OMICRON

StationScout

Substation Automation System Testing

Smart testing for automation, control and SCADA communication

Visualize IEC 61850 and make testing easy

Testing automation and communication systems is as time consuming as testing the protection. StationScout, together with the MBX1 test set, simplifies these tests and reduces the required effort significantly.

Firstly, StationScout provides a clear status overview of your substation during commissioning and operation. Secondly, it makes it possible to trace signals through the whole system.

Finally, by using the powerful simulation features, the time needed for testing the whole SCADA signalling can be shortened significantly.

Innovative views support commissioning and maintenance engineers during the entire lifecycle of Substation Automation Systems (SAS) based on IEC 61850. When working with IEC 61850, StationScout becomes the ideal solution.

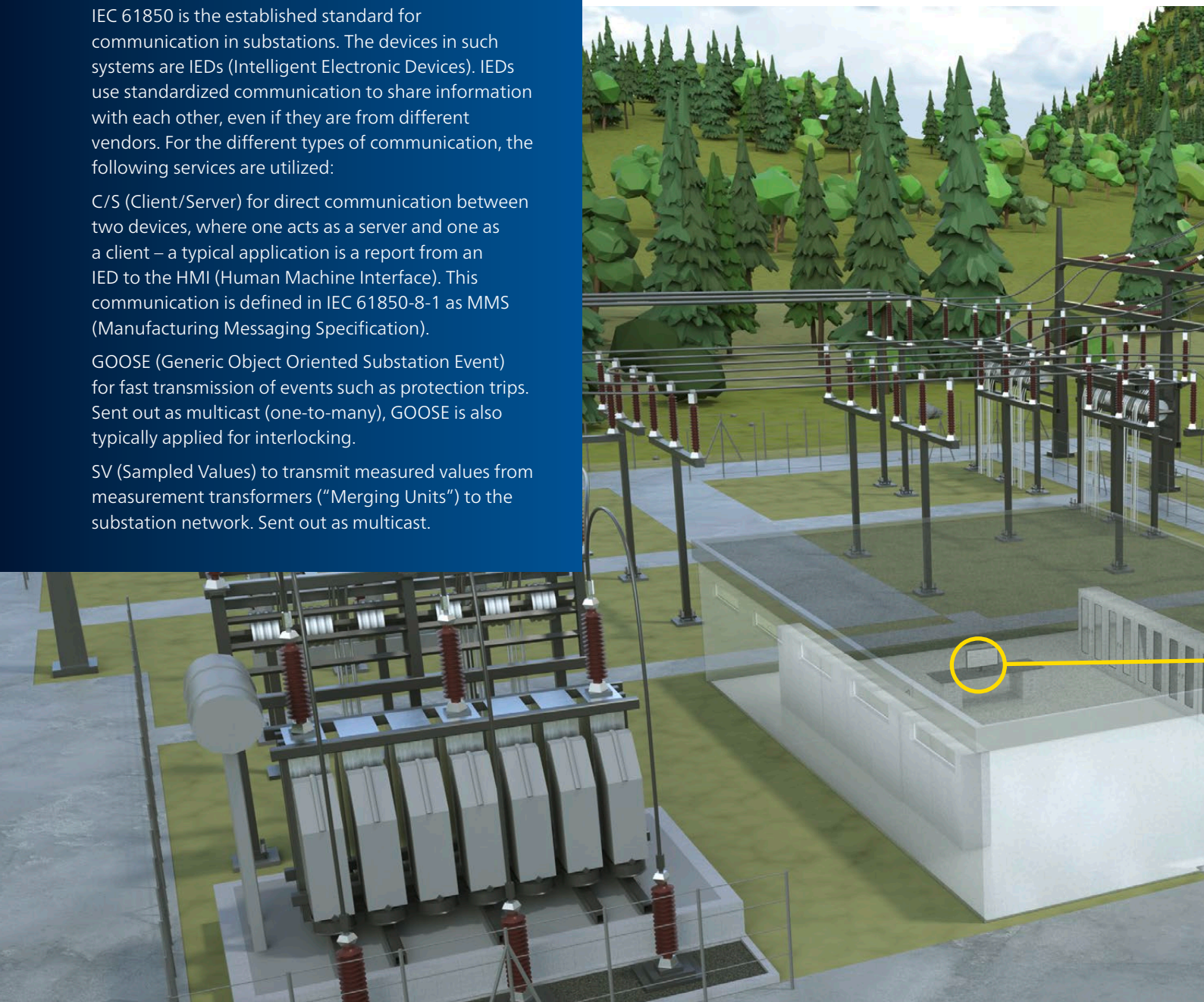
What is IEC 61850?

