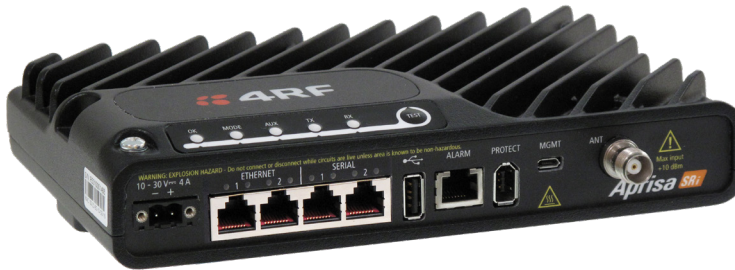


Supporting  
Multi-Hop Store &  
Forward Repeaters

**Aprisa** *SRi*

## UTILITY-GRADE UNLICENSED SCADA

902-907.5 and 915-928 MHz Industrial Licence Free Spread Spectrum



Utility-grade unlicensed radio for Aprisa edge-of-network extension and other applications up to 100 km / 62 miles line-of-sight

Based on proven Aprisa technology, the Aprisa SRi is a licence free 902-907.5 and 915-928 MHz ANATEL radio with unprecedented flexibility and security.

- **Secure:** with its defense in depth approach including AES encryption, authentication, address filtering and user access control, the Aprisa SRi protects against malicious attacks and consumer-grade wireless vulnerabilities.
- **Flexible hopping channel and zone arrangements:** full band and reduced non-overlapping zone options allow a tailored approach to interference mitigation. Unique combination of advanced forward error correction (FEC) with packet synchronized selective ARQ combats interference. Time-sliced fast hop and advanced access control MAC delivers more usable throughput and reduced latency.
- **Future-proof:** the Aprisa SRi 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.
- **Aprisa SR family:** the Aprisa SRi is fully integrated with the Aprisa SR family and includes all family features including networking, management, and security. Maximize your experience with reduced training and time to value.
- **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.
- **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 advanced IP routing features ensure efficient transfer of data across the Aprisa SRi network.
- **Reliable and robust:** the Aprisa SRi 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 third party network management system.



### The Aprisa SRi in brief

- 902-907.5 and 915-928 MHz band
- RS-232 and IEEE 802.3 protocols
- Software selectable frequency hop sets with black list capability
- Gross data rates up to 320 kbit/s
- Half duplex operation
- 256, 192 or 128 bit AES encryption
- Adaptive Coding and Modulation: QPSK to 256 QAM
- Enhanced Noise Rejection Mode enabled by default
- 31 Level Multi-Hop Store & Forward Repeaters
- AES-CCM to NIST SP 800-38C
- 1W peak output power
- Advanced FEC, packet synchronized selective ARQ
- Dedicated alarm port
- 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

### Aprisa SRi applications

- Electricity grid: distribution automation DA/DFA/DR and Volt/VAR cap banks
- Smart grid: concentrator communications and GPRS replacement
- Renewables: distributed energy DER/DERM for solar and wind farms
- Water and wastewater: flow, level, and pressure modulation
- Oil & Gas: wellhead automation, production metering, lift pump automation

### Aprisa SRi typical application deployment

- On site applications: intra-substation 'inside the fence' MV substation automation, water treatment plants, single and multi-well pads
- Tail-end links: Aprisa SR licensed network extensions and vault communications
- Medium range applications: water catchment management and coalbed methane (CBM) production

