WEBserver SCADA

Solution Catalog

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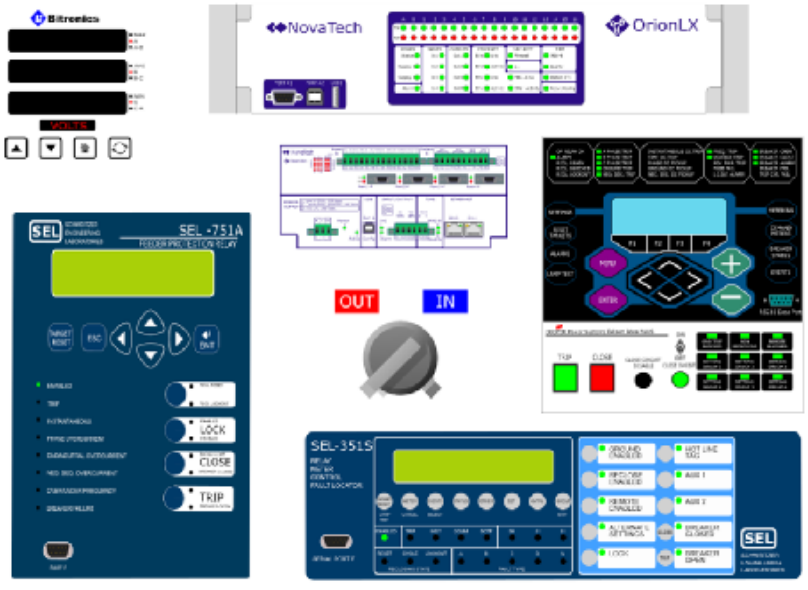
NovaTech WEBserver SCADA

NovaTech produces a license-free, lower-cost SCADA solution for electric cooperatives and municipalities. This document summarizes the key features, the differences between traditional SCADA and WEBserver SCADA, security features, and customer examples.

Key Features in WEBserver SCADA

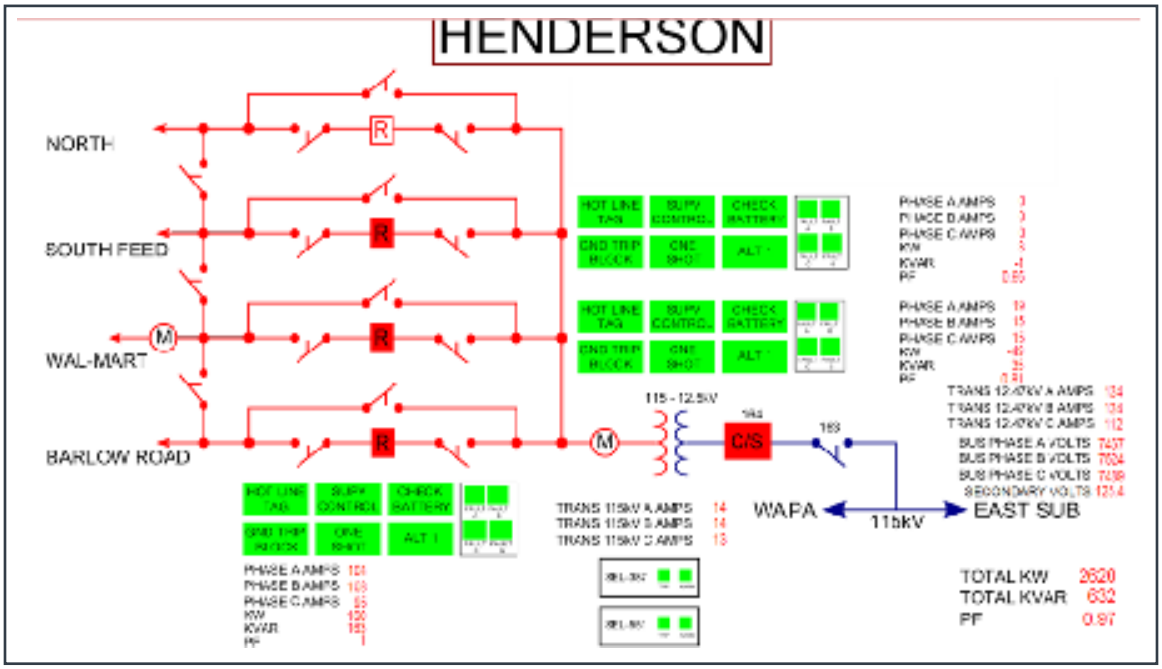
WEBserver SCADA offers the same features as traditional SCADA, plus additional features for accessing "non-operational data" such as fault records from protective relays. Features summarized below:

