

**LUXUL**  
WIRELESS

**USER GUIDE**

**PRO-WAV™**

**WI-FI RANGE EXTENDER SYSTEM**



**FOR USE WITH THE D-LINK DWL-2100AP**

**MODEL NUMBER: PW-FC1 - SINGLE ANTENNA**

**PW-FC1 - DUAL ANTENNA**



## PRO-WAV WI-FI RANGE EXTENDER SYSTEM

MODEL NUMBER: PW-FC1

### INSTALLATION GUIDE

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Antenna for broadband wireless communications

This product is covered by one or more U.S. and foreign patents.

Patents: 7,379,717 6,606,075, 6,373,448, other patents pending

## PRO-WAV WI-FI RANGE EXTENDER SYSTEM

MODEL NUMBER: PW-FC1

FCC ID: W59PWFC1

IC: 8584A-PWFC1

## D-LINK WIRELESS ACCESS POINT

MODEL NUMBER: DWL-2100AP

FCC ID: RRK2004042018-1

IC: 4216A-WL2100AP

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# SHOCK-WAV SIGNAL BOOSTER USER GUIDE

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## 1 - INTRODUCTION

The Luxul Wireless Pro-WAV Wi-Fi Range Extender System is designed to complement and enhance the performance of the D-Link DWL-2100AP Wireless Access Point (WAP). When combined with the DWL-2100AP and X-WAV XW-24-FP7 Flat Panel Antenna, it delivers up to the maximum approved transmit power, resulting in a farther reaching and higher performing network.

Luxul Wireless Pro-WAV Wi-Fi Range Extender System feature patented RF technology that dynamically optimizes output strength and provides the cleanest, most consistent signal amplification available for Wi-Fi networks. Designed for bidirectional signal amplification, Shock-WAV Wi-Fi Signal Boosters utilize patented Digital Automatic Gain Control (D-AGC) technology that actively monitors the incoming signal from each packet and makes adjustments so that the output signal maintains constant power levels, ensuring the cleanest and most consistent RF signal possible.

### 1.1 DOCUMENT CONVENTIONS

The following graphical alerts are used in this document to indicate notable situations:



**NOTE:** Tips, hints, or special requirements that you should take note of.



**CAUTION:** Care is required. Disregarding a caution can result in data loss or equipment malfunction.



**WARNING!:** Indicates a condition or procedure that could result in personal injury or equipment damage.

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### 1.2 WARNINGS

- Read all installation instructions and site survey reports, and verify correct equipment installation before connecting the Shock-WAV Wi-Fi Signal Booster or DWL-2100AP to its power source.
- Remove jewelry and watches before installing this equipment.
- Verify that the unit is grounded before connecting it to the power source.
- Verify that any device connected to this unit is properly wired and grounded.
- Connect all power cords to a properly wired and grounded electrical circuit.
- Verify that the electrical circuits have appropriate overload protection.
- Attach only approved power cords to the device.

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- Verify that the power connector and socket are accessible at all times during the operation of the equipment.
- Do not work with power circuits in dimly lit spaces.
- Do not install this equipment or work with its power circuits during thunderstorms or other weather conditions that could cause a power surge.
- Verify there is adequate ventilation around the device, and that ambient temperatures meet equipment operation specifications.
- Products outside the approved configurations may be in violation of Part 15 of the FCC Rules.

## 1.3 SITE PREPARATION

- Consult your site survey and network analysis reports to determine specific equipment placement, power drops, and so on.
- Assign installation responsibility to the appropriate personnel.
- Identify and document where all installed components are located.
- Provide a sufficient number of power drops for your equipment.
- Ensure adequate, dust-free ventilation to all installed equipment.
- Identify and prepare Ethernet and console port connections.
- Verify that cable lengths are within the maximum allowable distances for optimal and certified signal transmission.

