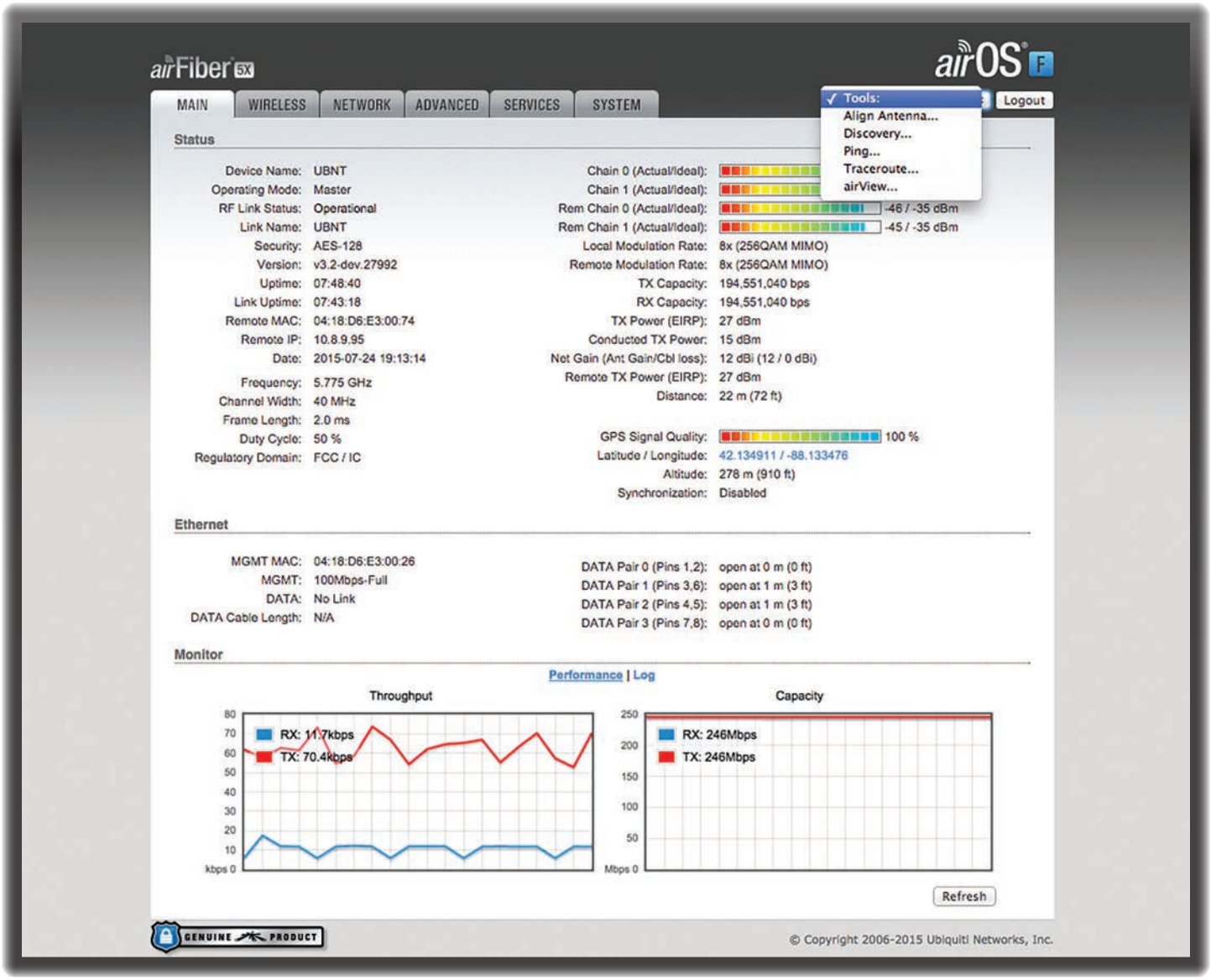
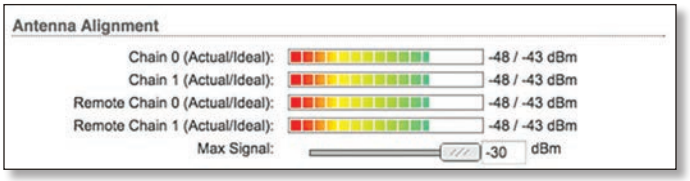


Chapter 10: Tools

Each tab of the airFiber Configuration Interface contains network administration and monitoring tools. Click the **Tools** drop-down list at the top right corner of the page.

Align Antenna

Use the *Align Antenna* tool to point and optimize the antenna in the direction of maximum link signal. The *Antenna Alignment* window is designed to refresh every 250 milliseconds.



Chain 0/1 (Actual/Ideal) Displays the absolute power level (in dBm) of the received signal for each chain.

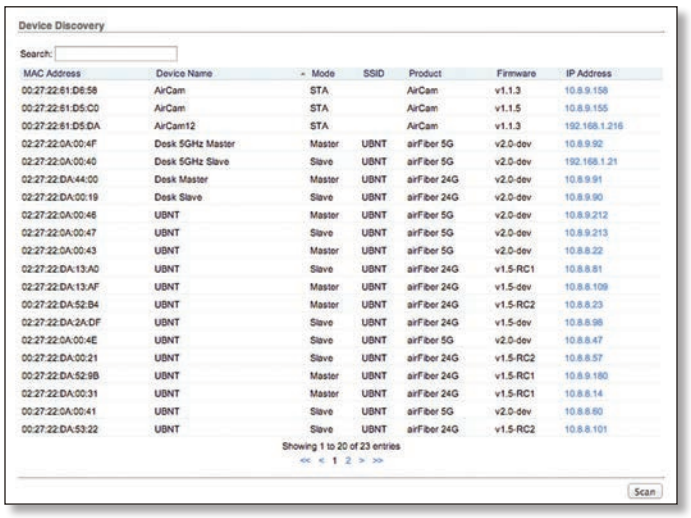
Note: If "Overload" is displayed to indicate an overload condition, identify and eliminate any sources of strong in-band interference.

