



# *rocket*<sup>™</sup> ac

Powerful airMAX<sup>®</sup> ac BaseStation

Model: R5AC-Lite, R5AC-PTP

airMAX ac Technology for up to 450+ Mbps Throughput

Superior Processing by airMAX Engine with Custom IC

Plug and Play Integration with airMAX ac Antennas



# Overview

Ubiquiti Networks has designed the first airMAX® ac radios with high performance and ease of installation in mind.

You have the freedom to deploy the Rocket™ ac anywhere in the world, and it allows for a high degree of flexibility in configuring channel bandwidths (subject to local country regulations).

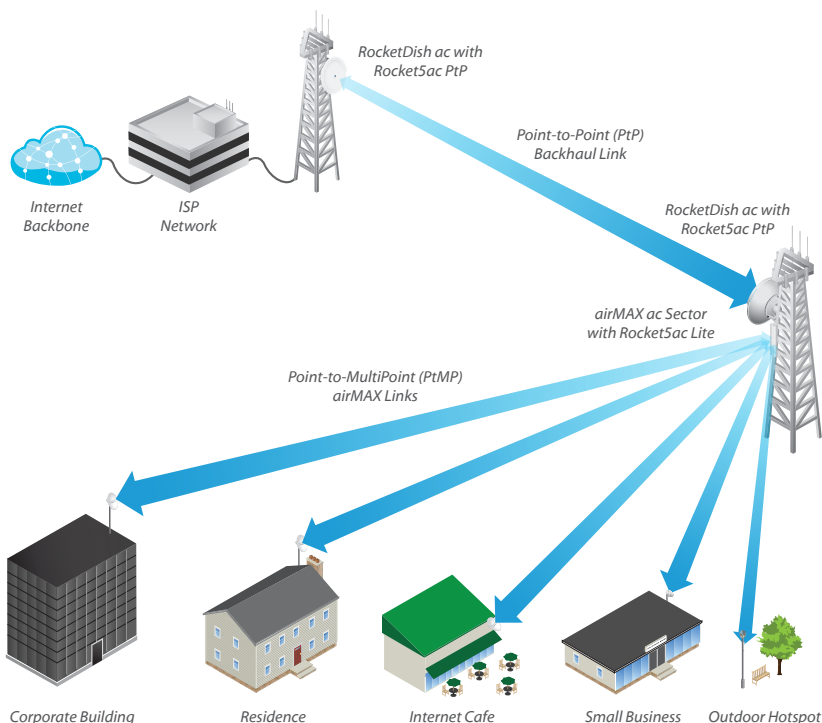
The Rocket ac is available as two models, the Rocket5ac Lite and the Rocket5ac PtP. Both include airMAX ac technology, and the Rocket5ac PtP also features airPrism™ technology to further enhance its performance.

Pair the Rocket ac with airMAX ac antennas for optimal performance:

- **PtP backhaul** Rocket5ac Lite or Rocket5ac PtP with the RocketDish™ ac
- **PtMP links** Rocket5ac Lite<sup>1</sup> with the airMAX ac Sector

<sup>1</sup> PtMP functionality is available with a firmware upgrade to airOS v7.1 or higher.

## Application Example



# Software



Sporting an all-new design for improved usability, airOS® v7 is the revolutionary operating system for Ubiquiti® airMAX ac products.

