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COLLABORATION AND INNOVATION:  
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## Transforming electric power grids to smart grids through shared open networks

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### Introduction

The Internet of Things (IoT) creates a fundamental shift in advanced energy production and distribution technology by supporting utilities to better leverage existing investments in infrastructure and operations. A broad based network is key for IoT to operate reliably and cost effectively across multiple geographies and conditions. By providing reliable two-way communication at a low cost, the network transforms passive grid assets into active assets.

### Research Design – Commercial trial with Ergon Energy

Following a successful Proof of Concept in 2016, NNNCo designed and delivered a trial end-to-end demand response load control IoT solution for Ergon Energy. The low power wide area network (LPWAN) was deployed in Townsville in October 2016 using the global open standard LoRaWAN technology, low-cost gateways mounted on power poles, and low-cost sensors installed on hot water circuits.

The objective was to enable Ergon to connect beyond substations to individual household power consumers and selectively reduce load when required by remotely switching off hot water. Ergon also wanted to leverage a network that could support many other use cases, transforming their assets from passive to active - with an ability to not just see but to manage.

### Technological innovations

The network solution for Ergon Energy successfully implemented the world's first group Multicast LoRaWAN deployment in addition to a secure, scalable, flexible and highly configurable software platform and application. This delivers secure central control of multiple devices and the ability to communicate from a few devices up to thousands and results in a cost effective, robust and scalable two-way network service. For the trial, NNNCo also developed a price-disruptive, low power device, capable of operating on small batteries for many years.

### Results

The Load Control IoT deployment has proved the efficacy and cost-efficiency of the solution to date. Coverage exceeded the target of 5km with the network connecting devices in excess of 7 kilometres from base stations. Ergon was able to install the solution using existing infrastructure and line operational crew, with LoRaWAN base stations taking less than 3 hours to install on a power pole. Ergon also executed numerous demand response events, all of which were successful, proving the reliability of the solution and a workflow specific to their needs but also one which could easily be adapted to support the changing ecosystem of energy supply and delivery through a multi-retail, renewable energy environment.

### Conclusion

Large-scale IoT roll-out for utilities, which have millions of endpoints requiring connectivity, requires an affordable solution. The Load Control IoT trial for Ergon has delivered in-field proof of a low cost, scalable, easy-to-install and robust solution.

## Keywords

IoT, LoRaWAN, Smart Grid, Smart Energy

## References

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## Graphic

The case for LoRaWAN technology in Smart Energy solutions

 <p><b>Long range</b> Essential to support very large distribution areas such as utilities networks</p>	 <p><b>Low power</b> Battery-powered devices with a battery life of several years</p>	 <p><b>Low cost</b> Low lifetime and installation cost for devices / sensors containing the compact module from Murata</p>	 <p><b>Open</b> Open standards enable the network to connect to others over time and build an ecosystem rather than a silo solution</p>
 <p><b>Secure</b> Very strong privacy and security enables companies to meet the most stringent government, regulatory and customer-based guaranteed service levels</p>	 <p><b>Reliable</b> A resilient Radio Frequency modulation scheme offers reliable coverage for remote locations, tall buildings and deep basements</p>	 <p><b>Two way</b><ul style="list-style-type: none"><li>- Verifies device operation</li><li>- Transmits control signals to remote devices</li><li>- Device configuration management</li><li>- Remote update firmware</li></ul></p>	 <p>Not just a receiver, two way capability gives control, confidence and the capacity to upgrade</p>