

# Aprisa LE

## POINT-TO-POINT DIGITAL MICROWAVE ETHERNET LINK 300 MHz to 2.0 GHz licensed ETSI bands



### Aprisa LE: maximizing spectrum use and making challenging long distance links possible

- **Long range:** a single Aprisa LE can link distances in excess of 150 km, overcoming the problems of water, environmental conditions and topographical obstacles.
- **Carrier-class performance:** Aprisa LE links are engineered to achieve 'five 9s' availability, benefiting from state of the art forward error correction and inherent low latencies, for unrivaled quality of service.
- **Cost-effective:** the Aprisa LE has a low total cost of ownership, providing a rapid return on investment by minimizing both capital and operational expenditure.
- **Maximum capacity:** class-leading spectral efficiency and up to 64 QAM modulation make the maximum use of the available spectrum, with industry leading capacity of up to 65.4 Mbit/s in a 14.0 MHz channel.
- **Redundancy options:** monitored hot standby is available for protection.
- **Easy-to-manage:** configuration, performance monitoring and diagnostics are easy with the 4RF embedded web-based element management system, SuperVisor.

#### The Aprisa LE in brief

- Licensed ETSI 300, 400, 1400 MHz and 2000 MHz frequency bands
- Up to 65.4 Mbit/s Ethernet capacity
- 25 kHz to 14.0 MHz channel sizes
- QPSK to 64 QAM modulation
- Range of 150+ km
- Web server and SNMP management
- MHSB protection option

## SYSTEM SPECIFICATION

RF	BAND	TUNING RANGE	SYNTHESIZER STEP SIZE
FREQUENCIES	300 MHz	330 – 400 MHz	6.25 kHz
	400 MHz	394 – 460 MHz	5.0 kHz
	400 MHz	400 – 470 MHz	6.25 kHz
	1400 MHz	1350 – 1550 MHz	12.5 kHz
2000 MHz	1900 – 2300 MHz	62.5 kHz	
MODULATION TYPES	Software configurable: QPSK / 16 / 32 / 64 QAM		
FREQUENCY STABILITY	Short term $\pm 1$ ppm (environmental effects and power supply variations) Long term $\pm 2$ ppm (aging of crystal oscillators $\approx$ over 5 years)		
ANTENNA CONNECTION	N-type female 50 ohm		
TRANSMITTER POWER OUTPUT		300 – 1400 MHz	2000 MHz
QPSK		+21 to +35 dBm	+20 to +34 dBm
16 QAM		+17 to +31 dBm	+17 to +31 dBm
32 QAM		+16 to +30 dBm	+16 to +30 dBm
64 QAM		+15 to +29 dBm	+15 to +29 dBm
RECEIVER			
MAXIMUM INPUT LEVEL	-20 dBm		
DYNAMIC RANGE	58 to 87 dB at $10^{-6}$ BER		
C/I RATIO	Co-channel	QPSK	better than 16 dB
		16 QAM	better than 20 dB
		32 QAM	better than 23 dB
		64 QAM	better than 27 dB
		First adjacent channel	better than -5 dB
	Second adjacent channel	better than -30 dB	
DUPLEXER (bandpass)	PASSBAND	TX / RX SPLIT	TUNING RANGE
A0, B0	2.0 MHz	$\geq 9.45$ MHz	330 - 400, 400 - 470 MHz
A1, B1	500 kHz	$\geq 5$ MHz	330 - 400, 400 - 470 MHz
A2, B2	3.5 MHz	$\geq 20$ MHz	330 - 400, 400 - 470 MHz
H0	7.0 MHz	$\geq 48$ MHz	1350 - 1550 MHz
I0	14.0 MHz	$\geq 91$ MHz	1900 - 2300 MHz
I1	7.0 MHz	$\geq 50$ MHz	1900 - 2300 MHz

POWER SUPPLY	
INPUT RANGE	115 / 230 VAC, 50/60 Hz $\pm 12$ VDC (10.5 – 18 VDC), $\pm 24$ VDC (20.5 – 30 VDC), $\pm 48$ VDC (40 – 60 VDC) +12 VDC (10.5 – 18 VDC) Low Power Option
POWER CONSUMPTION	(dependent on frequency band, power supply and transmitter output power) 115 / 230 VAC, $\pm 12$ VDC, $\pm 24$ VDC, $\pm 48$ VDC 39 – 84 W input power Low Power Option (12 VDC) 29 – 39 W input power
TRAFFIC INTERFACE	
ETHERNET	Integrated 4-port 10/100Base-T switch with port-based rate limiting, VLAN tagging and QoS Support
AUXILIARY INTERFACES	
ALARMS	4 external alarm outputs, 2 external alarm inputs
CONFIGURATION	Embedded web server with SNMP
MANAGEMENT	Ethernet interface for SuperVisor and SNMP; RS-232 setup port
RSSI	Front panel test point
ENVIRONMENTAL	
OPERATING	-10° C to +50° C
STORAGE	-20° C to +70° C
HUMIDITY	Maximum 95 % non-condensing
MECHANICAL	
RACK MOUNT	19" 2U high (internal duplexer)
WEIGHT	10 kg typical
PROTECTED OPTIONS	
MHSB	$\leq 4$ dB splitter / cable loss, $\leq 1$ dB TX relay / cable loss (system gain reduced by a maximum of 5 dB)
COMPLIANCE	
RADIO	EN 302 217
EMI /EMC	EN 301 489-5
SAFETY	EN 60950-1:2006
ENVIRONMENTAL	ETS 300 019 Class 3.2, EN 50385, WEEE