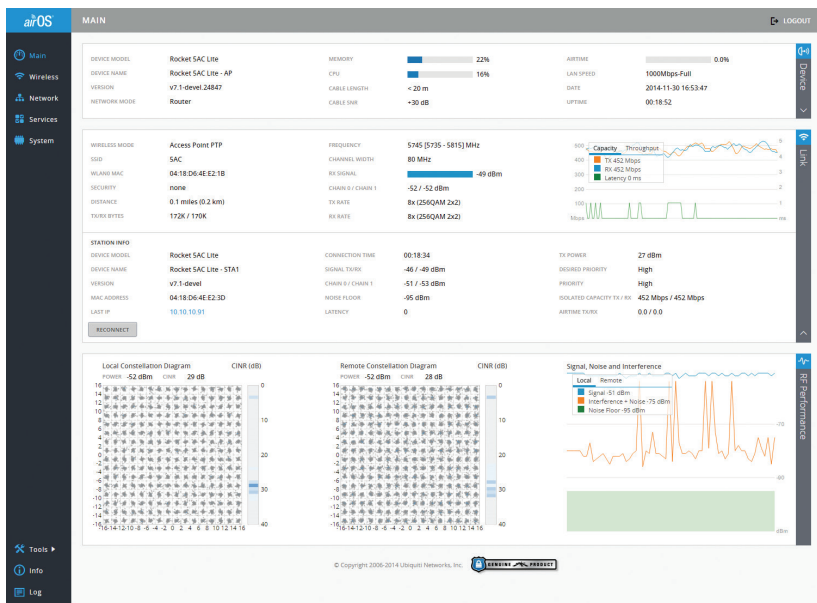
## Powerful Wireless Features

- airMAX ac Protocol Support
- Long-Range PtP Link Mode
- Selectable Channel Width
  - PtP: 10/20/30/40/50/60/80 MHz
  - PtMP: 10/20/30/40 MHz
- Automatic Channel Selection
- TX Power Control: Auto/Manual
- Automatic Distance Selection (ACK Timing)
- Strongest WPA2 Security

## Usability Enhancements

- Dynamic Configuration Changes<sup>2</sup>
- Instant Input Validation
- HTML5 Technology
- Optimization for Mobile Devices
- Detailed Device Statistics
- Diagnostic Tools, including Ethernet Cabling Test, RF Diagnostics, and airView® Spectrum Analyzer

<sup>2</sup> airControl™ does not work with airMAX ac products.



## Advanced RF Analytics

airMAX ac devices feature a multi-radio architecture to power a revolutionary RF analytics engine.

An independent processor on the PCBA powers a second, dedicated radio, which persistently analyzes the full 5 GHz spectrum and every received symbol to provide you with the most advanced RF analytics in the industry.

Data from the spectrum analysis and RF performance monitoring is displayed on the *Main* tab and airView Spectrum Analyzer.

## Real-Time Reporting

The *Main* tab displays the following RF information:

- Persistent RF Error Vector Magnitude (EVM) constellation diagrams
- Carrier to Interference-plus-Noise Ratio (CINR) histograms
- Signal-to-Noise Ratio (SNR) time series plots

## Spectral Analysis

airView allows you to identify noise signatures and plan your networks to minimize noise interference. airView performs the following functions:

- Constantly monitors environmental noise
- Collects energy data points in real-time spectral views
- Helps optimize channel selection, network design, and wireless performance

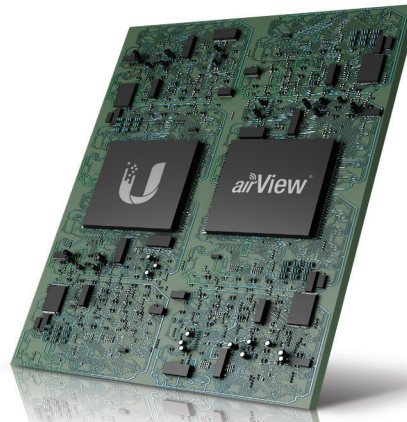
airView runs in the background without disabling the wireless link, so there is no disruption to the network.

In airView, there are three spectral views, each of which represents different data.