Remote Chain 0/1 (Actual/Ideal) Displays the absolute power level (in dBm) of the received signal for each chain of the remote airFiber X radio.

Max Signal Displays the maximum signal strength (in dBm). To adjust the range of the *Max Signal* meter, use the slider or manually enter the new value. If you reduce the range, the color change will be more sensitive to signal fluctuations, indicating the offset of the maximum indicator value and the scale itself.

Discovery

The *Device Discovery* tool searches for all Ubiquiti devices on your network. The *Search* field automatically filters devices containing specified names or numbers as you enter them.

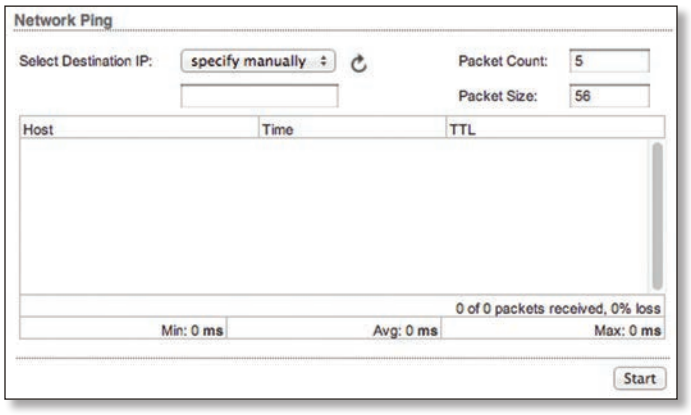


It reports the *MAC Address*, *Device Name*, *Mode*, *SSID*, *Product* type, *Firmware* version, and *IP Address* for each Ubiquiti device. To access a device configuration through its web management interface, click the device's IP address.

To refresh the window, click **Scan**.

Ping

You can ping other devices on the network directly from the airFiber X radio. The *Ping* tool uses ICMP packets to check the preliminary link quality and packet latency estimation between two network devices.



Network Ping

Select Destination IP You have two options:

- Select a remote system IP from the drop-down list, which is generated automatically.
- Select **specify manually** and enter the IP address in the field displayed below the option.

Packet Count Enter the number of packets to send for the ping test.

Packet Size Specify the size of the packet.

Start Click this button to start the test.

Packet loss statistics and latency time evaluation are displayed after the test is completed.

Traceroute

The *Traceroute* tool traces the hops from the airFiber X radio to a specified outgoing IP address. Use this tool to find the route taken by ICMP packets across the network to the destination host.

Destination Host Enter the IP address of the destination host.

Resolve IP Addresses Select this option to resolve the IP addresses symbolically rather than numerically.

Start Click this button to start the test.

Responses are displayed after the test is completed.

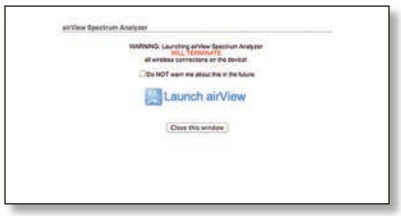
airView

Use the airView Spectrum Analyzer to analyze the noise environment of the radio spectrum and intelligently select the optimal frequency to install a PtP airFiber link.

There are two system requirements for the airView Spectrum Analyzer:

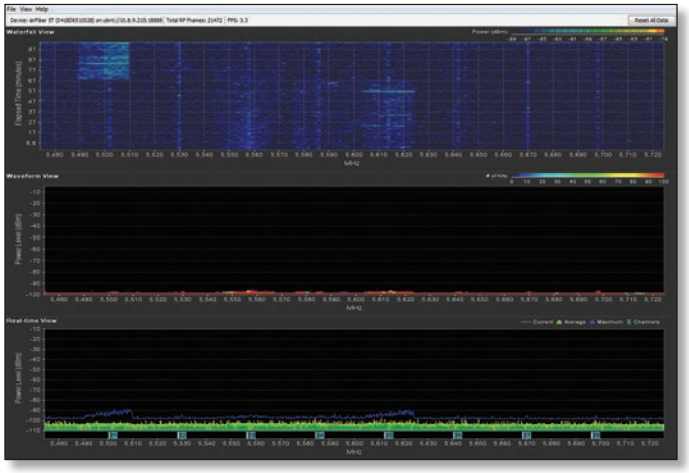
- Your system is connected to the device via Ethernet. Launching airView will terminate all wireless connections on the device.
- Java Runtime Environment 1.6 (or above) is required on your client machine to use airView.

On first use, the following window appears.



- **Do NOT warn me about this in the future** Check the box to bypass this window in future launches of the airView Spectrum Analyzer.

- **Launch airView** Click **Launch airView** to download the Java Network Launch Protocol (jnlp) file and complete the launch of airView.



Main View

Device Displays the device name, MAC (Media Access Control) address, and IP address of the device running airView.

Total RF Frames Displays the total number of Radio Frequency (RF) frames gathered since the start of the airView session or since the *Reset All Data* button was last clicked.

