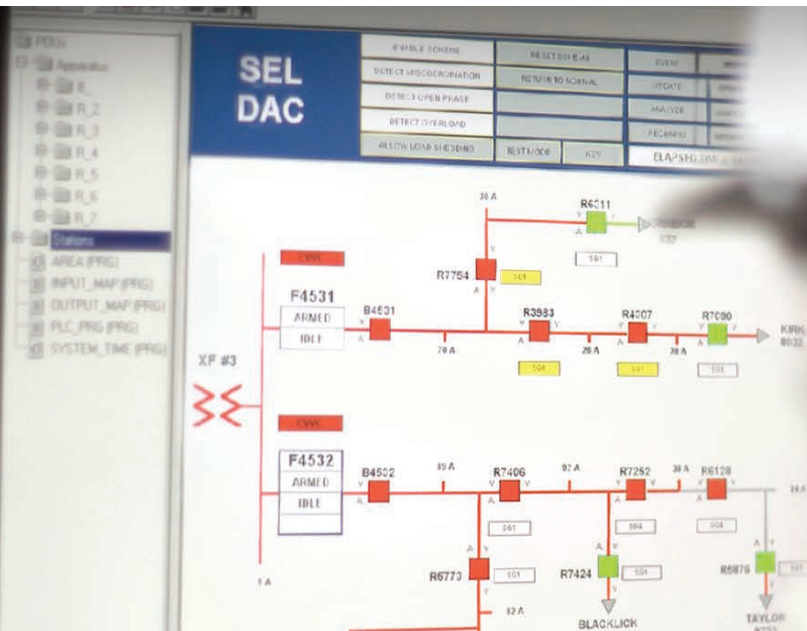


Automation Services and Solutions



Automate substation data acquisition and control to improve performance

- Maintain uninterrupted power services with proactive grid monitoring and controlling features.
- Improve transmission and distribution network efficiency with real-time visualization of operating conditions and device status.
- Decrease response times and reduce service calls with dynamic remote automation.
- Integrate intelligent electronic devices (IEDs) with ease for better situational awareness.
- Protect and secure automated operations using cybersecurity that complies with NERC CIP and other industry regulations.

Importance of Substation Automation

Substations are a critical component for maintaining electrical supply and load control in power system networks. As micro-processor-based IEDs become more integrated into systems to protect and operate substations, automation is essential to consolidate, aggregate, and visualize the data captured by these devices. Increased visibility into the power system helps utilities and industry make business and operating decisions more accurately. It allows users to manage risk without impacting operations. Customers of utilities with substation automation can expect to receive improved quality of service.