IEC 61850 is the established standard for communication in substations. The devices in such systems are IEDs (Intelligent Electronic Devices). IEDs use standardized communication to share information with each other, even if they are from different vendors. For the different types of communication, the following services are utilized:

C/S (Client/Server) for direct communication between two devices, where one acts as a server and one as a client – a typical application is a report from an IED to the HMI (Human Machine Interface). This communication is defined in IEC 61850-8-1 as MMS (Manufacturing Messaging Specification).

GOOSE (Generic Object Oriented Substation Event) for fast transmission of events such as protection trips. Sent out as multicast (one-to-many), GOOSE is also typically applied for interlocking.

SV (Sampled Values) to transmit measured values from measurement transformers (“Merging Units“) to the substation network. Sent out as multicast.



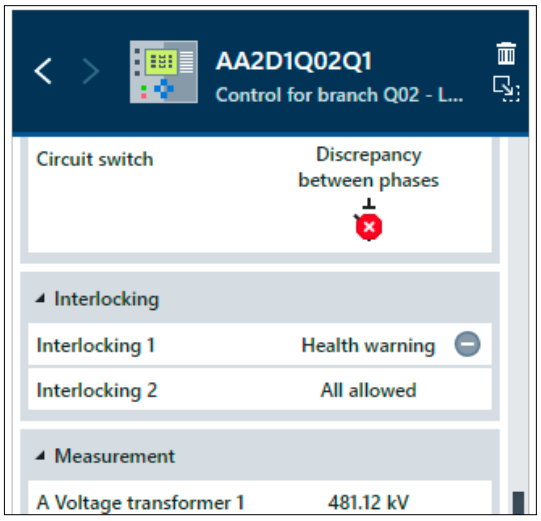
The concept

StationScout comes with innovative software and the digital substation test set, MBX1. The test set allows cyber secure connection to the substation network and can simulate dozens of IEDs with C/S and GOOSE.

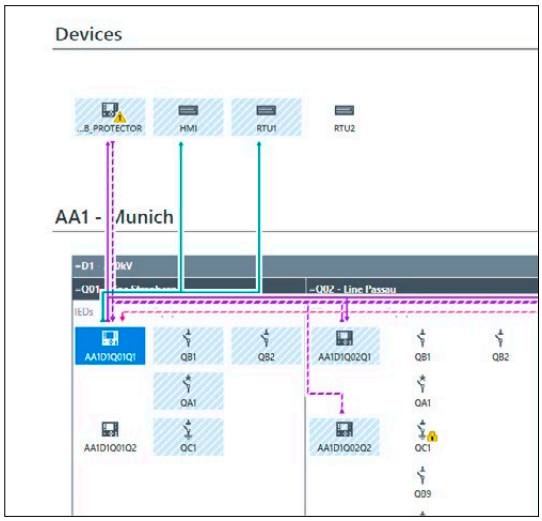
The intuitive user interface visualizes communication in the SAS, delivering the characteristics of an IED in an easy to read manner and supports the user in finding relevant information quickly.

When connected to the substation network, the values within the IED data models, as well as the connected assets, can be seen and communication signals can be easily traced through the SAS. All IEDs which are not available may be simulated to make testing of the entire SAS possible.

