Network management solutions for power reliability in Ecuador

Connecting to wind in Romania
New substation to connect 84 MW wind farm to the National Transmission Grid

Technology migration for RTUs in Zambia
From RTU211 to RTU511 for enhanced functionality and lifecycle extension
Dear readers,

Welcome to 2013's second issue of Network, the customer newsletter from ABB's Network Management business unit.

A highlight this quarter was the launch of our newly defined software portfolio at Ventyx World in San Francisco. The event was attended by almost 1000 people and showcased our new solutions for customers in utilities and asset-intensive industries. Among these was the Asset Health Center, a software platform for intelligence-based asset management (page 4).

Asset Health Center, which combines information- and operational technologies (IT/OT), is being deployed in all of AEP's substations in North America and we see demand for our software solutions in other parts of the world too. In Germany, we’re partnering with Deutsche Telekom to deliver another IT/OT solution (page 5). This enables operators to aggregate small generation units into larger “virtual” plants, better able to respond to fluctuating conditions in the grid. The solution will make an important contribution to the integration of distributed generation facilities, especially small-scale renewables, into the grid.

In South America and the Caribbean, Ventyx solutions will be used to improve power system performance, in both every-day operations (page 9) and power restoration following damage by storms such as hurricane Sandy (page 6).

In Romania, our substation automation technologies are helping to tap into the country’s potential for wind power. A new ABB substation, equipped with our advanced protection and control technologies, will enable a 84 MW wind farm to be connected to the grid (page 7).

Our communication technologies are also supporting power networks in different parts of the world. In Iraq, we will install a communications system using wireless radios, capable of communicating over more than 50km. These will improve the reliability for the grid and are well suited to the mix of challenging terrain and built-up areas in the country (page 10). The contribution our communications technologies can make to the modern power grid as discussed further in an interview with Rob Pilgrim from our Network Communications business (page 8).

In Switzerland, our new multiplexer, the FOX615, will provide communications functions for Axpo's wide-area power network in Switzerland (page 11). The new device supports current communications protocols, but will also accommodate new technologies as they gain utility-acceptance. This flexibility will extend the lifetime of the devices, adding value to the customer's investment.

ABB technologies are known for this kind of adaptability and in Zambia, ZESCO, the national power utility, is upgrading rather than replacing its ABB RTUs (page 12). The technology migration was achieved in just a few steps and brought new functionality to ZESCO's power system. Read more about this successful project on page 12.

Best regards

Jens Birgersson
Collaboration

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From RTU211 to RTU511 for enhanced functionality and lifecycle extension
At its inaugural “Ventyx World” customer event in San Francisco, ABB’s dedicated enterprise software business, unveiled Asset Health Center, a software platform for monitoring the health of mission-critical assets in asset-intensive industries.

Developed by Ventyx and ABB in partnership with American Electric Power (AEP), one of the largest electric utilities in the United States, the new Ventyx Asset Health Center solution for transmission companies represents a significant step forward in asset management that fully leverages utilities’ new smart grid technology investments.

By integrating real-time data generated by operational technology (OT) systems with transactional and historical data housed in information technology (IT) software, the solution offers utilities access to more timely and actionable insights into the health of vital transmission network assets. Armed with a real-time analysis of asset health across the entire transmission network, utilities can reduce unplanned outages caused by asset failure, and increase service reliability to their customers.

Since 2009, AEP has been partnering with ABB and Ventyx to develop this pioneering asset health platform supporting AEP’s business. Incorporating the wealth of operational and diagnostic experience provided by AEP and ABB, the Ventyx Asset Health Center is now available to all transmission owners and operators.

“At AEP, we faced a range of issues common to all transmission operators with aging infrastructures,” said Robert W. Bradish, vice president grid development, AEP. “At the same time, we recognized an opportunity in the rising tide of big data being generated at unprecedented rates by our equipment’s smarter sensors, equipment monitors and the like. To transform this data into practical and actionable information, we knew we needed a new combination of technologies, and partnered with market leaders ABB and Ventyx to develop this strategic solution.”