## 1.4 PROFESSIONAL INSTALLATION CONSIDERATIONS



**CAUTION:** Operation of the signal booster without regulatory approval is illegal

The Luxul Wireless Pro-WAV Wi-Fi Range Extender System is required to be professionally installed. The following components are approved for use in the system.

- Luxul PW-FC1 Wi-Fi Signal Booster
- Luxul Wireless X-WAV XW-24-FP7 Flat Panel Antenna
- D-Link DWL-2100AP Wireless Access Point

The output power of the amplifier is set and tested during manufacturing. There are no user modifiable parameters in the amplifier. The Luxul Shock-WAV Wi-Fi Signal Booster system incorporates a Digital AGC (D-AGC) that ensures a consistent and approved output power.

Please reference section 4 for installation instructions.

## 2 - SPECIFICATIONS

### 2.1 SHOCK-WAV™ WI-FI SIGNAL BOOSTER SPECIFICATIONS

Operating Range	2400 - 2483 MHz
Transmit Power	(28dBm)
Transmit Gain	20dB Typical (under D-AGC Control)
Receive Gain	15dB Typical
TX Input Power	+8dBm to +24dBm
Noise Figure	3.5dB Typical
LED Indicators TX\RX	Red for Transmit, Green for Receive
Power Consumption	400mW (RX) 5W (TX) Max
Power Options	Power Over Ethernet (POE) or AC-DC adapter
Operating Voltage	12 to 48VDC
Operating Temp	-4 F to +122F (-20c - +50c)
Dimensions	W: 4" (101.6mm) L: 5.16" (131mm) H: 1.13" (28.7mm)
Enclosure	Indoor, Aluminum
RF Connectors	Two (2) Type N Female
Weight	0.7lbs. (317.5g)

### 2.2 X-WAV™ FLAT PANEL ANTENNA SPECIFICATIONS

Frequency Range	2400 - 2500MHz
Gain	7dBi CP Gain
Polarization	Clear-WAV Right Hand Circular
Connector	N Female
Azimuth Beam Width	70 degrees
Elevation Beam Width	70 degrees
VSWR	< 1.5:1
F/B Ratio	23dB
Impedance	50 Ohm
Dimensions	W: 4.25" (107.95mm), L: 4.25" (107.95mm) , H: 1.6" (40.64mm)
Weight	4.5 oz (127.5g)

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## 3 - GETTING STARTED

### 3.1 PRECAUTIONS

Before installing the Shock-WAV Wi-Fi Signal Booster and DWL-2100AP verify the following:

- Do not install in wet or dusty areas without additional protection. Contact a Luxul Wireless representative for more information.
- Verify the environment has a continuous temperature range between -4 F to +122F (-20c - +50c).

### 3.2 PACKAGE CONTENTS

The Luxul Wireless Pro-WAV Wi-Fi Range Extender System consists of the following:



One-Shock-WAV Wi-Fi Signal Booster



- **PW-FC1 - Single Antenna:** One-XW-24-FP7 - 7dBi High Gain 2.4GHz
- **PW-FC1 - Dual Antenna:** Two-XW-24-FP7 - 7dBi High Gain 2.4GHz



- **PW-FC1 - Single Antenna:** Two-Coax cables (1-N-Male to N-Male, 1-N-Male to RP-SMA)
- **PW-FC1 - Dual Antenna:** Three-Coax cables (2-N-Male to N-Male, 1-N-Male to RP-SMA, RP-SMA to 1-RP-TNC adapter)



**PW-FC1 - Dual Antenna only:**  
One-Signal Splitter (S50-2502N) and Barrel Connector



**PW-FC1 - Dual Antenna only:**  
One-Barrel Connector



One-48VDC Universal Input Power Supply



**One-D-Link DWL-2100AP Wireless access point**  
Included with the D-Link DWL-2100AP is: a Detachable Antenna, Ethernet Cable, Power Supply, Mounting kit, Vertical Stand, Installation Guide and CD ROM

### 3.3 ADDITIONAL ITEMS REQUIRED

Before installing your Shock-WAV Wi-Fi Signal Booster, be sure to have the following items available:

- Ethernet cable for connection to your network source

### 3.4 OPTIONAL PRODUCTS AND ACCESSORIES

**Splitters and Surge Protectors:** Signal splitters, lightning surge protectors, and other useful accessories are available for making the most of your Luxul Wireless purchase.

