T&D PI Users Group
DNP3.0 Implementation

Schweitzer Engineering Laboratories
Pullman, WA USA

Making Electric Power Safer,
More Reliable, and More Economical

Successful SEL Automation Strategy

- Integrate Devices From Many Vendors
  - Meters, equipment monitors, PLCs, RTUs, controllers, weather stations, battery chargers, competitor relays, pagers, Ethernet servers / hubs / switches / routers
- Make Best Use of Available Devices and Data
- Utilize Multifunction IEDs to Simplify Systems

Types of Power System Data Available in SEL IEDs

- Instrumentation
- Protection
- Metering
- System Automation
- Control
- Supervisory
- Device Diagnostic
- Equipment Monitoring
- Historical
- Settings

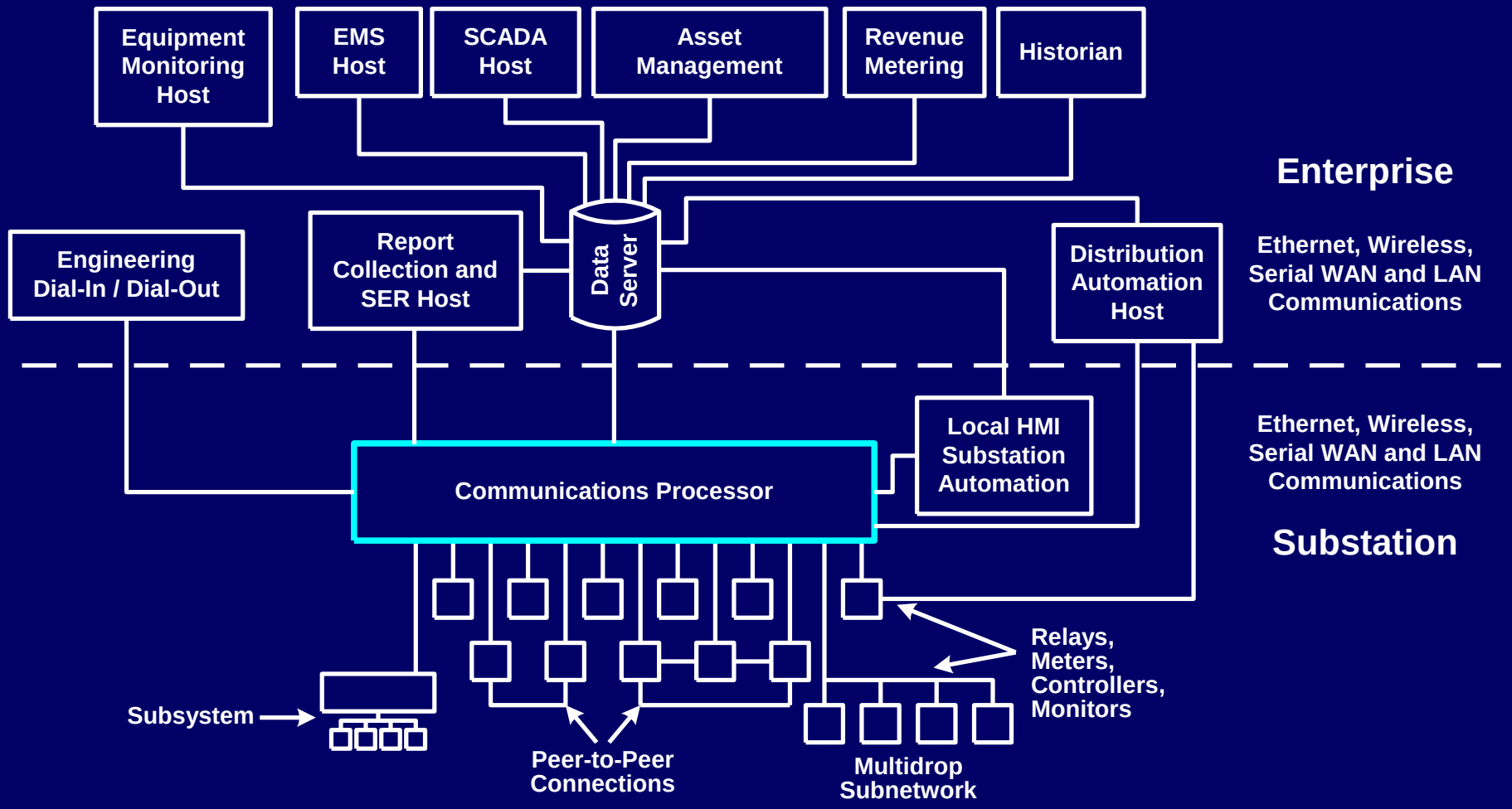
Communicate to New / Existing IEDs

SEL Communications Processor Connects to Non-SEL IEDs

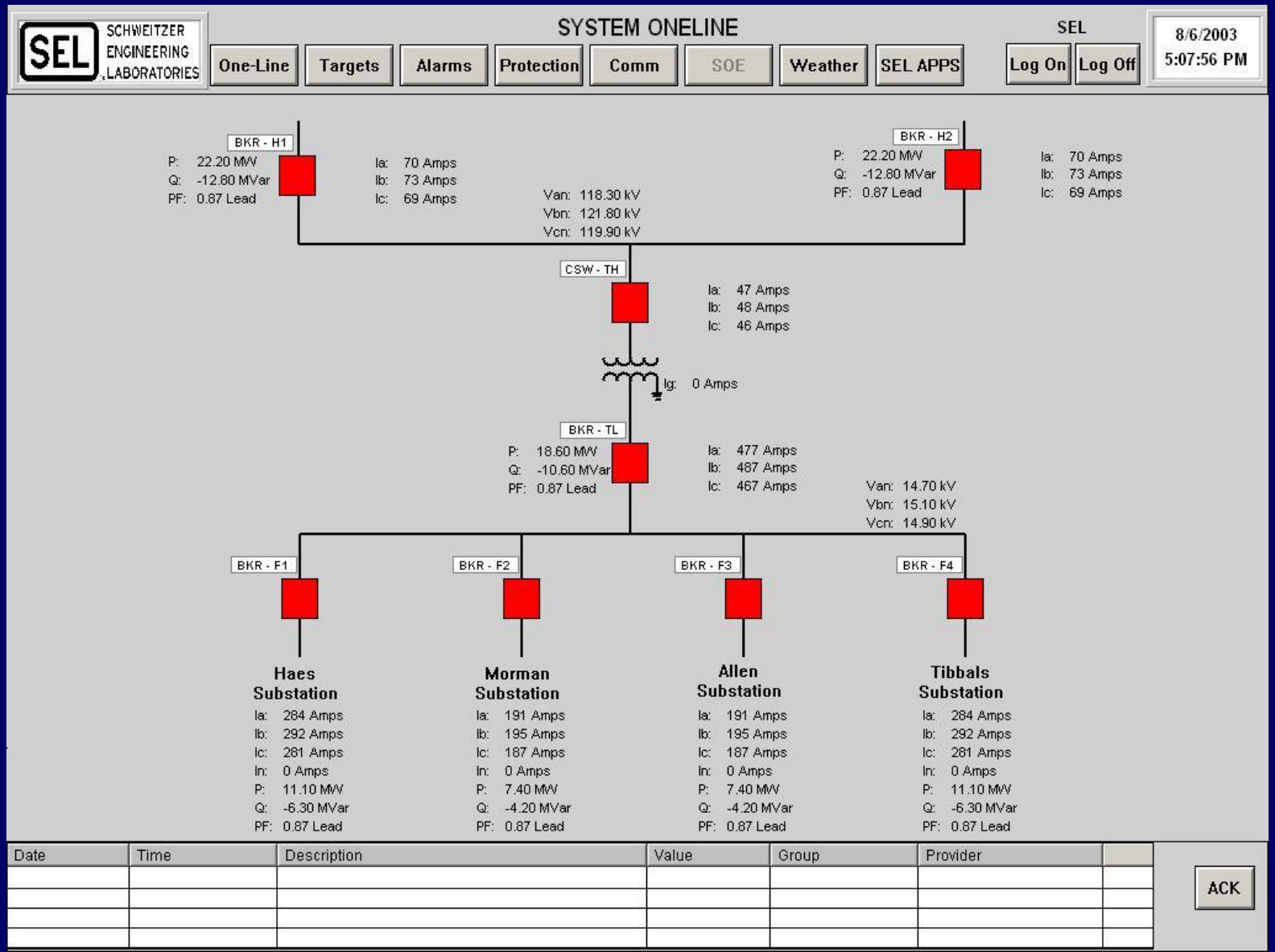
The flexible communications parameters of the SEL-2020 and SEL-2030 Communications Processors make either a great choice for almost any integration and/or port-switching application. With the database structure and ability to configure communication, data acquisition, and control parameters with database settings, the SEL-2020/2030 can simply and inexpensively integrate multiple devices in a substation, including many non-SEL IEDs. SEL engineers and/or customers have successfully communicated with the following devices.

