LAZER® AUTOMATION

One of the most versatile automation solutions available.

- Reliable and functional
- Optimized and efficient
- Flexible and scalable
- Easily integrated and secure
- Model-based
- Open architecture
- Quad redundancy option
- IED wizard/Control panel
- Optional Internet Interface

G&W Engineered to order. Built to last.

Building the Smart Grid

Challenge

We are facing unprecedented challenges in the energy industry. Well over 60% of the US GDP is directly dependent on the generation, distribution, and consumption of electricity. This dependence poses many challenges:

- Economies that demand more and more access to reliable and affordable energy
- Environmental issues such as dwindling natural resources and climate change
- Political pressures that limit various types of generation
- Aging infrastructure and workforce in North America

Energy is expected to play a major role in solving these challenges. As evidenced by other industries such as telecommunications and manufacturing, intelligence and integration is the solution.

Solution

A Smart Grid is the integration of intelligence into the entire electrical system from the point of generation or storage all the way to individual homes and businesses. Intelligently automating the distribution network offers one of the most cost effective ways to maximize return on investment. Much of the existing electrical distribution infrastructure in service today is decades old. Updating it with intelligent devices, networked communications, and decision making software enables:

- Major improvements in the reliability and availability of energy
- Optimization of an energy mix that incorporates various generation and storage types and sources
- Cost savings through optimization of system parameters, voltage levels, power factor, demand, load flow, and loading
- A more efficient workforce

From the control room to the field devices, G&W Lazer Automation can help.

Lazer Automation

The distribution automation expertise and products of G&W and the high end software knowledge of Survalent Technology have been combined to provide a state of the art solution – Lazer Automation. Various levels of Lazer solutions are available for peer-to-peer product applications, stand-alone controller based systems and total system wide management and control.

All Lazer solutions can be customized and are infinitely scalable because they utilize a **model-based** platform. Model-based programming is easier to configure because the algorithms are already written. All that is required is inputting the system parameters, including each of the IED's. By contrast, **rule-based** programming requires that each device be programmed and then continuously updated as more devices are added, or when the system changes. This can result in significant programming costs and a greater likelihood of programming errors.

G&W

Engineered to order. Built to last.

- Over 105 years of industry experience
- Global installed base of stand-alone Distribution Automation systems
- Industry leader in SF6 switchgear, solid dielectric switchgear and reclosers in North America
- Thousands of IED's installed world wide

Survalent Technology

- Over 45 years of industry experience
- 100% customer retention
- Full suite of control room software
- Most advanced user interface in the industry

Reliability

The key benefit of an automated distribution system is improved reliability. Customers expect an uninterrupted supply of power. Automating the grid can help provide a consistent supply of energy and can also save money. Lazer Automation has several software modules that can greatly improve the reliability of your distribution system.

Fault Detection Isolation and Restoration - FDIR

The heart of reliability improvements is the fully automated, Lazer FDIR software module. It analyzes the feeder or network experiencing an outage and determines the optimal system configuration to restore the greatest number of customers. Regardless of the system configuration, small multi-switch loop, large multi-substation configuration or an entire infrastructure, Lazer FDIR is the key to improving reliability while providing a significant return on investment.

Loss of Voltage – LOV

In addition to faults, loss of voltage represents another primary cause of system outages. The Lazer LOV software module acts in a similar manner to FDIR except it responds to feeders that have lost voltage that is not related to a fault. When this occurs the software detects an anomaly and automatically analyzes the loading on the dead feeder section and ties in other healthy feeders to restore power to as many customers as possible.

High Reliability Stand Alone Loop and Transfer Based Systems

In addition to system and feeder level solutions, G&W Lazer has a full complement of smaller scale, pre-packaged, stand alone systems. Using peer-to-peer communication and advanced local controllers, G&W can provide high speed closed loop systems, scalable open loop systems, and multi device distributed transfer schemes. For all of our solutions, we allow customers to specify which relays and communication devices to use. Many customers prefer the high reliability of SEL relays which has become the basis for many of our designs. All of these solutions can be applied with either padmount , vault style, or overhead switchgear.