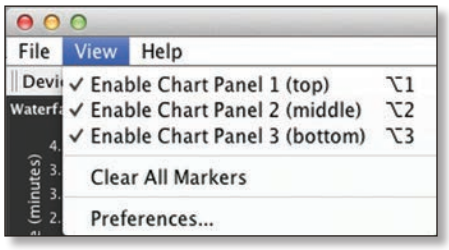
FPS Displays the total number of frames per second (FPS) gathered since the start of the airView session or since the *Reset All Data* button was last clicked. The wider the interval amplitude, the fewer the FPS will be gathered.

Reset All Data Click to reset all gathered data. Use this option to analyze the spectrum for another location or address.

File Menu

Click **Exit** to end the airView session.

View Menu



Enable Chart Panel 1 (top) Displays the Waterfall or Channel Usage chart in Chart Panel 1, depending on which option you have selected in *Preferences*. This time-based graph shows the aggregate energy collected or channel usage for each frequency since the start of the airView session.

Enable Chart Panel 2 (middle) Displays the Waveform chart in Chart Panel 2. This time-based graph shows the RF signature of the noise environment since the start of the airView session. The energy color designates its amplitude. Cooler colors represent lower energy levels (with blue representing the lowest levels) in that frequency bin, and warmer colors (yellow, orange, or red) represent higher energy levels in that frequency bin.

Enable Chart Panel 3 (bottom) Displays the Real-time chart (traditional spectrum analyzer) in Chart Panel 3. Energy (in dBm) is shown in real time as a function of frequency.

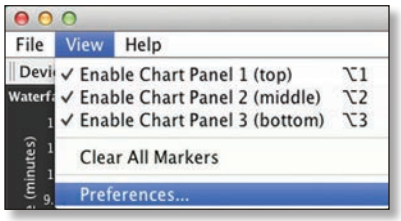
Note: Energy is the power ratio in decibels (dB) of the measured power referenced to one milliwatt (mW).

Clear All Markers Resets all previously assigned markers. Markers are assigned by clicking a point, which corresponds with a frequency on the Real-time chart.

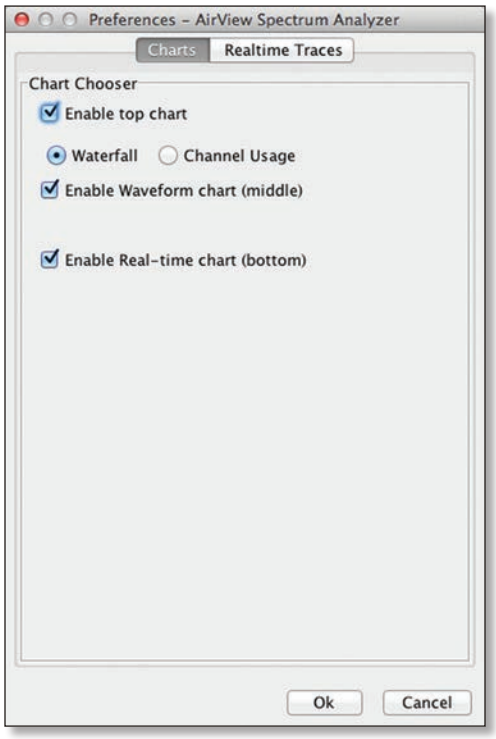
Preferences Changes airView settings, such as enabling or disabling charts and traces, or specifying the frequency interval.

Preferences

Select **View** > **Preferences** to display the *Preferences - airView Spectrum Analyzer* window.



Charts



Enable top chart Check the box to enable the top chart. Select the desired chart to display in the top chart panel on the main view. There are two options:

- **Waterfall** This time-based graph shows the aggregate energy collected for each frequency since the start of the airView session. The energy color designates its amplitude. Cooler colors represent lower energy levels (with blue representing the lowest levels) in that frequency bin, and warmer colors (yellow, orange, or red) represent higher energy levels in that frequency bin.

  The Waterfall View's legend (top-right corner) provides a numerical guide associating the various colors to power levels (in dBm). The low end of that legend (left) is always adjusted to the calculated noise floor, and the high end (right) is set to the highest detected power level since the start of the airView session.
- **Channel Usage** For each channel, a bar displays a percentage showing the relative "crowdedness" of that specific channel. To calculate this percentage, the airView Spectrum Analyzer analyzes both the popularity and strength of RF energy in that channel since the start of an airView session.

Note: airFiber X radio channels are not related to Wi-Fi channels which are determined by IEEE standards. airFiber X radio channels are numbered consecutively starting with 0 and are 28 MHz in width.

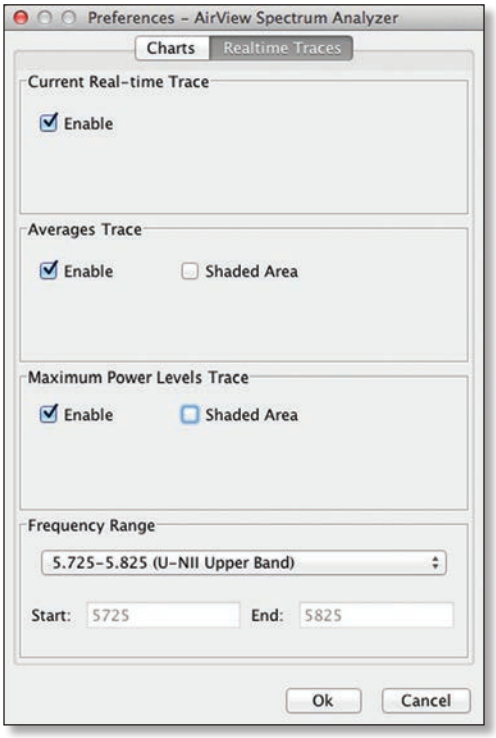
Enable Waveform chart (middle) Check the box to enable the middle chart. This time-based graph shows the RF signature of the noise environment since the start of the airView session. The energy color designates its amplitude. Cooler colors represent lower energy levels (with blue representing the lowest levels) in that frequency bin, and warmer colors (yellow, orange, or red) represent higher energy levels in that frequency bin.

