Aviat
NETWORKS

Aprisa SR+

SMART, SECURE POINT-TO-MULTIPOINT RADIO

VHF, 220 MHz, and UHF licensed bands. Private Market Spectrum 220, 700, and 900 MHz

DATASHEET [FCC / IC]

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.

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

Specifications

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	Frequency Band (MHz)	Tuning Range (MHz)	Tune Step (kHz)
Frequency Range	135	135 – 175	0.625
	220	215 – 240	0.625
	400	400 – 470	6.25
	450 [4]	450 – 520[4]	6.25[4]
	700 [4]	757 – 758[4] 787 – 788[4]	6.25[4]
	896 [5]	896 – 902[5]	6.25[5]
	928 [5]	928 – 960[5]	6.25[5]
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)
	4-CPFSK	0.01 – 10.0 W (+10 to +40 dBm, in 1 dB steps)[2]
Adjacent Channel Power	< –60 dBc	
Transient Adjacent Channel Power	< –60 dBc	
Spurious Emissions	< –37 dBm	
Attack Time	< 1.5 ms	

Transmitter	
Release Time	< 0.5 ms
Data Turnaround Time	< 2 ms
Emission Designator	Contact Aviat Networks for Emission Reports.

Receiver			12.5 kHz	25 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-QPSK	–113 dBm	–110 dBm	–107 dBm	–104 dBm
Adjacent Channel Selectivity			>–47 dBm	>–37 dBm	>–37 dBm	>–37 dBm
		[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 [1]]			
Blocking or Desensitisation			>–17 dBm [>78 dB [1]]			
Spurious Response Rejection			>–32 dBm [>63 dB [1]]			

Modem	12.5 kHz[3]		15 kHz		25 kHz		30 kHz	50 kHz		100 kHz
Gross Data Rate (kbit/s)										
Bands (MHz)	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	72	80	72	80	128	160	128	288	320	576
64 QAM	54	60	54	60	96	120	96	216	240	576
16 QAM	36	40	36	40	64	80	64	144	160	288
QPSK	18	20	18	20	32	40	32	72	80	144
4-QPSK	9.6	9.6	9.6	9.6	19.2	19.2	19.2	38.4	38.4	76.8
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 (optional)
GPS Receiver	Support for optional USP connect 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 Options	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 (not including connectors)	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
Humidity	Maximum 95 % non-condensing

Management & Diagnostics	
Local Management	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 NetworkManagement (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	EN/UL/IEC 62368-1, CB Certified, UL listed		
Hazardous Location	Class 1 division 2 for hazardous locations		
Environmental	ETS 300 019 Class 3.4 Ingress Protection IP51		
Electric Substation	IEEE 1613 Class 2, 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] Please consult Aviat Networks for availability
[3] The gross data rate for the 12.5 kHz channel size varies with regulatory compliance
[4] The 450 MHz and 700 MHz bands are only available for FCC.
[5] The receive tuning range is specified. The transmit tuning range is 896 - 960 MHz.

Disclaimer

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