

Ausgrid and Cisco Services Help Create Smarter Substations in Australia

Architectural approach focuses on helping Ausgrid to achieve security and operational efficiency for substation automation.

EXECUTIVE SUMMARY
Ausgrid <ul style="list-style-type: none"> • Energy • Sydney, Australia
BUSINESS CHALLENGE <ul style="list-style-type: none"> • Develop architectural design to meet both present and future needs • Modernize existing systems providing Supervisory Control and Data Acquisition (SCADA) and telephony services for high voltage substations
NETWORK SOLUTION <ul style="list-style-type: none"> • Connected Grid Services developed a highly modular, flexible, converged architecture built on a single standard (IEC 61850) • Deployed access and distribution layer networks based on Cisco Connected Grid switches
BUSINESS RESULTS <ul style="list-style-type: none"> • Modular approach will drive cost savings, will enable phased implementation of substations, and provided tools to support business case • Reduced costs and improved security with highly available LAN infrastructure within new major substations



The smart grid is rapidly gaining traction with utilities around the world as a source of improved operational efficiencies and greater

reliability. One such program is the Australian government's "Smart Grid, Smart City" project, led by Australia's Ausgrid (formerly known as EnergyAustralia). Ausgrid is a state-owned, electricity infrastructure company that owns, maintains, and operates the electrical distribution network to 1.6 million customers in New South Wales. It is Australia's largest electricity distribution company, providing power to residential and commercial customers as well as mining, manufacturing, oil refining, shipping, light to heavy engineering, and agriculture. The image above shows an enclosed substation in Sydney, Australia.

Leading the "Smart Grid, Smart City" project, Ausgrid has set the goal of developing a new smart grid architectural design for its organization. As part of this new strategy, the utility is establishing a design that can be used for all new substations to support modern approaches to protection and control, condition monitoring, and other services.

Ausgrid anticipates that this approach will provide the following benefits:

- Reduced capital and operating costs for substations and infrastructure
- Improved reliability due to condition-based maintenance
- Improved efficiency through mobility and field workforce collaboration applications
- Reduced third-party costs through new network services such as IP telephony in the substation
- Improved physical and network security for operations

“Ausgrid’s goal is to test the commercial success of these technologies, share our findings, and build a business case for change,” said Adrian Clark, Ausgrid’s Chief Technology Officer. “This pilot is designed to show how smart network infrastructures can help Ausgrid create a new, more efficient system for providing utility services.”

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— Philip King, Operational Technology and Innovation Development Manager, Ausgrid

Building the Knowledge Base with Cisco Services

Ausgrid selected Cisco Services based on its previous experience in similar international projects to assess business needs and design a substation communications architecture. “We liked the knowledge set and mix of skills that Cisco’s experts brought to the table,” said Philip King, Ausgrid’s Operational Technology and Innovation Development Manager. “We knew that Cisco would develop findings that can be leveraged for our architectures, and that this intellectual property can then be fed back into the lifecycle to help us expand the substation network effectively.”

This project was carried out in three phases:

- **Requirements gathering and use case development:** This phase included extensive interviews with stakeholders and use case and application owners. The Cisco team performed a series of onsite workshops to support a set of extensive business, process flow, and communications flow analyses.
- **Architecture development:** Based on the use cases and requirements, the team developed an optimal design for the organization to meet both present and future needs. This included protection and control, as well as functions such as automation, physical security, corporate traffic, cyber security, and overall network management.
- **Integration planning:** Finally, the team developed planning documents that set a standard for integrating the new architecture into the overall organization, as well as provisions for ongoing testing, support, and monitoring.

Outdoor Substation in Newcastle, New South Wales, Australia



Throughout this project, the team leveraged Cisco's GridBlocks Architecture development methodology, a rigorous program developed to extract and define business requirements, map these to specific communications needs, and deliver an optimal architectural design. Experts worked closely with Ausgrid to capture use cases across the business, aggregate relevant metrics, and create a suite of deliverables, including strategies for testing, production support, network integration, and holistic implementation.

Based on these detailed findings, Cisco Services developed a proposal for a scalable, highly modular, flexible architecture supporting a single standard (i.e., IEC 61850). This modular approach supports further cost savings, enabling larger implementation for major substations and smaller deployments for remote sites supplying fewer customers. The design also allows for a phased implementation for new substations and a retrofit for existing sites. The Cisco team supported these design concepts with a set of technical and business requirements, as well as providing input for a cost-benefits analysis.

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— Adrian Clark, Chief Technology Officer, Ausgrid

“The Cisco team went to great lengths to do the research and document the underlying business drivers,” King said. “This helped us develop relationships with internal stakeholders and ensure that they bought in to the project concept. We were very happy with the services provided and the quality of the work.”

Results and Next Steps

Ausgrid is building ten major substations every year in one of Australia's biggest infrastructure programs. Cisco was asked for communications equipment tough enough for very hot and humid conditions in substations as part of Ausgrid's transforming the electricity network into a smart grid. Cisco Connected Grid routers and switches create a reliable multi-service network in the substation. These industrial-grade routers and switches are designed for the substation harsh environment, and are compliant to industry standards including IEC-61850-3 and IEEE-1613.

The work performed by Cisco Services has established the direction for substation communications at Ausgrid over the next ten years, according to Clark.

"Cisco Services worked with Ausgrid to bring their expertise in the telecommunications industry to understand the requirements for electricity substations today and as we move towards a more complex and integrated future environment," Clark said. "Cisco was able to bring their knowledge of standards and the industry to help fill a skills gap beyond traditional electrical engineering for power utilities. Their work is assisting us to transform the electricity network into a smarter grid. We highly value their ongoing partnership and commitment to our company and the industry."



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