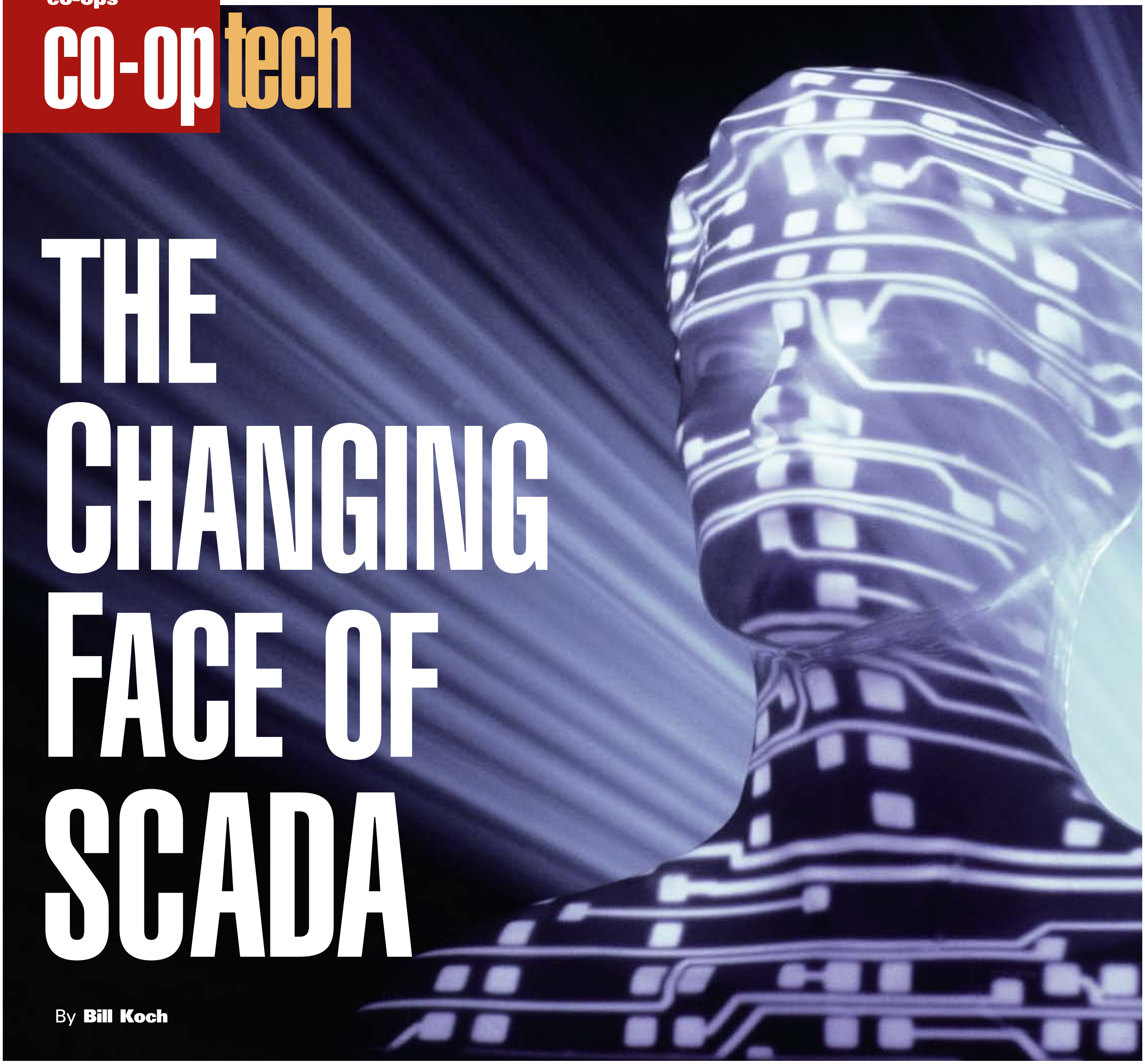
Working with vendors to build stronger electric co-ops

co-op tech



THE CHANGING FACE OF SCADA

By **Bill Koch**

Supervisory Control and Data Acquisition (SCADA) systems have expanded considerably since their early "show and tell" days—a time when only a privileged few engineers could view the "show" and provide "tell" on what to do when trouble spots along a distribution grid were identified. In many ways, SCADA has entered a period of rapid evolution, shifting from a substation information collection and control scheme to a linchpin of dynamic and real-time electric co-op operations.

