network

Photo credit: wikimedia.org

ABB brings WiFi to the water ways of Venice

An African commitment
Quality training for power utilities in Southern Africa
Improving traffic flow with Intelligent Transport Systems
Wireless mesh network to support ITS in Phoenix, Arizona

Power and productivity
for a better world™

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network

Jens Birgersson
Business Unit Manager Network Management

Dear readers,

Here is the last edition of the Network Manager customer newsletter for 2013. I hope you've had a successful year and have enjoyed reading about our technologies and their uses around the world.

In this edition, you can read about a range of projects and technology advances. The most visually appealing is the Wi-Fi system installed in the City of Venice, Italy. Our Tropos wireless mesh technologies have brought free Internet access to the citizens of this historic city, with little impact on its beautiful architecture. See whether you can spot the router in the picture opposite. You can find the full story on page 8 of this edition.

Tropos technologies are also being used to improve the traffic flow in the US city of Phoenix, Arizona (page 6), where they are part of an intelligent transport system. The wireless mesh offers considerable cost advantages over the city's previous low-bandwidth signaling system. On pages 11 and 12, our local manager in the UK, Andy Osiecki, talks about how our rugged Tropos radios provide reliable private communications systems for T&D systems around the world.

In Turkey, we have a nice example of MicroSCADA Pro being used in a water distribution system. You can read about this installation that will to monitor and control an irrigation network for fruit farms in Antalya on page 9.

Ventyx, our enterprise software team, has been busy in the past few months, supporting customers like Hunter Water in Australia (page 5), holding roadshows to publicize our asset health offering and publishing a report on return of investment in smart grid technologies. For a summary of the report and a link to the full document, go to page 7.

We are extending our commitment to customers in Africa by contributing equipment and technical expertise to courses being held in Zambia. The Kafue Gorge Regional training center serves several countries in Southern Africa and now offer ABB training courses in power system protection (page 4).

In Albania, we have delivered a turnkey project to upgrade substations serving the capital city, Tirana. Our solutions include a SCADA energy management system from the Ventyx portfolio and an optical communications system using our new multiplexer, the FOX615. These will help to improve reliability of the Albanian system and facilitate power trading with neighboring countries (page 10).

Enjoy the newsletter and feel free to contact me with your comments and questions on how our offering in Network Management can help you and your organization.

Best regards

Jens Birgersson

7 New study analyzes successful smart grid projects around the world

8 Tropos supplies WiFi network in Venice: compact routers that blend with the historic environment

Collaboration

News

Projects

Technology

An African commitment

Quality training for power utilities in Southern Africa

A mutual collaboration agreement has been reached between ABB and the Kafue Gorge Regional Training Centre, to support and develop their training sessions on power system protection technologies.

Located beside the Kafue Gorge Power Station on the Kafue River, the Kafue Gorge Regional Training Centre (KGRTC) was originally built as a regional hydropower training center, but over the years the institution's mandate has been expanded to include the provision of training courses for regional power utilities in Southern Africa. The center's board of trustees comprises representatives of utilities in Malawi, Tanzania, Uganda, Swaziland, Zimbabwe and Zambia itself. It also has representatives from the Zambian Ministries of Energy and Water Development, Science and Technology, and universities in the region.

KGRTC's scheduled sessions comprise a number of operational and managerial courses in a variety of disciplines related to the power industry. The list includes power systems operations and management, engineering operations and maintenance, engineering applications and management, as well as corporate governance, and health and safety.

ABB's substation automation team recently contributed to KGRTC's three week Power System Protection course by providing an instructor and equipment, giving participants the opportunity to gain hands-on experience with ABB's 670- and 650 series IEDs, as well as the related PCM600 software. This support was highly appreciated by KGRTC and

Kaela Siame, Director of KGRTC and John Gray, ABB SAP Area Sales Manager

the course participants.

