

Dodatok č. 1

K zmluve na dodanie tovaru a s tým súvisiacich služieb zo dňa 22.03.2021
(ďalej len „dodatok č. 1“)

Článok I. Zmluvné strany

Objednávateľ:

sídlo:

V zastúpení:

IČO:

DIČ:

Bank. spojenie:

IBAN:

SWIFT/BIC:

(ďalej aj ako „objednávateľ“)

Obec Maňa

Nám. M. R. Štefánika 7/1

941 45 Maňa

Ing. Igor Sádovský, Starosta obce

00309061

2021059403

Prima banka Slovensko, a.s.

SK56 5600 0000 0022 6977 9001

KOMASK2X

A

Zhotoviteľ

Sídlo:

Zapísaný v:

V zastúpení:

IČO:

DIČ:

SWIFT/BIC

IBAN

(ďalej len „objednávateľ“)

(spoločne tiež ako „zmluvné strany“)

HRAŠKA SYSTEMS, s.r.o.

Kmeťovo 320

941 62 Kmeťovo

Okresný súd: Nitra, Oddiel: Sro, vl. č. 36705/N

Mgr. Michal Hraška

47612142

2024003564

SUBASKBX

SK76 0200 0000 0032 3391 8051

Článok II. Preambula

Zmluvné strany sa v súlade s bodom 2. Článku IX Zmluvy na dodanie tovaru a s tým súvisiacich služieb zo dňa 29.01.2021, ktorej predmetom je: **Budovanie bezplatnej Wifi siete v obci Maňa** (ďalej len „Zmluva“) dohodli na tomto dodatku č.1 k Zmluve.

Článok III. Predmet dodatku č.1

1. Predmetom dodatku je zmena a doplnenie prílohy č. 1 zmluvy a zmena prílohy č. 3. K zmene prílohy č. 3 dochádza z dôvodu ukončenia garancie záruky na 60 mesiacov zo strany výrobcu Wifi routre pre typ výrobku zn. ZonerFlex T300 a ZonerFlex R610. Nové prístupové body(wifi routre) zn. ZonerFlex T310(Outdoor) a ZonerFlex R750(Indoor) spĺňajú rovnaké technické parametre ako pôvodne navrhované Wifi routre zn. ZonerFlex T300 a ZonerFlex R610. Uvedená zmena nemá vplyv na cenu.
2. V čl. I. *Predmet zmluvy*, ods. 1., sa druhá veta, ktorá znie:

Pôvodné znenie:

„K pokrytiu verejných priestranstiev WIFI pripojením bude dodanie tovarov - 3ks interných ZonerFlex R610 a 7ks externých ZonerFlex T300 prístupových bodov zahrňujúcich potrebné

nevyhnutné príslušenstvo s inštaláciou a montážou WIFI siete a s napojením na miestnu sieť“.

Mení sa nasledovne:

„K pokrytiu verejných priestranstiev WIFI pripojením bude dodanie tovarov - 3ks interných ZonerFlex R750 a 7ks externých ZonerFlex T310 prístupových bodov zahrňujúcich potrebné nevyhnutné príslušenstvo s inštaláciou a montážou WIFI siete a s napojením na miestnu sieť“.

3. V čl. V. Práva a povinnosti zmluvných strán, bod. 3, prvá veta, ktorá znie:

Pôvodné znenie:

„Dodávateľ na montáž a tovary poskytuje záruku v dĺžke 24 mesiacov, na tovary 3ks interných ZonerFlex R610 a 7ks externých ZonerFlex T300 poskytuje záruku v dĺžke 60 mesiacov pričom záruka začína plynúť od ukončenia diela v zmysle tejto zmluvy“.

Mení sa nasledovne:

„Dodávateľ na montáž a tovary poskytuje záruku v dĺžke 24 mesiacov, na tovary 3ks interných ZonerFlex R750 a 7ks externých ZonerFlex T310 poskytuje záruku v dĺžke 60 mesiacov pričom záruka začína plynúť od ukončenia diela v zmysle tejto zmluvy“.