As a result, SCADA has become more affordable, easier to integrate with other smart grid technologies, and standards-based thanks to the MultiSpeak® Initiative, a collaboration between NRECA and software companies, consultants, and electric utilities aimed at developing standard interfaces between commonly used (primarily distribution system) applications and automation tools. In many cases, these advancements result from strong relationships between electric co-ops and vendors.

Wood County Electric Cooperative, headquartered in Quitman, Texas, which

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New Supervisory Control and Data Acquisition (SCADA) tools can help electric co-ops of all sizes successfully implement a smart grid

serves about 33,000 members in nine counties east of Dallas, has been using VsNet SCADA from Valquest Systems, Inc. (valquest.net), for more than 23 years. "Valquest has continually supported and enhanced its VsNet SCADA, making it a valuable asset for our team by reducing diagnostic time and strengthening our reliability," remarks Robert Norman, chief operating officer at the co-op.

Norman recounts posing this question once to Valquest: "Why can't we figure out a way to keep an eye on volt/volt-ampere reactive [VAR] readings and use the information to switch our capacitor banks on and off as needed?" The answer: Wood County Electric now uses a stand-alone monitoring computer that sends a three-tone signal to targeted capacitor banks to open or close as required for proper volt/VAR control.

VsNet SCADA, specifically designed for use by smaller electric utilities, runs on Microsoft Windows 2000 or XP. Tabular displays and single line diagrams are put together by co-op personnel using computer-aided design and database instruments fashioned by Valquest—all included as part of the software.

Modular three-phase circuit boards check substation voltage and current transformers, passing waveforms to VsNet remote terminal units (RTUs) for digital signal analysis. A 900-MHz radio system ships collected substation and down-line equipment data through a microwave backbone or high-speed Internet connection back to the co-op.

In addition, a MultiSpeak interface moves VsNet SCADA "breaker open" alarms from Wood County Electric's 35 RTUs located in substations, tap points, microwave buildings, and distribution meter points to a DisSPatch OMS (outage management system) from Milsoft Utility Solutions, Inc. (milsoft.com). At locations where Schweitzer Engineering Laboratories, Inc. (selinc.com), SEL-351 relays are used, co-op dispatchers can "interrogate" devices to determine fault current magnitude, then enter that information into DisSPatch OMS's fault locator to pinpoint the approximate distance of a detected problem from a substation.

According to Wood County Electric Engineer C.H. Campbell, the fault locator gets line crews within a span or two of an actual fault. "We're standardizing to SEL-351 relays and equipping all of our new substations with a fiber link from the relay to the RTU. Fiber provides more reliable communications, particularly over longer distances."

SCADA systems that can grow with a co-op offer value beyond hardware and software. Trinity, Ala.-headquartered Joe Wheeler Electric Membership Corporation, which owns approximately 3,600 miles of distribution lines, installed a Survalent Technology (survalent.com) SCADA system more than six years ago. The completely scal-

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INFO TO GO

Five things you need to know about today's Supervisory Control and Data Acquisition (SCADA) systems:

1. *Scalable SCADA systems with open architecture and standard protocols are readily available.*
2. *The latest generation of SCADA products offers more features, modularity, increased power, and lower cost.*
3. *SCADA systems can integrate previously stand-alone applications and adapt as needs change.*
4. *Vendors have or are developing applications that extend SCADA functionality to a variety of substation and down-line automation tasks.*
5. *SCADA teamed with advanced metering infrastructure (AMI) remains a key component of any smart grid.*

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able Survalent SCADA delivers open access across any TCP/IP-based network.

Jeff Britnell, Joe Wheeler EMC manager of engineering, notes: "Initially, we used SCADA for basic data acquisition and monitoring. Now, we've extended those capabilities."

One of the co-op's recent SCADA additions, a Survalent Power Factor Control application, automatically corrects power factors at 19 of the co-op's 26 substations.

"The feature looks at power factor for both substations and feeders," Britnell comments. "It works automatically on 81 radio-equipped capacitor banks and a mix of old and new capacitor controls to keep power factors acceptable."

The co-op's SCADA system also controls voltage regulators in substations and 56 reclosers beyond. "We receive data on substation and feeder loading, which helps us decide which circuits are in need of upgrading," Britnell says.

