

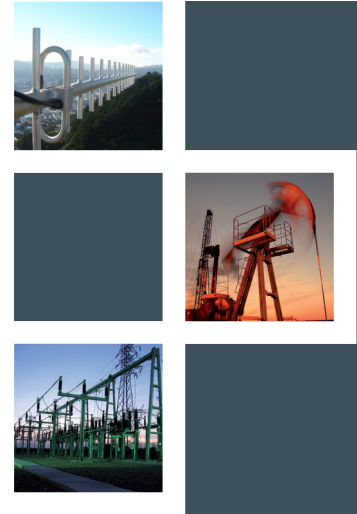
# Aprisa SR+

## SMART, SECURE POINT-TO-MULTIPOINT RADIO 220 MHz, UHF and 900 MHz licensed bands



Smart, secure, industry-leading speed licensed point-to-multipoint SCADA communications for industrial monitoring and control for the electricity, water, oil and gas industries

- **High capacity:** to meet the growing number of data-intensive applications in the SCADA environment, the Aprisa SR+ provides data rates of up to 216 kbit/s in 50 kHz licensed channels.
- **Secure:** with its defense in depth approach, including AES encryption, authentication, address filtering and user access control, the Aprisa SR+ protects against vulnerabilities and malicious attacks.
- **Future-proof:** the Aprisa SR+ supports multiple serial and Ethernet interfaces in a single, compact form factor, and is standards-based for long term incorporation into SCADA networks while protecting the legacy investment in serial devices.
- **Advanced L2/L3 capabilities:** selectable L2 Bridge or L3 Router modes, with VLAN, QoS and filtering attributes to support narrow bandwidth channels and mission critical traffic while meeting increasing security and IP network policy requirements.
- **Adaptable:** the Aprisa SR+ integrates into a range of network topologies, with each unit configurable as a base station, repeater or remote station; connect multiple RTUs / PLCs to a single radio.
- **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.
- **Link efficiency:** Adaptive Coding 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+ network.
- **Reliable and robust:** the Aprisa SR+ requires no manual component tuning and maintains its high power output and performance over a wide temperature range.
- **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 third party network management system.



### The Aprisa SR+ in brief

- 220 MHz, UHF and 900 MHz licensed bands
- RS-232 and IEEE 802.3 protocols with multiple port options
- Software selectable 12.5 kHz, 25 kHz and 50 kHz channel sizes
- Full and half duplex operation
- Single or dual frequency
- Gross data rates greater than 200 kbit/s
- 256, 192 or 128 bit AES encryption
- Adaptive coding modulation: QPSK to 64 QAM
- Advanced forward error correction
- Software selectable dual / single antenna port operation
- Transparent to all common SCADA protocols
- Dedicated alarm port
- Protected station option
- Power optimized option
- -40 to +70 °C operational temperature
- 210 mm (W) x 130 mm (D) x 41.5 mm (H)
- FCC and IC standards compliant
- Seamlessly integrates with Aprisa XE point-to-point radio

### Aprisa SR+ applications

Applications throughout the electricity grid and renewable energy:

- Smart grid: concentrator communications and GPRS replacement
- AMI / AMR: high density data concentrator backhaul
- Renewables: wind farm, tidal, hydro automation
- Measurement, control and protection in MV / HV distribution / transmission
- Co-generation and community energy storage monitoring and control in distributed storage and generation
- Fibre substitution in substation and feeder automation upgrades

