UBIQUITI®
N E T W O R K S

*air*Fiber® 11FX

11 GHz FDD
Licensed Backhaul Radio

Model: AF-11FX

QUICK START GUIDE

Introduction

Thank you for purchasing the Ubiquiti Networks® airFiber®
AF-11FX. This Quick Start Guide is designed to guide you
through installation. Warranty terms, safety notices, and
compliance information are in the airFiber AF-11FX User
Guide, available at: **www.ubnt.com/download/airfiber**

Package Contents

airFiber AF-11FX

Cable Ties (Qty. 2)

airFiber Gigabit PoE
(50V, 1.2A)

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. 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.

Antenna Compatibility

The airFiber AF-11FX radio is designed for use with the airFiber X antenna model AF-11G35*.

Installation Requirements

- Clear line of sight between airFiber radios
- 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 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.

- *High-Band Duplexer(s)* (model AF-11FX-DUP-H) or *Low-Band Duplexer(s)* (model AF-11FX-DUP-L):
    - SISO mode: One *Duplexer* of either band type
    - MIMO mode: Two *Duplexers* of the same band type
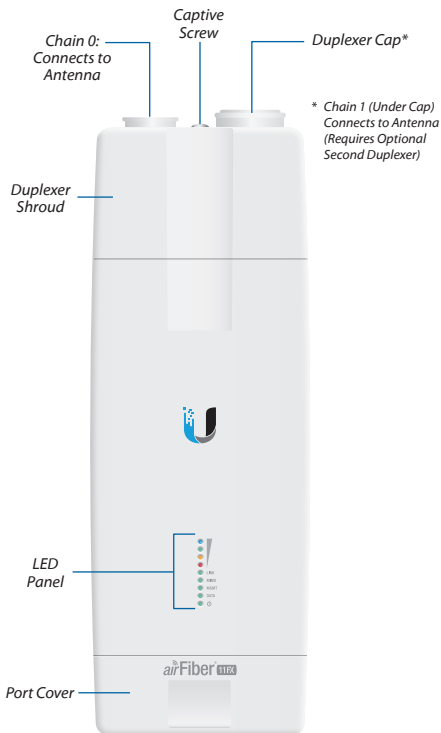
    Note: *Duplexers* must be purchased separately. The *Duplexer(s)* must match the terms of your license (frequency bands and polarities allowed).
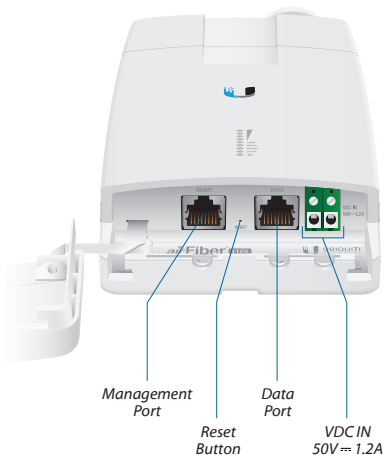
- (Optional) If not using PoE: DC power source and 12/30 AWG power cable
- Outdoor, shielded Category 6 (or above) cabling and shielded RJ-45 connectors are required for all wired Ethernet connections.

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* Check your local/regional regulations for the antenna gain allowed for your application

Hardware Overview

Chain 0: Connects to Antenna

Captive Screw

Duplexer Cap*

* Chain 1 (Under Cap) Connects to Antenna (Requires Optional Second Duplexer)

Duplexer Shroud

LED Panel

Port Cover

airFiber 11FX

Ports

Management Port

Reset Button

Data Port

VDC IN 50V ⎓ 1.2A

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.

**VDC IN** The terminal block can be used to power the AF-11FX with +50VDC ⎓ 1.2A instead of PoE.

Duplexer Ports

TX 0 *RX 0*   *RX 1* *TX 1*

Top View of AF-11FX (Duplexer Shroud Removed)
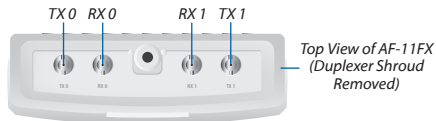
TX 0, RX 0 The TX and RX SMA ports for the Chain 0 *Low-Band Duplexer* or *High-Band Duplexer* (SISO and MIMO modes).