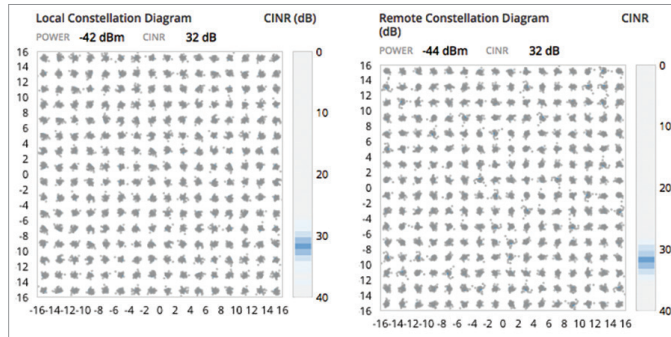
- **Waterfall** Aggregate energy collected for each frequency
- **Waveform** Aggregate energy collected
- **Ambient Noise Level** Background noise energy shown as a function of frequency

Available with a firmware upgrade to airOS v7.1, airView provides powerful spectrum analyzer functionality, eliminating the need to rent or purchase additional equipment for conducting site surveys.

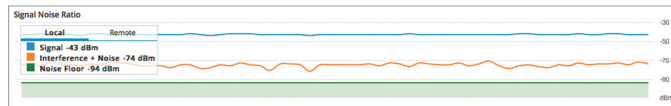
## Multi-Radio Architecture



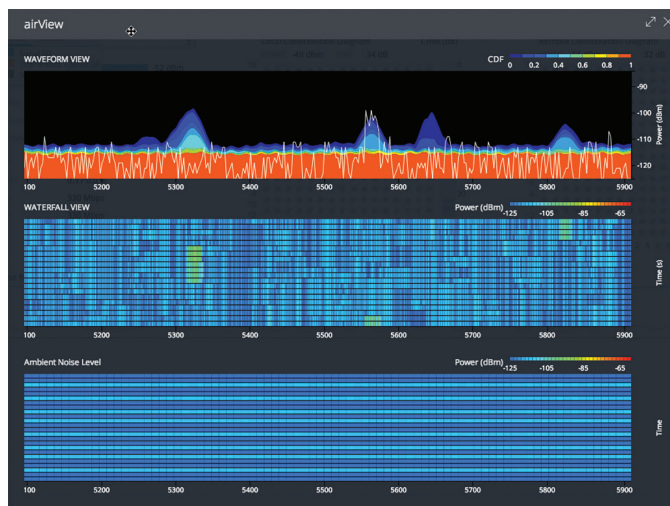
## Constellation Diagrams and CINR Histograms



## SNR Time Series Plots



## Dedicated Spectral Analysis





# Technology

## airMAX® ac

Unlike standard Wi-Fi protocol, Ubiquiti's Time Division Multiple Access (TDMA) airMAX ac protocol allows each client to send and receive data using pre-designated time slots scheduled by an intelligent AP controller.

This time slot method eliminates hidden node collisions and maximizes airtime efficiency, so airMAX ac technology provides performance improvements in latency, noise immunity, scalability, and throughput compared to other outdoor systems in its class.

**Intelligent QoS** Priority assigned to voice/video for seamless streaming.

**Scalability** High capacity and scalability.

**Long Distance** Capable of high-speed, carrier-class links.

### Superior Performance

The next-generation airMAX ac technology boosts the advantages of our proprietary TDMA protocol.

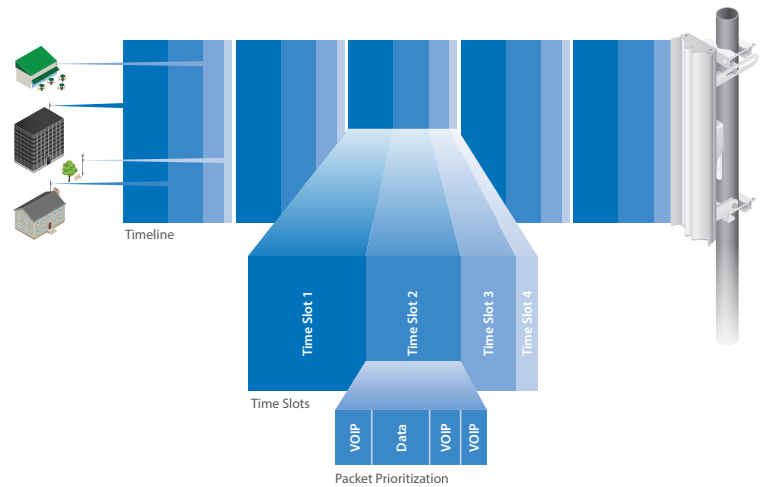
Ubiquiti's airMAX engine with custom IC dramatically improves TDMA latency and network scalability. The custom silicon provides hardware acceleration capabilities to the airMAX scheduler, to support the high data rates and dense modulation used in airMAX ac technology.