In future, ABB's substation automation team hopes to offer ABB product specific training courses at KGRTC, helping to develop local expertise at a fraction of the cost of attending courses in Europe.

"This agreement with KGRTC will benefit ABB and the local utilities," said John Gray, head of sales for substation automation products in Southern Africa. "The training center is well respected and this is a great opportunity to extend a much needed service to the African power utility community."

Contact: carmen.schick@de.abb.com

Hunter Water: Building a better water future with the help of Ventyx solutions

Asset management, resource planning and mobile workforce management to support $300 million infrastructure expansion by Hunter Water in New South Wales, Australia

Hunter Water, the company that provides water and wastewater services to more than half a million people in New South Wales, Australia, has selected the latest Ventyx software solutions to enhance the safety of maintenance staff and increase the performance of its asset network, currently valued at approximately 3.5 billion AUD.

The Ventyx solutions, which include enterprise asset management (EAM) and asset-intensive enterprise resource planning (ERP) solutions, as well as a Ventyx mobile work management solution, will improve the operational effectiveness of the existing network and also support the company's 300-million AUD infrastructure expansion plan.

By consolidating two asset management systems currently used by Hunter Water – an in-house solution supporting linear assets and a Ventyx solution supporting other major installations – into a single system, the new software will provide operators with clear visibility across the expanding network of assets. This will enable improved decision making and lead to safer, more efficient operations.

"The effective management and maintenance of our assets is a vital aspect of our business – allowing us to reliably deliver nearly 200 million litres of clean water a day to our customers and the community," said Chief Information Officer Joanne Martin at Hunter Water. "By gaining better visibility into the condition of all of our critical assets, we can significantly improve workforce safety and productivity. The integration of asset management processes with our geospatial information system will provide unequalled insight and new opportunities for operational improvements."

Under the agreement, worth more than 4 million AUD, Hunter Water will upgrade to the latest suite of Ventyx applications for enterprise asset and work management. These include ERP modules specifically tailored for asset-intensive industries, supporting human resources, finance, supply chain management and logistics. Asset-intensive ERP offers specialist financials relating to the inspection and maintenance of assets throughout their lifecycle so that performance can be analyzed and costs minimized.

Hunter Water will also implement the Ventyx mobile asset and work management solution to improve the safety and productivity of its field workers. These crews are responsible for assets dispersed over an area of 5,366 km² (2,712 square miles). With the Ventyx Mobile Worker and Mobile Inspector applications, work crews can connect with critical business systems from the field, accessing information that enables them to complete their work safely and on time, while at the same time providing managers with real-time status updates.

"Hunter Water has been using our software solutions for more than 20 years, delivering essential water services to thousands of people every day," said Daryl Rolley, EVP Global Sales, Ventyx. "With this new implementation, we will enable highly effective preventive-maintenance strategies based on a single source of truth about the status of company assets."

Hunter Water collects, treats and delivers drinking water to more than half a million customers. It also transports, treats and disposes of the region's wastewater.

Contact: gary.frazier@ventyx.abb.com

ABB has a broad offering for water utilities, including the range of software solutions for asset management, resource planning and mobile workforce management, as adopted by Hunter Water in New South Wales. To read more, visit Water Industry and Water & Wastewater Solutions.

Improving traffic flow with Intelligent Transport Systems

Wireless mesh network to support ITS (intelligent transportation systems) in Phoenix, Arizona

Photo credit: Bigmikebmw

The transportation authorities in the growing city of Pheonix, Arizona, decided to replace the costly, low-bandwidth traffic signal system with a broadband wireless mesh network to improve reliability, shorten journey times for commuters and save money.

In the last decade of the 20th century, Phoenix, Arizona, recorded a population growth rate of more than 45 percent a year, and it became the sixth largest city in the United States. This growth put a strain on the city's infrastructure and local transportation authorities were encouraged to optimize their operations. They decided to replace the costly, low-bandwidth traffic signal system with a broadband wireless mesh network to improve reliability, shorten journey times for commuters and save money.

