UBIQUITI
N E T W O R K S

*air*Fiber® X

2.4 GHz, 3 GHz, 4 GHz, 5 GHz
Carrier Backhaul Radio

Model: AF-2X, AF-3X, AF-4X, AF-5X

USER GUIDE

Table of Contents

Chapter 1: Overview

Introduction

Thank you for purchasing the Ubiquiti Networks® airFiber® X Carrier Backhaul Radio. This User Guide is for use with the following models:
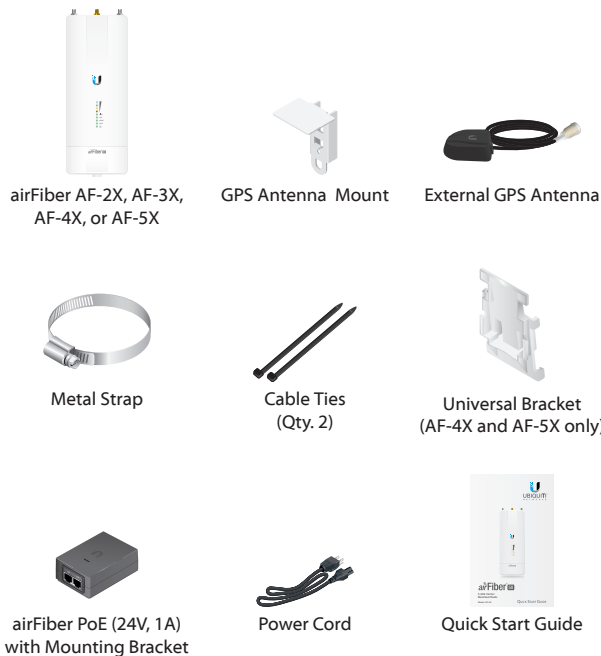
Model	Description	Operating Frequency*
AF-2X	2.4 GHz Carrier Backhaul Radio	2400 - 2500 MHz
AF-3X	3 GHz Carrier Backhaul Radio	3300 - 3900 MHz
AF-4X	4 GHz Carrier Backhaul Radio	4940-4990 MHz
AF-5X	5 GHz Carrier Backhaul Radio	5150 - 5925 MHz

This User Guide provides installation instructions, explains how to set up an airFiber link, and shows how to access and use the airFiber Configuration Interface.

> Note: Throughout this User Guide, *airFiber X radio* refers to all models listed above. Unless noted otherwise, illustrations for a specific model are applicable to all airFiber X radio models and accessories.

Package Contents

airFiber AF-2X, AF-3X, AF-4X, or AF-5X

GPS Antenna Mount

External GPS Antenna

Metal Strap

Cable Ties (Qty. 2)

Universal Bracket (AF-4X and AF-5X only)

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

Power Cord

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. TOUGHCable™ is designed for outdoor installations. It is the customer's responsibility to follow local country regulations, including operation within legal frequency channels, output power, and Dynamic Frequency Selection (DFS) requirements.

airFiber Configuration Interface System Requirements

- Microsoft Windows 7, Windows 8; Linux; or Mac OS X
- Java Runtime Environment 1.6 (or above)
- Web Browser: Mozilla Firefox, Apple Safari, Google Chrome, Microsoft Edge, or Microsoft Internet Explorer 11

