DATASHEET

airFiber® 11FX

Licensed Backhaul Radio

Models: AF-11FX

Full-Duplex, Point-to-Point Radio

11 GHz Frequency Operation

Up to 1.2+ Gbps Throughput

UBIQUITI®
NETWORKS

Overview

Ubiquiti Networks continues to disrupt the wireless broadband market with revolutionary technology at breakthrough pricing, by introducing the airFiber® AF-11FX, a radio purpose-built for outdoor PtP bridging and carrier-class network backhauls using the licensed 11 GHz radio band.

The AF-11FX breaks free from the congested 5 GHz band to help meet the growing need for broadband capacity.

For maximum flexibility, the airFiber AF-11FX works with the Ubiquiti® AF-11G35 antenna, or with most third-party antennas using an optional adapter kit (not included).

AF-11FX Radio Mounted on AF-11G35 Antenna

Groundbreaking Design

The AF-11FX gives exceptional performance compared to other 11 GHz radios in its price range. Unlike other products that use adaptations of Wi-Fi-based designs, the AF-11FX is specially engineered for the 11 GHz band, with a custom modem and radio design optimized for the efficient transport of data. Specific advantages of the AF-11FX include:

TDD

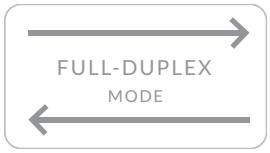
True FDD

True Full-Duplex Design
The AF-11FX offers a true FDD solution that fully satisfies all licensing requirements for the 11 GHz band.

Ultra-Low Latency
Overall customer experience and system capacity are enhanced with FDD performance.

Enhanced Robustness
The AF-11FX features a unique, built-in, rain-fade mitigation strategy for increased link robustness.

Extended Range The RF power amplifiers feature a unique bias scheme, allowing high-order constellations at longer ranges.



Channel Configuration

Optimized Channels

The airFiber AF-11FX can use single (SISO) or bonded (MIMO)* channels, depending on your specific licensing requirements. The AF-11FX also features different channel width sizes to suit your deployment needs, and you can independently configure TX and RX channel frequencies.

Reconfigurable Duplexers

The AF-11FX features a unique modular duplexer design to suit multiple frequency configurations.

Each AF-11FX radio can be configured to support any allowable frequency by simply changing the duplexers (sold separately) for high-band or low-band use in the 10.7 - 11.7 GHz allocation.

Each duplexer has a low channel and a high channel that can be configured by simply reversing the position of the duplexer.

Highest Performance Value

The compact AF-11FX supports high-order constellations – up to 1024QAM – allowing it to deliver the greatest spectral efficiency in its class.

* SISO mode configuration requires either one low-band duplexer or one high-band duplexer. MIMO mode configuration requires a second low-band or high-band duplexer. Duplexers are sold separately.

Low-Band Duplexer

High-Band Duplexer

Duplexer	Low Channel	High Channel	Model
Low-Band Duplexer	10.700 - 10.955 GHz	11.200 - 11.445 GHz	AF-11FX-DUP-L
High-Band Duplexer	10.940 - 11.200 GHz	11.440 - 11.700 GHz	AF-11FX-DUP-H

Reversible Duplexers For Easy Channel Configuration

SISO Mode

MIMO Mode

Example of SISO Mode vs MIMO Mode Configuration

Advanced Engineering

Ubiquiti's INVICTUS™ 2 custom silicon and proprietary radio architecture are designed specifically for long-distance, outdoor wireless applications, providing superior performance, long-range capability, and higher delivered throughput.

Deployment Flexibility

The airFiber AF-11FX provides a number of deployment options including:

Power Source Options

Support for PoE or DC power gives you the flexibility to power the AF-11FX separately from Ethernet traffic.

- PoE power can be supplied on the DATA port, using the provided PoE adapter.
- DC power can be supplied using the terminal block.

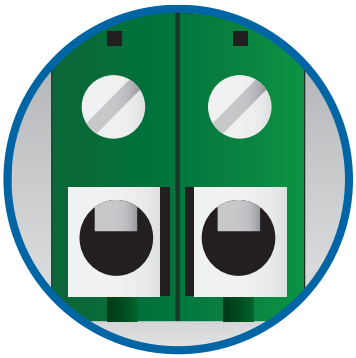
Versatile, Ruggedized N-Type Connectors

N-connectors allow the AF-11FX to be used with either the Ubiquiti AF-11G35 antenna or a variety of commonly available antennas.