RX 1, TX 1 The RX and TX SMA ports for the Chain 1 *Low-Band Duplexer* or *High-Band Duplexer* (MIMO mode only). In SISO mode, these unused ports are protected by the *Duplexer Cap*.

Duplexer

N Connector

SMA Ports

Low-Band Duplexer   *High-Band Duplexer*
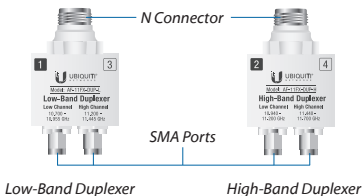
Note: *Duplexers* are not included with the AF-11FX. SISO mode requires one *Low-Band Duplexer* or one *High-Band Duplexer*. MIMO mode requires either two *Low-Band Duplexers* or two *High-Band Duplexers*.

N Connector Female N-type connector into which the antenna cable is plugged.

SMA Port High-band and low-band channel SMA ports.

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, MIMO, LINK,* and *Signal 1-4* LEDs light on. Once the CPU code takes over, the *MIMO, LINK,* and *Signal 1-3* LEDs turn off. *Signal 4* LED remains lit 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-11FX is fully booted.

Signal Level Once fully booted, the *Signal 1-4* LEDs act as a bar graph showing how close the AF-11FX 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-11FX. Each *Signal* LED has three possible states: *On, Flashing,* and *Off.* All *Signal* LEDs would be solidly on in an ideal link. For example, 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
MIMO	Off	Radio Configured in SISO Mode
	On	Radio Configured in MIMO Mode
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-11FX radios before site installation. The overview below summarizes the installation procedure, and the subsequent sections provide detailed installation information.

- Install the *Duplexer(s)* in the AF-11FX radio.
- Connect the *airFiber Gigabit PoE* adapter to the *DATA* port, and connect your computer to the *MGMT* port.
- Configure the AF-11FX.
- Install a ground wire and mount the AF-11FX on the airFiber AF-11G35 antenna (or a compatible antenna).
- At the installation site, install the antenna with the mounted AF-11FX radio (see the antenna's Quick Start Guide for installation instructions).
- Connect the *DATA* port to your LAN, and connect power (PoE or DC power) to the AF-11FX.
- Establish and optimize the RF link.

Installing the Duplexer for SISO Mode

1. Loosen the *Captive Screw* on top of the *Duplexer Shroud* and remove the *Duplexer Shroud*.

Duplexer Shroud
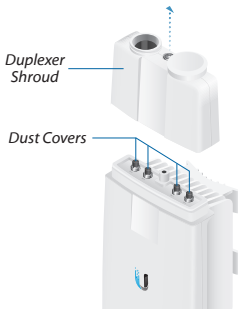
Dust Covers

2. Remove the *Dust Covers* from the *TX 0* and *RX 0* ports of the AF-11FX radio. Do not remove the *Dust Covers* from the *RX 1* and *TX 1* ports.

3. Seat the *SMA Ports* of the *Duplexer* onto the *TX 0* and *RX 0* ports of the AF-11FX, while positioning the low channel and high channel ports to yield the required transmit and receive frequencies.

4. Secure the *Duplexer* to the radio by tightening the collars on the *SMA Ports*.
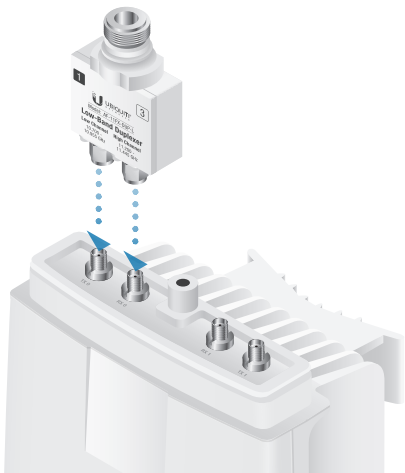
⚠ WARNING: Tighten the collars alternately, turning one collar a half turn, then the other collar a half turn, and so on, until both are fully tightened. Failure to do so may result in damage to the *Duplexer*.

