RUCKUS® R650

Indoor Wi-Fi 6 (802.11ax) 4x4:4 Wi-Fi Access Point with 2.5Gbps backhaul and 6 spatial streams

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Benefits

Stunning Wi-Fi performance
Mitigate interference and extend coverage with patented BeamFlex®+ adaptive antenna technology utilizing several directional antenna patterns.

Serve more devices
Connect more devices simultaneously with six MU-MIMO spatial streams and concurrent dual-band 2.4/5GHz radios while enhancing device performance.

Converged access point
Allow customers to eliminate siloed networks and unify WiFi and non-WiFi wireless technologies into one single network by using built-in BLE and Zigbee, and also expanding to any future wireless technologies.

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.

Multiple management options
Manage the R650 from the cloud, with on-premises physical/virtual appliances, or without a controller.

Better mesh networking
Reduce expensive cabling, and complex mesh configurations by checking a box with SmartMesh wireless meshing technology to dynamically create self-forming, self-healing mesh networks.

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.

Wi-Fi capacity requirements in office buildings, classrooms, and retail venues are rapidly raising due to increase in Wi-Fi connected devices, non-Wi-Fi IoT devices and bandwidth-hungry applications.

The RUCKUS® R650 access point (AP) with the latest Wi-Fi 6 (802.11 ax) technology delivers increased capacity, improved coverage and performance in dense environments. The R650 is our mid-range dual-band, dual-concurrent AP that supports six spatial streams (4x4:4 in 5GHz, 2x2:2 in 2.4GHz). The R650 supports peak data rates of up to 2974 Mbps and efficiently manages up to 512 clients connections. Furthermore, 2.5GbE Ethernet ensures the backhaul will not be a bottleneck for full use of available Wi-Fi capacity.

Also, wireless requirements within enterprises are expanding beyond Wi-Fi with BLE, Zigbee and many other non-Wi-Fi wireless technologies resulting in creation of network silos. Enterprises need a unified platform to eliminate network silos. The Ruckus AP portfolio is equipped to solve these challenges.

The R650 has built-in IoT radios with onboard BLE and Zigbee capabilities. In addition, the R650 is a converged access point that allows customers to seamlessly integrate any new wireless technologies with the pluggable IoT module.

The R650 is packed with ruckus patented technologies in addition to Wi-Fi 6 features such as OFDMA, MU-MIMO and TWT. The R650 is ideal for medium-density deployments such as office buildings, K-12 classrooms, libraries and retail venues.

The R650 Wi-Fi 6 AP incorporates patented technologies found only in the Ruckus Wi-Fi portfolio.

- **BeamFlex+ Antennas**: Extended coverage and optimized throughput with patented multi-directional antennas and radio patterns
- **ChannelFly**: Improved throughput with dynamically changing the channels to use least congested channel
- **Ruckus Ultra-High-Density Technology Suite**: Dramatically improved network performance with technologies such as Airtime Decongestion, Transient Client Management etc.

Whether you are deploying ten or ten thousand APs, the R650 is also easy to manage through Ruckus' physical and virtual management options.

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Front view

7.5in (19.4cm)

1.9in (4.7cm)

8.8in (22.4cm)

Weight: 1.88 lbs (0.854 kg)

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Access Point Antenna Pattern

Ruckus' BeamFlex+ adaptive antennas allow the R650 AP to dynamically choose among a host of antenna patterns 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
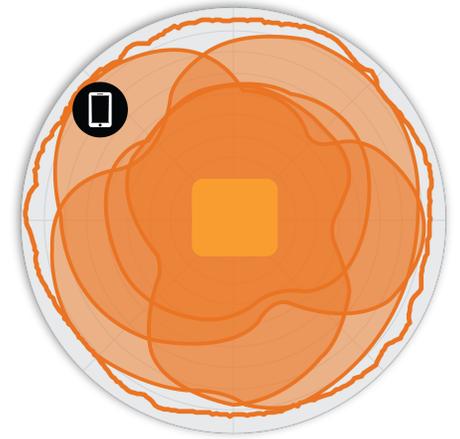
Client   Composite Pattern   BeamFlex+

Figure 2. R650 2.4GHz Azimuth Antenna Patterns

Figure 3. R650 5GHz Azimuth Antenna Patterns

Figure 4. R650 2.4GHz Elevation Antenna Patterns
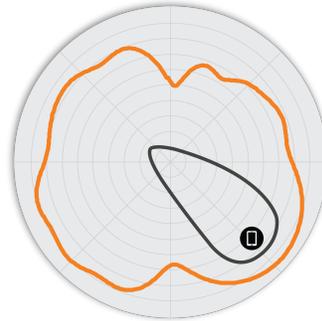
Figure 5. R650 5GHz Elevation Antenna Patterns
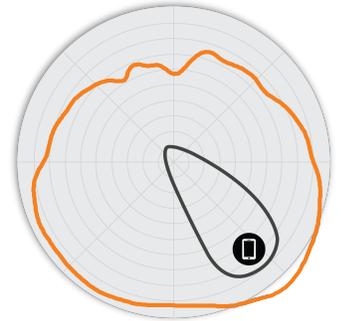
Note: The outer trace represents the composite RF footprint of all possible BeamFlex+ antenna patterns, while the inner trace represents one BeamFlex+ antenna pattern within the composite outer trace.