Specially designed silicone boots provide a weatherproof barrier against dust and moisture.

AF-11FX INVICTUS 2 Custom Silicon Design

PoE Power



DC Power

N-Connector with Boot Retracted

N-Connector with Boot In Place

airFiber X Antenna

Ubiquiti offers the AF-11G35 antenna, specially designed for the AF-11FX radio, so that installation requires no special tools. The AF-11G35 comes preconfigured with V/H polarization, and can be configured to support ± 45° slant polarization for improved noise immunity and Signal-to-Noise Ratio (SNR), dependent on regulatory region.

AF-11G35 Antenna

Model	Frequency	Gain	Radome
AF-11G35	11 GHz	35 dBi	Integrated

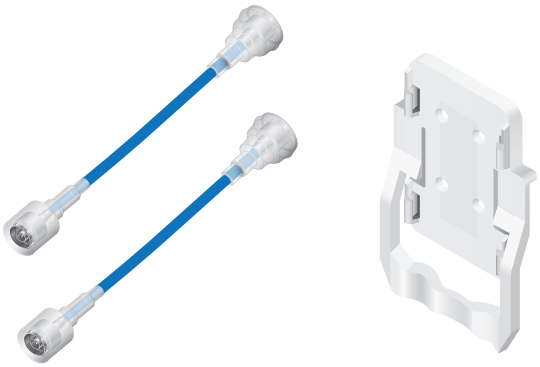
The AF-11G35 offers up to 35 dBi of gain.

Front View of AF-11G35 With Radome

Back View of AF-11G35 With AF-11FX Radio

Adapter Kit

For even greater flexibility, Ubiquiti also offers the optional AF11-CA adapter kit which allows the AF-11FX to work with most of the commonly available 11 GHz antennas. The kit includes two RF cables plus a bracket that provides a secure mount for the AF-11FX on the back of the antenna.



AF11-CA Adapter Kit

Specifications

AF-11FX	
Dimensions	327 x 112 x 86 mm (12.87 x 4.41 x 3.39")
Weight	2.260 kg (5 lb)
RF Connectors	(4) SMA Weatherproof: TX 0, RX 0 (Chain 0) and TX 1, RX 1 (Chain 1) (2) N-Type Waterproof, One per Duplexer
Power Supply	50VDC, 1.2A PoE Gigabit Adapter (Included)
Power Method	Passive Power over Ethernet Pins 1, 2, 4, 5 (+) and Pins 7, 8, 3, 6 (-) or DC Power Block
Max. Power Consumption	36W
Supported Voltage Range	38-56VDC
Automatic Transmit Power Control (ATPC)	Yes
Mounting	Integrated Pole Mount Included Oversized Rocket Mount Compatible
LEDs	(8) Status LEDs: Data Port Link/Activity Management Port Link/Activity MIMO Mode RF Link (4) Autoscaling Signal Strength Bar Graph
Operating Temperature	-40 to 55° C (-40 to 131° F)
Certifications	CE, FCC, IC

AF-11FX Networking Interface	
Data Port	(1) 10/100/1000 Ethernet Port
Management Port	(1) 10/100 Ethernet Port

AF-11FX System	
Processor	INVICTUS 2 IC
Maximum Throughput	1.2+ Gbps[1]
Maximum Range	300+ km[1]
Encryption	128-bit AES
OS	airOS® F
Wireless Modes	SISO/MIMO
Latency Full Duplex Mode	< 200 µs at Full Throughput
MTU (Maximum Transmission Unit)	Up to 9600

[1] Throughput and range values may vary depending on the environmental conditions.

AF-11FX Radio	
Frequency Range	10.7-11.7 GHz[2]
Max. Conducted TX Power	30 dBm[2] (Dependent on Regulatory Region)
Frequency Accuracy	± 2.0 ppm
Channel Bandwidth	3.5/5/7/10/14/20/28/30/40/50/56 MHz Selectable[3]

AF-11FX Suggested Max. TX Power	
10x (1024QAM)	18 dBm
8x (256QAM)	21 dBm
6x (64QAM)	24 dBm
4x (16QAM)	30 dBm
2x (4QAM)	30 dBm
1x (QPSK)	30 dBm

AF-11FX Duplexer	
Low-Band Duplexer	Low Channel: 10.700 to 10.955 GHz High Channel : 11.200 to 11.445 GHz
High-Band Duplexer	Low Channel : 10.940 to 11.200 GHz High Channel : 11.440 to 11.700 GHz