5. Reseat the *Duplexer Shroud* onto the AF-11FX radio and tighten the *Captive Screw* to secure the *Duplexer Shroud*.

6. Repeat steps 1-4 for the radio to be used on the other end of the link, ensuring that the numbers on the second radio's *Duplexer* are in the reverse order of the numbers on first radio's *Duplexer*.

> Note: For example, if the numbers on the first radio's *Duplexer* are (left to right) *1/3*, then the numbers on the second radio's *Duplexer* should be *3/1*.

## Installing the Duplexers for MIMO Mode

> Note: MIMO operation requires two licenses, one per polarization and two *Duplexers* of the same band type.

1. Loosen the *Captive Screw* on top of the *Duplexer Shroud*. Remove the *Duplexer Shroud*, and then remove the *Dust Covers* from the radio's four SMA ports.

Duplexer Shroud

Dust Covers
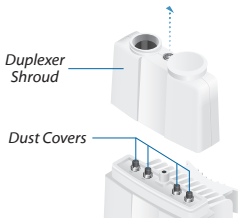
2. Seat the *SMA Ports* of one *Duplexer* onto the *TX 0* and *RX 0* ports of the AF-11FX, while positioning the low channel and high channel ports to yield the required transmit and receive frequencies.
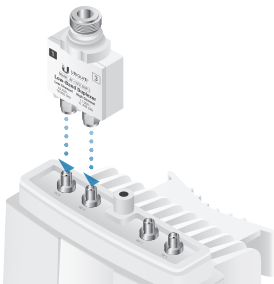

3. Seat the second *Duplexer* onto the *RX 1* and *TX 1* ports, and ensure that the numbers on adjacent sides of the *Duplexers* match. (The numbers on the right-side *Duplexer* must be in the reverse order of the numbers on the left-side *Duplexer*.)
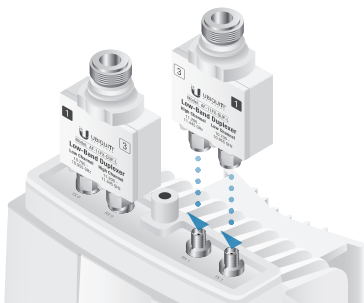
4. Secure each *Duplexer* to the radio by tightening the collars on the *SMA Ports*.

> ⚠ **WARNING:** Tighten the collars alternately, turning one collar a half turn, then the other collar a half turn, and so on, until both are fully tightened. Failure to do so may result in damage to the *Duplexer*.

5. Remove the *Duplexer Cap* and *Cap Washer* from the AF-11FX by removing the *Cap Screw* located inside the shroud.

Duplexer Cap

Duplexer Shroud (side view)

Cap Washer

Cap Screw
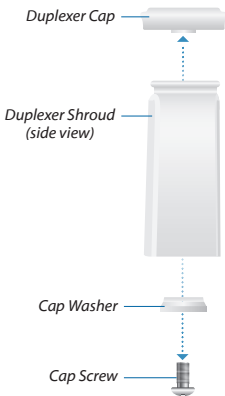
6. Reseat the *Duplexer Shroud* onto the AF-11FX radio and tighten the *Captive Screw* to secure the *Duplexer Shroud*.

7. Repeat steps 1-6 for the other radio to be used in the link, ensuring that the numbers on the second radio's *Duplexers* are in the reverse order of the numbers on the first radio's *Duplexers*.

> Note: For example, if the numbers on the first radio's *Duplexers* are (left to right) *2/4* and *4/2*, the numbers on the second radio's *Duplexers* should be *4/2* and *2/4*.

Connecting Power over Ethernet

1. Lift the release latch on the bottom of the AF-11FX and slide the *Port Cover* off.
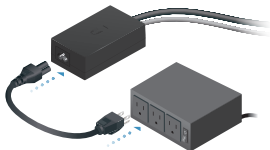
2. Connect an Ethernet cable to the *DATA* port.