StationScout supports **all project phases** of IEC 61850 SAS.



The IED summary uses clearly understandable and editable names instead of IEC 61850 abbreviations. Information is grouped according to their application, which helps the engineer trace signals. Easy to use browsing and navigation elements support this task.



Smart Overview visualizes communication links and status information of IEDs and primary assets. GOOSE subscription and report issues can be observed.

From overview to the details

No configuration required

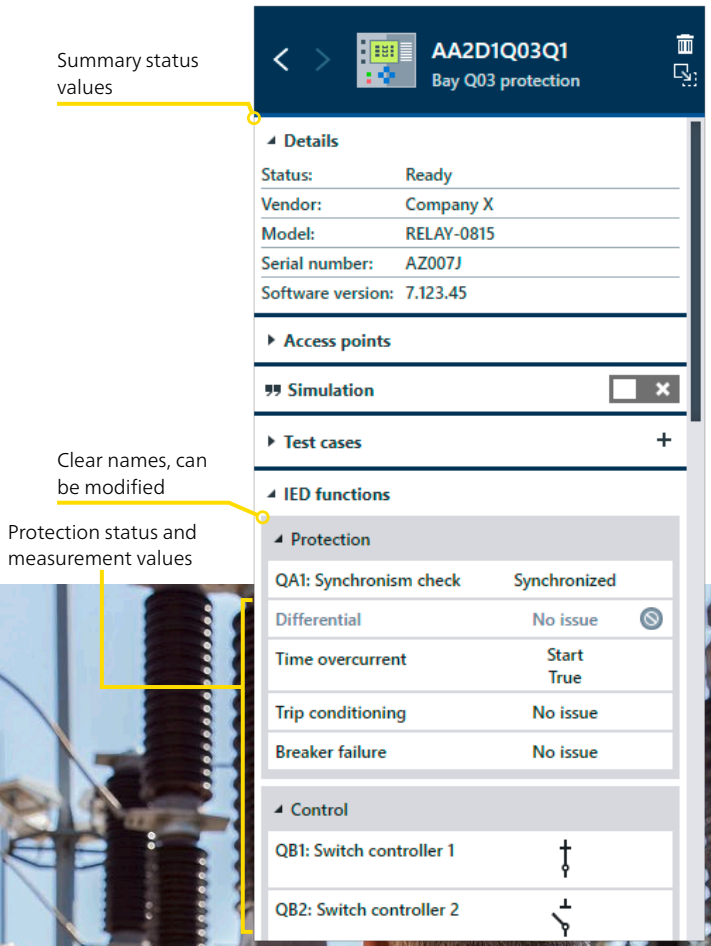
The substation HMI (Human Machine Interface) visualizes the status of all assets and collects alarms and warnings – but during commissioning and troubleshooting this system might not be available. StationScout comes with its own kind of visualization. Because single line information is not available in most IEC 61850 engineering files (SCD), OMICRON introduces the **ZeroLine View**.

Automated and without any additional information, IEDs are grouped into bays and primary assets such as switchgear. They are displayed with live status information.

Clear presentation with ZeroLine View

Clear IED summary

StationScout visualizes each IED data model in a new and innovative way. All information is summarized, translated and updated with the current value. Semantic values for over 150 Logical Nodes (LN) and over 200 different Data Objects (DOs) are implemented.