## PRODUCT RANGE

	BAND	CHANNEL SIZE											
		25 kHz	50 kHz	125 kHz	150 kHz	200 kHz	250 kHz	500 kHz	1 MHz	1.75 MHz	3.5 MHz	7 MHz	14 MHz
	300 MHz				✓	✓	✓	✓	✓	✓	✓		
	400 MHz	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	1400 MHz				✓		✓	✓	✓	✓	✓	✓	
	2000 MHz							✓	✓	✓	✓	✓	✓

## SYSTEM PERFORMANCE

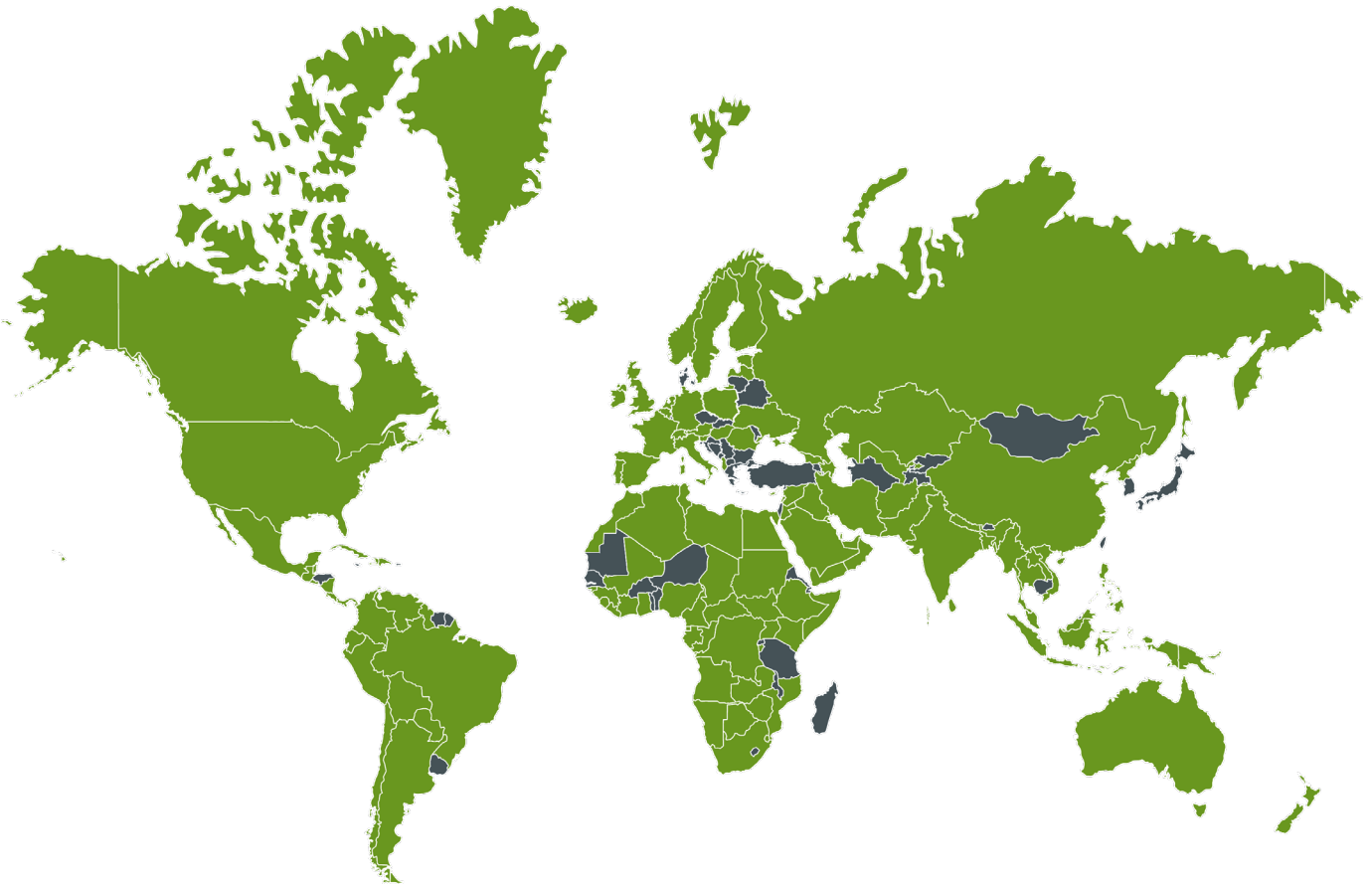
<b>25 kHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	N/A	72 kbit/s	96 kbit/s	112 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	N/A	-105 dBm	-102 dBm	-99 dBm
SYSTEM GAIN <sup>2</sup>	N/A	136 dB	132 dB	128 dB
<b>50 kHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	80 kbit/s	168 kbit/s	208 kbit/s	256 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-109 dBm	-103 dBm	-100 dBm	-97 dBm
SYSTEM GAIN <sup>2</sup>	144 dB	134 dB	130 dB	126 dB
<b>125 kHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	208 kbit/s	424 kbit/s	536 kbit/s	640 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-105 dBm	-99 dBm	-96 dBm	-93 dBm
SYSTEM GAIN <sup>2</sup>	140 dB	130 dB	126 dB	122 dB
<b>150 kHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	264 kbit/s	536 kbit/s	672 kbit/s	808 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-104 dBm	-98 dBm	-95 dBm	-92 dBm
SYSTEM GAIN <sup>2</sup>	139 dB	129 dB	125 dB	121 dB
<b>200 kHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	336 kbit/s	680 kbit/s	840 kbit/s	1024 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-102 dBm	-96 dBm	-93 dBm	-90 dBm
SYSTEM GAIN <sup>2</sup>	137 dB	127 dB	123 dB	119 dB
<b>250 kHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	408 kbit/s	824 (kbit/s)	1032 kbit/s	1240 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-101 dBm	-95 dBm	-92 dBm	-89 dBm
SYSTEM GAIN <sup>2</sup>	136 dB	126 dB	122 dB	118 dB
<b>500 kHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	792 kbit/s	1592 kbit/s	1992 kbit/s	2392 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-99 dBm	-93 dBm	-90 dBm	-87 dBm
SYSTEM GAIN <sup>2</sup>	134 dB	124 dB	120 dB	116 dB
<b>1.0 MHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	1624 kbit/s	3256 kbit/s	4072 kbit/s	4888 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-96 dBm	-90 dBm	-87 dBm	-84 dBm
SYSTEM GAIN <sup>2</sup>	131 dB	121 dB	117 dB	113 dB
<b>1.75 MHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	2872 kbit/s	5752 kbit/s	7192 kbit/s	8632 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-94 dBm	-88 dBm	-85 dBm	-82 dBm
SYSTEM GAIN <sup>2</sup>	129 dB	119 dB	115 dB	111 dB
<b>3.5 MHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	5720 kbit/s	11448 kbit/s	14312 kbit/s	17176 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-90 dBm	-84 dBm	-81 dBm	-78 dBm
SYSTEM GAIN <sup>2</sup>	125 dB	115 dB	111 dB	107 dB
<b>7.0 MHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	11832 kbit/s	23672 kbit/s	29592 kbit/s	35512 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	-87 dBm	-81 dBm	-78 dBm	-75 dBm
SYSTEM GAIN <sup>2</sup>	122 dB	112 dB	108 dB	104 dB
<b>14.0 MHz CHANNEL</b>	QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	N/A	47992 kbit/s	59992 kbit/s	65464 kbit/s
RECEIVER SENSITIVITY <sup>2</sup>	N/A	-78 dBm	-75 dBm	-72 dBm
SYSTEM GAIN <sup>2</sup>	N/A	109 dB	105 dB	101 dB

