



## ExtremeAir™ All-Outdoor Licensed FCC 11–23 GHz



### Fiber-Speed Microwave Systems for Ring, Aggregation and Core Applications

ExtremeAir all-outdoor radios are the world's first ultra-high capacity dual-carrier, zero footprint microwave systems. Capable of operation in the 6 – 43 GHz bands, ExtremeAir is designed to deliver guaranteed full-duplex Ethernet throughput as high as 1000 Mbps over a distance of 24 miles. These all-outdoor microwave systems are rugged, XPIC-enabled, tower-mounted radios requiring no cabinet space. ExtremeAir provides a true line speed, low cost alternative to fiber for high capacity ring, aggregation and core applications in LTE, WiMAX and wireline service provider networks as well as campus connectivity and video surveillance applications in enterprise and government networks. Features and benefits include:

#### Unprecedented ultra-high capacity over distance.

ExtremeAir makes full use of the 80 MHz channel in the 18 GHz band to deliver a total Layer 2 throughput of 1000 Mbps, a capacity previously achieved only in 60 and 80 GHz millimeter wave bands. Compared to those systems, ExtremeAir can support up to 20x greater link distances and higher availability at full uncompressed Gbps and near-Gbps capacities, freeing users from the range constraints that have until now limited ultra-high capacity microwave, millimeter wave and free-space optical systems. If desired, throughput by traffic type can be further increased using the advanced data compression option.

**Unique on-tower hub aggregation.** With up to four Gigabit Ethernet ports, ExtremeAir can aggregate edge traffic from as many as four lower capacity ExploreAir™ or ExtendAir® links without the need for an external switch or extra cables runs. In

addition, up to 1 Gbps full duplex can be carried over a single ultra-high capacity link to an access network element over a single CAT5 PoE cable without the significant constraints of standards-based link aggregation.

**High performance errorless and jitterless adaptive modulation.** With a programmable adaptive modulation range of 256QAM to QPSK, ExtremeAir can deliver up to line speed capacity at even greater ranges at high availability levels, then temporarily reduce throughput in the event of a fade while still ensuring the delivery of high priority traffic based on QoS/CoS. Unlike ultra-high capacity millimeter wave systems that simply shift modulation between a high and a low state while losing data in the process, ExtremeAir provides errorless and jitterless modulation changes over any number of available modulation states.

**Data networking.** ExtremeAir systems include an integrated hardened Layer 2 switch along with up to four 10/100/1000BaseT/X ports, allowing ExtremeAir to support Carrier Ethernet backhaul requirements and features such as 802.1p (QoS), 802.1q (VLAN tagging) and Ethernet rate limiting.

**Flexible remote management.** ExtremeAir systems include a full set of remote management tools such as secure Telnet/Command Line Interface (CLI), RS232, HTTP, HTTPS and SNMP v1, v2c and v3. In addition, the multi-port rcxx205 models provide unique out-of-band management functionality allowing both endpoints of a link to be managed independently.

Primary Specifications		ExtremeAir	ExtremeAir
		rc11200 / rc11205 / rc11220 / rc11230 rc18200 / rc18205 / rc18220 / rc18230 rc23200 / rc23205 / rc23220 / rc23230	rc11210 rc18210 rc23210
Maximum Capacity	Ethernet (full-duplex)	1000 Mbps	
	TDM	-	4xT1/E1
Frequency		11 GHz (10.7–11.7 GHz), 18 GHz (17.7–19.7 GHz), 23 GHz (21.2–23.61 GHz)	

