Digital Microwave Radio

Applications
The Aprisa XE digital microwave radio is a powerful point-to-point wireless access solution enabling connectivity over challenging radio paths and between two fixed points up to 100 kilometres apart. It provides up to 65 Mbit/s capacity for robust, carrier-class transmission of a wide-range of broadband enabled services (including Internet, LAN interconnect, VPN, VoIP, video conferencing, and web-hosting) and integrated voice and data services (including remote monitoring and control data, phone, PBX, mobile radio, and fax).

Performance
The Aprisa XE radio operates in the sub 3 GHz licensed bands enabling exclusive frequency assignment, minimizing interference and guaranteeing performance. These bands provide highly reliable carrier-class performance over long distances and difficult terrain, particularly water and partly obscured paths. The RF design integrates high-performance digital processing techniques including FEC (Forward Error Correction), interleaving and a 20-tap transversal adaptive equalizer. These minimize transmission degradation from interference and atmospheric or multipath effects. Sophisticated modulation techniques enable efficient transmission in narrow channels, minimizing spectrum use for situations where that resource may be limited and expensive.

Integration and Configuration
The Aprisa XE features an in-built multiplexer managing data, voice and IP traffic with customer-configurable interfaces enabling straightforward integration with legacy and next-generation network elements. The Aprisa XE may be easily configured using 4RF SuperVisor™ - the embedded web-based element management application. SuperVisor requires no training and runs on any web browser. The Aprisa XE also features a standard SNMP interface for efficient remote management and NMS integration.
**GENERAL RF**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Band</th>
<th>Range</th>
<th>Synthesizer step size</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 MHz</td>
<td>300</td>
<td>300 - 400 MHz</td>
<td>6.25 kHz</td>
</tr>
<tr>
<td>400 MHz</td>
<td>400</td>
<td>400 - 700 MHz</td>
<td>6.25 kHz</td>
</tr>
<tr>
<td>600 MHz</td>
<td>600</td>
<td>600 - 900 MHz</td>
<td>6.25 kHz</td>
</tr>
<tr>
<td>700 MHz</td>
<td>700</td>
<td>700 - 800 MHz</td>
<td>12.5 kHz</td>
</tr>
<tr>
<td>800 MHz</td>
<td>800</td>
<td>800 - 880 MHz</td>
<td>25.0 kHz</td>
</tr>
<tr>
<td>900 MHz</td>
<td>900</td>
<td>900 - 960 MHz</td>
<td>25.0 kHz</td>
</tr>
<tr>
<td>1400 MHz</td>
<td>1400</td>
<td>1400 - 1560 MHz</td>
<td>12.5 kHz</td>
</tr>
<tr>
<td>2000 MHz</td>
<td>2000</td>
<td>1800 - 2000 MHz</td>
<td>62.5 kHz</td>
</tr>
<tr>
<td>2500 MHz</td>
<td>2500</td>
<td>2300 - 2700 MHz</td>
<td>62.5 kHz</td>
</tr>
</tbody>
</table>

- **Modulation types**: 18 / 32 / 64 QAM and QPSK, software configurable
- **Frequency stability**: < ±3 ppm
- **Antenna connection**: N-type female 50 ohm

**TRANSMITTER**

- **Power output**
  - QPSK: 300, 400, 600, 700, 800, 900, and 1400 MHz +21 to +35 dBm
  - QPSK: 2000 and 2500 MHz +20 to +34 dBm

**RECEIVER**

- **Maximum input level**: -20 dBm
- **Dynamic range**: 58 to 87 dB (10 dB / 16 QAM)
- **C/I ratio**: Co-channel QPSK better than 16 dB
- **1st adj. channel**: QPSK better than -5 dB
- **2nd adj. channel**: QPSK better than -10 dB

**DUPLEXER (BANDPASS)**

- **Passband**
  - TX / RX split
  - 500 kHz ≥ 5 MHz
  - ≥ 9.45 MHz
  - ≥ 20 MHz
  - 7 MHz ≥ 30 MHz
  - ≥ 45 MHz
  - ≥ 40 MHz
  - ≥ 48 MHz
  - ≥ 91 MHz
  - ≥ 74 MHz