ABB DPU
ABB DPU 2000
ABB DPU 2000R
ABB GPU 2000R
ABB MDAR
ABB REL 301
ABB REL-302
ABB SPAJ141C
ABB TPU 2000R
ACS NTU
ACS RTU
Alcad Battery Charger
Allen-Bradley SLC 500 PLC
APT Relays
ARGA 25-469
Basler BPR-BEI
Beckwith M2001
Beckwith M2001A
Beckwith M3430
Beckwith Meters
GEC K-Series Relays via GEC Kitz
GEC Optimho Relays
Grayhill I/O Systems
Harley LTC MAP 1525 Transformer Monitor
Harley LTC MAP 2130 Transformer Monitor
Hathaway 512 SER
Hydran Gas Monitor
INCON Breaker Wear Monitor
Koyo PLC
Modicon 984 PLC
Modicon Quantum PLC
Morgan Schafer AMS 500 Plus Gas Monitor
Opto 22 I/O Systems
PML 3710
PML 3720
PML 7300 (Modbus)
PML 7700 (Modbus)
QEI RTU
RFL 9300
RFL 9600

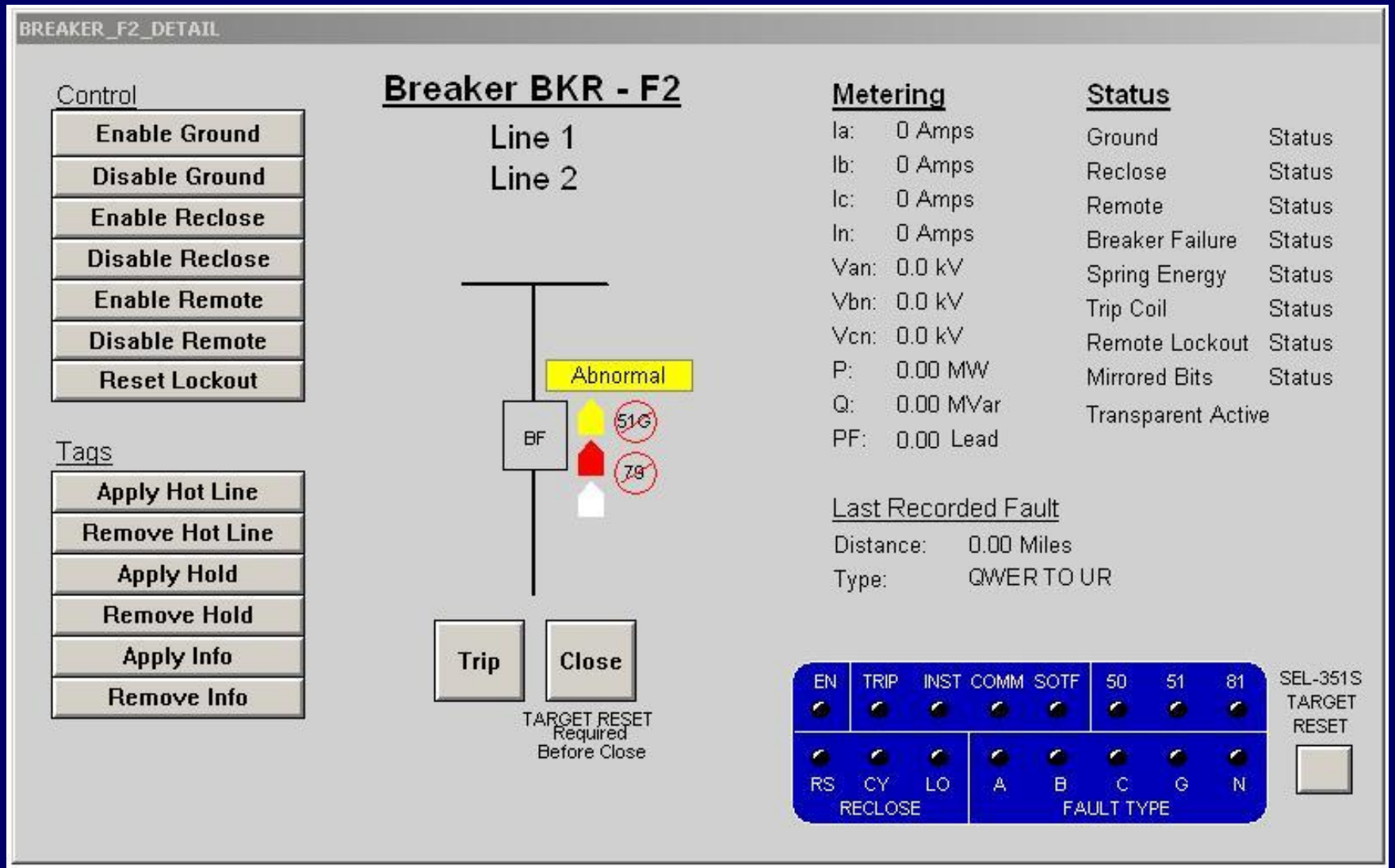
Innovative Communication Paths Integrate Devices



