Ubiquiti®
NETWORKS

*air*Fiber® 5X

**5 GHz Carrier
Backhaul Radio**

Model: AF-5X

QUICK START GUIDE

Introduction

Thank you for purchasing the Ubiquiti Networks® airFiber® 5 GHz Carrier Backhaul Radio. This Quick Start Guide is designed to guide you through the installation, show you how to access the airFiber Configuration Interface, and explain how to set up an airFiber link. This Quick Start Guide is for use with the airFiber AF-5X.

Warranty terms, safety notices, and compliance information are in the airFiber AF-5X User Guide, available at: **downloads.ubnt.com**

Package Contents

airFiber AF-5X

GPS Antenna Mount

External GPS Antenna

Metal Strap

Cable Ties (Qty. 2)

airFiber PoE Adapter with Mounting Bracket (24V, 1A)

Power Cord

Quick Start Guide

Installation Requirements

The airFiber AF-5X radio operates only with an airFiber X antenna or a converted RocketDish™ antenna.

airFiber X antenna models:

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

Conversion Kit for RocketDish (RD-5G30/RD-5G34):

• AF-5G-OMT-S45

Other 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.

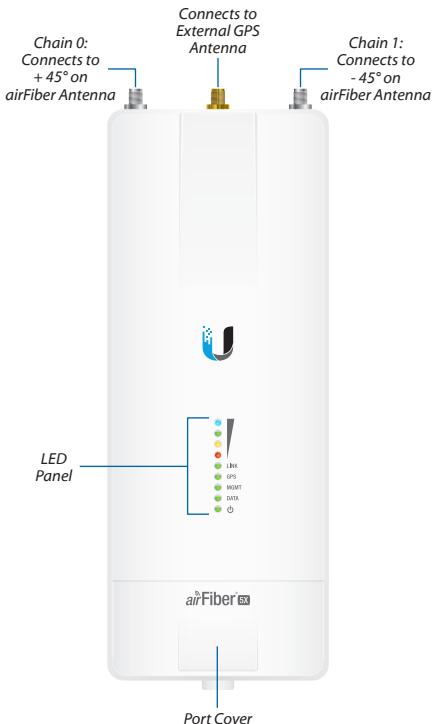> ⚠ **WARNING: Failure to properly ground your airFiber radio will void your warranty.**

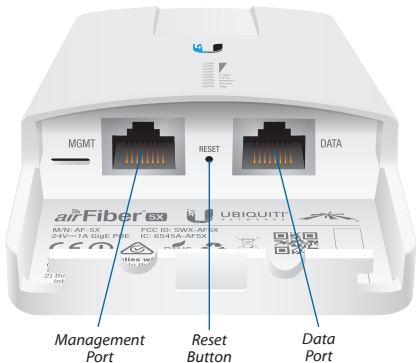• (Recommended) 2 Outdoor Gigabit PoE surge protectors

> 📓 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

Connects to External GPS Antenna

Chain 0: Connects to + 45° on airFiber Antenna

Chain 1: Connects to - 45° on airFiber Antenna

LED Panel

LNk
GPS
MGMT
DATA

airFiber 5X

Port Cover

Ports

Management Port   Reset Button   Data Port

Management Port 10/100 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.

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

Data Port Gigabit PoE port for handling all user traffic and powering the device.

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. *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-5X is fully booted.

Signal Level Once fully booted, the *Signal 1-4* LEDs act as a bar graph showing how close the AF-5X 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-5X. 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 Flashing	Ethernet Activity
DATA	Off	No Ethernet Link
	On	Ethernet Link Established
	Random Flashing	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-5X radios before site installation. Below is an overview of the installation with specific details in the following instructions:

- Connect the *airFiber PoE Adapter* to the *DATA* port, and connect your computer to the *MGMT* port.
- Configure the AF-5X.
- Install a ground wire and mount the AF-5X on an airFiber X antenna.
- At the installation site, install the airFiber X antenna with the mounted AF-5X 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-5X and slide the *Port Cover* off.
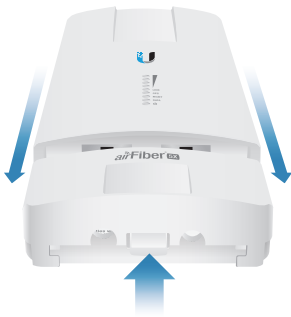
2. Connect an Ethernet cable to the *DATA* port.