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WI-FI

Wi-Fi Standards	• IEEE 802.11a/b/g/n/ac/ax
Supported Rates	• 802.11ax: 4 to 2400 Mbps • 802.11ac: 6.5 to 1732 Mbps • 802.11n: 6.5 to 600 Mbps • 802.11a/g: 6 to 54 Mbps • 802.11b: 1 to 11 Mbps
Supported Channels	• 2.4GHz: 1-13 • 5GHz: 36-64, 100-144, 149-165
MIMO	• 4x4 SU-MIMO • 4x4 MU-MIMO
Spatial Streams	• 4 streams SU/MU MIMO 5GHz • 2 streams SU/MU MIMO 2.4GHz
Radio Chains and Streams	• 4x4:4 (5GHz) • 2x2:2 (2.4GHz)
Channelization	• 20, 40, 80, 160/80+80MHz
Security	• WPA-PSK, WPA-TKIP, WPA2 AES, WPA3, 802.11i, Dynamic PSK, OWE • 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	• BeamFlex+ adaptive antennas with polarization diversity • Adaptive antenna that provides unique antenna patterns per band
Antenna Gain (max)	• Up to 3dBi
Peak Transmit Power (Tx port/chain + Combining gain)	• 2.4GHz: 26dBm • 5GHz: 28 dBm
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 (dBm)

HT20		HT40		VHT20		VHT40	
MCS0	MCS7	MCS0	MCS7	MCS0	MCS7	MCS0	MCS7
-93	-75	-90	-72	-93	-75	-90	-72

HE 20				HE40			
MCS0	MCS7	MCS9	MCS11	MCS0	MCS7	MCS9	MCS11
-93	-75	-70	-64	-90	-72	-67	-61

5GHZ RECEIVE SENSITIVITY (dBm)

VHT20				VHT40				VHT80			
MCS0	MCS7	MCS8	MCS9	MCS0	MCS7	MCS8	MCS9	MCS0	MCS7	MCS8	MCS9
-98	-80	-77	-	-95	-77	-	-72	-92	-74	-	-69

HE20				HE40				HE80			
MCS0	MCS7	MCS9	MCS11	MCS0	MCS7	MCS9	MCS11	MCS0	MCS7	MCS9	MCS11
-98	-80	-75	-70	-95	-77	-72	-67	-92	-74	-69	-64

2.4GHZ TX POWER TARGET (PER CHAIN)

Rate	Pout (dBm)
MCS0 HT20	22
MCS7 HT20	19
MCS8 VHT20	18
MCS9 VHT40	17
MCS11 HE40	15

5GHZ TX POWER TARGET (PER CHAIN)

Rate	Pout (dBm)
MCS0, VHT20	22
MCS7, VHT40, VHT80	16.5
MCS9, VHT40, VHT80	15
MCS11, HE20, HE40, HE80	12.5

PERFORMANCE AND CAPACITY

Peak PHY Rates	• 2.4GHz: 574 Mbps • 5GHz: 2400 Mbps
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

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NETWORKING	
Controller Platform Support	• SmartZone • ZoneDirector • Standalone • Unleashed
Mesh	• SmartMesh™ wireless meshing technology. Self-healing Mesh
IP	• IPv4, IPv6, dual-stack
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 Capbale	• Yes

PHYSICAL INTERFACES	
Ethernet	• One 2.5Gbps Ethernet port and one 1Gbps Ethernet port • Power over Ethernet (802.3af/at) with Category 5/5e/6 cable • LLDP
USB	• 1 USB 2.0 port, Type A

PHYSICAL CHARACTERISTICS	
Physical Size	• 22.4cm (L), 19.4cm (W), 4.7cm (H) • 8.8in (L) x 7.6in (W) x 1.9in (H)
Weight	• 0.854 kg • 1.88 lbs
Mounting	• Wall, acoustic ceiling, desk • Secure bracket (sold separately)
Physical Security	• Hidden latching mechanism • T-bar Torx • Bracket (902-0120-0000) Torx screw & padlock (sold separately)
Operating Temperature	• 0°C (32°F) - 40°C (104°F)
Operating Humidity	• Up to 95%, non-condensing

POWER[1]		
Power Supply	**Operating Characteristics**	**Max Power Consumption**
802.3af PoE	• 2.4GHz radio: 2x2, 19dBm per chain • 5GHz radio: 2x4, 20dBm per chain • 2nd Ethernet port, onboard IoT & USB disabled	12.25W
802.3at PoE+	• Full Functionality • 2.4GHz radio: 2x2, 23 dBm per chain • 5GHz radio: 4x4, 22 dBm per chain • 2nd Ethernet Port, onboard IoT & USB Enabled (3W)	PoE+ : 21.59W DC Power: 21.46W

CERTIFICATIONS AND COMPLIANCE	
Wi-Fi Alliance[2]	• Wi-Fi CERTIFIED™ a, b, g, n, ac, ax • Passpoint®, Vantage
Standards Compliance[3]	• 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

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

ORDERING INFORMATION	
901-R650-XX00	• R650 dual-band (5GHz and 2.4GHz concurrent) 802.11ax wireless access point, 4x4:4 + 2x2:2 streams, adaptive antennas, dual ports, onboard BLE and Zigbee, PoE support. Includes adjustable acoustic drop ceiling bracket. One Ethernet port is 2.5GbE. Does not include power adaptor.

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

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

[2] For complete list of WFA certifications, please see Wi-Fi Alliance website.

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

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OPTIONAL ACCESSORIES	
902-0180-XX00	• PoE Injector (60W)
902-1170-XX00	• Power Supply (48V, 0.75A, 36W)
902-0120-0000	• Spare, Accessory Mounting Bracket
902-0195-0000	• Spare, T-bar ceiling mount kit for mounting to flush frame ceiling

PLEASE NOTE: When ordering Indoor 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.

CommScope pushes the boundaries of communications technology with game-changing ideas and ground-breaking discoveries that spark profound human achievement. We collaborate with our customers and partners to design, create and build the world's most advanced networks. It is our passion and commitment to identify the next opportunity and realize a better tomorrow. Discover more at commscope.com

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