

## 4RF Communications

### DXR 200 Migration

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## 1 INTRODUCTION

For users of the DXR 200 from Harris Stratex Networks, the Aprisa XE from 4RF Communications provides a risk-free migration path to today's best-in-class point-to-point radios: this paper explains why.

4RF Communications was established ten years ago, the company's CTO and Founding Director having been responsible for much of the success of the DXR 200 during his time at MAS Technology, the original developers of the DXR 200. Many other members of the DXR engineering team now work at 4RF, continuing to support and develop the Aprisa XE products. Thousands of Aprisa XE units have been shipped to customers in over 100 countries throughout the world.

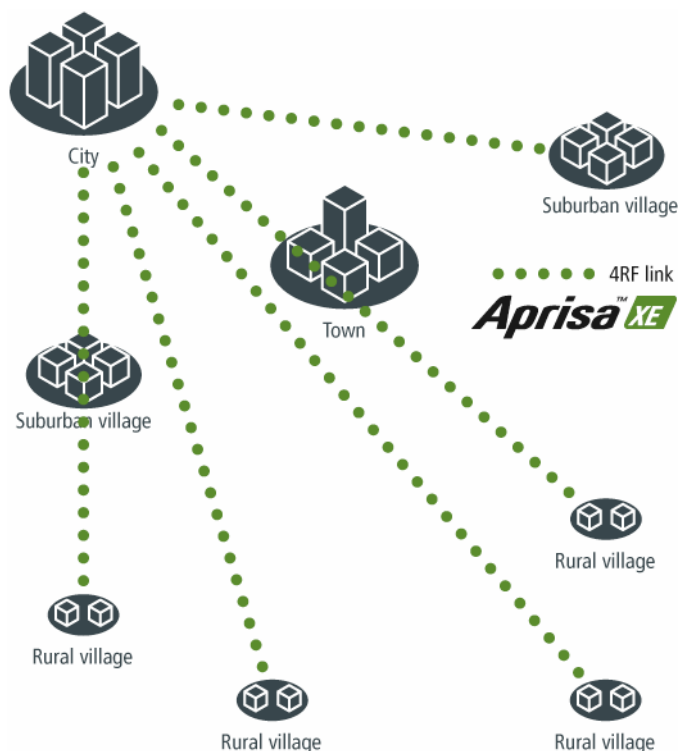
From a technical perspective, the Aprisa XE provides:

- Support for an increased range of frequency bands
- Increased flexibility in interface options
- Improved RF channel bandwidths and modulations
- A greater range of capacities
- The inclusion of hitless diversity to maximise link availability
- Significant reduction in the form factor and required rack space
- Ease of maintenance and minimal field failure rates

In addition to its superior technical performance, high level of flexibility and ease of management, the Aprisa XE presents customers with a low total cost of ownership and a rapid return on investment, supported by 4RF's range of network planning, support services and commitment to continued product development.

## 2 APRISA XE APPLICATIONS AND INDUSTRIES

The Aprisa XE is used to establish point-to-point connections across a broad range of industries, for applications ranging from real-time monitoring and control for utility providers through to the provision of rural broadband access by telecommunications operators:



*Bypassing existing infrastructure for rural mobile base stations: just one Aprisa XE application*

INDUSTRIES INCLUDE:	APPLICATIONS INCLUDE:
Fixed line telcos (PSTN, DSL, wireless broadband, Metro Ethernet)	Rural broadband access
Mobile telcos (GSM/CDMA, 2.5G/3G)	Cellular backhaul
Utilities (electric, gas, water)	WiMAX backhaul
Natural resources (oil, gas, mining)	Inter-exchange linking
Public safety and homeland security (police, fire, ambulance, coast guards, defence forces, border control)	DSL extension
Private and public enterprises	Remote base station backhaul
Broadcasters (television, radio)	Base station linkage
International aid organisations (economic aid, emergency / disaster relief agencies)	Private communications and signalling
	Real-time monitoring and control
	SCADA
	Landmobile connection, Tetra

*The Aprisa XE supports a wide range of industries and applications*

### 3 APRISA XE PERFORMANCE ENHANCEMENTS

With the same amount of spectrum, the Aprisa XE will always outperform the DXR 200.

The Aprisa XE supports a wide variety of industry-standard interfaces for all types of voice and data traffic, providing up to 65Mbit/s throughput. It can cover distances of up to 250km, minimising transmission degradation from interference and atmospheric or multipath effects.

