

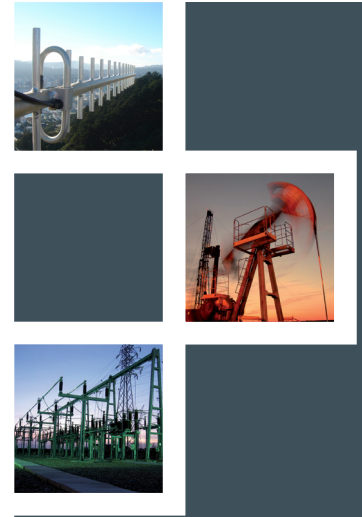
# Aprisa SR+

## SMART, SECURE POINT-TO-POINT RADIO VHF, 220 MHz, and UHF licensed bands



### Smart, secure, industry-leading speed licensed point-to-point for linking and backhaul of industrial monitoring and control and DMR voice

- **High capacity:** delivering an industry leading combination of capacity and distance the Aprisa SR+ PTP provides data rates of up to 1,024 kbit/s full duplex in 100 kHz licensed channels.
- **Secure:** with its defense in depth approach, including AES encryption, authentication, address filtering and user access control including RADIUS, the Aprisa SR+ PTP protects against vulnerabilities and malicious attacks.
- **Future-proof:** the Aprisa SR+ PTP supports dual serial and dual Ethernet ports in a single, compact form factor, designed to cryptographically secure legacy serial, protect existing device investment, and enable new applications. Old and new application protocols can be run side by side.
- **Advanced L2 / L3 capabilities:** selectable L2 bridge, L3 router, or advanced gateway router combination L2/L3 modes with VLAN, QoS, NAT, and filtering attributes to maximize capacity in constrained bandwidth and prioritize mission critical traffic while meeting tough security and IP network policy imperatives.
- **Flexible interfaces:** the data interfaces can be configured for serial or Ethernet operation; a range of options are supported, including two serial and two Ethernet, one serial and three Ethernet, or four Ethernet ports. Support for NMEA GPS receiver option.
- **Link efficiency:** Adaptive Coding and Modulation (ACM) and forward error correction maintains the integrity of the wireless connection while an effective channel access scheme and IP routing ensures efficient transfer of data across the Aprisa SR+ PTP link. Advanced payload and Ethernet / IP / TCP / UDP header compression.
- **Reliable and robust:** the Aprisa SR+ PTP requires no manual component tuning and maintains its performance over a wide temperature range using full specification industrially rated components and shared Aprisa family heritage.
- **Easily managed:** an easy to use GUI supports local element management via HTTPS and remote element management over the air and SNMP support allows network-wide monitoring and control via a variety of supported third party network management systems.



#### The Aprisa SR+ PTP in brief

- VHF, 220 MHz, and UHF licensed bands
- RS-232 and IEEE 802.3 with multiple port options
- Software selectable 12.5 kHz, 20 kHz, 25 kHz, 50 kHz, and 100 kHz <sup>(note 2)</sup> channel sizes (frequency band dependent)
- Two frequency full duplex operation
- Data rates of up to 1024 kbit/s full duplex
- 256, 192 or 128 bit AES encryption
- AES-CCM to NIST SP 800-38C
- Adaptive Coding and Modulation: QPSK to 256 QAM
- Advanced forward error correction
- Ethernet and IP / TCP / UDP header compression (ROHC) and payload compression
- Transparent to all common SCADA protocols
- Dedicated alarm port and optional GPS for radio coordinates
- Protected station option
- Layer 2 bridge (VLAN aware), layer 3 router, and advanced gateway router combination L2/ L3 modes
- VLAN tagging and Q-in-Q
- Flexible QoS priority enforcement – by port or traffic type, VLAN, PCP/DSCP, rule including SMAC/DMAC, IP address and IP protocol, and EtherType
- L2 / L3 / L4 filtering
- MEMS accelerometer motion sensing anti-tamper option
- Substation hardened to IEEE 1613 class 2 and IEC 61850-3
- 30 kV ESD antenna protection
- Class 1, Division 2 for hazardous protection
- -40 to +70 °C operational temperature without fans
- 210 mm (W) x 130 mm (D) x 88.9 mm (H)
- Complies with EU RED (2014/53/EU)

