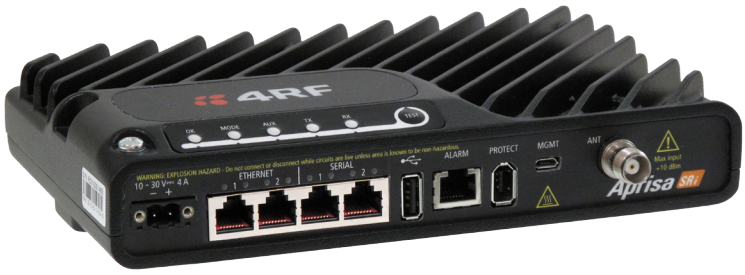
Aprisa SRi

UTILITY-GRADE UNLICENSED SCADA

902-928 MHz Industrial Licence Free Spread Spectrum



Utility-grade unlicensed radio for Aprisa edge-of-network extension and other short-range applications

Based on proven Aprisa technology, the Aprisa SRi is a licence free 902-928 MHz FCC Part 15 / IC RSS-247 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

- FCC / IC 902-928 MHz band
- RS-232 and IEEE 802.3 protocols
- Software selectable frequency hop sets with black list capability
- Gross data rates up to 240 kbit/s
- Half duplex operation
- 256, 192 or 128 bit AES encryption
- Adaptive Coding and Modulation: QPSK to 64 QAM
- AES-CCM to NIST SP 800-38C
- 1W peak output power
- Advanced FEC, packet synchronized selective ARQ
- Dedicated alarm port
- 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)
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 FHSS
SCADA	Transparent to all common SCADA protocols such as Modbus, IEC 60870-5-101/104, DNP3 or similar
RADIO	
FREQUENCY BAND	902 – 928 MHz
CHANNEL SIZE	50 kHz
NUMBER OF CHANNELS PER HOP ZONE	50
NUMBER OF STANDARD HOP ZONES	8 (non-overlapping)
FULL BAND OPTION	400 channels full band single zone
ZONE / CHANNEL SELECTION	Zone selection list and channel black list
FREQUENCY STABILITY	± 0.5 ppm
FREQUENCY AGING	< 1 ppm / annum
TRANSMITTER	
MAX PEAK ENVELOPE POWER (PEP)	1.0 W (+30 dBm)
AVERAGE POWER OUTPUT	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^{-6})	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 64 QAM	> –20 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	
GROSS DATA RATE	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

SECURITY	
DATA ENCRYPTION	256, 192 or 128 bit AES
DATA AUTHENTICATION	CCM
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)
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
POWER	
INPUT VOLTAGE	10 – 30 VDC (13.8 V nominal)
RECEIVE	< 4.5 W
TRANSMIT	< 15 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	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 15.247 FCC ID: UIPSI902M160
	IC RSS-247 IC: 6772A-SI902M160
EMC	FCC CFR47 Part 15 Subpart C
	IC RSS-Gen
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

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 coded FEC.
2. This device must be professionally installed. The installer must adjust the output power to meet FCC Part 15 / IC RS-247 rules after considering cable loss and antenna gain.

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 and PDH applications.

Made in USA from local and imported parts.

4RF

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