### Throughput Breakthrough

airMAX ac supports high data rates, which require dense modulation: 256QAM – a significant increase from 64QAM, which is used in airMAX.

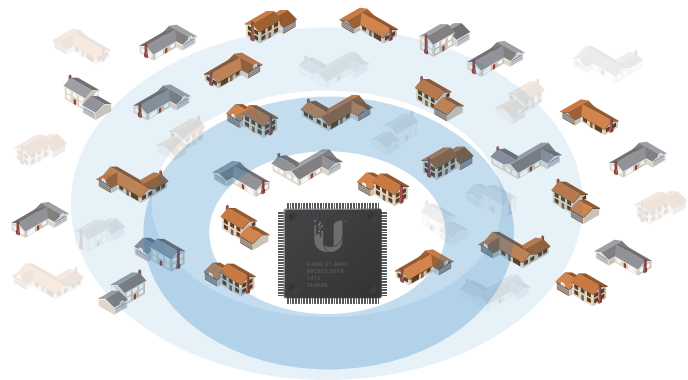
With their use of proprietary airMAX ac technology, airMAX ac products supports up to 450+ Mbps real TCP/IP throughput – up to triple the throughput of standard airMAX products.

## airMAX ac TDMA Technology

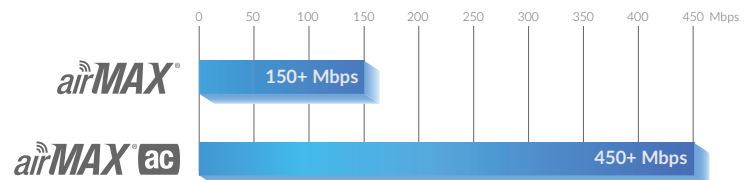


Up to 100 airMAX ac stations can be connected to an airMAX ac Sector; four airMAX ac stations are shown to illustrate the general concept.

## airMAX ac Network Scalability



## Superior Throughput Performance





To enhance airMAX ac performance, Ubiquiti Networks introduces our patented airPrism™ technology, which is featured on the Rocket ac model, R5AC-PTP.

### Improves SNR

High data rates require a high Signal-to-Noise Ratio (SNR), which is challenging to achieve, especially in noisy, high-density areas.

Integrated into Ubiquiti's custom silicon, airPrism technology creates a high SNR by isolating signals within the operating channel and rejecting interference using specialized circuitry, the High-Selectivity Receiver (HSR).

### Removes Interference

Depending on the product model and operating mode, available channel widths may include 10, 20, 30, 40, 50, 60, and/or 80 MHz.

Theoretically APs operate on different channels; however, because of the wider channel bandwidths, there can be overlap in spectrum usage.

airPrism technology removes up to an additional 30+ dB of adjacent channel interference through the active filtering design, so an airMAX ac AP with airPrism technology can provide significantly greater performance than a typical AP.

