



## High Tech US Smart Grid Lab Integrates SUBNET Technology

**SUBNET Solutions Inc. technology is being used in the new EnerNex state-of-the-art Smart Grid Labs, one of the premier smart grid testing and evaluation facilities in the country.**

CALGARY, ALBERTA, CANADA – April 3, 2012: SUBNET Solutions Inc. ("SUBNET"), a solutions provider that works with utilities to integrate substation IED access and security, visualization and control, fault file management and asset monitoring, recently donated software and engineering time to help build the EnerNex Smart Grid Labs (SGL). The facility was developed to give vendors, utilities and regulatory personnel a place to evaluate smart grid services for communications, security, standards compliance and implementation assistance.

SUBNET was selected to supply an integration platform for the substation and distribution devices at SGL to demonstrate multi-vendor interoperability. SUBNET's vendor agnostic solutions enable EnerNex to demonstrate advancements in unifying smart grid substation device access and security.

Travis Jaffray, Technical Product Manager with SUBNET, worked closely with EnerNex to help integrate a number of SUBNET smart grid technologies at the lab. EnerNex Smart Grid Labs is currently using SUBNET's PowerSYSTEM Center with My Passwords and My IEDs to provide complete and secure IED access control, password management, as well as My Faults for event file collection. SUBNET's SubSTATION Server is also being used as a secure data gateway and for protocol conversion, while SubSTATION Explorer is found in the testing facility's system as an HMI for visualization.

"SUBNET is really excited to have been included by EnerNex in their Smart Grid Labs initiative," says Jaffray. "One reason SUBNET was included in the project was we provide specifically multi-vendor solutions. The smart grid lab includes devices from multiple vendors such as Arbiter System, Bitronics, eMS, GE Digital Energy, Hindle Power, SEL, RuggedCom, Sisco and TE Connectivity all of which are accessible with SUBNET's vendor agnostic software solutions."

The lab's substation architecture was deployed using the SUBNET Unified Grid Intelligence Architecture, which SUBNET designed in order to eliminate the expense and inefficiencies of legacy tiered substation architectures. The system includes redundancy, creating a more reliable substation that is affordable and vastly improves the maintainability of the overall solution.

The SUBNET Unified Grid Intelligence Architecture enables utilities to configure substations in significantly less time than traditional RTU or other tiered communication processor based architectures. This architecture enables the consolidation of numerous different legacy device configurations per substation into one consolidated device configuration. Also, SUBNET's advanced configuration capabilities enable configuration automation that



leverages the utilities engineering design standards and configuration processes that vastly simplifies and accelerates system configuration.

The lab was opened on February 29, 2012, in Knoxville, Tennessee.

**About SUBNET**

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## SUBNET Ranked Among Top 10 Vendors for Smart Grid GRC

IEEE T&D, Orlando, Florida – May 7 – 10, 2012

SUBNET Solutions Inc. has been named one of the top 10 vendors for smart grid cyber security governance, risk management and compliance in a recent report published by Pike Research.

SUBNET Solutions Inc. ("SUBNET"), a provider of innovative interoperability solutions that combine the newest advancements in SUBstation technology with modern NETworking systems, has made the list of Pike Research's Top 10 Vendors in its "Pike Pulse Report: Smart Grid Cyber Security Governance, Risk Management, and Compliance." The report ranks the potential future leaders of smart grid governance, risk management, and compliance (GRC) - a niche market that has emerged within the highly specialized smart grid cyber security market.

GRC is regarded as the foundation upon which all current cyber security is launched. While policies and architecture further the opportunities for a cyber-security program, without GRC, no security program could exist at all. But despite its significance, GRC for the smart grid is still an under-served market, with a definite leader yet to emerge.

The list of potential GRC leaders includes a number of cyber security giants that SUBNET is involved with through partnerships and other relationships. SUBNET is a Cisco Developer Partner, and works closely with McAfee/Nitro, which took the number one spot on Pike's list. Such companies use SUBNET solutions to enhance their product offerings to the electric industry.

SUBNET is well positioned to move ahead as a leader in GRC with its unique vendor agnostic approach. By working hard to be specifically multi-vendor, SUBNET has been recognized for its ability to help utilities integrate multi-vendor substation devices with multi-vendor business systems.

"SUBNET's vendor agnostic philosophy found in our solutions is carried over into the way we work with utilities and partners," comments Sean Leonard, COO of SUBNET. "We strive to be specifically multi-vendor which enables us to work with other industry leaders including Cisco, Intel, McAfee/Nitro Security, SEL, GE, Microsoft and others to deliver smart grid solutions to the electric utilities industry. Top utilities are seeing the benefit of investing in vendor agnostic solutions versus vendor specific solutions that 'lock-in' a utility."