4. Príloha č. 1 zmluvy: Test splnenia technických parametrov v rámci projektu Wifi pre Teba sa mení a dopĺňa tak, ako je to uvedené v prílohe č. 1 tohto dodatku č. 1.
5. Príloha č. 3 zmluvy: Datasheet sa mení a dopĺňa tak, ako je to uvedené v prílohe č. 2 tohto dodatku č. 1.

IV.

Záverečné ustanovenia dodatku č. 1

1. Ustanovenia Zmluvy, ktoré neboli dotknuté týmto dodatkom č. 1 zostávajú platné a účinné v pôvodnom, nezmenenom znení.
2. Tento dodatok č. 1 nadobúda platnosť dňom jeho podpisu oprávnenými zástupcami oboch zmluvných strán a účinnosť v zmysle § 47a Občianskeho zákonníka v platnom znení dňom nasledujúcim po dni jeho zverejnenia, nie však skôr, ako doručením kladnej správy o schválení uzatvorenia tohto dodatku.
3. Tento dodatok č.1 je vyhotovený v 2 rovnopisoch, z ktorých každá strana obdrží 1 rovnopis.
4. Tento dodatok č.1 tvorí neoddeliteľnú súčasť Zmluvy a jej ustanovenia sa budú vykladať mutatis mutandis vo vzťahu k tomuto Dodatku č. 1.
5. Neoddeliteľnú prílohou tohto dodatku tvoria nasledovné:
Príloha č. 1: Test splnenia technických parametrov v rámci projektu Wifi pre Teba
Príloha č. 2: Datasheet
6. Zmluvné strany vyhlasujú, že si tento dodatok č. 1 pred jeho podpisom prečítali, rozumejú jeho obsahu, že bol uzavretý slobodne, vážne a určite a na znak súhlasu s jeho obsahom ho vlastnoručne podpisujú.

V Maňa, dňa 11.8. 2022.
Za objednávateľa:

Ing. Igor Šádovský
starosta obce



V Kmeťove, dňa 11.8. 2022.

Za dodávateľa: HRAŠKA SYSTEMS, s.r.o.



941 62 Kmeťovo 320
IČO: 471 941 62
tel: +421 941 62 320
www.hraska-systems.sk
info@hraska-systems.sk

Mgr. Michal Hraška,
konateľ spoločnosti

Príloha č. 1

Test splnenia technických parametrov (TSTP) v rámci "Wifi pre Teba"

TSTP slúži pre žiadateľa ako podklad pre špecifikáciu riešenia spĺňajúcu minimálne technické parametre požadovaných výzvov.

Technické parametre riešenia sú navrhnuté v súlade so schválenou štúdiou uskutočniteľnosť <https://easys.finance.gov.sk/studia/detaile8c95df2d-700e-47ce-a1b0-4cbf3334b453?tab=documents> a musia spĺňať požiadavky Robustného, Spôhlivého a Bezpečného produktu, ktorý poskytne občanom bezplatný prístup na internet prostredníctvom Wifi pripojenia.

1. **Robustný:** definuje minimálne technické parametre Prístupového bodu (Access pointu), resp. ostatného HW vybavenia,
2. **Spôhlivý:** definuje minimálne podmienky pre poskytnutie kvalitného internetového pripojenia,
3. **Bezpečný:** definuje minimálne podmienky pre sieťovú a fyzickú bezpečnosť.

Upozornenie: výsledky tohto testu slúžia výlučne pre potreby žiadateľa a nie sú zárukou výsledku v procese schvaľovania žiadosti o NFP.