The new communications system was provided by Tropos, now part of ABB's Communication Networks offering. Since its installation in 2010, the new system has achieved 99.999 percent reliability. When initially installed, the network saved the local authorities $220,000 a year. As the network was expanded to cover more of the city, the annual savings rose to $400,000.

The previous system relied mostly on fixed, leased line communication links as the optical fiber network covered only a limited area of the city. This was a costly solution, no longer fit for purpose,

and a decision was made to replace it with a high-bandwidth, high-reliability, secure wireless mesh network.

After a short pilot phase, the Tropos mesh was installed and launched in August 2010. The first deployment of 420 routers covered more than 250 square miles (~650 km^2) and 421 traffic signals in the Phoenix metropolitan area.

Some routers were attached to streetlights, but most were mounted on the traffic signals themselves, drawing power from small solar panels. The mesh is supervised by the city of Phoenix's traffic management center, which also manages the Intelligent Transportation System (ITS).

Since this initial deployment, additional mesh routers have been added to the system, along with video cameras, to cover 100 intersections in the department's jurisdiction. Fifty of these traffic cameras are connected via the Tropos network while the other 50 communicate via fiber. The cameras enable operators to view conditions at key intersections in real-time, and adjust signaling priorities as required. The network now

has 902 routers and covers an area of 500 square miles (~1300 km^2).

In future, the network could be expanded to include applications such as digital parking meters and streetlight management. In the meantime, local commuters can thank ABB's mesh network and the Phoenix Street Transportation Department for smoother journeys.

A recent study carried out by AZTech™ (a regional traffic management partnership in the Phoenix metropolitan area) found significant improvements due to the ITS supported by the Tropos wireless mesh, for example: Bell Road travel time from 303 to 101 has decreased by 14 percent in east-bound and 25 percent in west-bound direction, and on Club Road (city of Mesa) travel time was reduced by 3 minutes or 27% due to improved signal coordination along the corridor.

For more detailed information on ABB's Tropos installations in Phoenix, Arizona, read the **case study**.

Contact: bert.williams@nam.abb.com

New study analyzes successful smart grid projects around the world

First-ever global research into smart grid return on investment identifies characteristics of successful smart grid projects.

"Comprehensive" solutions are move effective than isolated pilot installations, according to the report.

Over the last decade, smart metering and smart grids have received a lot of attention – from regulators, media, customers and researchers alike. Until recently, however, stakeholders had little means by which to benchmark the payback potential of investments in more intelligent infrastructure. Ventyx, ABB's specialist enterprise software business, recently took up the challenge to fill that gap.

"Utilities are under increasing pressure to deliver more power, more efficiently, while maintaining high levels of reliability," said Jeff Ray, CEO of Ventyx. "As demand continues to rise, so too do the challenges faced by utilities. These encompass everything from spikes in demand caused by heat waves to managing outages caused by hurricanes and wildfires. Leading utilities are leveraging smart grid technologies to meet these challenges head on, and we want all of our customers to understand the benefits smarter grids can bring."

To learn from different approaches and identify key success factors in smart grid projects, Ventyx commissioned a report from global energy think-tank VaasaETT. The research drew on VaasaETT's broad expertise in demand-response and smart-grid programs, competitive energy markets and energy consumer behavior. It mapped more than 200 projects worldwide using in-depth questionnaires conducted with 30 project owners. The survey included a variety of project sizes, differing scopes and a wide geographic spread. The result is the just-released 2013 Smart Grid Global Impact Report, the first global study of its kind to date.

The report appraises the success and value of smart-grid technology against a host of criteria, including reliability, innovation and customer impact. Not surprisingly, of the many findings outlined in the study, a key outcome is that the most successful projects are more holistic – with a broad range of components deployed. In other words, multiple smart-grid components working together to provide intelligent, "comprehensive" solutions are more effective than isolated pilot installations.

