



The Computerworld Honors Program

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Final Copy of Case Study

Status:

Laureate

Year:

2013

Organization Name:

Cisco Systems, Inc.

Organization URL:

www.cisco.com

Project Name:

Connected Grid Field Area Network

Please select the category in which you are submitting your entry

Emerging Technology

Please provide an overview of the nominated project. Describe the problem it was intended to solve, the technology or approach used, how it was innovative and any technical or other challenges that had to be overcome for successful implementation and adoption. (In 300 words or less.)

As we face the demands of climate change, exponentially growing energy use, and aging systems, modernizing the electric grid has become a major objective for power companies. Updating to today's smart grid helps utilities incorporate renewable power sources, better manage customer usage, and meet regulatory requirements. Cisco Systems has implemented one of Canada's first large-scale Automatic Metering Infrastructure projects for British Columbia Hydro and Power Authority. BC Hydro's Smart Metering Program provides technologies to improve efficiency, reduce customer power requirements, and lay the foundation for future uses such as electric vehicles, customer generation, and microgrids. Connected by Cisco's innovative new Field Area Network (FAN), 2 million smart meters have been installed in the BC Hydro service area. They enable data collection and management, theft detection, and integration with utility applications to support measure, manage, and analyze energy usage. Meters record consumption throughout the day and send it to the network router, as well as alerts on outages and other emergencies. However, in constantly changing residential and

commercial environments and in harsh Canadian winters, outdoor networks need to be flexible and powerful to function. Cisco's FAN is the ruggedized backbone of the system, providing specially designed routers to support continuous data collection. Built to withstand conditions on pole tops, in substations, and other harsh environments, the Cisco 1000 Series Connected Grid Routers are designed to offer secure, reliable communications specifically for FAN applications. If there is interference, such as a truck parked in front of a meter, the self-healing network automatically redirects the data through nearby meters, securely sending it from meter to meter until it's received by the network router. The routers support a variety of communications interfaces and a powerful network and device management solution.

When was this project implemented or last updated? (Please specify month and year.) Has it incorporated new technologies and/or other innovations since its initial deployment? (In 300 words or less.)

The BC Hydro installation began in Summer 2011 and was completed December 2012. Cisco and its partner Itron are now working with BC Hydro to build on this powerful foundation to deploy distribution system meters to track energy theft, voltage optimization, and other future applications. For example, BC Hydro currently transmits more electricity than needed to ensure consistent, acceptable power quality. Reducing this wasted electricity benefits all customers through lower operating costs. The amount of excess energy required can be substantially reduced with better monitoring and control over the distribution system through voltage optimization. Voltage information is collected from smart meters to assure that electricity control devices (voltage regulators, capacitor banks, and transformers) are transmitting the right amount of energy to maintain expected power quality, but not more. This results in less electricity having to be generated or purchased, which in turn, lowers power use and costs. As well, smart meters will now enable more efficient applications for meter reading, meter sampling, distribution system maintenance, outage management, and load research. As well, legitimate customers must currently bear the cost of electricity theft, which has grown from approximately 500 GWh in 2006 to an estimate of at least 850 GWh today enough power to supply 77,000 homes for a year at a cost of \$100 million a year. Identifying and confirming theft is now a time-consuming, inefficient, and expensive manual process. Augmenting this process with networked distribution system meters located at key points on BC Hydro's system technologies will substantially reduce current levels of theft. Combined with software tools to enable electricity balancing analysis, distribution system meters help identify theft accurately and address it quickly. Household smart meters also have a tamper detection feature that automatically notifies BC Hydro if they have been manipulated in any way.

Is implementation of the project complete? If no, please describe the project's phases and which phase the project is now in. (In 300 words or less.)

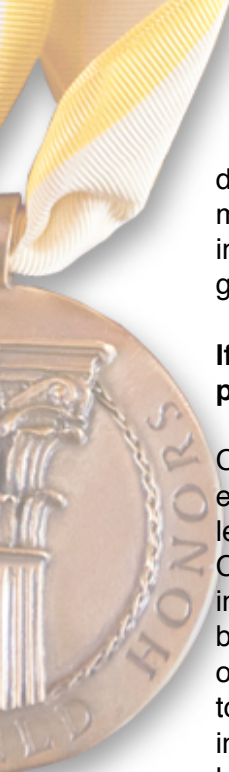
Yes.

