

# Aprisa XE

## POINT-TO-POINT DIGITAL MICROWAVE LINKS 2.0 GHz licensed band



### 2.0 GHz Aprisa XE: maximizing spectrum use and making challenging long distance links possible

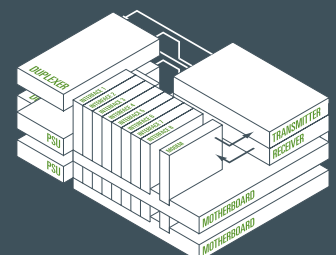
- **Efficient future-proof single-box architecture:** the Aprisa XE's built-in multiplexer and cross-connect eliminate external equipment and minimize the over-the-air requirements, with customer-configurable interface slots integrating all IP, voice and data traffic. Configuration, performance monitoring and diagnostics are easy with the 4RF embedded web-based element management system, SuperVisor.
- **High capacity:** class-leading spectral efficiency and up to 64 QAM modulation make the maximum use of the available spectrum, with industry leading capacity of up to 65.4 Mbit/s in a 14.0 MHz channel.
- **Long range:** a single 2.0 GHz Aprisa XE can link distances in excess of 80 miles, overcoming the problems of water, environmental conditions and topographical obstacles.
- **Carrier-class performance:** Aprisa XE links are engineered to achieve 'five 9s' availability, benefiting from state of the art forward error correction and inherent low latencies, for unrivaled quality of service.
- **Cost effective:** the Aprisa XE has a low total cost of ownership, providing a rapid return on investment by minimizing both capital and operational expenditure.
- **Redundancy options:** Monitored Hot Standby and Hitless Space Diversity are available for protection in mission-critical applications.
- **Reliable:** the Aprisa XE has an actual MTBF of 95.72 years, and zero out-of-the-box failures in 2008. It can be relied upon to perform in the harshest and most remote environments.



### The Aprisa XE in brief

- Licensed 2.0 GHz frequency band
- Built-in cross-connect and multiplexer
- Up to 65.4 Mbit/s capacity
- 500 kHz, 1.0 MHz, 1.75 MHz, 3.5 MHz, 7.0 MHz and 14.0 MHz channel sizes
- QPSK to 64 QAM modulation
- Range of 80+ miles
- Industry-leading reliability
- Web server and SNMP management
- All voice, data and IP applications
- MHSB and HSD protection options

### Future-proof single-box architecture



## SYSTEM SPECIFICATION

RF	BAND	TUNING RANGE	SYNTHESIZER STEP SIZE
FREQUENCIES	2000 MHz	1900 – 2300 MHz	62.5 kHz
MODULATION TYPES	Software configurable: 16/32/64 QAM		
FREQUENCY STABILITY	Short term $\pm 1$ ppm (environmental effects and power supply variations) Long term $\pm 2$ ppm (aging of crystal oscillators $\approx$ over 5 years)		
ANTENNA CONNECTION	N-type female 50 ohm		
TRANSMITTER OUTPUT POWER			
QPSK	+20 dBm to +34 dBm		
16 QAM	+17 dBm to +31 dBm		
32 QAM	+16 dBm to +30 dBm		
64 QAM	+15 dBm to +29 dBm		
RECEIVER			
MAXIMUM INPUT LEVEL	-20 dBm		
DYNAMIC RANGE	58 to 87 dB at $10^{-6}$ BER		
C/I RATIO	Co-channel	QPSK	better than 16 dB
		16 QAM	better than 20 dB
		32 QAM	better than 23 dB
		64 QAM	better than 27 dB
		First adjacent channel	better than -5 dB
	Second adjacent channel	better than -30 dB	
DUPLEXER (bandpass)	PASSBAND	TX / RX SPLIT	TUNING RANGE
	14 MHz	$\geq 91$ MHz	1900 – 2300 MHz
POWER SUPPLY			
INPUT RANGE	115 / 230 VAC, 50/60 Hz $\pm 24$ VDC (20.5 – 30 VDC), $\pm 48$ VDC (40 – 60 VDC)		
POWER CONSUMPTION	53 – 180 W input power (dependent on interface cards fitted and transmitter output power level)		