The spectral view over time will display the steady-state RF energy signature of a given environment.

Enable Real-time chart (bottom) Check the box to enable the bottom chart. This graph displays a traditional spectrum analyzer in which energy (in dBm) is shown in real time as a function of frequency. There are three traces in this view:

- **Current** (Yellow) Shows the real-time energy seen by the device as a function of frequency.
- **Average** (Green) Shows the running average energy across frequency.
- **Maximum** (Blue) Shows updates and maximum power levels across frequency.

Real-Time Traces



The following settings apply only to the *Real-time* chart:

Current Real-time Trace Check the *Enable* box to enable the real-time trace. When enabled, the yellow outline on the *Real-time* chart represents the real-time power level of each frequency. The refresh speed depends on the FPS.

Averages Trace Check the *Enable* box to enable the averages trace. When enabled, the averages trace is represented by the green area on the *Real-time* chart, which displays the average received power level data since the start of the airView session. To enable a shaded green area, check the *Shaded Area* box. To display only a green outline without the shaded area, uncheck the *Shaded Area* box.

Maximum Power Levels Trace Check the *Enable* box to enable the maximum power trace. When enabled, the maximum power trace is represented by the blue area on the *Real-time* chart, which displays the maximum received power level data since the start of the airView session. To enable a shaded blue area, check the *Shaded Area* box. To display only a blue outline without the shaded area, uncheck the *Shaded Area* box.

Frequency Range Select the amplitude of the frequency interval to be scanned from the *Frequency Range* drop-down list. Available frequencies are device-dependent. There are pre-defined ranges for the most popular bands. You can enter a custom range; select **Custom Range** from the *Frequency Range* drop-down list and enter the desired values in the *Start* and *End* fields.

Appendix A: Specifications

airFiber AF-2X	
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
Max. Conducted TX Power	29 dBm (Depends on Regulatory Region)
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 15.247 CE EN 300328 v1.8.1
Operating Temperature	-40 to 55° C (-40 to 131° F)

AF-2X Networking Interface	
Data Port	(1) 10/100/1000 Ethernet Port
Management Port	(1) 10/100 Ethernet Port

AF-2X System Interface	
Maximum Throughput	500 Mbps
Encryption	128-bit AES
OS	airOS F
Wireless Modes	Master/Slave

AF-2X Radio Interface	
Operating Frequency	2400-2500 MHz (Depends on Regulatory Region)
Frequency Accuracy	± 2.5 ppm without GPS Synchronization ± 0.2 ppm with GPS Synchronization
Channel Bandwidth	3.5 MHz, 5 MHz, 7.0 MHz, 10 MHz, 14 MHz, 20 MHz, 28 MHz, 30 MHz, 40 MHz, 50 MHz, and 56 MHz Selectable Programmable Uplink and Downlink Duty Cycles

airFiber AF-3X	
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
Max. Conducted TX Power	29 dBm (Depends on Regulatory Region)
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 90 Z CE EN 302 217-2-2
Operating Temperature	-40 to 55° C (-40 to 131° F)

AF-3X Networking Interface	
Data Port	(1) 10/100/1000 Ethernet Port
Management Port	(1) 10/100 Ethernet Port

AF-3X System Interface	
Maximum Throughput	500 Mbps
Encryption	128-bit AES
OS	airOS F
Wireless Modes	Master/Slave

AF-3X Radio Interface	
Operating Frequency	3300-3900 MHz (Depends on Regulatory Region)
Frequency Accuracy	± 2.5 ppm without GPS Synchronization ± 0.2 ppm with GPS Synchronization
Channel Bandwidth	3.5 MHz, 5 MHz, 7.0 MHz, 10 MHz, 14 MHz, 20 MHz, 28 MHz, 30 MHz, 40 MHz, 50 MHz, and 56 MHz Selectable Programmable Uplink and Downlink Duty Cycles

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
Max. Conducted TX Power	26 dBm (Depends on Regulatory Region)
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)

AF-5X Networking Interface	
Data Port	(1) 10/100/1000 Ethernet Port
Management Port	(1) 10/100 Ethernet Port

AF-5X System Interface	
Maximum Throughput	500 Mbps
Encryption	128-bit AES
OS	airOS F
Wireless Modes	Master/Slave

AF-5X Radio Interface	
Operating Frequency	5150-5950 MHz (Depends on Regulatory Region)
Frequency Accuracy	± 2.5 ppm without GPS Synchronization ± 0.2 ppm with GPS Synchronization
Channel Bandwidth	10 MHz, 20 MHz, 30 MHz, 40 MHz, 50 MHz Selectable Programmable Uplink and Downlink Duty Cycles

Appendix B: AF-5X and airFiber Multiplexer

Note: This appendix applies to the airFiber AF-5X radio when used with the airFiber NxN Multiplexer.

The following provides important information for using the AF-5X radio with the airFiber NxN Multiplexer (models AF-MPx4 or AF-MPx8). For a successful deployment, ensure that all additional steps are taken and that all information is taken into consideration.