Please provide at least one example of how the technology project has benefited a specific individual or organization. Feel free to include personal quotes from individuals who have directly benefited from the work. (In 300 words or less.)

Based on current findings, BC Hydro expects to see \$70 million in savings during the first three years of the FAN's operation savings, which it can then pass on to its customers. The net benefit to customers is expected to be at least \$500 million. More important in the long term is BC Hydro's preparation for the future of the province's power production. According to the British Columbia Energy Plan, BC Hydro must ensure that clean or renewable electricity generation will account for at least 90% of its total generation. As part of its Power Smart and Resource Smart programs, the Cisco FAN allows the company to analyze and understand power usage in much greater detail, helping to lower energy use through improved system controls, operational efficiencies, and new customer consumption management tools. BC Hydro is also better able to manage grid by reducing peak demand and capacity constraints. Applications such as Advanced Metering Infrastructures, Demand-Response services, Distribution Automation, Home Area Networks, Multi-Tenant Services, and utility workforce automation are all building the future of green energy. The Cisco FAN delivers unmatched customer and utility information security, ruggedized systems for harsh environments, faster disaster recovery, robust management of large data sets, and more cost-efficient operations for critical national infrastructure. Now able to monitor the grid and energy use in real time, modernized utilities are able to look forward to achieving a lower carbon footprint. Gary Murphy, Chief Project Office of BC Hydro's Smart Metering Program, says, "The ability to leverage our infrastructure with Cisco's telecommunications ability is a great stepping stone into smart grid. We will be able to leverage it for years to come."

Would this project be considered an innovation, a best practice or other notable advancement that could be adopted by or tailored for other organizations and uses? If yes, please describe that here. (In 300 words or less.)

The Cisco FAN is a powerful technology innovation that enables a new set of best practices within the energy industry. It is built on the secured Cisco network, which provides the backbone for many industrial and enterprise systems. Such a flexible, secure architecture is a huge benefit in this rapidly changing industry, allowing utilities to address current needs, then adopt and expand the same network to support future capabilities. The use of communications networks in the grid is still a fairly new concept among many utilities, and fully networked metering implementations are very new indeed. However, Automated Metering Infrastructures are increasingly recognized as a critical component of the modern grid. By monitoring and analyzing consumer energy consumption, utilities can identify opportunities to save energy and quantify routine energy waste. Smart meters are a key first step in modernizing the electricity system and ensuring safe, reliable power delivery while also managing carbon footprint. Research has shown that saving electricity is not something that customers typically think about, and that increasing their awareness can achieve electricity savings of up to 15%. Based on information gathered by the FAN solution, BC Hydro will shortly offer a new service that allows customers to log in and securely view their electricity usage up to the previous day, and then utilize online conservation tools to help better manage use. If this doesn't sound like much, reflect that if a utility with a customer base of 3 million is able to



decrease electricity usage by just 2.5%, it can cut its CO2 emissions by more than 1 million tons annually, according to green consulting firm WIPRO Technologies. More information and control both helps customers to save money and supports BC Hydro's goal of meeting two-thirds of incremental demand through conservation by 2020.

If there are any other details that the judges should know about this project, please note them here. (In 300 words or less.)

Cisco built its reputation in the utility industry by partnering with industry advisors and experts to develop innovative smart grid network solutions. Working with highly regarded leaders such as Itron and Alstom, Cisco has created a highly customizable FAN solution. Cisco provides one of the industry's most comprehensive portfolios of communications infrastructure solutions, spanning production, distribution and consumption of energy based on an end-to-end open standards network. By delivering multiple applications over a single, intelligent, and highly secure platform, electric utilities benefit from lower total cost of ownership as well as creating value from new services and functional integration well into the future. Please view the videos on the BC Hydro project at:
<http://www.youtube.com/watch?v=-1qlxrh1nPs>
<http://www.youtube.com/watch?v=8xQZscbdbuU>
<http://www.youtube.com/watch?v=Rg4LWVjvnyE>

The transformation of the power industry is one of the most significant technology changes of our generation, and is expected to have a powerful impact on the global economy, national security, and environmental policy for years to come. Cisco's vision of the smart grid as a key enabler of a cleaner, more efficient, and more secure power delivery system underlies all of its Connected Grid solutions, and Cisco FAN solutions are a critical component in building the energy industry's future.