Straightforward signal tracing

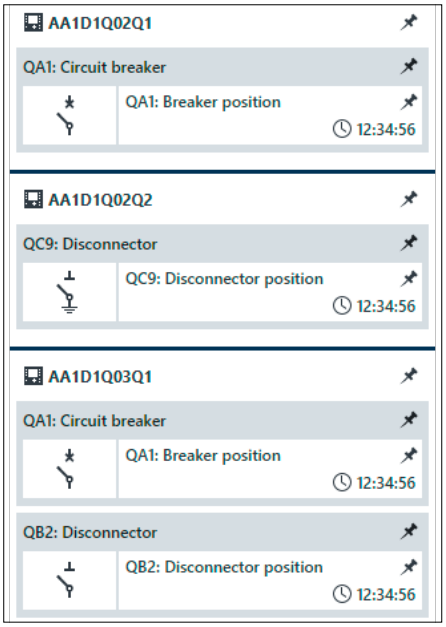
To find communication errors in the SAS, commissioning engineers have to trace signals all the way from the source to each receiver. In hardwired systems this "point-to-point" testing is very time consuming, IEC 61850 systems are even more challenging in this regard. With StationScout it becomes easy to follow signals. The propagation of GOOSE and Report signals through the SAS are visualized in an intuitive diagram – the **Smart Overview**.

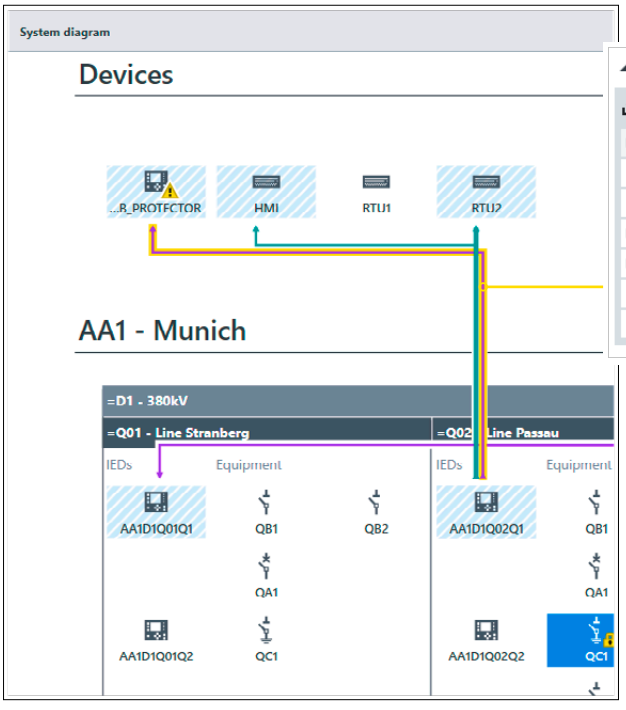
Being able to trace any signal in the overview screen significantly, reduces troubleshooting time.

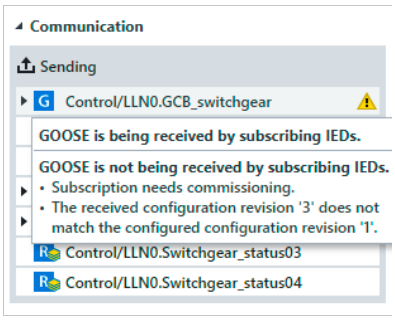
Furthermore, communication errors from both the sending and receiving side are displayed on the diagram making troubleshooting even simpler (receiving side errors are only shown if LGOS is supported by the IED). Immediately after loading an SCL configuration file (SCD file), StationScout visualizes all communication relationships in the SAS. When StationScout is connected to the substation, this information is augmented with live data.

Watch signals

Collect signals from the entire substation into a single list to watch and to change values comfortably during simulation.







Trace signals in GOOSE and reports from primary assets to subscribers and RTUs

Being able to **trace any signal** in the overview screen, significantly reduces troubleshooting time.

Your benefits

- Get an overview of the signal flows in the IEC 61850 substation
- Troubleshoot communication and logic errors faster
- Simulate missing components or the whole SAS
- Reuse test plans at recommissioning and after security patches

www.omicronenergy.com/StationScout

Covering the whole lifecycle of a SAS

Simulation of IEDs with their inputs and outputs.

Clear visualization of communication and status overview of the SAS.

Simulated equipment

Design, specification and engineering

Start with IEC 61850 on your desk, check a new concept or adapt an existing one. StationScout visualizes the whole system and simulates missing equipment – if required, it can even simulate the entirety of the system.