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

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

AF-11FX Capacity					
Channel Bandwidth	**Mode**	**Constellation**	**Rate Multiplier**	**One-Directional Capacity (Mbps)**	**Bi-Directional Capacity (Mbps)**
3.5 MHz	MIMO	1024 QAM	10x	38.4	76.8
		256 QAM	8x	30.7	61.4
		64 QAM	6x	23	46.0
		16 QAM	4x	15.4	30.8
		QPSK	2x	7.7	15.4
		QPSK xRT™	1x	3.8	7.6
	SISO	1024 QAM	5x	19.2	38.4
		256 QAM	4x	15.35	30.7
		64 QAM	3x	11.5	23.0
		16 QAM	2x	7.7	15.4
		QPSK	1x	3.85	7.7
5 MHz	MIMO	1024 QAM	10x	60.8	121.6
		256 QAM	8x	48.65	97.3
		64 QAM	6x	36.5	73.0
		16 QAM	4x	24.3	48.6
		QPSK	2x	12.1	24.2
		QPSK xRT™	1x	6.1	12.2
	SISO	1024 QAM	5x	30.4	60.8
		256 QAM	4x	24.3	48.6
		64 QAM	3x	18.25	36.5
		16 QAM	2x	12.15	24.3
		QPSK	1x	6.05	12.1
7 MHz	MIMO	1024 QAM	10x	86.4	172.8
		256 QAM	8x	69.1	138.2
		64 QAM	6x	51.8	103.6
		16 QAM	4x	34.6	69.2
		QPSK	2x	17.3	34.6
		QPSK xRT™	1x	8.6	17.2
	SISO	1024 QAM	5x	43.2	86.4
		256 QAM	4x	34.55	69.1
		64 QAM	3x	25.9	51.8
		16 QAM	2x	17.3	34.6
		QPSK	1x	8.65	17.3
10 MHz	MIMO	1024 QAM	10x	128	256.0
		256 QAM	8x	102.4	204.8
		64 QAM	6x	76.8	153.6
		16 QAM	4x	51.2	102.4
		QPSK	2x	25.6	51.2
		QPSK xRT™	1x	12.8	25.6
	SISO	1024 QAM	5x	64	128.0
		256 QAM	4x	51.2	102.4
		64 QAM	3x	38.4	76.8
		16 QAM	2x	25.6	51.2
		QPSK	1x	12.8	25.6

AF-11FX Capacity					
Channel Bandwidth	**Mode**	**Constellation**	**Rate Multiplier**	**One-Directional Capacity (Mbps)**	**Bi-Directional Capacity (Mbps)**
14 MHz	MIMO	1024 QAM	10x	182.4	364.8
		256 QAM	8x	145.9	291.8
		64 QAM	6x	109.4	218.8
		16 QAM	4x	72.9	145.8
		QPSK	2x	36.5	73.0
		QPSK xRT™	1x	18.2	36.4
	SISO	1024 QAM	5x	91.2	182.4
		256 QAM	4x	72.95	145.9
		64 QAM	3x	54.7	109.4
		16 QAM	2x	36.45	72.9
		QPSK	1x	18.25	36.5
20 MHz	MIMO	1024 QAM	10x	259.2	518.4
		256 QAM	8x	207.3	414.6
		64 QAM	6x	155.5	311.0
		16 QAM	4x	103.7	207.4
		QPSK	2x	51.8	103.6
		QPSK xRT™	1x	25.9	51.8
	SISO	1024 QAM	5x	129.6	259.2
		256 QAM	4x	103.65	207.3
		64 QAM	3x	77.75	155.5
		16 QAM	2x	51.85	103.7
		QPSK	1x	25.9	51.8
28 MHz	MIMO	1024 QAM	10x	361.6	723.2
		256 QAM	8x	289.3	578.6
		64 QAM	6x	216.9	433.8
		16 QAM	4x	144.6	289.2
		QPSK	2x	72.3	144.6
		QPSK xRT™	1x	36.2	72.4
	SISO	1024 QAM	5x	180.8	361.6
		256 QAM	4x	144.65	289.3
		64 QAM	3x	108.45	216.9
		16 QAM	2x	72.3	144.6
		QPSK	1x	36.2	72.4
30 MHz	MIMO	1024 QAM	10x	384	768.0
		256 QAM	8x	307.2	614.4
		64 QAM	6x	230.4	460.8
		16 QAM	4x	153.6	307.2
		QPSK	2x	76.8	153.6
		QPSK xRT™	1x	38.4	76.8
	SISO	1024 QAM	5x	192	384.0
		256 QAM	4x	153.6	307.2
		64 QAM	3x	115.2	230.4
		16 QAM	2x	76.8	153.6
		QPSK	1x	38.4	76.8