SUBNET's innovative approach to targeting specific areas of GRC has led nine of the top 12 utilities listed by Fortune magazine to utilize SUBNET products.

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## The Value of Gaining Expertise in Substation Asset Management

IEEE T&D, Orlando, Florida – May 7 – 10, 2012

In the modernized electric grid, utilities face the challenge of establishing a standard integration architecture that meets their specific needs.

Utilities can increase productivity by receiving expert training in industry standards and newly developed technologies, providing the power and knowledge needed to successfully implement an intelligent substation.

SUBNET's training programs provide a unique opportunity to achieve expertise in managing and administering substation assets.

Utilities should understand computer systems that embody supplier-independent standards, known as open systems, that allow software to be applied on various platforms and can interoperate with applications on local and remote systems.

Having knowledge of substation integration and automation system functional architecture is also key in managing assets. The functional architecture is comprised of three data paths from the substation to the utility enterprise, and also includes the SCADA system and the data warehouse.

Technical issues associated with substation integration and automation include the system responsibilities, the substation host processor and the user interface.

SUBNET's **SubSTATION Explore 2 Operator Training** course provides operator level instruction on using the SubSTATION Explorer 2 Human Machine Interface (HMI). The course teaches the benefits of having secure visual access to and control of all substation data, including devices, alarms, controls, value displays and user-defined custom objects.

Utilities must also establish a substation LAN that meets industry standards to allow interoperability and the use of plug-and-play devices. Using interfaces to substation IEDs to acquire data, determine their operating status, support communications protocols and support standard protocols being developed can also be problematic.

The substation-to-the-utility enterprise can also be a hang-up for utilities, which is the area of traditional SCADA communication protocols.

SUBNET's SubSTATION Server 2 Operator Training course covers these administrative functions, discussing master and slave protocols, devices and connections, working with the port server, calculator and logic functions.

Utilities should also be well aware of the distributed network protocol, which was developed to achieve open, standards-based interoperability between substation computers, RTUs, IEDs and master stations.

SUBNET's protocol training course combines a DNP3 protocol training module with an ASE2000 Test Set module to instruct in these protocols. Also, SUBNET's ASE2000 RTU Test Set Training offers hands-on training to working with the ASE Test Set.

Check out SUBNET's 2012 training schedule (<http://www.subnet.com/training/training-schedule.aspx>) to see when we will be bringing the Substation Intelligence Training Tour to a city near you.

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## The Benefits of Unified Fault File Management

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In SCADA/DMS systems, fault management is one of the main functions to reduce outage times. Also of high importance are the various computer systems used in network operation.

Outages can have serious consequences for utilities. If companies fail to comply with standard IEEE reliability indices, such as the System Average Interruption Duration Index (SAIDI) and the Customer Average Interruption Duration Index (CAIDI), they may face stiff penalties. Aside from being fined, adhering to such standards can also help utilities gain economic efficiency.

Power outages themselves have a tremendous economic impact on communities. According to the Lawrence Berkeley National Laboratory, electricity disturbances cost the U.S. about \$80 billion every year - roughly \$47,000 an hour for manufacturing firms. Outages quickly lead to customer dissatisfaction, as was seen when Hurricane Irene ravaged the eastern seaboard. Although 80 percent of lost power was restored in the first 72 hours, many customers expressed frustration that electricity had not been returned.

Currently, disturbances are remedied by sending personnel to remote substations to analyze and resolve problems, which adds to costs and takes up valuable time. Even so, once a worker has arrived at the substation, IEDs from various vendors require different methods to access the devices and data - a cumbersome and inefficient process.

As utilities use increasingly dissimilar substation devices, managing them all can become a tangled and unanticipated time commitment. Each have different protocols and varying methods for navigating the faceplates of devices to access data that can slow down restoration operations.

Understanding the fault file data it collects will be key to faster restoration, but utilities must leverage such technology in order to experience more efficient operations.

SUBNET provides a specifically multi-vendor solution that enables utilities to receive automatic notifications when fault files have been generated in remote substations, and then provides access to the data files.

With **PowerSYSTEM Center**, utilities are able to securely and centrally manage their large install base of many different intelligent electronic devices (meters, relays, RTUs, etc) deployed throughout their entire transmission and distribution system.

