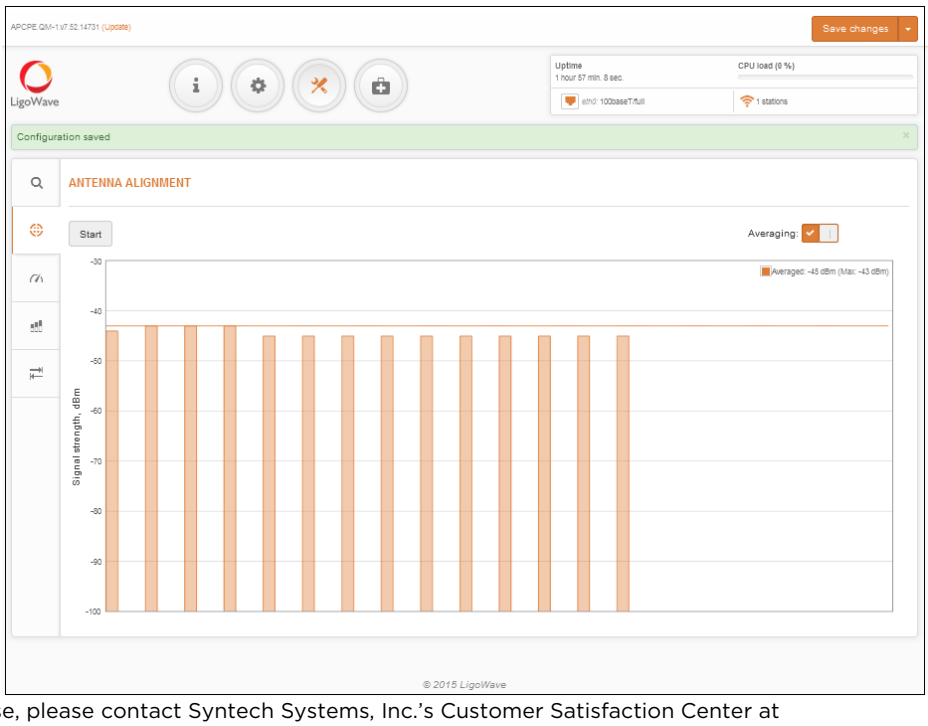

Figure 17 Antenna Alignment

1. Log in to the Access Point in accordance with Login to a DLB 5, DLB 5-15b, or DLB 5-15ac with a PC/Laptop.
2. From the INFORMATION screen, select **TOOLS** .
3. In the TOOLS, SITE SURVEY screen, select **Antenna Alignment** . The Antenna Alignment screen will open (see Figure 17).
4. Select **Start**. The antenna alignment will begin, and the Signal Strength dBm will appear.

NOTE The closer the two Deliberant devices are to one other; the less change will be observed when moving the station.

5. Monitor the antenna alignment display, and adjust one device until it achieves the greatest signal strength. Signal strength indications don't change instantaneously. A few seconds are necessary to refresh the display when the device is turned. When the greatest signal strength is attained, firmly anchor the device in place.
6. If applicable, repeat step 5 for the second device.
7. Select **Stop** to stop the procedure.
8. Logout and disconnect.

Considerations When Mixing DLB 5-15ac Radios with DLB 5 or DLB 5-15b Series Radios

In January 2017 we learned we could not order replacement DLB 5-15b radios again until March 2017. In the interim it was necessary to order and use DLB 5-15ac radios. When the DLB 5-15b becomes available again, we will order and use them as replacements for DLB 5-15b radios. New customers will receive the DLB 5-15ac.

Presently, the DLB 5-15ac uses different firmware than the DLB 5 and DLB 5-15b. If it is necessary to replace a DLB 5-15b with a DLB 5-15ac, any pre-existing DLB 5 or DLB 5-15b on the network will have to be upgraded with compatible firmware.