At its core, the Asset Health Center manages the collection of data from across the transmission grid, automating what is otherwise a time-consuming manual process performed by highly skilled individuals. It then applies advanced analytics to real-time, transactional and historical data to achieve more timely insight into asset performance across the grid, helping to drive decisions and actions that maximize asset health and performance. It further advances this process by delivering real-time visibility through a comprehensive set of business intelligence dashboards customized for transmission operations.

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Asset Health Center enables real-time monitoring and maintenance of aging assets, minimizing asset failures and costly downtime
ABB and Deutsche Telekom develop cloud-based solution for virtual power plants in Germany

Innovative solution leverages Ventyx’s demand response management software to manage distributed energy resources and facilitate smart grid deployment

A new cloud-based solution that enables energy providers to manage virtual power plants from the cloud is now ready for commercial use in Germany. The solution, which leverages demand response management software from Ventyx, an ABB company, was developed in collaboration with Deutsche Telekom. It has been tested extensively as part of the T-City project – a technology lab sponsored by Deutsche Telekom in partnership with the city of Friedrichshafen, in southern Germany, and is now ready for commercial use.

Virtual power plants enable energy providers to aggregate small, local plants – as well as demand response programs, energy storage and other distributed power sources – into larger units that can react more flexibly and rapidly to balance out energy surpluses or local shortfalls. As a result, energy providers can compensate for the significant fluctuations in wind and solar energy production and optimize the performance of the grid.

The overall solution includes Demand Response Management System (DRMS) software, which supports commercial and retail utility operations required to manage distributed energy resources and optimize smart grid deployment. It also includes secure IT and communications infrastructure enabling distributed electricity generators such as combined heat and power plants to exchange data with utilities or other energy companies. The software to manage the power plants is provided by Ventyx, ABB’s dedicated enterprise software entity and Deutsche Telekom looks after the IT infrastructure and data communication.

"Deutsche Telekom and ABB have been developing common solutions for energy system developments since 2010, including an intelligent secondary substation that enables energy operators to accommodate more renewable energy," said Jens Birgersson, head of ABB’s Network Management business unit, within the company’s Power Systems division. "This joint development will help to deliver reliable and more environmentally friendly energy."

ABB is uniquely positioned to bridge the gap between enterprise information technologies (IT) and operational technologies (OT) by combining its vast product and system portfolio and longstanding domain expertise across utilities and industries with Ventyx software solutions. The combination of IT and OT enables customers to make faster and better-informed decisions in daily operations and long-term planning, helping some of the world’s largest organizations to minimize risk and enhance operational and financial performance.

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Jamaican utility reduces impact of major storms on its citizens with Ventyx solutions

Jamaica Public Service improves outage restoration and customer service in the face of severe weather conditions with an integrated transmission and distribution system from Ventyx

Ventyx, an ABB company, has signed a significant software license agreement with Jamaica Public Service (JPS), the sole provider of electricity to Jamaica. As part of the agreement, JPS will upgrade its Ventyx customer information system (CIS) solution and implement Ventyx’s mobile workforce management and outage management system solutions to gain greater visibility across its transmission network – significantly improving outage-restoration times in the aftermath of severe weather conditions.

Located in the hurricane belt of the Atlantic Ocean, Jamaica is often affected by tropical storms, causing power outage problems for its 2.8 million citizens. Using the Ventyx solution, JPS will establish an integrated transmission and distribution system that will enable it to rapidly restore energy services to its customers and lessen the impact of future storms.

"When confronted by storms such as Hurricane Sandy, which affected power supply to tens of thousands of residents, restoring electricity services as quickly and efficiently as possible is essential to the welfare of Jamaican citizens," said Kelly Tomblin, President & CEO of JPS.

