



*air*Fiber[®] 5XHD

5 GHz Carrier Radio
with LTU Technology

Model: AF-5XHD

QUICK START GUIDE

Introduction

Thank you for purchasing the Ubiquiti Networks® airFiber® AF-5XHD. This Quick Start Guide is designed to guide you through installation. Warranty terms, safety notices, and compliance information are in the airFiber AF-5XHD User Guide, available at: www.ubnt.com/download/airfiber

Package Contents



airFiber
AF-5XHD



GPS Antenna
Mount



External GPS
Antenna



Metal Strap



Zip Ties
(Qty. 2)



Universal
Bracket



IP67 Upgrade Kit
(Vent and Gasket)



Gigabit PoE (24V, 1A)
with Mounting Bracket



Power Cord



AF-5XHD
Quick Start Guide

TERMS OF USE: Ubiquiti radio devices must be professionally installed. Shielded Ethernet cable and earth grounding must be used as conditions of product warranty. TOUGH Cable™ is designed for outdoor installations. It is the professional installer's responsibility to follow local country regulations, including operation within legal frequency channels, output power, and Dynamic Frequency Selection (DFS) requirements.

Antenna Compatibility

The airFiber AF-5XHD radio is designed for use with the following airFiber X antenna models:

- AF-5G23-S45
- AF-5G30-S45
- AF-5G34-S45

The AF-5XHD can also operate with the following RocketDish™ antenna models:

- RD-5G30*
- RD-5G34*

* *Requires Universal Bracket (included) or AF-5G-OMT-S45 Conversion Kit (not included).*

Installation Requirements

- Clear line of sight between airFiber radios
- Clear view of the sky for proper GPS operation
- Vertical mounting orientation
- Mounting point:
 - At least 1 m below the highest point on the structure
 - For tower installations, at least 3 m below the top of the tower
- Ground wires – min. 10 AWG (5 mm²) and max. length: 1 m. As a safety precaution, ground the airFiber radio to grounded masts, poles, towers, or grounding bars.



WARNING: Failure to properly ground your airFiber radio will void your warranty.

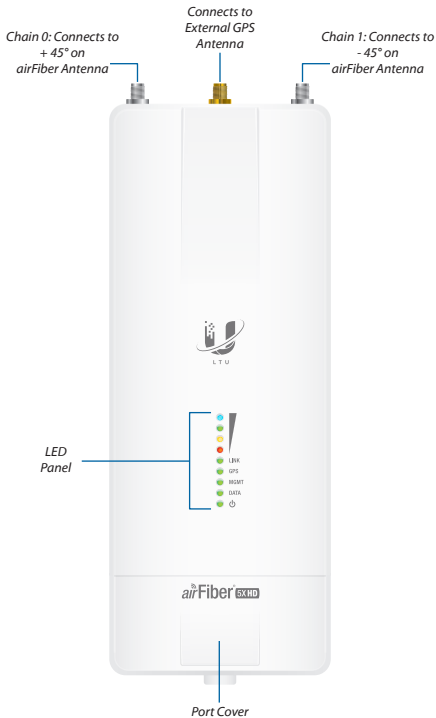
- (Recommended) 2 Outdoor Gigabit PoE surge protectors



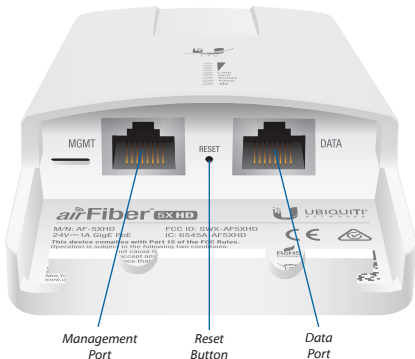
Note: For guidelines about grounding and lightning protection, follow your local electrical regulatory codes.

- Outdoor, shielded Category 6 (or above) cabling and shielded RJ-45 connectors are required for all wired Ethernet connections.