AF-11FX Capacity					
Channel Bandwidth	**Mode**	**Constellation**	**Rate Multiplier**	**One-Directional Capacity (Mbps)**	**Bi-Directional Capacity (Mbps)**
40 MHz	MIMO	1024 QAM	10x	502.4	1004.8
		256 QAM	8x	401.8	803.6
		64 QAM	6x	301.4	602.8
		16 QAM	4x	200.9	401.8
		QPSK	2x	100.4	200.8
		QPSK xRT™	1x	50.2	100.4
	SISO	1024 QAM	5x	251.2	502.4
		256 QAM	4x	200.9	401.8
		64 QAM	3x	150.7	301.4
		16 QAM	2x	100.45	200.9
		QPSK	1x	50.2	100.4
50 MHz[4]	MIMO	1024 QAM	10x	617.6	1235.2
		256 QAM	8x	494.1	988.2
		64 QAM	6x	370.6	741.2
		16 QAM	4x	247	494.0
		QPSK	2x	123.5	247.0
		QPSK xRT™	1x	61.8	123.6
	SISO	1024 QAM	5x	308.8	617.6
		256 QAM	4x	247.05	494.1
		64 QAM	3x	185.3	370.6
		16 QAM	2x	123.5	247.0
		QPSK	1x	61.75	123.5
56 MHz[4]	MIMO	1024 QAM	10x	687.9	1375.8
		256 QAM	8x	550.4	1100.8
		64 QAM	6x	412.8	825.6
		16 QAM	4x	275.2	550.4
		QPSK	2x	137.6	275.2
		QPSK xRT™	1x	68.8	137.6
	SISO	1024 QAM	5x	343.95	687.9
		256 QAM	4x	275.2	550.4
		64 QAM	3x	206.4	412.8
		16 QAM	2x	137.6	275.2
		QPSK	1x	68.8	137.6

[4] Used only for 80 MHz licensing for the FCC.

AF-11FX Receive MIMO Sensitivity in dBm											
Data Rate	Modulation	Channel (MHz)									
		3.5	5	7	10	14	20	28	30	40	50	56
10x	1024QAM MIMO	-64.5	-63.0	-61.5	-60.0	-58.5	-57.0	-55.5	-55.2	-54.0	-53.0	-52.5
8x	256QAM MIMO	-72.5	-71.0	-69.5	-68.0	-66.5	-65.0	-63.5	-63.2	-62.0	-61.0	-60.5
6x	64QAM MIMO	-79.5	-78.0	-76.5	-75.0	-73.5	-72.0	-70.5	-70.2	-69.0	-68.0	-67.5
4x	16QAM MIMO	-86.5	-85.0	-83.5	-82.0	-80.5	-79.0	-77.5	-77.2	-76.0	-75.0	-74.5
2x	QPSK MIMO	-93.5	-92.0	-90.5	-89.0	-87.5	-86.0	-84.5	-84.2	-83.0	-82.0	-81.5
1x	¼ Rate QPSK xRT	-95.5	-94.0	-92.5	-91.0	-89.5	-88.0	-86.5	-86.2	-85.0	-84.0	-83.5

AF-11FX Receive SISO Sensitivity in dBm											
Data Rate	Modulation	Channel (MHz)									
		3.5	5	7	10	14	20	28	30	40	50	56
5x	1024QAM SISO	-64.5	-63.0	-61.5	-60.0	-58.5	-57.0	-55.5	-55.2	-54.0	-53.0	-52.5
4x	256QAM SISO	-72.5	-71.0	-69.5	-68.0	-66.5	-65.0	-63.5	-63.2	-62.0	-61.0	-60.5
3x	64QAM SISO	-79.5	-78.0	-76.5	-75.0	-73.5	-72.0	-70.5	-70.2	-69.0	-68.0	-67.5
2x	16QAM SISO	-86.5	-85.0	-83.5	-82.0	-80.5	-79.0	-77.5	-77.2	-76.0	-75.0	-74.5
1x	QPSK SISO	-93.5	-92.0	-90.5	-89.0	-87.5	-86.0	-84.5	-84.2	-83.0	-82.0	-81.5

www.ubnt.com