"With Ventyx, we know we are getting the number one, industry-proven solution used by the world’s largest transmission and distribution providers to restore power quickly and minimize the impact of outages for our customers.”

JPS has relied on the Ventyx CIS solution for more than 15 years. With this new agreement, the utility is expanding its CIS implementation and adding the Ventyx mobile workforce management and outage management systems to provide an integrated, end-to-end outage restoration solution. As a result, JPS personnel will be able to more quickly locate customer outages, identify root causes, dispatch crews to repair the outages and verify restoration with customers – improving reliability, reducing downtime and enhancing customer service.

“Network outages are what every utility tries to avoid, but sometimes they’re unavoidable,” said Rick Nicholson, vice president, transmission and distribution solutions, Ventyx. “The impact of energy outages can be significant, and there is always pressure on utilities to reduce outage duration and frequency, as well as keep customers better informed during outages. With Ventyx, Jamaica Public Service can be assured they are implementing the latest, most advanced outage restoration solution based on more than 30 years of deep domain experience to improve the availability, performance and reliability of its power supply.”

JPS has worked for more than 90 years to satisfy Jamaica’s energy needs, growing from a modest network serving fewer than 4,000 customers to become the sole distributor of electricity in Jamaica with a customer base of close to 600,000. JPS meets the energy needs of the citizens of Jamaica with generation capacity that exceeds 620 megawatts from 27 generating units including eight hydropower plants and one wind farm, as well as 54 substations and approximately 14,000 kilometers of distribution and transmission.

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Connecting to wind in Romania

New substation to connect 84 MW wind farm to the National Transmission Grid

Since 2000, a total of 353 GW (gigawatts) of new power capacity has been installed across the European Union, 28 percent of which comes from wind. These additions meant that by 2012 wind power was contributing 11 percent of the EU’s total power mix with a cumulative installed capacity of 106 GW.

Across Europe, however, there are some areas better suited to wind power than others and Romania has been hailed as one of the top 10 most attractive countries of the world in which to invest in wind energy. This is because of its high potential for wind, with a feasible capacity of 14,000 MW (Ernst & Young).

Today, Romania’s is total installed wind power capacity is around 2,000 MW, which contributes about 7 percent of the country’s electricity and can, on certain days, exceed the power generated by its the country’s single nuclear power plant, or its entire fleet of active hydro-power plants.

As the proportion of wind generation in the region increases, so too will the infrastructure required to connect it to the National Transmission Grid. To help Romania to take advantage of its wind energy potential, ABB will install a brand new turnkey 110/33 kilovolt (kV) substation in Tulcea county, part of the Dobrogea region, known for its high wind power potential. This will allow a new 84 MW wind farm to be connected to the grid.

This project is a turnkey endeavor, which includes the design, engineering, equipment supply, erection and commissioning of the substation. The Dorobantu -Topolog substation will have a rated capacity of 126 megavolts-ampere (MVA) and will be connected by a 15 km long 110 kV underground cable to the Rahman substation, a substation previously built by ABB. The Dorobantu Topolog substation will be equipped with control and protection devices from ABB and will comply with the substation automation protocol IEC 61850, to facilitate communication within the substation and beyond.

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The new substation will be similar to this one and help Romania tap into its high potential for wind power.
The grid transformation forum: Envisioning the 21st century grid

How communication technologies can enable more reliable and efficient electricity distribution

ABB Tropos’ Rob Pilgrim is interviewed by Electric Energy T&D on smart grid wireless communications, its role, benefits and interoperability. For the full interview, go to this link.

EET&D: How can a communications equipment businesses such as ABB’s Communication Networks, group electrical power grid more reliable and efficient?

ABB: The concept of a smart grid is about combining information, automation, and communications technology to create a more responsive and intelligent electric grid. You can’t have a smart grid without communications and, if anything, the communications needs to be more reliable than the power grid. This is because you need visibility and control over your grid assets most when there is a fault or an outage. Communications have to remain up in these situations.

