



SCADA communications

Future-proof your investment



Aprisa SR

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1 The need for future-proofing

Utilities today face unprecedented change and distribution network operators (DNOs) have both the responsibility and requirement to prepare for the challenges of the smart grid. These include increasing demand, distributed generation, environmental concerns, peak management, security and more stringent regulations. Infrastructure investment must also meet the tests of fiscal responsibility, an important component of which is ensuring the suitability of such investments for the long term.

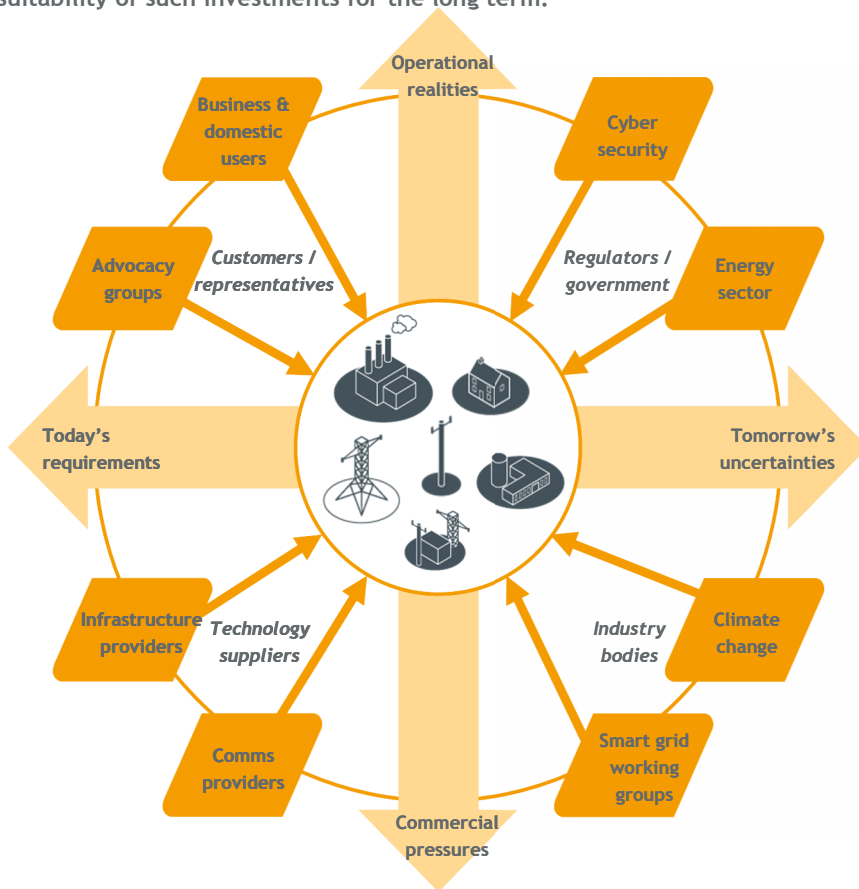


Figure 1: Utility balancing act and stakeholders

The investment challenge is further complicated by the lack of consensus as to the precise nature of the future landscape. Standing still and waiting for clarity is not an option due to the time required to select and deploy network-wide infrastructure and the imperative to quickly realise the performance gains demanded by regulators and, perhaps more importantly, the balance sheet. A future-proof investment policy is needed, where infrastructure:

- Is dimensioned for today's needs yet scalable to meet tomorrow's
- Addresses both commercial pressures and operational realities to deliver the most effective performance and efficiency improvements
- Takes into account the context of long term, multi-stakeholder asset management plans and capital investment cycles that require network equipment to be deployed for 20-30 years or longer

A changing world

A key example of how the utility world is changing is the transition to IP. It is now generally accepted even within the utility world that IP is a case of when not if. However, how can you manage a gradual transition to a world of IP? Also, while the interoperability advantages of the open standard are clear, how can the security implications be adequately addressed?

"We only want to purchase equipment once, for the long term, but we don't know what tomorrow's needs will be..."

"Commercial pressures mean we need to invest now but we cannot constantly visit sites to upgrade equipment as requirements change..."

