Unikátní mikrovlnné spoje

RAy

10 GHz | 11 GHz | 17 GHz | 18 GHz | 24 GHz

RAy je vysokorychlostní point-to-point mikrovlnný spoj vhodný i pro nejnáročnější podmínky. Využívají jej poskytovatelé internetových služeb i globální telekomunikační operátoři pro páteřní sítě a vysokorychlostní last-mile spoje.

Market leader

- Výjimečná spolehlivost na extrémní vzdálenosti
- Maximální využití spektra
- Minimální spotřeba energie
- Wifi management, mobilní aplikace

Výkon

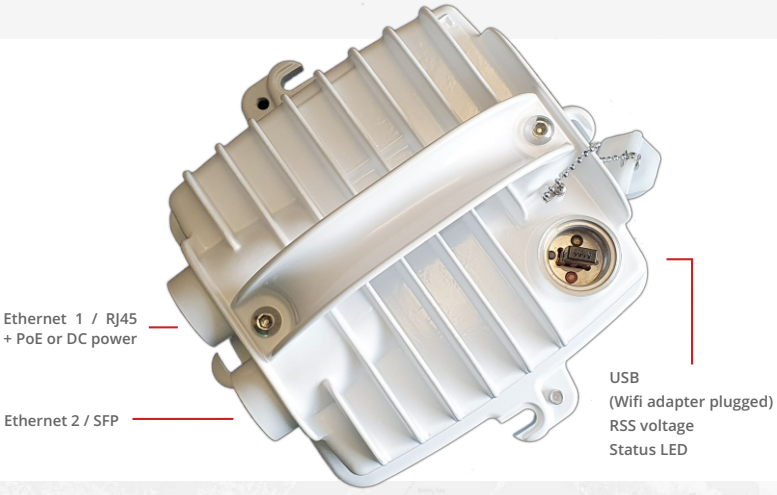
- 1 Gb/s FDD
- 3.5 – 112 MHz kanály
- QPSK – 4096 QAM
- 10, 17, 18, 24 GHz

Efektivní využití spektra

- Každá část spektra efektivně využita
- Vestavěný analyzátor spektra
- Vhodný i pro silně zarušené lokality
- Úzké i asymetrické kanály

Spolehlivost

- Vysoká citlivost, Hitless ACM a ATPC
- Ochrana proti přepětí 4 kV, ESD 8 kV
- Každá jednotka testována v klimatické komoře
- MTBF > 100 let, vyrobeno v ČR



RACOM

www.racom.eu

Technické parametry

Radio parameters	10 GHz		17 GHz / 24 GHz	11 GHz * / 18 GHz	
	Lower	Upper	The same HW for L/U	Lower	Upper
Sub-band A	10.301 – 10.420	10.476 – 10.588	no sub-bands	11 GHz: 10.700 – 10.989 18 GHz: 17.700 – 18.209	11 GHz: 11.199 – 11.491 18 GHz: 18.710 – 19.219
Sub-band B	10.125 – 10.325	10.475 – 10.675	17.10 – 17.30	11 GHz: 10.905 – 11.195 18 GHz: 18.167 – 18.690	11 GHz: 11.395 – 11.700 18 GHz: 19.177 – 19.700
Sub-band C	–	–	24.00 – 24.25	18 GHz: 17.700 – 18.300	18 GHz: 19.300 – 19.700
Channels	3.5; 7; 14; 20; 28; 40; 56; 80; 84; 112 MHz		3.5; 5; 7; 10; 14; 20; 28; 40; 56; 80; 100; 112 MHz	11 GHz: 3.5; 7; 14; 20; 28; 40; 56; 80; 112 MHz Dual Channel available 18 GHz: 5; 7; 7.5; 10; 13.75; 20; 27.5; 30; 40; 50; 55; 60; 80; 100; 110 MHz	
Duplex spacing	Sub-band A: Flexible 58 - 285 MHz; location adj. by SW Sub-band B: 350 MHz		Flexible min.18 MHz between channel edges; location adjusted by SW	11 GHz: 490 MHz (ETSI) or 530 MHz 18 GHz: 1008, 1010 MHz @ Sub-band A, B 1560 MHz @ Sub-band C	
Gross data rate	2.9 – 1010 Mb/s		2.7 – 1002 Mb/s	11 GHz: 2.9 – 2020 Mb/s 18 GHz: 4.2 – 1010 Mb/s	
FEC	LDPC		LDPC, RS	LDPC	

