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Industrial Communication

# WiMAX is the answer to a Smart Grid challenge in Philippines

Siemens wireless solution plays key role in Davao Light and Power Company's ambitious "Smart Grid" project

These are exciting times in the global utility sector as power companies throughout the world are undergoing a fundamental transformation to automate their distribution infrastructure, with profound applications such as fault detection isolation and restoration (FDIR), distribution feeder automation/load balancing, power quality monitoring and planning and advanced metering. All of this promises to translate into much more reliable and efficient use of energy. Davao Light and Power Company (DLPC) in the Philippines is a utility currently undergoing this kind of transition.

Established in 1946, DLPC is the third largest electric utility in the Philippines, covering territory of more than 3,500 square kilometres and serving over 300,000 customers in Davao City, Panabo City and the Davao del Norte municipalities of Santo Tomas and Dujali. To make its transformation happen, DLPC requires a sophisticated Supervisory Control and Data Acquisition (SCADA) communications network for monitoring and controlling its power distribution infrastructure, which includes substations, switching stations and reclosers.

In essence, this means having a communications network in which intelligent electronic devices (IEDs) – located throughout the infrastructure, – collect data and are in turn to communicate with the utility's central control station.

## The challenge

Fiber alone is not enough: secure, rugged and efficient wireless solutions also needed.

Nolasco "Bobot" Padillo is Supervisor of the Systems Operations Department at DLPC. He is responsible for maintaining the organization's SCADA network that oversees the utility's SCADA infrastructure.

Padillo describes how most of DLPC's communications network is fiber optic based, with about 120 kilometers of cable connecting 24 substations.

However, it cannot reach everywhere it needs to go. In fact, Padillo notes, DLPC's coverage territory includes a lot of very difficult hilly, mountainous and heavily vegetated terrain that is not suitable for fibre, including reclosers located in remote areas.

"This means wireless solutions must be integrated into the network," he says, adding that DLPC needs many of its IEDs for the reclosers to be connected via WiMAX (Worldwide Interoperability for Microwave Access) broadband wireless technology. A stand-alone network was the best solution in this particular case.

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For any wireless products being installed, Padillo emphasizes, there are significant challenges to be overcome. Security and bandwidth capacity and control must be strong, and managing the equipment needs to be simple. And most importantly, reliability is essential.

As Padillo explains, ensuring reliability is much easier said than done in light of some very difficult conditions to confront.

“We are in a tropical climate with very hot temperatures, and there can be gusty wind, and being near some very high-voltage electricity lines there is a lot of electromagnetic interference,” he says.

### The solution

For its wireless needs, DLPC had some products in place from a different vendor, but these were far from ideal, not being designed for the communications network of an electrical grid. Using that vendor, each tower required multiple wireless access points to be installed and maintained, which was far from optimally efficient. Plus they were not as strong as desired in terms of security, ruggedness and reliability.



Wide area network visualization and substation automation (SCADA for PLCs/RTUs/reclosers)

In late 2014, DLPC representatives attended an industry conference where Siemens had a presence. The executives from DLPC connected with the Siemens team and it quickly became clear that a number of products could potentially displace the existing vendor's wireless equipment while significantly improving DLPC's network performance.

### Key Products

Notable specific Siemens RUGGEDCOM products currently deployed for DLPC include:

**RUGGEDCOM WIN7015** – this high-power, broadband wireless base station meets DLPC's need for a long-range deployment in a harsh environment. It's designed to deliver maximum coverage where regulations permit high-power operation. With a single sector per base station design it can accommodate as many sectors as required at a given site, simply by adding the requisite number of base stations as driven by coverage, bandwidth and subscriber considerations.

**RUGGEDCOM WIN5214** – as a broadband wireless subscriber unit, this device has a built-in directional antenna for use in harsh environments such as what DLPC encounters. It greatly simplifies installation, aligns signal strength, automatically connects to the strongest serving base station, and automates service provisioning based on authentication credentials. Specifically designed for point-to-multipoint broadband wireless access applications, the product provides efficient use of wireless spectrum and supports a range of applications.

**RUGGEDCOM WIN5114** – this is a broadband wireless subscriber unit with external antenna connectors for use in fixed or mobile applications in harsh environments, with hardware supporting up to +75° C. It has the ability to detect the base station on the best signal available, allowing for plug-and-play installation and maintenance free operation.

**RUGGEDCOM RP100** – A single port Power-over-Ethernet (PoE) injector that is rugged-rated at up to +85° C, this product provides the flexibility to power remote PoE devices using standard cable. Compatible with the latest high-power PoE standard and backward compatible with older low-power PoE devices, the RP100 provides versatility and investment protection to handle future demands for increased power.