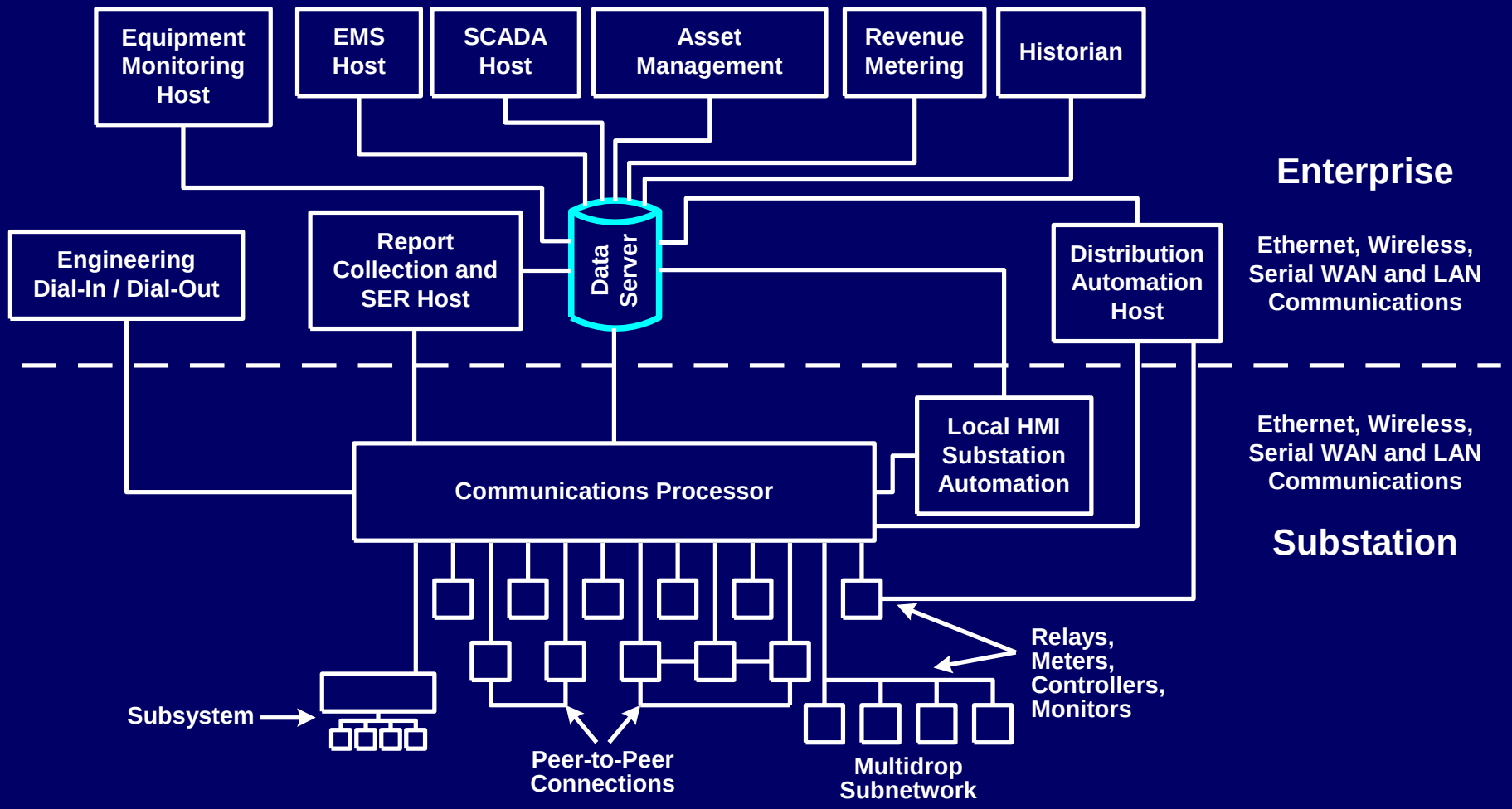
Local Substation HMI Overview



Local Substation HMI Detail



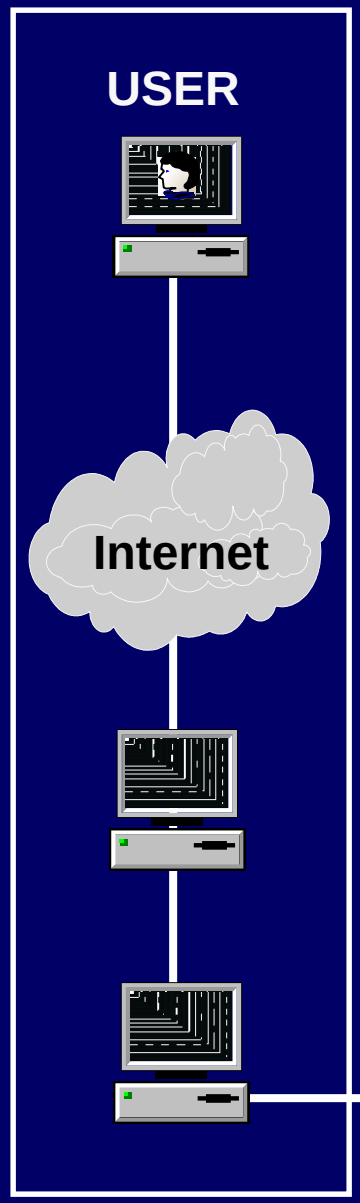
Innovative Communication Paths Integrate Applications



Basic System for DNP3.0 to PI System

- Integration system platform consisting of:
  - Protective Relays with SEL-2030 Communication Processor(s)
  - SEL-2890 Serial to Ethernet Transceivers
  - OSI-PI Server with the DNP3.0 Interface installed
  - Web Server Running Industrial Evolution

