Application Note AN2013-32

Create a SCADA Server or Gateway Using SEL Tough Computers and Survalent SmartGateway

David González and Ian Olson

INTRODUCTION

A supervisory control and data acquisition (SCADA) server or gateway allows an operator to remotely monitor and control the main apparatus and machines used in an automated process. A SCADA server, gateway, or data concentrator collects information from the different intelligent electronic devices (IEDs) that supervise the process, and then processes the information to make it available to a remote supervisory system. The SCADA server or gateway is able to convert data between different protocols, such as Modbus®, DNP3, IEC 61850, IEC 60870-5, and others.

This application note describes an SEL solution for creating a SCADA server or gateway to interface substation equipment and apparatus with a SCADA master station.

PROBLEM

SCADA servers and gateways are used in remote locations in close proximity to the systems they monitor and control. Because of this, SCADA servers and gateways must operate in the same environments as the apparatus, machines, and systems they control. The environments in these locations are often harsh, with extreme vibration, shock, heat, moisture, dust, and debris as part of the normal operating conditions that the computers must endure. SCADA servers and gateways are critical to the systems they control. If they are not operational, operators have no way to know the present state of the processes or systems.

SEL SOLUTION

SEL tough computers are designed to be applied in harsh environments without any additional equipment or special enclosures to protect them. Because the computers are factory loaded with Microsoft® Windows® operating systems, users can install any Windows-based software to meet their application needs. Combining SEL computers with the robust SmartGateway software package from Survalent Technology provides the ideal platform for SCADA server or gateway applications, or even for human-machine interface (HMI) purposes, if required.

Two of the most important aspects of any supervisory system are reliability and availability. Using tough computers in a redundant scheme provides for both of these aspects. Figure 1 shows an example SCADA server setup using the SEL-3354 Embedded Automation Computing Platform and SmartGateway software. The SEL-3355 Computer can be used instead of SEL-3354 for the SCADA server or gateway.

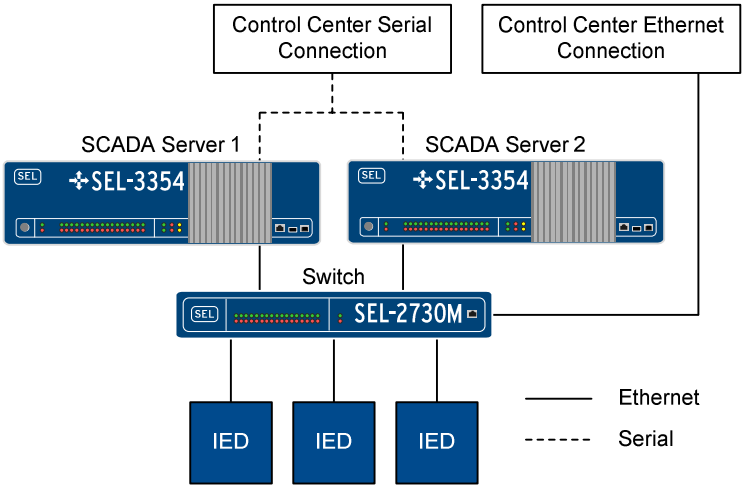

Figure 1 SCADA Server Based on SEL-3354 and Survalent SmartGateway Software

SEL Substation-Grade Hardware

SEL tough computers are designed and tested to endure the same harsh conditions as SEL protective relays. Using a low-power, highly efficient processor and unique thermal design, SEL computers can operate in a wide temperature range without fans. They have no moving parts, and solid-state storage makes them immune to shock and vibration. A rack-mount chassis allows them to be installed in the same standard 19-inch cabinets as other protective and industrial equipment. An integrated watchdog system monitors computer health and alerts operators to conditions that could lead to system failure. Integrated power supply options enable SEL computers to directly connect to a wide range of ac and dc sources, removing the need for external power inverters. With up to 16 serial ports and 3 Ethernet adapters for copper or fiber connections, an SEL computer can serve double duty as an HMI and as a SCADA server or gateway, collecting data from nearby serial and/or Ethernet devices to be sent to enterprise databases and supervisory control systems. Because SEL computers require zero maintenance and are extremely reliable, the total cost of ownership is significantly lower than solutions based on office-grade computers and servers.