### SYSTEM SPECIFICATION

GENERAL			
NETWORK TOPOLOGY		Point-to-multipoint (PMP); Base, 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 FHSS	
SCADA		Transparent to all common SCADA protocols such as Modbus, IEC 60870-5-101/104, DNP3 or similar	
RADIO			
FREQUENCY BAND		902-907.5 and 915-928 MHz	
CHANNEL SIZE		50 kHz	
NUMBER OF CHANNELS PER HOP ZONE		35	
NUMBER OF STANDARD HOP ZONES		8 (non-overlapping)	
FULL BAND OPTION		280 channels full band single zone	
ZONE / CHANNEL SELECTION		Zone selection list and channel black list	
FREQUENCY STABILITY		± 1.0 ppm	
FREQUENCY AGING		< 1 ppm / annum	
TRANSMITTER			
MAX PEAK ENVELOPE POWER (PEP)		1.0 W (+30 dBm)	
AVERAGE POWER OUTPUT		(Note 3)	256 QAM 0.01 – 0.16 W (+10 to +22 dBm, in 1 dB steps)
			64 QAM 0.01 – 0.2 W (+10 to +23 dBm, in 1 dB steps)
			16 QAM 0.01 – 0.25 W (+10 to +24 dBm, in 1 dB steps)
			QPSK 0.01 – 0.4 W (+10 to +26 dBm, in 1 dB steps)
SPURIOUS EMISSIONS		< -37 dBm	
ATTACK TIME		< 1.5 ms	
RELEASE TIME		< 0.5 ms	
DATA TURNAROUND TIME		< 2 ms	
RECEIVER		50 kHz	
SENSITIVITY (BER < 10 <sup>-6</sup> )		(Note 3)	256 QAM -90 dBm
			64 QAM -96 dBm
			16 QAM -104 dBm
			QPSK -109 dBm
RECEIVER PERFORMANCE			
ADJACENT CHANNEL SELECTIVITY		> -37 dBm	
		(Note 1)	[> 58 dB]
CO-CHANNEL REJECTION QPSK		> -10 dB	
CO-CHANNEL REJECTION 256 QAM		> -26 dB	
INTERMODULATION RESPONSE REJECTION		> -35 dBm [> 60 dB <sup>Note 1</sup> ]	
BLOCKING OR DESENSITISATION		> -17 dBm [> 78 dB <sup>Note 1</sup> ]	
SPURIOUS RESPONSE REJECTION		> -32 dBm [> 63 dB <sup>Note 1</sup> ]	
MODEM			
GROSS DATA RATE		(Note 3)	256 QAM 320 kbit/s
			64 QAM 240 kbit/s
			16 QAM 160 kbit/s
			QPSK 80 kbit/s
OCCUPIED BANDWIDTH		50 kHz	
FORWARD ERROR CORRECTION		Variable Reed Solomon plus convolutional code	
ADAPTIVE BURST SUPPORT		Adaptive Coding and Modulation	

#### 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 coded FEC.
- This device must be professionally installed. The installer must adjust the output power to meet ANATEL Resolution No. 680 after considering cable loss and antenna gain.
- Please consult 4RF for availability.

SECURITY		
DATA ENCRYPTION		256, 192 or 128 bit AES
DATA AUTHENTICATION		CCM
CRYPTOGRAPHIC PROTECTION		FIPS 140-2
IPSEC		Transparent
INTERFACES		
ETHERNET		2 ports RJ45 10/100Base-T switch
SERIAL		2 ports RJ45 RS-232 Additional RS-232 / RS-485 port via USB converter (optional)
GPS RECEIVER		Support for NMEA GPS receiver with radio coordinates
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 TNC 50 ohm female
LEDs		Status: OK, MODE, AUX, TX, RX Diagnostics: RSSI, traffic port status
TEST BUTTON		Toggles LEDs between diagnostics / status
PRODUCT OPTIONS (specified at order)		
PROTECTED STATION OPTION		Providing hot-swappable / hot-standby redundant hardware switching (10-60 VDC)
POWER		
INPUT VOLTAGE	Radio	10 – 30 VDC negative earth
	Protected Station	10 – 60 VDC floating
RECEIVE		< 4.5 W (326 mA at 13.8 VDC) in active receive state  < 2.0 W (145 mA at 13.8 VDC) in idle receive state  < 0.5 W (36 mA at 13.8 VDC) in sleep mode
TRANSMIT		< 15 W (1086 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
OVER THE AIR		Low overhead SuperVisor Extended Network Management (EXM)
COMPLIANCE		
RF / EMC		Resolution No. 680
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

### 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 and PDH applications.

Made in USA from local and imported parts.

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