3. Connect the Ethernet cable from the *DATA* port to the Ethernet port labeled **POE** on the *airFiber PoE Adapter*.

⚠ **WARNING:** Use only the included *airFiber PoE Adapter,* Model: **GP-H240-100G-4**. Failure to do so can damage the unit and void the product warranty.


4. Connect the *Power Cord* to the power port on the *airFiber PoE Adapter*. Connect the other end of the *Power Cord* to a power source.
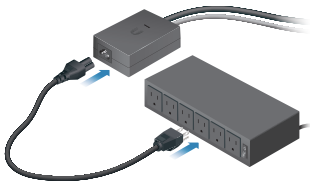
airFiber Configuration

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

- **Wireless Mode** Configure one AF-5X 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-5X.
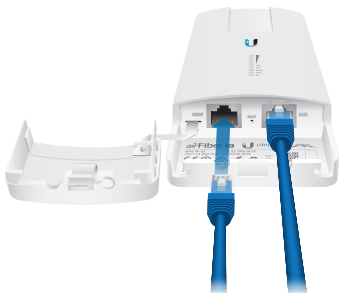
2. Configure the Ethernet adapter on your computer with a static IP address on the 192.168.1.x subnet.

3. Launch your web browser. Type **http://192.168.1.20** 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**.
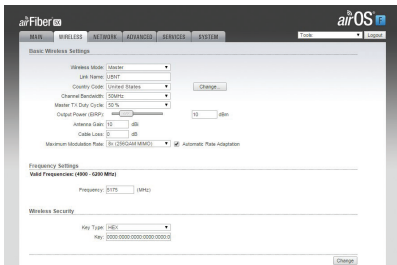
Note: U.S. product versions are locked to the U.S. Country Code to ensure compliance with FCC regulations.

5. The *Main* tab will appear. Click the **Tools** drop-down and select **Link Calculator**. This tool will guide you on how to best minimize bandwidth and power/interference issues.

6. Enter the requirements of your link, and then click **Calculate.** Adjust the values as needed to get the optimal result, and then write down the settings needed for your configuration.

7. Click the **Wireless** tab.

8. Configure the *Basic Wireless Settings*:

   a. For one AF-5X, select **Master** as the *Wireless Mode*. For the other AF-5X, keep the default, *Slave*.

   b. Enter a name in the *Link Name* field. This should be the same on both the Master and the Slave.

   c. If needed, change the *Channel Bandwidth, (Master) Duty Cycle, Output Power* and/or *Maximum Modulation Rate* settings.

9. Configure the *Frequency Setting*. The selected *Frequency* must be the same on both airFiber radios.

10. Configure the *Wireless Security*:

    a. Select the AES *Key Type*, **HEX** or **ASCII**.

    b. For the *Key* field:

       - **HEX** Enter 16 bytes (eight, 16-bit HEX values: 0-9, A-F, or a-f). You can omit zeroes and use colons, similar to the IPv6 format.

       > Note: The airFiber Configuration Interface supports IPv6 formats excluding dotted quad and "::" (double-colon) notation.

       - **ASCII** Enter a combination of alphanumeric characters (0-9, A-Z, or a-z).

11. Click **Change** and then click **Apply**.

12. *In-Band Management* is enabled by default, so each airFiber radio must have a unique *IP Address*. (If the airFiber radios use the same *IP Address*, you may lose access to the airFiber radios via the *DATA* ports.) Click the **Network** tab.
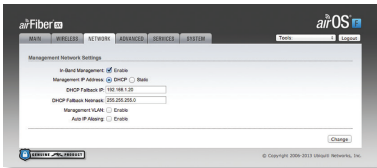
a. For the *Management IP Address* option:

  - **DHCP** Keep the default, *DHCP*, to use DHCP reservation on your router to assign a unique *IP Address*.

  - **Static** Change the *IP Address*, *Netmask*, and other settings to make them compatible with your network.

b. Click **Change** and then click **Apply**.