INTERFACES	
ETHERNET	Integrated 4-port 10/100Base-T switch with port-based rate limiting, VLAN tagging and QoS Support
E1 / T1	Quad 120 ohm G.703/4
DATA	Quad V.24 asynchronous, synchronous and over sampling mode Single synchronous X.21 / V.35 / RS-449 / RS-530
ANALOG	Dual 2-wire FXS/FXO (POTS); Quad 4-wire E&M
AUXILIARY INTERFACES	
ALARMS	4 external alarm outputs, 2 external alarm inputs
CONFIGURATION	Embedded web server with SNMP
MANAGEMENT	Ethernet interface for SuperVisor and SNMP; V.24 setup port
RSSI	Front panel test point
ENVIRONMENTAL	
OPERATING	+14° F to +122° F (-10° C to +50° C)
STORAGE	-4° F to +158° F (-20° C to +70° C)
HUMIDITY	Maximum 95 % non-condensing
MECHANICAL	
RACK MOUNT	19" 2U high (internal duplexer)
WEIGHT	23 lbs (10 kg) typical
PROTECTED OPTIONS	
MHSB	$\leq 4$ dB splitter / cable loss, $\leq 1$ dB TX relay / cable loss (system gain reduced by a maximum of 5 dB)
HSD	$\leq 1$ dB TX relay / cable loss, < 25 ms TX switching / hitless RX switching
COMPLIANCE	
RADIO	RSS-GEN, RSS-119, SRSP-302.0
EMI / EMC	ICES-003
SAFETY	EN 60950 CSA 253147 applicable for AC, 48 VDC and 24 VDC product variants
ENVIRONMENTAL	ETS 300 019 Class 3.2, WEEE

## SYSTEM PERFORMANCE

500 kHz CHANNEL		QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	gross (T1 + wayside)	792 ( 12 TS + 24 ) kbit/s	1592 ( 1 T1 + 8 ) kbit/s	1992 ( 1 T1 + 408 ) kbit/s	2392 ( 1 T1 + 808 ) kbit/s
RECEIVER SENSITIVITY <sup>2</sup>		-99 dBm	-93 dBm	-90 dBm	-87 dBm
SYSTEM GAIN <sup>2</sup>		133 dB	124 dB	120 dB	116 dB
1.0 MHz CHANNEL		QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	gross (T1 + wayside)	1624 ( 1 T1 + 40 ) kbit/s	3256 ( 2 T1 + 88 ) kbit/s	4072 ( 2 T1 + 904 ) kbit/s	4888 ( 3 T1 + 136 ) kbit/s
RECEIVER SENSITIVITY <sup>2</sup>		-96 dBm	-90 dBm	-87 dBm	-84 dBm
SYSTEM GAIN <sup>2</sup>		130 dB	121 dB	117 dB	113 dB
1.75 MHz CHANNEL		QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	gross (T1 + wayside)	2872 ( 1 T1 + 1288 ) kbit/s	5752 ( 3 T1 + 1000 ) kbit/s	7192 ( 4 T1 + 856 ) kbit/s	8632 ( 5 T1 + 712 ) kbit/s
RECEIVER SENSITIVITY <sup>2</sup>		-94 dBm	-88 dBm	-85 dBm	-82 dBm
SYSTEM GAIN <sup>2</sup>		128 dB	119 dB	115 dB	111 dB
3.5 MHz CHANNEL		QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	gross (T1 + wayside)	5720 ( 3 T1 + 968 ) kbit/s	11448 ( 7 T1 + 360 ) kbit/s	14312 ( 9 T1 + 56 ) kbit/s	17176 ( 10 T1 + 1336 ) kbit/s
RECEIVER SENSITIVITY <sup>2</sup>		-90 dBm	-84 dBm	-81 dBm	-78 dBm
SYSTEM GAIN <sup>2</sup>		124 dB	115 dB	111 dB	107 dB
7.0 MHz CHANNEL		QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	gross (T1 + wayside)	11832 ( 7 T1 + 744 ) kbit/s	23672 ( 14 T1 + 1496 ) kbit/s	29592 ( 18 T1 + 1080 ) kbit/s	35512 ( 22 T1 + 664 ) kbit/s
RECEIVER SENSITIVITY <sup>2</sup>		-87 dBm	-81 dBm	-78 dBm	-75 dBm
SYSTEM GAIN <sup>2</sup>		121 dB	112 dB	108 dB	104 dB
14.0 MHz CHANNEL		QPSK	16 QAM	32 QAM	64 QAM
CAPACITY <sup>1</sup>	gross (T1 + wayside)	N/A	47992 ( 30 T1 + 472 ) kbit/s	59992 ( 32 T1 + 9304 ) kbit/s	65464 ( 32 T1 + 14776 ) kbit/s
RECEIVER SENSITIVITY <sup>2</sup>		N/A	-78 dBm	-75 dBm	-72 dBm
SYSTEM GAIN <sup>2</sup>		N/A	109 dB	105 dB	101 dB