- During initial configuration of each AF-5X radio, input the additional cable loss associated with the multiplexer, and enable the *NxN Radio* setting. For details, refer to Step 6 of **"airFiber Configuration" on page 4**.
- When performing antenna alignment, perform the procedure in **"Establishing a Link" on page 9** on one radio only. This will help ensure maximum success in registrations.
- After the first radio has been aligned with the other side of the link, ensure that the TX power balance is present.
- To maintain 8x performance, maximum TX power should not exceed 19-20 dBm.
- If 8x performance cannot be achieved at these TX power levels, it may be possible to improve performance by increasing channel spacing.

airFiber X Compatibility

The airFiber NxN is designed for use with airFiber 5X radios, (model AF-5X) and 5 GHz airFiber X or RocketDish™ antennas.

Note: The airFiber X Antenna OMT Conversion Kit (AF-5G-OMT-S45) is highly recommended when using a RocketDish for proper fitting and improved frequency isolation.

Installation Requirements

- (2) airFiber 5X radios for AF-MPx4
- (4) airFiber 5X radios for AF-MPx8
- airFiber X or RocketDish antenna
- Clear view of the sky for proper GPS operation
- Ground wires – min. 10 AWG (5 mm^2) and max. length: 1 m. As a safety precaution, ground the airFiber radios to grounded masts, poles, towers, or grounding bars.

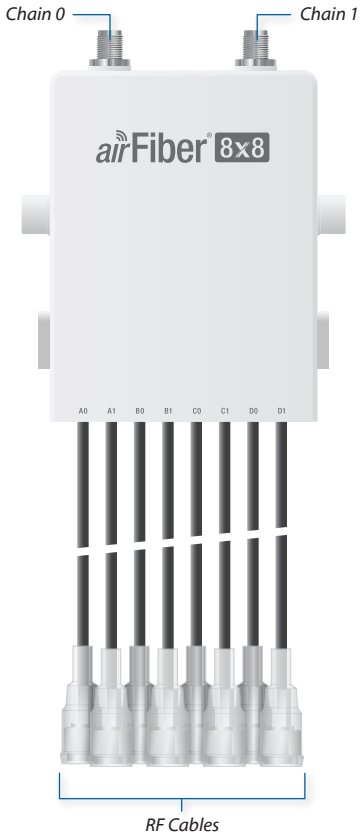
  WARNING: Failure to properly ground your airFiber radio will void your warranty.

  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

airFiber NxN Multiplexer



(AF-MPx8 Shown)

Chain 0 Connect the antenna RF +45° to this connector.

Chain 1 Connect the antenna RF -45° to this connector.

RF Cables Connect each *RF Cable* pair to the corresponding RF connection chain on each airFiber 5X radio. For example, connect cable **A0** to **Chain 0**, and cable **A1** to **Chain 1**.

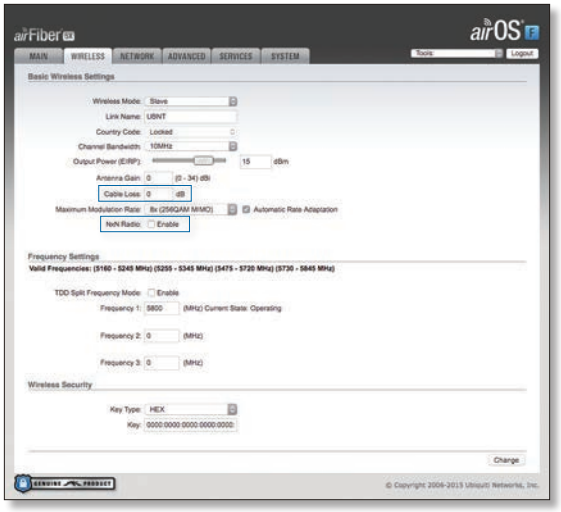
Configure the airFiber 5X Radio

Note: The airFiber 5X radios must be running airOS®F v3.2.1 or newer. The latest firmware is available at: **downloads.ubnt.com/airfiber**

Each airFiber 5X radio must be preconfigured for use with the airFiber NxN before installing them at the site.

Enable airFiber NxN support on each radio:

1. Log into the airOS F Configuration Interface.
2. Click the **Wireless** tab.
3. Enter the additional *Cable Loss* value (dB):
   a. **4.1** for the AF-MPx4, or
   b. **7.2** for the AF-MPx8
4. For the *NxN Radio* setting, select **Enable**.

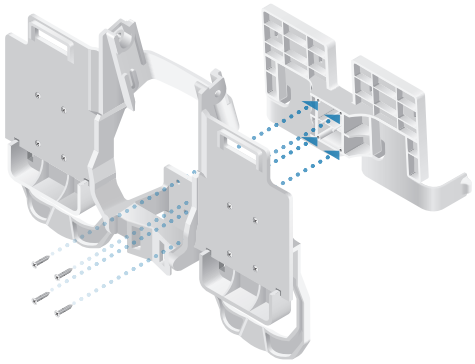


5. Click **Change**, and then click **Apply**.

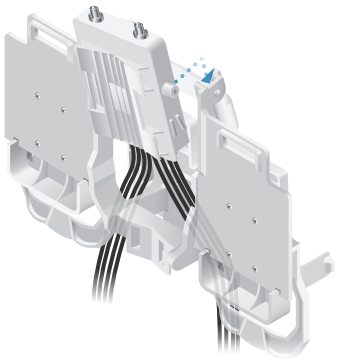
Hardware Installation

The following installation shows the AF-MPx8. For the AF-MPx4 installation, only the mounting and connecting of two airFiber 5X radios apply.