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

For details on the airFiber Configuration Interface, refer to the airFiber AF-5X User Guide, available at:
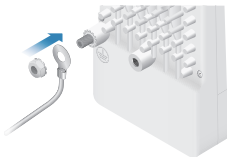**downloads.ubnt.com**

Hardware Installation

Install a Ground Wire

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

Ground Bonding Point
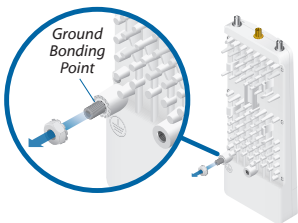
2. Attach a ground wire (min. 10 AWG or 5 mm^2) to the lug and replace the nut to secure the wire.

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.


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Mount to an Antenna

The AF-5X can be mounted to an airFiber X antenna or an airFiber X converted RocketDish. The airFiber X Antenna (AF-5G30-S45) is shown in the following steps:

1. Attach the AF-5X to the mounting bracket.

   a. Align the mounting tabs on the back of the AF-5X with the mounting bracket.

   b. Slide the AF-5X down to lock it into place.

2. Attach the RF cables from the antenna feed to the RF connectors on the AF-5X in this combination: *+ 45°* to *Chain 0* and *- 45°* to *Chain 1*.
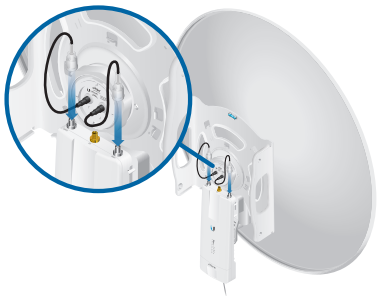
3. Attach the *External GPS Antenna* to the RF connector labeled *GPS*. Then place the magnetic *External GPS Antenna* on the bracket (this is temporary; you will mount the *External GPS Antenna* on the *GPS Antenna Mount* at the site).
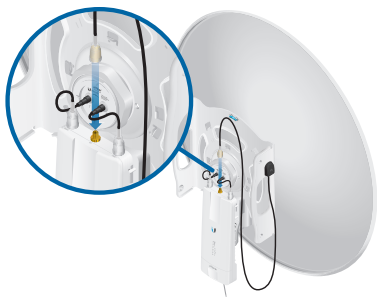
4. Attach the protective shroud.
   a. Align the hash mark on the top of the shroud with the notch on the dish antenna.
   b. Rotate the shroud clockwise until it locks into place.

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-5X.

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).
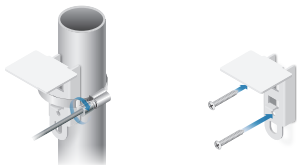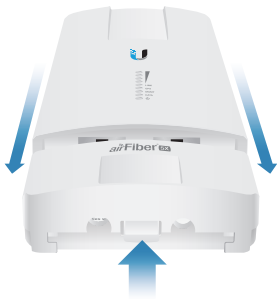

2. Place the *External GPS Antenna* on the mount.

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

Connecting Power over Ethernet

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

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

3. Connect the other end of the cable from the *DATA* port to the Ethernet port labeled **POE** on the *airFiber PoE Adapter*.

> ⚠️ **WARNING:** Use only the included *airFiber PoE Adapter,* Model: **GP-H240-100G-4**. Failure to do so can damage the unit and void the product warranty.

4. Connect an Ethernet cable from your network to the Ethernet port labeled **LAN** on the *airFiber PoE Adapter*.
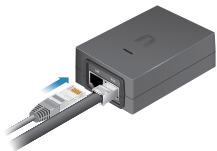
5. Connect the *Power Cord* to the power port on the *airFiber PoE Adapter*. Connect the other end of the *Power Cord* to a power source.
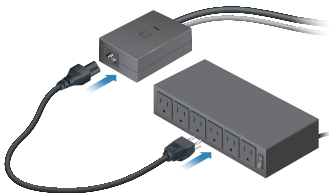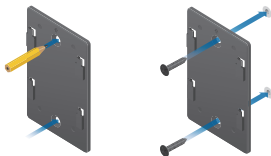
Mount the PoE Adapter (Optional)

1. Remove the *Mounting Bracket* from the adapter by sliding the bracket downward.

2. Place the *Mounting Bracket* at the desired location and mark the holes for the fasteners. Pre-drill the holes if necessary, then secure the bracket to wall using two fasteners (not included).