Survalent SmartGateway Software

Survalent Technology, in business since 1964, is one of the leading names in utility SCADA and HMI systems. SmartGateway is one of many applications available from Survalent. An efficient software design makes SmartGateway a very robust and well-integrated but lightweight application that has been used with great success on SEL computing platforms.

The high-level features of this software include the following:

- Local IED data acquisition using protocols such as the following:
  - DNP3 (serial or Ethernet)
  - IEC 61850 (Manufacturing Message Specification [MMS])
  - Modbus RTU or Modbus TCP
  - IEC 60870-5-101/103/104
  - OPC client

- Unlimited number of supervised points
- Reports for SCADA, distributed control systems, or HMI systems using protocols such as the following:
  - DNP3 (serial or Ethernet)
  - IEC 60870-5-101/104
  - Modbus RTU or Modbus TCP
  - OPC server
- Dual serial ports (main and alternate) for reporting to remote supervisory systems
- Drag-and-drop graphical tools for configuration
- IED wizard for fast IED integration
- Single operation or dual, triple, or quadruple redundancy
- Alarm and event logging with source time-stamping
- Client tools for IED point monitoring (digitals and analogs)
- Client tools for protocol troubleshooting (scan monitor)
- Point grouping and calculations

Figure 2 shows the interface used to define the points to be shared with a remote SCADA system.

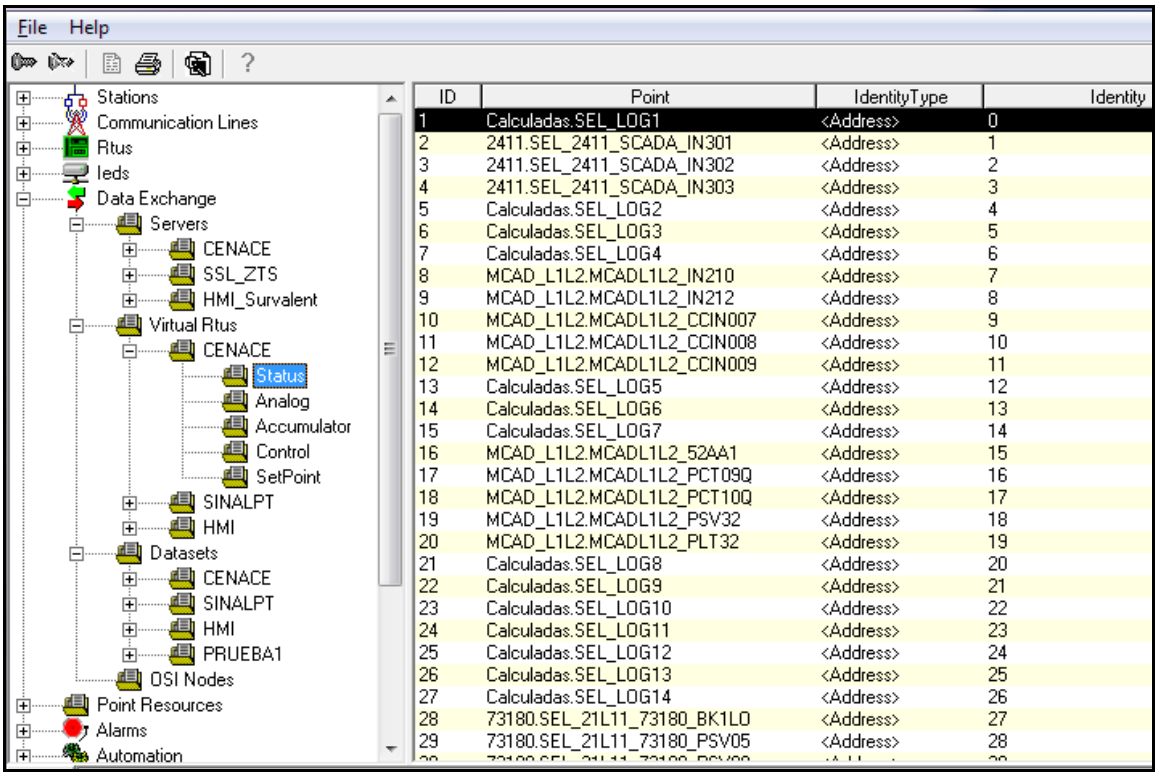

Figure 2 Data Exchange Virtual Remote Terminal Unit (RTU) Data Set With Points to Serve to SCADA Center

Figure 3 shows the troubleshooting tool for monitoring communications between the gateway and a local IED or between the gateway and the SCADA center.