The Aprisa XE makes best use of the available spectrum by employing sophisticated modulation techniques, enabling the maximum possible data to be transmitted in the least amount of spectrum. Forward Error Correction, interleaving and adaptive equalisation are standard for all channel options.

#### 3.1 Frequency Band Support

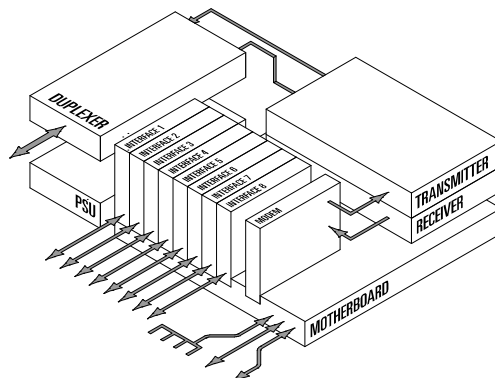
The Aprisa XE provides support for ten licensed frequency bands, giving customers the confidence that it can be deployed throughout the world. This also maximises flexibility, enabling the most appropriate band to be chosen for each installation according to spectrum availability and link requirements.

BAND:	SPECTRUM:
300MHz	330 – 400MHz
400MHz	400 – 470MHz
600MHz	620 – 715MHz
700MHz	698 – 806MHz
800MHz	805 – 890MHz
900MHz	850 – 960MHz
1400MHz	1350 – 1550MHz
1800MHz	1700 – 2000MHz
2000MHz	1900 – 2300MHz
2500MHz	2300 – 2700MHz

*The Aprisa XE supports ten licensed sub-3GHz bands: maximum flexibility throughout the world*

#### 3.2 Interface Options

The Aprisa XE has an integrated multiplexer, cross-connect and Ethernet switch, supporting data, voice and IP traffic, with customer-configurable interfaces enabling straightforward integration with legacy and next-generation network elements.



*The Aprisa XE architecture provides maximum flexibility*

**APRISA XE INTERFACES:**

E1 / T1 G.703 / 4  
2-Wire FXO / FXS  
4-Wire E&M  
V.24 / RS-232  
High-speed synchronous X.21 / V.35 / RS449 / RS530  
10 / 100 BaseT

*Variety of interface options  
provided for maximum flexibility*

### 3.3 Channel Bandwidths and Modulation

The Aprisa XE supports a number of different channel sizes:

- 500kHz in 300 and 400MHz bands
- 2MHz in 300 and 400MHz bands
- 3.5MHz in 300 and 400MHz bands
- 7MHz in 600, 700, 800, 900 and 1400MHz bands
- 14MHz in 1800, 2000 and 2500MHz bands

User-selectable modulation schemes supported by the Aprisa XE are QPSK, 16QAM, 32QAM, 64QAM and 128QAM, maximising the performance of the link, compared with the DQPSK and 16QAM modulation supported by the DXR 200 (with 16QAM only available in larger channel options).

### 3.4 Range of Capacities

The Aprisa XE provides a high degree of flexibility, with support from 1 to 840 channels, compared to the DXR 200's options of 4, 10, 30 or 60 channels. The overall capacity of the Aprisa XE ranges from 32kbit/s to 65Mbit/s, enabling customers to select the product options that best suit their deployment requirements and their budget throughout their network.

### 3.5 Hitless Diversity

As well as Monitored Hot Standby (MHSB) the Aprisa XE provides space diversity. This enables the highest possible signal availability, with hitless diversity. The Aprisa XE can therefore be used with confidence in even the most demanding situations such as cellular backhaul, where carrier class performance is essential.

### 3.6 Form Factor

With its compact form factor, the Aprisa XE radio is less than a quarter of the size and weight of the DXR 200, making it easier to deploy and manage.

*The Aprisa XE is 89mm high,  
compared to the DXR 200's  
400mm height*



### 3.7 Ease of Maintenance and Minimal Field Failure

4RF Communications has a minimal field failure rate for its Aprisa XE family of radios. The company is 100% responsible for its own product design, and ensures complete quality control in all its products.

The Aprisa XE's all indoor single box, front access to interfaces and connectors, and 4RF's SNMP-based management tool mean minimal maintenance, reducing overall network running costs.

## 4 WHY CHOOSE 4RF COMMUNICATIONS?

As well as the improved performance the Aprisa XE offers across its wide range of applications and industries, there are other advantages to customers in choosing 4RF Communications for their point-to-point links.

