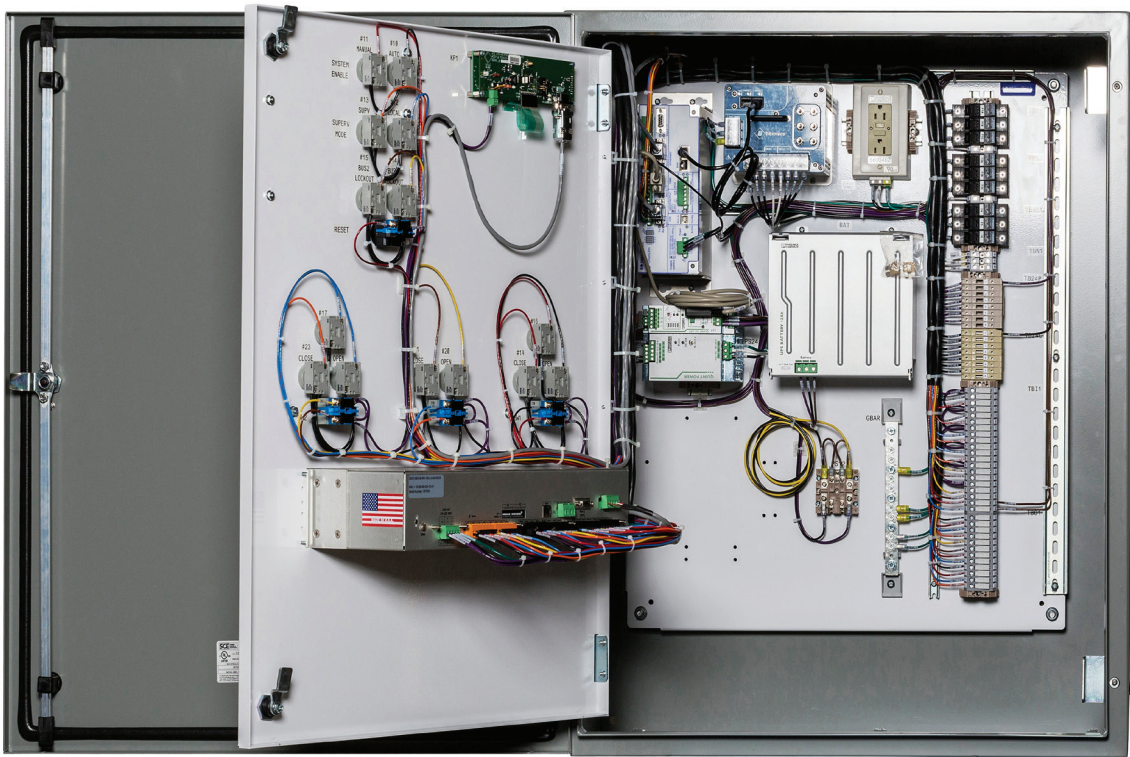# Orchestrating Data Acquisition and Communications for Utilities with a Single Programming Platform

Utilities face an ongoing challenge of orchestrating data acquisition and communications between aging measurement and control equipment across their networks. From switch poles to large scale transmission and distribution stations, the equipment used to monitor and control power delivery across a utility's network can use multiple communication protocols from different generations. They also vary significantly in age, configurability, performance and complexity.

Today, field engineers must use multiple programming languages simply to maintain and upgrade the wide array of equipment and technologies that have accumulated in a network over the decades. Added challenges include lack of vendor support for older equipment,

difficulties in sourcing parts, and lack of compatibility with newer devices and software. Until utilities replace all of their aging Remote Terminal Units (RTUs) and Supervisory Control and Data Acquisition (SCADA) equipment, these challenges will continue to persist.

"What we have currently is a high level of complexity and therefore inefficiency in managing our field equipment," said a lead measurement controls technician from an electric power company in Kentucky that serves 1.1 million people throughout the state.

"With some of the equipment, you can't even buy parts," said the technician. "New software may not be backwards compatible with our older devices. We even have some RTUs that require us to carry 32-bit processors just to be able to program them."

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Complicating communications management are the varied generations of communication protocols that older equipment uses, which include Conitel, serial DNP and Modbus. With Internet Protocol (IP) as the current and go-forward communication standard for most utilities, the older equipment, which may not be upgradeable, must be able to share their data for the rest of their usable life until they are eventually replaced.

Orchestration using a single platform
A solution that the power company has adopted to address their technology management needs is to use a single programming platform that can orchestrate the communications between all the equipment and communications protocols at a location in their network of over 120 transmission and 500 distribution substations.

