



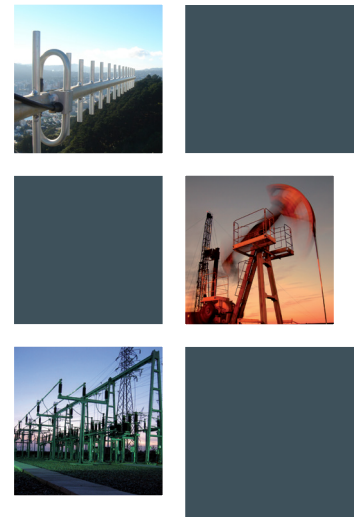
Aprisa SR+

SMART, SECURE POINT-TO-MULTIPOINT RADIO



Smart, secure, industry-leading speed licensed point-to-multipoint SCADA communications for industrial monitoring and control for the electricity, water, oil and gas industries – now with 256 QAM

- **High capacity:** to meet the growing number of data-intensive applications in the SCADA environment, the Aprisa SR+ provides data rates of up to 576 kbit/s half duplex / 1,152 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+ protects against vulnerabilities and malicious attacks.
- **Future-proof:** the Aprisa SR+ 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.
- **Adaptable:** the Aprisa SR+ integrates into a range of network topologies, with each unit configurable as a master 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. 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+ network. Advanced payload and Ethernet / IP / TCP / UDP header compression.
- **Reliable and robust:** the Aprisa SR+ 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+ in brief

- 135–175, 215–240, 400–520, 757–758 and 787–788, 896–902 and 928–960 MHz
- RS-232 and IEEE 802.3 with multiple port options
- Software selectable 12.5 kHz, 15 kHz, 25 kHz, 30 kHz, 50 kHz, and 100 kHz channel sizes (frequency band dependent)
- Full and half duplex operation, single or dual frequency
- Data rates of up to 576 kbit/s half duplex / 1,152 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
- Software selectable dual / single antenna port operation
- Transparent to all common SCADA protocols
- Dedicated alarm port and optional GPS for radio coordinates
- Protected station and remote station options
- Power optimized 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 5MAC/DMAC, IP address and IP protocol, and EtherType
- L2 / L3 / L4 filtering
- MEMS accelerometer motion sensing anti-tamper option
- IEEE 1613 and IEC 61850-3 substation protection
- 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 41.5 mm (H)
- FCC and IC standards compliant

Aprisa SR+ applications

- Electricity grid: distribution automation control and protection in MV / HV distribution / transmission
- Smart grid, DA, DFA, DER, cap bank control
- Oil & Gas: production metering, lift pump automation
- AMI / AMR: high density data concentrator backhaul
- Renewables: wind farm, tidal, hydro automation
- Water and wastewater: flow, level, pressure modulation automation and pump status

