# M510

Mobile Indoor 802.11ac Wave 2 Wi-Fi AP with LTE Backhaul

DATA SHEET

## BENEFITS

### MOBILE WI-FI

Superior performance, managed Wi-Fi without cable pulls using an LTE connection to support mobile hotspot requirements.

### CARRIER-GRADE MANAGEMENT

M510 with SmartZone brings in carrier-grade management features. MSPs can leverage physical or virtual SmartZone controller to manage all APs.

### ONBOARD GPS

GPS support location aware services for tracking the mobile unit.

### ENTERPRISE WI-FI COVERAGE

Provide an excellent user experience in any environment with patented BeamFlex+™ adaptive antenna technology and multiple directional antenna patterns.

### AUTOMATE OPTIMAL THROUGHPUT

ChannelFly™ dynamic channel technology uses machine learning to automatically find the least congested channels. You always get the highest throughput the band can support.

### SERVE MORE DEVICES

Connect more devices simultaneously with two MU-MIMO spatial streams and concurrent dual-band 2.4/5GHz radios while also enhancing non-Wave 2 device performance.

### MORE THAN WI-FI

Support services beyond Wi-Fi with Ruckus IoT Suite, Cloudpath security and onboarding software, SPoT Wi-Fi locationing engine, and SCI network analytics.

In a fiercely competitive marketplace, managed service providers (MSP) are looking for new ways to differentiate their services and open new revenue streams. One nascent market is the “mobile-wireless” segment where new opportunities to add branded Wi-Fi to mobile and semi-mobile public access context exist that complement LTE networks. But integrating into existing LTE networks with mobile Wi-Fi hotspot services has not been straightforward.

The Ruckus M510 mobile-wireless access point (AP) is an 802.11ac 2x2:2 Wave 2 Wi-Fi AP designed to leverage LTE networks as a backhaul and connect wirelessly back to any network without the need for an Ethernet cable connection.

Because of the wireless LTE backhaul capability, the M510 addresses multiple deployment scenarios not previously served, including mobile “in-vehicle” Wi-Fi (“mobile AP”), rapid Wi-Fi deployment for pop-up retail or first-responders and temporary Wi-Fi deployments at a construction site. M510’s LTE backhaul can serve as a failover or redundancy for the WAN connectivity. Additionally, the M510 satisfies an operator’s requirement to deliver branded Wi-Fi connectivity for mobile outdoor hotspots for transit hubs or isolated public locations where a wired connection is too expensive or impossible.

The M510 AP incorporates patented technologies found only in the Ruckus Wi-Fi portfolio.

- Extended coverage with patented BeamFlex+ utilizing multi-directional antenna patterns.
- Improve throughput with ChannelFly, which dynamically finds less congested Wi-Fi channels to use.

Additionally, using the M510’s integrated GPS, customers can automatically establish the exact location of each access point on a network or geographic map in real-time—greatly simplifying installation, tracking and maintenance.

Whether operators are deploying ten or ten thousand APs, the M510 is easy to manage through any SmartZone physical or virtual controller. MSPs can leverage the carrier-grade features of SmartZone such as resiliency and geo-redundancy.

## ACCESS POINT ANTENNA PATTERN

Ruckus' BeamFlex+ adaptive antennas allow the M510 AP to dynamically choose among a host of antenna patterns (up to 64 possible combinations) in real-time to establish the best possible connection with every device. This leads to:

- Better Wi-Fi coverage
- Reduced RF interference

Traditional omni-directional antennas, found in generic access points, oversaturate the environment by needlessly radiating RF signals in all directions. In contrast, the Ruckus BeamFlex+ adaptive antenna directs the radio signals per-device on a packet by-packet basis to optimize Wi-Fi coverage and capacity in real-time to support high device density environments. BeamFlex+ operates without the need for device feedback and hence can benefit even devices using legacy standards.