## 4 - INSTALLATION PROCEDURES



**NOTE:** The combination of the D-Link DWL-2100AP and the Shock-WAV Wi-Fi Signal Booster requires professional installation. Please contact Luxul Wireless for more information.

### 4.1 REMOVING THE STOCK ANTENNA FROM THE D-LINK DWL-2100AP

Shock-WAV Wi-Fi Signal Boosters are connected between the DWL-2100AP and the X-WAV antenna.

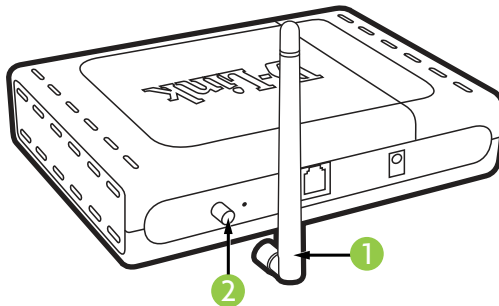


Figure 1

Remove the stock antenna (Figure 1) **1** from your DWL-2100AP's Antenna port **2**.

*(Consult your D-Link documentation for more details on the DWL-2100AP's ports).*



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## 4.1 CONNECTING THE PW-FC1 - SINGLE ANTENNA TO THE D-LINK DWL-2100AP

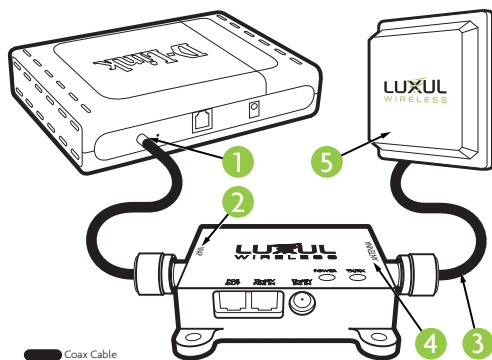


Figure 2 — Coax Cable

Using the supplied N-Male to RP-SMA-Male coax cable, connect the Shock-WAV Wi-Fi Signal Booster to your DWL-2100AP's Antenna port . (Figure 2) ①. Be sure to connect the cable to the side of the Signal Booster labeled WAP ②. Next use the included N-Male to N-Male cable ③ connect the Shock-WAV Wi-Fi Signal Booster to the X-WAV XW-24-FP7 antenna ⑤. Be sure to connect the cable to the side of the Signal Booster labeled Antenna ④.

## 4.2 CONNECTING THE PW-FC1 - DUAL ANTENNA TO THE D-LINK DWL-2100AP

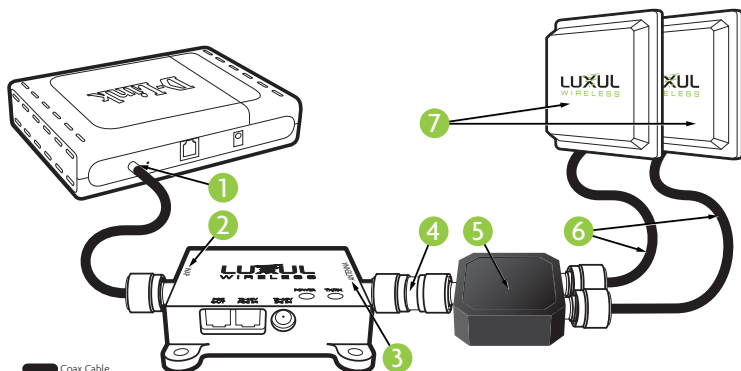


Figure 3 — Coax Cable

Using the supplied N-Male to RP-SMA-Male coax cable, connect the Shock-WAV Wi-Fi Signal Booster to your DWL-2100AP's Antenna port . (Figure 3) ①. Be sure to connect the cable to the side of the Signal Booster labeled WAP ②. Next use the included barrel connector ④ to connect the splitter ④ to the side of the Signal Booster labeled Antenna ③. Using the two N-Male to N-Male cables ⑥ connect the Splitter to the two X-WAV XW-24-FP7 antennas ⑦.

