



Long paths: the Aprisa XE Advantage

The Aprisa XE has the ability to link distances often believed to be outside the reach of traditional digital microwave radio links. This is a result of 4RF's design focus on high specifications, quality and stability, or what 4RF calls 'distance engineering'. This is the result of more than 20 years of experience in microwave radio design, coupled with using the latest components and techniques available when designing the Aprisa XE.

What makes the Aprisa XE special?

While each link needs to be assessed individually, 4RF is confident that if a link cannot be achieved by the Aprisa XE then it cannot be achieved by any other point-to-point microwave solution. There are a number of key reasons why the Aprisa XE provides this performance:

- Frequency bands of operation
- High RF system stability
- Adaptive equalizers and forward error correction
- Use of the latest components and techniques

Frequency bands of operation

The Aprisa XE operates in multiple frequency bands below 3 GHz, giving an inherent long-haul capability compared to other frequency bands, with links of two to three times longer than 7 GHz and higher frequency bands. Using the sub-3 GHz bands results in reduced free space loss and links that are largely free from atmospheric conditions such as rain fade. Typically, while a tropical storm may introduce 80 dB of rain fade over a 50 kilometre path at 7 GHz, this can be as low as 3-4 dB in the 1400 MHz band.

High RF system stability

Extremely high specifications for the Aprisa XE's RF module combine with the latest RF components, for a platform that introduces an extremely low amount of signal distortion. The linking system only has to correct for and cancel distortion in the signal caused from the RF path. The Aprisa XE platform has a level of stability in its oscillators and RF chains that is unrivalled in the industry.

Adaptive equalizers and forward error correction

Signal correction techniques and forward error correction (FEC) combine to cancel distortion from the conditions such as multi-path or fading. They then correct any resultant errors, extending the receive levels for which errorless operation can be maintained.

Achieving long links

- Sub-3 GHz frequency bands for long distance links
- Capable of links up to 250 kilometres
- Minimal multipath and impact from atmospheric conditions
- Space diversity and non-space diversity configurations available

Use of the latest components and techniques

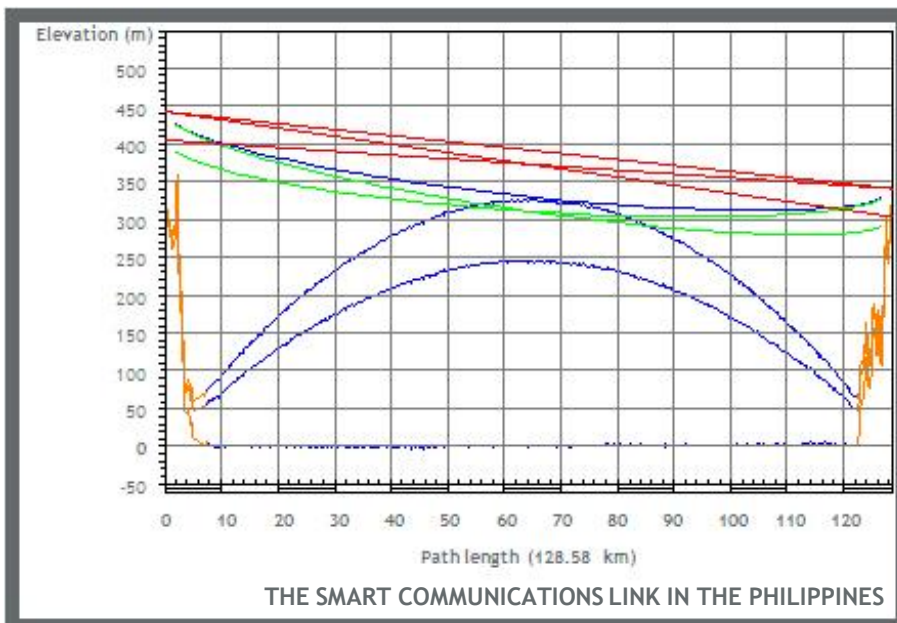
The Aprisa XE RF and modem modules feature the latest linear RF devices, ceramic substrates, SAW filters, multi-tap adaptive equalization and FEC components and techniques, with a focus on design quality and stability that is unmatched in the industry. This, combined with the inherent distance capability at sub-3 GHz, results in 4RF's ability to link further than any competing product.



Aprisa XE

Long path example

4RF has deployed a 128 kilometre link, over water, for Smart Communications in the Batanes island group in the Philippines, using a space diversity configuration. This example represents a particularly challenging links, but it is worth noting that space diversity is not necessarily required in many links. 4RF has deployed a huge number of long distance links around the world, many in excess of 100 kilometres, using standard, non-space diversity configurations. While the inclination of this link is not perfect, it provides sufficient line-of-sight and Fresnel clearance. Antenna heights were chosen to maximise inclination and protect from multi-path interference. The link is currently providing capacity of 11 x E1 at 99.999% availability, and is software upgradeable to 22 x E1 with a reduction in availability.



Smart Communications link details

Frequency (MHz) = 2500.0; K = 1.33, 1.00; %F1 = 100.0, 100.0

Calayan RS end of link

Latitude	19 19 23.10 N
Longitude	121 28 54.10 E
Azimuth	21.93 degrees
Elevation	394 metres ASL
Antenna CL	48.0, 10.0 metres AGL

Mahatao RS end of link

Latitude	20 23 59.70 N
Longitude	121 56 30.60 E
Azimuth	202.09 degrees
Elevation	293 metres ASL
Antenna CL	48.0, 10.0 metres AGL



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 analogue, serial data and PDH applications.

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