## Specifications

## ExtremeAir Licensed FCC Series

### System

Models <sup>1</sup>	rc11200, rc18200, rc23200: 1x10/100/1000BaseT PoE rc11205, rc18205, rc23205: 1x10/100/1000BaseT PoE + 3x10/100/1000BaseT rc11210, rc18210, rc23210: 1x10/100/1000BaseT PoE + 1x10/100/1000BaseT+ 4xT1/E1 rc11220, rc18220, rc23220: 1xDC + 2x10/100/1000BaseT + 1x1000BaseX (SFP) rc11230, rc18230, rc23230: 1x10/100/1000BaseT PoE + 2x10/100/1000BaseT + 1x 1000BaseT (IEEE1588 v2)"
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Frequency Bands		10.70–11.70 GHz	17.70–19.70 GHz	21.2–23.61 GHz
FCC Part 101				
TR Spacing (MHz)		490 / 500	1560	1200
Channel Bandwidth (MHz)		30, 40, 80 <sup>2</sup>	30, 40, 50, 80	30, 40, 50
Antenna Interface		19.05 mm / 0.750 in Dia	11.56 mm / 0.455 in Dia	9.40 mm / 0.370 in Dia
Output Power (dBm) <sup>3</sup>		Standard/Power Upgrade <sup>4</sup>		
	QPSK	-	22	20
	16QAM	22 / 26	20	18
	32QAM	21 / 26	19	17
	64QAM	20 / 25	18	16
	128QAM	19 / 25	17	15
	256QAM	18 / 23	16	14
Receiver Threshold (BER=10 <sup>-6</sup> typical (dBm)) <sup>3</sup>				
QPSK	30 MHz	-	-84	-82
	40 MHz	-	-82	-81
	50 MHz	-	-81	-79
	80 MHz	-	-80	-
16QAM	30 MHz	-78	-78	-76
	40 MHz	-	-76	-75
	50 MHz	-	-75	-73
	80 MHz	-	-74	-
32QAM	30 MHz	-74	-75	-73
	40 MHz	-73	-73	-72
	50 MHz	-	-72	-70
	80 MHz	-70	-71	-
64QAM	30 MHz	-71	-71	-70
	40 MHz	-70	-69	-69
	50 MHz	-	-68	-67
	80 MHz	-67	-67	-
128QAM	30 MHz	-68	-68	-67
	40 MHz	-67	-66	-66
	50 MHz	-	-65	-64
	80 MHz	-64	-64	-
256QAM	30 MHz	-65	-65	-64
	40 MHz	-64	-63	-63
	50 MHz	-	-62	-61
	80 MHz	-61	-61	-

**Specifications (Cont.)**
**ExtremeAir Licensed FCC Series**

Frequency Bands FCC Part 101		10.70–11.70 GHz	17.70–19.70 GHz	21.2–23.61 GHz
<b>Throughput (Mbps full-duplex) (Max system layer 1 / Max Ethernet layer 2)<sup>5</sup></b>				
<b>QPSK</b>	30 MHz	-	115 / 93	115 / 93
	40 MHz	-	153 / 124	153 / 124
	50 MHz	-	192 / 155	192 / 155
	80 MHz	-	319 / 258	-
<b>16QAM</b>	30 MHz	229 / 185	229 / 185	229 / 185
	40 MHz	-	307 / 248	307 / 248
	50 MHz	-	385 / 311	385 / 311
	80 MHz	636 / 516	636 / 516	-
<b>32QAM</b>	30 MHz	286 / 231	286 / 231	286 / 231
	40 MHz	383 / 310	383 / 310	383 / 310
	50 MHz	-	482 / 390	482 / 390
	80 MHz	777 / 645	777 / 645	-
<b>64QAM</b>	30 MHz	344 / 278	344 / 278	344 / 278
	40 MHz	461 / 373	461 / 373	461 / 373
	50 MHz	-	579 / 468	579 / 468
	80 MHz	954 / 775	954 / 775	-
<b>128QAM</b>	30 MHz	401 / 324	401 / 324	401 / 324
	40 MHz	538 / 435	538 / 435	538 / 435
	50 MHz	-	672 / 546	672 / 546
	80 MHz	965 / 904	965 / 904	-
<b>256QAM</b>	30 MHz	459 / 371	459 / 371	459 / 371
	40 MHz	613 / 498	613 / 498	613 / 498
	50 MHz	-	750 / 624	750 / 624
	80 MHz	1000 / 986	1000 / 986	-
<b>Emissions Designators</b>	30 MHz	30M0W7D	30M0W7D	30M0W7D
	40 MHz	40M0W7D	40M0W7D	40M0W7D
	50 MHz	-	50M0W7D	50M0W7D
	80 MHz	80M0W7D	80M0W7D	-
<b>Maximum RSL</b>		0 dBm no damage		
<b>QPSK</b>		-25 dBm error-free		
<b>16–256QAM</b>		-30 dBm error-free		
<b>Minimum Output Power</b>		0 dBm		
<b>Power Control Step Size</b>		0.5 dB		
<b>ATPC<sup>6</sup></b>		Yes		
<b>Interference Cancellation</b>		XPIC		
<b>Adaptive Modulation</b>		QPSK–256QAM; selectable, fully configurable, errorless & jitterless		
<b>TDM Latency</b>		<250 µs typical		
<b>Ethernet Latency</b>		40–125µs (<100µs typical) at full throughput (GigE) with AES encryption enabled		
<b>Error Floor</b>		10 <sup>-12</sup>		
<b>FEC</b>		Reed Solomon T=8		
<b>Data Security</b>		Optional NIST FIPS 197-compliant 128-bit AES and 256-bit AES <sup>7</sup>		
<b>Link Security</b>		96-bit security key		
<b>Spectrum Analyzer</b>		Embedded		
<b>RF Sub-bands</b>		<b>11 GHz TR 490 / 500 MHz; Hi / Lo</b>	<b>18 GHz TR 1560 MHz; Hi / Lo</b>	<b>23 GHz TR 1200 MHz; Hi / Lo</b>
		Band 1: 10.70–10.90 GHz / 11.20–11.40 GHz	Band 1: 17.70–18.14 GHz / 19.26–19.70 GHz	Band 1: 21.20–21.62 GHz / 22.40–22.82 GHz
		Band 2: 10.85–11.05 GHz / 11.35–11.55 GHz	-	Band 2: 21.59–22.01 GHz / 22.79–23.21 GHz
		Band 3: 11.00–11.20 GHz / 11.50–11.70 GHz	-	Band 3: 21.98–22.40 GHz / 23.18–23.60 GHz

