

# airFiber<sup>®</sup> X

5 GHz Carrier Backhaul Radio

Model: AF-5X

Up to 500+ Mbps Real Throughput, Up to 200+ km Range

Full-Band Certification including DFS

Ubiquiti's INVICTUS™ Custom Silicon



# Overview

Ubiquiti Networks continues to disrupt the wireless broadband market with revolutionary technology at breakthrough pricing by introducing airFiber® X, a modular airFiber radio system that will serve a wide range of frequencies and is designed to be compatible with a variety of Ubiquiti® antennas.

Building upon the proven design of the airMAX® Rocket™ system, airFiber X allows you to customize airFiber backhaul links or upgrade existing Rocket Point-to-Point (PtP) links. The first airFiber X model is the AF-5X model for use in the 5 GHz frequency band.

## Engineered for Performance

Ubiquiti's INVICTUS™ custom silicon and proprietary radio architecture are designed specifically for long-distance, outdoor wireless applications.

Our INVICTUS core communications processing engine surpasses all of the limitations inherent to generic Wi-Fi chips to provide superior performance, long-range capability, DFS flexibility, and power output.

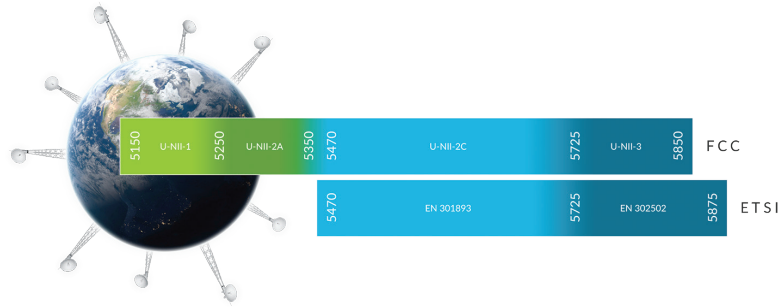
The AF-5X features industry-leading 10.6 bps/Hz spectral efficiency, line-rate data packet processing for up to 500+ Mbps of real data throughput, and innovative xtreme Range Technology (xRT™) for up to 200+ km in range.



# 5 GHz Backhaul

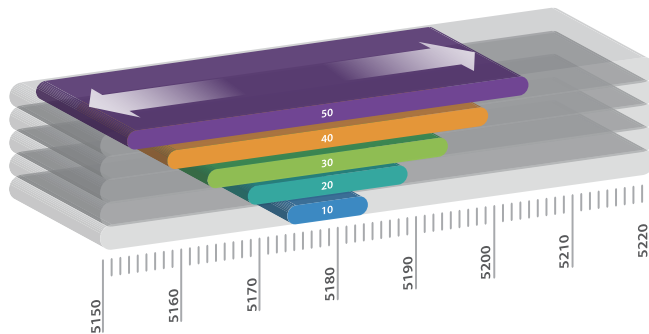
## Full-Band Certification with DFS

The AF-5X covers the entire, license-free, 5 GHz spectrum and includes DFS approval. Anyone around the world can deploy and operate the AF-5X in the 5 GHz range practically anywhere they choose (subject to local country regulations).



## Optimal Operation in Unlicensed Bands

Channel width flexibility (10/20/30/40/50 MHz) allows independent TX and RX channel frequency configurations anywhere within the radio band to avoid local interference, and the channel centers are selectable in 1 MHz increments. You also have the ability to program different uplink and downlink duty cycles to support asymmetric traffic requirements.



## Ultra-Low Latency with HDD Technology

The AF-5X is designed to provide the highest TDD throughput available and is engineered with proprietary Hybrid Division Duplexing (HDD) technology.

In a backhaul link, two AF-5X radios use patent-pending HDD technology to calculate the propagation delay and know when each radio can transmit and receive, so they send packets in precise synchronization. Packet transmission latency is virtually eliminated.



# Co-Location

Co-location is vital in many scenarios. For example, a WISP may have limited tower space, so it must co-locate all equipment within that allotted footprint.

## GPS Synchronization

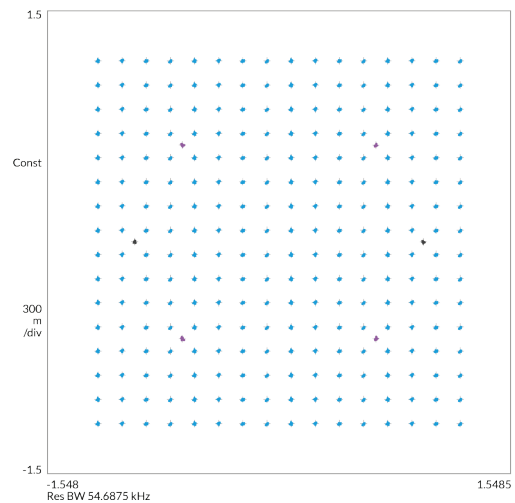
Precise GPS frame synchronization frees the AF-5X from interference for superior co-location capability. GPS enables the concurrency of TX and RX frames so you can co-locate the AF-5X radios and enhance the overall performance of your backhaul links.

## Clean Power Output

Using digital pre-distortion compensation and multi-IFFT processing, the innovative RF design delivers ultra-clean power output that improves noise immunity and co-location performance. This reduces the potential impact on the RF noise environment and allows for the use of higher-order modulation, such as 256QAM.



