1. Zero footprint, fully outdoor and cost-effective solution

2. QoS (Quality of Service) based on port, VLAN ID/Priority, DSCP for traffic prioritization

3. Scalable bandwidths (ETSI up to 112 MHz, FCC up to 80MHz) and flexible modulation schemes (QPSK-4096QAM) to secure best link performance

4. Advanced multilevel LDPC and RS FEC

5. Up to 4Gbps capacity with Hitless Automatic Adaptive Coding and Modulation (HAACM)

6. The capacity can be up to 8Gbps by 2-radios aggregation

7. Power supply with coaxial cable or 2-wire cable

8. Multi-GE ports with 2-10 Gb

9. High availability and reliability based on licensed frequencies 5~44G

10. Jumbo frame up to 10240 bytes

11. Layer-2 switching, auto MDI/MDXI, VLAN, QoS, QinQ, STP/RSTP, LACP

12. 16K Mac Table Entries

13. RF and digital loopback capability

14. Adaptive digital Pre-distortion feature

15. ATPC and built-in FEC function

16. Built-in Bit Error Rate (BER) monitoring and spectrum scan

17. Small and attractive profile, Low latency and low power consumption, wide operating temperature range fits all weather conditions

18. Management capability as well as SNMP and Https call

19. Support Local and Remote loopback for Line checking

20. System Log for alarm, events, configuration.

Multiwave Packet Radio

A compact all-outdoor packet radio solution, combining the advantages of an all-outdoor profile with carrier-grade performance of Multiwave Family, generates significant CAPEX and OPEX savings.

Multiwave Packet Radio is the innovative packet radio which is the perfect replacement of optical fiber cable and FSO.

Robust and durable single-box structure withstands harsh weather conditions and can be easily mounted on towers, rooftops, lamp posts, traffic light poles and small outdoor mobile cell-sites.

Enhanced spectrum utilization, low-latency traffic and comprehensive synchronization solution.

Software-scalable bandwidths (ETSI up to 112 MHz, FCC up to 80MHz) and adaptive modulation schemes (QPSK-4096QAM) provide traffic with more flexibility and strong adaptability to various application environments.

Multiwave Packet Radio is compliant with the IEEE 802.1/3 and RFC standards for various Ethernet functionalities.

User-friendly Management- Telnet, WEB GUI, NMS, SNMP Manager. Software and firmware online upgradeable.

Applications

4G and 5G mobile Backhaul

Multiwave Packet Radio is a perfect fit for 3G/4G/5G base station backhaul to replace optical fiber and FSO, ideally for new all-packet base station, and caters to various connection needs: voice, data, management and control. With SynE synchronization, Multiwave Packet could meet any RAN network requirement. With external PWE3 interface unit, Multiwave Packet could provide up to 8E1 and more Ethernet interfaces for 2G/3G/4/5G co-site scenario.
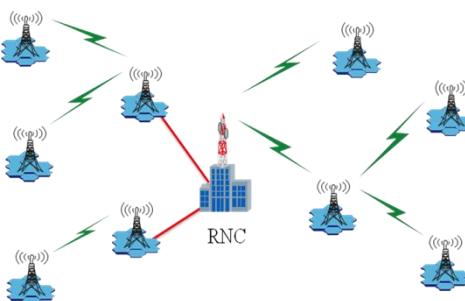
Figure 1 – Cellular Backhaul

ISP Backhaul

Multiwave Packet Radio allows ISPs, who own no land lines, to quickly establish a backhaul without quality compromises. ISPs can grow up their profits by delivering services with guaranteed SLA or reaching distant clients from their PTP using radios with similar cost at licensed frequencies to avoid spectrum congestion.