	Speed / Sensitivity					
Modulation	**5 MHz**	**112 MHz**	**3.5 MHz**	**112 MHz**	**5 MHz**	**110/112 MHz**
QPSK_S	4.2 Mb/s @ -105.5 dBm	96 Mb/s @ -86.0 dBm	2.7 Mb/s @ -100.5 dBm	97 Mb/s @ -86.5 dBm	4.2 Mb/s @ -100.5 dBm	96 Mb/s @ -86.5 dBm
QPSK	7.2 Mb/s @ -96.5 dBm	166 Mb/s @ -82.0 dBm	5.0 Mb/s @ -96.0 dBm	161 Mb/s @ -83.0 dBm	7.2 Mb/s @ -96.5 dBm	166 Mb/s @ -82.5 dBm
16QAM	12 Mb/s @ -92.0 dBm	287 Mb/s @ -77.0 dBm	9.5 Mb/s @ -90.0 dBm	334 Mb/s @ -76.0 dBm	12 Mb/s @ -92.0 dBm	287 Mb/s @ -77.5 dBm
32QAM	17 Mb/s @ -87.0 dBm	400 Mb/s @ -72.0 dBm	11 Mb/s @ -86.5 dBm	426 Mb/s @ -72.0 dBm	17 Mb/s @ -87.0 dBm	400 Mb/s @ -72.5 dBm
64QAM	22 Mb/s @ -84.0 dBm	513 Mb/s @ -69.5 dBm	15 Mb/s @ -83.5 dBm	536 Mb/s @ -69.0 dBm	22 Mb/s @ -84.0 dBm	513 Mb/s @ -70.0 dBm
128QAM	26 Mb/s @ -81.5 dBm	604 Mb/s @ -66.5 dBm	17 Mb/s @ -80.5 dBm	636 Mb/s @ -66.0 dBm	26 Mb/s @ -81.5 dBm	604 Mb/s @ -67.0 dBm
256QAM	30 Mb/s @ -78.5 dBm	698 Mb/s @ -63.5 dBm	19 Mb/s @ -77.5 dBm	730 Mb/s @ -63.0 dBm	30 Mb/s @ -78.5 dBm	698 Mb/s @ -64.0 dBm
512QAM	34 Mb/s @ -75.5 dBm	791 Mb/s @ -60.5 dBm	22 Mb/s @ -74.5 dBm	823 Mb/s @ -60.0 dBm	34 Mb/s @ -75.5 dBm	791 Mb/s @ -61.0 dBm
1024QAM	38 Mb/s @ -72.0 dBm	881 Mb/s @ -57.5 dBm	23 Mb/s @ -71.0 dBm	918 Mb/s @ -57.0 dBm	38 Mb/s @ -72.0 dBm	881 Mb/s @ -57.5 dBm
2048QAM	42 Mb/s @ -68.5 dBm	958 Mb/s @ -54.5 dBm	-	1002 Mb/s @ -54.0 dBm	42 Mb/s @ -68.5 dBm	958 Mb/s @ -53.5 dBm
4096QAM	-	1010 Mb/s @ -50.5 dBm	540 Mb/s @ -54.0 dBm @ 56 MHz		-	1010 Mb/s @ -49.5 dBm

ACM	Hitless		
RF Output power	Sub-band A: -15 to +10 dBm (+13 dBm for QPSK) Sub-band B: -15 to +10 dBm	-30 to +10 dBm (all modulations and channels)	-1 to +23 dBm (all modulations and channels)
ATPC	Yes		
MTU	10240 B		
Latency (RFC 2544)	<150 µs (66 B, 352 Mb/s); <200 µs (1518 B, 352 Mb/s) <100 µs (66 B, 1010 Mb/s); <150 µs (1518 B, 1010 Mb/s)	268 µs (64B/366 Mb/s); 313 µs (1518 B/366 Mb/s) 173 µs (64B/1002 Mb/s); 198 µs (1518 B/1002 Mb/s)	<150 µs (66 B, 352 Mb/s); <200 µs (1518 B, 352 Mb/s) <100 µs (66 B, 1010 Mb/s); <150 µs (1518 B, 1010 Mb/s)
Synchronization	Synchronous Ethernet*; PTP(IEEE-1588v2 transparent clock)*		
Electrical			
Primary power	PoE active, IEEE 802.3 bt (PoE++); PoE passive 20 – 60 VDC; DC 20 – 60 VDC; floating	PoE active, IEEE 802.3 at (PoE+); PoE passive 20 – 60 VDC; DC 20 – 60 VDC; floating	PoE active, IEEE 802.3 bt (PoE++); PoE passive 37 – 60 VDC; DC 37 – 60 VDC; floating
Power consumption	Typ. 26.5 W (w/o SFP)	Typ. 22.5 W (w/o SFP)	Typ. 30 W for Tx < +17 dBm (w/o SFP); 33 W for Tx >= +17 dBm (w/o SFP)
Interfaces			
Ethernet	1x 10/100/1000 Base-T Auto MDI/MDIX / RJ45		
SFP	1x 10/100/1000/2500 Base-T; 1000Base-SX; 1000Base-LX (power max. 1.25 W)		
USB	USB 2.0 / Host A		
RSS voltage	Two contact sockets		
Indication LED	System status (multicolor)		
Environmental			
IP Code (Ingress Protection)	IP66		
MTBF (Mean Time Between Failure)	> 1 000 000 hours (> 114 years)		
Operating temperature	- 30 to + 55°C (ETSI EN 300019-1-4, class 4.1.)		
Operating humidity	5 to 95% non-condensing		
Surge immunity	4 kV acc. EN 61000-4-5		
ESD resistance	8 kV acc. EN 61000-4-2		
Mechanical			
Casing	Rugged die-cast aluminium		
Size	160 H x 245 W x 245 D mm (6.3 x 9.6 x 9.6 in)		
Weight	2.8 kg (6.2 lbs)	2.6 kg (5.7 lbs)	2.9 kg (6.4 lbs)
Mounting	FOD, direct mounting to antenna		
Diagnostic			
Real time monitoring	RSS, MSE, BER		
Diagnostic tools	Spectrum analyzer, Pinger	Spectrum analyzer, Pinger, Radio loopback	Spectrum analyzer, Pinger
History charts	Temperature, Power voltage, RSS, MSE, BER, Data rate, RF Output power		
Statistics	RMON counters for all interfaces		
Antenna alignment	RSS voltage, Mobile App (RAyTools), Web		
SNMP	v2c including configurable TRAPs		
Security			
Management	Web (HTTP, HTTPS), SSH, Telnet, Mobile App (RAyTools)		
Access accounts	3 levels (Guest, Admin, Super)		
Encryption	AES256, 192, 128		
Standards			
Approvals	CE (RED), RoHS	17 GHz CE (RED), RoHS 24 GHz CE (RED), FCC, RoHS	CE (RED), FCC 101, RoHS

* Pending

Technical parameters are subject to change without prior notification. For more details see User manuals.

ver. 5.2