Otázka č.	Znenie otázky	Odkaz na relevantnú časť Technických oslov (žiadateľ uvedie predmetnú časť technických oslov, resp. iného relevantného zdroja zodpovedajúceho konkrétnemu parametru)	Odpoveď (po kliknutí na bunku vyberte jednu z možností)
1.	Kompaktné dvojpásmové Wifi zariadenia (2,4GHz - 5 GHz), ktoré sú certifikované pre európsky trh?	ZoneFlex T310: 3. strana, DUAL-BAND 802.11AC 2x2.2. ZoneFlex R750: 4. strana, Frequency Bands Indoor 802.11ac Wave 2 4x4.4	Áno
2.	Životný cyklus použitých produktov vyšší ako 5 rokov?	Životný cyklus min. 5 rokov	Áno
3.	Stredná doba medzi poruchami (MTBF) minimálne 5 rokov?	Stredná doba medzi poruchami min. 5 rokov	Áno
4.	Možnosť centrálného manažmentu pre riadenie, monitoring a konfiguráciu siete (single point of management)?	ZoneFlex T310: 4. strana, NETWORKING Controller Platform Support, ZoneFlex R750: 5. strana, NETWORKING Controller Platform	Áno
5.	Súlad s „802.11ac Wave 1, Institute of Electrical and Electronics Engineers“ (IEEE) štandardom?	ZoneFlex T310: 4. strana Other Wi-Fi Standards, ZoneFlex R750: 4. strana Other Wi-Fi Standards	Áno
6.	Podpora 802.11n IEEE štandardu?	ZoneFlex T310, R750: 5. strana, NETWORKING 802.11n	Áno
7.	Podpora 802.11r IEEE štandardu?	ZoneFlex T310: 4. strana Other Wi-Fi Standards, ZoneFlex R750: 4. strana Other Wi-Fi Standards	Áno
8.	Podpora 802.11k IEEE štandardu?	ZoneFlex T310: 4. strana Other Wi-Fi Standards, ZoneFlex R750: 4. strana Other Wi-Fi Standards	Áno
9.	Podpora 802.11v IEEE štandardu?	ZoneFlex T310: 4. strana Other Wi-Fi Standards, ZoneFlex R750: 4. strana Other Wi-Fi Standards	Áno
10.	Schopnosť AP obsluhovať naraz aspoň 50 rôznych užívateľov bez zníženia kvality služby?	ZoneFlex T310, R750: 4. strana PERFORMANCE AND CAPACITY Up to 512 clients per AP	Áno
11.	Minimálne 2x2 MIMO (multiple-input-multiple-output)?	ZoneFlex T310, R750: 4. strana Wi-Fi Radio Chassis and Stream	Áno
12.	Súlad s Hotspot 2.0 (Passpoint Wifi Alliance certification program)?	ZoneFlex T310: 4. strana Other Wi-Fi Standards, ZoneFlex R750: 4. strana Other Wi-Fi Standards	Áno
13.	Buďšesťou dodávky bude: projektová dokumentácia ktorá bude obsahovať sieťové zapojenie aktívnych prvkov siete s IP adresným plánom, Simuláciu pokrytia priestoru, Meranie skutočného pokrytia, technické listy aktívnych prvkov, funkčný popis a vyobrazenie obsahu hotspot portálu s umiestnením logom?	Buďšesťou dodávky bude: projektová dokumentácia ktorá bude obsahovať sieťové zapojenie aktívnych prvkov siete s IP adresným plánom, Simuláciu pokrytia priestoru, Meranie skutočného pokrytia, technické listy aktívnych prvkov, funkčný popis a vyobrazenie obsahu hotspot portálu s umiestnením logom.	Áno

Všetky otázky sú zodpovedané

Minimálne technické podmienky sú zadefinované.

Počet odpovedí "nie"	0
Počet nezodpovedaných otázok	0



HRAŠKA SYSTEMS, s.r.o.
 941 62 Kmeťovo 320
 IČO: 47612472 DIČ: 2024003564
 tel: +421 947 1471
 www.hraska.sk
 info@hraska.sk

RUCKUS® R750

Indoor Wi-Fi 6 (802.11ax) Access Point for Ultra-Dense Environments



Benefits

Connect more devices simultaneously

Improve device performance, by enabling more simultaneous device connections with built-in 8 spatial streams (4x4:4 in 5GHz, 4x4:4 in 2.4GHz), MU-MIMO and OFDMA technology.

High density performance

Provides exceptional end-user experience within large meeting halls, general enterprise spaces, and large classrooms with the RUCKUS Ultra-High-Density Technology Suite.

Converged Access Point

Allows 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 through the USB port.

Multigigabit access speeds

Optimized multi-gigabit Wi-Fi performance delivered using the built-in 2.5GbE port to connect to multigigabit switches.

Multiple management options

Manage the R750 with on premise physical/ virtual appliances and control auto-provisioning for faster deployment and seamless firmware upgrades.