PowerSYSTEM Center is a multi-function IED management solution that supports several additional functions including: unified relay event file collection and archiving, unified password management, unified asset monitoring and unified data historian interfaces.



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## SUBNET Helps Combat Substation Security Concerns

IEEE T&D, Orlando, Florida – May 7 – 10, 2012

**SUBNET was recently featured in the first Microsoft Power and Utilities blog of the year for its success in making utility substations more intelligent through unified grid intelligence solutions.**

SUBNET Solutions Inc. ("SUBNET"), a Microsoft partner and Smart Energy Reference Architecture (SERA) advisory council member that specializes in substation intelligence, was recently featured in Microsoft Power and Utilities' blog that discussed the highlights of the SUBNET User Group Conference. The company has recently enjoyed tremendous success as nine of the 12 largest North American utilities have implemented its substation technology.

The conference discussed product enhancements that have helped SUBNET become an industry leader of substation security through access control. Security has become a major issue due to threats from malware, hacking and access control, as well as the rapidly increasing amount of data that supervisory control and data acquisition (SCADA) owners and engineers are faced with. Further compounding the problem is the growing number of systems from which the data is being sent.

SUBNET President Ameen Hamdon spoke on the increasing number of connections between Intelligent Electronic Devices (IEDs), and how such growth has become a point of vulnerability.

To confront this problem, Microsoft underscored the importance of SUBNET's solution, which enables IED management, password and configuration management that has the potential to virtualize substation software. The solution does away with the tiered complexities of previous systems while gaining redundant architecture for the substation - helping the utility to accomplish security, scalability and the ability to better manage cyber assets.

Microsoft Cyber Security Architect Michael Howard argued that fully-formed solutions must be developed, as threats are increasingly being borne from software solutions that utilities use to manage the grid's intelligent devices. Howard also referred to Hamdon's keynote address, stating there are two immediate actions utilities can take to increase cyber security amid growing vulnerability points.

1. To optimize security, utilities should implement vulnerability tests. Vulnerability testing is an uncommon skill set in Utilities today but is of growing importance.
2. Ensure that software solutions developers follow SUBNET's lead, have a deep knowledge of the platforms they are developing on and have tested the interfaces.

Microsoft noted the most significant takeaway was that although it may be impossible to identify and eliminate all vulnerabilities, SUBNET is helping to make utility operational systems secure while still meeting the industry demands.



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## Smart Grid Rollout May Depend on New Policies

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While it may seem like smart grid implementation delays are caused by the energy industry dragging its feet, industry professionals have a much different take on the issue, Smart Grid News reports.

According to the media outlet, utilities and industry experts agree that one of the largest hurdles in smart grid installation is regulation.

At a recent smart grid forum held in Washington, D.C., industry professionals stated that a "lack of uniformity" in regulations was responsible for slow adoption of the smart grid. The electric industry is forced to contend with complex, sweeping and at times competing rules and standards that keep new investments low because of the uncertainty they create over a utility's ability to recoup costs.

"Until energy companies sense some degree of regulatory support for smart grid, coupled with a relatively normalized set of costing rules, the deployment and offering of smart grid will remain limited," forum panelists said in statement.

According to the news provider, smart grid policy should focus on creating a digital integrated network that can facilitate real-time communication across wide boundaries. A constantly evolving energy network will require utilities to ensure they are well-positioned to support the demand of billions of machine-to-machine interactions.

Utilities in the U.S. are faced with taking on the responsibility of expanding the smart grid, unlike in Europe, where the European Commission developed rules that required states to begin smart grid installments. But, the media outlet states that entails convincing lawmakers of the smart grid's potential.

It is up to electric companies to ensure that the term "smart" is more than a marketing scheme, but a proper description of a modernized network that provides information and energy that benefits both end users and utilities.

To bypass the roadblocks to smart grid implementation, utilities will need to start from the ground up and become fully knowledgeable of the new grid, the news source stated. It will be important for companies to come together to ensure interoperability of all smart grid systems, and educate and inform the public and lawmakers on the benefits of the smart grid.

SUBNET is helping utilities create a cohesive power system by introducing its Unified Grid Intelligence - an interoperability philosophy that promotes real-time integration of intelligent utility systems, all while ensuring utilities comply with stringent NERC CIP standards.



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## Integrating Substation Data in the Modern Grid

IEEE T&D, Orlando, Florida – May 7 – 10, 2012

As more utilities turn to the smart grid for enhanced operating efficiency and reliability, many are realizing that integrating data in substations containing several intelligent electronic devices (IEDs) can be a serious challenge that can impede smart grid deployment.

