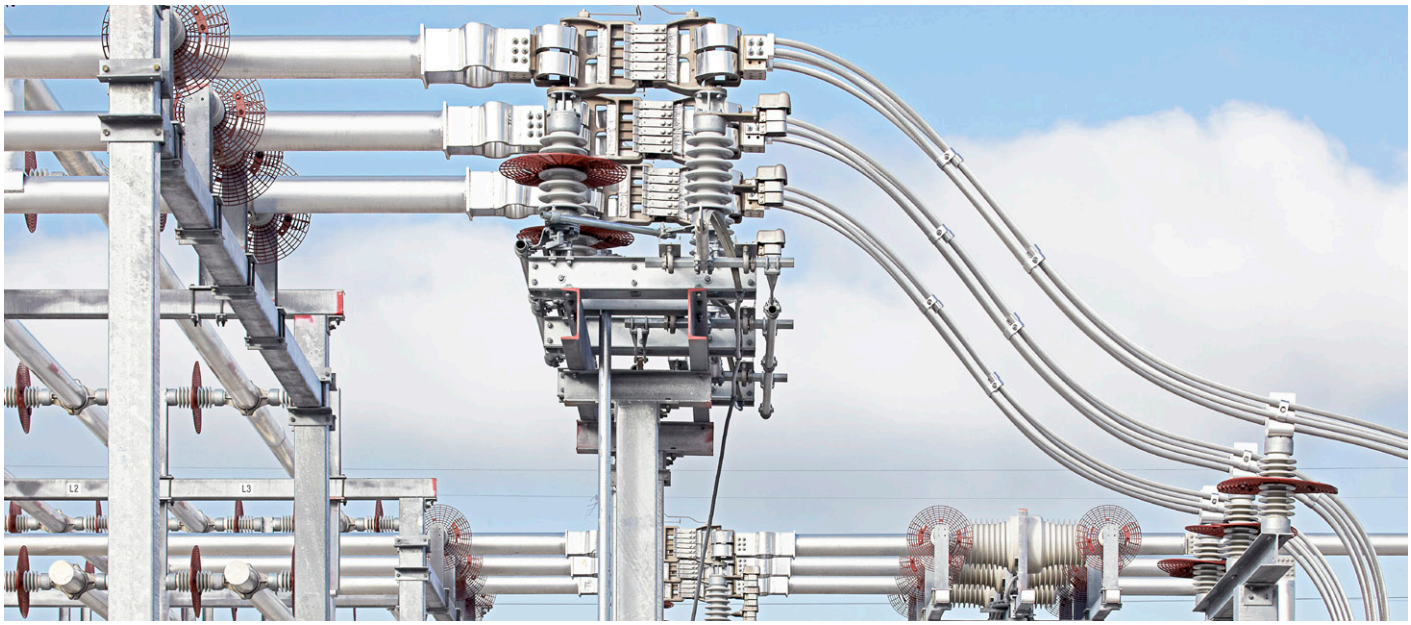
Solution Overview

Smart grid



Benefits

- Improves power distribution reliability by providing centralized visibility and control of intelligent electronic devices (IEDs)
- Lowers costs and improves efficiency by enabling applications such as active Volt/VAR management and conservation voltage reduction
- Decreases expense of retrofitting substations to implement automation
- Increases meter reading accuracy; quickly isolates problems, reducing repair time; enables remote shut off/turn on of utility
- Improves mobile utility workers access to information in the field, increasing efficiency and reducing costs

Applications

- Distribution automation
- Substation automation
- Advanced metering infrastructure
- Mobile workforce automation

TropOS technology differentiators

- Performance – multi-megabit capacity, low latency
- Security – firewall, IPsec VPN, AES encryption in every router
- Reliability – ruggedized and weatherized equipment; patented mesh routing algorithms use multiple paths, channels and frequency bands
- Scalability – can be deployed indoors and/or outdoors citywide, across 10s, 100s, and 1000s of square miles
- Reliable broadcast capability – supports GOOSE messaging
- Mobility – seamless roaming across entire coverage area
- Radios – maximum power, best receive sensitivity, outdoor optimized
- Management – most comprehensive centralized configuration, analysis and reporting

Electric utility modernization is taking place around the world, improving operational efficiency, enabling new applications, lowering operating costs, increasing system reliability, encouraging conservation, and improving the quality of services provided to customers. The term "smart grid" is often used to describe this modernization and refers to a utility infrastructure that incorporates bidirectional flow of power and digital information enabling end-to-end monitoring and control of many different types of IEDs.