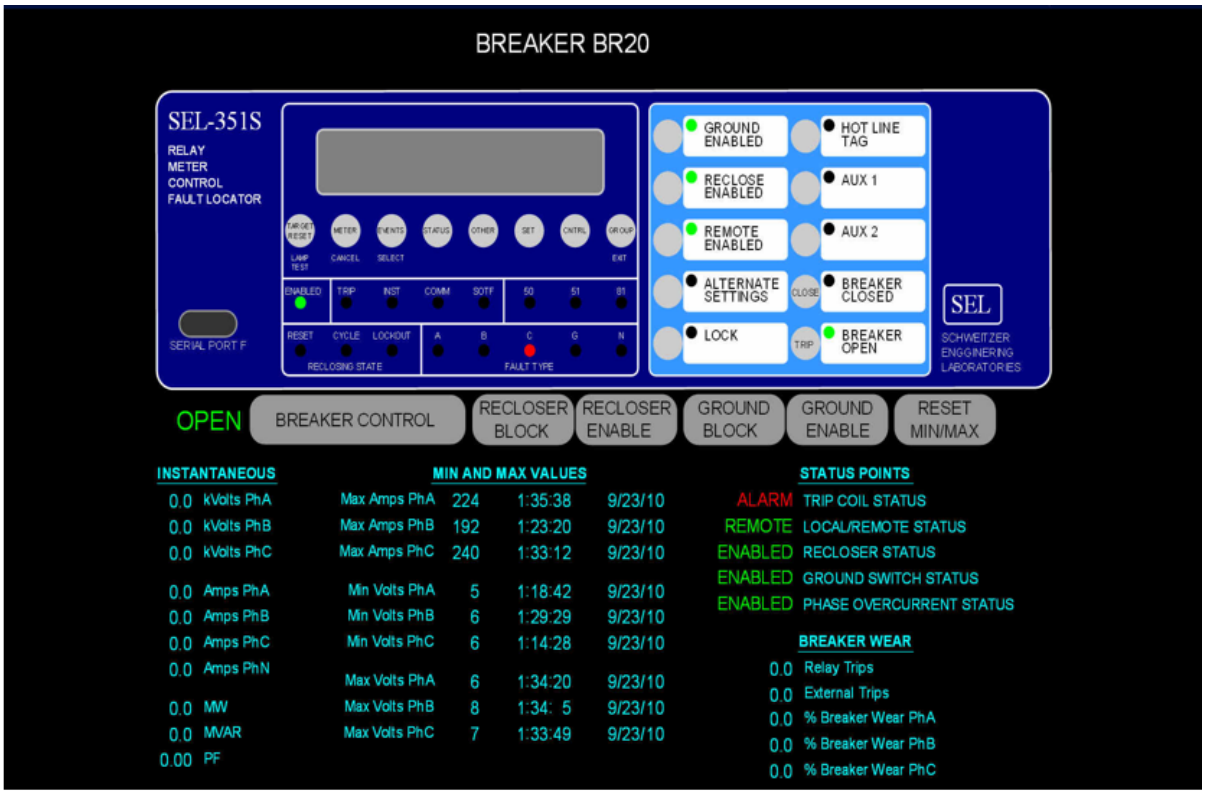
- System Overview screens
- "Real-time" visibility into substations
  - Breaker positions
  - Tap and regulator steps
  - Relay and Apparatus Alarms
  - Weather conditions
- Alarm Annunciation
  - Pre-formatted Tile Annunciator
- Sequence of Event Records
- Remote control
  - Circuit Breakers
  - Reclosers
  - Voltage Regulators
  - Tap Changers
  - Capacitor Bank Controllers
- Data Trending
  - Trend any point in the Orion database
  - Select time interval
  - Save trends for quick retrieval
  - Export trends
- Secure access to "non-operational data" in protective relays:
  - SEL® relay fault records and oscillography
  - ProView access to Cooper Recloser Controllers
  - WinECP access to ABB DPU and TPU relays
  - AcSELerator access to SEL relays



Large library of pre-drawn animated IED faceplates and symbols simplifies screen development