Figure 2 – ISP Backhaul

Broadband Access

Multiwave Packet Radio is an affordable medium capacity radio solution for enterprises that need private lines and broadband Ethernet traffic.
It offers solutions with fine combination of cost effectiveness & short commission time for the following applications:
* DSLAM backhaul
* No right-of-way
* Extending network from a fiber POP
* Private Communication networks

Channel configuration

* Dual-channels in each subband using dual-polarization (XPIC)
* Dual-channels in different subband using dual-polarization
* Dual-channels with east/west and Add/drop feature
* 8+0 by using 2 radios
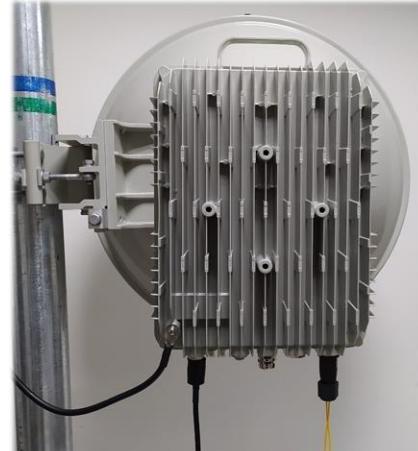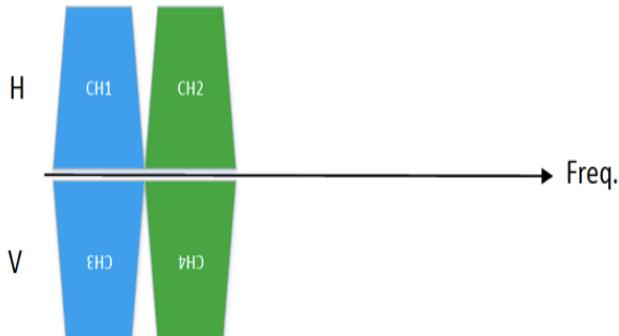
Dual-channels in each subband using dual polarization (XPIC) with OMT
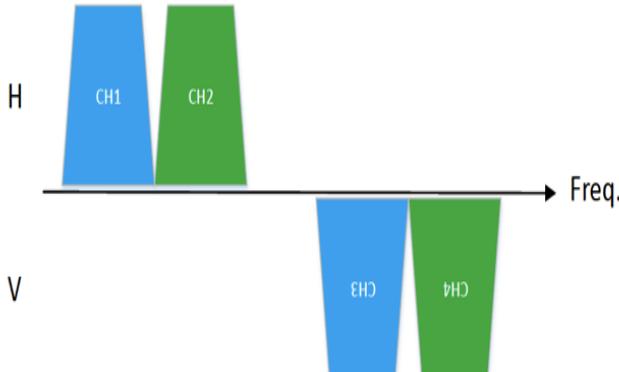
Dual-channels in different subband using dual-polarization with OMT
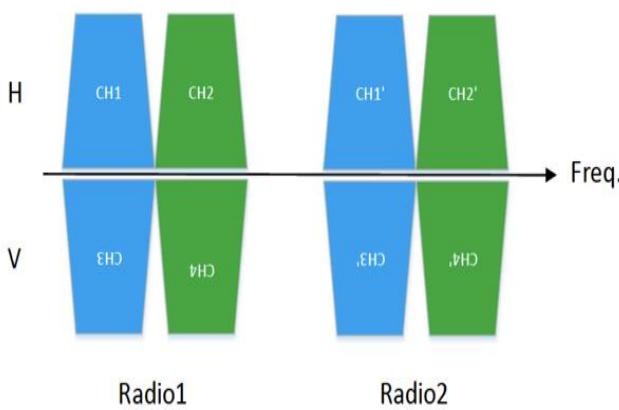
8+0 by using 2 radios with OMT plus combiner