**Specifications (Cont.)****ExtremeAir Licensed FCC Series**

Management	In-band management Out-of-band management (except rcxx200 models)		
Security	SSL / SSH and secure, encrypted SNMPv3		
Web GUI	HTTP, HTTPS (Internet Explorer, Firefox, Safari, Chrome)		
CLI	Telnet, SSH via Ethernet		
SNMP	v1, v2c, and secure v3		
MIB	MIB I, MIB II, Exalt MIB		
Installation and Management Manual	Embedded in radio, accessible via HTTP GUI		
Compliance	SNMP v1, v2c, v3 FCC Part 101, Part 15 SRSP-310.7, 317.8, 321.8		
Physical			
Dimensions (H x W x D)	27.7 cm x 17 cm x 31.8 cm 10.9 in x 6.7 in x 12.5 in		
Operating Temperature	-40 to +65 °C; -40 to +149 °F		
Full Spec Temperature	-33 to +60 °C; -27 to +140 °F		
Weight	7.7 kg / 17 lbs.		
Environmental	NEMA 4 / IP66		
Altitude	4600 m / 15,000 ft.		
Humidity	100% condensing		
Interfaces			
Ethernet <sup>8</sup>	RJ48C/RJ45 Female (x1 or x4)	SFP (x1)	IEEE 1588v2 (x1)
Interface Speed	10/100/1000BaseT	1000BaseT/X	1000BaseT
Duplex	Half, Full, Auto		
Compliance	802.3 with MDIX		
Maximum Packet Size	9728 bytes		
Ethernet Rate Limiting	Configurable per port via software		
VLAN	802.1q, transparent, trunk, and management only		
QoS <sup>6</sup>	8 priority levels, 8 queues; 802.1p, 802.1q(VLAN ID), source MAC address, destination MAC address		
AC Power Adapter			
Input	100–240 VAC, 2.3 A		
Output	130 W, 55 VDC		
Operating Temperature	0 to +50 °C; +32 to +122 °F		
Warranty	Two years <sup>9</sup>		

<sup>1</sup> Consult your Exalt sales representative for availability.

<sup>2</sup> 80 MHz channel on 11 GHz pending approval of proposed rulemaking for broadband services before the FCC (US only).

<sup>3</sup> Includes built-in diplexer and OMT losses of approximately 1dB. Threshold specifications are ± 1dB over temperature.

<sup>4</sup> Power upgrade is a license key option to improve system gain when required. System requires software release version 1.1.0 or later.

<sup>5</sup> Maximum layer 1 throughput as measured with 64-byte packets and maximum layer 2 Ethernet measured with 1522-byte packets. In both cases throughput includes source address, destination address and CRC overhead. 80 MHz channel on 11 GHz pending approval of proposed rulemaking before the FCC. Depending on model. Base configuration is 400 Mbps with 200 Mbps license key upgrades up to 1Gbps. Consult Exalt for details.

<sup>6</sup> Software upgrade required.

<sup>7</sup> Software license key option.

<sup>8</sup> Depending on model.

<sup>9</sup> Terms and conditions apply. Consult Exalt for details.