"We want to be ready for an IP world to avoid equipment replacement or two networks, but we don't want to have to over-spend to over-provision now..."

2 Future-proof SCADA communications

For DNOs and integrated utilities alike, the investment priority is clear. While industry forums resound with talk of renewable energy sources, electric vehicles, AMR and peak shaving, it is widely accepted that the most immediate and substantial returns are to be found by increasing visibility and control of the distribution network through the deployment of more and better SCADA equipment. Furthermore, it is in deploying the communications networks required to support these SCADA deployments that utilities have the most obvious opportunity to make smart, future-proof investments.

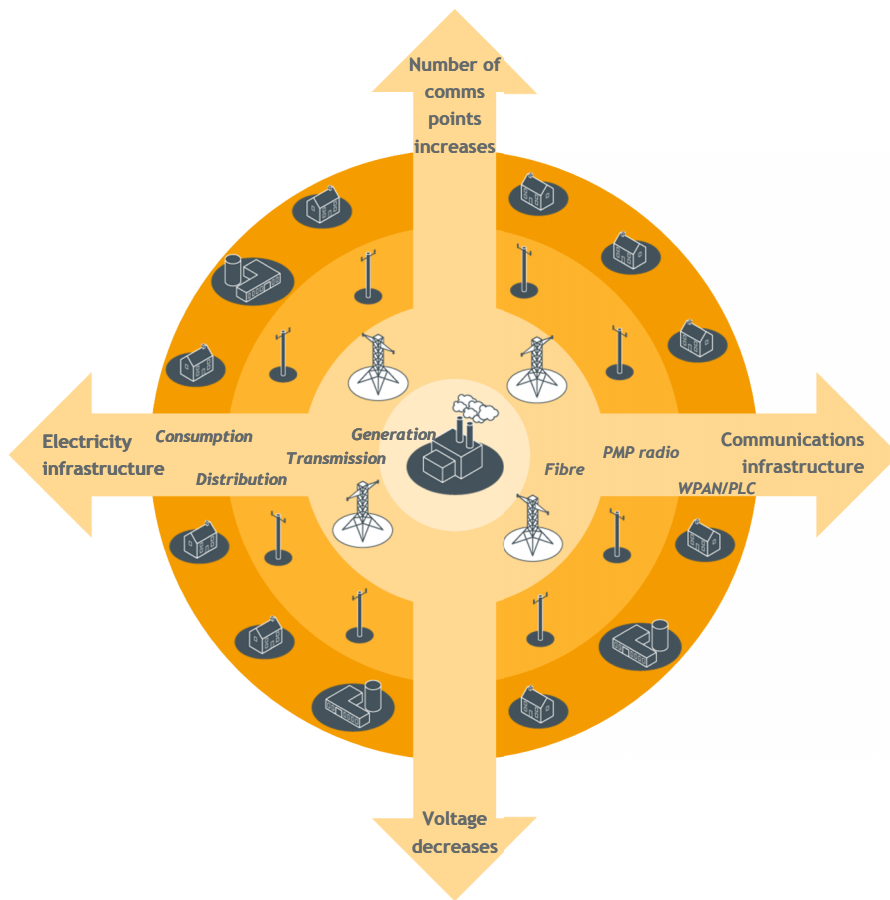


Figure 2: Increasing visibility and control in the distribution network

How can a communications platform address both commercial and operational concerns and provide such a future-proof investment? The Aprisa SR smart point-to-multipoint radio does this by ensuring that it provides the following three things:

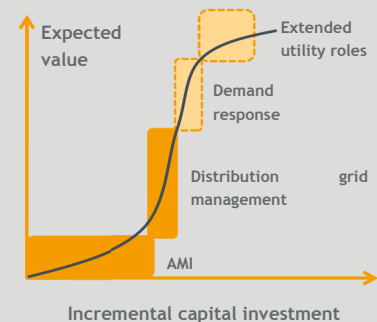
- A single, scalable, upgradeable network
- Equipment designed for longevity
- Comprehensive, upgradeable security measures

A technical legacy

Combined, transmission and distribution networks represent a significant technical legacy. It is not unusual for electricity utilities to have infrastructure assets ranging from brand new to 80 years old.