Enhanced Security

Enhanced securityThe latest Wi-Fi security standard with WPA3 and receive enhanced protection from man-in-the-middle attacks in the most secure way.

More Than Wi-Fi

Support services beyond Wi-Fi with [RUCKUS IoT Suite](#), [Cloudpath](#) security and onboarding software, [SPoT](#) Wi-Fi locationing engine, and [SC](#) network analytics.

The RUCKUS® R750 is based on the latest Wi-Fi 6 standard and bridges the performance gap from 'gigabit' Wi-Fi to 'multi-gigabit' Wi-Fi in support of the insatiable demand for better and faster Wi-Fi. The R750 is the first Wi-Fi 6 AP to be certified by Wi-Fi Alliance as Wi-Fi CERTIFIED 6. As part of the Wi-Fi Alliance testbed, the R750 validates other devices for Wi-Fi CERTIFIED 6 interoperability.

The RUCKUS R750 is our high-end dual-band, dual-concurrent Wi-Fi 6 AP that supports 8 spatial streams (4x4:4 in 5GHz, 4x4:4 in 2.4GHz). The R750, with OFDMA and MU-MIMO capabilities, efficiently manages up to 1024 client connections with increased capacity, improved coverage and performance in ultra-high dense environments.

The R750, with OFDMA, TWT and MU-MIMO capabilities, efficiently manages up to 1024 client connections with increased capacity, improved coverage and performance in ultra-dense environments. Furthermore, multi-gigabit Ethernet ensures the backhaul is not 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. Enterprises need a unified platform to eliminate network silos. The RUCKUS AP portfolio is equipped to solve these challenges through wireless convergence.

The R750 has built-in IoT radios with onboard BLE and Zigbee capabilities. In addition, the R750 is a converged access point that allows customers to seamlessly integrate any new wireless technologies with our USB port.

The R750 addresses the increasing client demands in transit hubs, auditoriums, conference centers, and other high traffic indoor spaces. It is the perfect choice for data-intensive streaming multimedia applications like 4K video transmissions, while supporting latency sensitive voice and data applications with stringent quality-of-service requirements. The R750 is also easy to manage through RUCKUS physical and virtual cloud management options.

The R750 when paired with the RUCKUS Ultra-High-Density Technology Suite found only in the RUCKUS Wi-Fi portfolio, dramatically improves network performance through a combination of patented wireless innovations and learning algorithms that includes:

- **Airtime Decongestion:** Increases average network throughput in heavily congested environments
- **Transient Client management:** Reduces interference traffic from unconnected Wi-Fi devices
- **BeamFlex® + Antennas:** Extended coverage and optimized throughput with patented multi-directional antennas and radio patterns

Whether you are deploying ten or ten thousand APs, the R750 is also easy to manage through RUCKUS' physical and virtual management options.

RUCKUS® R750

Indoor Wi-Fi 6 (802.11ax) Access Point for Ultra-Dense Environments



Front View



RUCKUS® R750

Indoor Wi-Fi 6 (802.11ax) Access Point for Ultra-Dense Environments

Access Point Antenna Pattern

RUCKUS' BeamFlex+ adaptive antennas allow the R750 AP to dynamically choose among a host of antenna patterns (over 4,000 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

