

Grid Solutions

# HELPING TO MAKE THE DIGITAL TRANSFORMATION A REALITY

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GE VERNOVA

Many Grid Solutions customers today share the same concerns: Reducing material and labor costs and adapting to a shrinking work force as many people will be eligible for retirement in the near future. They also need increased asset adaptability to maximize reliability while working within the growing constraints of the grid. But with our digital substations, we are working with customers to address these concerns.

We sat down with Nicolas Vassilevsky, Grid Automation Product Management Leader, and Byron Flynn, Senior Technical Sales Manager, to hear what they had to say on how digital substations and digitization in general can bring value to both utility and industrial customers – regardless of where they are in their modernization journey.

## What is a digital substation?

**Nicolas:** At its core, a digital substation focuses on converting binary status and analog measured data into digital data - reliably and seamlessly. When we talk about a digital substation, the focus is on secondary systems like protection and control, measurement and condition monitoring devices that are directly associated with the primary equipment (power transformers, circuit breakers, instrument transformers...). Digital substations help utilities focus their limited time and resources on where they are needed most. They bring the flexibility of software-based applications to handle the challenge of renewable energy integration into the grid. They also allow more maintenance to be performed remotely – including upgrades, which helps avoid trips for fault investigation.

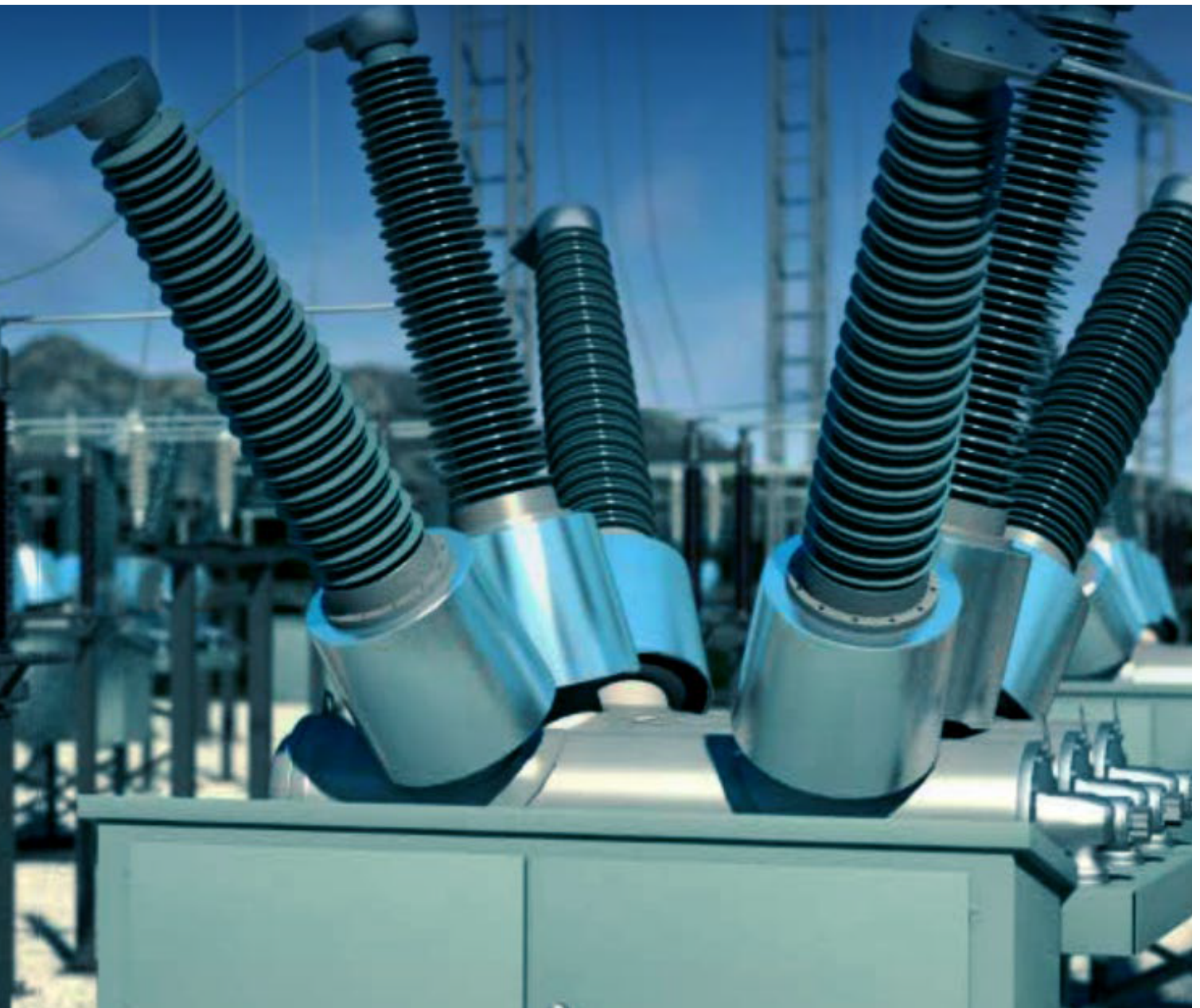




## Is the industry moving towards digital substations?

**Nicolas:** As a worldwide leader in digital substations, we see a trend that more of our grid and industrial customers are making the switch from analog to digital. They are converting traditional analog signals that use hundreds of copper wires in a substation, to a digital signal that runs over fiber-optic cables. Digitization dramatically shrinks a substation's physical communication network, while simultaneously boosting its ability to relay mountains of new data. This data can then be used to avoid system failure, analyze faults faster and anticipate maintenance. Today, we have over 100 digital substation projects ongoing with more than 50 customers in 28 countries.

In a standard modular digital substation, data is captured and digitized as close to the source as possible. With grid modernization, through our experience, we have seen customers reduce project schedules, save in labor and material costs and unlock future value streams – all by taking a digital approach.