System Redundancy

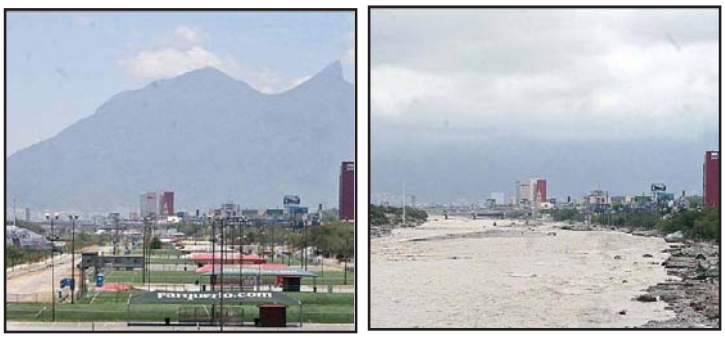
Lazer Automation software and controller based solutions are anti-cascading and available with up to quad redundancy for maximum reliability under catastrophic system events. Anti-cascading is the prevention of system software from malfunctioning due to too many queries (system overload) during a major storm or other catastrophic event. Separate software running in parallel to three additional programs can assume control and have instant access to all information.

The advantage of system redundancy

An excellent example of this is CFE located in Monterrey, Mexico. A quad redundant Survalent software system was installed with four servers in two separate locations. During two of the worst storms in the area's history, the software performed flawlessly.

- The first was the storm of March 18th 2008 which had sustained winds higher than 75 mph for over 12 hours. By the end of the storm more than 60% of the distribution system was out of service and over 126,000 events were recorded by the SCADA/DMS system. At no point was the system out of service, which enabled monitoring and fast power restoration.
- The second event was Hurricane Alex which was the single worst historical weather phenomenon ever recorded. Again the system performed flawlessly and enabled power to be restored quickly to customers.

▲ *Before and after the storm in Monterrey, Mexico*



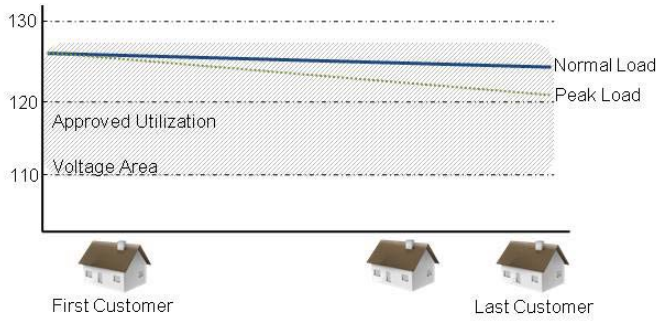
▲ *Before and after Hurricane Alex*

Optimization

Optimizing the use of distribution assets offers the potential for significant savings in reduced losses, lower energy consumption, reduced generation costs, and greater improvements in reliability. Lazer software optimization modules can open up access to these savings. It is estimated that up to $43 billion in the US alone could be saved by 2019 using CVR technology (*McKinsey on Smart Grid 2010*).

Conservation Voltage Reduction (CVR)