## NOTES

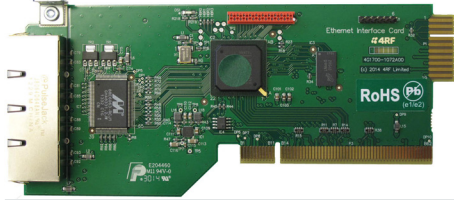
<sup>1</sup> T1 capacities are specified as unframed. The management Ethernet capacity must be subtracted from the gross capacity (default 64 kbit/s).

<sup>2</sup> Performance specified at the antenna port for 10<sup>-6</sup> BER. Figures for 10<sup>-3</sup> BER are typically 1 dB better.

<sup>3</sup> Unreleased: Please contact 4RF for availability.

### QETH

#### Quad port Ethernet interface card supporting 10Base-T or 100Base-TX

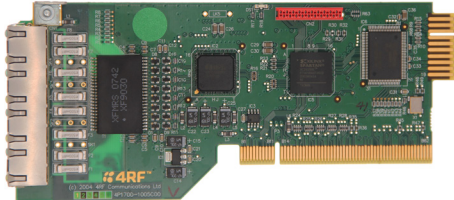


The QETH is a quad port Ethernet interface card supporting 10Base-T or 100Base-TX for transport of user Ethernet traffic. The QETH features are:

- Layer 2 Ethernet / VLAN Switch conforming to 802.1D/Q supporting standard LAN networks
- Traffic segregation with transparent VLAN and per port VLAN tagging for user and management traffic.
- QoS support for tight traffic control with per packet prioritization, scheduling and priority queuing. Priority can be either per port or per packet and scheduling can be either strict priority or weighted priority. Ingress rate limiting per port (up to 8 Mbit/s) can be used to protect against buffer flooding.

### QJET

#### Quad E1 / T1 framed / unframed interface card



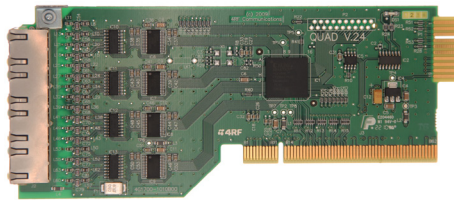
The QJET is a quad port 2 Mbit/s E1 / T1 digital interface providing unframed (G.703) and framed (G.704) interfaces. Unframed (G.703) E1 is typically used for transport of an entire E1 / T1 over the radio link.

Framed (G.704) E1 / T1 timeslots can be cross connected to:

1. Any other E1 / T1 timeslot on any other E1 / T1 interface providing transport, timeslot grooming and drop and insert functionality.
2. Analogue interface cards providing digital trunk interface connection to PBX and telephone exchanges.
3. QV24 interface cards providing synchronous over sampling circuits.

### QV24

#### Quad V.24 serial interface card



The QV24 is a quad port serial interface card providing asynchronous and synchronous V.24 data transmission.

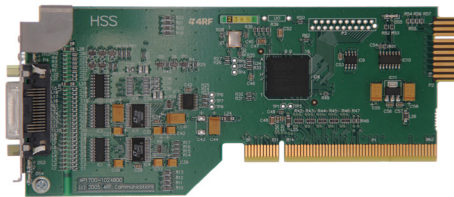
Asynchronous mode provides V.24 circuits at data rates of 300, 600, 1200, 2400, 4800, 7200, 9600, 12800, 14400, 19200, 23040, 28800, 38400, 57600 and 115200 bit/s.

