E510

Embedded 802.11ac Outdoor Wave 2 Wi-FI AP with External BeamFlex+ Antennas

DATA SHEET

BENEFITS

DEPLOYMENT FLEXIBILITY
Separation of the antenna from the small radio component provides deployment flexibility that supports location constraints and aesthetic requirements.

GREAT OUTDOOR WI-FI
Deploy high-performance outdoor 802.11ac Wave 2 Wi-Fi in harshest of the outdoor environments with IP-67 weather proofing.

STUNNING WI-FI PERFORMANCE
Extends coverage with patented BeamFlex+™ adaptive antenna technology while mitigating interference by utilizing up to 64 directional antenna patterns.

MULTIPLE MANAGEMENT OPTIONS
Manage the E510 with physical or virtual appliances.

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.

The demand for public outdoor Wi-Fi continues to explode. Users expect great Wi-Fi experience whether at a stadium or on a train. In outdoor environments, designing an optimal wireless network without interfering with the aesthetics of the environment is a challenge for operators and service providers.

The Ruckus E510 802.11ac Wave 2 access point (AP) is designed with a unique, diminutive two element enclosure which separates the RF components from the antenna module. This approach provides placement flexibility for the antenna which is necessary when the AP must be placed inside a vehicle or metal-shielded environment. The E510 can be placed unobtrusively inside signage at a bus or train stations, and within a vending machine and display kiosk.

The E510 RF module with its small form-factor is designed to be installed in park benches, street furniture, on light poles or other aesthetically restrictive areas. The separate low-profile antenna module is placed in a nearby un-obtrusive location. Both modules are IP-67 and industrial temperature rated and can withstand the most challenging outdoor environments allowing operators and service providers to deploy Wi-Fi in previously unreachable environments.

The Ruckus E510 incorporates patented technologies found only in the Ruckus Wi-Fi portfolio.

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

Whether you're deploying ten or ten thousand APs, the E510 is easy to manage through Ruckus' physical and virtual appliance options.

Front and rear view of the E510 AP RF module

ACCESS POINT ANTENNA PATTERN

Ruckus' BeamFlex+ adaptive antennas allow the E510 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 omnidirectional 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.

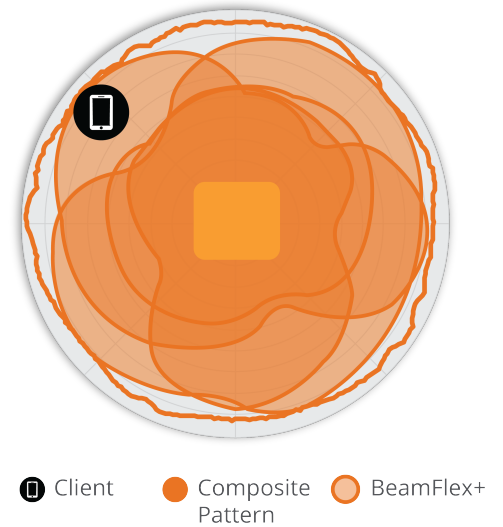**Figure 1. Example of BeamFlex+ pattern**

Client | Composite Pattern | BeamFlex+

Figure 2. E510 2.4GHz Azimuth Antenna Patterns

Figure 3. E510 5GHz Azimuth Antenna Patterns

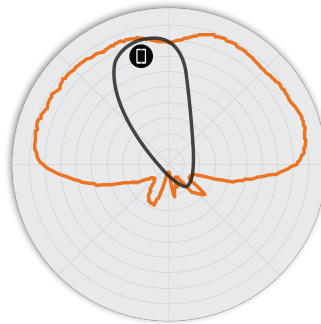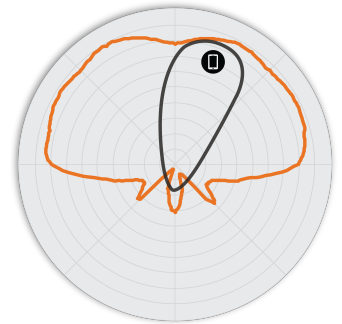**Figure 4. E510 2.4GHz Elevation Antenna Patterns**

Figure 5. E510 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 867Mbps (MCS0 to MCS9, NSS=1 to 2 for VHT20/40/80) • 802.11n: 6.5 Mbps to 300Mbps (MCS0 to MCS15) • 802.11a/g: 54, 48, 36, 24, 18, 12, 9, 6Mbps • 802.11b: 11, 5.5, 2 and 1 Mbps
Supported Channels	• 2.4GHz: 1-13 • 5GHz: 36-64, 100-144, 149-165
MIMO	• 2x2 SU-MIMO • 2x2 MU-MIMO
Spatial Streams	• 2 SU-MIMO • 2 MU-MIMO
Radio Chains and Streams	• 2x2:2
Channelization	• 20, 40, 80MHz
Security	• WPA-PSK, WPA-TKIP, WPA2 AES, 802.11i, Dynamic PSK • WIPS/WIDS
Other Wi-Fi Features	• WMM, Power Save, Tx Beamforming, LDPC, STBC, 802.11r/k/v • Hotspot, Hotspot 2.0 • Captive Portal • WISPr