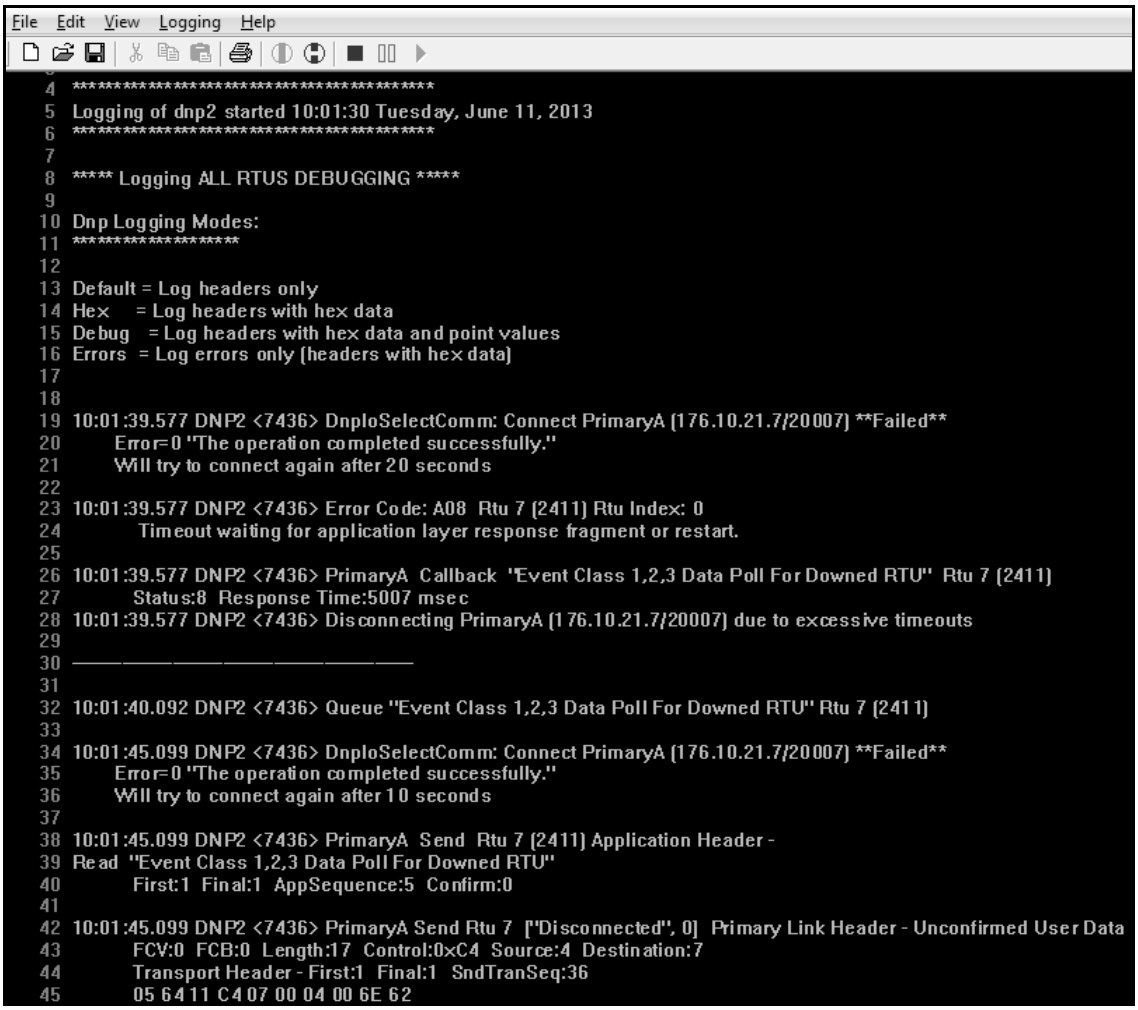

Figure 3 ScanMon – Client Tool for Communications Troubleshooting

LAN2013-32

SCHWEITZER ENGINEERING LABORATORIES, INC.
2350 NE Hopkins Court • Pullman, WA 99163-5603 USA
Tel: +1.509.332.1890 • Fax: +1.509.332.7990
www.selinc.com • info@selinc.com