Hardware Overview



Ports







Management Port 10/100/1000 Mbps, secured Ethernet port for configuration. *In-Band Management* is enabled by default in the airFiber Configuration Interface. When *In-Band Management* is disabled, the *MGMT* port is the only port that can monitor, configure, and/or update firmware. This port can also be used to provide redundant PoE power.

Reset Button To reset to factory defaults, press and hold the *Reset* button for more than 10 seconds while the device is powered on.

Data Port Gigabit PoE port for handling all user traffic and powering the device. Default IP address: *192.168.1.20*

LEDs





Signal LEDs

-  **Signal 4** LED will light blue when on.
-  **Signal 3** LED will light green when on.
-  **Signal 2** LED will light yellow when on.
-  **Signal 1** LED will light red when on.

Bootup to airOS When powering on, the *Power, GPS, Link, and Signal 1-4* LEDs light on. Once the CPU code takes over, the *GPS, Link, and Signal 1-3* LEDs turn off. The *Signal 4* LED remains on to indicate the boot sequence is underway.


Initializing airFiber Software When the airFiber application begins to boot under airOS®, the *Signal 4* LED goes from solidly on to a 2.5 Hz flash. This continues until the AF-5XHD is fully booted.

Signal Level Once fully booted, the *Signal 1-4* LEDs act as a bar graph showing how close the AF-5XHD is to ideal aiming. This is auto-scaled based on the link range, the antenna gains, and the configured TX power of the remote AF-5XHD. Each *Signal* LED has three possible states: *On, Flashing, and Off*. All *Signal* LEDs would be solidly on in an ideal link. If the link has a 1 dB loss, the *Signal 4* LED will flash; a 2 dB loss and the *Signal 4* LED will turn off. The full bar graph LED states are shown below.

dB loss	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13
	1	F	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	F	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	1	F	F	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1	1	1	F	F	F	0

0 = Off, 1 = On, F = Flashing

Additional LEDs

LED	State	Status
Link	Off	RF Off
	Short Flash*	Syncing
	Normal Flash*	Beaconing
	Long Flash*	Registering
	On	Operational
GPS	Off	No GPS Synchronization
	Normal Flash*	Non-Operational (Weak Signal)
	On	Operational (Strong Signal)
MGMT	Off	No Ethernet Link
	On	Ethernet Link Established
	Random Flash	Ethernet Activity
Data	Off	No Ethernet Link
	On	Ethernet Link Established
	Random Flash	Ethernet Activity
	Off	No Power
	On	Powered On

* Short Flash (1:3 on/off cycle)
Normal Flash (1:1 on/off cycle)
Long Flash (3:1 on/off cycle)

Installation Overview

We recommend that you configure your paired AF-5XHD radios before site installation. The overview below summarizes the installation procedure, and the subsequent sections provide detailed installation information.

- Connect the *airFiber PoE Adapter* to the *Data* port, and connect your computer to the *MGMT* port.
- Configure the AF-5XHD.
- Recommended: Install the *IP67 Upgrade Kit* (included) to prevent intrusion by water, dust, and insects.
- Install a ground wire and mount the AF-5XHD on an airFiber X or RocketDish antenna.
- At the installation site, install the airFiber X or RocketDish antenna with the mounted AF-5XHD radio (see the antenna's Quick Start Guide for installation instructions).
- Secure the ground wire and mount the GPS antenna.
- Establish and optimize the RF link.

Connecting Power over Ethernet

1. Lift the release latch on the bottom of the AF-5XHD and slide the *Port Cover* off.



2. Connect an Ethernet cable to the *Data* port.

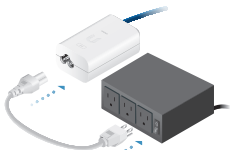


3. Connect the Ethernet cable from the *Data* port of the AF-5XHD to the **POE** port of the adapter.

! **WARNING:** Use only the included adapter, model **POE-24V-5X-HD**. Failure to do so can damage the unit and void the product warranty.