#### Aprisa SR+ PTP applications

- Remote control, monitoring and site security applications throughout a range of public safety, critical infrastructure and utility industries
- Point-to-multipoint radio base station to SCADA master station linking
  - AMI / AMR high density data concentrator backhaul
  - Protection relays, DER and renewables monitoring/disconnect
  - Traffic management and electronic sign telemetry
  - Agriculture and weather station linking
  - Site security alarms, tower management, remote transmitter shutdown
  - Low-rate high resolution CCTV and automatic number plate reader backhaul (ANPR)

GENERAL							
NETWORK TOPOLOGY	Point-to-point (PTP); Local Radio, Remote Radio						
NETWORK INTEGRATION	Serial and Ethernet (router or bridge mode)						
PROTOCOLS							
ETHERNET	IEEE 802.3, 802.1d/q/p						
SERIAL	Legacy RS-232 transport						
WIRELESS	Proprietary						
SCADA	Transparent to user traffic; e.g. Modbus, IEC 60870-5-101/104, DNP3 or similar						
RADIO							
FREQUENCY RANGE	FREQ BAND	TUNING RANGE	TUNE STEP				
	135 MHz	135 – 175 MHz	0.625 kHz				
	(Note 2) 220 MHz	215 – 240 MHz	0.625 kHz				
	320 MHz	320 – 400 MHz	6.25 kHz				
	400 MHz	400 – 470 MHz	1.25 kHz				
	450 MHz	450 – 520 MHz	6.25 kHz				
CHANNEL SIZE	12.5 kHz, 20 kHz, 25 kHz, 50 kHz and 100 kHz (note 3) software selectable						
DUPLEX	Two frequency full-duplex						
FREQUENCY STABILITY	± 0.5 ppm						
FREQUENCY AGING	< 1 ppm / annum						
TRANSMITTER							
MAX PEAK ENVELOPE POWER (PEP)	7.9 W (+39 dBm)						
AVERAGE POWER OUTPUT	256 QAM 0.01 – 1.3 W (+10 to +31 dBm, in 1 dB steps)						
	64 QAM 0.01 – 1.6 W (+10 to +32 dBm, in 1 dB steps)						
	16 QAM 0.01 – 2.0 W (+10 to +33 dBm, in 1 dB steps)						
	QPSK 0.01 – 3.2 W (+10 to +35 dBm, in 1 dB steps)						
ADJACENT CHANNEL POWER	< –60 dBc						
TRANSIENT ADJACENT CHANNEL POWER	< –60 dBc						
SPURIOUS EMISSIONS	< –37 dBm						
ATTACK TIME	< 1.5 ms						
RELEASE TIME	< 0.5 ms						
DATA TURNAROUND TIME	< 2 ms						
EMISSION DESIGNATOR SUFFIX	QPSK G1D, QAM D1D						
RECEIVER							
		12.5 kHz	20 kHz	25 kHz	50 kHz	100 kHz	
SENSITIVITY (BER < 10 <sup>-9</sup> )	max coded	256 QAM	–97 dBm	–93 dBm	–93 dBm	–90 dBm	–87 dBm
	max coded	64 QAM	–103 dBm	–99 dBm	–99 dBm	–96 dBm	–93 dBm
	max coded	16 QAM	–110 dBm	–107 dBm	–107 dBm	–104 dBm	–101 dBm
	max coded	QPSK	–115 dBm	–112 dBm	–112 dBm	–109 dBm	–106 dBm
ADJACENT CHANNEL SELECTIVITY		> –47 dBm	> –37 dBm	> –37 dBm	> –37 dBm	> –37 dBm	
	(Note 1)	[> 48 dB]	[> 58 dB]	[> 58 dB]	[> 58 dB]	[> 58 dB]	
CO-CHANNEL REJECTION max coded QPSK		> –10 dB					
CO-CHANNEL REJECTION max coded 256 QAM		> –26 dB					
INTERMODULATION RESPONSE REJECTION		> –35 dBm [ > 60 dB Note 1]					
BLOCKING OR DESENSITISATION		> –17 dBm [ > 78 dB Note 1]					
SPURIOUS RESPONSE REJECTION		> –32 dBm [ > 63 dB Note 1]					
MODEM							
		12.5 kHz	20 kHz	25 kHz	50 kHz	100 kHz	
GROSS DATA RATE	256 QAM	80 kbit/s	112 kbit/s	160 kbit/s	288 kbit/s	512 kbit/s	
	64 QAM	60 kbit/s	84 kbit/s	120 kbit/s	216 kbit/s	384 kbit/s	
	16 QAM	40 kbit/s	56 kbit/s	80 kbit/s	144 kbit/s	256 kbit/s	
	QPSK	20 kbit/s	28 kbit/s	40 kbit/s	72 kbit/s	128 kbit/s	
FORWARD ERROR CORRECTION		Variable length concatenated Reed Solomon plus convolutional code					
ADAPTIVE BURST SUPPORT		Adaptive Coding and Modulation					
DUPLEXER							
BANDS	135 MHz N0	220 MHz	320 MHz A0	400 MHz B0	450 MHz M0		
PASSBAND	0.5 MHz	Note 4	2.0 MHz	2.0 MHz	0.5 MHz		
TX / RX Split	≥ 4.6 MHz		≥ 9.45 MHz	≥ 9.45 MHz	≥ 5.0 MHz		