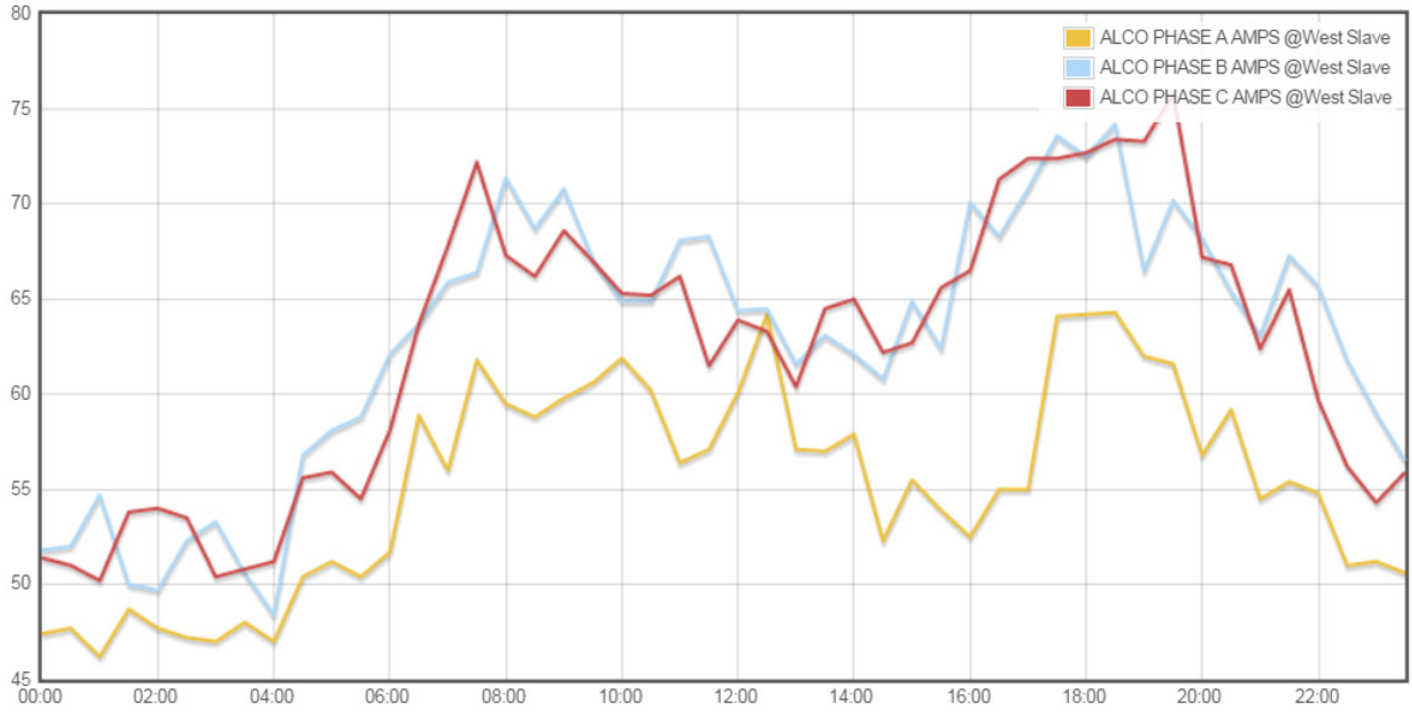
A typical “Alarm Tile Annunciator” is shown above.
A typical example of a “one-line diagram” is shown below.





A typical animated IED faceplate is shown above. The faceplate on this custom graphic exactly emulates the actual faceplate for this relay in the substation (including controls), making it useful for intuitive remote operation and also for assisting field technicians.

A typical trend of archived amperage data is shown below, illustrating the 24-hour load profile and phase balance on a selected day.



Traditional SCADA vs. WEBserver SCADA

In traditional SCADA, PCs and servers contain all the software. In WEBserver SCADA, the Orion Automation Platform contains all the software; PCs only browse web pages served out from the Orion. If no PCs are desired at all, Orion can support a connection to a local monitor.

When inside a substation, SCADA webpages for that local substation can be viewed when attached to the OrionLX RTU. SCADA pages from other substations can also be viewed. Photo is from a Colorado WEBserver substation.