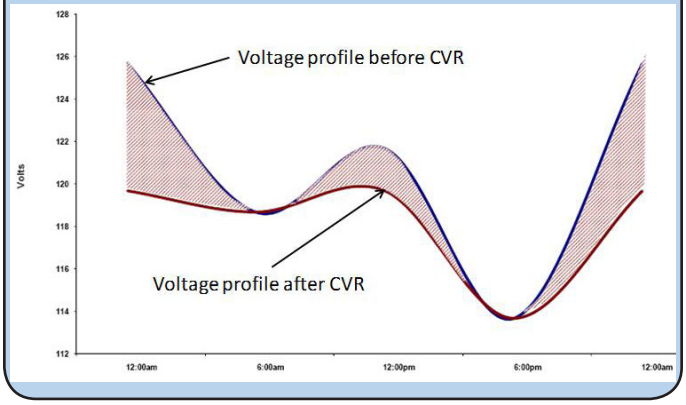
Power providers have an obligation to deliver an End of Line Voltage within the parameters detailed in standards such as IEEE and IEC. In order to do this the voltage leaving the substation needs to be higher than the end of line requirement. Conservation voltage reduction optimizes the end of line voltage to the lowest acceptable level according to the standard.



Lazer CVR software enables the automatic control of tap-changers and voltage regulators to optimize the voltage level. Using an interface to the AMI software and automated customer meters, the end of line voltage can be monitored in real time and the substation voltage regulated appropriately. This allows the power providers to save roughly 0.7% in power for every 1-volt decrease in voltage. Two examples of the software in action are:

Example 1: Entergy

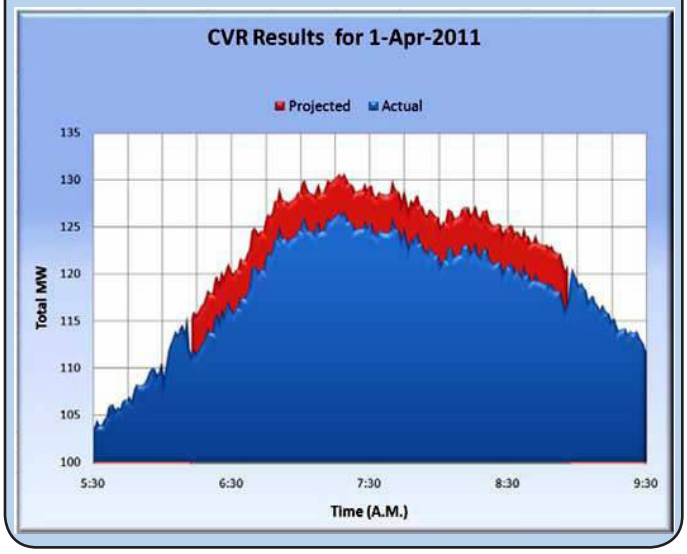
A consortium of Survalent, ABB, Quanta, and Elster partnered to decrease voltage levels and save Entergy many thousands of dollars.



▲ *Entergy voltage levels*

Example 2: Clinton Utilities Board

Reduced their peak power by 4 MW on 10 different feeders, saving between $30 and $35 thousand per month.



▲ *Clinton Voltage Profile for April 2011*

Power Factor Control

The ability to monitor and manage the power factor to get as close as possible to unity (1.0) offers huge potential savings by reducing losses and power factor penalties. The Lazer Automation Power Factor Control module monitors the power factor at specified locations within the power system and sends commands to correction devices such as capacitors when needed. All features such as billing points, correction times and levels are fully user configurable to maximize flexibility.

Load Flow

Load flow management represents the ultimate level of feeder / network optimization. The Lazer Load Flow module periodically performs a three-phase unbalanced load flow calculation and update that redistributes the feeder load data so that the total matches the substation data in the SCADA system. It also updates the feeder voltage/loss profiles, and the feeder min/max margin and min/max volts data. The load flow calculations are performed automatically at periodic user defined intervals, after significant changes in data, and after a reconfiguration or a dispatcher change.

Operator Training Simulator (OTS)

The Lazer Operator Training Simulator is an independent copy of the system / controller software operating with simulation programs instead of scan tasks. This allows any independent copy of the database to be used for training. The system can be used offline to allow engineers to test new system components and configurations as well as allowing operators to become familiar with the software and system. A scripting tool is provided that allows an

instructor to define and operate scripts to create sequences of events for instructors to teach students how to operate the software.