EET&D: What are the basic requirements for a smart grid communication network?

ABB: Reliability is the number one requirement. This is really a combination of survivability and availability, meaning, “Do I have access to the network resource when I need it?” both in terms of system uptime as well as system service availability. Survivability deals with how the network performs during exceptional or unplanned events, think Hurricane Sandy. Utilities should be looking for communications solutions with resilient architectures that are fault-tolerant and have back-up power systems.

Other factors to consider in selecting communications include:
- Coverage – Utilities cover large areas with lots of assets to connect in remote locations
- Security – Smart grids are large scale industrial control systems and the networks that connect them, whether legacy or IP-based, need to incorporate the well-tested layered security approaches utilized by enterprises.
- Performance – This is not so much about bandwidth per se. Latency is often more important, especially for applications like feeder protection. Bandwidth is important in the aggregate, however. As utilities deploy more and more applications, such as mobile workforce and substation video monitoring, bandwidth requirements will likely increase.
- Quality of Service – Utilities can deliver great value by running a mix of applications over a single network, but some applications have real-time needs that must be prioritized appropriately.
- Lifecycle – 20 plus year utility asset operating lifetimes

EET&D: How can communications improve power distribution?

ABB: Utilities can improve customer satisfaction by deploying software, intelligent devices, and network communications to implement a state-of-the-art outage management system. These technologies can minimize the scope and duration of outages and enable proactive engagement with affected customers.

A key element enabling proactive outage management is real-time, bidirectional communication with utility devices in the field. Communications permit outage management systems and other utility software systems to collect up-to-the second information from the distribution system, adjust system operation, and provide information to customer service systems and personnel for proactive customer engagement.

EET&D: How important are industry interoperability standards to smart grid communication networks?

ABB: For communications, standards are vital. Deploying networks based on interoperability standards from the IEEE – Ethernet and 802.11, for example – and the IETF’s family of IP-related standards allow the network to be a platform that connects a variety of devices from a wide range of vendors, supporting a diverse set of applications. Using standards-based components and software lowers operating costs for utilities and allows them to take advantage of innovation from a larger pool of vendors. It’s also important for vendors and utilities to support utility-specific standards, such as IEC 61850 and DNP 3, as well as legacy standards such as Modbus, to avoid stranded assets when migrating to an IP-based grid communication solution.

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VENTYX SOLUTIONS TO IMPROVE POWER RELIABILITY FOR 15 MILLION CITIZENS IN ECUADOR

Ecuador’s transmission grid operators upgrade Ventyx network management software to enhance the efficiency, safety and reliability of the country’s expanding generation and transmission network.

TRANSELECTRIC, the utility operating Ecuador’s transmission grid, and Ecuador’s National Energy Control Center (CENACE), which manages the Ecuadorian wholesale electricity market, will upgrade to the latest Ventyx solution for energy management and wide-area monitoring to optimize the utilization of the country’s generation and transmission network assets.

The move is in response to a new national smart grid policy established by the Ecuador Ministry of Electricity and Renewable Resources, which requires the country’s utilities to establish power grid operation and optimization strategies to support the modernization of Ecuador’s electricity assets and services. The project will allow for supporting the grid’s expansion under the all-important Program for Regional Power Integration that covers interconnections between Ecuador, Peru and Colombia.

The agreement, which includes long-term service, maintenance and support, will enhance the safety, efficiency and reliability of the country’s power transmission network – improving power access for its 15 million citizens now and well into the future. TRANSELECTRIC and CENACE will also receive 24/7 software support from Ventyx over a multi-year term, as well as maintenance to keep Ecuador’s transmission platform up to date with the latest technology standards.

Furthermore, the contract will enhance interactions between TRANSELECTRIC and CENACE by upgrading both to the same version of Ventyx software - allowing each system to provide emergency backup support to the other as needed.