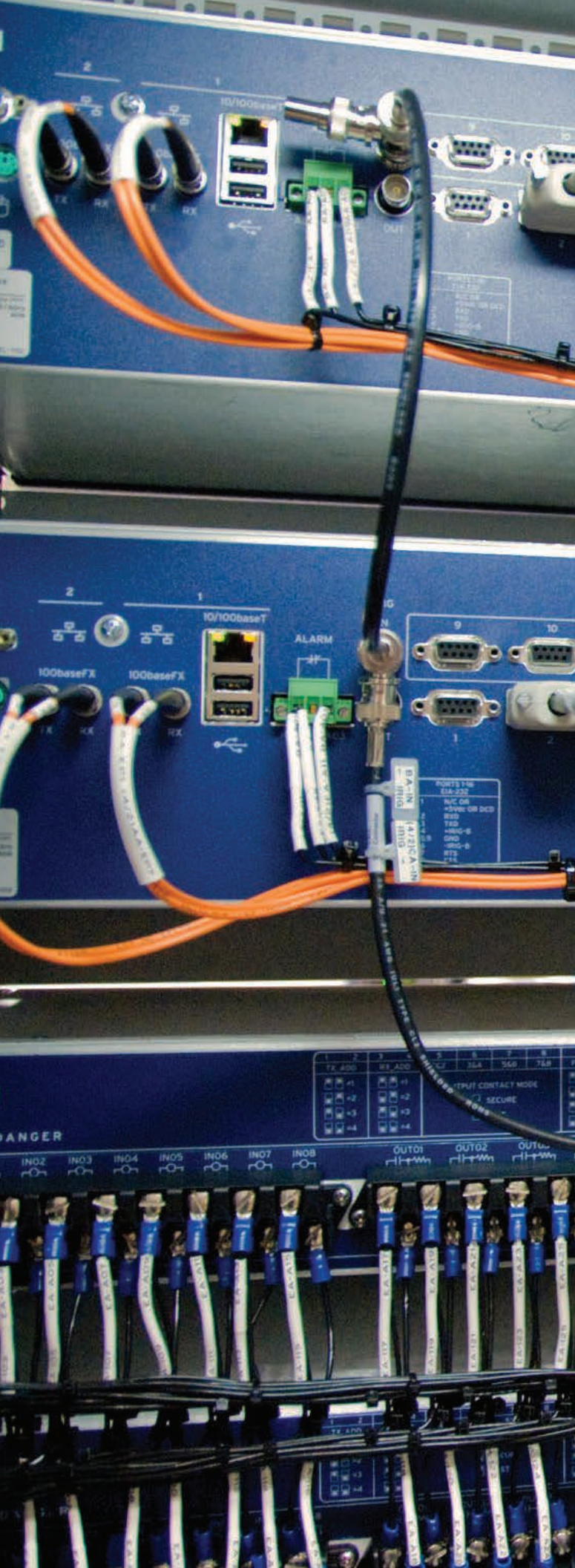
SEL Can Help

SEL Engineering Services (ES) brings industry-experienced engineers to every project to create the best possible solution. Cost-effective capabilities and customer collaboration are encouraged throughout the process. We take care in the planning, management, and execution of each project, making sure the client is included and kept informed during each phase. Our project procedures encompass a sequential, phased design decision process where the primary goal is to design quality into the project from the beginning. Our mix of experience and knowledge has allowed us to develop preconfigured system solutions for many typical applications. Preconfigured solutions have the benefit of being highly cost-effective. Many standard designs are scalable with various interfaces. Alternatively, ES can engineer individual solutions to meet specific requirements. SEL substation automation solutions can:

- Decrease response times.
- Reduce service calls.
- Enable remote operations.
- Improve efficiency.
- Protect against cyber threats.
- Gather and analyze event records.

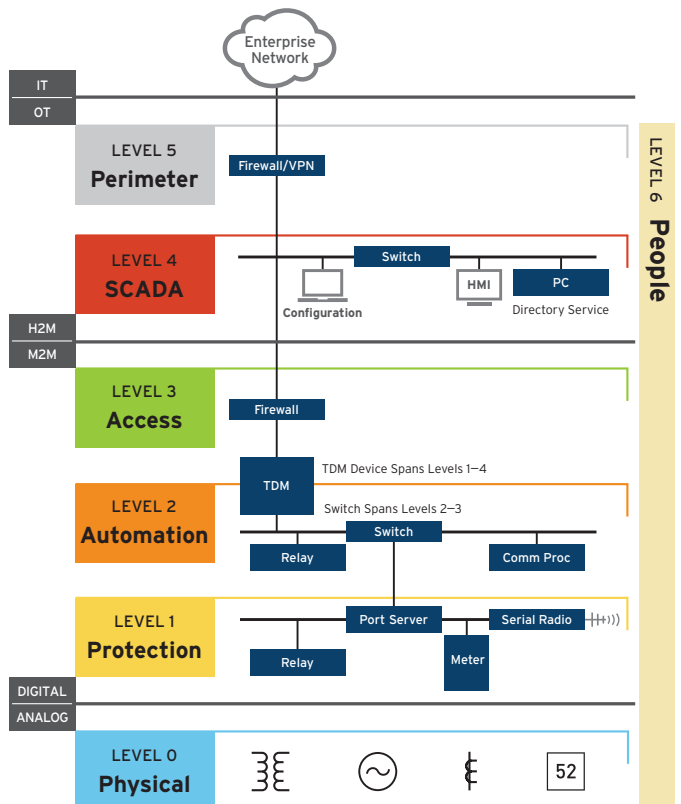






Layers of Cybersecurity

Cybersecurity threats to substation automation are serious because they threaten critical electric infrastructure. At SEL, we design security into our automation solutions. A single layer of defense is not enough, which is why our approach integrates layered security throughout the system. This allows us to address the specific communications and security needs of critical systems. By using system hardening as part of our designs, we are able to ensure more reliable and secure solutions. Hardening includes limiting applications, open or unused ports, and services to an absolute minimum in order to minimize a device's attack surface. Our solutions are tailored to the specific installation and comply with local security standards or regulations, such as NERC CIP, where applicable.



Visualizing System Status

In an automated substation, operators can view information on human-machine interfaces (HMI) to monitor and control substation operations and related equipment. SEL designs robust HMI systems that monitor the status of communications lines and logic controllers, display power system data (e.g. real power, reactive power, voltage, and current), and interface with IED settings for protection and control schemes. Sequence of Events (SOE) reports and other nonoperational data can also be displayed to assist with troubleshooting and event analysis.