“The Brattle Group says that North America alone will require nearly \$1 trillion in new transmission and distribution investment from 2008 to 2030, not counting what will be required to meet future climate change rules. Other sources forecast even higher numbers, especially for the world as a whole. According to the International Energy Agency (IEA), a cumulative \$13 trillion is needed worldwide during that period, more than half of that for the grid and related equipment (as opposed to new or refurbished power plants).” [1]

According to a recent GTM Research survey, distribution automation and grid optimisation is the number one priority for utilities. [2]



The distribution grid is a key area where improvements can be real and substantial. [3]

2.1 Scalability

A single, scaleable, upgradeable network means that your communications network works for you, not the other way round. You transition from serial to IP at your own pace, with a mix in the network as required, and with a communications solution that interoperates with both existing and new equipment. This avoids the situation of separate serial and IP networks for legacy RTUs and new IEDs respectively, ripping out old serial communications when you change to IP, or investing in IP capacity now throughout the network despite not needing it in the short term in many instances.

With such a network, you control when, where and how you scale your network and deploy new units or add previously unmonitored assets. You pay for enhanced features and functionality as and when you need, rather than having to pay upfront for a wide feature set that may or may not be what you need in the future. You eliminate costly truck rolls and minimise maintenance costs.

How can a communications platform achieve this? By providing a standards-based solution that gives you what you need now, with a software-based evolution path. The Aprisa SR future-proof approach includes:

- Support for both serial and IP protocols, with every element of the network configured as serial, IP or both: IP capability can be added when needed, rather than investing in this ability before it is needed
- Software upgradeability for initiating licence keys for new functionality or installation of new software releases, implemented over-the-air from the network operations centre and eliminating the need for site visits
- Scalability, flexibility and network efficiency: adding to the network as needs change, reconfiguring the network at the touch of a mouse, and optimising the network for maximum efficiency based on the network topology

These future-proof features mean that you can invest in a communications network that is dimensioned for your current needs yet scales easily and cost-effectively as the future landscape becomes clear and your needs evolve, for both operational and commercial sense. A controlled rollout is enabled through software upgrades, not truck rolls.

A future-proof investment...

- *Is dimensioned for today's requirements yet scalable to meet tomorrow's*
- *Addresses both commercial pressures and operational realities to deliver the most effective performance and efficiency improvements*
- *Takes into account the context of long term, multi-stakeholder asset management plans and capital investment cycles that require network equipment to be deployed for 20-30 years or longer*

2.2 Longevity

Equipment designed specifically for longevity means that your communications network will stand the test of time. You can be reassured that the reduced maintenance cost advantages of improved monitoring and control are not eliminated by having to spend time and money maintaining the communications network itself. You know that wherever you deploy the equipment, from high temperatures on overhead lines to freezing conditions, it will continue to operate. You know that you can plan and deploy your communications infrastructure in line with lengthy budget cycles, confident that once deployed it will remain so for as long as you need it.

How can a communications platform achieve this? By providing equipment that has been specifically designed to take into account the harsh conditions, lengthy deployments and dependability needed by utilities. The Aprisa SR future-proof approach includes:

- **Reliability:** superior RF design guarantees both quality and quantity of data transmission, and from a physical perspective, attention to design detail, comprehensive thermal testing and specialist manufacturing ensure that equipment simply keeps on working
- **Robustness:** a rugged enclosure and immunity to temperature extremes means you can deploy your communications equipment anywhere and everywhere, confident that it will withstand any conditions
- **Resilience:** with licensed frequency bands and a network that you own and operate, your communications network does not fall over if the local cellular network goes down

These future-proof features mean that you can invest in a communications network that takes a total life cost approach, hardware longevity combined with software upgradeability. It will stand the test of time, both operationally and commercially.

Longevity throughout the grid

“The speed of technology change in the telecommunications market is high compared with utility technology. Utilities expect asset life of up to 40 years. This exposes utilities to risk of obsolescence and associated cost of maintaining obsolete technologies.”^[4]

New technologies that can deliver longevity and a future-proof approach enable utilities to maximise asset utilisation.