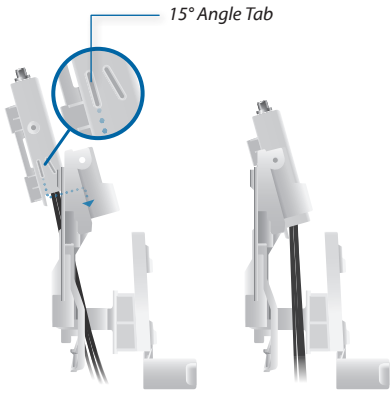
1. (For AF-MPx8 only) Attach the *8x8 Radio Bracket* to the *4x4 Radio Bracket* using four *M3x8 Screws*.



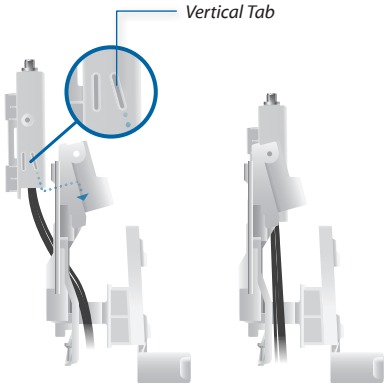
2. Seat the *airFiber NxN Multiplexer* into the *4x4 Radio Bracket* either at (a) a 15° angle or (b) vertically:



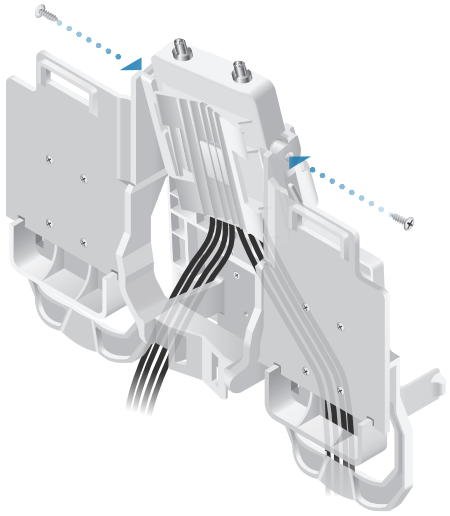
a. For most antenna models, the *airFiber NxN Multiplexer* should be installed at a 15° angle. Insert the *airFiber NxN Multiplexer* from behind the *4x4 Radio Bracket* and slide the *15° Angle Tabs* into the slots on the bracket.



b. For other antenna configurations that require the airFiber NxN assembly to be mounted to a pole, the *airFiber NxN Multiplexer* must be installed vertically. Insert the *airFiber NxN Multiplexer* from behind the *4x4 Radio Bracket* and slide the *Vertical Tabs* into the slots on the bracket.



3. Secure the *airFiber NxN Multiplexer* to the *4x4 Radio Bracket* using two *M4x12 Screws*.



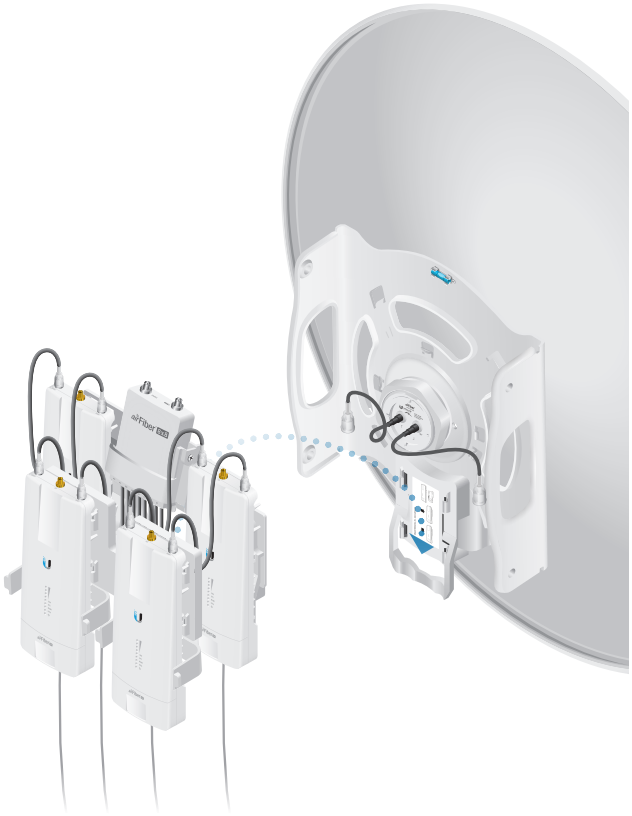
Note: Ensure the airFiber 5X radios are preconfigured and the ground wires are installed as outlined in the radio's Quick Start Guide before mounting the radios.

4. Mount the airFiber 5X radios to the *4x4 Radio Bracket*:
   a. Align the mounting tabs on the back of the radio with the mounting bracket.
   b. Slide the radio down to lock it into place.

5. Mount the airFiber 5X radios to the *8x8 Radio Bracket*:
   a. Align the mounting tabs on the back of the radio with the mounting bracket.
   b. Slide the radio down to lock it into place.

6. Connect the *RF Cables* to the airFiber 5X radios. Connect each *RF Cable* pair to the corresponding RF connection chain on each radio. For example, connect cable **A0** to **Chain 0**, and cable **A1** to **Chain 1**.

7. Attach the airFiber NxN assembly to the airFiber X or RocketDish antenna:
   a. Align the mounting tabs on the back of the *airFiber NxN Multiplexer* with the mounting bracket.
   b. Slide the *airFiber NxN Multiplexer* down to lock it into place on the bracket.

