



zenon
by COPA-DATA



IEC 61850 with zenon

*Smooth communication and seamless
interoperability with IEC 61850*

IEC 61850 with zenon

In the transition towards a smarter grid, the growing adoption of IEC 61850-based substation automation and control systems is among the most notable trends. zenon by COPA-DATA provides comprehensive SCADA solutions that support IEC 61850 Edition 1 & Edition 2. This enables fast, reliable, and secure access to and control over the substation, achieving seamless interoperability.



FROM EDITION 1 TO EDITION 2

Since its advent in 2004, the IEC 61850 standard has evolved quickly in the substation field. The global standard soon gained traction outside the substation, leading to its extension in IEC 61850 Edition 2. From zenon 7.20 on, the Service Tracking feature is available for commissioning and security supervision. All data types and Functional Constraints introduced by Edition 2 are supported along with commands for analog values.

EFFICIENT ENGINEERING

zenon is designed to make the engineering of a substation quick and easy. It saves your time and helps you design projects that meet the highest standards in reliability, security, and usability:

- ▶ Simple engineering of the command control, as the system reads the control model and manages a command process automatically.
- ▶ Communication with IEC 61850 devices is directly set up through the SCADA engineering environment (zenon Editor). It includes a tool to configure IEDs and reporting straight from an SCD file for faster configuration.
- ▶ When establishing the connection (association), the driver reads the data model and prevents mismatches. The driver automatically selects the best matching reports. If a report does not exist, the driver automatically starts polling the referred data.
- ▶ The driver supports automatic reconnect and an alternative IP-address.

HIGH-QUALITY SOFTWARE

Our in-house experts ensure that product development and quality assurance meet the highest standards in reliability and security. This is also true for all zenon drivers and supported protocols. Our state-of-the-art certificates like the IEC 61850 Edition 2 demonstrate zenon's commitment to top quality.

Compared to other SCADA systems, our IEC 61850 Client is natively integrated into zenon. This is possible because our development team has developed the entire stack without using a third-party source code. With our extensive experience in driver development, any additional desired functionality can be quickly developed and integrated into zenon.

SUPPORT AND CONSULTING

Our local consulting along with a global network of experts in the Energy Industry provide you with full support in delivering services to your customers. With over 20,000 installations, zenon is widely applied in the Energy Industry.