WEBserver SCADA Advantage

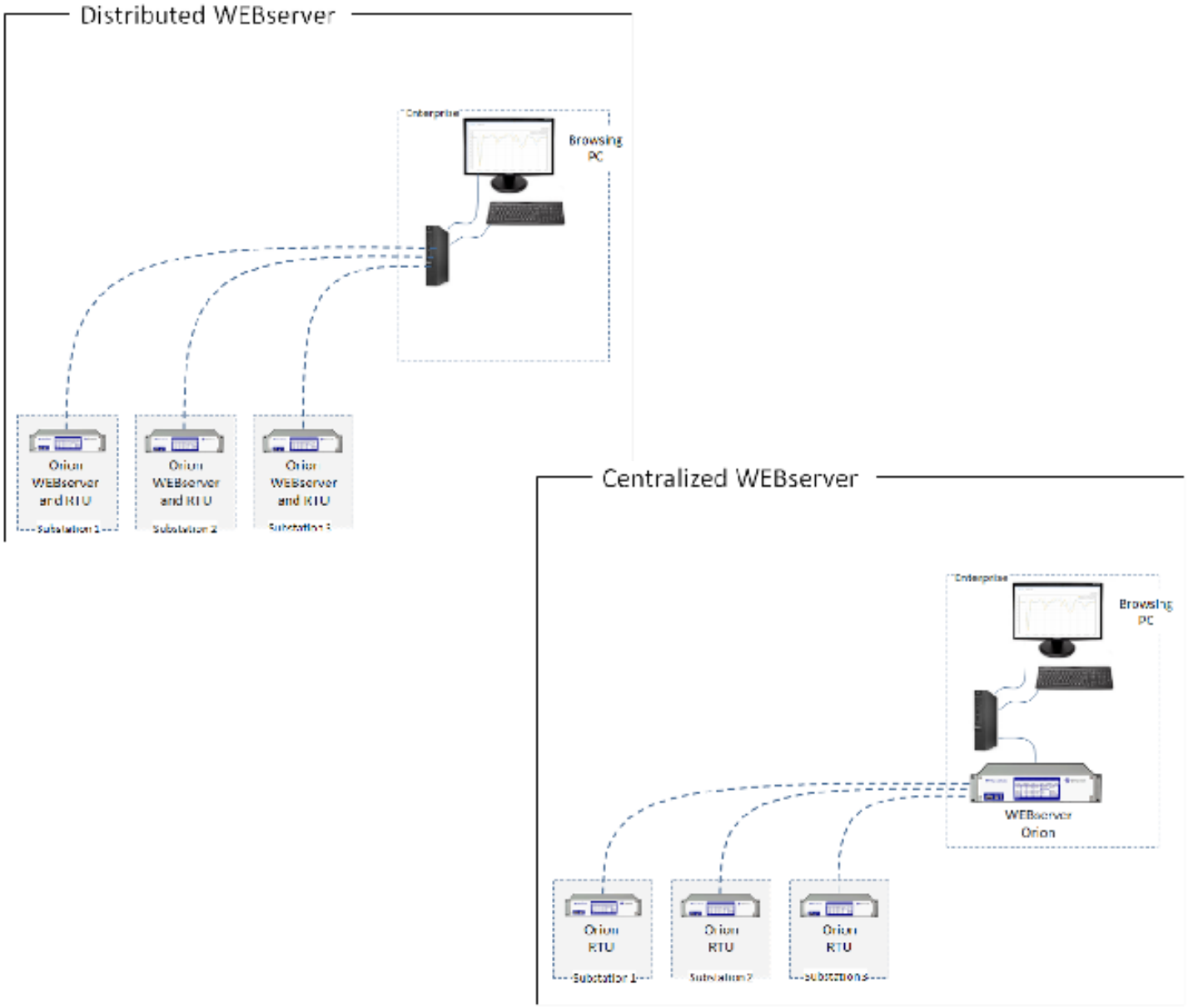
- No licensing fees.
- "SCADA" maintained by same personnel that work on RTUs.
- Longer life expectancy—Users can expect at least 10 years from the OrionLX when applied as a WEBserver host.
- Any SCADA page can be viewed from any Orion RTU in any substation.
- The Orion "Direct Video" option enables users to connect a monitor to the Orion and view SCADA pages without a PC.
- The Orion RTU is designed to access fault records from SEL® relays, and provide secure engineering passthrough using relay manufacturers' configuration software.
- Scalability and smaller initial investment.
- WEBserver SCADA is a good fit for a utility with three substations, or a utility with 30 substations. The investment for the utility with three substations may only one tenth as much.