2.3 Security

Comprehensive, upgradeable security measures mean that despite an unknown future, your communications network can embody relevant security standards and recommendations as they evolve. As governments and regulators continue to develop increasingly stringent requirements, you know that the communications equipment you deploy now will continue to have the best security available. You know that you will not have to rip out hardware because it fails to comply with easily predictable security regulations. You can be reassured that despite the types and sources of cyber attack changing, your communications network remains secure.

How can a communications platform achieve this? By providing a solution that not only embodies the best security available, but continues to do so into the future. The Aprisa SR future-proof approach includes:

- **Defence in depth approach to security:** the utility world can no longer depend on ‘security through obscurity’, and security is much more than simple encryption or password protection. A comprehensive approach to security takes into account the types and sources of attack, relevant security design standards and recommendations, network interfaces and security fundamentals
- **Upgradeability through software:** security and securing networks are constantly moving targets, with attacks and attackers constantly evolving to meet the challenge of whatever measures are currently implemented: Software upgradeability is essential, particularly for equipment that will be deployed for considerable periods of time, to ensure that the latest standards and recommendations can be embodied without the need for site visits or hardware replacements
- **Absolute control:** with security being such a vital element of utility networks, SCADA and communications, owning your own communications infrastructure makes absolute sense. Why depend on a third party operator, who often has other commercial imperatives, to deliver a utility-specific communications network that will always give you the security you need?

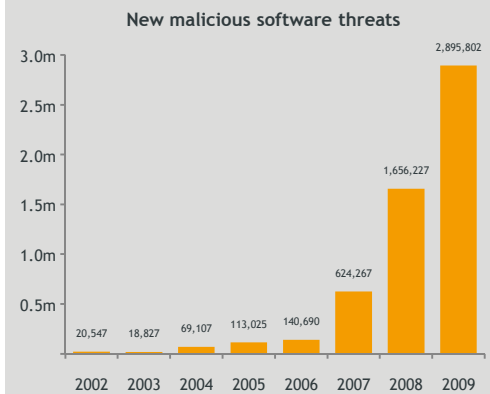
These future-proof features mean that you can invest in a communications network that takes security and evolving standards into account, ensuring that your critical infrastructure is safe and within your absolute control, both now and into the future, while still making commercial sense by minimising upgrade costs.

Cyber security

Cyber security is of ever-increasing concern. The world as we know it is changing. Cyber attacks are changing and utilities are moving from targets of opportunity to targets of intent.

Vulnerabilities are being considered at the very highest levels of government, with unfolding security standards and large national economic stimulus spending plans. While it is not known exactly how security standards and requirements are going to evolve, they are only going to get more stringent.

The Stuxnet worm is only one of the more recent cyber attacks to have been widely publicised. By September 2010, there were approximately 100,000 infected hosts. [5] More than half of the malicious software threats that have ever been identified were identified in 2009. [6]



Pike Research estimates that worldwide smart grid cyber security spending will reach over \$1.7 billion in 2013. [7]

3 Future-proof consequences

Choosing a communications platform that provides you with a future-proof investment means:

- A single network, deploying enhanced functionality as needed, rather than over-provisioning and over-paying on day one, despite the uncertainties of the future
- Seamless rollout of the latest and most stringent security mechanisms across your SCADA communications network
- Reduced maintenance costs with equipment designed for the lengthy deployment periods that utility infrastructure demands

Most importantly, owning your own future-proof communications platform gives you absolute control over your network, from both a commercial and an operational perspective, however long it is deployed for and whatever the future holds. When it comes to your critical infrastructure, a future-proof investment is not just smart, it is essential.

4 References

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About 4RF Communications



Operating in more than 120 countries, 4RF solutions are deployed by utilities, oil and gas companies, international aid organisations, public safety, military and security organisations, transport companies, broadcasters, enterprises and telecommunications operators.

The Aprisa SR is a smart, secure, point-to-multipoint radio for SCADA and monitoring and control communications.



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