Basic System Overview



Web Server Running Industrial Evolution

PI Server With DNP3.0 Interface Running

DNP3.0 VPN Connection

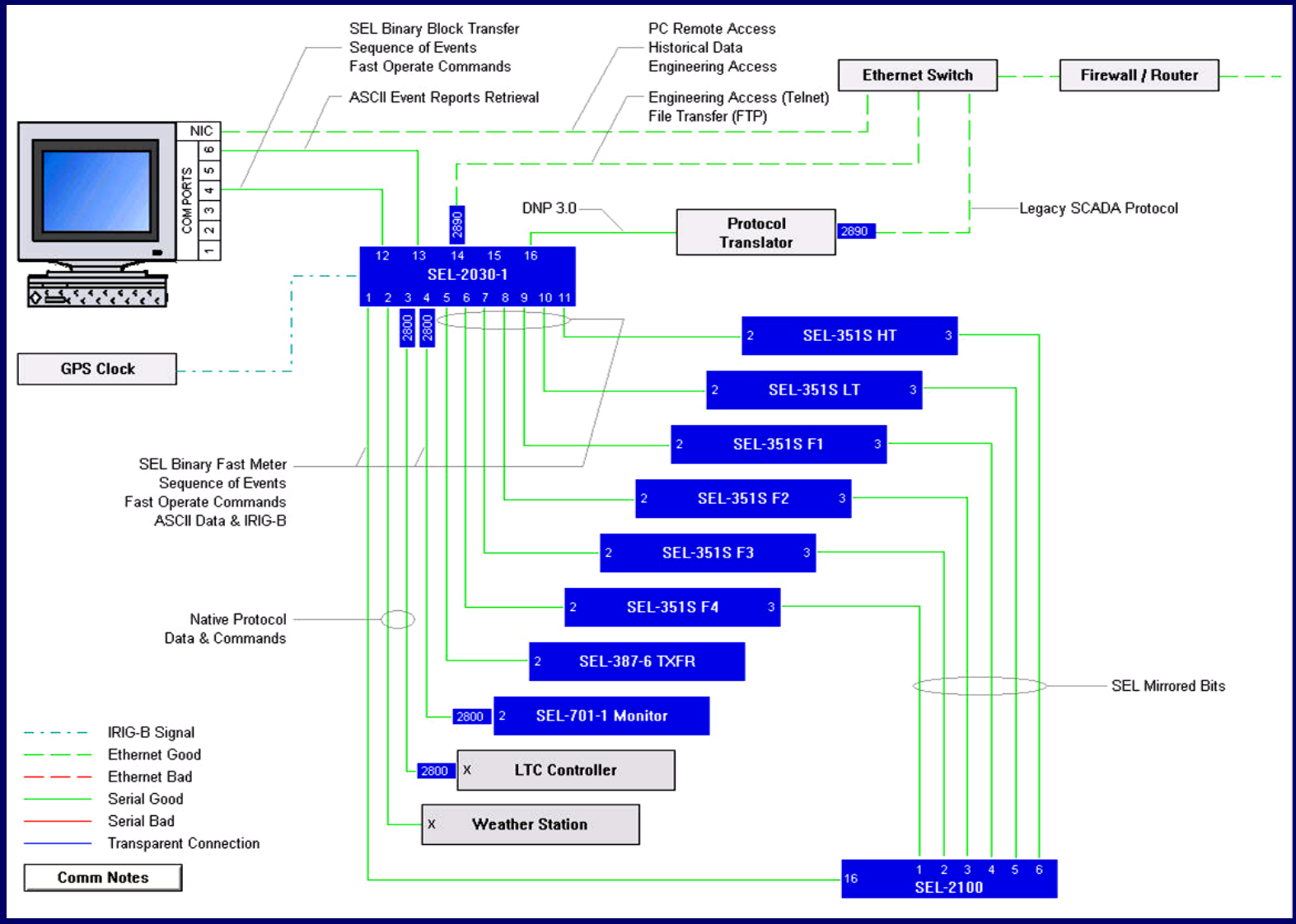
Advance System

- Integration system platform consisting of:
  - SEL-7000 System with HMI
  - Hardened Substation Computer
  - OSI- PI Server Running at the Substation
  - Interface through DNP3.0, OPC, or DDE
  - WAN Access
  - Web Server Running Industrial Evolution