Studies and Reports

The final piece to optimizing a distribution network is the ability to manage data in a useful form. The Lazer Automation premium reporting package allows studies and reports to be created so system information can be easily viewed and analyzed. Some examples of reports and studies available are Short-Circuit Studies, Post-Fault Load Transfer Recommendations, Load Flow Data Reports, Voltage, Loss and Load Balance Report.

Scalability

Lazer Automation solutions are scalable from small stand alone systems to controller based solutions to entire network management.

Open Communications and IED Neutrality

Lazer Automation software and systems are protocol, media and IED neutral. Widely adapted protocols such as DNP, IEC 61850 and ModBus, are easy to incorporate as well as legacy and proprietary protocols such as SEL Mirrored® Bits. Hardwired, fiber and wireless solutions from cell modems to the latest Ethernet mesh technology are all possible. This makes working with existing and new equipment easier.

Lazer automation is also IED neutral. Our control software can interface with any IED and we are experts at integrating and programming most vendors' relays. Our standard relay package is SEL because they are extremely reliable, capable, and widely accepted.

Controller Based Solution

Lazer Automation offers the power and capability of the complete Survalent software built into a stand-alone controller. This controller can be used as a substation and/or feeder controller while working seamlessly with the existing SCADA or DMS system. G&W uses field proven, rugged controllers that can be mounted in a substation or a pad mount switch providing optimum flexibility. A controller based solution is perfect for various applications:

- A pilot automation project to prove the functionality
- Local substation and feeder control
- Redundant automation that will work in parallel with an existing DMS system taking over in the event of a catastrophe.

FDIR Model-Based Operation

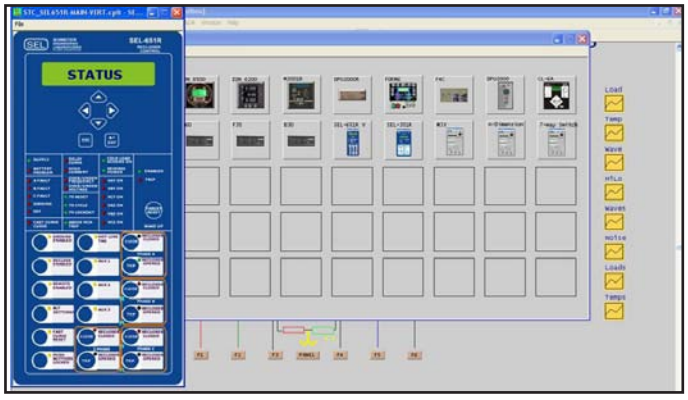
FDIR model-based software enables any device system parameters to be configured and the software algorithm does the rest. This can save countless hours of programming versus a rule-based system where each device **and** reconfiguration scenario must be individually programmed. This makes the addition of new devices to an automated feeder or network much easier and less costly.

Automatic Generator Control (AGC)

The Lazer AGC module is a feedback control system that regulates the power output of electric generators to maintain a specified system frequency and/or scheduled interchange. The load allocation algorithm computes two components of load distribution. The first method is an economic model, where each generator is assigned a base load plus an economic participation factor that enables the correction to be distributed economically. The second method is a regulating model where an additional component is used to incorporate specific, regulated sources.

IED Wizard/Control Panel

IED Wizard is a tool that automates the creation of the database for IED's. In just a few simple steps, the wizard creates the required points in the SCADA system database. The wizard is preconfigured with an extensive library of the most common IEDs available on the market, including SEL, Cooper, ABB, Beckwith, and PML. Along with the data and communication points, the software has a visualization feature where a snapshot of the faceplate of the IED is shown on the screen. This enables control room operators to see the same IED faceplate as an operator in the field looking at the actual device. The faceplate push buttons are fully operational from the master station.