3. Attach the *airFiber PoE Adapter* to the bracket by aligning the four slots and tabs, and then slide the adapter downward.
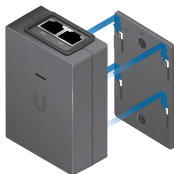
Surge Protection

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.
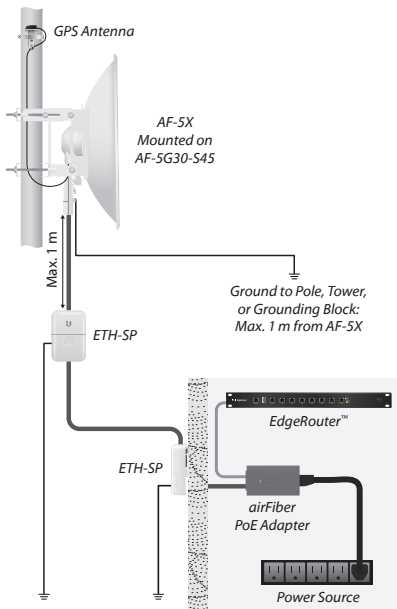
Alignment

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 guide features the airFiber antenna, AF-5G30-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:

   a. Loosen the four pole clamp nuts, and rotate the airFiber antenna on the pole to align the azimuth.
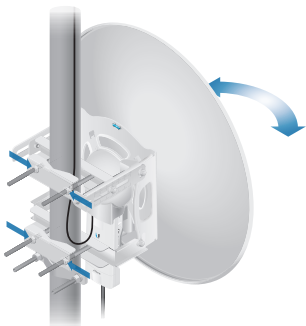
b. Loosen the six elevation bolts, and use the hex nut on the elevation rod to adjust the elevation.
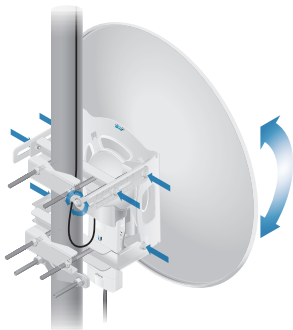
> Note: Do NOT make simultaneous adjustments on the *Master* and *Slave*.

2. **Slave** Visually aim the *Slave* at the *Master*. To adjust the *Slave*'s position:

   a. Loosen the four pole clamp nuts, and rotate the airFiber antenna on the pole to align the azimuth.

   b. Loosen the six elevation bolts, and use the hex nut on the elevation rod to adjust the elevation.

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*.

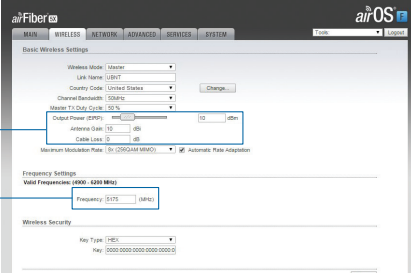   Note: Refer to the *Signal LEDs* section for details on the signal values.

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

Specifications

airFiber AF-5X	
Dimensions	224 x 82 x 48 mm (8.82 x 3.23 x 1.89")
Weight	0.35 kg (0.77 lb)
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
Mounting	Rocket Mount Compatible GPS Pole Mount (Included)
Certifications	FCC Part 15.407 CE EN 302502 v1.2.1, EN 301 893 v1.7.1
Operating Temperature	-40 to 55° C (-40 to 131° F)
Networking Interface	
Data Port	(1) 10/100/1000 Ethernet Port
Management Port	(1) 10/100 Ethernet Port
System	
Maximum Throughput	500 Mbps
Encryption	128-bit AES
OS	airOS F
Wireless Modes	Master/Slave
Radio	
Operating Frequency	5150-5925 MHz (Depends on Regulatory Region)
Max. Conducted TX Power	26 dBm (Depends on Regulatory Region)
Frequency Accuracy	± 2.5 ppm without GPS Synchronization ± 0.2 ppm with GPS Synchronization
Channel Bandwidth	10/20/30/40/50 MHz Selectable Programmable Uplink and Downlink Duty Cycles

Online Resources

Support support.ubnt.com

Community community.ubnt.com

Downloads downloads.ubnt.com