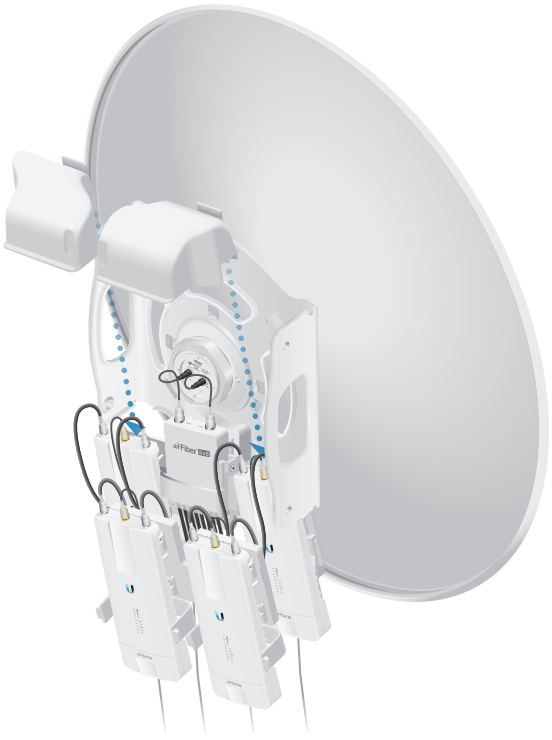


Note: The airFiber NxN assembly may be pole-mounted if it cannot be attached to the antenna. See the Pole-Mounting section for details.

8. Connect the RF cables from the antenna to the RF connectors on the *airFiber NxN Multiplexer*. Connect +45° to *Chain 0* and -45° to *Chain 1*.

9. Attach the GPS antennas to each of the airFiber 5X radios.
10. Mount the GPS antennas in a location that has a clear view of the sky, and is above and as far away from the radios as possible.

11. Attach the *Protective Shrouds*:
   a. Insert the *Protective Shroud's* attachment tab between the airFiber 5X radio and the *4x4 Radio Bracket*.
   b. Push the *Protective Shroud* down until the attachment tab locks into place.



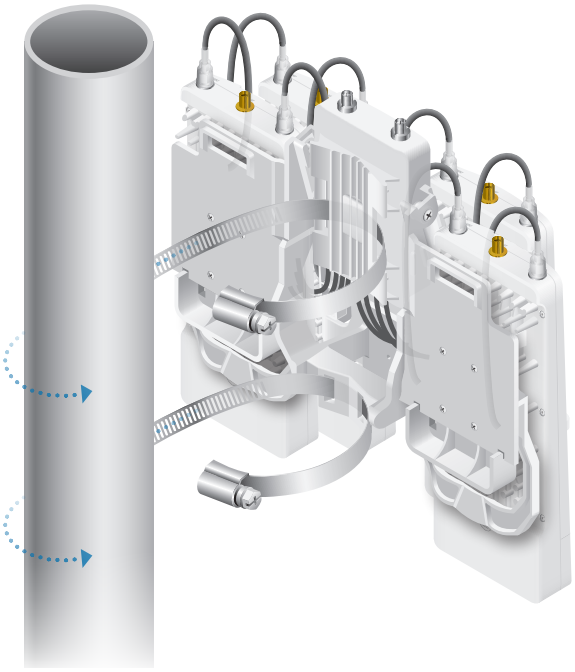
12. Secure the grounding wire from each radio to a grounded mast, pole, tower, or grounding bar.

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.

Pole-Mounting

1. Ensure the *airFiber NxN Multiplexer* is installed vertically in the *4x4 Radio Bracket*.
2. Mount the airFiber NxN assembly to the pole using two metal straps (not included):
   a. Insert a metal strap through each mounting bracket on the back of the *airFiber NxN Multiplexer* and *4x4 Radio Bracket*.
   b. Secure both straps around the pole.



3. Connect the RF cables from the antenna to the RF connectors on the *airFiber NxN Multiplexer*. Connect +45° to *Chain 0* and -45° to *Chain 1*.

Appendix C: Listen Before Talk

Note: This appendix applies to the airFiber AF-3X radio only.

Introduction

Listen Before Talk (LBT) is a requirement for the 3.6 GHz band in North America and Canada.

Because exclusive licenses for the 3650-3700 MHz band are not granted within the United States, operators must take steps to minimize potential interference in this band.

LBT refers to a contention-based protocol (CBP) that requires a device to check if the transmission channel is in use (listen) before it can initiate a transmission (talk). FCC standards that relate to LBT include the following:

- FCC Part 90, Subpart Z requires 3.6 GHz systems to implement a contention-based protocol to provide LBT capability. This same requirement has also been adopted by Industry Canada (IC).
- FCC Part 90, Subpart Z defines two categories of contention-based protocols, *restricted* and *unrestricted*:
  - **Restricted contention-based protocol** This is a protocol that can detect interference from products that use a similar contention technology. Systems using a restricted contention-based protocol operate in the lower 25 MHz of the frequency band (3650-3675 MHz).
  - **Unrestricted contention-based protocol** This is a protocol that can detect interference from products that use a dissimilar contention technology. Systems using an unrestricted contention-based protocol use the full 50 MHz (3650-3700 MHz) of the frequency band.

Unrestricted Protocol Description

The AF-3X Master/Slave system uses dedicated logic for the LBT protocol, which is embedded into a TDD frame structure. Energy detection is done at the beginning of the TX defined by the frame structure of the air interface, at intervals of 2.0, 2.5, 4.0, or 5.0 ms for compatibility between various other Part 90Z radio devices.