The DLB 5-15ac has a maximum bandwidth setting of 80 MHz, which is not available with the DLB 5 or DLB 5-15b. If a DLB 5-15ac is used with a DLB 5 or DLB 5-15b, the DLB 5-15ac must be set to Auto/80 MHz (default setting), or any setting below 80 MHz. If a DLB 5-15ac is used with another DLB 5-15ac, both radios may use the Auto/80 MHz bandwidth setting. Auto/80 MHz only uses 80 MHz when it is available in all radios on the same network.

Considerations When Mixing DLB 5-15ac Radios with APC 5M or APC 5M-12 Series Radios

The DLB 5-15ac may be installed in a mix with APC 5M or APC 5M-12 by a qualified IT professional due to the settings and changes required. If this is desired, contact us, and we can provide detailed instructions from LigoWave. It is recommended the APC 5M or APC 5M-12 be replaced with one of the newer LigoWave DLB radios, for ease of operation. The end result on the FMU end of the network requires a connection to a static IP address. The

instructions for mixing a DLB 5-15ac with the APC series radios calls for all radios to be configured for dynamic IP method.

Troubleshooting

LigoWave has a very informative Wiki which may be found at:

https://www.ligowave.com/wiki/.

The Wiki contains much more information than can be found in this product bulletin, and will provide the newest information on updates to the equipment and firmware.

Unlike previous Deliberant radios, these LigoWave radios are defaulted to Dynamic IP method. All radios must be configured to Static IP method to work with the available FuelMaster software settings.

If you are unable to connect to a LigoWave device with any IP address, perform Resetting to Defaults. The procedure will restore LigoWave to the manufacturer's original default configuration.

A satisfactory Repeater configuration has not yet been found, but alternatives to a Repeater have been discovered.

When you make a PC connection to a LigoWave device, remember it takes a moment for the device to boot up. It is not immediately available as soon as the connections are made and power is applied.

Verify two (or more) units are configured correctly. They, and the devices they are connected to, must be on the same subnet. They must be using the same SSID. They must be using the same security settings. They cannot be using the same IP address.

The DLB 5-15b and DLB 5-15ac have a directional antenna. If being used as an access point for several FMUs, and not communicating to all of them, the signal may not be reaching all the FMUs. This may be tested by performing the Antenna Alignment procedure. It may be necessary to replace the DLB 5-15b or DLB 5-15ac with a DLB 5 and omni antenna.
If the PC is presently on a network, it may have to be reconfigured with a static IP address as opposed to Obtain an IP address automatically. The static IP address must be on the same subnet as the LigoWave radios.

After any changes are made to the configuration of the radios, be sure they are saved correctly. Do not remove power while a save or reboot is in progress.

If wireless security is enabled, verify it is configured with the same settings, so the two devices will communicate with each other. Wireless security passkeys are case sensitive.

If troubleshooting doesn't resolve communication conflicts, reset both devices to their default settings, and accomplish configuration of both devices. A simple typographical error in one setting can be very difficult to find and can prevent communications.

Resetting to Defaults

If the IP address is unknown and assuming the POE cable is connected, reset the DLB radios by pressing and holding the reset button for 5-10 seconds. Then, release. The radio will reboot. If the reset button was not closed long enough, the radio will still reboot but will not

reset. After it completes the reboot, it will be accessible using the default IP address of 192.168.2.66.

LigoWave offers a free downloadable reset tool. This reset tool functions differently from the Deliberant reset tool. It will not show the current IP address of the radio. It will only reset the radio to the default IP address. The reset button shown in Figure 18 is much faster and easier.