4. Connect the *Power Cord* to the adapter's power port. Connect the other end of the *Power Cord* to a power outlet.



airFiber Configuration

The instructions in this section explain how to access the airFiber Configuration Interface and configure the following settings:

- **Wireless Mode** Configure one AF-5XHD as the *Master* and the other as the *Slave*.
 - **Frequency Setting** The operating *Frequency* must be the same on both the Master and the Slave.
1. Connect an Ethernet cable from your computer to the *MGMT* port on the AF-5XHD.



2. Configure the Ethernet adapter on your computer with a static IP address on the 192.168.2.x subnet.
3. Launch your web browser. Type **http://192.168.2.20** in the address field and press **enter** (PC) or **return** (Mac).



4. The login screen will appear. Enter **ubnt** in the *Username* and *Password* fields. Select your *Country* and *Language*. You must agree to the *Terms of Use* to use the product. Click **Login**.



Note: U.S. product versions are locked to the U.S. Country Code to ensure compliance with FCC regulations.

5. Click the **Wireless** tab.
6. Configure the *Basic Wireless Settings*:
 - a. For one AF-5XHD, select **Master** as the *Wireless Mode*. For the other AF-5XHD, select **Slave** as the *Wireless Mode*.
 - b. Enter a name in the *Link Name* field. This should be the same on both the Master and the Slave.
 - c. Select your *Country*.



Note: U.S. product versions are locked to the U.S. Country Code to ensure compliance with FCC regulations.

- d. If needed, change the *Channel Bandwidth*, *Frequency*, *Output Power (EIRP)*, *Antenna Gain*, and *Max TX Modulation* settings. The *Channel Bandwidth* and *Frequency* should be the same on both the Master and the Slave.
7. Configure the *Wireless Security*:
 - a. Select **AES-256** for the *Security mode*.
 - b. Select **PSK** for the *Authentication mode*.
 - c. In the *Key* field, enter a combination of alphanumeric characters (0-9, A-Z, or a-z).



Note: Only ASCII mode is supported.

8. Click **Save Changes**.
9. Configure each airFiber radio with a unique IP address for the *Data* port:
 - a. Click the **Network** tab.
 - b. For both the *Data IP Address* and *Management IP Address* options:
 - **DHCP** Have your router use DHCP reservation to assign a unique *IP Address*.
 - **Static** Change the *IP Address*, *Netmask*, and other settings to make them compatible with your network.
 - c. Click **Save Changes**.

Repeat the instructions in the *airFiber Configuration* section on the other AF-5XHD radio.

For details on the airFiber Configuration Interface, refer to the airFiber AF-5XHD User Guide, available at:

www.ubnt.com/download/airfiber

You can also manage your device using the Ubiquiti® Network Management System. The UNMS™ app lets you configure, monitor, upgrade, and back up your devices using a single application and can be downloaded from the App Store® (iOS) or Google Play™ (Android).

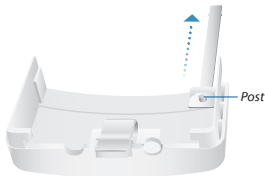
Upgrade for IP67 Compliance

To protect the AF-5XHD from intrusion by water, dust, and insects, we recommend installing the *IP67 Upgrade Kit* (included) as instructed below:

1. Remove the tether from the radio and from the *Port Cover*.



Removing the Tether from the Radio

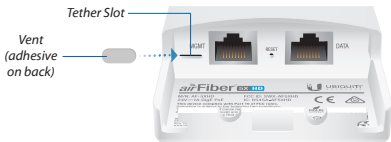


Removing the Tether from the Port Cover

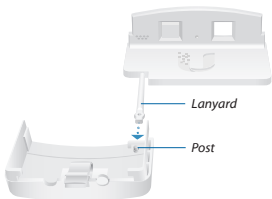


Note: Do not damage or remove the post on the *Port Cover*.

2. Remove the *Vent* and *Gasket* from their protective bag. Peel the *Vent* off of its backing and place the *Vent* on the *Tether Slot*, ensuring that it covers the slot completely.