Specifications

| Frequency			6.5GHz	7GHz	8GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz
Standard			ETSI/ITU or customer specified							
RF Output Power/per channel (dBm-Max)		4096QAM	19	19	19	15	15	15	14	15
		2048QAM	19	19	19	15	15	15	14	15
		1024QAM	20	20	20	16	16	16	15	15
		512QAM	20	20	20	16	16	16	15	16
		256QAM	20	20	20	17	17	17	15	17
		128QAM	20	20	20	17	17	17	15	17
		64QAM	21	21	21	18	18	18	18	18
		32QAM	21	21	21	19	19	19	19	19
		16QAM	21	21	21	19	19	19	20	20
		QPSK	21	21	21	20	20	20	21	21
RF Output Power(dBm- Min)			0							
Tuning Increment (dB)			1							
Accuracy (dB)			±2							
RX at BER=10-6 (dBm)	112MHz	4096QAM	-49.1	N/A	-49.1	-48.6	-48.6	-48.6	-48.1	-48.1
		2048QAM	-53.0	N/A	-53.0	-52.5	-52.5	-52.5	-52.0	-52.0
		1024QAM	-56.1	N/A	-56.1	-55.6	-55.6	-55.6	-55.1	-55.1
		512QAM	-59.3	N/A	-59.3	-58.8	-58.8	-58.8	-58.3	-58.3
		256QAM	-62.3	N/A	-62.3	-61.8	-61.8	-61.8	-61.3	-61.3
		128QAM	-65.4	N/A	-65.4	-64.9	-64.9	-64.9	-64.4	-64.4
		64QAM	-68.3	N/A	-68.3	-67.8	-67.8	-67.8	-67.3	-67.3
		32QAM	-70.6	N/A	-70.6	-70.1	-70.1	-70.1	-69.6	-69.6
		16QAM	-73.7	N/A	-73.7	-73.2	-73.2	-73.2	-72.7	-72.7
		QPSK	-80.1	N/A	-80.1	-79.6	-79.6	-79.6	-79.1	-79.1
	80MHz	4096QAM	-50.5	N/A	-50.5	-50.0	-50.0	-50.0	-49.5	-49.5
		2048QAM	-54.4	N/A	-54.4	-53.9	-53.9	-53.9	-53.4	-53.4
		1024QAM	-57.6	N/A	-57.6	-57.1	-57.1	-57.1	-56.6	-56.6
		512QAM	-60.7	N/A	-60.7	-60.2	-60.2	-60.2	-59.7	-59.7
		256QAM	-63.8	N/A	-63.8	-63.3	-63.3	-63.3	-62.8	-62.8
		128QAM	-66.9	N/A	-66.9	-66.4	-66.4	-66.4	-65.9	-65.9
		64QAM	-69.7	N/A	-69.7	-69.2	-69.2	-69.2	-68.7	-68.7
		32QAM	-72.1	N/A	-72.1	-71.6	-71.6	-71.6	-71.1	-71.1
		16QAM	-75.2	N/A	-75.2	-74.7	-74.7	-74.7	-74.2	-74.2
		QPSK	-81.7	N/A	-81.7	-81.2	-81.2	-81.2	-80.2	-80.2
	56MHz	4096QAM	-51.9	-51.9	-51.9	-51.4	-51.4	-51.4	-50.9	-50.9
		2048QAM	-55.8	-55.8	-55.8	-55.3	-55.3	-55.3	-54.8	-54.8
		1024QAM	-59.1	-59.1	-59.1	-58.6	-58.6	-58.6	-58.1	-58.1
		512QAM	-62.3	-62.3	-62.3	-61.8	-61.8	-61.8	-61.3	-61.3
		256QAM	-65.4	-65.4	-65.4	-64.9	-64.9	-64.9	-64.4	-64.4
		128QAM	-68.4	-68.4	-68.4	-67.9	-67.9	-67.9	-67.4	-67.4
		64QAM	-71.2	-71.2	-71.2	-70.7	-70.7	-70.7	-70.3	-70.3
		32QAM	-73.7	-73.7	-73.7	-73.2	-73.2	-73.2	-72.7	-72.7
		16QAM	-76.8	-76.8	-76.8	-76.3	-76.3	-76.3	-75.8	-75.8
		QPSK	-83.2	-83.2	-83.2	-82.7	-82.7	-82.7	-82.2	-82.2
	40MHz	4096QAM	-53.3	-53.3	-53.3	-52.8	-52.8	-52.8	-52.3	-52.3
		2048QAM	-57.2	-57.2	-57.2	-56.7	-56.7	-56.7	-56.2	-56.2
		1024QAM	-60.6	-60.6	-60.6	-60.1	-60.1	-60.1	-59.6	-59.6
		512QAM	-63.8	-63.8	-63.8	-63.3	-63.3	-63.3	-62.8	-62.8
		256QAM	-67.0	-67.0	-67.0	-66.5	-66.5	-66.5	-66.0	-66.0
		128QAM	-69.8	-69.8	-69.8	-69.3	-69.3	-69.3	-68.8	-68.8
		64QAM	-72.6	-72.6	-72.6	-72.1	-72.1	-72.1	-71.6	-71.6
		32QAM	-75.2	-75.2	-75.2	-74.7	-74.7	-74.7	-74.2	-74.2
		16QAM	-78.4	-78.4	-78.4	-77.9	-77.9	-77.9	-77.4	-77.4
		QPSK	-84.7	-84.7	-84.7	-84.2	-84.2	-84.2	-83.7	-83.7
	28MHz	4096QAM	-54.6	-54.6	-54.6	-54.1	-54.1	-54.1	-53.6	-53.6
		2048QAM	-58.6	-58.6	-58.6	-58.1	-58.1	-58.1	-57.6	-57.6
		1024QAM	-62.1	-62.1	-62.1	-61.6	-61.6	-61.6	-61.1	-61.1
		512QAM	-65.4	-65.4	-65.4	-64.9	-64.9	-64.9	-64.4	-64.4
		256QAM	-68.5	-68.5	-68.5	-68.0	-68.0	-68.0	-67.5	-67.5
		128QAM	-71.3	-71.3	-71.3	-70.8	-70.8	-70.8	-70.3	-70.3
		64QAM	-74.1	-74.1	-74.1	-73.6	-73.6	-73.6	-73.1	-73.1
		32QAM	-76.8	-76.8	-76.8	-76.3	-76.3	-76.3	-75.8	-75.8
		16QAM	-79.9	-79.9	-79.9	-79.4	-79.4	-79.4	-78.9	-78.9
		QPSK	-86.2	-86.2	-86.2	-85.7	-85.7	-85.7	-85.2	-85.2
Flange			UBR84	UBR84	UBR84	UBR100	UBR140	UBR140	UBR220	UBR220
RSSI			Output voltage vs. RSL: 0～1.4V vs. -90～-20dBm(10dB/200mV)							
RSL Accuracy			±2 dB@-80~-30dBm, ±3 dB@-90~-80dBm or -30~-20dBm							
Frequency Stability			±5ppm							
Frequency Source			Synthesizer							
Max Input Level Without Damage			0dBm							