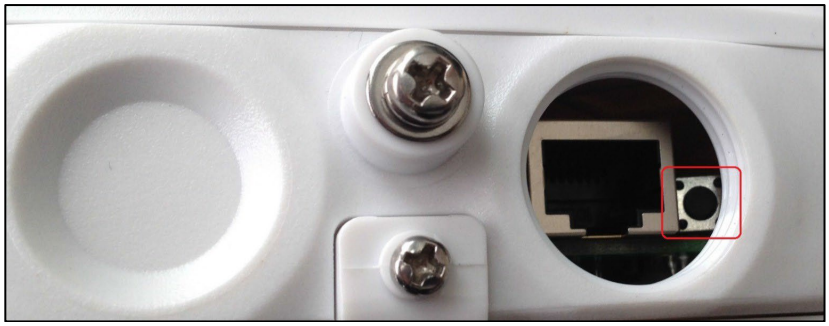

Figure 18 Reset Button

Adjusting Effective Isotropic Radiated Power (EIRP)

To eliminate the need for FCC licensing, the signal strength of each wireless radio must remain below a maximum Effective Isotropic Radiated Power (EIRP). The EIRP is measured by adding the antenna dBi to the radio output power (example: 7 dBi antenna + 29 dBm radio output power = 36 EIRP).

Point-to-point (one access point to one station) cannot exceed 53 EIRP. Point-to-multipoint (one access point to multiple stations) cannot exceed 36 EIRP. When first logging in to the DLB radios, you will be asked to enter the gain of the antenna, as well as whether it will be used for point-to-point, or point-to-multipoint. The maximum transmit power of the DLB radios is 29 dBm when the EIRP is not exceeded. The radio firmware will automatically reduce the maximum transmit power to keep the EIRP within the maximum permitted by the FCC.

TIP	If any questions arise, contact Syntech Systems, Inc.'s Customer Satisfaction Center (CSC) at 1-800-888-9136, ext. 2, or email support@myfuelmaster.com.

Change Log:

Date	Description
10/30/2015	Original
3/23/2016	Added explanation and instructions for disabling Client Isolation, pages 13 and 14. Revised 5/6/2016 Added sentence Firmware 7.53 enhances the use of Access Points in the Repeater position (see Troubleshooting, page 23) to first Note bullet, page 1. Added Update to Troubleshooting, page 23, Update: this procedure was attempted unsuccessfully by one of our distributors. He contacted LigoWave support and was told to upgrade from 7.51 firmware to 7.53. When he upgraded, the procedure worked as described.
2/8/2017	Added coverage for DLB 5-15ac
11/17/2020	Rebranded/reformatted
5/11//2021	Edited for conciseness

HOLD HARMLESS AGREEMENT

to be completed when installing wireless networking equipment

TO:

SUBJECT: Potential Security Breaches Through Wireless Network Connections to FuelMaster

FuelMaster® Fuel Management Units (FMUs) and software do not contain personal information subject to the Privacy Act of 1974. However, when added to a network the FMU may provide a link to other resources which do contain personal or privileged information. Cable or fiber optic network connections are not easily accessible. Wireless networks operate on radio waves that can be intercepted by anyone with the right equipment and within range of the transmitter. Without proper wireless network security, outside users can access your network to attain such valuable information as social security numbers, credit card numbers, bank account numbers, and other private information sources stored on your network. If accessibility is achieved, outside users can access anything stored in your network, not just FuelMaster related information.

Though the physical installation of the equipment may be accomplished by anybody with the knowledge and experience, the responsibility for the network, IP addresses, wireless components and devices, access points and network configuration rests entirely on the customer and, where applicable, his/her Information Technology (IT) person(s) or Network Administrator(s) for that site.

Syntech Systems, Inc., cannot emphasize enough the potential damage that may result from a breach in network security. When a wireless network connection to FuelMaster is established, Syntech Systems, Inc, cannot prevent accessibility by outside users. As such, this HOLD HARMLESS AGREEMENT is prepared to remove liability from Syntech Systems, Inc. and the installer/installing company for any breach of security resulting from the development of a wireless network connection to FuelMaster. Please acknowledge receipt and concurrence with the terms of this agreement by signing below.

ACKNOWLEDGEMENT:

I acknowledge receipt and concurrence with the terms of this agreement:

_____

(Signature of Authorized Representative)