"Our goal was to find a single platform that will function correctly in all the different equipment we manage," said the technician. "Our department is responsible for SCADA and metering from transmission to distribution substations, switch poles and everything in between. We have to be able to program all these devices."

The company uses an Orion integrated communications platform produced by NovaTech Automation, a leading power automation provider for over 35 years who engineers solutions from their Lenexa, Kansas facility. The platform accesses and distributes SCADA, protection and other operational data to quickly identify and resolve problems. It supports Conitel, DNP, IP, Modbus, serial, ST fiber and I/O ports.

States the technician, "Because we program a wide range of devices across a variety of relays and meters, having a single platform to program now makes it so much easier for our field team."

The power company uses the OrionLX platform for their transmission stations and the smaller OrionLXm for their distribution stations and SCADA controls at some of their power plants and remote switching sites.

According to the technician, the power company initially trialed the Orion platform in a transmission station, after which they have added more units as they upgraded or built new switchyards. The power technician estimates that they now have over 50 units in their transmission stations and about 70 more in their distribution stations. Configuring to each station's needs
Ease of configurability is critical, given the wide variety of environments field engineering teams face when they work across the stations in their network.

Despite having 16 connections on the back of their new Orion RTUs, the company needed more connectivity in some of their stations.

"Typically, an RTU will have up to 16 connections for a combination of serial and fiber channels," said the technician. "But we have some stations that have 40-50 devices, and we needed a way to extend the reach of our new RTUs. We worked with NovaTech Automation to engineer an Orion-based port expander that operates essentially as an ethernet port switch. Information passes through to more devices without having us pay for additional RTUs."

For their largest switchyards, the electric company deploys multiple port expanders together with the new RTU. Working with NovaTech, they designed a pre-built cabinet that is pre-wired with its own UPS as their standard package for their distribution stations.

Beyond addressing varying capacity needs at stations, utilities also need to easily reconfigure equipment based on the requirements of a specific station's environment.

"You may have ordered an RTU configured for fiber only to get to the substation to find that you

really need RS-485 serial connections," said the technician. "And when you are dealing with an outage, you are doing everything possible to get the station back online. A flexible platform can enable you to convert a serial port to an IP comms quickly. What you want is the ability to be able to open up an RTU, change the card, and be back up and running without having to wait and order a new RTU or make a major hardware change."

Streamlining programming and field training
Much of today's fieldwork is focused on the management of the software, which includes matching the programming software to the hardware revision. Rebuilds may even be necessary if an RTU goes offline after deleting a program. As a result, technicians need to be proficient in programming in order to troubleshoot RTU issues.

At the power company, the technicians must be able to program and function with all the software before they are allowed to go out in the field on their own. This is especially important for a relatively small team who is responsible for a very large geographic territory where they will encounter all variations of installations. Consistency of knowledge and applications is critical.

"We probably have 35 programs on our computers that our team of five field technicians need to be trained on in order to support IEDs, meters, transducers and more," said the technician. "We even have one manufacturer from whom we have six different program versions for different applications based on firmware or hardware revisions. With NovaTech Orion we just need to know the single "NCD" program."

Saving money through inventory consolidation
With the proliferation of hardware deployed over the years, inventory management is another pain point for utilities. Utilities typically need to order certain types of RTUs based on the size of the substation being built or upgraded.

Instead, the electric power company stocks a standard distribution cabinet they developed with NovaTech. For their distribution RTUs, it includes a specifically configured Orion RTU, a heater, and termination blocks for wiring I/O which are then wired to the device. They purchase these platforms to stock in their warehouse so that when they build a new substation, they have a cabinet ready. They just need to program, install and test it.

After developing an RTU cabinet, NovaTech will build it back on their next application. If these applications are very similar, the company has built the NCD application files and included them with the shipment. When the application is standardized to the point that each substation can almost be the same, the application can be stored on a shelf ready to be taken to the next substation and will only need to be tweaked to be ready.

The company has also worked with NovaTech to design a standard cabinet for their motor operated air break (MOAB) switches which are single poles with switches designed to isolate the system during a disturbance in order to expedite getting power back to customers. As a standard inventory item, anytime a MOAB is set up, communications are set-up more quickly based on the same programming platform of their full RTUs.

The ability to orchestrate the communications not only within each station but across a network increases in complexity with time because of the proliferation of equipment, software and the evolution of communication protocols. Consolidating the programming needed to support this wide array of technologies through a single programming platform can be a powerful opportunity for a utility to manage their network more efficiently and, as a result, better serve their customers.

For more information, visit the NovaTech website, **www.novatechautomation.com** or call (844) 668-2832.