▲ *SEL-651R faceplate*

▲ *Cooper Form 6 faceplate*

System Integration

The goal of a Smart Grid is to collect and provide the information necessary for customers, distribution and transmission system operators, and generators to optimize system demand and reduce cost. Doing this frequently requires integrating various existing systems with new ones. Lazer automation provides features that make it easier and more secure to either communicate to existing platforms or act as a central hub for all system information.

Security

Integration to devices, other software, and integration into a network must be secure. Lazer Automation controllers and software feature user account passwords with a minimum 128-bit encryption and are neither stored nor transmitted in plain text. Access is settable for individual users to view, control, or have full administrative rights. Other features include the ability to set password change frequency, inactivity timeout, disable account, deny remote access, and logging of account access.

WebSurv

WebSurv is a powerful, secure web-browser based application which provides real-time SCADA information across an entire enterprise. It acts as an instant, out-of-the-box solution providing unparalleled ease of use and access to information by eliminating multiple software licenses to manage. WebSurv accesses actual Worldview software screens including graphics, tables or data. It can also be used to access information automatically from alternate master stations or controllers during a catastrophic failure.

Existing Software Integration

Lazer DA software and controllers rely on open, standardized interfaces to communicate to other existing software (SCADA, DMS, AM, etc.). Some of the options are:

- **MultiSpeak -** a collaboration of the National Rural Electric Cooperative Association (NRECA), leading software vendors and electric utilities. The MultiSpeak specification helps vendors and utilities develop interfaces to allow software products to communicate seamlessly.
- **OPC (OLE for Process Control) -** a non-proprietary technical specification that defines a set of standard interfaces based upon Microsoft's OLE/COM technology.
- **Simple Network Management Protocol (SNMP)** - an application layer protocol (part of the TCP/IP protocol suite); and the de facto standard for network management.
- **Inter-Control Center Communication Protocol (ICCP)** - the industry standard for Master to Master communications. ICCP application consists of both client and server software.

Complete System Integration Software – SmartVU

At the very highest integration level, SmartVU software functions as an integration platform and repository for operational data from disparate utility systems. This level of integration of real-time connections drives optimal decision support. SmartVU offers configurable data dashboards for displaying key performance information and indicators and a portfolio of applications that sit on a systems integration platform. The core components consist of the Data Repository (Data Server), Scheduling/Data Access, Reporting, and Presentation Modules of the Application Server. With these two components, data from any system, field endpoint collection systems or enterprise can be integrated, reported, and viewed.

The Lazer Solution

Whether it's best products or an integrated best package, G&W can help. We will work with your engineers, consultants, and other suppliers to help build the best automation solution for any application. **There are no limits.** In addition, G&W can help to justify your capital investment through reliability improvements and system optimization.

Lazer I

Lazer I Automation uses stand-alone, peer-to-peer solutions. G&W has several pre-packaged automation solutions including the following:

- ❑ High Speed Closed Loop Systems
- ❑ Open Loop FDIR Systems
- ❑ Loss of Voltage Restoration Schemes
- ❑ Distributed Transfer Schemes

Lazer II

Lazer II Automation is a complete suite of Survalent software scaled down and packaged in an industrial computer that is capable of automating substations as well as feeders. The standard automation controller package consists of a rugged, industrial computer pre-loaded and configured with the following software:

- ❑ Worldview Geographical User Interface (GUI)
- ❑ SCADA Explorer for programming
- ❑ FDIR and LOV Automation for reconfiguration on faults and voltage loss
- ❑ IED Wizard to easily integrate and view IED's
- ❑ Single phase reconfiguration (future)

The following optional software modules can be preloaded in the controller or added later:

- ❑ CVR module
- ❑ AMI / AMR interface
- ❑ Power Factor Correction Module (Volt / VAR Control)
- ❑ Complete Load Flow Module
- ❑ Automatic Generator Control

- ❑ WebSurv for visualizing without additional licenses
- ❑ Short Term Load Forecasting
- ❑ Load Estimation and Curtailment
- ❑ SCADA Replicator
- ❑ Operator Training Simulator
- ❑ Additional non-Control Room License
- ❑ Redundancy Option

Reporting Options

- ❑ Disturbance Capture
- ❑ Fault Data Recorder
- ❑ Automatic Vehicle Locator
- ❑ Remote Alarm Annunciation
- ❑ Premium Reporting Package

Instead of the standard controller package, **a lower cost option** is available to provide data concentration and basic visualization. This option is a computer pre-loaded and configured with Survalent SmartSCADA Lite software.

