CASE STUDY: KANSAS CITY POWER & LIGHT, MISSOURI, USA

THE CLIENT

Kansas City Power and Light (KCP&L) is an electric utility company based in Kansas City, Missouri, servicing 850,000 customers in an area of 18,000 square miles throughout Missouri and Kansas. Supporting 3,600 miles of high voltage transmission lines and 22,300 miles of distribution lines in both metropolitan and rural areas, KCP&L has a reputation as one of the most reliable energy suppliers in the Midwest.

SITUATION

As a result of an acquisition of another utility company, KCP&L found themselves with three entirely separate radio systems covering different parts of their service area. Any time crews based in different regions were brought together in storm situations, they had no interoperability between radio networks, forcing them to resort to cell phones as backup. This resulted in a dangerous lack of communication when they needed it most.

Coverage was also a problem. Their radio networks suffered large gaps in service, often in areas where cellular coverage was also unreliable, creating locations with virtually no communication options at all. Safety is the top priority at KCP&L, and the potential human risk was unacceptable. As one of their radio networks was quickly approaching end-of-life, they seized the opportunity to find a better option.

RESPONSE

Many vendors were considered for the new radio network. "Through an evaluation process about quality, about past experiences with other customers and about cost, the selection of Tait was made." says Chris Kurtz, Senior Director of Operations at KCP&L.

Tait provided a Digital Mobile Radio (DMR) Tier 3 trunked network. The 23 site deployment utilized the TN9300 core network to support 1,200 subscriber units, made up of TP9300 portable radios and TM9300 mobile radio units in their fleet of trucks. For worker safety, radio units are equipped with Man Down, Lone Worker and GPS location services.

The Tait solution also included product integrations from several industry leading partners to meet the specific needs of KCP&L. Zetron supplied 52 Acom EVO consoles for the dispatch center at KCP&L. X10DR supplied secure wireless microphones to extend communication capabilities away from vehicles, and Tallysman supplied a GPS location services solution.

CUSTOMERS 850,000

LOCATION MISSOURI **USA**

EXPERTISE ELECTRICAL UTILITY

APPLICATIONS

▸ Tait DMR Tier 3 trunked network

▸ Man Down & Lone Worker

▸ Zetron dispatch consoles

▸ Tallysman location services

▸ X10DR wireless microphones

BUSINESS BENEFITS

▸ Improved worker safety

▸ Faster response time

▸ Greater service uptime

▸ Improved customer satisfaction

▸ Coordination in storm situations

RadioResource
INTERNATIONAL

Photos courtesy Ergon Energy

Australian Utility
Extends Coverage

Ergon Energy recently deployed a Project 25 (P25) trunked network using location services and out-of-vehicle technology to enhance coverage.

By Martin Cahill

Ergon Energy is a government-owned corporation with around 4,600 employees and about a US$10 billion asset base that supplies electricity to 700,000 customers in the northeastern state of Queensland, the second-largest state in Australia. Ergon Energy services an operating area of more than 1 million square kilometers from the coastal regions to the cities and townships and the remote communities of the outback.

The electricity network consists of about 1 million power poles, and nearly 100,000 miles of power lines with major substations, power transformers and various associated infrastructure. In remote areas distant from

Ergon Energy needed an out-of-vehicle solution to keep users connected while on the job.

the main electricity grid, Ergon operates 33 independent power stations supplying electrical power to isolated communities across the far reaches of the state. Ergon Energy also operates the 55-megawatt Barcaldine gas-fired power station, supplying power to the main state power grid. In addition, Ergon Energy is involved in alternative renewable energy generation solutions.

Similar to many electrical utilities, economic realities meant the utility had to maximize the return on its prior radio communications investments. In 2012, following an evaluation of the emerging digital radio technology solutions, Ergon commenced the rollout of a Project 25 (P25) open-standard trunked network. The massive system undertaking will provide mobile communications across the entire power delivery footprint via more than 200 antenna sites.

Largest Trunked P25 Network

Ergon Energy completed the initial rollout of a large P25 trunked system at the end of 2012. Following an initial proof of concept, the utility is proceeding to the next stage of the deployment. A staged rollout is planned during the next few years to cover the majority of the state on a regional district-by-district basis.

The initial rollout of 28 sites and about 300 radios as part of a 200-site system strategy will make the system the largest P25 trunked network in Australia, covering more than 266,000 square kilometers. The system is also the first open-standards P25 network to be deployed in Australia using the Inter RF Subsystem Interface (ISSI) and Console Subsystem Interface (CSSI) protocols, which allow the network to interconnect to other third-party P25 networks and equipment. The next stage is similar in scope to the first phase but with around 500 mobiles being installed.

The system operates at VHF high band, well suited and optimized for the rural geography of greater Queensland where Ergon operates. The system also employs Tier 2 GPS implementation, delivering improved resource/event location services for customer support teams, the key driver for the system. The network is expected to support more than 3,000 mobile radios.

Airwave Solutions partnered with Ergon Energy to design and build the initial phase of the digital radio system network. The partnership was the result of an extensive tender process designed to secure a trunked P25 digital radio system, initially in one of the inland regional areas with a plan to eventually roll it out across the state. The core network was equipped with an ISSI that allows dispatch and talk group interoperability and inter-network connectivity with other P25-compliant networks across regional and state borders.

Airwave operates large and complex public-safety voice and data networks, providing a secure nationwide digital radio network for some 300 government, police, fire, ambulance and emergency service agencies in the United Kingdom.

To resource and deliver the necessary skill sets seamlessly, Airwave teamed with three technology suppliers — Auria Wireless, Tait Communications and Wireless Pacific — to provide Ergon with current and advanced purpose-built private radio solutions. Auria is based in Sydney and is a 100-percent Australian subsidiary of Etherstack. Auria has more than 15 years of involvement in the development of the Telecommunications Industry Association (TIA) P25 TR.8 standard.