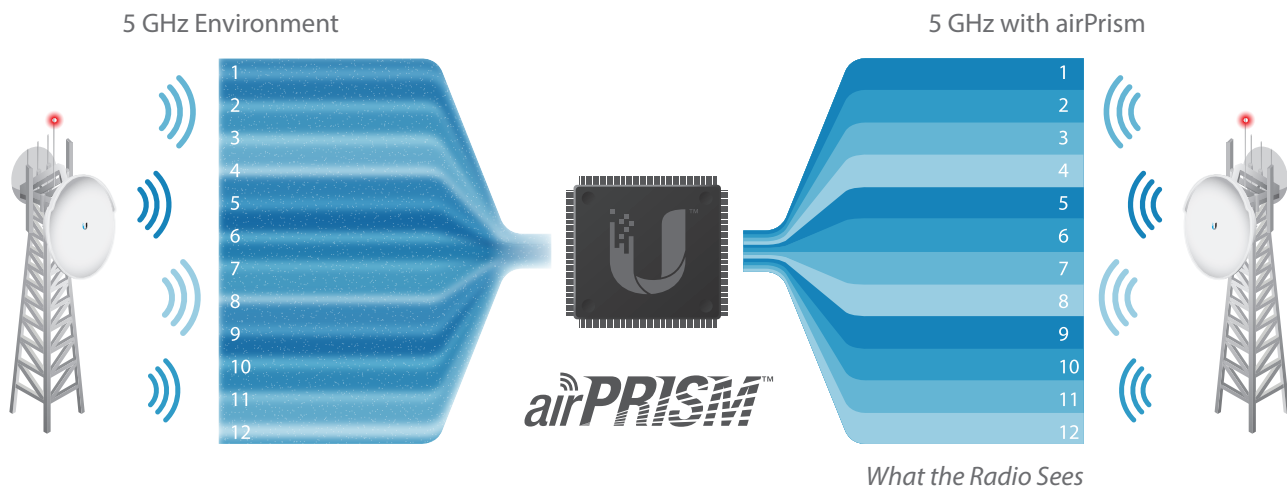
### Facilitates AP Co-Location

Co-location is vital in many scenarios. For example, a WISP may have limited tower space, so it must co-locate all APs within that allotted footprint. Shielding and other means can lessen interference but may be impractical.

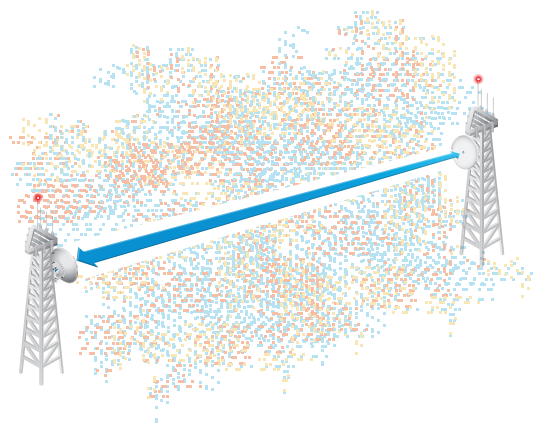
By deploying airMAX ac APs with airPrism technology, you can co-locate APs and enhance the overall performance of your wireless network.

Number of APs	Channel Width
4	80 MHz
8	40 MHz
16	20 MHz

### Active Radio Frequency Filtering



### Improved Latency and Noise Immunity



# Models



## Features

**5 GHz Frequency Band** The 5 GHz radio band is free to use, worldwide, offers plentiful spectrum, and works well for long-distance links.

**Passive Power over Ethernet (PoE)** Includes 24V Passive PoE functionality, which allows both power and data to be carried over a single Ethernet cable to the device.

**Gigabit Ethernet** The Rocket ac provides a Gigabit Ethernet connection to deliver high throughput.

**Plug and Play Integration** Every airMAX antenna has a built-in Rocket mount, so no tools are needed to install the Rocket ac. (airMAX ac antennas are recommended for optimal performance.)



## Rocket5ac Lite

Launched with PtP functionality, the Rocket5ac Lite adds PtMP functionality with a firmware upgrade to airOS v7.1 or higher.

## Rocket5ac PtP

Featuring Ubiquiti’s innovative airPrism technology, the Rocket5ac PtP is ideal for PtP links in noisy, high-density environments.

### Model Comparison Chart

		
	Rocket5ac Lite	Rocket5ac PTP
Model Number	R5AC-Lite	R5AC-PTP
Frequency	5 GHz	5 GHz
airMAX ac Technology	✓	✓
airPrism Technology		✓
Point-to-Point Functionality	✓	✓
Point-to-MultiPoint Functionality	✓*	
Gigabit Ethernet	✓	✓
Ubiquiti PoE	✓	✓
Output Power	27 dBm	27 dBm

\* Requires firmware airOS v7.1 or higher.