3. Connect the Ethernet cable from the *DATA* port of the AF-11FX to the **POE** port of the adapter.

> ❗ **WARNING:** Use only the included adapter, model **POE-50-60W**. 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:
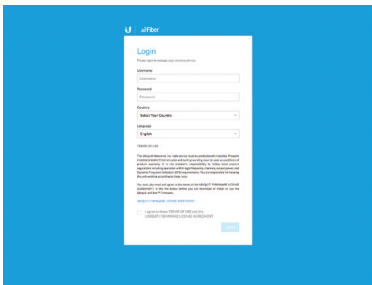
- **Wireless Mode** Configure one AF-11FX as the *Master* and the other as the *Slave*.
- **Frequency Setting** The *TX Frequency* and *RX Frequency* settings must be the reverse of each other on both the Master and the Slave.

1. Connect an Ethernet cable from your computer to the *MGMT* port on the AF-11FX.
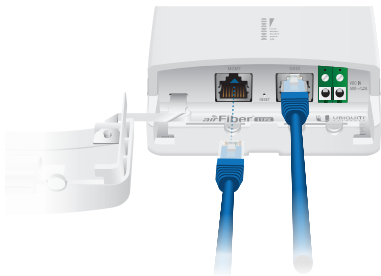

2. Configure the Ethernet adapter on your computer with a static IP address on the 192.168.1.x subnet.

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**.


5. Click ⚙ **Settings**, and then click the **Wireless** tab.
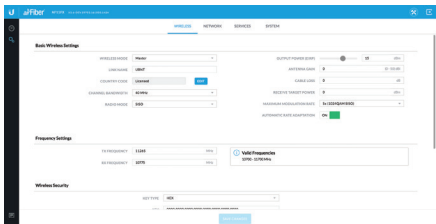
6. Configure the *Basic Wireless Settings*:

    a. For one AF-11FX, select **Master** as the *Wireless Mode*. For the other AF-11FX, 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, Output Power* and/or *Maximum Modulation Rate* settings.

7. Configure the *TX Frequency* and *RX Frequency*.

    📄 Note: One airFiber radio's *TX Frequency* is the other radio's *RX Frequency*, and vice versa.

8. Configure the *Wireless Security*:

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

    b. For the *Key* field:

       - **HEX** Enter 16 bytes (eight, 16-bit hexadecimal digits: 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 **Save Changes**.

10. *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.
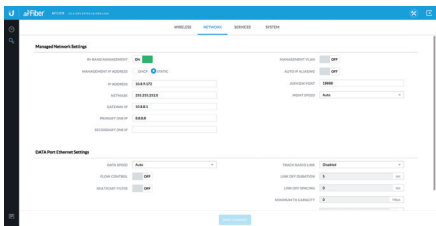
a. For the *Management IP Address* option:

- **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 **Save Changes**.

11. Disconnect the Ethernet cables from the *MGMT* and *DATA* ports on the AF-11FX. Configuration of the AF-11FX radio is complete.

Repeat the instructions in the *airFiber Configuration* section on the other AF-11FX radio.
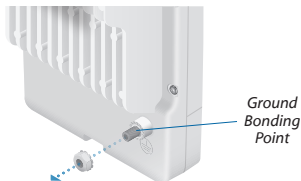
For details on the airFiber Configuration Interface, refer to the airFiber AF-11FX User Guide, available at:
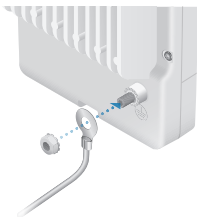**www.ubnt.com/download/airfiber**

Hardware Installation

Install a Ground Wire

1. Remove the nut from the *Ground Bonding Point* located on the back of the AF-11FX, near the lower-right corner.

Ground Bonding Point

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.
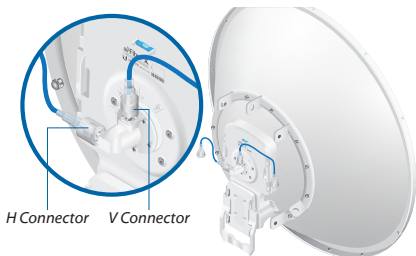
Mount to the airFiber Antenna

Follow the instructions in this section to mount the AF-11FX to an airFiber AF-11G35 antenna:

1. Attach an *RF Cable* to an RF connector labeled *H* or *V*. Then slide the silicone boot over the RF connector to protect it.