A smart grid communications infrastructure is layered and can span end-to-end from the point of power generation to its point of use. One of these layers is the field area network which can span tens or hundreds of square miles and is typically deployed from substations, where fiber backhaul is accessible, into the distribution area – neighborhoods, business parks, etc. The field area network basically provides coverage from the substation to the utility point of use. The field area is where a private wireless broadband IP network is most often deployed by utilities. It provides a single private broadband communications foundation upon which to securely support both IEDs as well communications for mobile workers. Mobile workers can connect to the field area network virtually extending the utility's intranet.

Improving utility system reliability

A smart grid can include a wide range of new applications not possible without a communications infrastructure and intelligent end devices. These applications include distribution automation, substation automation, automated metering infrastructure (AMI),

distribution automation, outage management, automatic load shedding, and management of alternative energy resources. With centralized access to data in near real-time, decisions about managing the grid can take place faster and in many cases IEDs controlled centrally, improving system reliability and efficiency.

Utility workers in the field can securely utilize the same wireless network for communications from mobile devices providing them with ready access to a wide range of information and abilities that improve their efficiency and eliminate drives to the office to access information. For example, digital access to and updating of work orders, replacing use of paper; access to up-to-date GIS maps replacing cumbersome and outdated paper maps; ability to access meter and DA device status from anywhere – enabling them to quickly pinpoint problems.

A private wireless IP broadband mesh network from ABB Wireless is field-proven for use by all types of utilities. It delivers a reliable and secure foundation for support of IEDs and mobile field workers. Utilities often select use of a private network in order to achieve control as well as high reliability and availability required by some of the demanding mission critical applications. In some instances, a private wireless network is the only option to achieve the desired coverage and capacity as public networks are insufficient. TropOS utility customers often replace use of data cellular cards used by field workers. This provides significant cost savings, thousands of dollars every year as well as access delivers higher speed network access.

Multi-use networks for smart grids

ABB Wireless broadband network solutions provide a scalable and reliable foundation to securely support multiple concurrent smart grid applications. These applications include:

Distribution automation – Distribution automation applications involves IEDs on the distribution lines including switches, reclosers, transformers and capacitor banks that monitor telemetry and can use this information to take action such as automatically reroute power, minimizing the effect of an outage. They can automatically isolate faults to enable upstream and downstream restoration of power, increasing system reliability and reducing outage time.

Conservation Voltage Reduction (CVR) – this application reduces power consumption by slightly reducing voltage transmitted from the substation. Using line sensors to monitor and ensure supplied power remains within specified voltage range at all points along the distribution feeder, the utility can implement a closed loop system that automatically self-adjusts and conserves power.

Substation automation – two-way communications between IEDs such as breaker controllers, voltage regulators, remote terminal units (RTUs), and substation computers enables remote gathering and analysis of data as well as remote control of distribution power systems. Improvement gains include more efficient power distribution and reliability as well as reduced operational costs (fewer truck rolls and field workers dispatched to substations). Wireless is economically attractive especially when retrofitting existing substations with automation capabilities.

AMI – Each utility meter usage is monitored and centrally reported enabling faster, more accurate reading of meters; faster identification of problems such as water/gas line leaks or power theft quickly; ability to turn on/off power centrally rather than requiring a truck roll.

Mobile workforce automation – improves the effectiveness, efficiency, productivity and safety of utility workers and provides easy and quickly access to information from the field (AMI data, GPS, maps, etc.); enables them to obtain/submit work orders and reports from the field saving a drive back to their office; real-time access to AMI and DA data enables them to quickly and in real-time pinpoint problems, reducing downtime.

Video surveillance – providing substation security and access control; operations may utilize for monitoring for instances of dangerous power arcs.

Demand response – As power demand begins to surpass supply, a demand response can automatically adjust smart end devices such as thermostats to throttle their usage temporarily, balancing demand and supply and avoiding a potential outage.

Smart grid network building blocks

TropOS wireless mesh routers easily mount just about anywhere utilities are likely to have mounting rights such as fixed towers, substations, utility poles, and in utility vehicles. Routers can be powered via an array of options – AC, DC, PoE, and solar providing connectivity for mobile municipal workers as well as for remote control and monitoring of IEDs across the distribution area.

ABB Wireless networks securely and reliably connects IEDs and people across the utility's coverage footprint. TropOS gateways can connect to the utility's network at substations via fiber optic, copper or PTP/PTMP links. Mobile mesh routers can be mounted into utility vehicles and become an integral part of the network providing broadband connectivity for one or many devices.

> "The (Smart Circuits) project represents an important step towards the future of energy delivery. TropOS is a very good fit for outdoor applications, has a strong base, and their reliability/availability design will ensure a high-capacity wireless communications foundation."
>
> Jim Corder
> Director of IT Infrastructure
> Avista

Click the link to learn more about our smart grid communication solutions.

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