Modulation	QPSK~4096QAM		
ACM switching	Hitless		
Throughput (single channel)/Mbps	Up to 1400Mbps@4*40MHz (anatel) ,2500Mbps@4*80MHz, 4Gbps@4*112MHz		
Switch type	10GE Layer 2	QoS	802.1p
Max frame size	10240 bytes	QoS queuing	Yes
MAC table	16k entries, auto learning & aging	VLAN support	802.1Q, QinQ
Packet buffer	8Mbit;non-blocking store & forward	Spanning tree protocol	802.1D-1998 STP&RSTP
Flow control	802.3x	Synchronization	N/A
SNMP	SNMP traps, MIB, SNMP v1/v2c/v3,		
EMS	Web based HTTP, SNMP, https call		
Interface	2-10GE optical，Multi-mode 10G SFP		
NMS Interface	Ethernet(in-band)		
RSSI	Mini-BNC		
Power	Coaxial cable with N-type connector		
Power Supply	-48V±20%		
Power Consumption	< 150W		
Ambient Temperature	-35~ +55 ℃		
Dimension (L*W*H, mm)	Radio: 298*115*412; OMT:250*112*208; Radio+OMT: 298*217*412		
Weight (kg)	Radio: 10.8; OMT:3.3; Radio+OMT: 14.1		
Humidity	All weather		
Elevation	15,000ft / 4572 m, IP65		