Tests created in the design phase are available for repetition through the whole lifecycle.

Factory Acceptance Testing (FAT)

Partly simulated

Modern SAS are rigorously tested in the factory. Missing servers (IEDs) and clients (SCADA or RTU) can be simulated, making real testing possible right from the beginning.

See live values with a single click

Cyber secure connection to the station network with robust hardware.

Maintenance: Security patches and testing

Site Acceptance Testing (SAT) and commissioning

Real equipment

Due to the increasing demands for cyber security, IEDs need to be patched.

With StationScout you can use the prepared tests and simulate equipment that can not be taken out of service for testing. Even complex logic can be re-tested easily.

✓ **Formerly created test cases can be reused**

On-site tests have to be performed at least once with real equipment. Testing every point within the SCADA system (including all details) can be performed by simulating the client even without a control center.

✓ **Repeat previous tests and simulations**

Who uses StationScout?

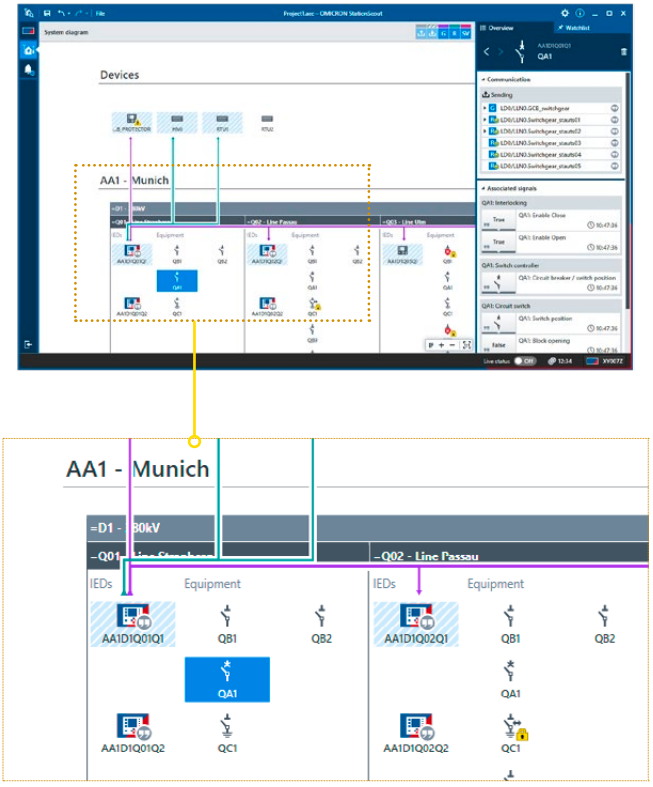
- Utilities performing factory- or site acceptance-tests
- SAS commissioning experts
- Protection testers
- Communication and commissioning engineers
- Developers of IEDs and SAS
- Planners, certification labs, system integrators, SAS maintenance engineers, …

Simulation and security

Simulation if needed

Depending on the project stage and on the testing situation, not all assets are available during the testing. The HMI might be missing while the protection is engineered, or the SCADA/HMI developers might need the protection staff for simulating certain messages, and, of course, during the FAT none of the primary assets are available.

StationScout offers simulations as required during any stage and for any circumstance. Simulate missing IEDs, missing RTUs/Gateways/HMI, or any other equipment not available including binary I/O simulation for switchgear positions.



Simulate IEDs, SCADA/HMI, and switchgear positions

Maximum cyber security in IEC 61850 substations

To connect to the substation network, perform tests, and simulate IEDs, StationScout comes with the special MBX1 test set.

This test set ensures maximum security, reliability, and performance when connected to the substation network. Therefore, the industrial-grade MBX1 hardware is equipped with encrypted storage, a cryptoprocessor module (TPM), and a secure firmware. MBX1 can be used in combination with IEDScout, StationScout as well as future OMICRON solutions for the testing of power utility communication.