   📝 Note: For SISO mode, use the RF connector (*H* or *V*) as determined by your licensing. Keep the other RF connector covered with the included *Metal Cap*.

   If using MIMO mode, remove the cap over the second RF connector (*V* or *H*) and attach an *RF Cable*. Then slide the silicone boot over the RF connector to protect it.


H Connector   *V Connector*

2. 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.
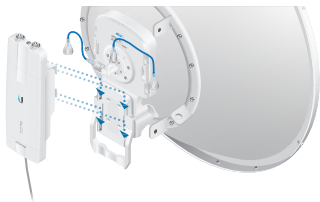
3. Connect the *RF Cable(s)* (one in SISO mode, two in MIMO mode) to the radio as follows:

   - Attach the *RF Cable* from the *H Connector* to the radio's *Chain 0* connector.
   - Attach the *RF Cable* from the *V Connector* to the radio's *Chain 1* connector.

H Connector   V Connector

Chain 0   Chain 1
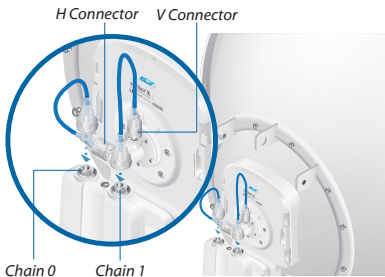
4. Attach the protective shroud.

   a. Align the dot on the side of the shroud with the arrow on the dish antenna.

   b. Guide the shroud's tabs into the slots on the antenna.

   c. Push the shroud in and then pull it down until it locks into place.

Dot   Arrow
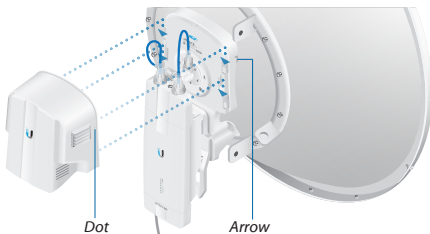
Connecting Data

1. Lift the release latch on the bottom of the AF-11FX and slide the *Port Cover* off.

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

3. If you are using DC power, connect the other end of the Ethernet cable to your LAN.

Connecting Power

Follow the instructions for the source of power that you are using: *Power over Ethernet* or *DC Power*.

Power Over Ethernet

1. Connect the Ethernet cable from the *DATA* port of the AF-11FX to the **POE** port of the adapter.

   ⚠ **WARNING:** Use only the included adapter, model **POE-50-60W**. Failure to do so can damage the unit and void the product warranty.

2. Connect an Ethernet cable from your LAN to the adapter's **LAN** port.

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

DC Power

1. Connect a DC power cable to the *Terminal Block*. (The +VDC and GND can be connected to either terminal.)
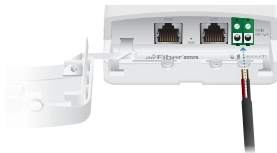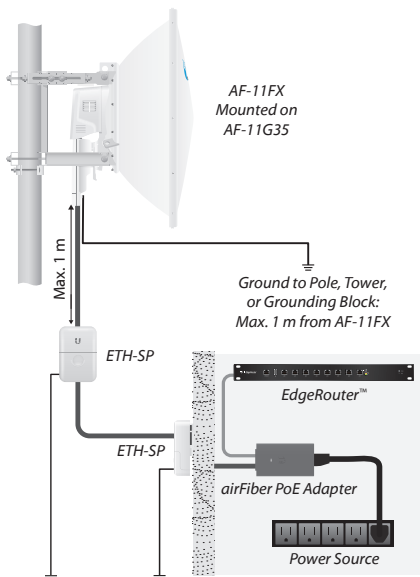

2. Connect the other end of the DC power cable to a DC power supply that supplies +50VDC.

   ⚠ **WARNING:** Applying a negative voltage such as -48VDC will damage the radio.