# Specifications

R5AC-Lite Physical / Electrical / Environmental Information	
Dimensions	162 x 84 x 37 mm (6.38 x 3.31 x 1.46")
Weight	250 g (8.81 oz)
Enclosure Characteristics	Outdoor UV Stabilized Plastic
Processor	Atheros MIPS 74Kc, 720 MHz
Memory	128 MB DDR2 SDRAM, 16 MB NOR FLASH
Networking Interface	(1) 10/100/1000 Mbps
RF Connections	(2) RP-SMA (Waterproof)
LEDs	Power, Ethernet, (4) Signal Strength
Max. Power Consumption	8.5W
Power Supply	24V, 0.5A Gigabit PoE Adapter
Power Method	Passive PoE (Pairs 4, 5+; 7, 8 Return)
ESD/EMP Protection	± 24KV Air / Contact
Operating Temperature	-40 to 80° C (-40 to 176° F)
Operating Humidity	5 to 95% Noncondensing
Shock and Vibration	ETSI300-019-1.4

R5AC-Lite Software Information	
Modes	Access Point, Station
Services	Web Server, SNMP, SSH Server, Telnet , Ping Watchdog, DHCP, NAT, Bridging, Routing
Utilities	Antenna Alignment Tool, Discovery Utility, Site Survey, Ping, Traceroute, Speed Test
Distance Adjustment	Dynamic Ack and Ackless Mode
Power Adjustment	Software Adjustable UI or CLI
Security	WPA2 AES Only
QoS	Supports Packet Level Classification WMM and User Customer Level: High/Medium/Low
Statistical Reporting	Up Time, Packet Errors, Data Rates, Wireless Distance, Ethernet Link Rate
Channel Sizes	
PtP Mode	10/20/30/40/50/60/80 MHz
PtMP Mode	10/20/30/40 MHz
Other	Remote Reset Support, Software Enabled/Disabled, VLAN Support, 256QAM,
Ubiquiti Specific Features	30/50/60 MHz Channels, airMAX ac Mode, Traffic Shaping with Burst Support, Discovery Protocol, Frequency Band Offset, Ackless Mode

R5AC-Lite Compliance	
Wireless Approvals	FCC, IC, CE
RoHS Compliance	Yes

R5AC-Lite Operating Frequency							
Operating Frequency				Worldwide: 5150 - 5875 MHz USA: 5725 - 5850 MHz			
Output Power				27 dBm			
TX Power Specifications				RX Power Specifications			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (1/2)	27 dBm	± 2 dB	airMAX ac	1x BPSK (1/2)	-96 dBm	± 2 dB
	2x QPSK (1/2)	27 dBm	± 2 dB		2x QPSK (1/2)	-95 dBm	± 2 dB
	2x QPSK (3/4)	27 dBm	± 2 dB		2x QPSK (3/4)	-92 dBm	± 2 dB
	4x 16QAM (1/2)	27 dBm	± 2 dB		4x 16QAM (1/2)	-90 dBm	± 2 dB
	4x 16QAM (3/4)	27 dBm	± 2 dB		4x 16QAM (3/4)	-86 dBm	± 2 dB
	6x 64QAM (2/3)	27 dBm	± 2 dB		6x 64QAM (2/3)	-83 dBm	± 2 dB
	6x 64QAM (3/4)	26 dBm	± 2 dB		6x 64QAM (3/4)	-77 dBm	± 2 dB
	6x 64QAM (5/6)	25 dBm	± 2 dB		6x 64QAM (5/6)	-74 dBm	± 2 dB
	8x 256QAM (3/4)	23 dBm	± 2 dB		8x 256QAM (3/4)	-69 dBm	± 2 dB
	8x 256QAM (5/6)	22 dBm	± 2 dB		8x 256QAM (5/6)	-65 dBm	± 2 dB