## 4.3 CONNECTING POWER AND DATA SOURCE CABLES



**WARNING!:** Do not attempt to connect or disconnect any components while the D-Link DWL-2100AP WAP or Shock-WAV signal booster are plugged into power. Doing so may cause equipment damage and/or physical injury and will void your warranty.

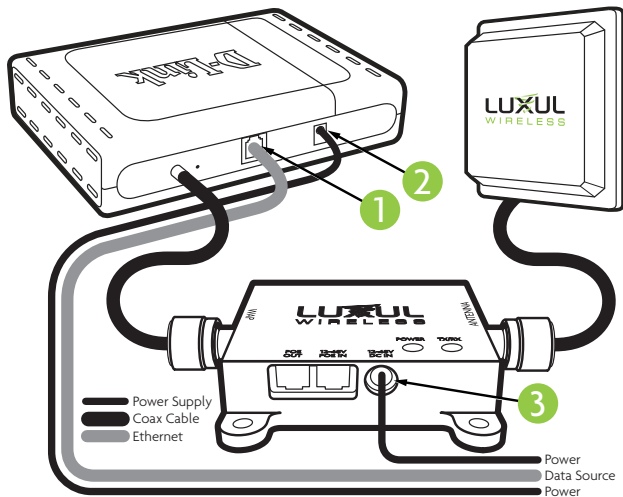


Figure 4

Power connections are the same for both PW-FCI units. The PW-FCI - Single antenna is show in figure 4. Connect your Data source Ethernet cable to the LAN port on the back of the D-Link DWL-2100AP, (Figure 4) 1. Connect the D-Link Power supply the power port on the back of the DWL-2100AP 2. Connect the 48V AC-DC power supply to the Signal Booster port labeled, 12-48V DC IN 3. Plug the power supplies into your 100-240V compatible power source.

*(Consult your D-Link Documentation for more information on the DWL-2100AP).*

## 5 - ANTENNA PLACEMENT

Luxul Wireless products, particularly those implementing our patented signal booster technology, are often capable of emitting enough signal strength to cover the desired area regardless of orientation. For best results, the Antenna should be deployed where the maximum amount of signal can be sent throughout the desired coverage area.

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## 5.1 ANTENNA DEPLOYMENT

Be sure you place the antenna so there is a minimum of 2 feet (6 meters) of open space around it.