In synchronous mode, interface data is synchronously mapped to radio capacity using proprietary subrate multiplexing providing data rates of 300, 600, 1200, 2400, 4800, 9600 and 19200 bit/s. QV24 interfaces are required at both ends of the circuit.

In over sampling mode, the interface data is sampled at a fixed 64 kHz. This timeslot can be cross connected to an E1 or T1. This over sampling mode can be operated up to 19200 bit/s.

### HSS

#### Single synchronous serial interface card



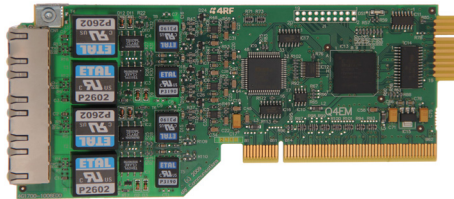
The HSS is a single port high speed serial interface card providing V.35, X.21, RS-449 and RS-530 synchronous data transmission as either a DTE or a DCE. It supports data rates of 8 to 2048 kbit/s in 8 kbit/s steps (dependent on rate selected). 8 kbit/s is used for control lines.

The interface card provides an LFH 60 connector and uses standard Cisco WAN port serial interface cables to provide the correct data interface connector.

The interface specification (X.21 / V.35 etc) is automatically changed by simply changing the type of interface cable connected to the HSS.

### Q4EM

#### Quad 4 wire E&M interface card



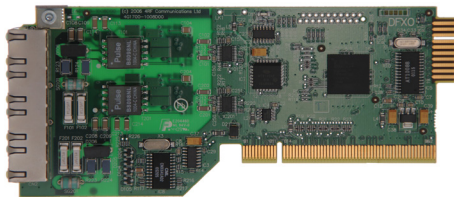
The Q4EM is a quad port analogue interface card providing a 4 wire analogue circuit and single E&M signalling.

The Q4EM digitizes analogue signals using either 64 kbit/s PCM (G.711-compliant) or 32, 24 or 16 kbit/s ADPCM compression (G.726-compliant), providing phone-quality voice transmission. Channel Associated Signalling (A bit) is used to signal between the interfaces.

The Q4EM E&M signalling leads are optically isolated, bi-directional lines which can be externally referenced to meet any of the EIA-464 connection types I, II, IV or V.

### DFXO

#### Dual 2 wire loop signalling foreign exchange office (FXO) interface card



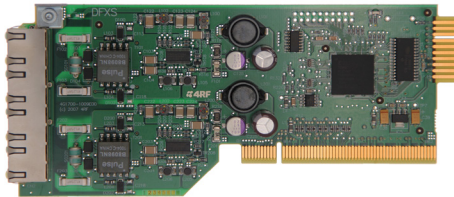
The function of FXO / FXS two wire loop interface circuits is to transparently extend the 2 wire interface from the exchange line card to the telephone / PBX, ideally without loss or distortion. These circuits are known as 'ring out, dial in' 2 wire loop interface circuits. The DFXO interface simulates the function of a telephone.

The DFXO digitizes analogue signals using either 64 kbit/s PCM (G.711-compliant) or 32, 24 or 16 kbit/s ADPCM compression (G.726-compliant), providing phone-quality voice transmission. Channel Associated Signalling (ABCD bits) is used to signal the remote DFXS.

Line and balance impedances are synthesized with high-performance DSP architecture.

### DFXS

#### Dual 2 wire loop signalling foreign exchange subscriber (FXS) interface card



The function of FXO / FXS two wire loop interface circuits is to transparently extend the 2 wire interface from the exchange line card to the telephone / PBX, ideally without loss or distortion. These circuits are known as 'ring out, dial in' 2 wire loop interface circuits. The DFXS interface simulates the function of an exchange line card.

The DFXS digitizes analogue signals using either 64 kbit/s PCM (G.711-compliant) or 32, 24 or 16 kbit/s ADPCM compression (G.726-compliant), providing phone-quality voice transmission. Channel Associated Signalling (ABCD bits) is used to signal the remote DFXO.

Line and balance impedances are synthesized with high-performance DSP architecture.

### ABOUT 4RF

Operating in more than 130 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 analog, serial data and PDH applications.

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