Lazer III

Lazer III Automation incorporates a complete suite of Survalent software in a master station control platform that can manage an entire network and act as a system enterprise integration platform. All of the modules available in Lazer II are available in Lazer III with an optional unlimited tag license. Lazer III Automation provides superior operation and visualization functionality when compared to traditional systems at a much greater value. The standard package consists of a rugged, industrial computer pre-loaded and configured with the following software:

- ❑ SmartSCADA – a full SCADA package with unlimited points
- ❑ SmartOMS - a fully integrated, flexible and feature-rich Outage Management System (OMS).
- ❑ SmartDMS - a fully integrated DMS platform that enables a wide-range of standard SCADA features such as multiple redundancy and a single user interface for both DMS and SCADA.
- ❑ AMI Interface – imports information from AMI software into Worldview screens
- ❑ Vehicle Locator – integrates vehicle location information into Worldview screens

Ask about our performance guarantee.

Legend	
Standard	S
Option	O

Lazer Features Comparison Chart

Feature	Lazer I	Lazer II	Lazer III
Basic Features			
High Speed Closed Loop Systems	S	S	S
Open Loop FDIR Systems	S	S	S
Loss of Voltage Restoration Schemes	S	S	S
Distributed Transfer Schemes	S	S	S
Worldview interface	—	S	S
WebSurv	—	S	O
SCADA Explorer	—	S	S
FDIR and LOV Automation	—	S	O
IED Wizard	—	S	S
Single phase reconfiguration	—	O	O
SmartSCADA	—	—	S
SmartOMS	—	—	O
SmartDMS	—	—	S
AMI Interface	—	O	O
Vehicle Locator	—	O	O
Volt/VAR	—	O	O
CVR	—	O	O
Load Flow	—	O	O
Anti-cascading	—	S	S
MultiSpeak	—	O	O
Operator Training Simulator	—	O	O
SCADA Replicator	—	O	O
Protocol			
ICCP	—	O	O
DNP3	—	S	S
IEC 61850	—	O	O

G&W offers a complete line of **smart distribution voltage equipment** including:

Lazer® Automation

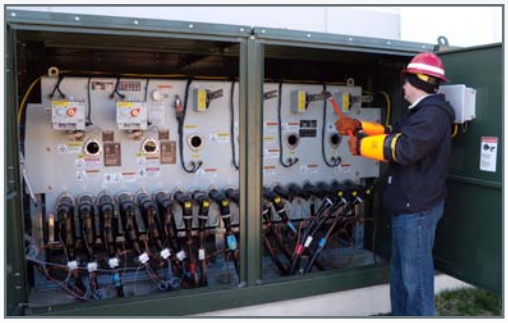
- Multiple levels of protection
- Open, flexible communication
- Pre-engineered, factory tested
- Transfer, loop, and network applications

Solid Dielectric Switchgear

- To 38kV, 16kA interrupting
- Submersible vault and padmount
- Smart Grid / Lazer solutions
- Single phase and three phase

SF6 Insulated Switchgear

- To 38kV, 25kA interrupting
- Submersible vault and padmount
- Smart Grid / Lazer solutions
- Load and Fault Interrupting



Solid Dielectric Reclosers

- To 38kV, 12.5kA interrupting
- To 27kV, 16kA interrupting
- Overhead, substation and padmount
- Smart Grid / Lazer solutions
- Single phase and three phase
- Six voltage sensing available

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