Visits by Siemens officials to DLPC soon followed, and a collection of RUGGEDCOM products for the setup of a Wide Area Private Wireless System were provided for trial and evaluation. Based on actual performance, RUGGEDCOM showed superior capacity compared to existing radio device.

“A one-year pilot project to incorporate RUGGEDCOM into the network was quickly set up,” he says, adding that despite a challenging schedule, Siemens delivered everything on time for DLPC.

In utilizing the RUGGEDCOM WIN series of products, DLPC is taking full advantage of the industry’s first broadband wireless product portfolio designed for private networks. DLPC is getting the benefits of carrier-grade 4G technology for critical infrastructure applications, despite operating in a harsh environment.

Based on the IEEE 802.16e standard and third party validated to support interoperability with other vendors, RUGGEDCOM WIN products have some compelling advantages for the communications needs of utilities like DLPC. That includes a unique capability that allows this family of products to operate without an Access Service Network (ASN) gateway, reducing initial capital outlay significantly and simplifying the deployment.

In addition, the products have built-in mechanisms to ensure maximum bandwidth is delivered at all times for a given distance or coverage area. Plus they are scalable to cover vast territories with embedded GPS synchronization to reduce self-interference and maximize frequency reuse, have built-in quality of service, a full security feature set, and are capable of maintaining session persistence with real-time applications in a mobility environment.

### The results

It didn’t take long during the pilot project for the profound benefits of the RUGGEDCOM solution to have a major positive impact on DLPC’s network.

“We found the products to be very superior in terms of network connectivity,” says Padillo. “It was all very easy to set up and very quickly deployed. We connected everything to the network in just minutes, and it is easily maintained. Plus RUGGEDCOM products have excellent security.”

He adds that the ability to deal with harsh environmental conditions was another crucial factor in the RUGGEDCOM products’ favor.

“The equipment from Siemens can withstand all of our difficult elements here – the hills, the heat, gusty wind, and all the electromagnetic interference.”

In displacing the products of the existing vendor, there was another major advantage that Siemens brought to DLPC. Instead of multiple access points being required for each individual tower being automated, only one was required when using RUGGEDCOM, meaning dramatic cost and efficiency benefits. It’s a classic case of being able to do more with less.

In addition, Padillo notes, the Siemens solution provides greater bandwidth capacity, much better bandwidth management, and “total control of the network.”

“That’s an important feature and it’s not available in the old equipment we had,” he explains.



Demand response, remote disconnection

## The future

More oil and gas opportunities, plus new frontiers with Smart Grid initiatives and Intelligent Transportation Systems.

Thanks to the power of the Siemens solution, DLPC is now looking ahead to a major expansion of what was deployed in the pilot project. Expectations are for the process to gain more momentum in the coming months and years, with RUGGEDCOM products from Siemens playing a key role in enabling DLPC to reach its goals.

The network being created and enabled by key RUGGEDCOM elements means fewer outages, faster repairs, and improved line reliability for DLPC's customers. "DLPC's Smart Grid vision is to have a robust, scalable, reliable and efficient communication infrastructure," Padillo describes.

In short, these are just the early days on DLPC evolving into a utility of the future, and the early days of a great relationship between Siemens and DLPC.

"The team at Siemens is a great business partner", concludes Padillo. Siemens provides the right solution to network infrastructure needs with excellent technical support.



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## Case study at-a-glance

**Customer:** established in 1946, DLPC is the third largest electric utility in the Philippines, covering territory of more than 3,500 square kilometers and serving over 300,000 customers.

**Challenge:** a sophisticated fiber optic communications infrastructure is needed for the utility's distribution automation initiative, but challenging terrain and climatic conditions mean that a robust wireless broadband solution is essential for the network to operate; existing products in place had significant efficiency, security and reliability limitations

**Solution:** RUGGEDCOM WIN series of products from Siemens, including WIN7015 base station, WIN5214 fixed subscriber unit, WIN5114 mobile subscriber unit, and RUGGEDCOM RP100 power injector

**Results:** RUGGEDCOM products have delivered substantial benefits, thanks to easy and quick deployment, simple maintenance, excellent security, and full reliability despite hot temperatures, electromagnetic interference and difficult topography.

**Future:** with Siemens playing a key role, DLPC is moving toward realizing its Smart Grid vision – an improved network reliability (SAIFI/SAIDI) of distribution system.

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