Hardware Overview

Chain 0: Connects to +45° on airFiber Antenna

Connects to External GPS Antenna

Chain 1: Connects to -45° on airFiber Antenna

LED Panel

LINK
GPS
MGMT
DATA

Port Cover

Ports

Management Port   Reset Button   Data Port
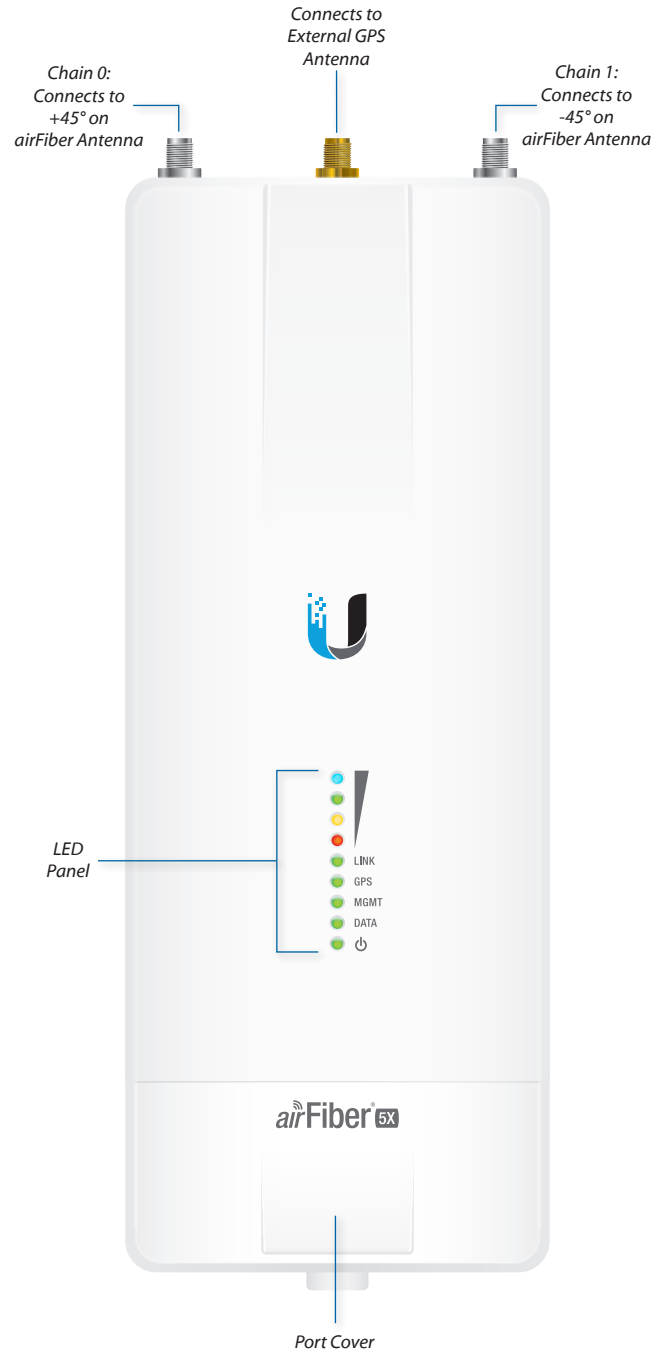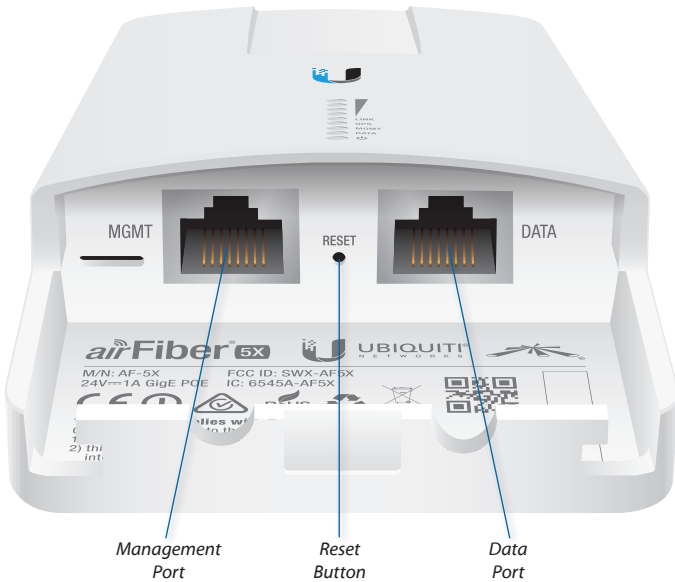
Management Port 10/100 Mbps, secured Ethernet port for configuration. *In-Band Management* is enabled by default in the airFiber Configuration Interface. When *In-Band Management* is disabled, the *MGMT* port is the only port that can monitor, configure, and/or update firmware.

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 airFiber X radio is fully booted.

Signal Level Once fully booted, the *Signal 1-4* LEDs act as a bar graph showing how close the airFiber X radio is to ideal aiming. This is auto-scaled based on the link range, the antenna gains, and the configured TX power of the remote airFiber X radio. 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)

Chapter 2: Installation

Installation Requirements

The airFiber radio operates only with the antennas listed below:

airFiber Radio	airFiber X Antenna	RocketDish + Conversion Kit
AF-2X	AF-2G24-S45	n/a
AF-3X	AF-3G26-S45	n/a
AF-4X	AF-5G30-S45 AF-5G34-S45	RD-5G30 + AF-5G-OMT-S45 RD-5G34 + AF-5G-OMT-S45
AF-5X	AF-5G23-S45 AF-5G30-S45 AF-5G34-S45	RD-5G30 + AF-5G-OMT-S45 RD-5G34 + AF-5G-OMT-S45

See the antenna's Quick Start Guide for antenna installation instructions.