## What are the benefits for customers to go digital?

**Byron:** In the past, substations utilized a complex maze of wires to provide signals and measurements between the primary equipment and a control room, challenging for both new and retrofit projects. By eliminating up to 80% of the wiring and terminations, our customers can move resources away from designing, installing and maintaining copper wires to other critical projects, which significantly reduces the grid modernization project backlog.

Moreover, as GE Vernova's digital substation is designed according to the IEC 61850 standard, **our digital system opens the door to a more secure and efficient exchange of data between multiple devices. The advantages are real-time data that can be analyzed to optimize asset use and maximize system reliability.** Such advantages are crucial for substations not only to supply electricity to the homes, but also to manage the power flowing into the grid from the various renewable energy sources.

For example, in a conventional substation, there are hundreds of miles of copper wires lying in shallow trenches throughout the switchyard. When copper is replaced by fiber optic, **you can save up to 80% of material and trenchwork costs, as well as reducing project-commissioning time.** In addition, a digital substation also requires smaller buildings than its analog ancestor. For some of our customers, the footprint reduction has been so significant that they were able to realize a 50% smaller control room – allowing them to also reduce the total footprint or size of their substation.

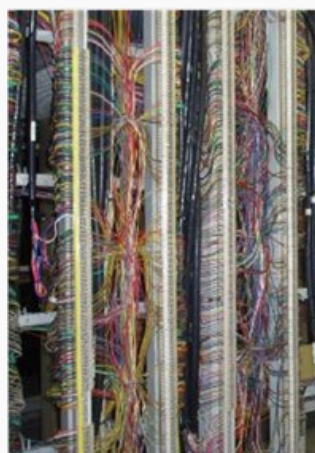






**Byron:** Finally, weaning a substation off copper has other critical benefits. Being made of lightweight, rugged and flexible glass, fiber-optic cables do not conduct electricity and are safer for workers, as there aren't dangerous current measurements running from the apparatus to the devices in the substation control building.

With the modernization of today's electric grid, a digital substation is no longer a static construction throughout its entire life cycle. It is instead an agile component in the electrical power supply network that can be more easily adapted to requirements and conditions over its life cycle. Cyber security is the most prominent function in this respect, because the objective is to keep the system with all its intelligent devices up to date to reduce the cyber risks. **Grid Solutions has just been certified IEC 62443-4-1**, an international standard used in industrial automation and control system.