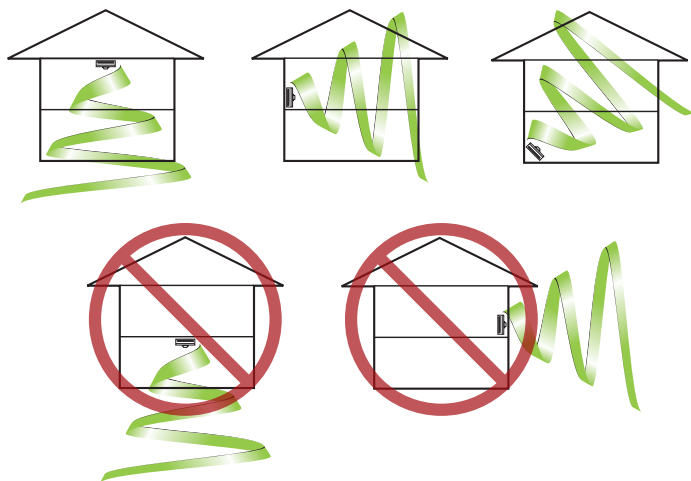


Figure 5

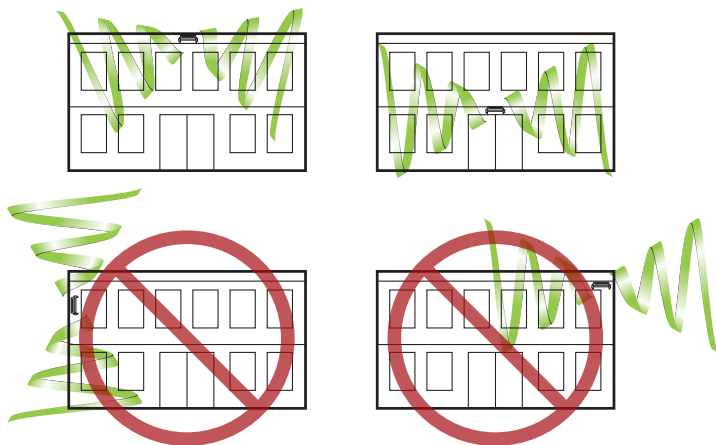


Figure 6

Figure 5 (Single antenna) and 6 (Dual Antenna) show the recommended Antenna deployments and how loss of the signal coverage can happen due to bad antenna placement.

## 5.2 ANTENNA DIRECTION

For maximum coverage it is important to have your antenna pattern radiating in the correct direction. The pattern radiates out in a cone shape pattern away from the antenna. If the antenna is tipped at an angle, the pattern will radiate out at that angle. See Figure 7 for an example of pattern radiation.

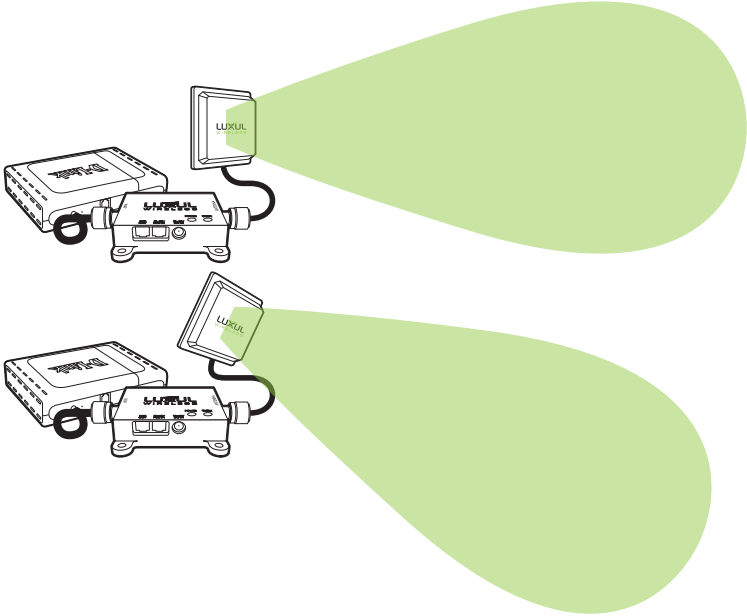


Figure 7

## 6 - REGULATORY COMPLIANCE

This device is approved under the Luxul Wireless brand and designed to comply for use specifically with the D-Link DWL-2100AP. This device is designed to be compliant with rules and regulations in locations where they are sold and will be labeled as required. Any changes or modifications to Luxul equipment, not expressly approved by Luxul, could void the user's authority to operate the equipment. This Luxul device when used in conjunction with the D-Link DWL-2100AP should be professionally installed and the Radio Frequency Output Power will not exceed the maximum allowable limit for those countries that have regulatory approval. Antennas: Use only the supplied or an approved replacement antennas. Unauthorized antennas, modifications, or attachments could cause damage and may violate regulatory approvals.

