



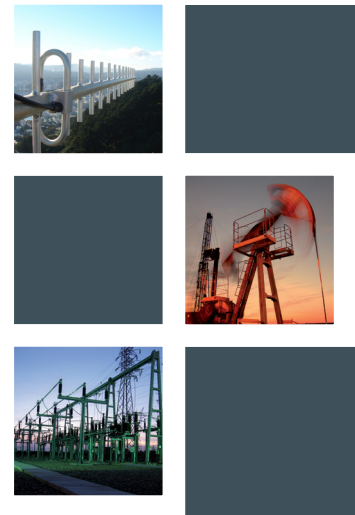
Aprisa SR+

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. Automatic Transmit Power Control maintains the minimum transmit power required for effective communications enhancing both frequency reuse and power savings. 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 (point-to-point option)
- 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
- Automatic Transmit Power Control: reduces interference in large networks, improves power savings
- 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 USB connected GPS receiver
- Protected station option
- 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 SMAC/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 (PTMP), Master, Remote, Repeater Point-To-Point (PTP) FD see 'Aprisa SR+ PTP Datasheet'						
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	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 (Note 3)	15 kHz	25 kHz	30 kHz	50 kHz	100 kHz	
SENSITIVITY (BER < 10 ⁻⁶)	min coded	256 QAM	–95 dBm	–91 dBm	–88 dBm	–85 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 min 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, 700, 896, 450	135, 220	220, 400, 450, 896, 928	700	135, 220, 400, 896, 928	700	700, 896, 928
256 QAM	72 kbit/s 80 kbit/s	72 kbit/s 80 kbit/s	128 kbit/s 160 kbit/s	128 kbit/s	288 kbit/s 320 kbit/s	576 kbit/s	
64 QAM	54 kbit/s 60 kbit/s	54 kbit/s 60 kbit/s	96 kbit/s 120 kbit/s	96 kbit/s	216 kbit/s 240 kbit/s	432 kbit/s	
16 QAM	36 kbit/s 40 kbit/s	36 kbit/s 40 kbit/s	64 kbit/s 80 kbit/s	64 kbit/s	144 kbit/s 160 kbit/s	288 kbit/s	
QPSK	18 kbit/s 20 kbit/s	18 kbit/s 20 kbit/s	32 kbit/s 40 kbit/s	32 kbit/s	72 kbit/s 80 kbit/s	144 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	19.2 kbit/s	38.4 kbit/s 38.4 kbit/s	76.8 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		
CRYPTOGRAPHIC PROTECTION	FIPS 140-2		
IPSEC	Transparent		
INTERFACES			
ETHERNET PORTS	RJ45 10/100Base-T auto-neg MDI/MDIX		
SERIAL PORTS	RJ45 RS-232 Additional RS-232 / RS-485 port via USB converter (option)		
GPS RECEIVER	Support for optional USB connected GPS receiver		
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 (specified at order)			
DATA PORT CONFIGURATION OPTIONS	2 x Ethernet ports + 2 serial ports 3 x Ethernet ports + 1 serial port 4 x Ethernet ports		
DUPLEX OPTIONS	Half Duplex or Full Duplex		
PROTECTED STATION OPTION	Providing hot-swappable / hot-standby redundant hardware switching		
POWER			
INPUT VOLTAGE	Radio 10 – 30 VDC negative earth Protected Station 10 – 60 VDC floating		
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	Radio 1.25 kg (2.81 lbs) Protected Station 10.0 kg (22 lbs) (includes the 2 radios)		
MOUNTING	Wall, Rack or DIN rail (radio only)		
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		
OVER THE AIR	Low overhead SuperVisor Extended Network Management (EXM)		
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.

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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