Challenges to Traditional SCADA

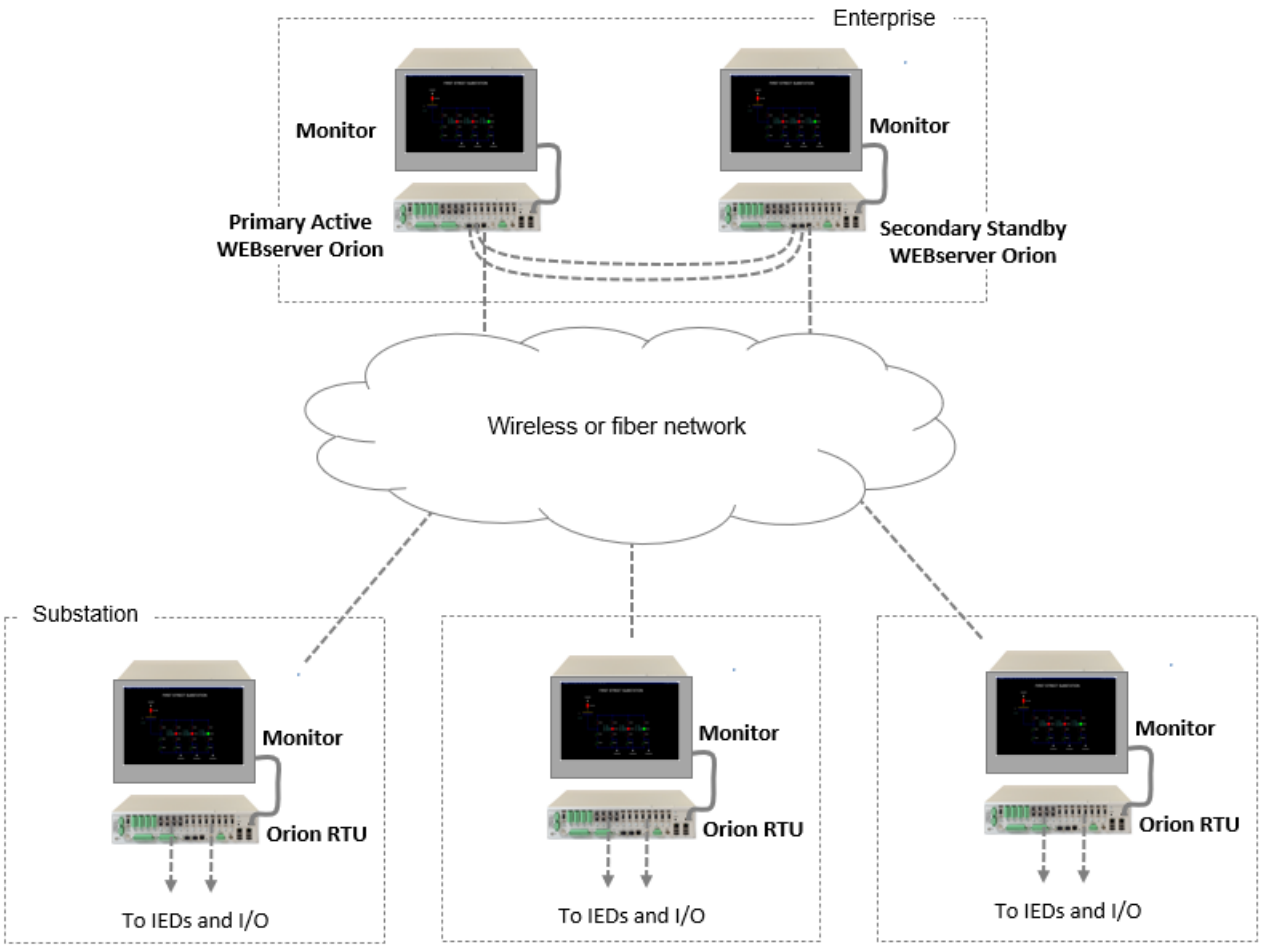
- Software licensing fees.
- Need for specialized personnel who understand servers and PC architecture.
- Short life expectancy—PC-based systems required operating system upgrades every few years.
- SCADA page viewing options limited.
- Use of PCs for page viewing required.
- SCADA System and RTUs not designed for accessing non-operational data from protective relays.
- Larger initial investment to get started.

Distributed & Centralized WEBserver SCADA

In Distributed WEBserver, the Orion RTUs in the substation serve out SCADA webpages. In Centralized WEBserver, an Orion Automation Platform at the enterprise consolidates data from the Orion RTUs in the substations and serves out SCADA webpages.



