Case Study

Intel® Architecture Processors

Energy Industry

MOXA®

"We can service a large number of I/O ports, yet remain fanless in a standard 19-inch, 1U form factor with Intel Architecture Processors."

– Mark Liu , business development manager, Moxa Inc.

Ensuring Power Substation Reliability at the Highest Level

Moxa embedded computers take the Smart Grid to power substations

Engineers at Moxa have been designing communication network solutions that satisfy the strict, many-fold requirements of industrial automation for over twenty years. Their equipment enables power utilities to offer uninterrupted and reliable electric power to the public, even under harsh environmental conditions. But Moxa's latest power substation automation system – an IEC 61850-3-certified, 18-port, embedded computer – presented some new challenges for the company's designers.

Moxa wanted to build a platform for substation automation that could handle a large number of LAN and serial ports while withstanding high temperatures in a fanless, 1U standard rack-mount form factor. "We also had to meet rigorous electromagnetic interference (EMI) testing requirements for IEC 61850-3, a specification governing communication networks and systems in substations," says Moxa European business development manager Hermann Berg. "Our EMC/RFI shielding technology and purpose-built L-type heat sink that takes heat to the side rather than the top or bottom, combined with our prior experience with Intel® Architecture Processors enabled us to develop this stackable computer."

The new DA-681* Series rack-mount embedded computer is designed to service the communications traffic generated by as many as six Ethernet ports and a mix of twelve RS-232/RS-485 ports. This high level of I/O capacity and flexibility is needed as power substations transition from analog to digital, which requires integrated communications and control systems for managing various equipment inside a power substation. Moxa is a leader in industrial serial communication, using its own serial technology to serve the most diverse and demanding requirements. Using Intel's leading CPU technology, Moxa was able to build an "industrial off-the-shelf" computer system that stands up to the extreme environmental conditions of the power substation.

Faster processing with less heat

The Moxa design team chose Intel's mobile product line to power their DA-681 rack-mount embedded computer because it offers high levels of computing performance while enabling a fanless solution. Further decreasing power consumption, the DA-681 automatically throttles (reduces) the operating frequency of the processor, if the system runs hot, through the use of Moxa-designed BIOS features. "With Intel® processors, our energy customers have the computing headroom to run pre-installed operating systems, like Linux,* Windows* WinCE* 6.0, or XP Embedded,* in addition to executing many protocol stacks, protocol conversion routines and data pre-processing algorithms needed to monitor and control power systems," says Mark Liu of Moxa.

Measures of Success

- **IEC 61850-3 certification** demonstrates compliance with energy industry-standard requirements such as environmental and EMI immunity for communications networks and systems in substations.

- **Fanless, high temperature design** increases power system reliability and stability, based on Moxa's extensive experience in building industrial-grade networking and computing equipment.

- **Moxa's five-year product warranty** assures utility operators of reliable performance for years to come, facilitated by Intel's long life cycle support for seven years.

- **EMC (ElectroMagnetic Compatibility)** protection ensures critical functions experience no delays or data loss when exposed to various EMI disturbances, enabled by Moxa EMC/RFI shielding technology.

In addition to the DA-681, Moxa uses Intel® Architecture Processors in its modular DA-682 (2U rack-mount), which allows utility operators to swap out modules quickly and easily.

Figure 1. Moxa DA-681* Series Rack-Mount Embedded Computer

Integrating multiple control units

Utility operators are looking for reliable monitoring solutions that perform many control functions in a single, secure box such as the DA-681. The DA-681 can be used to automate power distribution and monitor substations and service cabinets. "Instead of dedicated communication units, some power substations still use separate control units with proprietary, non-integrated data acquisition, analysis and handling mechanisms," says Hermann Berg. "These aging units can be highly susceptible to frequent communication shutdowns, complicated maintenance procedures and may not maintain stable and reliable operations."

Simplifying energy application development

Designed to meet the real-time demands of energy substation applications, the DA-681 runs Linux, WinCE 6.0 or Windows XP Embedded (pre-installed) and provides a friendly environment for developing sophisticated application software. "We offer a ready-to-run software platform, based on energy industry standards, with easy-to-use serial communication technology to significantly reduce system development effort and time," says Mark Liu. "This is particularly helpful for power automation system integrators as they no longer need to develop the network from the basic hardware layer."

Renewable energy trends

"The move from using traditional coal-fired power plants to renewable energy sources is well underway and is expected to accelerate considerably over the next decade," says Hermann Berg. He continues, "In particular, solar power has been recognized as a viable alternative, and in recent years a number of regions in both North America and Europe have enacted so-called FiT (Feed-in Tariff) legislation that allows individuals to sell solar-generated power to their local power utility." At the same time, industry experts predict a number of large-scale solar power plants will emerge and sell power to consumers through existing power grids. Moxa's embedded computers are expected to enable both efficient wind or solar power plant operation and the integration of power substation equipment into the electricity network operator's smart grid.

Find a business solution that is right for your company. Contact your Intel representative or visit the Reference Room at www.intel.com/references.

Benefits of Using the Intel® Architecture Processors

- Moxa achieved a high level of engineering efficiency through three successful design experiences with Intel® processors (DA-681,* DA-682* and V481*).

- The processor's low-power consumption supports a high working temperature.

- The visibility and availability of Intel processors and chipsets with long life cycle support permit Moxa to offer an exceptional five-year standard product warranty and support installations around the world for as long as customers need it.

- Intel's development environment and processor road map help Moxa speed new product development by an estimated 30 percent.

- Technical and marketing support from Intel and its distributor, Acer Sertek*, enables Moxa to more easily extend the reach of its solutions into new market segments such as wind or solar power plants and power substations.

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