Tait Communications from New Zealand is a leader in the development of location services for P25 terminals. Provision of location services is paramount to the successful deployment of wide-area location-based services for Ergon Energy's vehicles and staff. Location services have increased the efficiency in operational deployment of field resources and enhanced safety to staff operating in some of Australia's most remote areas.

Wireless Pacific is a developer and supplier of specialist radio solutions and is the inventor of the X10DR secure wireless microphone. Ergon is the first utility globally to fully incorporate the use of lightweight wireless speaker microphones, ensuring users stay in contact with personnel in and out of their vehicles. The wireless microphone allows Ergon Energy's field personnel to communicate up to 300 meters from their vehicles.

Balancing the Deliverables

Deployment of wide-area mobile radio networks for large electrical utilities takes a significant systems engineering effort in balancing the deliverables. The design challenges include the desired and specific operational performance, defining the minimum working and peak levels of

system access, and achieving the maximum usable financially achievable coverage. While the multisite technology available now to achieve nationwide coverage is becoming more accessible, the deployment cost still remains a financial challenge.

Unlike the amortized cost per subscriber of cellular network infrastructure, the total fleet size of even a large utility operating over such vast distances is high and requires the use of the best antenna site selection and engineering practices. This also demands that mobile terminal selection calls for optimum equipment performance. With the size of the geographical operational areas demanded by Ergon Energy's required footprint, the need to maintain service level performance and absolute coverage reliability is difficult, complex and expensive. Developing solutions for the competing requirements, two-way system engineers have little choice but to design network coverage for vehicle-installed mobile radios, with handheld portable coverage approached in most areas as a secondary consideration.

Operationally, as is with most vehicle-based personnel, the user typically does not conduct most work in the vehicle. The problem is that when the user arrives at a work site, the user exits the vehicle and leaves behind the connection with control room personnel and other work crews using the radio system. This lack of communications connectivity invariably affects vital field operational effectiveness and the user's personal safety. A system's inherent poor portable radio coverage greatly restricts users from leaving their vehicles because doing so leaves them unable to call a team member or control room for assistance. Portable handheld users in need of activating an emergency call may also be unable to get through, rendering those users at risk.

To address this black hole in the optimized mobile-based solution, Ergon Energy integrated 350 secure wireless microphones into the P25 trunked system to deliver the last 300-meter connectivity to users. The small,

lightweight speaker microphone is worn on the user's shoulder and allows staff to instantly communicate using the power of mobile radio back into the entire network. Ergon's management now remains in seamless communications with field personnel when outside their vehicles.

The utility fitted dual units on its bucket trucks, which allows the linesman in the bucket to communicate

The utility is deploying the first P25 network in Australia that uses the ISSI and CSSI P25 interfaces.

with fellow workers at adjacent power poles or at remote grid control points via the trunked radio system. They also simultaneously communicate with their ground man, enhancing personnel safety and providing operational benefits to workplace practices and productivity. It is expected that most vehicles with dual personnel will have two of the microphones fitted to allow at-scene communications between crew, especially on bucket appliances.

Out-of-Vehicle Solutions

For more than 50 years, radio manufacturers and system designers have grappled with alternative solutions to enhance user mobility when away from the vehicle. The most adopted solution typically involved deploying more portable handheld radios in the vehicle with expansion of base station infrastructure or radio sites and complex remote receiver voting systems to back fill marginal coverage areas to provide talk-back capability to the powered radio devices. These "portable of the person" solutions could triple the infrastructure cost and double the vehicle fit out cost, so they have been implemented sparingly.

Alternatively, some manufacturers developed vehicle-based mobile re-

peater systems where local simplex portable transmissions are repeated through a vehicle fitted with a cross-band or in-band mobile repeater back into the base station network. These expensive systems require use of additional LMR channels, specialist engineering considerations, bulky filtering devices and the incorporation of often complex contention management protocols to try to eliminate radio communications clashing from multiple vehicle mobile repeaters attending the same location. The mobile repeaters can cause system delays and often require user intervention to decide which channels, mode or status of the mobile repeater should be chosen.

Regardless of the complexity, the high implementation cost of the mobile vehicle systems could not be justified for every mobile user. Some smart mobile repeaters with the required handheld portable radios often incur costs up to four times the investment of a single mobile radio. For users of P25 trunked digital mobile radios, especially those requiring encryption, these approaches for out-of-vehicle communications have seen implementation costs significantly balloon.

Instead Ergon Energy's choice of wireless microphones is simple to use and performs much like a remote speaker microphone, connected invisibly to a vehicle's mobile radio, providing transmit, receive and emergency duress alarm functionality. The user experiences seamless operation with total control of the full-powered mobile radio without complexity and without the need for extensive training. User training and retained knowledge can be the bane of a major radio system rollout, so careful selection of the right intuitive products will always bode well for the successful acceptance by users of any new radio communications network.

Ergon Energy believes that a well-engineered P25 trunked system featuring advanced location services that are fully backed by a highly experienced network management team provided a solid core baseline. When coupled with wireless microphones, it gives the

utility the ability to redefine historical work practices. Ergon is confident the microphones will better equip its operators to deliver best-in-class services to their clients and set a new performance benchmark for all electrical utilities in achieving the optimum operational and safety deliverables from a built-for-purpose private radio system. ∎

Martin Cahill is vice president of global markets at Wireless Pacific. Cahill previously was a senior manager at Motorola Solutions Asia Pacific division. He left in 2002 to help found Wireless Pacific. Cahill is the original founder of the Australian Radio Communications Industry Association (ARCIA). Email comments to editor@RRMediaGroup.com.