### 4.1 Risk-Free Migration

4RF Communications, with its pre- and post-sales support teams, works closely with its customers to ensure a seamless transition from existing DXR 200 installations to Aprisa XE installations. The same standards are applied whether for a single link or a network comprising hundreds of links. In some cases, the increased performance of the Aprisa XE means that the need for repeater stations or high gain antennas is eliminated. This further improves the overall business case for customers.

### 4.2 Ongoing Support Programme

4RF provides a comprehensive package of customer support, which includes:

- Pre-sales support, including link evaluation, RF planning and network planning, whether for a single link or a multiple link network
- Deployment services, from site evaluation through to the physical installation of equipment
- Product training: 4RF offers training courses throughout the world, from product operation through to link planning and installation
- Network monitoring: 4RF can help customers with network monitoring through its SNMP Network Management System integration services
- Technical support and repairs: all customers have access to 4RF's help desk, and repairs, while rare, are carried out with minimal delay
- Warranties: 4RF provides warranties as standard, and extended warranties and service level agreements are available, depending on customer requirements

### 4.3 Commitment to Continual Product Development

4RF is committed to the future of its Aprisa XE product family and invests substantially in research and development. The product has been designed to be highly flexible and future proof, with support for a large range of interfaces.

### 4.4 Total Cost of Ownership

4RF is committed to the industry's lowest possible total cost of ownership. This includes not only equipment expenditure but all other issues that contribute to the financial and human resources needed to run a network. These factors include 4RF's ease of network management, maximum support for spectrum bands to lower licensing costs, and the overall reliability and dependability of 4RF's products.

## 5 COMPARISON OF TECHNICAL SPECIFICATIONS

CHARACTERISTIC	DXR 200	APRISA XE
<b>Frequency Ranges</b>	300-470MHz 620-750MHz 795-960MHz 1350-1550MHz 2000-2700MHz	330-400MHz, 400-470MHz 620-715MHz, 698-806MHz 805-890MHz, 850-960MHz 1350-1550MHz 1700-2000MHz 2000-2300MHz 2300-2700MHz
<b>Stability</b>	± 2.5ppm	± 1.5ppm
<b>Step Size</b>	25kHz below 470MHz 125kHz above 470MHz	5, 6.25, 12.5, 25, 62.5kHz
<b>Capacities</b>	4, 10, 30, 60 channels	1 to 840 channels
<b>Modulation Scheme</b>	DQPSK all capacities 16QAM in 30/60 channels	QPSK, 16, 32, 62, 128QAM (user selects)
<b>Forward Error Correction</b>	Reed-Solomon optional in 30/60 channel option	Reed-Solomon
<b>Equalisation</b>	Adaptive equaliser optional in 30/60 channel option	Adaptive equaliser and interleaver
<b>Transmit Power at TX Port</b>	+33dBm QPSK (all bands) +37dBm (400 & 900MHz) +33dBm 16QAM	+37dBm QPSK <1550MHz +36dBm QPSK >1700MHz +33dBm 16QAM
<b>Receive Sens.</b> <b>6 384kbit/s</b> <b>12 768kbit/s</b> <b>30 E1</b> <b>60 2xE1</b>	(10 <sup>-3</sup> BER) -101dBm QPSK -99dBm QPSK -96dBm QPSK, -93dBm 16QAM -93dBm QPSK, -93dBm 16QAM	-102dBm QPSK -100dBm QPSK -97dBm, -91dBm 16QAM -93dBm, -87dBm 16QAM
<b>Protected Options</b>	MHSB	MHSB, space diversity, errorless diversity switching
<b>Alarm I/O</b>	8 input, 8 output	2 input, 4 output
<b>Voltage</b>	± 24VDC or -48VDC	-24,-48VDC, 110/220VAC
<b>Power</b>	65W minimum	63W minimum
<b>Temperature range</b>	Operational: -10 to +50°C Storage: -20 to +60°C	Operational: -10 to +50°C Storage: -20 to +70°C
<b>Size</b>	9RU 400mm	2RU 89mm
<b>Standards Compliance</b>	ETS 300 385 ETS 300 630/633	ETS 300 385, ETS 300 630 EN 302 217, EN 301 751 EN 301 489, EN 60950 CE marked FCC-compliant models

## 6 FOR MORE INFORMATION

Operating in more than 100 countries, 4RF solutions are deployed by cellular mobile operators, utilities, oil and gas companies, international aid organisations, fixed line telcos and public safety and security organisations.

For more information about 4RF and the Aprisa XE product family, including case studies and detailed performance specifications, please visit the 4RF Communications web site, at [www.4rf.com](http://www.4rf.com).

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