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## 6.1 HEALTH AND SAFETY RECOMMENDATIONS

**Warnings for the use of Wireless Devices:** Please observe all warning notices with regard to the usage of wireless devices

**Potentially Hazardous Atmospheres:** You are reminded of the need to observe restrictions on the use of radio devices in fuel depots, chemical plants etc. and areas where the air contains chemicals or particles (such as grain, dust, or metal powders).

**Safety in Hospitals:** Wireless devices transmit radio frequency energy and may affect medical electrical equipment. When installed adjacent to other equipment, it is advised to verify that the adjacent equipment is not adversely affected.

**Power Supply:** Use only a Luxul approved power supply output rated at 48VDC and minimum 0.25A. The power supply shall be Listed to UL/CSA 60950-1; and certified to IEC60950-1 and EN60950-1 with SELV outputs. The device can also be powered from a compliant POE source. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

## 6.2 RF EXPOSURE GUIDELINES

**Safety Information:** The device complies with internationally recognized standards covering human exposure to electromagnetic fields from radio devices.

### **Warning: Exposure To Radio Frequency (RF) Radiation:**

- The radiated output of this device is below the FCC radio frequency exposure limits. Nevertheless, the device should be used in such a manner that the potential for human contact during normal operation is minimized.
- The end user must avoid any extended human RF exposure directly in front of the Model PW-FC1, up to a distance of 20cm, when unit is switched on.
- When servicing the equipment and selecting a location for the antennas, it is important to note that a minimum distance of 20cm is required between personnel and the Model PW-FC1 antennas to comply with the radio frequency exposure limit.
- The antenna used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

- The following safety precautions should be observed:
  - Do not touch or move the antenna while the unit is transmitting or receiving.
  - Do not hold any component containing the radio such that the antenna is very close or touching any exposed parts of the body, especially the face or eyes, while transmitting.
  - Do not operate the radio or attempt to transmit data unless the antenna is connected; this behavior may cause damage to the radio.

**Remote and Standalone Antenna Configurations:** To comply with FCC RF exposure requirements, antennas that are mounted externally at remote locations or operating near users at stand-alone desktop of similar configurations must operate with a minimum separation distance of 20 cm from all persons.

### 6.3 RADIO FREQUENCY INTERFERENCE REQUIREMENTS—FCC

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

### 6.4 RADIO TRANSMITTERS (PART 15)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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## 6.5 INDUSTRY CANADA ( RSS-GEN ISSUE 2)

In accordance with Industry Canada Regulations, this radio frequency power amplifier may only be used with a transmitter with which the amplifier has been certified by Industry Canada. The Industry Canada Identification Number for the transmitter with which this amplifier is permitted to operate is 4216A-WL2100AP

This PW-FC1 - Single Antenna is designed to work with one XW-24-FP7 antenna. This PW-FC1 - dual Antenna is designed to work with two XW-24-FP7 antennas. The XW-24-FP7 antenna has a maximum linear gain of 4dBi or maximum CP gain of 7dBi. Any antenna having a gain greater than 4dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

## 7 - SALES AND SUPPORT CONTACTS

### For Sales Assistance:

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Lindon, UT 84042  
sales@luxulwireless.com

### For Technical Assistance:

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support@luxulwireless.com

**Results may vary depending on building layout, type of construction and other environmental factors including Wi-Fi traffic, Microwaves Ovens, Cordless Phones, etc.**

**FCC NOTICE:** The use of all radio equipment is subject to regulations in each country. To comply with FCC part 15 rules in the United States, radio equipment must only be used in systems that have been FCC certified. It is the responsibility of the user/professional installer/operator to ensure that only approved equipment/systems are deployed. To ensure FCC part 15 compliance, Luxul amplifier products should only be installed in certified systems by licensed professionals.

**FCC Certification Support for OEMs:** Luxul Wireless offers FCC certification assistance and engineering support for qualified OEMs interested in certifying complete amplified WLAN systems. Please contact us for details.



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