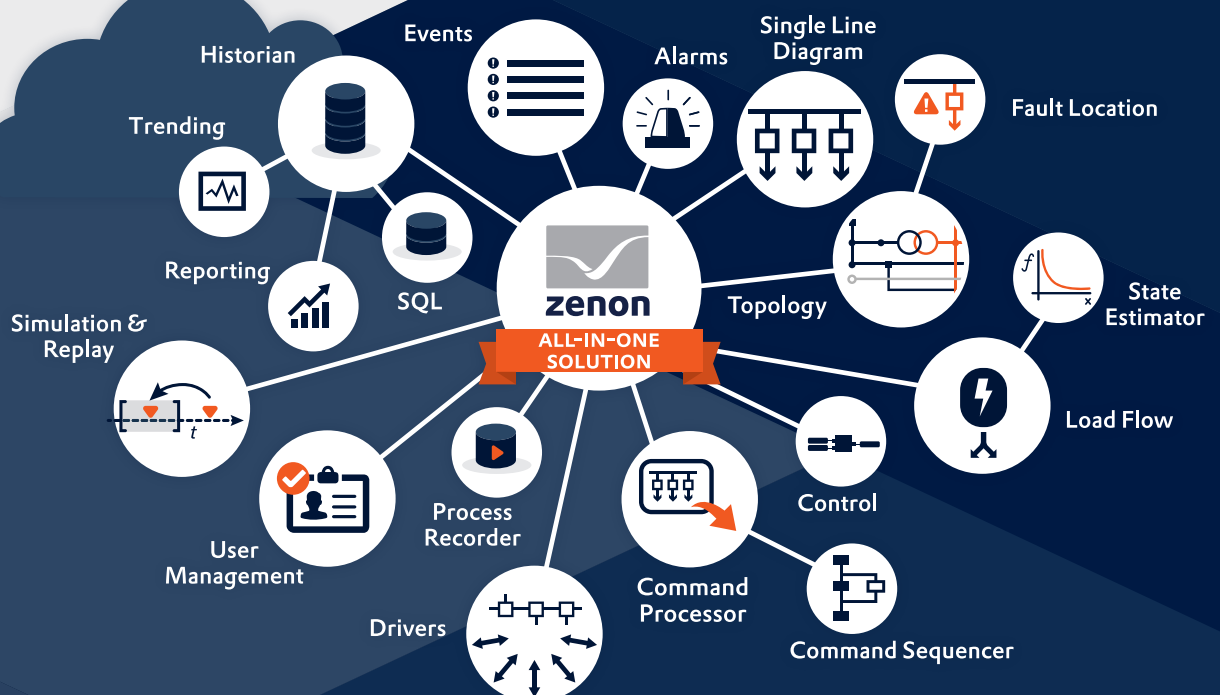
FAST FACTS

- ▶ Certified IEC 61850 Client Driver
- ▶ Efficient engineering that saves your time
- ▶ Driver acts as a communication Client
- ▶ "Direct operate" and "select before operate", with and without enhanced security, integrated into command control
- ▶ RTU time stamping and RTU quality used in the entire system
- ▶ Online browsing for process variables from the engineering environment
- ▶ Offline browsing (SCL files)
- ▶ Dynamic datasets
- ▶ ACSE authentication (IEC 62351-4)
- ▶ File transfer support
- ▶ Definable originator category (orCat)
- ▶ Individual trigger options for reports (for devices requiring that from the Client)
- ▶ Use your own variable names

Digital Substations Delivered by zenon

Engineering – implementation – operation

zenon Energy Edition provides comprehensive SCADA solutions for a secure, reliable, and efficient substation. Connection to all typical field equipment and protection relays of vendors, via standard protocols, provides users with the freedom of choice. Implement secure operations through integrated command input for the simple creation of command processes. Create command objects through simple mapping of interlockings.



Efficient engineering of a digital substation

The creation of a local control system for a substation can be a quick and straightforward process. Depending on the purpose of the local control system, zenon can be assembled with various modular components to fulfill the plant operator's requirements.

HIGH-PERFORMANCE VISUALIZATION

Drawing feeder and transformer bays is a recurring task in the creation of one-line diagrams for the local control system. For this zenon offers a pre-defined IEC library of graphical objects that can be pulled into the screen by drag & drop and indirect tag addressing. The clear advantage: central object management delivers rapid results and eases maintenance considerably.

The reusability of graphical objects, screens, or entire projects enables rapid generation of follow-up projects. Furthermore, screens can be saved as templates in the zenon Editor (engineering environment). To automate the entire project creation process, users can program Wizards that can automatically generate projects or portions of one.

CONFIGURATION OF CONNECTIONS

To speed up the configuration of connections based on IEC 61850, IEC 60870, DNP3, etc., data points can be easily imported online from the connected device or offline from a description file in zenon Editor.

SAFETY ENSURED BY INTERLOCKINGS

To prevent operations from creating any hazardous conditions to the plant personnel or equipment, zenon allows the definition of interlockings. This enables displaying and warning that specific equipment or operation would cause damage. Combined with the User Administration, zenon ensures that critical operations are carried out by authorized users only.

COMMAND INPUT

Engineering of the command input is fast and simple. Whether double, single, pulse, or any other particular command is needed, the zenon command input covers every

request. Engineers can quickly compile sets of commands in a command group and make them available to the user via a pop-up window or context menu.

DISTRIBUTED ENGINEERING

To accelerate project development, zenon allows multiple engineers to check out portions of a project and simultaneously work on specific areas, where only they can make changes. These changes are then synchronized across all engineering machines. zenon also enables logging of changes in a project along with simplified version control.

ZENON AS A GATEWAY

zenon's process control functionality enables the transmission of data or the receiving of commands from a higher-level system. This software-based solution can serve as a replacement for an RTU (Remote Terminal Unit). The gateway solution is also available on redundant zenon servers, for critical substations.

FAST FACTS

- ▶ Integrated command input
- ▶ All standard protocols (e.g. IEC 60870-5-101, 103,104, DNP3 or IEC 61850, GOOSE)
- ▶ Topological coloring
- ▶ Import mechanism
- ▶ Automated project creation
- ▶ Interlocking and user administration are combinable
- ▶ Distributed engineering
- ▶ Replace screens and symbols
- ▶ Structured text and CSV variable import
- ▶ DNP3 device profile and variable import
- ▶ Gateway function as a soft RTU

Streamlined implementation of a digital substation

During the commissioning, FAT, SAT, and trial operation phases of the project, making sure the system integrator has a full set of tools to complete the testing is critical.

DRIVER SIMULATION

zenon's drivers offer various simulation modes. One to consider during FAT (Commissioning Factory Acceptance Test) is the Simulation Programmed Mode. This allows the system integrator to simulate the performance of devices and processes as if they are already configured in the field. Additionally, the integrator can show the end user the way the screens will look when everything is completed, rather than simply displaying INVALID values on the screens.