**Figure 1. Example of BeamFlex+ pattern**

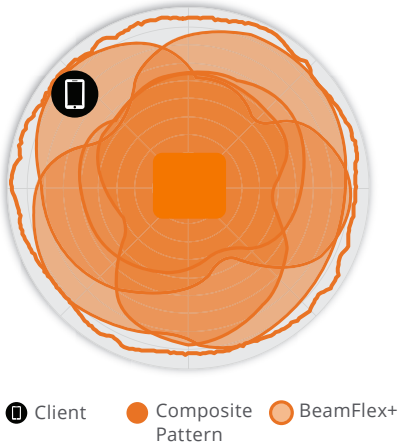



**Figure 2. M510 2.4GHz Azimuth Antenna Patterns**

**Figure 3. M510 5GHz Azimuth Antenna Patterns**

**Figure 4. M510 2.4GHz Elevation Antenna Patterns**

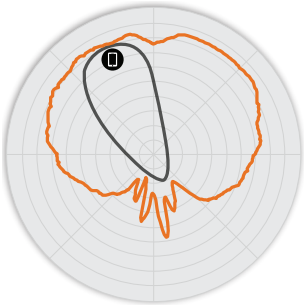
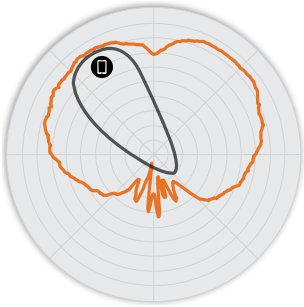


**Figure 5. M510 5GHz Elevation Antenna Patterns**



Note: The outer trace represents the composite RF footprint of all possible BeamFlex+ antenna patterns, while the inner trace represents one BeamFlex+ antenna pattern within the composite outer trace.

| WI-FI | |
|---|---|
| **Wi-Fi Standards** | • IEEE 802.11a/b/g/n/ac Wave 2 |
| **Supported Rates** | • 802.11ac: 6.5 to 867 (MCS0 to MCS9, NSS = 1 to 2 for VHT20/40/80)<br>• 802.11n: 6.5 Mbps to 300 Mbps (MCS0 to MCS15)<br>• 802.11a/g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps<br>• 802.11b: 11, 5.5, 2 and 1 Mbps |
| **Supported Channels** | • 2.4GHz: 1-13<br>• 5GHz: 36-64, 100-144, 149-165 |
| **MIMO** | • 2x2 SU-MIMO<br>• 2x2 MU-MIMO |
| **Spatial Streams** | • 2 SU-MIMO<br>• 2 MU-MIMO |
| **Channelization** | • 20, 40, 80MHz |
| **Security** | • WPA-PSK, WPA-TKIP, WPA2 AES, 802.11i, Dynamic PSK<br>• WIPS/WIDS |
| **Other Wi-Fi Features** | • WMM, Power Save, Tx Beamforming, LDPC, STBC, 802,11r/k/v<br>• Hotspot, Hotspot 2.0<br>• Captive Portal<br>• WISPr |

| WI-FI RADIO SPECIFICATIONS | |
|---|---|
| **Antenna Type** | • BeamFlex+ adaptive antennas with polarization diversity<br>• Adaptive antenna that provides up to 64 antenna patterns per band |
| **Antenna Gain (max)** | • 2.4GHz: 2 dBi<br>• 5GHz: 3 dBi |
| **Peak Transmit Power[1] (aggregate across MIMO chains)** | • 2.4GHz: 24 dBm<br>• 5GHz: 23 dBm |
| **Minimum Receive Sensitivity** | • -101dBm (2.4GHz)<br>• -95dBm (5GHz) |
| **Frequency Bands** | • ISM 2.4-2.484GHz<br>• U-NII-1 5.15-5.25GHz<br>• U-NII-2A 5.25-5.35GHz<br>• U-NII-2C 5.47-5.725GHz<br>• U-NII-3 5.725-5.85GHz |

[1] Max transmit power varies by country to operate in accordance with local regulation

| 2.4GHZ RECEIVE SENSITIVITY | | | |
|---|---|---|---|
| HT20 | | HT40 | |
| MCS0 | MCS7 | MCS0 | MCS7 |
| -95dBm | -77dBm | -92dBm | -74dBm |

| 5GHZ RECEIVE SENSITIVITY | | | | | |
|---|---|---|---|---|---|
| VHT20 | | VHT40 | | VHT80 | |
| MCS0 | MCS7 | MCS0 | MCS7 | MCS0 | MCS7 |
| -95 dBm | -77 dBm | -92 dBm | -74 dBm | -89 dBm | -71 dBm |