3. Attach the *Gasket* lanyard to the post on the *Port Cover*.



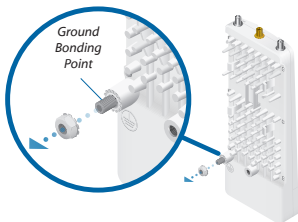
4. Insert the *Gasket* into the AF-5XHD, ensuring that it fits securely in place to form a tight seal.



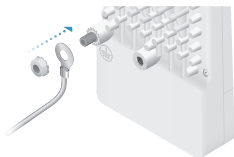
Hardware Installation

Install a Ground Wire

1. Remove the nut from the *Ground Bonding Point* located on the back of the AF-5XHD.



2. Attach a ground wire (min. 10 AWG or 5 mm²) to the lug and replace the nut to secure the wire.



3. At the installation site, secure the other end of the ground wire to a grounded mast, pole, tower, or grounding bar.



WARNING: Failure to properly ground your airFiber radio will void your warranty.




Note: The ground wire should be as short as possible and no longer than one meter in length.



640-00338-05

Mount to an airFiber X Antenna

Follow the instructions in this section to mount the AF-5XHD to an airFiber X antenna or to a RocketDish antenna equipped with the AF-5G-OMT-S45 Conversion Kit.

 **Note:** To mount the AF-5XHD to a RocketDish using the included *Universal Bracket*, see the *Mount to a RocketDish Antenna* section.

The airFiber X antenna AF-5G23-S45 is shown in this section:

1. Attach the airFiber X radio to the antenna by aligning the four tabs on the back of the radio with the slots of the radio mount. Then slide the radio down to lock it into place.



2. Attach the RF connectors to the radio in this combination: +45° to *Chain 0* and -45° to *Chain 1*. Then slide the jackets over the RF connectors to protect them.




3. Attach the external GPS antenna (included with the radio) to the RF connector labeled *GPS* on the radio.



4. Attach the *Protective Shroud* by sliding it down over the radio until it locks into the radio mount.

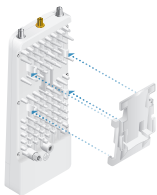


Mount to a RocketDish Antenna

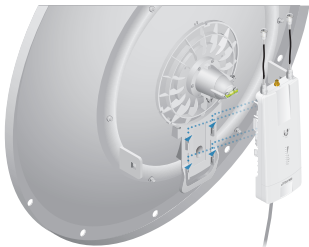
-  **Note:** If you are mounting the AF-5XHD on a RocketDish equipped with the AF-5G-OMT-S45 Conversion Kit, the *Universal Bracket* is not needed. Refer instead to the *Mount to an airFiber X Antenna* section for instructions.

The RocketDish RD-5G30 antenna is shown in this section:

1. Position the *Universal Bracket* over the back of the AF-5XHD with the bracket clips over the AF-5XHD mounting tabs.
2. Push the bracket onto the AF-5XHD until it locks in place.



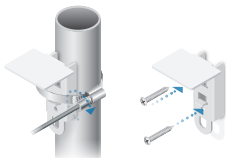
3. Attach the AF-5XHD to the RocketDish mounting bracket.
 - a. Align the mounting tabs on the *Universal Bracket* with the RocketDish mounting bracket.
 - b. Slide the AF-5XHD down to lock it into place.



Mount the External GPS Antenna

Locate a mounting point that has a clear view to the sky, and is above and as far away as possible from the AF-5XHD.

1. Attach the *GPS Antenna Mount* to the pole using the *Metal Strap*, or attach it to a wall using the appropriate fasteners (not included).



2. Place the *External GPS Antenna* on the mount.



3. Secure the cable of the *External GPS Antenna* to the mount with a *Zip Tie*.




Connecting Power over Ethernet

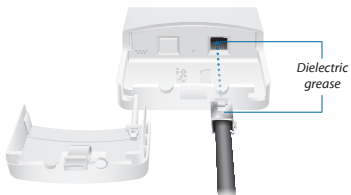
1. Lift the release latch on the bottom of the AF-5XHD and slide the *Port Cover* off.