- Display one-line diagrams, alarms, communications diagrams, and many other useful tools with the substation touchscreen.
- Employ SEL remote I/O modules and alarm panels for quick indication status and alarm annunciation.
- Connect to information processors and IEDs to gather data, perform operations, and display the information you want.





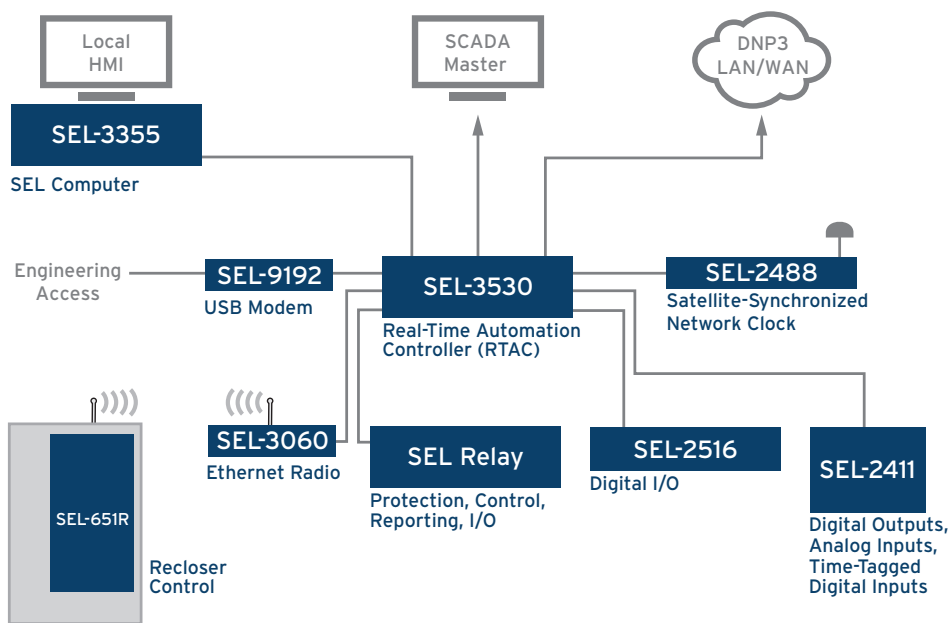
Gather and Analyze Data

Supervisory control and data acquisition (SCADA) is the backbone of any substation automation system. SCADA systems use the real-time data provided by IEDs to monitor and control the power system. SEL-customized SCADA systems offer streamlined access to valuable information, improved reliability and performance, and expanded power system management capabilities. We provide an all-in-one solution for new and legacy equipment with unmatched support that is less expensive than traditional SCADA applications. An SEL SCADA system can be engineered to include:

- Master and local substation HMIs
- Protection data network
- Station- and system-wide Sequential Events Recorder (SER)
- System-wide relay event retrieval
- Master SCADA server redundancy
- Remote access
- Fast response to HMI control outputs
- Time synchronization
- IED polling
- Enterprise and local power system reporting
- Industry-standard protocols

SEL's effective SCADA systems can result in significant savings. ES can work with your existing protection and automation products, or we can assist with specifying, setting, and installing additional equipment needed for your system.

- Use the SEL Real-Time Automation Controller (RTAC) family for SCADA remote terminal unit (RTU) and IED data collection.
- Create distribution management systems (DMSs) to avoid service interruptions, to restore power quickly, and to manage load shedding, load flow, switch order, automatic voltage control, disturbance analysis, load management, and SER analysis.
- Create energy management systems (EMSs) for automatic generation control, synchrophasor state analysis, state estimation, operator load flow, load management, contingency analysis, dispatcher load flow, and optimal power flow.



Reduce Cost and Improve Performance

Substation automation systems are a must-have for utilities of all sizes. Automation benefits can justify the costs associated with substation automation and provide a good return on investment. To ensure power system reliability, the states and conditions of IEDs have to be monitored. Costs can be lowered by monitoring the system power factor in real time to better manage generation resources. The advanced capabilities of IEDs make fault information available immediately following an event. This information empowers the utility to make decisions that will reduce the customer base affected and prevent future outages.



SEL SCHWEITZER ENGINEERING LABORATORIES

SEL Engineering Services
Tel: +1.509.332.1890 | Email: esinfo@selinc.com | Web: www.selinc.com

© 2017 by Schweitzer Engineering Laboratories, Inc.
PF00552 • 20170203