RF

Antenna Type	• External BeamFlex+ adaptive antennas with polarization diversity • Adaptive antenna that provides upto 64 unique antenna patterns
Antenna Gain (max)	• Up to 3dBi
Peak Transmit Power (aggregate across MIMO chains)	• 2.4GHz: 22dBm • 5GHz: 22dBm
Minimum Receive Sensitivity[1]	• -101dBm
Frequency Bands	• ISM (2.4-2.484GHz) • U-NII-1 (5.15-5.25GHz) • U-NII-2A (5.25-5.35GHz) • U-NII-2C (5.47-5.725GHz) • U-NII-3 (5.725-5.85GHz)

2.4GHZ RECEIVE SENSITIVITY

HT20		VHT40	
MCS0	MCS7	MCS0	MCS7
-95	-76	-92	-75

5GHZ RECEIVE SENSITIVITY

VHT20		VHT40			VHT80		
MCS0	MCS7	MCS0	MCS7	MCS9	MCS0	MCS7	MCS9
-95	-77	-93	-74	-68	-90	-71	-65

2.4GHZ TX POWER TARGET

Rate	Pout (dBm)
MCS0 HT20	22
MCS7 HT20	17
MCS0 HT40	22
MCS7 HT40	17

5GHZ TX POWER TARGET

Rate	Pout (dBm)
MCS0 VHT20	22
MCS7 VHT20	18
MCS9 VHT20	16.5
MCS0 VHT40, VHT80	21
MCS7 VHT40, VHT80	20
MCS9 VHT40, VHT80	18

PERFORMANCE AND CAPACITY

Peak PHY Rates	• 2.4GHz: 300Mbps • 5GHz: 867Mbps
Client Capacity	• Up to 512 clients per AP
SSID	• Up to 31 per AP

RUCKUS RADIO MANAGEMENT

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

[1] Rx sensitivity varies by band, channel width and MCS rate.

NETWORKING

Controller Platform Support	• SmartZone (Physical and Virtual) • ZoneDirector • Standalone
Mesh	• SmartMesh™ wireless meshing technology. Self-healing Mesh
IP	• IPv4, IPv6
VLAN	• 802.1Q (1 per BSSID or dynamic per user based on RADIUS) • VLAN Pooling • Port-based
802.1x	• Authenticator & Supplicant
Tunnel	• L2TP, GRE, Soft-GRE
Policy Management Tools	• Application Recognition and Control • Access Control Lists • Device Fingerprinting • Rate Limiting
IoT Capable	• Yes

PHYSICAL INTERFACES

Ethernet	• 1 x 1GbE port, with M12 connector
USB	• 1 USB 2.0 port, Type A
Trusted Platform Module (TPM)	• HW capability for Secure Boot

PHYSICAL CHARACTERISTICS

	E510 (RF module)	E510 (antenna module)
Physical Size	• 21(L) x 14.2(W) x 3.3 (H) cm • 8.3(L) x 5.6(W) x 1.3(H) in.	• 17.5(L) x 8.0(W) x 8.0(H) cm • 6.9(L) x 3.15(W) x 3.15(H) in
Weight	• 900gm	• 310gm
Ingress Protection	• IP-67	• IP-67
Mounting	• Wall, Pole, Cabinet, DIN Rail and others • Pole Mount Diameter 1" to 2.5"	
Operating Temperature	• -40°C (-40°F) to 70°C (158°F)	
Operating Humidity	• Up to 95%, non-condensing	

POWER[2]

Power Supply	Max Power Consumption
802.3af (PoE)	• 12.35W
DC (12-48VDC)	• 13.88W

CERTIFICATIONS AND COMPLIANCE

Wi-Fi Alliance[3]	• Wi-Fi CERTIFIED™ a, b, g, n, ac • Passpoint®, Vantage
Standards Compliance[4]	• EN 60950-1 Safety • EN 60601-1-2 Medical • EN 61000-4-2/3/5 Immunity • EN 50121-1 Railway EMC • EN 50121-4 Railway Immunity • IEC 61373 Railway Shock & Vibration • UL 2043 Plenum • EN 62311 Human Safety/RF Exposure • WEEE & RoHS • ISTA 2A Transportation

RELATED SOFTWARE AND SERVICES

Location Based Services	• SPoT
Network Analytics	• SmartCell Insight (SCI)
Security and Policy	• Cloudpath

ORDERING INFORMATION

901-E510-XX01	• E510 Radio module
902-2101-0000	• E510 antenna module

See Ruckus price list for country-specific ordering information.
Warranty: Sold with a limited 1 year warranty.
For details see: http://support.ruckuswireless.com/warranty.

OPTIONAL ACCESSORIES

902-2000-0000	• Antenna Cable (60 cm length)
902-2001-0000	• Antenna Cable (150 cm length)
902-2002-0000	• Antenna Cable (300 cm length)
902-2004-0000	• Bracket for AP Module
902-2005-0000	• Bracket (Light) for Antenna Module
902-2006-0000	• Customized bracket for Stadium mounting
902-0162-XXYY	• PoE injector (24W) (Sold in quantities of 1, 10 or 100)

PLEASE NOTE:When ordering Outdoor APs, you must specify the destination region by indicating -US, -WW, or -Z2 instead of XX. 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.
For access points, -Z2 applies to the following countries: Algeria, Egypt, Israel, Morocco, Tunisia, and Vietnam.

[2] Max power varies by country setting, band, and MCS rate.
[3] For complete list of WFA certifications, please see Wi-Fi Alliance website.
[4] For current certification status, please see price list.

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