Príloha č. 1 Príručky pre prijímateľa DOP Wifi pre Teba - príloha k ŽoP: Podrobný popis prístupového bodu (AP) s väzbou na finančné limity

Položka	Merná jednotka	Počet jednotiek	Jednotková cena (v EUR bez DPH)	Vysúťažená suma celkom (v EUR s DPH)	Limity podľa Príručky pre oprávnenosť výdavkov PO7 OPII pre dopytovo orientované projekty „Wifi pre Teba“ (max. suma za 1 AP v EUR s DPH)
Externý prístupový bod (AP) č. 1:	*(nevypĺňa sa)*			**15 000**	**1 500,00**
rozpísať všetky nákladové položky daného AP, ktoré sú uvedené na faktúre:	*(nevypĺňa sa)*				
Externý prístupový bod RUCKUS T310	Kus	10	1 250	15 000	*(nevypĺňa sa)*
Celkom				**15 000**	**15 000**

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

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

Technické parametre riešenia sú navrhnuté v súlade so schválenou Štúdiou uskutočniteľnosti https://metais.finance.gov.sk/studia/detail/8c95df2d-700e-47ce-a1b0-4cbf3334b453?tab=documents a musia spĺňať požiadavky Robustného, Spoľahlivého 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. **Spoľahlivý**: 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 listov (žiadateľ uvedie predmetnú časť technických listov, 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?		Áno
2.	Životný cyklus použitých produktov vyšší ako 5 rokov?		Áno
3.	Stredná doba medzi poruchami (MTBF) minimálne 5 rokov?		Áno
4.	Možnosť centrálneho manažmentu pre riadenie, monitoring a konfiguráciu siete (single point of management)?		Áno
5.	Súlad s „802.11ac Wave I, Institute of Electrical and Electronics Engineers" (IEEE) štandardom?		Áno
6.	Podpora 802.1x IEEE štandardu?		Áno
7.	Podpora 802.11r IEEE štandardu?		Áno
8.	Podpora 802.11k IEEE štandardu?		Áno
9.	Podpora 802.11v IEEE štandardu?		Áno
10.	Schopnosť AP obsluhovať naraz aspoň 50 rôznych užívateľov bez zníženia kvality služby?		Áno
11.	Minimálne 2x2 MIMO (multiple-input-multiple-output)?		Áno
12.			Áno
13.	Súčasťou 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 umiestneným logom?		Áno

Všetky otázky sú zodpovedané

Minimálne technické podmienky sú zadefinované.

Počet odpovedí "nie"	0
Počet nezodpovedaných otázok	0

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T310 Series

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

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BENEFITS

VARIETY

One size does NOT fit all. The T310 series offers the broadest variety of APs in the market today with options of power, antenna design, and/or IoT support. All these enable customers to meet specific use case needs that may not be possible with standard APs.

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.

GET 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

Enhance your network with Cloudpath security and management software, SPoT real-time Wi-Fi location engine and analytics software, 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.

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T310 Series

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

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FEATURES

WIRELESS

- 802.11ac Wave 2 Multi-User MIMO (MU-MIMO)
- Concurrent dual-band (5GHz/2.4GHz) support
- 2x2:2ss with total 1167Mbps WLAN data rate
- BeamFlex+ adaptive antenna technology and advanced RF management
- Up to 10dB interference mitigation
- Polarization diversity for optimal mobile device performance
- WPA-PSK (AES), 802.1X support for RADIUS and Active Directory**
- Airtime fairness
- Admission control **
- Band balancing and Load balancing**
- Dynamic, per-user rate-limiting for hotspot WLANs

INTERFACES

- 1 x 1GbE port
- USB 2.0, Type A connector - ideal for BLE dongles and sensors (on the T310d, n, s models)

IP CERTIFICATION

- IP-67 rated, -40°C to +65°C (temp range varies with model)

POWER

- 802.3af PoE Input (Class 3 PD)
- DC Input (on the T310d, n, s models)

SOFTWARE

- Standalone or centrally managed by SmartZone, ZoneDirector
- SPoT™ Real-time location engine and analytics software
- Cloudpath™ (security and management software)
- SmartCell Insight (Network analytics engine)
- NAT and DHCP
- Smart QoS
- Zero-IT and Dynamic PSK**
- Captive portal and guest accounts**
- Application recognition and control**
- Secure HotSpot**
- SmartMesh**

** when used with Ruckus ZoneDirector or SmartZone controllers.
[1]Supported by ZoneDirector controller

The T310 Series is delivered in four models with different antenna configurations, power options, and support of an integrated USB port. See Table 1 for the major differences between the four models.

Table 1 - T310 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

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ACCESS POINT ANTENNA PATTERN

The T310 Series access points incorporate the Ruckus' BeamFlex™ adaptive antenna technology which manages RF coverage dynamically on a packet-by-packet basis to optimize signal strength, data-rates and connection reliability.

The Ruckus' adaptive antenna is unique and the multiple, over-laid patterns (see Figure 1) depict its ability to optimize coverage and mitigate interference. Each AP antenna is specifically designed to match the target use case and have up to 64 different antenna patterns from which to select in meeting the goal of optimizing the wireless performance and ensuring the best connection reliability.

The BeamFlex adaptive antenna design is also more than a simple one-dimension omni-antenna. The antennae are dual polarized and can transmit and receive signals with both vertical and horizontal polarizations. Ruckus' unique BeamFlex antennas outperform traditional omnidirectional antennas used in competitive access points.