SUBNET's **SubSTATION Server** is a multi-function software application that can manage data from various IEDs through data concentration, protocol translation, automation logic, event file collection and enterprise connectivity.

### Saving Money and Time

When utilities use different vendor-specific programs, personnel training costs can quickly mount due to the distinctively different features of each system, as well as the look and feel of different packages. SubSTATION Server saves utilities both time and money by getting rid of the need to buy, configure and manage multiple different legacy integration devices.

Utilities are facing slow response due to manual analysis of varying IEDs, which can become an impediment if a large number of records taken from different IEDs for the same event must be uploaded and analyzed. With SUBNET's solution, companies can avoid the limitations of IED vendor-specific integration devices through true multi-vendor integration capabilities that support the process for nearly all prominent IED vendors.

### Integrating Data

The SubSTATION Server solution replaces outdated RTU data concentrators, relay communication processors and other legacy integration devices, which can allow for easy access and data analysis. Utilities use several forms of IEDs to collect data measurements in modern substations, including DFRs, DPRs, CBMs, RTUs, SERs and PLCs.

As these devices evolved from relatively simple to complex, the use of an automated collection system for IED data became necessary.

### Avoiding Obsolescence

IEDs were originally designed with highly specific, usually limited, data collection features. The progression of technology has given these IEDs new capabilities, with critical improvements including more memory, better communication interfaces and high quality of data recording.

Utilities can get more out of their IED investments by avoiding unnecessary upgrades and replacements with SubSTATION Server, and can avoid technological obsolescence issues typically found in traditional substation integration solutions. The system leverages, and evolves with, mainstream networking and computing



technologies such as Microsoft and Intel, compared to proprietary embedded IED vendor computing technologies.

The unparalleled power and ease of use have made the system the solution for more than 100 utilities around the world.

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## Managing Utility IEDs Remotely While Ensuring NERC CIP Compliance

IEEE T&D, Orlando, Florida – May 7 – 10, 2012

Across the country, more utilities are beginning to explore vendor-specific password, security, faceplate and display capabilities of substation intelligent electronic devices (IEDs), making it more difficult to access and manage the passwords to all of their different substation IEDs. These installations are also complicating compliance with NERC CIP standards, hindering utilities' ability to operate efficiently.

To confront this problem, SUBNET developed its **SUBNET IED Management Solution** - PowerSYSTEM Center, which addresses these challenges by integrating IED access management and password management.

The challenge of interoperability has arisen as electric utility systems and processes - though consistently effective - have evolved over time. These changes have complicated a utility's ability to perform crucial functions, such as remote access, substation information management and NERC CIP compliance. While investing in these technologies will create a more intelligent power grid, interoperability will be a major challenge as utilities attempt to integrate many different legacy devices from a wide range of vendors.

As utility personnel who access data from utility assets go about this process, they will be faced with two major challenges. First, they will need to remotely access and manage data from IEDs in order to optimize operation, maintenance and asset management while meeting corporate goals. The next challenge lies in performing these duties successfully while meeting NERC CIP requirements. SUBNET's whitepaper breaks these two challenges down in more detail. To obtain a copy of this whitepaper, please visit [www.SUBNET.com](http://www.SUBNET.com).

While these technological advances bring about interoperability and security issues, the benefits of these breakthroughs, such as the ability to remotely interface with and access data from several devices, will ultimately help utilities operate more efficiently. Power companies can use remotely acquired data to adapt IED settings as needed, help analyze and correct line faults, identify optimal timing to repair or replace equipment, among other benefits.

However, these remote access capabilities are potentially eliminated by stringent NERC CIP standards. First introduced in 2007, these standards went into effect in June 2009, which require that utilities create authorization and authentication methods for access to remote IEDs. For instance, one standard states:

The Responsible Entity shall establish, implement, and document technical and procedural controls that enforce access authentication of, and accountability for, all user activity, and that minimize the risk of unauthorized system access.

SUBNET's **PowerSYSTEM Center** effectively helps utilities manage substation passwords while ensuring NERC CIP compliance. Such an action should be top priority for utilities, as failure to meet these standards can result in fines of up to \$1 million per day.

SUBNET IED Management Solution addresses this challenge by providing features and benefits in two main areas: Access management and password management.

The system helps utilities manage access to IEDs, both local and remote, allowing them to perform a wide range of operational maintenance and asset management tasks. With the system, IEDs are automatically connected, saving personnel from having to learn the process, procedure or parameters needed to access the devices. This freedom enables managers to focus on their jobs, not the complicated task of accessing IEDs.