# Specifications

R5AC-PTP Physical / Electrical / Environmental Information	
Dimensions	198.5 x 86.4 x 44.1 mm (7.82 x 3.40 x 1.74")
Weight	295 g (10.41 oz)
Enclosure Characteristics	Outdoor UV Stabilized Plastic
Processor	Atheros MIPS 74Kc, 720 MHz
Memory	128 MB DDR2 SDRAM, 16 MB NOR FLASH
Networking Interface	(1) 10/100/1000 Mbps
RF Connections	(2) RP-SMA (Waterproof)
LEDs	Power, Ethernet, (4) Signal Strength
Max. Power Consumption	8.5W
Power Supply	24V, 0.5A Gigabit PoE Adapter
Power Method	Passive PoE (Pairs 4, 5+; 7, 8 Return)
ESD/EMP Protection	± 24KV Air / Contact
Operating Temperature	-40 to 80° C (-40 to 176° F)
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Channel Sizes (PtP Mode)	10/20/30/40/50/60/80 MHz
Other	Remote Reset Support, Software Enabled/Disabled, VLAN Support, 256QAM,
Ubiquiti Specific Features	30/50/60 MHz Channels, airMAX ac Mode, Traffic Shaping with Burst Support, Discovery Protocol, Frequency Band Offset, Ackless Mode

R5AC-PTP Compliance	
Wireless Approvals	FCC, IC, CE
RoHS Compliance	Yes

R5AC-PTP Operating Frequency							
Operating Frequency				Worldwide: 5470 - 5875 MHz USA: 5725 - 5850 MHz			
Output Power				27 dBm			
TX Power Specifications				RX Power Specifications			
Modulation	Data Rate	Avg. TX	Tolerance	Modulation	Data Rate	Sensitivity	Tolerance
airMAX ac	1x BPSK (1/2)	27 dBm	± 2 dB	airMAX ac	1x BPSK (1/2)	-96 dBm	± 2 dB
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	2x QPSK (3/4)	27 dBm	± 2 dB		2x QPSK (3/4)	-92 dBm	± 2 dB
	4x 16QAM (1/2)	27 dBm	± 2 dB		4x 16QAM (1/2)	-90 dBm	± 2 dB
	4x 16QAM (3/4)	27 dBm	± 2 dB		4x 16QAM (3/4)	-86 dBm	± 2 dB
	6x 64QAM (2/3)	27 dBm	± 2 dB		6x 64QAM (2/3)	-83 dBm	± 2 dB
	6x 64QAM (3/4)	26 dBm	± 2 dB		6x 64QAM (3/4)	-77 dBm	± 2 dB
	6x 64QAM (5/6)	25 dBm	± 2 dB		6x 64QAM (5/6)	-74 dBm	± 2 dB
	8x 256QAM (3/4)	23 dBm	± 2 dB		8x 256QAM (3/4)	-69 dBm	± 2 dB
	8x 256QAM (5/6)	22 dBm	± 2 dB		8x 256QAM (5/6)	-65 dBm	± 2 dB



# Plug and Play Integration

Rocket radios and airMAX antennas have been designed to seamlessly work together. Every airMAX antenna has a built-in Rocket mount, so installation requires no special tools.

## Antenna Compatibility

	Frequency Band	
	5 GHz	5 GHz
<b>Rocket5ac Lite</b>	<ul style="list-style-type: none"> <li>AM-5AC21-60</li> <li>AM-5AC22-45</li> <li>AM-V5G-Ti</li> <li>AM-M-V5G-Ti</li> <li>AM-5G16-120</li> <li>AM-5G17-90</li> <li>AM-5G19-120</li> <li>AM-5G20-90</li> </ul>	
<b>Rocket5ac PTP</b>		<ul style="list-style-type: none"> <li>RD-5G31-AC</li> <li>RD-5G30</li> <li>RD-5G34</li> </ul>