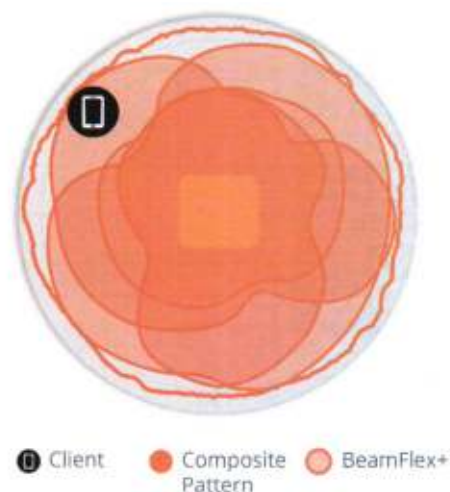


Figure 2. R750 2.4GHz AzimuthAntenna Patterns

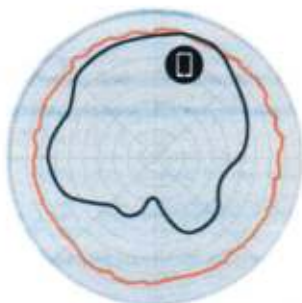


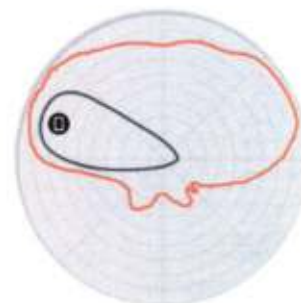
Figure 3. R750 5GHz AzimuthAntenna Patterns



Figure 4. R750 2.4GHz Elevation Antenna Patterns



Figure 5. R750 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.

RUCKUS® R750

Indoor Wi-Fi 6 (802.11ax) Access Point for Ultra-Dense Environments

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 for both SU-MIMO & MU-MIMO
Radio Chains and Streams	4x4:4
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 4,000+ 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
-96	-78	-93	-75	-96	-78	-93	-75
HE 20				HE40			
MCS0	MCS7	MCS9	MCS11	MCS0	MCS7	MCS9	MCS11
-96	-78	-73	-67	-93	-75	-70	-64

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	20
MCS7 HT20	16
MCS8 VHT20	15
MCS9 VHT40	14
MCS11 HE40	12

5GHz TX POWER TARGET (PER CHAIN)	
Rate	Pout (dBm)
MCS0, VHT20	22
MCS7, VHT40, VHT80	19
MCS9, VHT40, VHT80	17
MCS11, HE20, HE40, HE80	15

PERFORMANCE AND CAPACITY	
Peak PHY Rates	2.4GHz: 1148 Mbps 5GHz: 2400 Mbps
Client Capacity	Up to 1024 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

RUCKUS® R750

Indoor Wi-Fi 6 (802.11ax) Access Point for Ultra-Dense Environments

NETWORKING	
Controller Platform Support	- SmartZone - ZoneDirector - Unleashed¹ - Standalone - Cloud
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 Capable	Yes

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

PHYSICAL CHARACTERISTICS	
Physical Size	23.5cm (L), 20.6cm (W), 6.2cm (H) 9.3in (L) x 8.1in (W) x 2.4in (H)
Weight	1.01 kg 2.23 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) - 50°C (122°F)
Operating Humidity	Up to 95%, non-condensing

POWER ²		
Power Supply	Operating Characteristics	Max Power Consumption
802.3af PoE	2.4GHz radio: 2x4, 19dBm per chain 5GHz radio: 2x4, 20dBm per chain 2nd Ethernet port, onboard IoT & USB disabled	PoE: 12.54W
802.3at PoE+	- Full Functionality 2.4GHz radio: 4x4, 20 dBm per chain 5GHz radio: 4x4, 22 dBm per chain 2nd Ethernet Port, onboard IoT & USB Enabled (3W)	PoE+: 22.34W DC Power: 22.69W

CERTIFICATIONS AND COMPLIANCE	
Wi-Fi Alliance ³	- Wi-Fi CERTIFIED™ a, b, g, n, ac, ax - 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

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

ORDERING INFORMATION	
901-R750-XX00	R750 dual-band (5GHz and 2.4GHz concurrent) 802.11ax wireless access point, 4x4:4 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 Refer to Unleashed datasheets for SKU ordering information.

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.

RUCKUS® R750

Indoor Wi-Fi 6 (802.11ax) Access Point for Ultra-Dense Environments

OPTIONAL ACCESSORIES	
902-0180-XX00	• PoE Injector (60W)
902-1170-XX00	• Power Supply (48V, 0.75A, 36W)
902-1180-XX00	• Multigigabit PoE injector (2.5/5/10)-BaseT PoE port, 60W
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, -AJ, -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](https://www.commscope.com)

[commscope.com](https://www.commscope.com)

Visit our website or contact your local CommScope representative for more information.

© 2022 CommScope, Inc. All rights reserved.

