SCADA communications: why point-to-multipoint radio?

Electricity utilities seeking to improve their performance, and hence income, need to decrease the quantity and duration of faults and outages throughout their large, aging, fixed infrastructure, while also reducing maintenance costs. This means increasing monitoring and control throughout the distribution network, for real time or on demand status monitoring of assets; early identification of problems; rapid fault fixing; and increasing the ability to carry out preventative maintenance.

Generation → **Transmission** → **Distribution** → **Supply**

Monitoring and control, with underlying communications, become more scarce the further you get into the distribution network

When increasing the extent of monitoring and control, the most appropriate communications options need to be evaluated and selected. Key considerations include security and ownership, financial implications, and a future-proof approach:

- Security and ownership are key factors, because the growing use of IP together with increasing levels of control open up the network to new vulnerabilities and threats which must be protected against

- Financial considerations include choosing a communications technology that takes into account the total cost of ownership over the whole life cost, as well as reducing maintenance time and cost through increased reliability and efficiency

- Future proof means protecting the huge investment in serial RTUs, while also using the infrastructure for other applications where possible

There are two main categories of communications options for SCADA: opex-based options such as GPRS, leased lines or satellite, or capex-based options such as fibre / cable, private mobile radio or spread spectrum unlicensed radio.

TECHNOLOGY OPTIONS	Latency / QoS issues	Capex	Opex	Flexibility issues	Security / ownership issues
GPRS / GSM	Medium	Low	Medium	Medium	High
Leased lines	Medium	Low	High	Medium	Medium
Satellite	High	Low	High	Medium	High
Fibre / cable	Low	High	Low	High	Low
Private mobile radio	Medium	Medium	Medium	Low	Low
Spread spectrum unlicensed radio	High	Medium	Low	Low	Low
Point-to-multipoint licensed radio	Medium	Medium	Low	Low	Low

Smart radio for smart networks

Comparing point-to-multipoint radio with other technology options

GPRS / GSM

While suitable for basic monitoring, GPRS and GSM are not suitable for controlling critical infrastructure. Delivery time varies, quality of service is lacking and coverage may be unavailable in remote areas. With an external incident, the network may go down, causing you to lose sight of your critical infrastructure. Opex based on data quantity means costs quickly ramp up. Point-to-multipoint radio provides a flexible, scalable solution, under your complete control.

Leased lines

While usually readily available, leased lines have cost and control issues. Remote sites can be expensive to serve and opex grows rapidly as the network expands and more points are monitored. Repair SLAs are typically unsatisfactory and failures can be lengthy to repair. Point-to-multipoint radio offers a flexible, easy to deploy network completely within your control and eliminating opex.

Satellite

Satellite, while it can reach remote locations, has issues of latency and incurs huge operational expenditure. Point-to-multipoint radio provides a much greater level of control and flexibility, ideal for time-sensitive monitoring and control applications. It also eliminates the high ongoing operational expenditure of satellite.
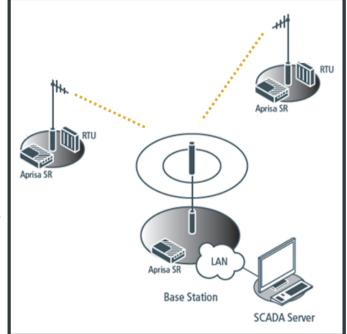
Fibre / cable

Fibre or cable are highly reliable and where available, very suitable. However, where it is not already deployed, particularly where multiple dispersed sites need to be connected, it becomes expensive and time-consuming, and provides much higher bandwidth than is needed. Point-to-multipoint radio offers a flexible, fast deployment, with maximum control and redeployment opportunity as your network evolves.

Private mobile radio

While a PMR network provides a communications network under your control, the technology was initially designed for voice rather than data, with analogue systems requiring additional infrastructure for data communications. Point-to-multipoint radio can reduce network running costs, since private mobile radio infrastructure can prove expensive, with high terminal equipment costs.

Spread spectrum unlicensed radio

Despite being readily available, unlicensed spectrum is not suitable for use in mission-critical applications: even if it performs upon initial deployment, other networks can subsequently cause interference. Point-to-multipoint radio in licensed spectrum protects the network from interference and higher transmit powers mean greater coverage.

Why use point-to-multipoint radio?

• Monitoring and control must be on demand or in real time

• Eliminating dependence on a third party to provide and maintain communications is needed

• Ensuring network security is essential

• Flexibility of communications infrastructure is essential

• Reducing opex and minimising whole life cost are key business drivers

Each technology has its place in the communications mix. However, as smart grid infrastructure continues to evolve, as the world moves to IP, and as the need for security becomes paramount, the control, quality, flexibility and whole life financial benefits of using point-to-multipoint radio, such as the Aprisa SR, become clear. The Aprisa SR incorporates AES 256 encryption as standard, as part of its defence in depth approach to security. You can find out more about the Aprisa SR at www.4rf.com.