MBX1 represents the license of the software and can be shared within teams. An IEDScout license is also included in all StationScout packages.

Additionally, a 19" rack variant is available – the RBX1 platform for rack mounting.

Powerful and secure: the MBX1 test set

Cybersecure rack-mountable RBX1 platform

Troubleshooting and communication testing

Putting substation automation systems into operation is a time-consuming task. Wiring and configuration errors have to be fixed – even after a successful factory acceptance test (FAT).

The **Smart Overview** in StationScout assists protection and control engineers by depicting what is configured in the engineering file as well as in the real substation. For example:

- Are the GOOSEs published and subscribed to properly?
- Are the Report Control Blocks correctly used by the gateway?
- How is a particular signal transmitted?

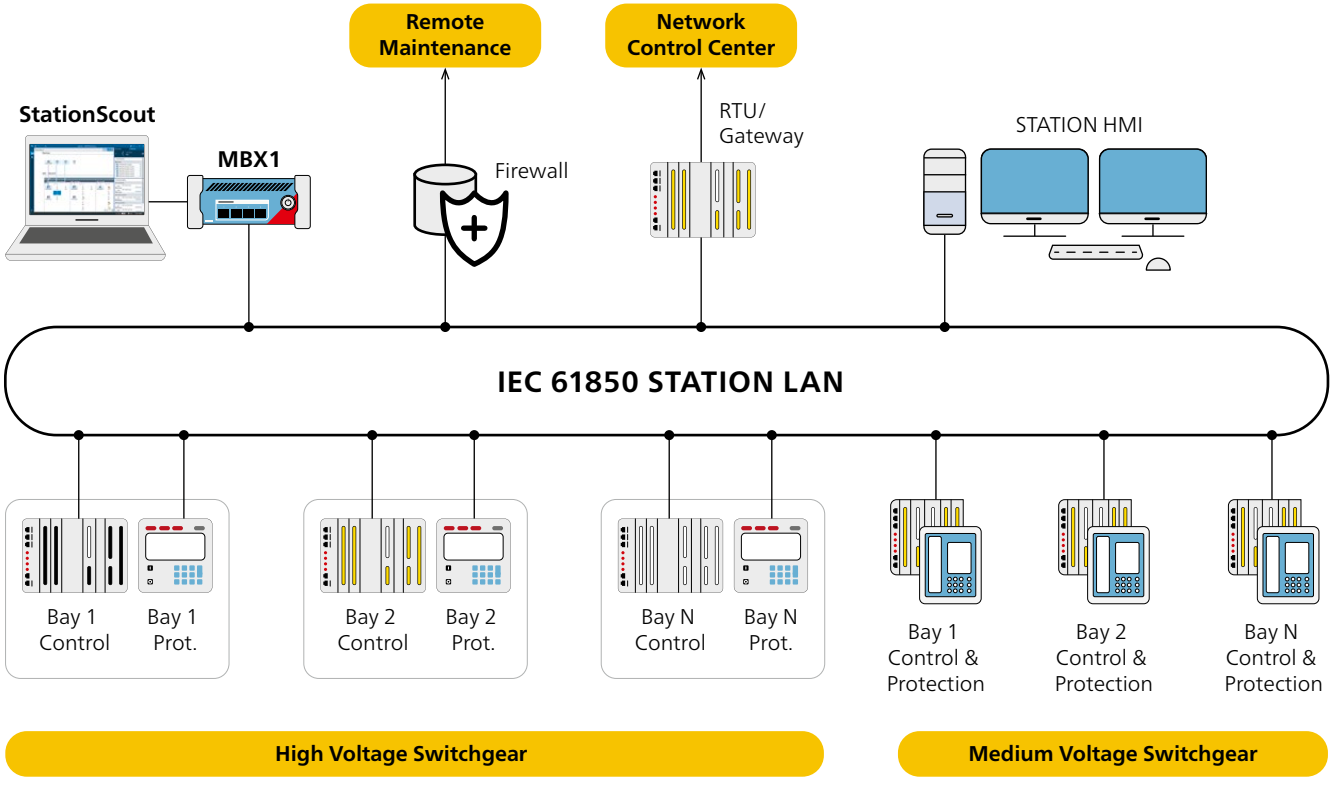
By clicking on an IED, a summary is shown detailing its relevant functions. Filters support selecting the communication of interest. Colored lines illustrate the signal flow. Engineering signal names are used from the SCL. If unavaiblable, useful names are generated by StationScout, or the utility's own naming conventions can be imported. Setup, workspace, and configuration are stored in a file.