| 2.4GHZ TX POWER TARGET (DUAL CHAIN) | |
|---|---|
| Rate | Pout (dBm) |
| MCS0 HT20 | 24 |
| MCS7 HT20 | 21 |
| MCS0 HT40 | 23 |
| MCS7 HT40 | 21 |
| MCS8 VHT20 | 20 |
| MCS9 VHT40 | 19 |

| 5GHZ TX POWER TARGET (DUAL CHAIN) | |
|---|---|
| Rate | Pout (dBm) |
| MCS0 VHT20 | 23 |
| MCS0 VHT80 | 22 |
| MCS7 VHT40, VHT80 | 22 |
| MSC9 VHT40, VHT80 | 20 |

| WI-FI PERFORMANCE & CAPACITY | |
|---|---|
| **Physical Layer Rates** | • 2.4GHz: 300Mbps<br>• 5GHz: 867Mbps |
| **Client Capacity** | • Up to 512 clients per AP |
| **SSID** | • Up to 16 on 2.4GHz<br>• Up to 16 on 5GHz |

| GPS SPECIFICATIONS | |
|---|---|
| **GPS Radio** | • GNSS: GPS, GLONASS, BeiDou, Galileo |
| **Antenna Connector** | • SMA female |
| **Antenna (included with M510)** | • Magnetic mount, 2dBi active GPS antenna, 3m/10ft cable |

| 3G/4G RADIO SPECIFICATIONS | |
|---|---|
| **Physical Layer Rates** | **LTE:**<br>• LTE FDD: Max 150Mbps (DL)/Max 50Mbps (UL)<br>• LTE TDD: Max 130Mbps (DL)/Max 35Mbps (UL)<br>**UMTS:**<br>• DC-HSDPA: Max 42Mbps (DL)<br>• HSUPA: Max 5.76Mbps (UL)<br>• WCDMA: Max 384Kbps (DL)/Max 384Kbps (UL) |
| **Bands** | **USA (AT&T) SKU:**<br>• LTE FDD: B2/B4/B12<br>• WCDMA: B2/B4/B5<br>**Domain 1 SKU:**<br>• LTE FDD: B1/B3/B5/B7/B8/B20<br>• LTE TDD: B38/B40/B41<br>• WCDMA: B1/B5/B8<br>**Domain 2 SKU:**<br>• LTE FDD: B1/B2/B3/B4/B5/B7/B8/B28<br>• LTE TDD: B40<br>• WCDMA: B1/B2/B5/B8<br>**Japan SKU:**<br>• LTE FDD: B1/B3/B8/B18/B19/B26<br>• LTE TDD: B41<br>• WCDMA: B1/B6/B8/B19 |
| **Peak Transmit Power** | • 23dBm for LTE<br>• 24dBm for WCDMA |
| **Minimum Receive Sensitivity** | • < -99.5dBm for LTE<br>• < -110dBm for WCDMA |
| **Antenna connectors** | • 2x SMA female |
| **Antennas (included with M510)** | • 2x whip antennas, hinged, 700-2700MHz, peak gain 2dBi |
| **SIM Card** | • 2x SIM Card slots (primary & redundant), Micro-SIM size (3FF) |

# M510

## Mobile Indoor 802.11ac Wave 2 Wi-Fi AP with LTE Backhaul

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| RUCKUS RADIO MANAGEMENT | |
|---|---|
| **Antenna Optimization** | • BeamFlex+<br>• Polarization Diversity with Maximal Ratio Combining (PD-MRC) |
| **Wi-Fi Channel Management** | • ChannelFly<br>• Background Scan Based |
| **Client Density Management** | • Adaptive Band Balancing<br>• Client Load Balancing<br>• Airtime Fairness<br>• Airtime-based WLAN Prioritization |
| **SmartCast Quality of Service** | • QoS-based scheduling<br>• Directed Multicast<br>• L2/L3/L4 ACLs |
| **Mobility** | • SmartRoam |
| **Diagnostic Tools** | • Spectrum Analysis<br>• SpeedFlex |