*Traditional Copper Wiring of Protection Devices*



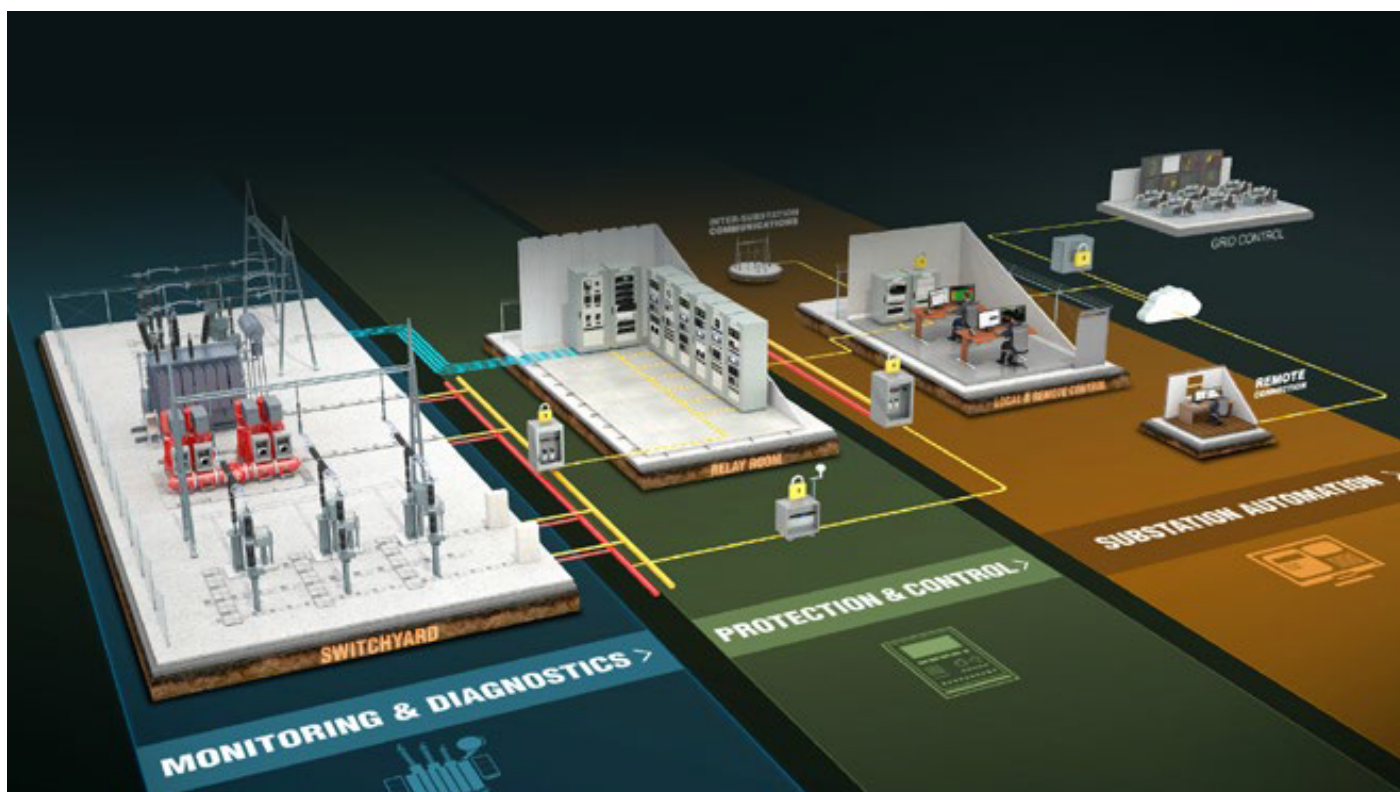
*Simplified Fiber Optic Wiring of Protection Devices – Copper wires are replaced by a few fiber optic cables*

## With so many benefits, why has the adoption to digital substations not been faster? What are the challenges?

**Nicolas:** It is not an easy move from an analog to a digital system. To maximize the digital benefits, customers need to change their design standards, system engineering, work processes, as well as change the way substations are tested and commissioned. If they don't address these changes prior to moving to a digital substation, the final cost may be higher than a traditional substation. Indeed, customers should update many of their standards and processes to get the most from their new modern digital substation. Consequently, it can take up to two years from the initial decision to go digital to the full deployment of the first digital substation. If the proper preparatory work has been done, deployment of the solution becomes faster than analog and much more flexible for projects, for substation extension, and for protection and control scheme adaptation to grid evolution.

As this is such a complex transition for our customers, we often provide them with full support all along the transition phase as they update their standards and systems.

**This is the reason why utilities around the globe are choosing GE Vernova's digital substations to help modernize their grid and make the digital substation a reality.**



*Example architecture of a digital substation that connects primary, secondary, and operational systems to provide situational awareness and increased asset performance*

For more information, visit  
[governova.com/grid-solutions](https://governova.com/grid-solutions)