



Case Study: GPRS Communication in Feeder Automation Applications

Arctic IEC-104 Gateway Helps Power Utilities Save Costs and Improve Distribution Management

Communication is the key

In 1988 **ABB Distribution Automation** delivered a MicroSCADA system for the control and supervision of the power distribution network of Koillis-Satakunta Power Utility. The distribution network of the Koillis-Satakunta District comprises 3889 km of medium voltage lines, 7 substations and switching stations, and 1188 distribution transformers.

The distribution network covers a large area, over 100 km in diameter, in a hilly terrain with numerous lakes and rivers. Substations, disconnectors and transformers are scattered over the area and are often located in difficult to reach places.

Despite all these challenges, the whole network has been successfully operated and maintained by a relatively small staff, thanks to continuous investments in automation. For distribution automation reliable communication is a key factor.

What is a remote controlled disconnector station?

The disconnector stations divide the network into smaller, more manageable sections. They disconnect faults, re-route the power supply, and perform scheduled outages controlled by the MicroSCADA system.

In case of a network failure, the fault is first located by means of the ABB Open++ Opera DMS, a high-level distribution management software that runs on top of MicroSCADA.

Then, through the use of remote-controlled disconnector stations, the located fault is isolated from the healthy part of the distribution network. This allows a repair team to be guided more accurately to the fault spot and a faster power restoration.

“Also a section subject to maintenance and renovation can now be separated from the distribution network at minimum effort, thanks to the disconnector stations remotely controlled via the Arctic IEC-104 Gateway,” says **Aimo Rinta-Opas**, Operations Manager of Koillis-Satakunta Power Utility. “

Arranging reliable remote connectivity causes headache

”The benefits of adding remote control capability to a disconnector station are undeniable. But in practice, arranging a reliable data connection to a remote disconnector station can cause a lot of headache,” explains **Jari Hakala**, IT Manager of Koillis-Satakunta Power Utility.

In 2001 a pilot project was executed in collaboration with ABB. The data connections to remote disconnector stations were established with dial-up GSM modems. At that time, the price for the use of GPRS was considered too high for large scale commercial implementation. “We had a number of issues related to the usability and reliability of GSM modems,” Hakala remembers.



Jari Hakala, IT Manager of the Koillis-Satakunta Power Utility, is satisfied with the high reliability and ease of use offered by the Viola M2M Solution™

“Things have gone really well. We now have reliable, secure and always-on connections to the selected remote disconnector stations,” states IT Manager Hakala.

“Actually, the Viola M2M Solution™, that is the Arctic IEC-104 Gateway combined with the Viola M2M Gateway, has proven to be so reliable in the field that we are already extending the application to the substation level,” states Hakala with a satisfied smile.

Industry:	Utilities, Power
Customer:	Koillis-Satakunta Power Utility
Solution:	Arctic IEC-104 Gateway + Viola M2M Gateway

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A patient man uses GSM modem

GSM dial-up is not an always-on connection but must be re-established every time when needed. "With each connection attempt, we experienced an average connection establishment delay of about 30 seconds."

"The old system works for a patient man. But when you have an outage situation at hand requiring swift actions, patient men are hard to find. Sometimes the GSM modems even stalled," Hakala concludes.

GPRS prices came down

The radical price drop during 2002 made GPRS a viable option for arranging always-on remote data connections.

"Always-on remote connectivity sounded interesting but we were still not satisfied with the GPRS products available on the market," says **Jarkko Holmlund**, Product Manager, ABB Distribution Automation.

"Ever since 2003 we have had a successful collaboration with Viola Systems."

Partnership with ABB

"When we specified the functionality of Viola's Arctic IEC-104 Gateway, we worked closely together and leveraged ABB's 20 years long experience in feeder automation," ABB's Holmlund explains.

"The common fear factor at the Koillis-Satakunta Power Utility towards the use of public cellular networks was already eliminated through the experience with GSM modems," Holmlund says. All GSM modems were replaced with Viola's Arctic IEC-104 Gateways, that are industrial-grade serial-to-GPRS gateways featuring IEC-101 to IEC-104 protocol conversion, a built-in firewall and VPN technology for secure communication.

The exchange of GSM modems to mere GPRS modems wouldn't have been enough to justify the replacement. "Viola and ABB offered us a total end-to-end solution that is both secure and always-on yet easy to use," says IT Manager Hakala.

"More important, the migration from GSM to GPRS required only a minimum of engineering efforts in the MicroSCADA system," Hakala adds.

Smooth migration

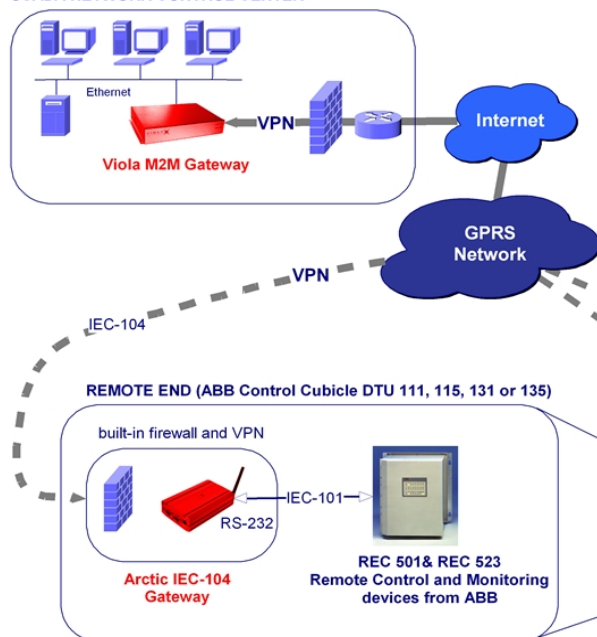
The migration from GSM modems to Arctic IEC-104 Gateways took place in early 2005. And since then, there hasn't been a single failure in their operation. The Arctic IEC-104 Gateways were delivered preconfigured, a fact that makes the installation and deployment a lot easier.

"First, a SIM card is inserted into an appropriate SIM slot, then an external antenna is attached, and finally 12 V power cables are connected. And that's all," explains Hakala.

The on-site installation at a disconnector station takes less than 30 minutes. The ABB DTU control cubicle holds all the required equipment for adding remote control capability. This includes ABB's REC523 unit that actually controls and monitors the disconnectors.

After the installation has been completed the Arctic IEC-104 Gateway automatically creates a secure VPN tunnel to the Viola M2M Gateway located at the Network Control Center.

SCADA NETWORK CONTROL CENTER



DTU 135 Control Cubicle



"Considering our high power-quality objectives and our limited human resources, I can't imagine how we could operate our network today without the capability of wireless telecontrol," ponders Operations Manager Rinta-Opas.

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About Viola M2M Solution™

Unlike many competitors who sell boxes, Viola delivers a total secure end-to-end connectivity solution that seamlessly integrates remote devices and sites to centralized management systems such as SCADA or HP OpenView. No changes to existing systems are needed. Viola M2M Solution™ is an install-and-forget-it, hassle-free approach. In addition, Viola M2M Solution™ is operator-independent; it allows customers to implement two-way data communications in a similar manner all around the world.

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