William Rambo, Survalent Technology vice president of marketing, comments: "Co-ops have been working on 'smarter' distribution for years. We've structured our systems so that co-ops can start with the basics and add functionality as needs and a business case drive them."

At Dalton Ga.-based North Georgia Electric Membership Corporation, efforts are under way to develop a voltage reduction application for its Telvent (telvent.com) SCADA. The plan involves gathering total system load for the nearly 100,000-member co-op along with voltage levels at each of 52 substation transformers and load tap changer positions and then using the information to adjust voltage levels to control peak load.

"Telvent SCADA also supplies power factor monitoring from point-of-delivery to all substation transformers," points out David Creekmore, North Georgia EMC engineering/technical consultant. "That data helps us control a limited number of substation-mounted three-phase capacitor banks. We've also implemented SCADA control on a few three-phase G&W Electric Company [gwelec.com] Viper reclosers."

Tom Christopher, Telvent vice president, electric utilities-North America, points out that the firm markets core SCADA products in three forms: "full-blown" SCADA; Station OaSyS, a smaller version that focuses on substations; and OaSyS Lite, a critical function-only version without any redundant backup.

"SCADA was the automation hub of the past and will be a key player in smart grid initiatives, particularly when it comes to retrieving and applying data from outside the substation," he relates. "Coupled with RTU-integrated, accurate, low-cost sensors and switches, SCADA will permit a lot more self-healing activities out on the pole."

SCADA systems can be boosted through a "down-line automation assist." As part of a Wisconsin pilot project between Pierce Pepin Cooperative Services in Ellsworth and its wholesale power supplier, La Crosse-based Dairyland Power Cooperative, the distribution co-op plans to integrate SCADA, a Cannon advanced metering infrastructure (AMI) network from Cooper Power Systems (cooperpowereas.com), and in-home personal energy management units.

"To date, we have changed out approxi-

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mately 2,300 single-phase meters," explains Jeff Olson, vice president-engineering, member services & information technology for the 9,600-member distribution co-op. "The Cannon AMI will enable us to tie existing substation data with down-line readings such as end-of-line voltages and oil-circuit recloser status to give us a complete picture of our system."

The co-op's Yukon software platform includes a rural SCADA application known as eSubstation. "eSubstation supports our overall goals by allowing operation of the down-line portion of our system through a web-based interface," Olson indicates. "After putting in AMI, we will automate distribution switches to remotely isolate and reroute power during an outage to speed up restoration."

He continues: "A smart grid offers our members accurate and timely energy data and empowers them to make decisions about their energy consumption. Meanwhile, having real-time information about our distribution system will show us where budget dollars can be best spent."

Blue Grass Energy Cooperative Corporation, a 54,000-member co-op in Nicholasville, Ky., has launched a pilot project to see if advancements in technology can quickly and effectively extend smart grid functionality beyond the substation fence. Mike Williams, Blue Grass Energy senior vice president & chief operating officer, believes the effort "will demonstrate the effectiveness of integrated volt/VAR control and dynamic voltage optimization solutions that use real-time distribution system information."

By deploying a smart grid package from CURRENT Group LLC (currentgroup.com) coupled with its 900-MHz point-to-multipoint SCADA radio communication link for information backhaul, Williams hopes to cut line losses, optimize feeder voltage profiles, and lower system load through automated voltage reduction controls. "We will concentrate on

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seven distribution feeders running off two substations, one that primarily serves commercial and industrial accounts and another that serves a mix of urban and rural consumers."

A key component of the co-op's study will be CURRENT low-voltage analytics (LVA) intelligent grid sensors equipped with integrated communications interfaces. CURRENT LVA sensors can be configured to detect, analyze, and record a wide variety of line conditions. Both measured and computed values will be stored for at least 30 days.

About 50 bellwether LVAs will be placed at strategic locations in the test area. Real-time substation voltage and VAR measurements from a QEI, Inc. (qeiinc.com), SCADA system and real-time down-line operating information from the LVAs will flow into the CURRENT System Optimization application within CURRENT's OpenGrid platform for analytics.

Based on the data, timely and optimal volt/VAR control commands or recommendations to Beckwith Electric Co., Inc. (beckwithelectric.com), regulator and capacitor banks will be issued. "We will first use the product's recommendation mode to get comfortable with how capacitor banks are being controlled before moving to automatic controls," Williams imparts. "As a bonus, we expect line-drop compensation, typically an engineering planning calculation, will adjust to real-time conditions." ■

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