2. Connect an outdoor, shielded Ethernet cable to the *Data* port.



 **Note:** If the *IP67 Upgrade Kit* is installed, first apply dielectric grease to the connector and port.



3. Connect the Ethernet cable from the *Data* port of the AF-5XHD to the **POE** port of the adapter.

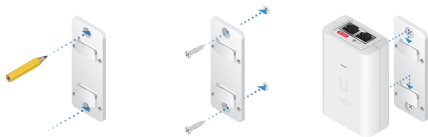
! **WARNING:** Use only the included adapter, model **POE-24V-5X-HD**. Failure to do so can damage the unit and void the product warranty.

4. Connect an Ethernet cable from your LAN to the adapter's **LAN** port.
5. Connect the *Power Cord* to the adapter's power port. Connect the other end of the *Power Cord* to a power outlet.



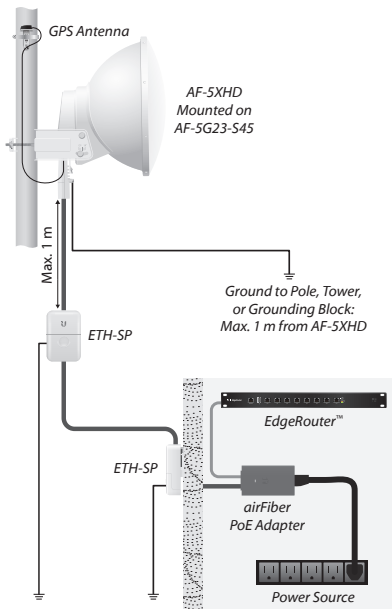
Mount the PoE Adapter (Optional)

1. Remove the *Mounting Bracket* from the adapter, place the bracket at the desired location, and mark the two holes.
2. Pre-drill the holes if necessary, and secure the bracket using two fasteners (not included).
3. Align the adapter's slots with the tabs of the *Mounting Bracket*, and then slide the adapter down.



Surge Protection

For added protection, install two surge suppressors, such as the Ubiquiti Ethernet Surge Protector, model ETH-SP, at the end of each link. Install the first surge protector within one meter of the airFiber *Data* port, and install the second surge protector at the ingress point of the location housing the wired network equipment.




Alignment

Tips

- To accurately align the airFiber radios for best performance, you **MUST** align only one end of the link at a time.
- You may need to use additional hardware to compensate for issues such as the improper orientation of a mounting pole or significant elevation differences between airFiber radios.

Establishing a Link

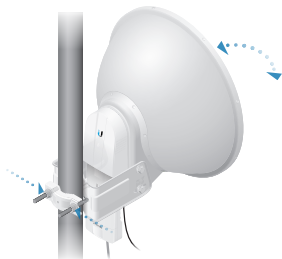
Adjust the positions of the *Master* and the *Slave* to establish a link. The following section features the airFiber X antenna, AF-5G23-S45:

 **Note:** The *Master* must be aimed first at the *Slave* because the *Slave* does not transmit any RF signal until it detects transmissions from the *Master*.

1. **Master** Visually aim the *Master* at the *Slave*. To adjust the *Master's* position, adjust the azimuth and the elevation.

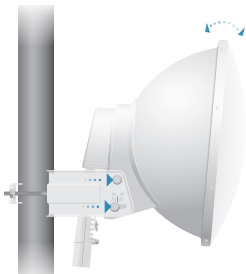
Adjust the azimuth:

- a. Loosen the two *Flange Nuts* on the *U-Bolt*.
- b. Rotate the antenna to point towards the other end of the link.
- c. Tighten the two *Flange Nuts*.



The elevation angle may be adjusted $\pm 15^\circ$. Adjust the elevation angle:

- d. Loosen the four *Hex Bolts* on both sides of the antenna.
- e. Pivot the antenna to the desired elevation.
- f. Tighten the four *Hex Bolts*.