All trademarks identified by "™" or "®" are trademarks or registered trademarks in the US and may be registered in other countries. All product names, trademarks and registered trademarks are property of their respective owners. This document is for planning purposes only and is not intended to modify or supplement any specifications or warranties relating to CommScope products or services.

PA-114022-4-EN (09/21)

RUCKUS®
COMMSCOPE

RUCKUS® T310

Outdoor 802.11ac Wave 2 2x2:2 Wi-Fi Access Point

COMMScope®
RUCKUS®



Benefits

SIMPLICITY

RUCKUS® Outdoor APs make Wi-Fi deployments extremely simple to deploy with one-touch technologies like SmartMesh™.

STUNNING WI-FI PERFORMANCE

Extends coverage with patented BeamFlex® + adaptive antenna technology while mitigating interference by utilizing up to 64 directional antenna patterns.

GREAT OUTDOOR WI-FI

Experience high performance outdoor 802.11ac Wave 2 Wi-Fi with IP-67 weather proofing.

MULTIPLE MANAGEMENT OPTIONS

Manage the T310 Series with physical or virtual controller appliances.

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.

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.

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.

Modern Wi-Fi device users expect reliable connectivity— anywhere, anytime. But in crowded outdoor venues with thousands of users and constant RF noise, they are often frustrated by poor coverage, dropped connections, and reduced data rates. These aggravating Wi-Fi experiences can easily translate to negative perceptions of the venue and the service provider, resulting in loss of business. The quality of the network experience becomes the "litmus test" for acceptance or rejection.

As the market leader in outdoor Wi-Fi deployments, RUCKUS® knows that one AP solution cannot meet every possible challenge of varied and complex outdoor requirements. This is why the RUCKUS T310 802.11ac Wave 2 series is designed with more variety than any other outdoor AP in the market today. Available with either internal omni-directional antennas or internal high-gain directional antenna models, the T310 Series uses patented RUCKUS antenna optimization and interference mitigation technologies to improve throughput, connection reliability, and deliver industry-leading 802.11ac Wave 2 performance to every connected client. At the same time, the T310 Series is designed for fast, simple installation with an ultra-lightweight, low profile, IP-67 rated enclosure that can stand up to the most challenging outdoor environments.

At RUCKUS, we know that outdoor AP deployments are especially challenging for installation and maintenance, which is why RUCKUS outdoor APs use a variety of technologies, like SmartMesh that help simplify outdoor AP deployment.

The RUCKUS T310 Series is perfect for high-density outdoor public venues such as airports, convention centers, plazas, malls, smart cities, and other dense urban environments. By providing a superior Wi-Fi experience to every user in high-density outdoor locations, venue operators can improve guest satisfaction and loyalty, deliver new kinds of wireless application services, and increase revenues.

The RUCKUS T310 Series 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.

Whether you're deploying ten or ten thousand APs, the T310 Series is easy to manage through RUCKUS' appliance and virtual management options.

RUCKUS® T310

Outdoor 802.11ac Wave 2 2x2:2 Wi-Fi Access Point

Access Point Antenna Pattern

RUCKUS' BeamFlex+ adaptive antennas allow the T310 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

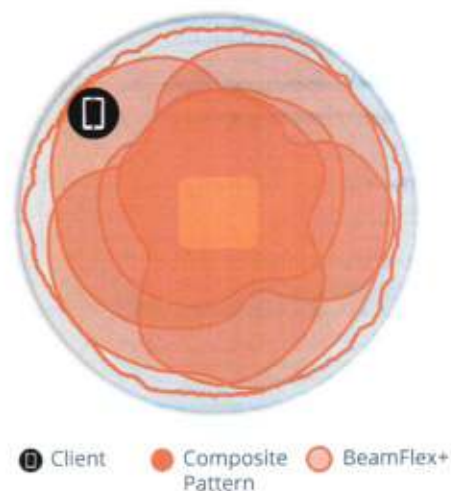


Figure 2. T310d 2.4GHz Azimuth Antenna Patterns



Figure 3. T310d 5GHz Azimuth Antenna Patterns

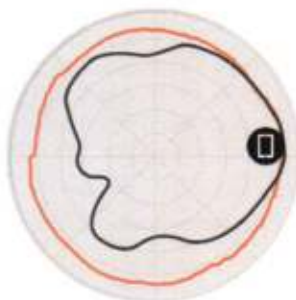
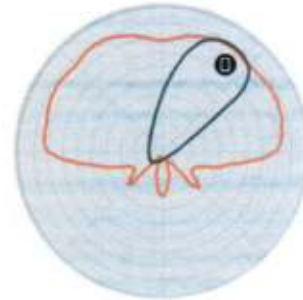


Figure 4. T310d 2.4GHz Elevation Antenna Patterns



Figure 5. T310d 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.