Complete Protection, Automation, SCADA

Advance Automation System

PI Server Located at Substation




Welcome - Microsoft Internet Explorer provided by AT&T WorldNet Service
File Edit View Favorites Tools Help
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Go Norton AntiVirus
OSIsoft Welcome
LogOut | Publish | Adhoc Trend | Help
Welcome
Dashboard View
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ICE/Public
1 - Welcome
2 - Airplane Tracker
3 - Building Monitor
4 - Cleveland Weather
5 - JEA Water Plant
6 - Schweitzer Engineering
Substation Breaker Details
7 - Timken
Content Viewer
About This Web Site
This web site contains a number of sample implementations using the PI-ICE software from OSIsoft. These examples are hosted and maintained by Industrial Evolution, OSIsoft's equity partner for secure data sharing services.
Getting Started
To view the live data, open the folders and/or pages shown in the directory to the left. Double-click any entry to open it, or use the navigation bar shown above.
Most pages are in the "Public Folders", meaning that these are view-only pages. The Building Monitor pages are replicated in your "Private Folders" section as well – these pages are available for you to edit, change, re-arrange, etc.
Before proceeding, please be sure that all of the Active-X/Plug-In Browser Security Settings are set to either "Enable" or "Prompt". In particular, the graphic elements shown in this site have not been marked as "safe", since they are specifically designed to interact with other parts of the page.
This website includes access to the following:
Airplane Tracker
See live in-flight details for the OSIsoft corporate plane. Flight data is collected directly from an onboard PI System via cellphone link every minute that the plane is in flight.
Building Monitor
