Ergon Energy gets world’s first hybrid network
Case study
BAI Communications (BAI) is currently deploying an integrated P25 technology/Long Range Digital Radio (LRDR) communications solution in the Australian state of Queensland for the utility company Ergon Energy Corporation – one of the first of its kind in the world.

Ergon Energy’s electricity network covers more than 1.3 million square kilometres of Queensland, from the densely populated east coast, across vast inland areas of remote outback cattle/sheep stations and desert. This comprises approximately 160,000 kilometres of power lines and one million power poles, along with associated infrastructure such as major substations and power transformers. A number of additional stand-alone power stations supply isolated communities across Queensland. These are independent from the main electricity grid.

To ensure this enormous state-owned electricity network stays up and running, Ergon Energy relies upon a number of advanced communications and control systems overseen by a team of employees based in two regional operational communications centres located 1,000 kilometres apart. The communications centres receive notification of any electricity related network issues and dispatch resources to rectify as needed; one of the key operational tools is an integrated digital radio network for voice and data communications with field crews.

Integrated digital radio network
Like most of Australia, Queensland’s population is mainly clustered around the cities and fertile lands along the coast. To serve this area – which is large, at some 480,000 square kilometres – BAI’s dedicated Critical Communications team has deployed a sophisticated and ultra-resilient P25 trunked digital radio network (VHF 136-178MHz) that is built to withstand the state’s annual cyclone season.

Incorporating more than 100 sites, the P25 network comprises six high-availability cores, along with six high-availability disaster recovery cores, and is integrated with Ergon Energy’s private, secure and extremely robust IP network. This P25 digital radio network – which also carries SCADA data to support control of the electricity grid – is geographically one of the largest and technically the most advanced in the world.

With the state’s highly populated areas covered by the P25 network, an alternative communications solution was sought for the remaining 1.229 million square kilometres of outback where Ergon Energy operates. Recent technology advances have meant that LRDR could be configured to meet operational needs, coupled with its advantages over satellite, convinced BAI and Ergon Energy that LRDR was the most attractive and cost-optimised option.
The Ergon Energy LRDR network will ultimately comprise just three transmission sites and three receive only sites – one of each in the northern, central west and south-west regions of the state of Queensland. Of these, the two in the south-west region are deployed and operational with the other two regions coming online presently.

Each site hosts a LRDR base station radio and high-powered amplifier (400W), with five assigned voice/data channels ranged through 3-10MHz.

Alongside the base station radio is an LRDR site controller, which provides a tightly integrated standards-compliant interface between the LRDR base station and the P25 network, allowing it to route calls and data. It also performs ALE “soundings” every 5-30 minutes to identify the best usable frequency (BUF) for use. It also manages site condition monitoring and alarming. The setup additionally includes a PSTN gateway for answering and redirecting incoming phone calls to the radio network. The LRDR radio signals are transmitted and received via a specially tuned omni-directional high-power broadband biconical antenna array.

Field vehicles are equipped with an integrated mobile system (antennas, transceivers and handsets) that support near vehicle communications, LRDR, P25, V/UHF and 3G/4G communications, and incorporates an intelligent mobile router to identify and automatically manage which network is to be used.
In the case of LRDR, digital voice performance is comparable to P25 audio. Although no SCADA data is transmitted over the LRDR network at this stage, the system supports a range of other important narrowband data capabilities. Of particular importance for deployed personnel working in remote areas, emergency duress alert capability and support of GPS location services help Ergon Energy comply with stringent operational health and safety requirements.

In most cases, mobile LRDR terminals bounce signals back to one of the main LRDR transmission/receive sites, up to 550 kilometres away, in order to communicate with other network users. However, LRDR handsets within 40 kilometres of each other may communicate directly via dedicated “off-net” chat-channels assigned for each region to provide wide-vehicle area network communications.

Rugged and reliable
Ergon Energy’s LRDR network is designed specifically to meet the conditions experienced by Australia’s remote areas – taking into account the weather, terrain and population density. The infrastructure is extremely rugged and built for reliability and long life.

The base-station sites have been designed to provide coverage overlap with adjacent sites, ensuring there will always be a backup site available. In the highly unlikely event that a primary site does go down, users can manually, roam channels to connect via an adjacent/overlapping coverage area. Significantly, the infrastructure cost per LRDR transmission/receive site is roughly equivalent to the cost per P25 base station site - making the three-site network exceptionally economical allowing Ergon to avoid the substantial cost associated with building-out hundreds more P25 sites to achieve equivalent geographical coverage.

Operationally, the hybrid P25/LRDR network provides Ergon Energy with a seamless communication and information platform that supports almost 3,000 front-line employee’s right across the state of Queensland. To users in remote areas, the LRDR communications solution functions like it is part of Ergon’s P25 digital radio network.