RUCKUS® T310

Outdoor 802.11ac Wave 2 2x2:2 Wi-Fi Access Point

Wi-Fi	
Wi-Fi Standards	IEEE 802.11a/b/g/n/ac Wave 2
Supported Rates	802.11ac: 6.5 to 867 Mbps (MCS0 to MCS9, NSS=1to2 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-Personal, WPA2-Enterprise, WPA3-Personal, WPA3-Enterprise, 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				
	T310c	T310d	T310s	T310n
Antenna Type	BeamFlex+ adaptive antennas with polarization diversity			
Antenna Gain (max)	Up to 3dBi		Up to 9dBi	Up to 13 dBi
Peak Transmit Power (aggregate across MIMO chains)	2.4GHz: 23dBm 5GHz: 24dBm		2.4GHz: 24dBm 5GHz: 21dBm	2.4GHz: 21dBm 5GHz: 17dBm
BeamFlex+ SINR Transmit Power Gain	Up to 6 dB			
BeamFlex+ SINR Receive Power Gain	Up to 4 dB			
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		HT40	
MCS0	MCS7	MCS0	MCS7
-95	-78	-92	-75

5GHz RECEIVE SENSITIVITY							
VHT20		VHT40		VHT80			
MCS0	MCS7	MCS0	MCS7	MCS9	MCS0	MCS7	MCS9
-96	-77	-93	-74	-69	-90	-71	-66

2.4GHz TX POWER TARGET	
Rate	Pout (dBm)
MCS0 HT20	23
MCS7 HT20	18
MCS0 HT40	22
MCS7 HT40	18

5GHz TX POWER TARGET	
Rate	Pout (dBm)
MCS0 VHT20	24
MCS7 VHT20	20
MCS9 VHT20	18
MCS0 VHT40, VHT80	23
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

* BeamFlex gains are statistical system level effects translated to enhanced SINR based on observations over time in real-world conditions with multiple APs and many clients.

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

RUCKUS® T310

Outdoor 802.11ac Wave 2 2x2:2 Wi-Fi Access Point

NETWORKING	
Controller Platform Support	- SmartZone - ZoneDirector - Unleashed - Cloud - Standalone
Mesh	SmartMesh™ wireless meshing technology. Self-healing Mesh
IP	IPv4, IPv6
VLAN	802.1Q (1 per BSSID or dynamic per use 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				
	T310c	T310d	T310s	T310n
Ethernet	1 x 1GbE port, RJ-45			
USB	—	1 USB 2.0 port, Type A		
DC Power	—	12V DC Terminal Block (8V - 20V)		

PHYSICAL CHARACTERISTICS				
	T310c	T310d	T310s	T310n
Physical Size	18.1(L) x 15.1(W) x 7.9 (H) cm		26(L) x 20.9(W) x 10.3(H) cm	
	7.1(L) x 5.9(W) x 3.1(H) in.		10.2(L) x 8.2(W) x 4.1(H) in.	
Weight	1kg (2.1lbs)		1.65kg (3.6lbs)	
Ingress Protection	IP-67			
Mounting	Wall, Drop ceiling, Desk			
	Pole Mount Diameter 1" to 2.5"			
Operating Temperature	-20°C (-4°F) to 65°C (149°F)		-40°C (-40°F) to 65°C (149°F)	
Operating Humidity	Up to 95%, non-condensing			
Wind Survivability	Up to 266km/h (165 mph)			

POWER ²				
	T310c	T310d	T310s	T310n
Power Supply	Max Power Consumption (includes USB power)			
802.3af/at (PoE)	7.92W	11.86W	11.86W	11.86W
DC	—	11.7W	12.11W	11.7W