Note: Do NOT make simultaneous adjustments on the *Master* and *Slave*.

2. **Slave** Visually aim the *Slave* at the *Master*. To adjust the *Slave*'s position, adjust the azimuth and elevation as described in step 1.
3. Check to see if a link is established. Ensure that the *Link* LED is solidly lit green and the *Signal* LEDs of the *Slave* are displaying signal levels.



4. **Slave** Aim the *Slave* at the *Master* to achieve the strongest signal level on the *Master*.



Note: Refer to the *Signal LEDs* section for details on the signal values.

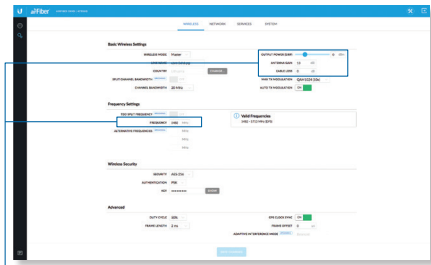


Note: Maximum signal strength can best be achieved by iteratively sweeping through both azimuth and elevation.

5. **Master** Aim the *Master* at the *Slave* to achieve the strongest signal level on the *Slave*.
6. Repeat steps 4 and 5 until you achieve an optimal link, with all four *Signal LEDs* solidly lit. This ensures the best possible data rate between the airFiber radios.
7. Lock the alignment on both airFiber antennas by tightening all the nuts and bolts.
8. Observe the *Signal LEDs* of each airFiber radio to ensure that the values remain constant while tightening the nuts and bolts. If any LED value changes during the locking process, loosen the nuts and bolts, finalize the alignment of each airFiber antenna again, and retighten the nuts and bolts.

Installer Compliance Responsibility

Devices must be professionally installed and it is the professional installer's responsibility to make sure the device is operated within local country regulatory requirements.



The *Frequency*, *Output Power*, *Antenna Gain*, and *Cable Loss* fields are provided to the professional installer to assist in meeting regulatory requirements.

Specifications

AF-5XHD	
Dimensions	224 x 82 x 48 mm (8.82 x 3.23 x 1.89")
Weight	0.35 kg (12.3 oz)
RF Connectors	(2) RP-SMA Weatherproof (CH0, CH1) (1) SMA Weatherproof (GPS)
GPS Antenna	External, Magnetic Base
Power Supply	24V, 1A PoE Gigabit Adapter (Included)
Power Method	Passive Power over Ethernet Pins 1, 2, 4, 5 (+) and Pins 7, 8, 3, 6 (-)
Supported Voltage Range	+19 to +50VDC ¹
Max. Power Consumption	6-12W ²
Networking Interface Data Port Management Port	(1) 10/100/1000 Ethernet Port (1) 10/100/1000 Ethernet Port Bluetooth v4.0
Mounting	airFiber X Mount (Rocket Mount Compatible) GPS Pole Mount (Included)
Operating Temperature	-40 to 55° C (-40 to 131° F)
Weatherproofing	IP67 ³
Certifications	CE, FCC, IC

¹ Full range depends on Ethernet cable length.

² Varies with firmware load and operational mode.

³ After installation of IP67 Upgrade Kit (included).

System	
Maximum Throughput	1.34 Gbps ^{1,2}
Encryption	256-bit AES
OS	airOS LTU
Wireless Modes	Master/Slave

¹ May vary depending on environmental conditions.

² Assuming 4096QAM (available with future firmware upgrade).

Radio	
Operating Frequency	4800-6200 MHz*
Max. Conducted TX Power	29 dBm*
Frequency Accuracy	< 2 ppm
Channel Bandwidth	10/20/30/40/50/60/80/100 MHz Selectable Programmable Uplink and Downlink Duty Cycles

* Depends on regulatory region.

Online Resources

Website www.ubnt.com

Support help.ubnt.com

Community community.ubnt.com

Downloads downloads.ubnt.com



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