SECURITY	
DATA ENCRYPTION	256, 192 or 128 bit AES
DATA AUTHENTICATION	CCM
INTERFACES	
ETHERNET	2, 3 or 4 port RJ45 10/100Base-T auto-neg MDI/MDIX (specified at order)
SERIAL	2, 1 or 0 port RJ45 RS-232 (specified at order) Additional RS-232 / RS-485 port via USB converter (optional)
MANAGEMENT	1 x USB micro type B (device port) 1 x USB standard type A (host port)
ANTENNA	2 x TNC 50 ohm female Software selectable single or dual port operation
ALARM I/O	1 x RJ45 Alarm I/O interface 2 x inputs + 2 x outputs
LEDs	Status: OK, MODE, AUX, TX, RX Diagnostics: RSSI, traffic port status
TEST BUTTON	Toggles LEDs between diagnostics / status
PRODUCT OPTIONS	
DATA PORT CONFIGURATION	2 x Ethernet ports + 2 serial ports 3 x Ethernet ports + 1 serial port 4 x Ethernet ports
PROTECTED STATION	Providing hot-swappable / hot-standby redundant hardware switching (13.8 VDC or 48 VDC)
GPS RECEIVER	Support for NMEA GPS receiver with radio coordinates
POWER	
INPUT VOLTAGE	10 – 30 VDC
RECEIVE	All bands < 7 W (507 mA at 13.8 VDC)
TRANSMIT	All bands < 35 W (2530 mA at 13.8 VDC)
MECHANICAL	
DIMENSIONS	Radio 434 mm (W) x 315 mm (D) x 89.9 mm (H) 2 RU 17.1" (W) x 12.4" (D) x 3.54" (H)
	Protected Station 434 mm (W) x 372 mm (D) x 88.9 mm (H) 2 RU 17.1" (W) x 14.6" (D) x 3.5" (H)
WEIGHT	5.0 kg (11.3 lbs) (dependant on duplexer type)
MOUNTING	Rack mount 19" 2U high (includes duplexer)
ENVIRONMENTAL	
OPERATING TEMPERATURE	–40 to +70 °C
HUMIDITY	Maximum 95 % non-condensing
MANAGEMENT & DIAGNOSTICS	
LOCAL ELEMENT	SSH and HTTP/S web servers with full control / diagnostics Partial diagnostics via LEDs and test button Software upgrade from PC or USB flash drive
REMOTE ELEMENT	SSH and HTTP/S over-the-air remote element management with control / diagnostics Network software upgrade over-the-air
NETWORK	SNMPv2 and SNMPv3 security support for integration with external network management systems
COMPLIANCE	
RED COMPLIANCE	Tested to Radio Equipment Directive 2014/53/EU (note 3)
RF	12.5 kHz EN 300 113 25 kHz, 50 kHz and 100 kHz EN 302 561
EMC	EN 301 489-1 and 5
SAFETY	EN 60950 Class 1 division 2 for hazardous locations
ENVIRONMENTAL	ETS 300 019 Class 3.4, Ingress Protection IP51 Substation hardened to IEEE 1613 class 2 and IEC 61850-3

#### Notes:

- The receiver figures are shown in typical fixed interference dBm values and dB values [in brackets] relative to the sensitivity. Relative values are given for QPSK modulation and max coded FEC. Refer to the Aprisa SR+ User Manual for a complete list of modulation and coding levels.
- Please consult 4RF for availability.
- 100 kHz subject to EU RED verification
- Contact 4RF for options

## 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 applications.

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For more information please contact  
EMAIL [sales@4rf.com](mailto:sales@4rf.com)  
URL [www.4rf.com](http://www.4rf.com)