Figure 1 - Example of BeamFlex pattern

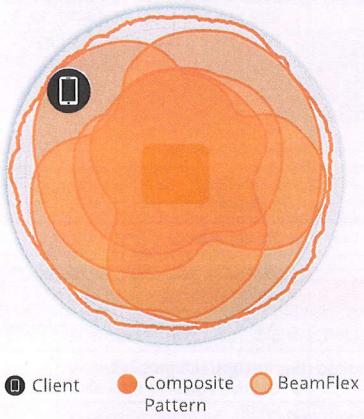


Figure 2 - T310d 2.4GHz Azimuth Antenna Patterns

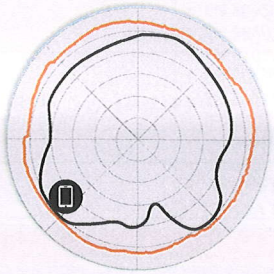


Figure 3 - T310d 5GHz Azimuth Antenna Patterns

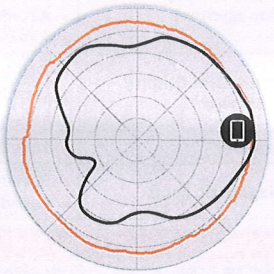


Figure 4 - T310d 2.4GHz Elevation Antenna Patterns

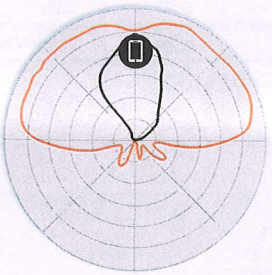
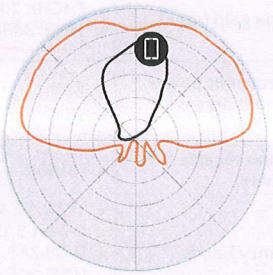


Figure 5 - T310d 5GHz Elevation Antenna Patterns



The four figures above demonstrate the unique design of the BeamFlex technology in the two major Wi-Fi RF bands. The outer trace represents the composite RF footprint of all possible BeamFlex patterns. The inner trace represents an individual adaptive antenna pattern that may appear in various positions within the outer trace, providing greater SNR and increased performance on a packet-by-packet basis.

BeamFlex operates without any need for client feedback and irrespective of the 802.11 standard the client may be running and hence benefits even legacy clients.

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T310 Series

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

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WI-FI	
Wi-Fi Standards	• IEEE 802.11a/b/g/n/ac Wave 2
Supported rates	• 802.11ac: 6.5 to 876Mbps (MCS0 to MCS9, NSS = 1 to 2 for VHT20/40/80, NSS = 1 to 2 for VHT80) • 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
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	T310c	T310d	T310s	T310n
Antenna type	• BeamFlex+ adaptive antennas with polarization diversity			
Antenna gain (max)	• 2.4GHz: 2dBi • 5GHz: 3dBi		• 2.4GHz: 6dBi • 5GHz: 9dBi	• 2.4GHz: 9dBi • 5GHz: 13dBi
Peak transmit power (aggregate across MIMO chains)	• 2.4GHz: 23dBm • 5GHz: 24dBm		• 2.4GHz: 24dBm • 5GHz: 21dBm	• 2.4GHz: 21dBm • 5GHz: 17dBm
Minimum receive sensitivity	• -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 T310 RECEIVE SENSITIVITY			
HT20		HT40	
MCS0	MCS7	MCS0	MCS7
-95dBm	-78dBm	-92dBm	-75dBm

5GHZ T310 RECEIVE SENSITIVITY							
VHT20		VHT40			VHT80		
MCS0	MCS7	MCS0	MCS7	MCS9	MCS0	MCS7	MCS9
-96dBm	-77dBm	-93dBm	-74dBm	-69dBm	-90dBm	-71dBm	-66dBm

T310 2.4GHZ TX POWER TARGET	
Rate	Pout (dBm)
2.4GHz Tx	
MCS0 HT20	23
MCS7 HT20	18
MCS0 HT40	22
MCS7 HT40	18

T310 5GHz TX POWER TARGET	
Rate	Pout (dBm)
5GHz Tx	
MCS0 VHT20	24
MCS7 VHT20	20
MCS9 VHT20	18
MCS0 VHT40, VHT80	23
MCS7 VHT40, VHT80	20
MCS9 VHT40, VHT80	18

PERFORMANCE & 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
Smart Cast Quality of Service	• QoS-based scheduling • Directed Multicast • L2/L3/L4 ACLs
Mobility	• SmartRoam
Diagnostic Tools	• Spectrum Analysis • SpeedFlex

NETWORKING	
Controller Platform Support	• SmartZone • ZoneDirector • 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 Visibility and Control • Access Control Lists • Device Fingerprinting • Rate Limiting

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T310 Series

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

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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 • 7.1(L) x 5.9(W) x 3.1(H) in.		• 26(L) x 20.9(W) x 10.3(H) cm • 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			

CERTIFICATIONS AND COMPLIANCE

Wi-Fi Alliance	• Wi-Fi CERTIFIED™ a, b, g, n, ac • Passpoint®, Vantage
Standards Compliance*	• 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

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

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

SUPPORTED SERVICES

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

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.

ORDERING INFORMATION

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.

OPTIONAL ACCESSORIES

902-0162-XX00	Spares of Power over Ethernet (PoE) Adapter
902-1121-0000	Weatherizing Cable gland with option of one hole or 2 hole connection
902-0127-0000	Extended cap to accommodate up to 6 cm long USB dongle

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

Warranty: Sold with a limited one year warranty.

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