"Since 2003, utilities have invested more than $14 billion in 'smart grid' projects globally, but much of this investment has focused on advanced metering and monitoring technology," said Philip Lewis, CEO of VaasaETT.

"Given the long-term nature of capital investment, utilities must move beyond a technology-focused 'smart' grid to an 'empowered' grid by focusing on true interconnectivity, connecting the silos of source-to-socket lifecycle processes, to real-time conditions in the grid, and to consumers. Empowered grids make energy companies more productive, and more responsive to their customers."

The Smart Grid Global Impact Report has been featured in Ventyx's "Beyond Smart" roadshow, which has provided preliminary results to customers, media and industry analysts, from Toronto to Tokyo – and numerous stops in between. The report has generated strong interest from utilities to date, with many expressing a desire to participate in future editions to further global collaboration for a brighter energy future.

For access to the full document go to
the smarter grid

Links:
ABB's smart grid portal

Ventyx web site

Contact: james.braatvedt@ventyx.abb.com

ABB extends WiFi for waterways in Venice

ABB has supplied a high-performance wireless broadband network that provides reliable, free Internet access for the residents of Venice, Italy – regardless of whether they are in open piazzas, narrow alleys, or traveling along the Grand Canal by boat.

The WiFi solution provided for Venice comprises both fixed and mobile wireless nodes to deliver a broadband network that can handle in excess of 200 gigabytes of data and 40,000 users.

The project was initiated in 2009 by the municipality of Venice to bring free, city-wide wireless broadband internet access for its citizens and businesses and – in return for a small fee - for the 22 million tourists who visit the city every year.

To get things started, the municipality's information and communications technology company, Venis, assessed numerous vendors before conducting a pilot installation and selecting a wireless mesh system to deliver the broadband network. The system chosen was supplied by Tropos, which was acquired by ABB in 2011, and is now part of ABB's extensive offering of communications solutions.

The WiFi solution provided for Venice comprises both fixed and mobile wireless nodes to deliver a broadband network that can handle in excess of 200 gigabytes of data and 40,000 users. It is equipped with 200 wireless mesh routers, deployed in discreet enclosures that blend in with the historical surroundings of the city.

Among the features that differentiate this solution from its competitors are its ability to switch automatically between two frequencies (2.4 and 5 GHz) to ensure maximum signal strength and continuous connectivity, even in narrow and winding alleys where there is no line of sight.

Another distinguishing feature of the solution are the onboard routers that provide reliable and seamless roaming for users on water buses that traffic the Grand Canal and other waterways of the city. A third differentiator is the solution's scalability and ease of installation. It was delivered and deployed in just three months, and has already been extended into new areas of the city.

The Venice WiFi project is part of the "Free ItaliaWiFi" initiative, which was started in 2010 by the Province of Rome, the region of Sardinia, and the City of Venice, each of which already had their own public WiFi networks. Its objective is to create a national network of free wireless broadband networks. The initiative currently embraces 41 networks, 2,130 WiFi hotspots and 427,000 members.

ABB is the market leader in wireless broadband networks that provide reliable, secure and scalable wireless IP networks for field applications in a broad range of industries, including utilities, oil and gas, mining, smart grids and smart cities.

Contact: bert.williams@nam.abb.com

Links:
Communication Networks
Tropos Networks
ABB's Smart Grid portal
ABB's Smart Cities portal

New irrigation project with DSI in Antalya, Turkey

ABB, working with partner YEO, has successfully set up a new monitoring and control system for a water utility in Turkey.

Water is a scarce commodity in Korkulteli, south-eastern Turkey. The highlands in the north have several lakes, but the southern lowlands, home to the region's agricultural communities, rely on a network of canals to irrigate the land.

Since irrigation work began in the 1950s, local fruit farms have expanded and the thriving orchards, as well as the growing population, now need a better watering system. The original network comprised open irrigation channels, fed by the Korkuteli Dam, but without modernization, adequate water supplies could not be guaranteed.