“This important upgrade of our Ventyx control center software deployment will allow both TRANSELECTRIC and CENACE to fulfill their critical responsibilities for operating the national generation and transmission grid and ensuring the power system’s reliability,” said Marcelo Vicuña Izquierdo, general manager at TRANSELECTRIC. “This is of the utmost importance in light of the significant network expansion planned for the next 10 years and the implementation of our ambitious smart grid strategies.”

“We’re seeing greater investment across Latin America in the modernization of electricity distribution and transmission networks,” said Daryl Rolley, executive vice president global sales, Ventyx. “Ecuador is one of the countries leading the charge in this area. TRANSELECTRIC and CENACE have already demonstrated their leadership in this region by establishing a long-term partnership with Ventyx to manage their power network today and successfully deploy smart grid technologies to meet the country’s increased demand for power.”

The Ventyx network management system is an advanced control center software solution that helps electric power transmission companies manage complex energy system processes and reduce operating costs, while ensuring the required levels of system security. The solution facilitates an efficient, secure and reliable grid operation, not only for managing today’s power networks but also for tomorrow’s smart grids, with rapidly expanding sources of renewable energy.

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The national smart grid policy will support the regional initiative for grid interconnections between Ecuador, Peru and Colombia.
ABB to deliver communication technologies to advance smart grid development in Iraq

Advanced wireless radios to link seven regional control centers and facilitate automation of power distribution system

ABB has won an order from LS Industrial Systems (LSIS) to deliver a utility communications solution that will serve seven electricity distribution control centers in Iraq. The project is part of a larger infrastructure improvement initiative currently being carried out by the Ministry of Electricity in Iraq, aimed at establishing a dependable power network to support economic and social development in the country. The order was booked in the second quarter.

ABB will deliver a communications system, capable of transmitting data from 428 distribution substations and 150 maintenance centers in the grid to seven regional control centers. The system will include broadband wireless radios to carry both data and voice transmissions, ensuring reliable operation of the grid and supporting the speedy identification, isolation and resolution of faults.

“The establishment of an effective communications system is key to the reliability and efficiency of the grid,” said Jens Birgersson, head of ABB’s Network Management business unit, a part of the company’s Power Systems division.

“The breadth of our portfolio and expertise in smart grid technologies enables us to provide a multicomponent system from a single source.”

Communications play a key role in coordinating operations in electricity networks. It provides the high-performance data services required by most operational networks and supports multiple applications. For this project, that includes operational telephony and SCADA (supervisory control and data acquisition) services.

The high-capacity wireless communication network being delivered in Iraq will bring a number of advantages to the grid. The radios can communicate over distances in excess of 50 km to provide a scalable, highly flexible and cost-effective solution. Wireless communication is well suited to challenging terrains and built-up areas.

ABB’s comprehensive communications offering comprises fiber optic, power line carrier and wireless services, including the recently acquired Tropos wireless mesh technologies, enabling ABB to serve customers in the power, transportation, mining and public infrastructure sectors.

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Effective communications are essential for grid stability and wireless solutions are particularly effective in challenging terrain.
Axpo adopts new ABB multiplexer for utility communications in Switzerland

FOX615 multiplexers to enhance capacity and system security, and enable future upgrades as new technologies win utility approval

To keep pace with increasing demand for power, as well as benefit from the latest advances in technology, Axpo Power AG, a leading Swiss utility, has chosen to use ABB equipment in the expansion of its communications network. The company will install ABB’s new generation multiplexer, the FOX615, to enhance the capacity and flexibility of its network, which uses FOX515 and legacy FOX-U multiplexers, managed by a FOXMAN-UN network management system.

The new devices will add functionality to the existing WAN (wide area network), which serves substations in northeastern Switzerland (at Grynau, Sarelli, and the Rupperswil power plant). The installations will also provide high-performance communication channels for teleprotection applications, as well as enable future upgrades to packet switched technologies, as approvals are granted for utility applications.