| NETWORKING | |
|---|---|
| **Controller Platform Support** | • SmartZone<br>• Standalone |
| **Mesh** | • SmartMesh™ wireless meshing technology. Self-healing Mesh (in future release) |
| **IP** | • IPv4, IPv6 |
| **VLAN** | • 802.1Q (1 per BSSID or dynamic per use based on RADIUS<br>• VLAN Pooling<br>• Port-based |
| **802.1x** | • Authenticator & Supplicant |
| **Tunnel** | • L2TP, GRE, soft-GRE |
| **Gateway & Routing** | • NAT/DHCP |
| **Policy Management Tools** | • Application Recognition and Control<br>• Access Control Lists<br>• Device Fingerprinting<br>• Rate Limiting |

| PHYSICAL INTERFACES | |
|---|---|
| **Ethernet** | • 2 x 1GbE ports, RJ-45 |
| **USB** | • 1 USB 2.0 port, Type A connector |

| PHYSICAL CHARACTERISTICS | |
|---|---|
| **Physical Size** | • 17.2(L) x 16.7(W) x 4.2(H) cm<br>• 6.8 (L) x 6.6(W) x 1.6(H) in. |
| **Weight** | • 450g (15.9oz) |
| **Mounting** | • Wall, Drop ceiling, Desk (mounting hardware included)<br>• Vehicle (flange mounting bracket sold separately) |
| **Physical Security** | • Hidden latching mechanism<br>• Kensington lock |
| **Operating Temperature** | • -40°C (-40°F) to 65°C (149°F) |
| **Operating Humidity** | • Up to 95%, non-condensing |

| POWER[2] | |
|---|---|
| **Power Supply** | **Maximum Power Consumption** |
| **PoE+ (802.3at)** | • 18.738W |
| **12VDC Input – Barrel connector** | • 16.999W |
| **12VDC Input – Terminal block** | |

[2] Max power varies by country setting, band and MCS rate.

| CERTIFICATIONS & COMPLIANCE | |
|---|---|
| **Wi-Fi Alliance[3]** | • Wi-Fi CERTIFIED™ a, b, g, n, ac<br>• Passpoint®, Vantage, AMB, OCE |
| **Standards Compliance[4]** | • EN 60950-1 Safety<br>• EN 61000-4-2/3/5 Immunity<br>• EN 50155 Railway<br>• EN 50121-3-2 Railway EMC<br>• IEC 61373 Railway Shock & Vibration<br>• UL 2043 Plenum<br>• EN 62311 Human Safety/RF Exposure<br>• EN 62311<br>• WEEE & RoHS<br>• ISTA 2A Transportation<br>• E-Mark Automotive |
| **Mobile Radio Approvals** | • GCF, PTCRB, AT&T |

[3] Wi-Fi Alliance Certifications may be available subsequent to product release.

[4] For current certification status, please see price list.

| RELATED SOFTWARE AND SERVICES | |
|---|---|
| **Location Based Services** | • SPoT™ |
| **Network Analytics** | • SmartCell™ Insight (SCI) |
| **Security & Policy** | • Cloudpath |

| ORDERING INFORMATION | |
|---|---|
| **901-M510-ATT0** | • Ruckus M510, USA (AT&T) |
| **901-M510-D100** | • Ruckus M510, Domain 1<br>• (All Carriers in below countries)<br>• (India, Singapore, Malaysia, Philippines, Thailand, Vietnam, Hong Kong, Europe, Turkey) |
| **901-M510-D200** | • Ruckus M510, Domain 2<br>• (All Carriers in below countries)<br>• (Australia, New Zealand, Mexico, Brazil, Taiwan) |

| OPTIONAL ACCESSORIES | |
|---|---|
| **902-1122-0000** | • Accessory Flange Mounting Bracket for M510 |
| **902-0120-0000** | • Accessory Wall Mounting Bracket |
| **902-0173-XXYY** | • Power Adapter, AC/DC wall plug,100-240Vac 50/60Hz |
| **902-0162-XXYY** | • PoE injector |
| **902-0195-0000** | • T-bar ceiling mount kit for mounting to<br>• flush frame ceiling |

PLEASE NOTE: When ordering PoE injectors or power supplies, you must specify the destination region by indicating -US, -EU, -AU, -BR, -CN, -IN, -JP, -KR, -SA, -UK, or -UN instead of -XX.

Warranty: Sold with a limited lifetime warranty.

For details see: http://support.ruckuswireless.com/warranty.



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