NETWORK TEST

During the SAT (Site Acceptance Test), zenon makes communication tests easier on the system integrator in various ways. Via a SNMP driver and a system driver, zenon helps to build a screen that displays the entire network infrastructure and its status. There is also a Variable Diagnosis Screen that can be built into zenon. This allows any of the variables as well as their statuses and value to be clearly displayed.

DRIVER CONNECTION ANALYSIS

If the project happens to not function as it should, the Diagnosis Viewer can run an analysis of driver connections that may have caused the problem.

MANUAL DATA HANDLING

zenon can display all variables and simulate their values on the screen, even before they are actually connected to the process. So the test operation can start on its own without needing all equipment parts to be set up in the automation and control components.

USER ADMINISTRATION IN ENGINEERING

The zenon Editor (zenon's engineering environment) can define various access rights. This ensures that only authorized users can make particular changes, even during the test operation.

FAST FACTS

- ▶ FAT: Process simulation via programmed driver simulation
- ▶ SNMP- and system driver for system overview
- ▶ Variable diagnosis window
- ▶ Variable overviews made easy
- ▶ Diagnosis Viewer, if driver connections are not working as they should
- ▶ Manual correction for not yet reported variables in the system
- ▶ User administration in the Editor: only in areas where change is permitted

Reliable operation of a digital substation

During manned operation of a substation, it is essential that the application deliver reliable control and monitoring as well as provide operators with tools that empower them to work efficiently.

INTERLOCKING AND USER RIGHTS

A reliable and secure system should be able to prevent potential operating errors from occurring in the first place. This is supported by zenon's interlocking and topology check for command input. The system detects potential damage an operation could do to the equipment and warns the operator through Switch Locking.

To ensure that only authorized users can edit commands, the user administration verifies if the user has the necessary access rights. The user administration can be integrated with Windows Active Directory.

WATCHDOG TIMER

Critical events often require multiple switch operations to be carried out consecutively. The operator can, however, not wait for every disconnecter to reach its end position, but must proceed directly to the next action. So that intermediate positions are not overlooked, zenon can bring the user's attention to it via alarm or a blinking symbol. The watchdog timer is an integral part of zenon's command input.

SECURITY RULES

The five security rules for running tasks with electrical equipment:

1. Disconnect completely;
2. Secure to avoid re-connection;
3. Verify that the installation is dead;
4. Carry out earthing and short-circuiting;
5. Provide protection against adjacent live parts.

SWITCH LOCK/COMMAND

To fulfill the second of the five security rules "Secure to avoid re-connection", the switch lock is integral to the command input module. zenon allows for a digital lock to be placed on

a switch. This will lock out the operation of a device across the entire network. Only after the user's unique pin has been entered will the device return to a controllable state. The locking and unlocking of the switch are logged in the chronological event list.

In addition to the standard commands of ON and OFF, the switches and variables of entire branches can be changed to revision (no alarm), decoupled from the process (no data transfer), or shifted to a replacement value (no data transfer and new value for the system).

MANUAL DATA HANDLING

Switches that are only available in the screen and not yet transmitted, can be brought into the corresponding position through manual correction.