Improvements to the local utility's 250 km pipeline include the installation of 631 RTUs, small, microprocessor devices that interface between networks and their control systems. The device chosen was ABB's RTU511, a compact and cost-effective product that comes in a tough housing to protect it from harsh outdoor conditions, including extremes of temperature.

The RTUs are programmed to monitor water-flow in the pipeline and transmit the data they collect to the network's SCADA (supervisory control and data acquisition) system. This enables the utility to monitor the performance of the water distribution system and identify problems, such as leaks or blockages.

The high-quality RTUs, combined with excellent support from YEO, and a good relationship with the customer enabled the establishment of an expanded water distribution network, with minimal losses, that now serves residential areas of Korkulteli, as well as the thriving orchards.

ABB has installed a number of control systems for irrigation systems around the world. These include the SCADA Neptuno system installed in southern Spain. Not only does this system manage multiple RTUs, alarms, events and historical data, it also communicates via SMS and email, enabling users to access the system and control irrigation settings remotely.

For more information on ABB's RTUs and the SCADA Neptuno system, please visit the links provided below:

ABB Review article "Downloading the cloud"

ABB RTU 500 series

Contact: carmen.schick@de.abb.com

Photo credit: wikimedia.org

Modern control systems help the growing agricultural commodities in Antalya to improve the reliability of their irrigation systems.

Strengthening Albania's national electricity grid

ABB's control solution upgrades to improve power quality, reliability and facilitate power trading

ABB has delivered a power monitoring and control system that significantly improves the reliability of Albania's national power grid and its ability to control high-voltage power transmissions. In addition to enhancing the stability of Albania's power supply, the upgraded grid will also facilitate power trading with nearby countries. The project has been financed by a loan from the Italian Government to enhance Albanian strategic infrastructures to help strengthen the local economy and ease its integration into the European market.

ABB's turnkey project in Albania included the upgrade of substations that have been adapted to connect to the central control system, in Tirana, the country's capital. This will be enabled by a supervisory control and data acquisition/energy management solution (SCADA/EMS) now a part of ABB's Ventyx portfolio, which will serve as the 'brain' of the system.

The overall scope includes implementation of a nationwide utility network connecting 63 substations and 30 power plants, and installation of 450 kilometers of optical ground wire (OPGW) on high-voltage lines. This required the building of a fiber optic broadband network based on ABB's well proven multiplexer FOX515. In areas of the network where optical fibers are not available, communication has been established via power line carriers (PLC). The solution also provides highly reliable teleprotection functionality.

Data collected from around the grid now enables operators to model power flows and perform outage simulations, to devise safe and efficient network operations. The system is designed to quickly restore power in the event of an outage and allow systematic load shedding to avoid grid collapse and blackouts. The upgrades will also facilitate energy trading and support new investments. Albania exchanges energy with Greece, Montenegro, Kosovo and Serbia, and is part of a developing energy market in Southeastern Europe.

"This solution will help to improve grid reliability and enable more people to receive quality power," said Jens Birgersson, Head of ABB's Network Management business unit, a part of the company's Power Systems division. "The new infrastructure and control system also provides an opportunity to exchange energy with neighboring countries."

The grid upgrade in Albania is also aligned to the vision of developing interconnections between power systems in the Mediterranean region and a wider pan-European energy community. Nearly 100 percent of Albania's electricity is generated by hydropower and it is widely believed that only around 40 percent of its hydro generating potential is being leveraged at present.

Data collected from around the grid enables operators to model power flow and perform outage simulations.

Read more about **ABB's Communication Networks** and **enterprise software**.

Contact: stefania.mascheroni@it.abb.com

Tropos brings a new dimension to utility communications

Andy Osiecki, head of ABB's Network Management business in the UK, explains how ABB's Tropos mesh technologies can provide private, wireless communications for transmission and distribution systems, whatever the weather.