In addition to extending the current network, some of the FOX615 units will be used to replace aging devices supplied by manufacturers who have discontinued long-term support for TDM (circuit-switched) technology.

Communication plays a key role in coordinating operations in electricity networks. It provides the real-time data services required by most operational networks and supports multiple applications, from teleprotection, operation- al telephony and SCADA (supervisory control and data acquisition) to high-speed Internet services for administrative purposes. The FOX615 multiplexer is a multifunction device suitable for use in utility-hardened circuit-switched communications. It will also be able to accommodate packet-switched communications, as and when these technologies gain acceptance.

Driven by demand for higher bandwidth to accommodate fast-growing Internet, television and telephony services, packet-switched technologies, such as Ethernet/IP, are used extensively in public telecoms systems. Unfortunately, the technologies cannot yet provide the high-performance, deterministic communication channels required in the demanding world of utilities. Utility customers therefore continue to use established TDM(SDH) circuit-switched technologies, capable of future migrations to new technologies.

The ability of the FOX615 to accommodate both types of communications technology makes it the ideal choice for customers seeking to enhance existing infrastructure with “future-proof” equipment that is both forward and backward compatible. The FOX615 is also compliant with IEC61850, the international standard for substation automation, which has been widely adopted in the utility sector. This provides a number of specific advantages, including the interoperability of devices from multiple manufacturers.

ABB has supplied several hundred FOX multiplexers to Axpo and other Swiss customers in recent years. The company’s comprehensive suite of communication solutions provides a durable foundation for modern power networks and the smarter grids: the intelligent networks needed to handle challenges posed by aging infrastructure and increasing demand for secure, sustainable electricity supplies.

The FOX615 installations for Axpo are scheduled for completion during the second quarter of 2013. More information of the FOX 615 can be found at this link.

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Axpo Power AG, wholly owned by Axpo Holding AG, is a leading utility, active in generation, transmission, distribution, utilisation and marketing of electrical and other energy and provision of services of all kinds in the fields of energy and the environment.

FOX615 is the latest addition to the FOX family of communications devices and is specifically designed for power utilities. It bridges the gap between circuit- and packet-switched technologies to provide an optimized solution for protection applications. Read more link.
ABB’s RTUs (remote terminal units) play an essential role in power systems, interfacing between physical installations and their associated control, data collection and monitoring systems. To keep up to date with the latest functionalities, ABB customers can now upgrade from RTU211 installations, which have been available for some years now, to the RTU511, bringing new functionality, including updated cyber security functions, and extending the life of their system.

ZESCO, the national power utility of Zambia, recently took the opportunity to upgrade its system using a migration kit provided by ABB. ZESCO’s aim was to benefit from the functionalities of the high-end RTU511 while maintaining a significant number of RTU211 units already installed.

ABB’s migration kit (511MKM01) significantly eases the migration process by providing all of the pre-selected components needed. It includes a replacement CMU (communication unit) module and a new housing, enabling migration to be completed in just a few steps. The process is further simplified by the ability to reuse the existing multi I/O module, the power supply unit and existing wiring of the RTU211.

At ZESCO, the upgrade was performed on site in collaboration with the customer. After successfully importing the existing RTU211 configuration using RTUtil500 tool, which is compatible with the entire RTU500 series, the migration was performed. The CMU module was replaced, while the process interfaces remained unchanged. An SD-card carrying the new firmware and license, was installed and the migrated configuration data downloaded. The process was completed by simply restarting the RTUs.

ZESCO was very happy with the result of migration process. The switch to the modern, up-to-date functionality of the RTU511 is a key step in ABB’s mission to protect customer investments.

The RTU511 supports all standard protocols, including IEC 61850, the international standard for substation automation, as well as Ethernet protocols. Its archive and diagnostic response capability provide yet more functionality and additional piece of mind for the customer.

For more information about ABB’s RTU500 series remote monitoring and control technologies visit this link.

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