# 4RF

Aprisa SR+

SMART, SECURE POINT-TO-POINT RADIO

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 800 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.
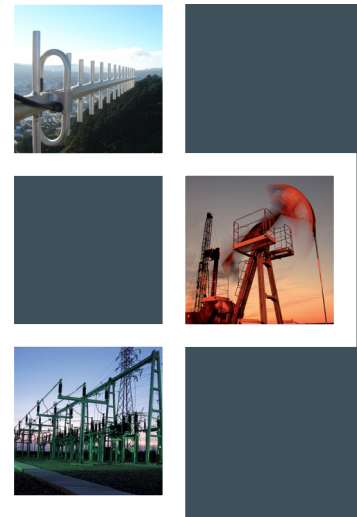
The Aprisa SR+ PTP in brief

- 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)
- Two frequency full duplex operation
- Data rates of up to 800 kbit/s full duplex
- Pass band duplexer options
- 256, 192 or 128 bit AES encryption
- AES-CCM to NIST SP 800-38C
- Adaptive Coding and Modulation: QPSK to 64 QAM
- Advanced forward error correction
- Ethernet and IP / TCP / UDP header compression (ROHC) and payload compression
- 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
- 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
- 434 mm (W) x 315 mm (D) x 44.45 mm (H) (dependent on duplexer type)
- FCC and IC standards compliant

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)

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SYSTEM SPECIFICATION

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 all common SCADA protocols such as Modbus, IEC 60870-5-101/104, DNP3 or similar

RADIO

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 3)	450 MHz	450 – 520 MHz	6.25 kHz
	(Note 3)	700 MHz	757 – 758 & 787 – 788 MHz	6.25 kHz
	(Note 4)	896 MHz	896 – 902 MHz	6.25 kHz
	(Note 4)	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		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	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

RECEIVER			12.5 kHz	25 kHz	50 kHz	100 kHz
SENSITIVITY (BER < 10^{-6})	max coded	64 QAM	−101 dBm	−97 dBm	−94 dBm	−91 dBm
	max coded	16 QAM	−108 dBm	−105 dBm	−102 dBm	−99 dBm
	max coded	QPSK	−113 dBm	−110 dBm	−107 dBm	−104 dBm
ADJACENT CHANNEL SELECTIVITY			> −45 dBm	> −35 dBm	> −35 dBm	> −35 dBm
(Note 1)			[> 48 dB]	[> 58 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			> −33 dBm [> 60 dB Note 1]			
BLOCKING OR DESENSITISATION			> −15 dBm [> 78 dB Note 1]			
SPURIOUS RESPONSE REJECTION			> −30 dBm [> 63 dB Note 1]			

MODEM

MODEM	12.5 kHz (Note 2)		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	
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	400 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	267 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	134 kbit/s	
OCC BW	10.7 kHz	12.0 kHz	10.7 kHz	12.0 kHz	19.8 kHz	24.5 kHz	19.8 kHz	43.0 kHz	48.0 kHz	85.0 kHz	

FORWARD ERROR CORRECTION	Variable Reed Solomon plus convolutional code
ADAPTIVE BURST SUPPORT	Adaptive Coding and Modulation

DUPLEXER

DUPLEXER	135 MHz N0	220 MHz	400 MHz B0	450 MHz M0	700 MHz E0	896/928 MHz G2
BANDS						
PASSBAND	0.5 MHz	Note 5	2.0 MHz	0.5 MHz	7.0 MHz	1.0 MHz
TX / RX Split	≥ 4.6 MHz		≥ 9.45 MHz	≥ 5.0 MHz	≥ 30.0 MHz	9.0 MHz

SECURITY

DATA ENCRYPTION	256, 192 or 128 bit AES
DATA AUTHENTICATION	CCM

INTERFACES

ETHERNET	2, 3 or 4 port RJ45 10/100Base-T 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 (option)
MANAGEMENT	1 x USB micro type B (device port) 1 x USB standard type A (host port) 1 x Alarm port RJ45
ANTENNA	1 x N-type Female 50 ohm
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 (13.8 V nominal)
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 44.45 mm (H) 1 RU 17.1" (W) x 12.4" (D) x 1.75" (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		5.0 kg (11.3 lbs) (dependant on duplexer type)
MOUNTING		Rack mount 19" 1U high including duplexer except for 135 MHz N0, 400 MHz B0 and 450 MHz M0

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, Ingress Protection IP51
	Substation hardened to IEEE 1613 class 2 and IEC 61850-3

Notes:

1. 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.
2. The gross data rate for the 12.5 kHz channel size varies with regulatory compliance.
3. The 450 MHz and 700 MHz bands are only available for FCC.
4. The receive tuning range is specified. The transmit tuning range is 896 - 960 MHz.
5. Contact 4RF for options

ABOUT 4RF

Operating in more than 140 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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