**SYSTEM PERFORMANCE**

<table>
<thead>
<tr>
<th>Channel size</th>
<th>OPUS</th>
<th>16 DAM</th>
<th>32 QAM</th>
<th>64 DAM</th>
<th>Receiver sensitivity</th>
<th>System gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 kHz²</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>72 kbit/s</td>
<td>112 kbit/s</td>
<td>-105 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>1 T in 8 bit/s</td>
<td>96 kbit/s</td>
<td>1 T in 32 bit/s</td>
<td>1 T in 48 bit/s</td>
</tr>
<tr>
<td>50 kHz³</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>168 kbit/s</td>
<td>256 kbit/s</td>
<td>-103 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>2 T in 40 bit/s</td>
<td>208 kbit/s</td>
<td>4 T in 40 bit/s</td>
<td>91 dB</td>
</tr>
<tr>
<td>75 kHz⁴</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>264 kbit/s</td>
<td>400 kbit/s</td>
<td>-101 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>4 T in 8 bit/s</td>
<td>312 kbit/s</td>
<td>6 T in 16 bit/s</td>
<td>129 dB</td>
</tr>
<tr>
<td>150 kHz⁵</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>536 kbit/s</td>
<td>800 kbit/s</td>
<td>-98 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>8 T in 24 bit/s</td>
<td>672 kbit/s</td>
<td>12 T in 40 bit/s</td>
<td>127 dB</td>
</tr>
<tr>
<td>200 kHz²³</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>880 kbit/s</td>
<td>1024 kbit/s</td>
<td>-95 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>10 T in 40 bit/s</td>
<td>840 kbit/s</td>
<td>16 T in 80 bit/s</td>
<td>126 dB</td>
</tr>
<tr>
<td>250 kHz⁵</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>1024 kbit/s</td>
<td>1240 kbit/s</td>
<td>-95 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>12 T in 56 bit/s</td>
<td>1302 kbit/s</td>
<td>19 T in 24 bit/s</td>
<td>124 dB</td>
</tr>
<tr>
<td>500 kHz⁶</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>1592 kbit/s</td>
<td>1992 kbit/s</td>
<td>-93 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>12 T in 56 bit/s</td>
<td>1302 kbit/s</td>
<td>19 T in 24 bit/s</td>
<td>124 dB</td>
</tr>
<tr>
<td>1 MHz⁷</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>256 kbit/s</td>
<td>256 kbit/s</td>
<td>-90 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>1 E1 + 1568 kbit/s</td>
<td>2072 kbit/s</td>
<td>2 E1 + 712 kbit/s</td>
<td>121 dB</td>
</tr>
<tr>
<td>1.75 MHz⁸</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>256 kbit/s</td>
<td>256 kbit/s</td>
<td>-88 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>1 E1 + 1568 kbit/s</td>
<td>2072 kbit/s</td>
<td>2 E1 + 712 kbit/s</td>
<td>119 dB</td>
</tr>
<tr>
<td>3.5 MHz²³⁷</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>1144 kbit/s</td>
<td>14312 kbit/s</td>
<td>-84 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>2 E1 + 1575 kbit/s</td>
<td>14312 kbit/s</td>
<td>4 E1 + 280 kbit/s</td>
<td>115 dB</td>
</tr>
<tr>
<td>7 MHz⁸</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>1144 kbit/s</td>
<td>14312 kbit/s</td>
<td>-84 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>2 E1 + 1575 kbit/s</td>
<td>14312 kbit/s</td>
<td>4 E1 + 280 kbit/s</td>
<td>115 dB</td>
</tr>
<tr>
<td>14 MHz²³⁷</td>
<td>Gross</td>
<td>16 DAM</td>
<td>-</td>
<td>1144 kbit/s</td>
<td>14312 kbit/s</td>
<td>-84 dBm</td>
</tr>
<tr>
<td></td>
<td>E1 + wayside</td>
<td>QPSK</td>
<td>2 E1 + 1575 kbit/s</td>
<td>14312 kbit/s</td>
<td>4 E1 + 280 kbit/s</td>
<td>115 dB</td>
</tr>
</tbody>
</table>

**POWER SUPPLY**

- **Input range**: 115 / 230 VAC
- **Output**: 12 VDC (10.5 - 19 VDC) consult 4RF
- **Output**: 24 VDC (20.5 - 30 VDC)
- **Output**: 48 VDC (40 - 60 VDC)
- **Power consumption**: 63 – 180 W (dependant on interface cards fitted and radio TX power)

**MECHANICAL**

- **Weight**: 10 kg typical

**ETHERNET INTERFACE**

- **Type**: Integrated 4-port switch with port-based rate limiting, VLAN tagging, and QoS support

**OPTIONAL INTERFACE CARDS (6 slots)**

- **E1 / T1**: Quad G.703 / 4 (1/200 ohm)
- **Data**: Quad asynchronous V.24 / RS232
- **Single synchronous X.21 / V.35 / RS449 / RS530**: Dual 2 wire FAS / FXO (POTS)
- **Analogue**: Quad 4 wire E&M

**AUXILIARY INTERFACES**

- **Alarms**: 4 external alarm outputs, 2 external alarm inputs
- **Configuration**: Embedded web server with SNMP Management
- **Interface**: Via Ethernet interface or V.24 Setup
- **RS232**: Front panel test point

**ENVIRONMENTAL**

- **Operating**: -10 to +50 °C
- **Storage**: -20 to +70 °C
- **Humidity**: Maximum 95% non-condensing
- **Altitude**: Up to 5000 metres

**PROTECTED OPTIONS**

- **MHSB / space diversity**: ≤ 3.5 dB RX splitter loss, ≤ 1.5 dB TX relay loss
  - (system gain reduced by a maximum of 5 dB)

**COMPLIANCE**

- **Radio**: EN 302 217, EN 301 791, EN 300 369
- **EMI / EMC**: EN 301 489 Parts 1 & 4
- **Safety**: EN 60950

**DUPLEXER (BANDPASS)**

- **Passband**
  - TX / RX split
  - Bands
  - 500 kHz
  - ≥ 5 MHz
  - ≥ 9.45 MHz
  - ≥ 20 MHz
  - 7 MHz ≥ 30 MHz
  - ≥ 45 MHz
  - ≥ 40 MHz
  - ≥ 48 MHz
  - ≥ 91 MHz
  - ≥ 74 MHz

**Specifications are typical unless stated otherwise and are subject to change without notice.**

1. Contact 4RF for other duplexer and frequency options.
2. Performance specified at the antenna port for 10°/60°.
3. Figures for 1°/60° are typically 1 dB better.
4. E1 capacities specified as unframed.
5. BER: Figures for 10°/16 QAM)
6. System gains reduce by 3 dB for 32 QAM and 6 dB for 64 QAM.
7. System gains increase by 10 dB for QPSK (9 dB for QPSK in 2000 and 2500 MHz bands)
8. Only available in the 300 and 400 MHz bands
9. Only available in the 2000 and 2500 MHz bands
10. Only available in the 1400, 2000 and 2500 MHz bands
11. Only available in the 2000 and 2500 MHz bands