## NOTES

- The management Ethernet capacity must be subtracted from the gross capacity (default 64 kbit/s).
- Performance specified at the antenna port for 10<sup>-6</sup> BER. Figures for 10<sup>-3</sup> BER are typically 1 dB better.

**WHEN YOUR CONNECTIVITY REQUIREMENTS ARE DEMANDING...**

Customers in over 150 countries have chosen 4RF, not just because of the unbeatable value and performance of our products, but also because they know they can rely on our comprehensive range of network planning, equipment installation and support services.

**ABOUT 4RF**

Combining a low total cost of ownership with unbeatable performance, 4RF delivers a solution that is significantly cheaper than copper wire or fibre deployment and provides considerable technical and cost benefits over satellite and high frequency microwave links.

Utilities, oil and gas companies, international aid and peacekeeping organisations, transport operators, broadcasters, enterprises, and all types of fixed and wireless telecoms operators all use 4RF products. The applications are limitless, including remote monitoring and control, transmitter and base station linking and backhaul for mobile radio networks, and all types of fixed and mobile telecoms networks.

All 4RF products are optimised for performance in harsh climates and difficult terrain.

**ABOUT 4RF**

Operating in more than 150 countries, 4RF provides radio communications equipment for critical infrastructure applications. Customers include utilities, oil and gas companies, transport companies, telecommunications operators, international aid organisations, public safety, military and security organisations. 4RF point-to-point and point-to-multipoint products are optimized for performance in harsh climates and difficult terrain, supporting IP, legacy analogue, serial data and PDH applications.

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