WHITE PAPER

JUNE 2023



Dell Technologies and Phoenix Contact: Partnering to support decarbonization through best-in-breed solutions

Key benefits

of Dell Technologies and Phoenix Contact Better Together for Substation Modernization Solutions

With an integrated virtualization substation architecture, many physical devices and IEDs can be converted to software appliances. Hardware platforms will no longer need to be changed every time an application changes, and added flexibility increases the ability to respond quickly to new monitoring, automation, protection, and control challenges in the changing grid.

- Lower total cost of ownership with VMware automation handling much of the functionality that drives up the cost of implementing a legacy microprocessor-based solution. Reduce CAPEX with smaller hardware and wiring footprints and consolidation and reduce OPEX with lower labor and maintenance.
- Improve safety and sustainability practices and reduce costs with fewer onsite maintenance visits.
- This partnership brings a starting point for substation modernization projects. Both companies bring global supply chains for product development, deployment, and support. Shared engineering labs will validate new product performance and specific customer configurations.

The global demands to deliver the energy transition, coupled with decarbonization efforts through clean electrification necessitate a virtualized architecture model for the electric substation. The current substation protection, automation, and control systems are comprised of proprietary, fit for purpose, hardware components that are difficult to upgrade and expensive to manage. The challenges and costs driven by these legacy solutions are shown by increased deployment times and costs for facilities construction, operations, and maintenance.

The growth of distributed energy resources (DERs) like solar, wind, and electric vehicles (EVs), will make electricity demand more variable; yet existing customer expectations for grid reliability and resilience will not change. This requires grid operators to rely on data across the connected grid to rapidly forecast the generation and distribution of these intermittent energy sources to meet demand levels and maintain reliability. New connected grid operational models will require digital platforms and tools to better detect grid anomalies, balance grid supply and demand in real time, and maintain reliability by detecting and remediating cyberattacks.

The benefits of the virtualized protection, automation, and control are improved safety, reliability, costs, and intelligence of the substation. Nearly every industry group and authority, including the International Energy Agency (IEA), views grid modernization as the main enabler of addressing the world's climate change needs. Without substation upgrades, the vision for the smart grid cannot be realized.

Phoenix Contact is a global leader and innovator in electrification, networking, and automation. Their business approach is innovative, sustainable, and based on partnership. They are committed to supporting the energy industry's movement toward a carbon-neutral world through the development of innovative new products and key industry partnerships with companies like Dell Technologies. This document describes the collaboration between Dell Technologies and Phoenix Contact to co-engineer an innovative platform to support the next generation of substation applications that will meet the evolving needs of the power industry.

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The Virtual Protection, Automation and Control (vPAC) Platform

The journey to modern substation architecture starts with leveraging standardized, IEC- 61850-3 compliant ruggedized server hardware for the substations, and implementing software-defined protection, automation and control systems along with resilient, secure, and compliant networks. Multiple substation workloads can be virtualized and consolidated onto a single platform, simplifying management, and reducing operating costs.

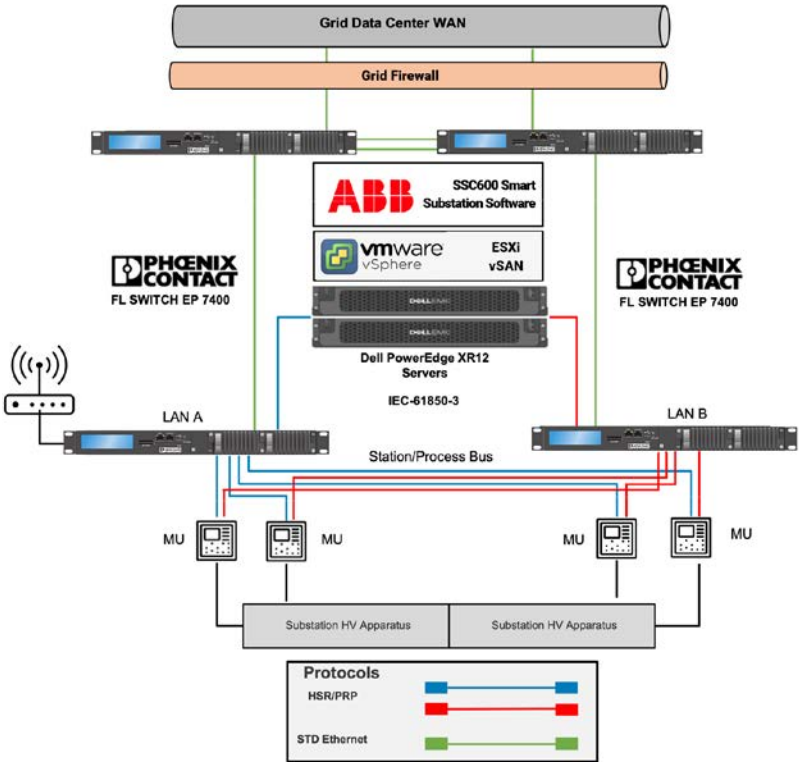


Figure 1. Physical Architecture of vPAC Platform

Implementing virtualization software on a common Intel-based server in the electric substation allows for the protection, automation, and control hardware components to be converted into software-defined appliances. This enables the immediate deployment of multiple vendor applications and workloads on a common hardware platform, such as the IEC 61850-3 industry compliant Dell PowerEdge XR12 server. This virtualized platform provides the flexibility required to respond quickly to new protection, automation and control challenges in the changing grid. It will also reduce the number of cabling and physical devices needed, and reduce the number of on-site maintenance visits.