SYSTEM SPECIFICATION

GENERAL						
NETWORK TOPOLOGY	Point-to-multipoint (PMP), Master, Remote, Repeater					
NETWORK INTEGRATION	Serial and Ethernet (router or bridge mode)					
PROTOCOLS						
ETHERNET	IEEE 802.3, 802.1d/q/p					
SERIAL	Legacy RS-232 transport, Mirrored Bits®, SLIP and Terminal Server support					
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	135 MHz	135 – 175 MHz	0.625 kHz			
	220 MHz	215 – 240 MHz	0.625 kHz			
	400 MHz	400 – 470 MHz	6.25 kHz			
	(Note 4) 450 MHz	450 – 520 MHz	6.25 kHz			
	(Note 4) 700 MHz	757 – 758 & 787 – 788 MHz	6.25 kHz			
	(Note 5) 896 MHz	896 – 902 MHz	6.25 kHz			
	(Note 5) 928 MHz	928 – 960 MHz	6.25 kHz			
CHANNEL SIZE	12.5 kHz, 15 kHz, 25 kHz, 30 kHz, 50 kHz and 100 kHz software selectable					
DUPLEX	Single frequency half-duplex Dual frequency half-duplex Dual frequency full-duplex					
FREQUENCY STABILITY	± 0.5 ppm					
FREQUENCY AGING	< 1 ppm / annum					
TRANSMITTER						
MAX PEAK ENVELOPE POWER (PEP)	10.0 W (+40 dBm)					
AVERAGE POWER OUTPUT	(Note 6) 256 QAM 0.01 – 2.0 W (+10 to +33 dBm, in 1 dB steps)					
	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 2) 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					
EMISSION DESIGNATORS	see https://4rf.com/emission-designators					
RECEIVER	12.5 kHz	25 kHz	50 kHz	100 kHz		
SENSITIVITY (BER < 10 ⁻⁶)	max coded (Note 6)	256 QAM	–97 dBm	–93 dBm	–90 dBm	–87 dBm
	max coded	64 QAM	–103 dBm	–99 dBm	–96 dBm	–93 dBm
	max coded	16 QAM	–110 dBm	–107 dBm	–104 dBm	–101 dBm
	max coded	QPSK	–115 dBm	–112 dBm	–109 dBm	–106 dBm
	min coded	4-CPFSK	–113 dBm	–110 dBm	–107 dBm	–104 dBm
ADJACENT CHANNEL SELECTIVITY	> –47 dBm > –37 dBm > –37 dBm > –37 dBm					
	(Note 1) [> 48 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 (Note 3)	15 kHz	25 kHz	30 kHz	50 kHz	100 kHz
GROSS DATA RATE						
BANDS	220, 400, 450, 700, 896, 928	135, 220	220, 400, 450, 896, 928, 700	135	135, 220, 400, 896, 928, 700	700, 896, 928
256 QAM ⁶	72 kbit/s	80 kbit/s	N/A	N/A	128 kbit/s	160 kbit/s
64 QAM	54 kbit/s	60 kbit/s	54 kbit/s	60 kbit/s	96 kbit/s	120 kbit/s
16 QAM	36 kbit/s	40 kbit/s	36 kbit/s	40 kbit/s	64 kbit/s	80 kbit/s
QPSK	18 kbit/s	20 kbit/s	18 kbit/s	20 kbit/s	32 kbit/s	40 kbit/s
4-CPFSK	9.6 kbit/s	9.6 kbit/s	9.6 kbit/s	9.6 kbit/s	19.2 kbit/s	19.2 kbit/s
FORWARD ERROR CORRECTION	Variable Reed Solomon plus convolutional code					
ADAPTIVE BURST SUPPORT	Adaptive Coding and Modulation					

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 (option)		
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		
POWER OPTIMIZED	Providing optimized power and sleep mode		
PROTECTED STATION	Providing hot-swappable / hot-standby redundant hardware switching (10-30 VDC or 18-60 VDC)		
GPS RECEIVER	Support for NMEA GPS receiver with radio coordinates		
POWER			
INPUT VOLTAGE	10 – 30 VDC		
RECEIVE	All bands < 3 W (217 mA at 13.8 VDC) in active receive state < 2 W (145 mA at 13.8 VDC) in idle receive state < 0.5 W (36 mA at 13.8 VDC) in sleep mode		
TRANSMIT	135 and 220 MHz < 26 W (1884 mA at 13.8 VDC) 400, 450, 700, 896, 928 MHz < 28 W (2028 mA at 13.8 VDC)		
MECHANICAL			
DIMENSIONS	Radio 210 mm (W) x 130 mm (D) x 41.5 mm (H) 8.27" (W) x 5.12" (D) x 1.63" (H) Protected Station 434 mm (W) x 372 mm (D) x 88.9 mm (H) 2 RU 17.1" (W) 14.6" (D) 3.5" (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	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			
RF	FCC CFR47 Part 24 / 27 / 80 / 90 / 95 / 101 IC RSS 119 / RSS 134		
	BAND	FCC ID:	IC:
	135	UIPSQ135M150	6772A-SQ135M150
	220	UIPSQ215M141	6772A-SQ215M141
	400	UIPSQ400M1311	6772A-SQ400M1311
	450	UIPSQ450M140	N/A
	700	UIPSQ757M160	N/A
	896	UIPSQ896M141	6772A-SQ896M141
	928	UIPSQ928M141	6772A-SQ928M141
EMC	FCC CFR47 Part 15, EN 301 489-5, ICES-003		
SAFETY	UL / EN 60950, Class 1 division 2 for hazardous locations		
ENVIRONMENTAL	ETS 300 019 Class 3.4, IEEE 1613 Class 2 IEC 61850-3, Ingress Protection IP51		

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.
- The gross data rate for the 12.5 kHz channel size varies with regulatory compliance.
- The 450 MHz and 700 MHz bands are only available for FCC.
- The receive tuning range is specified. The transmit tuning range is 896 - 960 MHz.
- 256 QAM available in selected frequency bands. Contact 4RF for availability.

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.

Made in USA from local and imported parts.

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