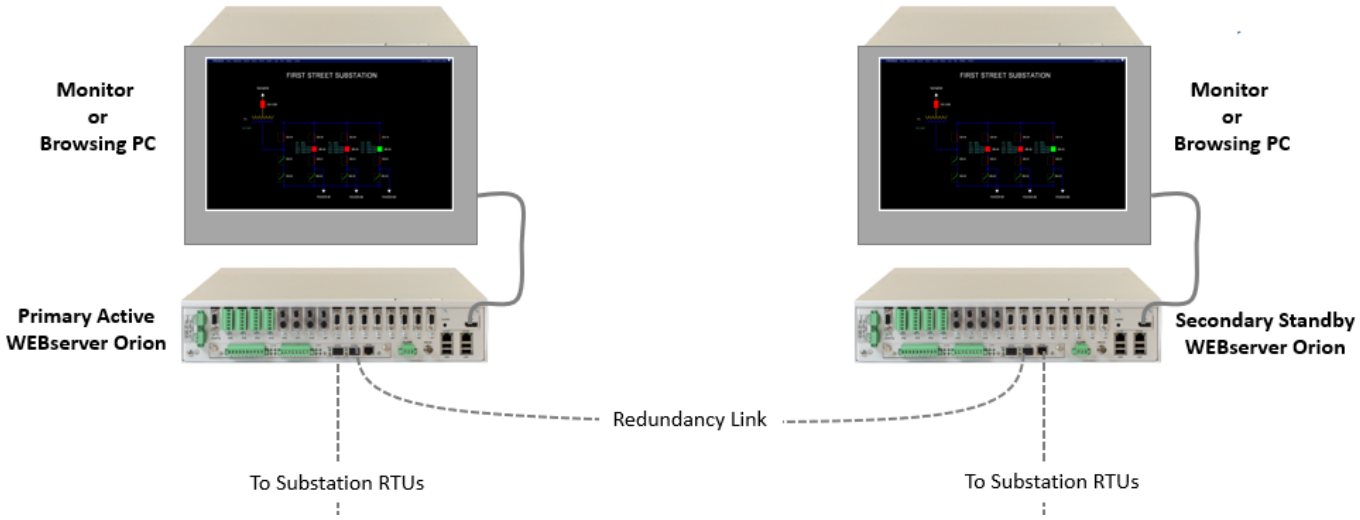
PC-free Architecture Available



The complete WEBserver SCADA system and RTUs diagrammed above can be operated without any Windows PCs or servers. This yields the following benefits:

- Eliminates time-consuming patching of Windows computers plus no annual fees for support and security software.
- Any SCADA webpage can be viewed in any substation, providing complete system visibility.
- The same OrionLX+ model and monitor can be used for both the RTUs and for the WEBserver SCADA system. One spare monitor and one spare OrionLX+ are all that is needed to back up system hardware.
- Both Orion RTUs and the Orion WEBserver SCADA system use the same firmware and the same configuration tools. This reduces the learning curve

WEBserver SCADA Redundancy



- Operator-initiated actions are replicated bi-directionally (Active-to-Standby and Standby-to-Active)
  - › Tags and Tag Log
  - › Acknowledged Alarms
  - › Blocked Points

This means SCADA operators can use either the Primary SCADA system or the Secondary SCADA system for viewing status, placing tags, acknowledging alarms, blocking points or executing controls. Any operation action will be replicated.

- The Standby Orion can be configured to poll or not poll substation RTUs. Polling confirms communication health.
- Configurations loaded to Active Orion will be automatically transferred to Standby Orion, ensuring both in sync, and simplifying housekeeping. SVG graphic pages are also automatically transferred over.
- Throwover criteria can be configured by the user. For example, a higher than normal incidence of comm errors can be set up as a condition to force throwover.
- Primary and Secondary Orions can be in different locations (miles apart OK with fiber link) to reduce chances of common mode failure.

