

HomePlug Alliance Case Study:

3One Networks Deploys Intelligent Power Grid Solution for World's Largest Utility Company

Contributed by Intellon

The standard electric power grid is widely distributed, with multiple substations, transformers, lines and meters. As the grid is currently architected, identifying and troubleshooting problems in this grid can be an arduous task for utility companies - resulting in power lapses, revenue loss and energy inefficiency.

Intelligent grid ("smart grid") management promises to revolutionize the way utility companies oversee their grids by enabling them to monitor use in real time, and shorten or eliminate power outages. 3One Networks, a technology and services company that has commercialized Broadband over Powerline (BPL) technologies, has developed innovative BPL power grid management solutions. Based in Victoria, British Columbia, Canada, the company combines advanced hardware and software to enable the remote, real-time monitoring and control of electrical power grids.

As 3One developed its BPL power grid management solutions, it needed a powerline communications chipset with the performance, reliability and ease of use required to support these applications. 3One evaluated several chipsets, testing their performance in trial implementations. Based on proven performance in the trials, the company selected Intellon's HomePlug® AV chipsets for its BPL power grid management solutions. In addition to unparalleled performance, Intellon offered the ease of use and engineering support that 3One required as it designed its intelligent grid solutions.

"Intellon's HomePlug AV technology proved to be the best solution for enabling our BPL intelligent grid system," said Oliver Ding, CEO of 3One Networks. "HomePlug AV offered the bandwidth and QoS necessary to support real-time grid monitoring, video surveillance and Internet access for end users."

3One was also familiar with Intellon because the company uses Intellon's HomePlug 1.0 with Turbo chipset in its 3One BPL Access systems, providing a low-cost method to distribute broadband Internet to end-users in multi-unit buildings such as hotels, apartments, condominiums, offices, schools and hospitals.

In the trials, Intellon's HomePlug AV chipset demonstrated throughput rates of between 20-40Mbps, while other chipsets only reached speeds of 7Mbps.

3One's BPL power grid management solutions create the data network required for intelligent power grid management. With intelligent power grid management, utility companies can remotely read electric meters, monitor voltage levels at transformers,

quickly identify power outages, monitor and control utility assets, and manage security cameras. They can also deliver high-speed Internet access services to end users on the intelligent grid.

3One recently deployed a BPL-based Intelligent Grid System in Anhui Province, China with its joint venture partner, Fujian Great Power PLC Equipment Co., for the world's largest utility company - the State Grid Corporation of China (SGCC). 3One believes this project is the first commercial deployment in China as well as the most comprehensive BPL utility grid deployment in that country to date.

In the Anhui Province deployment, the intelligent grid system incorporates 3One's broadband over powerline technologies as well as narrowband PLC technology to enable SGCC to monitor hundreds of residential units within numerous multi-dwelling unit properties. 3One Networks' Medium Voltage Communication System uses the medium-voltage (MV) power lines to transmit TCP/IP-based data communications. Designed to function with both MV underground and aerial grid cabling, the solution enables a direct link between all connected IP-based devices and an Intelligent Grid network operation center (NOC).

With an average distance between substation and transformers of 2.5 kilometers, the backhaul network uses 3One's 200Mbps BPL System. With Intellon's HomePlug AV-based ICs, transfer rates of up to 200Mbps and advanced QoS provide the bandwidth and reliability required to enable and manage an entire utility grid network.

To monitor power use, 3One installed narrowband PLC energy meters within each residential unit, using automated meter reading (AMR) technology. The aggregate narrowband data is then modulated and transmitted over the power lines to the nearest substation. With supervisory control and data access (SCADA) technology, the utility company collects data at points throughout the grid and brings it back to a central point for monitoring and analysis. In addition, the network provides sufficient bandwidth to stream IP-based video from the substation security cameras as well as deliver high-speed Internet access to residents.

3One's BPL power management solutions provided a number of important benefits to SGCC. With the BPL-based Intelligent Grid System, SGCC now monitors its grid in real time, allowing it to assess power quality, current flows and power fluctuations continuously.

The ability to identify problems proactively enables the utility company to prevent or reduce power loss. In China, line loss from generation to the end user is typically about 15-20 percent, compared to 7-10 percent in North America. By reducing this loss, SGCC can collect those additional power revenues and improve service to customers. With the intelligent grid in place, the utility company can reduce energy loss by 5-10 percent, which provides substantial benefits to the company in terms of cost savings and customer service.

Ongoing energy efficiency not only increases revenues, but reduces the overall need for power-generation plants moving forward. If all plants are operating efficiently, SGCC will not need to build as many plants to meet demand.

The security features that are part of the intelligent grid allow SGCC to collect live video of transformers, thereby increasing the security of its infrastructure. Also, the utility company enhances its service to end customers by offering Internet access to those connected into the intelligent grid.

With the successful initial commercial deployment in Anhui Province, SCGG plans to roll out 3One's BPL-based Intelligent Grid System in other regions across the country.

Intellon's HomePlug AV chipset has performed exceptionally well, delivering the high throughput 3One needs for power grid monitoring and allowing SGCC to bring Internet access to its customers. 3One looks forward to future collaboration with Intellon on next-generation PLC technologies, as well as expanding its intelligent grid footprint in places like China and South America.

According to Oliver Ding, "Intellon's HomePlug AV technology proved to be the best solution for enabling our BPL intelligent grid system. HomePlug AV offered the bandwidth and quality of service necessary to support real-time grid monitoring, video surveillance and Internet access for end users."