CONSTELLATION PLOT | 256QAM



# Deployment Flexibility

The AF-5X supports  $\pm 45^\circ$  slant polarization for improved noise immunity and Signal-to-Noise Ratio (SNR). It is compatible with multiple Ubiquiti antennas offering gain of 23 to 34 dBi. The compact form factor of the AF-5X allows it to fit into the radio mount of Ubiquiti antennas, so installation requires no special tools.

The airFiber X antennas are purpose-built with  $45^\circ$  slant polarity for seamless integration with the AF-5X. Pair the AF-5X with one of the following airFiber X antennas:

## airFiber<sup>®</sup> X Antenna



| Model       | Frequency | Gain   |
|-------------|-----------|--------|
| AF-5G23-S45 | 5 GHz     | 23 dBi |

The AF-5G23-S45 offers 23 dBi of gain in a 378-mm diameter size.



| Model       | Frequency | Gain   |
|-------------|-----------|--------|
| AF-5G30-S45 | 5 GHz     | 30 dBi |

The AF-5G30-S45 offers 30 dBi of gain in a 650-mm diameter size.



| Model       | Frequency | Gain   |
|-------------|-----------|--------|
| AF-5G34-S45 | 5 GHz     | 34 dBi |

The AF-5G34-S45 offers 34 dBi of gain in a 1050-mm diameter size.

# RocketDish™

You can also pair the AF-5X with one of the following RocketDish™ antennas by using a kit to convert the RocketDish to 45° slant polarity.



| Model   | Frequency | Gain   |
|---------|-----------|--------|
| RD-5G30 | 5 GHz     | 30 dBi |

The RD-5G30 offers 30 dBi of gain in a 650-mm diameter size.



| Model   | Frequency | Gain   |
|---------|-----------|--------|
| RD-5G34 | 5 GHz     | 34 dBi |

The RD-5G34 offers 34 dBi of gain in a 1050-mm diameter size.

## Conversion Kit

The 5 GHz RocketDish to airFiber Antenna Conversion Kit converts the RocketDish RD-5G30 or RD-5G34 antenna for use with the AF-5X.



| Model         | RD-5G30 | RD-5G34 |
|---------------|---------|---------|
| AF-5G-OMT-S45 | ✓       | ✓       |

# 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)<br>(1) SMA Weatherproof (GPS)           |
| GPS Antenna             | External, Magnetic Base  |
| Power Supply            | 24V, 1A PoE Gigabit Adapter (Included)                                     |
| Power Method            | Passive Power over Ethernet<br>Pins 1, 2, 4, 5 (+) and Pins 7, 8, 3, 6 (-) |
| Max. Power Consumption  | 12W  |
| Supported Voltage Range | 19-29VDC   |
| Mounting                | airFiber X Mount (Rocket Mount Compatible)<br>GPS Pole Mount (Included)    |
| Certifications          | CE, FCC, IC  |
| 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             |                        |
|--------------------|------------------------|
| Processor          | INVICTUS IC            |
| Maximum Throughput | 500+ Mbps <sup>1</sup> |
| Maximum Range      | 200+ km <sup>1</sup>   |
| Encryption         | 128-bit AES            |
| OS                 | airOS F                |
| Wireless Modes     | Master/Slave           |

| Radio   |   |
|---|---|
| Frequency Range<br>FCC 15.407<br>IC RSS-210<br>ETSI EN 301 893, EN 302 502<br>Other Regions | 5150 - 5350 MHz, 5470 - 5850 MHz<br>5470 - 5600 MHz, 5650 - 5850 MHz<br>5470 - 5875 MHz<br>5150 - 5950 MHz <sup>2</sup> |
| Max. Conducted TX Power   | 26 dBm <sup>2</sup><br>(Dependent on Regulatory Region)   |
| Frequency Accuracy  | ± 2.5 ppm without GPS Synchronization<br>± 0.2 ppm with GPS Synchronization   |
| Channel Bandwidth   | 10/20/30/40/50 MHz Selectable<br>Programmable Uplink and Downlink Duty Cycles   |

<sup>1</sup> Throughput and range values may vary depending on the environmental conditions.

<sup>2</sup> For region-specific details, refer to the *Compliance* chapter of the airFiber5X User Guide at [downloads.ubnt.com/airfiber](http://downloads.ubnt.com/airfiber)

| Suggested Max. TX Power |             |
|-------------------------|-------------|
| 8x                      | 19 - 20 dBm |
| 6x                      | 21 - 22 dBm |
| 4x                      | 23 - 24 dBm |
| 1/2x                    | 26 dBm      |
| 1/4x                    | 26 dBm      |

| Receive Sensitivity |                   |                      |                      |                      |                      |                      |
|---------------------|-------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Spatial Streams     | Modulation        | Sensitivity (10 MHz) | Sensitivity (20 MHz) | Sensitivity (30 MHz) | Sensitivity (40 MHz) | Sensitivity (50 MHz) |
| 8x                  | 256QAM            | -66 dBm              | -64 dBm              | -62 dBm              | -61 dBm              | -60 dBm              |
| 6x                  | 64QAM             | -74 dBm              | -71 dBm              | -69 dBm              | -68 dBm              | -67 dBm              |
| 4x                  | 16QAM MIMO        | -81 dBm              | -78 dBm              | -76 dBm              | -75 dBm              | -74 dBm              |
| 2x                  | QPSK MIMO         | -88 dBm              | -85 dBm              | -83 dBm              | -82 dBm              | -81 dBm              |
| 1x                  | 1/2 Rate QPSK xRT | -90 dBm              | -87 dBm              | -85 dBm              | -84 dBm              | -83 dBm              |