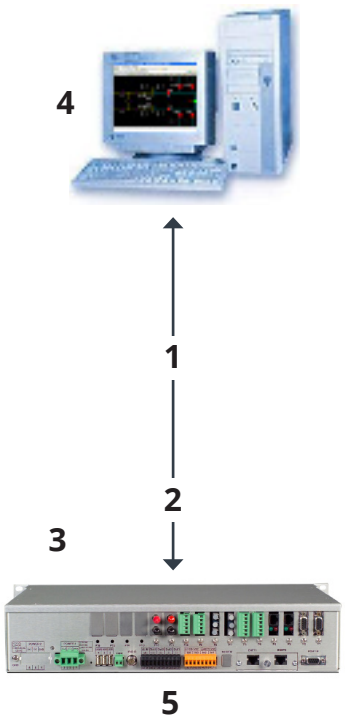
WEBserver SCADA Software Options

IEC 61850	Server/GOOSE and Client supported
Advanced Math & Logic	Advanced math and logic editor built on the powerful Lua programming language. Includes simulation tool.
Alarm-Archive-Retentive	Stores both discrete and analog events based on time (e.g., every 15 minutes) or change (e.g., ON-OFF or analog change our of deadband). Alarm Annunciation and Alarm Archive functionality included in web tables. Retentive function retains alarm status through power cycling.
Configuration Backup Manager	Retrieves configuration files from substation cyber assets (currently Orion configuration files and SEL® relay settings), names and zips the files, and stores them in non-volatile Orion memory. MDS checksum available. Useful in determining if anything has changed.
Email	Enables email messages containing alarms, SEL® fault record information (*Short Event Summary* or *Full Length Event Report*) to be sent out from WEBserver Orion.
IEC 61131-3	IEC 61131-3 is a graphical "PLC-style" editor with five math and logic editors: Ladder Diagram, Instruction List, Structured Text and Sequential Flow Chart. Online simulation available.
LogicPak	LogicPak provides pre-configured logic functions for commonly-used routines, including: "**Calculator**" where equations can be typed in using the same format as MS Excel "**Delay**" where a time delay can be applied to any point before it is report as an Event "**AND**", "**OR**" where alarms or health data can be OR'd and AND'd together to simplify SCADA reporting "**XYZ**" where pulse can be accumulated from energy meters "**Primary/Secondary**" where data can be accessed from either a primary or secondary IED depending on availability of communications.
Points Blocking	Also known as "Alarm Shelving", enables users to manually and temporarily block the logging or displaying of alarms. Can be useful during commissioning and testing.
Relay "Data Logger"	Enables Orion to access full length fault records from SEL® relays and to place records in a file in Orion memory. Requires SEL® serial server protocol #14.
Tile Annunciator	A web-based, software-defined alarm annunciation product. The Tile Annunciator webpages are served directly from Orion I/O and provide simplified setup, categorization and viewing of active and acknowledged alarms. Requires Alarm/Archive/Retentive (AAR).

Making WEBserver SCADA Secure

WEBserver SCADA provides the highest levels of security to prevent unauthorized access, eliminate eavesdropping, and restrict device control to only users with specific pre-defined privileges.

The diagram below summarizes security features:



1. All communication between browsing PCs and Orion WEBserver is encrypted using secure protocols (HTTPS, SSH, SFTP).

2. A stateful Firewall is set up in Orion to block unauthorized traffic.

3. Users are set up with strong passwords and specific “Privileges”. For example, while some users may only view data, others users may acknowledge alarms and remotely control substation devices. Administrator users may add or remove users.

4. Device controls can be further locked down with an “IP Address Lockout” feature where only PCs at pre-authorized IP addresses can control breakers and other apparatus.

5. All user attempts to access the SCADA system, or actions (such as controlling breakers) are logged in an unalterable “syslog” record.

Improve Operational Performance with WEBserver SCADA

The following comments were reported to NovaTech by users of WEBserver SCADA.

Midwest customer:

- Integration with Outage Management System (OMS)
  - › OMS system is configured to automatically create a device outage based on feedback from SCADA about breaker operations.
  - › This helps to streamline operations during an outage and reduce call volume to our dispatcher.
- Data trending
  - › Trend KW, KVAR, PF, etc. for breakers during different load cycles.
  - › Provides historical data for system studies and contingency analysis.
- Reporting
  - › Custom Substation Reports
    - Overall System Peak—Load on each substation during a coincident peak.
    - Substation Peak—Max load on substation regardless of coincident loading.
  - › Reporting package
    - Export to Excel
    - Graphs

Southwest customer:

- The SCADA System has eliminated the need to drive to the substation during a power outage, which shortens the outage time for the customer.
- Allows the City to monitor the power factor on individual circuits, and then adjust the capacitance of the system without having to depend upon other companies.
- We are able to monitor and capture events such as low voltage or high voltage at the bus, this helps when trouble shooting customer complaints.
- History of events can be accumulated such as: breaker trips, breaker lock outs, reclosers blocked or enabled, low voltage events, high voltage events, and maximum amperage for each circuit.
- It allows the dispatcher to determine, at a glance, the position of the breaker being opened or closed as well as the position of the load and line side knife blade switches.

Midwest customer:

- Provides Secure Web Access to any user with appropriate access.
- The SCADA System will eliminate the need to drive to the substation during a power outage, which shortens outage times.
- Substation one-line diagrams show the status of the entire sub at a glance-dispatch can quickly tell what feeders are open, if any are on Hot Line Tag and if there are voltage issues.
- Feeder breaker zoom screens allow more detailed information to be viewed at the office such as: ground trip blocked, non reclosing, max amperage, power factor, and fault currents.
- Cooper software can be used to remotely log into the substation breakers and regulators to view settings, sequence of events, and make changes if needed.

Customer Application Examples

Four users of NovaTech WEBserver SCADA prepared presentations summarizing their application and experience. Details can be provided upon request.