See building power consumption & related data in real-time for the OSIsoft headquarters in San Leanro, CA. Data is collected directly from building sources every minute.
Cleveland Weather
See live weather & related information from OSIsoft in Cleveland, Ohio. Data is collected from a local weather station every minute.
JEA Water Plant
See live process measurements from JEA's Ridenour water treatment plant in Jacksonville, Fl. Data is collected directly from the local PI System every minute.
Schweitzer Engineering Laboratories
See live electrical substation data collected in real-time from actual operating substation equipment. Data is collected directly from the field equipment every minute.
Timken Bearing
See live data from an actual operating bearing, updated every minute, plus vibration & bearing oil analysis results. Selected data is automatically populated in MS-EXCEL for web-based viewing.
INDUSTRIAL evolution
Secure sharing of Real-Time Data...
User Help Desk: 1-888-WEB-PWRD
...using the PI ICE software from
OSIsoft
http://www.osisoftdemo.com/dashboard/dashboard.asp?DashboardID=http://www/DAVCatalog/ICE/Public/6 - Schweitzer Engineering/
Internet

Substation Overview - Microsoft Internet Explorer provided by AT&T WorldNet Service

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Substation Overview

LogOut | Publish | Adhoc Trend

Substation Overview | Substation Breaker Details

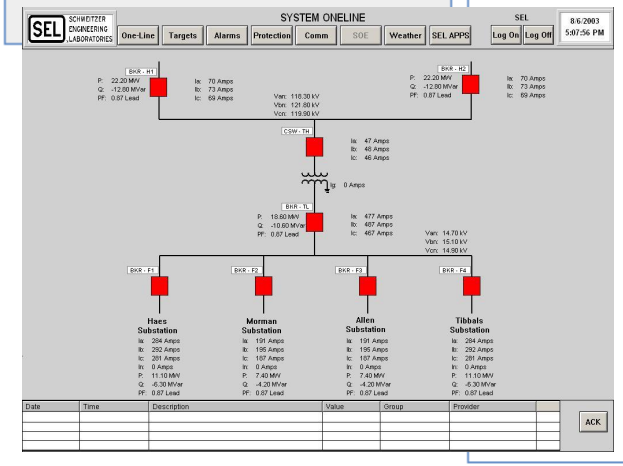
Dashboard View

- ICE/Private/roland.heersink
- ICE/Public
  - 1 - Welcome
  - 2 - Airplane Tracker
  - 3 - Building Monitor
  - 4 - Cleveland Weather
  - 5 - JEA Water Plant
  - 6 - Schweitzer Engineering
    - Substation Breaker Details
  - 7 - Timken

Navigation Tools

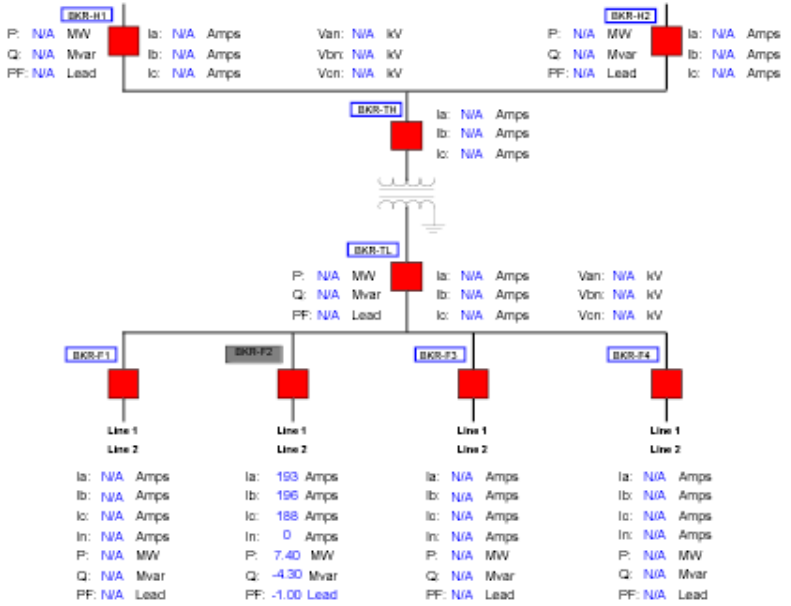
One-Line | Targets | Alarms | Protection | Comm | SOE | Weather | SEL Apps