CERTIFICATIONS AND COMPLIANCE	
Wi-Fi Alliance ³	- Wi-Fi CERTIFIED™ a, b, g, n, ac - Wi-Fi Enhanced Open™ - WPA2™ - Personal - WPA2™ - Enterprise - WPA3™ - Personal - WPA™ - Enterprise - Wi-Fi Agile Multiband™ - Wi-Fi Optimized Connectivity™ - Wi-Fi Vantage™ - WMM™ - Passpoint™
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 - LUL 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) - RUCKUS Analytics
Security and Policy	Cloudpath

MODEL FEATURE DIFFERENCES				
Model	Antenna	Low Temp	USB	DC Power
T310c	Omni	-20°C	N	N
T310d	Omni	-40°C	Y	Y
T310n	Narrow Sector (30°)	-40°C	Y	Y
T310s	Sector (120°)	-40°C	Y	Y

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.

RUCKUS® T310

Outdoor 802.11ac Wave 2 2x2:2 Wi-Fi Access Point

ORDERING INFORMATION

T310 OUTDOOR APS	
901-T310-XX20	T310c, omni, outdoor access point, 802.11ac Wave 2 2x2:2 internal BeamFlex+, dual band concurrent. One Ethernet port, PoE input. -20°C to 65°C Operating Temperature. Includes mounting bracket and one year warranty. Does not include PoE injector.
901-T310-XX40	T310d, omni, outdoor access point, 802.11ac Wave 2 2x2:2 internal BeamFlex+, dual band concurrent. One Ethernet port, PoE input, DC input and USB port. -40°C to 65°C Operating Temperature. Includes mounting bracket and one year warranty. Does not include PoE injector.
901-T310-XX51	T310s, 120x30 deg, Outdoor 802.11ac Wave 2 2x2:2, 120 degree sector, dual band concurrent access point. One Ethernet port, PoE input, DC input and USB port. -40°C to 65°C Operating Temperature. Includes adjustable mounting bracket and one year warranty. Does not include PoE injector.
901-T310-XX61	T310n, 30x30 deg, Outdoor 802.11ac 2x2:2 Wave 2, narrow beam, dual band concurrent access point. One Ethernet port, PoE input, DC input and USB port. -40°C to 65°C Operating Temperature. Includes adjustable mounting bracket and one year warranty. Does not include PoE injector.

See RUCKUS price list for country-specific ordering information. PLEASE NOTE: When ordering outdoor APs, you must specify the destination region by indicating -US, -WW, or -Z2 instead of XX. For access points, -Z2 applies to the following countries: Algeria, Egypt, Israel, Morocco, Tunisia, and Vietnam.

Warranty: Sold with a limited one year warranty.

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

OPTIONAL ACCESSORIES

902-0162-XXXX	• PoE injector (24W) (Sold in quantities of 1, 10 or 100)
902-0125-0000	• Secure articulating mounting bracket
902-0134-0000	• Outdoor AP mounting bracket (weatherized aluminum), 180-degree adjustment range in both azimuth and elevation. Mounting support for solid wall or ceiling, vertical or horizontal pole 1" to 4" in diameter using enclosed mounting hardware. Pole diameter greater than 4" can be supported with user-supplied clamps. For use with T310n and T310s.
902-0127-0000	• Extended cap to accommodate up to 6 cm long USB dongle
902-1121-0000	• Spare weatherizing cable gland with option of one hole or 2 hole connection

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.

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

COMMSCOPE®

commscope.com

Visit our website or contact your local CommScope representative for more information.

© 2020 CommScope, Inc. All rights reserved.

Unless otherwise noted, all trademarks identified by ® or ™ are registered trademarks, respectively, of CommScope, Inc. This document is for planning purposes only and is not intended to modify or supplement any specifications or warranties relating to CommScope products or services. CommScope is committed to the highest standards of business integrity and environmental sustainability with a number of CommScope's facilities across the globe certified in accordance with international standards, including ISO 9001, TL 9000, and ISO 14001.

Further information regarding CommScope's commitment can be found at www.commscope.com/AboutUs/Corporate-Responsibility-and-Sustainability.