Notes: *All Specifications are typical values and subject to change without prior notice.*

Capacity (Mbps)/per channel											
BW	Mod	QPSK	16QAM	32QAM	64QAM	128QAM	256QAM	512QAM	1024QAM	2048QAM	4096QAM
28MHz	2+0	91.9	183.6	224.6	276.5	322.6	368.5	415.7	461.0	501.8	531.7
	4+0	182.8	367.2	449.2	553.1	645.2	737.1	831.4	922.0	1003.6	1063.4
	8+0	365.6	734.4	898.4	1106.2	1290.4	1474.2	1662.8	1844.0	2007.2	2126.8
29.65MHz	2+0	97.4	194.4	237.8	292.8	341.6	390.2	440.2	488.2	531.4	563.0
	4+0	194.8	388.8	475.6	585.6	683.2	780.4	880.4	976.4	1062.9	1126.1
	8+0	389.6	777.6	951.2	1171.2	1366.4	1560.8	1760.8	1952.8	2125.9	2252.3
40MHz	2+0	130.0	260.1	320.2	396.1	462.2	528.4	594.0	662.0	720.0	768.0
	4+0	260.0	520.0	640.0	792.0	924.0	1056.0	1188.0	1324.0	1440.0	1536.0
	8+0	520.0	1040.0	1280.0	1584.0	1848.0	2112.0	2376.0	2648.0	2880.0	3072.0
56MHz	2+0	183.8	367.2	449.2	553	645.2	737	831.4	922	1003.6	1063.4
	4+0	365.6	734.4	898.4	1106.2	1290.4	1474.2	1662.8	1844	2007.2	2126.8
	8+0	731.2	1468.8	1796.8	2212.4	2580.8	2948.4	3325.6	3688	4014.4	4253.6
59.3MHz	2+0	189.6	372.1	462.0	570.2	666.3	755.5	847.5	949.9	1024.0	1064.6
	4+0	379.1	744.1	923.9	1140.3	1332.6	1510.9	1694.9	1899.7	2047.9	2129.2
	8+0	758.2	1488.2	1847.8	2280.7	2665.2	3021.7	3389.8	3799.4	4095.8	4384.4
80MHz	2+0	244.35	478.0	596.8	734.5	858.8	969.75	1086.8	1221.7	1311.4	1406
	4+0	488.7	956.0	1193.6	1469.0	1717.6	1939.5	2173.6	2443.4	2622.8	2812.0
	8+0	977.4	1912.0	2387.2	2938.0	3435.2	3879.0	4347.2	4886.8	5245.6	5624.0
112MHz	2+0	367.6	734.4	898.4	1106	1290.4	1474	1662.8	1844	2007.2	2126.8
	4+0	731.2	1468.8	1796.8	2212.4	2580.8	2948.4	3325.6	3688	4014.4	4253.6
	8+0	1462.4	2937.6	3593.6	4424.8	5161.6	5896.8	6651.2	7376	8028.8	8507.2

Note:

1. **The max output power is test under each polarization port with dual channel. If using one channel per polarization port, the max. power will increase about 3.5dB.**

2. **For lower freq. bands(Below 15GHz), we can use single channel XPIC(2+0) and wider channel bandwidth(112MHz) to get 2Gbps capacity at lower cost.**

3. **For narrow bandwidth, the capacity is almost double for XPIC. But for wide bandwidth, like 112MHz, the capacity is 1.86 times. We take 1.9 times for 80MHz at XPIC.**

4. **For HC (head compression) at network traffic model 2, the capacity will increase about 20~30%**