Other Requirements

- Clear line of sight between airFiber X 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 mm^2) and max. length: 1 m. As a safety precaution, ground the airFiber X radio to grounded masts, poles, towers, or grounding bars.

  > **WARNING: Failure to properly ground your airFiber X 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.

Installation Overview

We recommend to configure your paired airFiber X 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 and the *MGMT* port.
- Configure the airFiber X radio.
- Install a ground wire and mount the airFiber X radio on an airFiber X antenna.
- At the installation site, install the airFiber X antenna with the mounted airFiber X 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 airFiber X radio and slide the *Port Cover* off.

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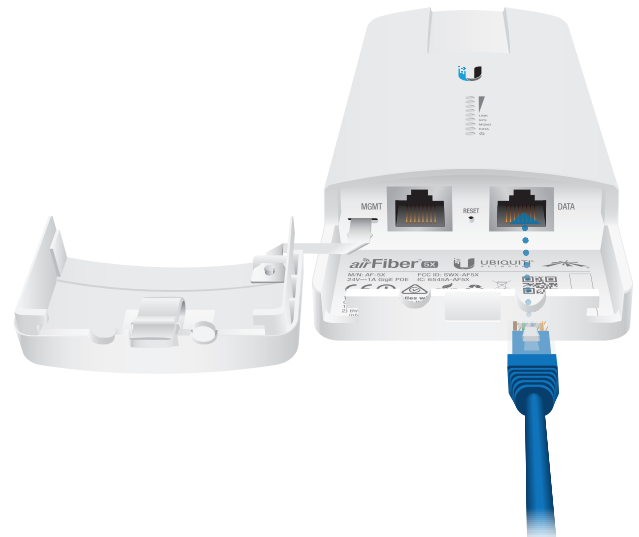
3. Connect the Ethernet cable from the *DATA* port to the Ethernet port labeled **POE** on the *airFiber PoE Adapter*.

   > **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.
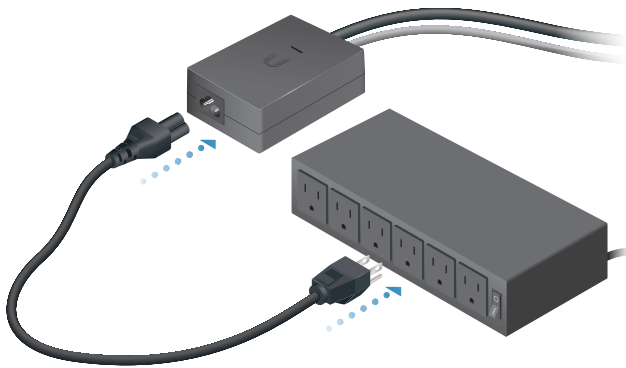

airFiber Configuration

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

• **Wireless Mode** Configure one airFiber X radio 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 airFiber X radio.

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).
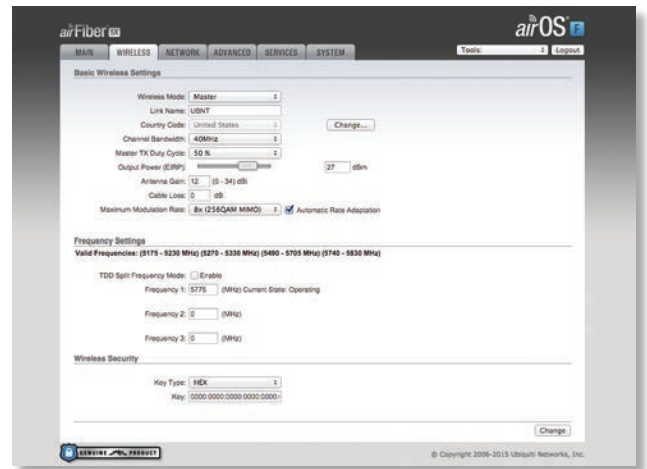

4. The login screen will appear. Enter **ubnt** in the *Username* and *Password* fields. Select your *Country* and *Language*. You must agree to the *Terms of Use* to use the product. Click **Login**.