3. Connect the DC power supply to its source.

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.

AF-11FX
Mounted on
AF-11G35

Max. 1 m

Ground to Pole, Tower,
or Grounding Block:
Max. 1 m from AF-11FX

ETH-SP

ETH-SP

EdgeRouter™

airFiber PoE Adapter

Power Source

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-11G35:

📄 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.
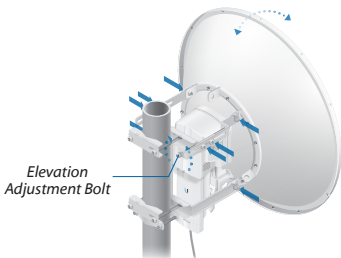
   Adjust the azimuth:

   a. Loosen the four flange nuts on the two pole clamps.
   b. Rotate the antenna to point towards the other end of the link.
   c. Tighten the four flange nuts on the two pole clamps.
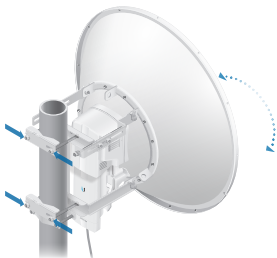
Adjust the elevation angle:

a. Loosen the eight hex head bolts to so that the washers can spin freely by hand.

b. Tighten or loosen the *Elevation Adjustment Bolt* to set the desired tilt.

c. Tighten the eight hex head bolts.

Elevation Adjustment Bolt

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.

For detailed information on setting up an airFiber link, see the airFiber AF-11FX User Guide available at:
www.ubnt.com/download/airfiber

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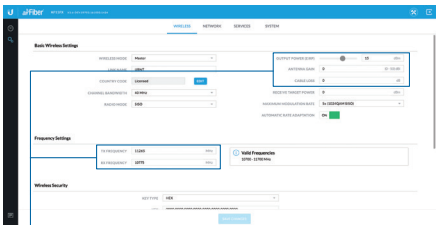
The *Output Power, Antenna Gain, Cable Loss*, TX Frequency* and *RX Frequency* fields are provided to the professional installer to assist in meeting regulatory requirements.

* *Cable Loss* includes loss due to the *Duplexer(s)*.

Specifications

airFiber AF-11FX	
Dimensions	327 x 112 x 86 mm (12.87 x 4.41 x 3.39")
Weight	2.26 kg (5.0 lb)
RF Connectors	(4) SMA Weatherproof, Two per Chain: TX 0, RX 0 (Chain 0) and TX 1, RX 1 (Chain 1) (2) N-Type Waterproof, One per Duplexer
Power Supply	50V, 1.2A PoE Gigabit Adapter (Included)
Power Method	Passive Power over Ethernet, DC Power Block
Supported Voltage Range	38-56VDC
Certifications	FCC Part 101, ETSI EN 302 217
Mounting	AF-11G35 Mount Compatible
Operating Temperature	-40 to 55° C (-40 to 131° F)
Networking Interface Data Management	(1) 10/100/1000 Ethernet Port (1) 10/100 Ethernet Port

System	
Processor	INVICTUS™ 2 IC
Maximum Throughput	1.2+ Gbps
Encryption	128-bit AES
OS	airOS F
Wireless Modes	SISO/MIMO

Radio	
Operating Frequency	10.7-11.7 GHz (Depends on Regulatory Region[1])
Max. Conducted TX Power	30 dBm (Depends on Regulatory Region[1])
Frequency Accuracy	± 1 ppm
Channel Bandwidth	3.5/5/7/10/14/20/28/30/40/50/56 MHz Selectable[2] Programmable Uplink and Downlink Duty Cycles

[1] For region-specific details, refer to the Compliance chapter of the airFiber AF-11FX User Guide at **www.ubnt.com/download/airfiber**

[2] Channel widths may vary according to country/region regulations.

www.ubnt.com

Online Resources

Support help.ubnt.com

Community community.ubnt.com

Downloads downloads.ubnt.com

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