### SYSTEM SPECIFICATION

GENERAL						
NETWORK TOPOLOGY	Point-to-multipoint (PMP), Repeater					
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 all common SCADA protocols such as Modbus, IEC 60870-5-101/104, DNP3 or similar					
RADIO						
FREQ BAND	TUNING RANGE	TUNE STEP				
FREQUENCY RANGE	220 MHz	215 – 240 MHz	3.125 kHz			
	220 MHz	215 – 240 MHz	2.5 kHz			
	400 MHz	400 – 470 MHz	6.25 kHz			
	(Note 7) 450 MHz	450 – 520 MHz	6.25 kHz			
	896 MHz	896 – 902 MHz	6.25 kHz			
	928 MHz	928 – 960 MHz	6.25 kHz			
CHANNEL SIZE	12.5 kHz, 25 kHz and 50 kHz software selectable					
DUPLEX	Single frequency half-duplex Dual frequency half-duplex Dual frequency full-duplex (Note 4)					
FREQUENCY STABILITY	± 1.0 ppm					
FREQUENCY AGING	< 1 ppm / annum					
TRANSMITTER						
AVERAGE POWER OUTPUT (Note 1)	64 QAM	0.01 – 2.5 W (+10 to +34 dBm, in 1 dB steps)				
	16 QAM	0.01 – 3.2 W (+10 to +35 dBm, in 1 dB steps)				
	QPSK	0.01 – 5.0 W (+10 to +37 dBm, in 1 dB steps)				
	(Note 3) 4-CPFSK	0.01 – 10.0 W (+10 to +40 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					
RECEIVER		12.5 kHz	25 kHz	50 kHz		
SENSITIVITY (BER < 10 <sup>-9</sup> )	max coded	64 QAM	–103 dBm	–99 dBm	–96 dBm	
		max coded	16 QAM	–110 dBm	–107 dBm	–104 dBm
		max coded	QPSK	–115 dBm	–112 dBm	–109 dBm
		min coded	4-CPFSK	–113 dBm	–110 dBm	–107 dBm
ADJACENT CHANNEL SELECTIVITY		> –47 dBm	> –37 dBm	> –37 dBm		
	(Note 2)	[> 48 dB]	[> 58 dB]	[> 58 dB]		
CO-CHANNEL REJECTION max coded QPSK	> –10 dB					
CO-CHANNEL REJECTION max coded 64 QAM	> –20 dB					
INTERMODULATION RESPONSE REJECTION	> –35 dBm [> 60 dB Note 2]					
BLOCKING OR DESENSITISATION	> –17 dBm [> 78 dB Note 2]					
SPURIOUS RESPONSE REJECTION	> –32 dBm [> 63 dB Note 2]					
MODEM	135 / 400 / 450 MHz Bands	220 / 896 / 928 MHz Bands				
	12.5 kHz	25 kHz	12.5 kHz (6)	25 kHz	50 kHz	
GROSS DATA RATE	64 QAM	54 kbit/s	96 kbit/s	60 kbit/s	96 kbit/s	216 kbit/s
	16 QAM	36 kbit/s	64 kbit/s	40 kbit/s	64 kbit/s	144 kbit/s
	QPSK	18 kbit/s	32 kbit/s	20 kbit/s	32 kbit/s	72 kbit/s
	4-CPFSK	9.6 kbit/s	19.2 kbit/s	9.6 kbit/s	19.2 kbit/s	38.4 kbit/s
OCCUPIED BANDWIDTH	10.7 kHz	19.8 kHz	11.8 kHz	19.8 kHz	43.0 kHz	
FORWARD ERROR CORRECTION	Variable Reed Solomon plus convolutional code					
ADAPTIVE BURST SUPPORT	Adaptive FEC with Adaptive Coding Modulation					

SECURITY	
DATA ENCRYPTION	256, 192 or 128 bit AES
DATA AUTHENTICATION	CCM
INTERFACES	
ETHERNET	2, 3 or 4 port RJ45 10/100Base-T switch (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) 1 x Alarm port RJ45
ANTENNA	2 x TNC 50 ohm female Software selectable single or dual port operation
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
POWER OPTIMIZED	Providing optimized power and sleep mode
PROTECTED STATION	Providing hot-swappable / hot-standby redundant hardware switching
POWER	
INPUT VOLTAGE	10 – 30 VDC (13.8 V nominal)
RECEIVE	STANDARD < 7 W POWER OPTIMIZED < 3 W in active receive state < 2 W in idle receive state, < 0.5 W in sleep mode
TRANSMIT	< 35 W
MECHANICAL	
DIMENSIONS	210 mm (W) x 130 mm (D) x 41.5 mm (H) 8.27" (W) x 5.12" (D) x 1.63" (H)
WEIGHT	1.25 kg (2.81 lbs)
MOUNTING	Wall, Rack or DIN rail
ENVIRONMENTAL	
OPERATING TEMPERATURE	–40 to +70 °C (–40 to +158 °F)
HUMIDITY	Maximum 95 % non-condensing
MANAGEMENT & DIAGNOSTICS	
LOCAL ELEMENT	Web server with full control / diagnostics Partial diagnostics via LEDs and test button Software upgrade from PC or USB flash drive
REMOTE ELEMENT	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	
RF	FCC CFR47 Part 24 / 90 / 101, IC RSS 119 / RSS 134 FCC IDs UIPSQ400M131, UIPSQ450M140 IC ID 6772A-SQ400M131
EMC	FCC CFR47 Part 15, EN 301 489 Parts 1 & 4, ICES-003 IEEE 1613 (Note 5)
SAFETY	EN 60950 Class 1 div 2 for hazardous locations
ENVIRONMENTAL	ETS 300 019 Class 3.4 Ingress Protection code IP51

#### Notes:

- The Peak Envelope Power (PEP) at maximum set power level is +41 dBm.
- 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.
- Full duplex channel access for point to multi-point available in a future software release.
- The Aprisa SR+ has been successfully evaluated against the requirements of IEEE 1613 for class 1 performance criteria.
- The gross data rate for the 12.5 kHz channel size in the 896 / 928 MHz bands varies with regulatory compliance.
- The 450 MHz band is only available for FCC.

### ABOUT 4RF

Operating in more than 130 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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