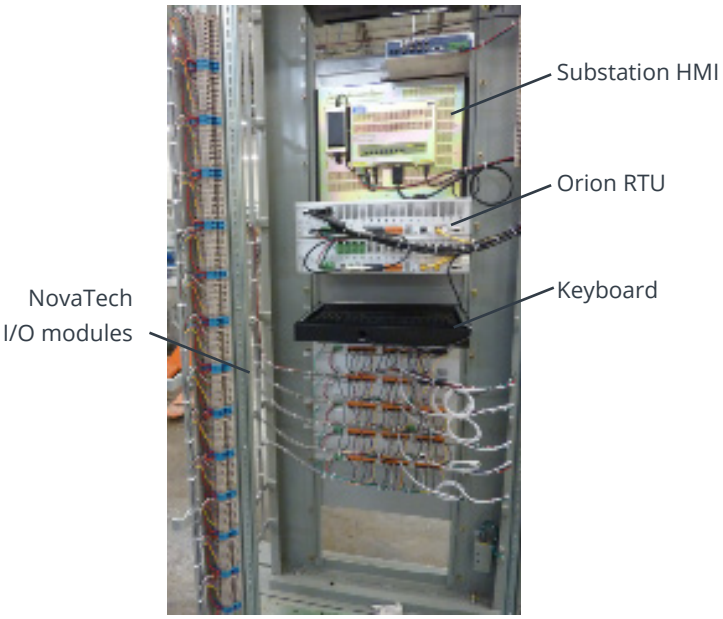
Other users of NovaTech WEBserver SCADA (some projects in engineering as of May 2021):

- Athens Utility Board (TN)
- Augusta, City of (KS)
- Bentonville, City of (AR)
- Butler County PUD (NE)
- Carroll Electric Coop (AR)
- Chanute, City of (KS)
- Chickasaw Electric Coop (TN)
- Conway Corp. (AR)
- Colby, City of (KS)
- Fairfield, City of (IL)
- Farmington, City of (MO)
- Fort Morgan, City of (CO)
- Fremont, City of (NE)
- Gardner, City of (KS)
- Gladstone Power and Light (MI)
- Goodland, City of (KS)
- Hyrum, City of (UT)
- Kinston, City of (NC)
- Kirkwood, City of (MO)
- Lena, Village of (IL)
- Lindsborg, City of (KS)
- Loudon Utilities (TN)
- McPherson, City of (KS)
- Milford, City of (IA)
- Monroe County Electric Coop (IL)
- Natchitoches, City of (LA)
- Nebraska City (NE)
- North Carolina State University
- Norris Public Power District (NE)
- Norris Electric Coop (IL)
- Oak Ridge, City of (TN)
- Pampanga Electrical Coop (Philippines)
- Paris, City of (KY)
- Pulaski Electric System (TN)
- Russel, City of (KS)
- Seguin, City of (TX)
- Shrewsbury, City of (MA)
- Siloam Springs, City of (AR)
- Southwestern Electric Coop (IL)
- Smithville Electric System (TN)
- United Electric Coop (ID)

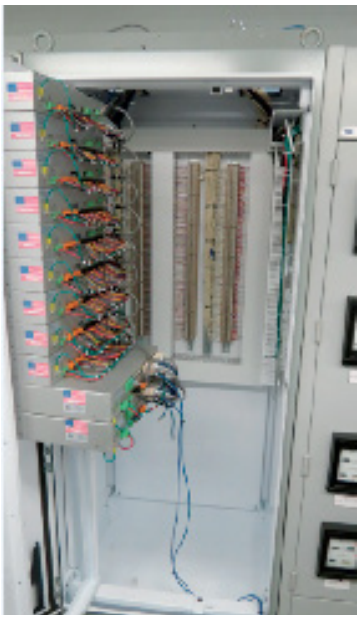
NovaTech Engineering Services

Almost half of the NovaTech utility business is comprised of services: engineering design, packaging, commissioning, and training. We work closely with utility customers to define and engineer RTU panels and custom cabinetry, design HMI screens, create special logic, and manage complete web-based SCADA systems. On-site installation, commissioning, and training services are dispatched from local offices in seven US locations to assist users implement projects quickly and safely. NovaTech provides high levels of post-project support.

Examples of projects shown below:



RTU cabinet for corn processing plant



The new RTU cabinet located at Keys Energy Thompson Street Substation

Rob DePhillips, Keys Energy Project Engineer, pictured above in front of the new RTU cabinet located at Thompson Street Substation

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