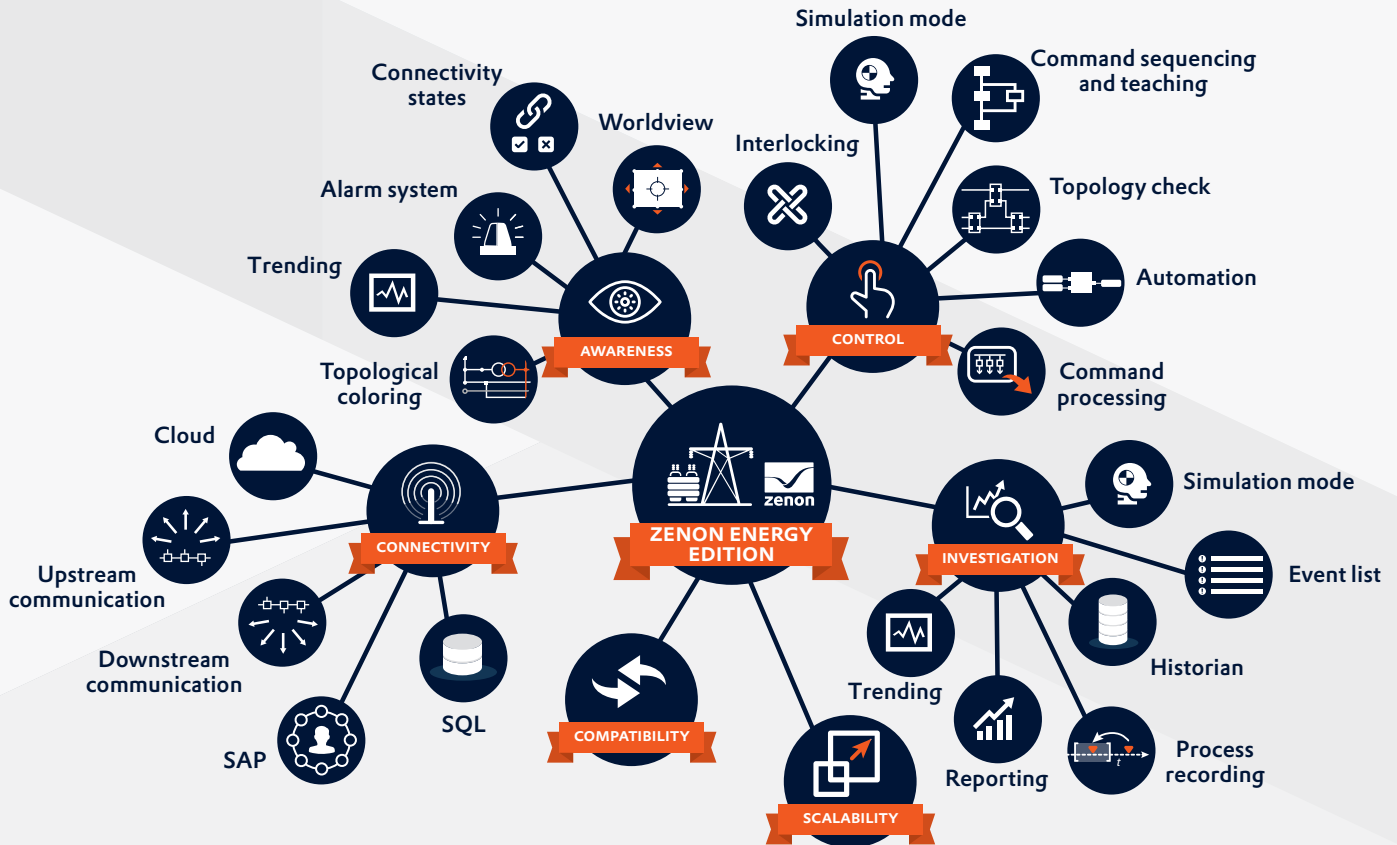
BREAKER TRIP DETECTION

Immediate information about an independently triggered circuit breaker is essential to certain cases (e.g. when the protection relays aren't reported yet). zenon can inform the operator in the form of alarms or special display of symbols. Furthermore, the operator can suppress the switch operation detection, for example, through the connection with a local or remote control switch.

LOGGING VIA CEL, AML, AND ARCHIVE

The Chronological Event List (CEL) keeps an automatic and timely account of the equipment operation. It displays all system and predefined messages and can filter information for analysis and reports. The list is stored in the system in a binary format so that the data cannot be tampered. The operator can comment on the list entries for efficient traceability.

Besides, zenon's Alarm Message List (AML) displays and filters alarms as well as their statuses. It also identifies alarm areas, providing on-site employees with the most informed view of the problem, from an aggregated view to a detailed diagnosis.



The data displayed in the Chronological Event List or the Alarm Message List can also be logged in a measured-value archive, available for analysis and reporting. The measuring curves can be precisely assessed in the trend display and compared with binary signal states or other measuring curves. Typically, counter values are evaluated in reports, displayed in the tabular or graphical form, and stored, printed or forwarded via data transfer.

Fault records from protective relays can be read manually or automatically. They can also be stored in the system or passed on to the superior instance (control center). Such automation is made possible thanks to the fully implemented IEC 61850, IEC 60870, DNP3 or FTP protocols.



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FAST FACTS

- ▶ Automated unmanned substation with user-friendly interface
- ▶ Topology check
- ▶ Command input – interlocking
- ▶ User administration
- ▶ Command input – watchdog timing
- ▶ Alternative value, revision, Off
- ▶ Manual correction, switch locking
- ▶ Breaker tripping detection
- ▶ Chronological Event List
- ▶ Alarm management – user guidance
- ▶ Process Recorder
- ▶ Command Sequencer
- ▶ Archiving, trend analysis
- ▶ Reports
- ▶ Disposal and forwarding of fault records

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