PowerSYSTEM Center also automates the password management process for all IEDs, strongly supporting compliance with NERC CIP. The system allows administrators to make password changes at pre-scheduled times, on demand, or manually as required. Without any additional hardware installed on the substation, administrators can grant and control local IED access through the system.

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## Dealing with the Complexities of Substation Cyber Security

IEEE T&D, Orlando, Florida – May 7 – 10, 2012

As more utilities begin to integrate the functionality of traditional substation devices with the standard NERC CIP-007, many are running into a number of uncertainties regarding how to effectively manage substation cyber security solutions.

However, SUBNET has detailed how one top 10 Fortune 500 electrical utility assessed and addressed the substantial complexities of managing substation device passwords.

The complexities came about after recent regulatory requirements in the U.S. met with the highly intelligent smart grid, which have created the need for better substation data communications security. For example, one of the biggest utilities in North America had to develop a comprehensive security solution for providing and controlling access to IEDs that had been installed on its substation.

The company used SUBNET's software to standardize the deployment of a proposed solution throughout four of its electric utility companies. The utility faced many challenges in the rollout, but with the help of SUBNET, it was able to create a solution and determine the future benefits of that solution.

SUBNET's **My Passwords** software module was developed to help utilities manage thousands of IED passwords located across all of its substations. By using automated password management, utility personnel are better able to focus on their job, leading to better operation, management and maintenance of utility assets, as workers will not have to worry about how to gain access to IEDs.

With SUBNET's software, all of this access is performed securely, ensuring that cyber assets are kept safe while complying with strict legislative NERC CIP standards.

SUBNET's "Complexities of Substation Cyber Security" webinar (<http://www.subnet.com/news-events/substation-cyber-security-systems-management.aspx>) helps utilities with several aspects of securing substation data. The webinar deals with the risks incurred when managing device passwords is performed manually, and discusses the factors to consider when integrating automated password management.

Also covered are the considerations to take when automating password management solutions across multi-vendor devices and how to handle devices that do not allow for automated password management. The webinar touches on how to minimize the requirement for manual password administration, as well as how to ensure access passwords are complex to a reasonable extent and changed regularly.

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## Unified Substation Visualization and Control

IEEE T&D, Orlando, Florida – May 7 – 10, 2012

In order for utility workers to perform the effective operation of a large power system, massive amounts of data must be analyzed. The huge amount of data must be presented in a way that allows the operators to assess the state of the system and respond accordingly - a formidable challenge that can slow smart grid deployment.

Although relatively simple forms of displays sufficed in the pre-smart grid era, the restructuring of electric infrastructure has prompted the need for enhanced visualization techniques. Analysis of data in large power systems involves modeling complex elements to the substation technician, who is usually faced with analyzing a vast amount of information from line loadings, bus voltages, generation, available transfer capability and other sources of data.

Presenting this data so as to facilitate quick assimilation and assessment of the situation has become a major challenge for utilities. With SubSTATION Explorer 2, these information sources can be quickly and easily integrated, keeping projects within their intended time frames and on budget.

SUBNET's **SubSTATION Explorer 2** helps utilities unify the visualization of all critical substation information. In typical IED-based substations, crucial information is strewn about dozens of various IED faceplates that have obscure menu-driven displays. For personnel who manage electrical utility substations, SubSTATION Explorer 2 is a software application that enables you to safely, securely and reliably view and control all of your critical substation data.

The solution is configurable, as opposed to programmable, providing companies with a full-featured HMI interface without the additional costs of extensive training, development and code maintenance to achieve advanced intuitive HMI displays in a matter of hours, not weeks.

As the amount of information grows, utility workers will find it more difficult to be made aware of alarms and alerts, which warn the technician of anomalous conditions in the system. SUBNET's solution was developed with a built-in digital alarm annunciator, which facilitates the timely resolution of substation alarms before they become critical and costly.

As the frequency and complexity of cyber attacks increase, utilities will need to ensure substation data remains safe and secure. SubSTATION Explorer 2 features built-in multi-level security that leverages existing corporate policies, keeping maintenance overhead to a minimum. Security can be applied down to the configuration file level by assigning users specific privileges such as full control, modify, view & execute or just view configurations.

By using the solution, personnel who manage electrical utility substations can centrally view all local substation data in a standard format and layout, manage alarms and retain safe and reliable operations during network and system outages.



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