Substation Overview Graphic



Real-Time Substation Monitoring

9/11/2003 9:59:00 AM EDT



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Internet

Substation Breaker Details - Microsoft Internet Explorer provided by AT&T WorldNet Service

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Substation Breaker Details

LogOut | Publish | Adhoc Trend

Substation Overview | **Substation Breaker Details**

Dashboard View

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Navigation Tools

One-Line | Targets | Alarms | Protection | Comm | SOE | Weather | SEL Apps

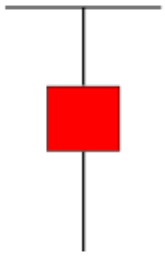
Detailed Breaker Display

Breaker BKR - F2 Detailed Display

9/11/2003 10:01:00 AM EDT

Breaker BKR - F2

Line 1
Line 2



Metering

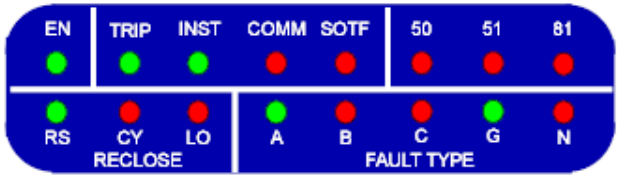
Ib:	195	Amps
Ia:	193	Amps
Ic:	188	Amps
In:	0	Amps
Van:	14.70	kV
Vbn:	15.20	kV
Vcn:	14.90	kV
P:	7.40	MW
Q:	-4.30	Mvar
PF:	-1.00	Lead

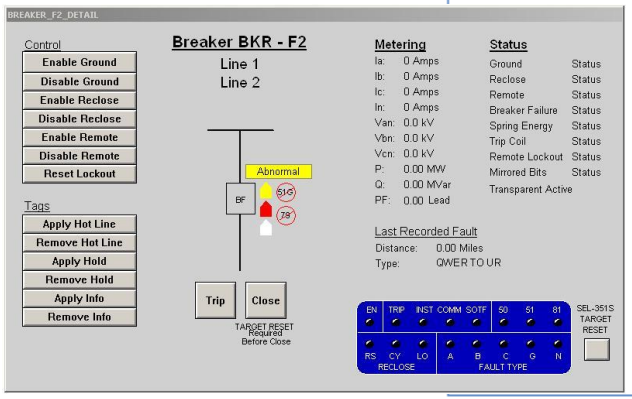
Status

Reclose:	Disabled
Ground:	Enabled
Remote:	Enabled
Breaker Failure:	Normal
Spring Energy:	Normal
Trip Coil:	Normal
Remote Lockout:	Normal
Mirrored Bits:	Normal
Transparent Active:	Normal

Last Recorded Fault

Distance: 0.00 Mile
Type: QWER TO UR





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Internet

Internal IT Network Power System Monitoring

METER

SEL-7000 System

SEL-2032

SEL-7000 System

Internet

Internet

Customer Web Server

Customer Data Concentrator/Server

Web Based Clients

Web Based Clients

3rd Party IT Network Power System Monitoring

METER

SEL-7000 System

SEL-2032

SEL-7000 System

Internet

Internet

3rd Party Web Server

3rd Party Data Concentrator/Server

Web Based Clients

Web Based Clients

Substation Hardened Power System Monitoring

Web Based Clients

Internet

SEL-7000 System

Substation Hardened Concentrator/Server and Web Server

Web Based Clients

Questions?