Dell PowerEdge Server XR-12: Compact, ruggedized and expandable for the utilities edge



Figure 2. Dell PowerEdge XR-12 Rugged Server: A rugged, compact, and substation-compliant 2U server.



Figure 3. The Phoenix Contact FL SWITCH EP 7400 Switch meets the energy industry's requirements for performance, uptime and security.

The Dell PowerEdge XR12 server offers 3rd generation Intel® Xeon® Scalable processors and it's designed for challenging operating environments like the distribution substation. With reduced depth and front and rear port options that support reverse air flow, it gives administrators new flexibility without expensive retrofits or HVAC updates. The XR-12 is built for long life, so organizations can offer game-changing services without downtime and disruption. Security measures are intrinsic to the design of the Dell PowerEdge servers. Cyber resilience features include Secured Component Verification and Silicon Root of Trust. Remote access for management and administration functions are provided through Dell's native toolset, including OpenManage and iDRAC9. Security features like OpenManage Secure Enterprise Key Manager and Automatic Certificate Enrollment outmaneuver cyber threats with intelligence, automation, and recovery tools that include iDRAC9 Telemetry, BIOS live scanning, and Rapid OS recovery.

Dell Technologies and Phoenix Contact: Physical network technology for vPAC systems

As the demand for intelligent power distribution and control increases, more sites – from remote local municipal installations to multisite regional control installations – are connecting more devices than ever before. Peer-to-peer messages travel horizontally through a substation's station bus but extend into the lower process bus. The ability to define and prioritize these messages is critical to the operation of primary substation functions. The Phoenix Contact FL SWITCH EP 7400 managed switch series provides the hardware and firmware functions that modern substations need to manage the growing bandwidth and data traffic flows.

The FL SWITCH EP 7400 is a modular managed network switch. The adaptable platform meets the electric power industry's increasing requirements for scalable network performance, uptime, and security. Powerful Layer 2 and Layer 3 capabilities, along with hardware-based IEEE 1588 V2 PTP synchronization based on the IEC 61850-9-3 Utility Power Profile, give extensive options to meet changing performance and security needs.

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The FL SWITCH EP 7400 is designed for extreme environments using IEC 61850-3 and IEEE 1613 standards. It is backed by Phoenix Contact's experience selling and supporting over 2 million industrial Ethernet switches globally. Modular power supplies with hot-swap capabilities help overcome unusual situations. Optional DIN rail-mount (with rack-mount option) PRP redundancy modules provide zero packet loss recovery to communication disruption events.

Critical infrastructure applications require strong security. State-of-the-art managed switch security functions can limit local access, remote access, and network access to switch management. Features such as VLANs allow utilities to segment various critical zones within the electronic security perimeter that connect systems, such as intelligent electronic devices (IEDs), RTUs, and PLCs within the substation infrastructure. With the increasing deployment of protocols such as IEC 61850, this segmentation prevents unauthorized access or interference by non-critical substation processes on networks that are processing and transmitting time-sensitive and critical communications. Additionally, user authentication and Syslog support allow monitoring and auditing. This makes it easy to detect changes to network hardware and status by users, further ensuring a secure and reliable network.

Enhance your electric utility automation

Utilizing their respective strengths in engineering and product development, Dell Technologies and Phoenix Contact collaborate to help electric utility companies accelerate the adoption of the vPAC environment with industry-leading technology. These flexible, resilient and scalable systems improve how energy is reliably managed on grid, lowering the overall cost of ownership for utilities, and making a measurable impact towards sustainability. Dell Technologies and Phoenix Contact are dedicated to assisting electric utilities in supporting their customers in a more sustainable energy world.

ABOUT PHOENIX CONTACT

Phoenix Contact is a global market leader based in Germany. Phoenix Contact produces future-oriented components, systems, and solutions for electrical controls, networking, and automation. With a worldwide network reaching across more than 100 countries, and with over 20,300 employees, Phoenix Contact maintains close relationships with its customers, which is essential for shared success. The company's wide variety of products makes it easy for engineers to implement the latest technology in various applications and industries. Phoenix Contact focuses on the fields of energy, infrastructure, process, and factory automation.

For more information about Phoenix Contact or its products, visit **www.phoenixcontact.com, call** technical service at **800-322-3225,** or email **info@phoenixcontact.com**.

ABOUT DELL TECHNOLOGIES

Dell Technologies (NYSE:DELL) helps organizations and individuals build their digital future and transform how they work, live and play. The company provides customers with the industry's broadest and most innovative technology and services portfolio for the data era. To learn more, go to **DellTechnologies.com**.

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