Andy Osiecki, head of Network Management in the UK.

In a world where wireless communication is becoming the norm and where smart grids are becoming a reality, ABB is now able to offer a new service to power utilities in the UK. Silicon Valley-based Tropos Networks, acquired by ABB's Network Management business last year, provides private wireless networks with sufficient capacity to free operators from the inconvenience of leasing costly bandwidth from third parties. The wireless networks also ensure the necessary network availability and the ability to run multiple applications simultaneously, with high bandwidth, low latency and high levels of security.

Tropos has been developing its wireless network technology for nearly a decade and has extensive experience of installing end-to-end solutions. There are more than 70,000 Tropos routers in operation, serving more than 1,000 customers in 50 different countries. The Tropos team has established itself as the industry leader in the field and is an excellent fit with ABB. Its addition to the Communications portfolio has significantly extended the company's wireless communications offering.

With a client list that includes blue-chip organizations, from utilities, through mining and oil and gas, to smart cities and ports, Tropos technologies can bring real value to ABB customers across the world.

Networks and application

So what exactly does Tropos technology offer? The two main applications are smart grids and smart cities. The solutions include networks of routers and directional radio systems, arranged in a mesh or grid structure, along with the architecture and network management to support them.

Thanks to their high performance levels, the networks can handle an assortment of applications. In the energy sector, these include Advanced Metering Infrastructure (AMI), demand management and response, distribution automation and control, outage management, mobile workforce applications, support for distributed generation and video security.

A key feature is that the networks don't restrict the user to a single application vendor. Customers are free to choose the applications they need, they just need to operate over the Internet or an enterprise IT network.

Performance and flexibility

Because every router in an ABB Tropos network is intelligent, data is directed through the most available nodes with the greatest efficiency. This minimizes transmission times and gives system operators real-time visibility and control over their assets.

Tropos mesh networks are also scalable, meaning that customers can choose to start small and grow as needed. As a network is extended, existing routers will automatically reconfigure themselves, making expansion a relatively simple exercise. This self-configuration means that mesh networks are inherently reliable, responding to bottle necks of outages by simply redirecting the data via a different route, intelligently and seamlessly.

Rugged and reliable

With an IP67 rating and tamper-evident casings, ABB Tropos routers are designed to cope with almost any physical challenge, a necessity when routers are routinely installed in outdoor locations in the field. They can withstand temperatures from -40 ˚C to +85 ˚C, wind speeds of up to 165 miles per hour and sandy or dusty environments as well as the damp, salt-laden climate found in coastal locations.

The option of adding mobile routers to wireless mesh networks enables the network to be extended whatever the location of field staff – one mobile router even gave uninterrupted network access throughout the launch of the rocket on which it was installed. This build quality contributes to network accessibility figures in excess of 99.99 per cent.

Recognizing customers' demands for networks that are both reliable and secure, Tropos has integrated a high level of security into its products, allowing them to be deployed in military and law-enforcement applications.

Each device is equipped with multi-layered security, including VPN, WPA2- and AES-encryption and support for multiple VLANs. Networks also feature software alarms and authentication and security measures to restrict unauthorized access.

Unique position

While there are other providers of wireless mesh networks, only ABB Tropos has a track record in the delivery of end-to-end solutions for utility applications and distribution networks. The company has provided networks for power generation, substations, utilities and transportation applications. For more on their use in transportation, see the article on the Venice Wi-Fi network in this issue.

As the number of applications managed over a wireless mesh network grows, so does the financial benefit. Some customers have achieved full pay back on their investment in as little as one year by integrating several applications into their networks.

For more information about ABB's communications technologies, visit **tropos** and **communication networks**.

This article is based on a piece in Fast forward, ABB's magazine for the Power businesses in the UK.
To read other articles from Fast forward visit this **link**.

Contact: karen.strong@gb.abb.com

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