> 📝 Note for models AF-2X, AF-3X, and AF-5X only: 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 airFiber X radio, select **Master** as the *Wireless Mode*. For the other airFiber X radio, 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*, *Cable Loss* (see Note below), and/or *Maximum Modulation Rate* settings.

> 📝 Note: If you are using the airFiber AF-5X radio with an airFiber Multiplexer, perform the following additional steps:

d. Set the *Cable Loss* to a value that includes the *additional* loss (in dB) due to the Multiplexer. The additional cable loss is (approximately):

• **4** dB for the AF-MPx4, or

• **7** dB for the AF-MPx8

e. Enable the *NxN Radio* setting on each end of the link.

7. Configure the *Frequency Settings*. The selected *Frequency* must be the same on both airFiber X radios.

8. 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).

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

10. *In-Band Management* is enabled by default, so each airFiber X radio must have a unique *IP Address*. (If the airFiber X radios use the same *IP Address*, you may lose access to the airFiber X 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 your other airFiber X radio. After you have configured the airFiber X radios, disconnect them and move them to your installation site.

Hardware Installation

Install a Ground Wire

1. Remove the nut from the *Ground Bonding Point* located on the back of the airFiber X radio.

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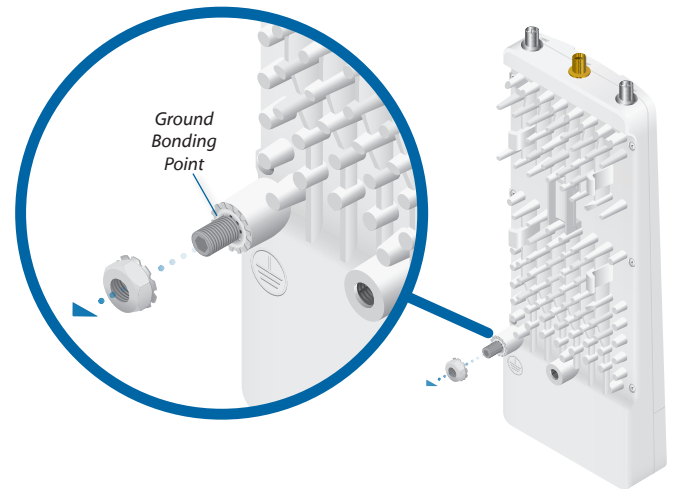
2. Attach a ground wire (min. 10 AWG or 5 mm^2) to the lug and replace the nut to secure the wire.

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 X radio will void your warranty.**

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

Mount to an Antenna

The airFiber X radio can be mounted to the antenna(s) listed in **"Installation Requirements" on page 3**. The airFiber X Antenna (AF-5G30-S45) is shown in the following steps:

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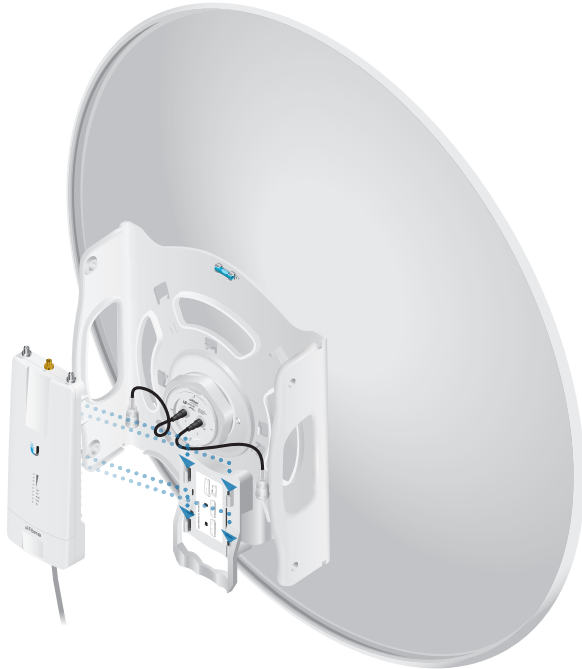
2. Attach the RF connectors to the radio in this combination: *+45°* to *Chain 0* and *-45°* to *Chain 1*. Then slide the jackets over the RF connectors to protect them.

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

4. Attach the protective shroud.
   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.