Threshold Detection To Determine Occupancy

The AF-3X averages the energy detected over a fixed listen time and compares it to a preconfigured threshold value. This threshold is configured for values that are within the linear portion of the radio's Receive Signal Strength Indicator (RSSI) dynamic range.

The energy detection threshold is proportional to the transmitter's maximum transmit power. For example, if the transmitter's EIRP is 23 dBm, then the detection threshold at the receiver's input (assuming antenna gain of 0 dBi) is -73 dBm/MHz.

The detection threshold is adjusted as follows:

$$DT = -73\ \text{dBm/MHz} + 10\log_{10}(B) + 23 - P_T + A$$

where:

DT = Detection Threshold in dBm
B = Monitored bandwidth in MHz
P_T = Maximum transmit power in dBm EIRP
A = Receive antenna gain in dBi

The receive antenna gain A is set equal to the external antenna gain. The following are set by the operator during the configuration of the AF-3X radio:

- maximum desired EIRP power P_T
- external antenna gain A
- channel bandwidth B

The AF-3X ensures that the sum of the actual conducted power and the external antenna gain used to calculate P_T does not exceed the regulatory EIRP limit.

The Master/Slave device makes an average measurement during its Tx and samples the channel every frame (typically 2.0 ms) to accumulate a co-channel signal measurement. A typical accumulation period is 5 µs.

The bandwidth used for all channel occupancy measurements is the same bandwidth used for system operation and is configurable for values that range from 3.5 MHz to 40 MHz.

The detection threshold is configured to scale automatically based on the in-use modulation level that the system negotiates. The threshold level is automatically set by the radio to meet regulatory requirements. All threshold levels are normalized to a 0 dBi reference level.

The detection system uses the same hardware as the actual radio lower-level software code and is therefore operational over the same power range.

The AF-3X point-to-point system employs a proprietary media access layer (MAC) that utilizes a TDD scheduled transmission which is synchronized. Both the Master and Slave employ a threshold detection mechanism to monitor for other systems running within a selected channel.

Action Taken When Occupancy is Determined

Upon detection of occupancy, the Master will cease transmission. It will continue to monitor the channel to see if at any point that it becomes available.

Hidden-node problems are avoided by the AF-3X system's proprietary media access control (MAC) layer that utilizes a TDD scheduled transmission (a synchronized framed transmission). The Slave device cannot transmit until it is allocated bandwidth from the Master device. If the Master device detects co-channel signals, the uplink for the scheduled slot allocation is not granted to the Slave, preventing the Slave from transmitting. Since permission to transmit is granted by the Master, there is no hidden node problem like that experienced by Wi-Fi systems which employ a contention-based protocol.

Opportunities for Other Transmitters to Operate

No differences are performed between start-up mode and operational mode. The Master/Slave device goes into an energy scanning mode where it is allowed to do one full cycle of energy detection before it is allowed to transmit. The scan is a mode where the average energy is accumulated to compare against the programmed detection threshold. If the energy detected is less than the detection threshold, the Master/Slave device is allowed to make a transmission.

In normal operational mode the system does not allow any transmission once the threshold has been detected. Once the energy is no longer present will the system begin to transmit again.

The Master and Slave uses the energy detected prior to each transmit frame to control the muting of the transmit function.

At any load level (no load, typical, or overload), the system transmits data based on the configuration for the uplink/downlink ratio The same amount of bandwidth is reserved for channel detection, so performance remains unaffected.

If there are two AF-3X systems on a co-channel, they would share the spectrum as follows:

- Since the system is a synchronized frame-based system, both systems would operate effectively with each other because each system can be configured to transmit and receive at the same point in time. The system uses a GPS synchronization to time-align the start-of-frame for all systems deployed.
- If the users configure the number of uplink and downlink slots and the duty cycle (uplink/downlink ratio) in an identical manner and each system uses the same set of uncommitted uplink slots for the detection sampling interval, then the two systems will co-exist with no knowledge of the others presence.
- Each system listens prior to transmit and if it detects activity yields to the other system.
- The system will shut down when the accumulated energy is above the detection threshold and will continue to transmit if it is below the detection threshold. When the co-channel system is clear of the channel then the target system will go back into regular operation. Regular operation will consist of a constant averaging of the energy detected in the uplink slots.

Appendix D: Safety Notices

1. Read, follow, and keep these instructions.
2. Heed all warnings.
3. Only use attachments/accessories specified by the manufacturer.

WARNING: Do not use this product in location that can be submerged by water.

WARNING: Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning.

Electrical Safety Information

1. Compliance is required with respect to voltage, frequency, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified may result in improper operation, damage to the equipment or pose a fire hazard if the limitations are not followed.
2. There are no operator serviceable parts inside this equipment. Service should be provided only by a qualified service technician.
3. This equipment is provided with a detachable power cord which has an integral safety ground wire intended for connection to a grounded safety outlet.
   a. Do not substitute the power cord with one that is not the provided approved type. Never use an adapter plug to connect to a 2-wire outlet as this will defeat the continuity of the grounding wire.
   b. The equipment requires the use of the ground wire as a part of the safety certification, modification or misuse can provide a shock hazard that can result in serious injury or death.
   c. Contact a qualified electrician or the manufacturer if there are questions about the installation prior to connecting the equipment.
   d. Protective earthing is provided by Listed AC adapter. Building installation shall provide appropriate short-circuit backup protection.
   e. Protective bonding must be installed in accordance with local national wiring rules and regulations.