IEC 61850 terminology is avoided, drilling down to IEC 61850 level is still possible, but not necessary. Of course details, such as Report Control Blocks and GOOSE information, are still available if requested.

Main applications

- SAS and SCADA testing
- Logic testing
- Commissioning
- Protection testing
- Troubleshooting
- Testing after firmware upgrade

StationScout works with **any network topology –** just connect it to the substation LAN:



Commissioning features

SCADA, RTU/Gateway testing

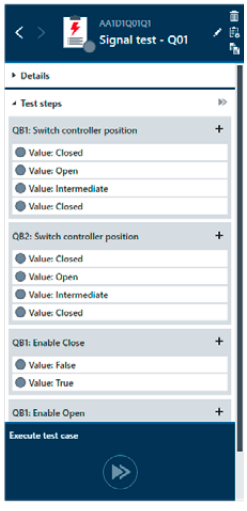
When commissioning a substation, all data, such as warning signals and measurement values, must be tested along with their transmission to the SCADA system – local and remote. With StationScout, SCADA signal testing can be simplified and accelerated. StationScout can inject all alerts, switchgear status signals, and measurement values by simulating IEDs. The engineer only needs to verify if the HMI and control center displays the signals correctly.

The StationScout Commissioning License allows to define test cases. Assessing, stimulating signals, and recording results offer huge potential for cost savings. Passed or failed tests within a certain project stage can be exported and printed. Tests performed during commissioning can be repeated later after firmware updates or refurbishments. With its simulation features, StationScout can especially speed up FAT, where only parts of the SAS are available.

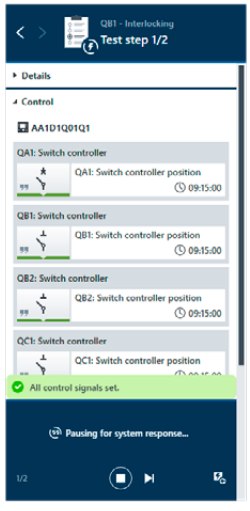
For quickly creating signal tests, you can directly import signals from your signal list and let StationScout create the test steps for switch states and single point status signals. Test steps for measurements can manually be added afterwards. These test plans can also be re-used during the SAT to visualize and assess the IEC 61850 signal flow.

Automated testing of interlocking conditions and logics

Logic is used in interlocking as well as in many other substation automation functions. Testing such logic functions is an essential part of FAT and SAT. To speed up testing, StationScout allows you to prepare test cases in the office and run it on your system with automated execution of control commands and automated assessments. The assessments include checking values from logical nodes like CILO, issuing switching commands, and checking the command response and switch state. Unavailable assets can be simulated, allowing testing during any project phase.



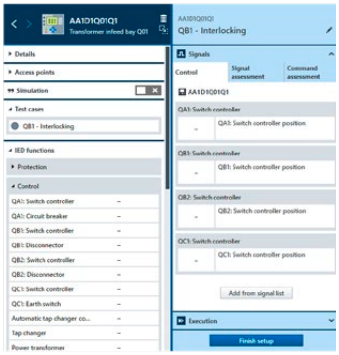
Signal testing



Interlocking test plan

Define and use test plans

Test cases are created by selecting the signals under test as well as the signals asscociated.

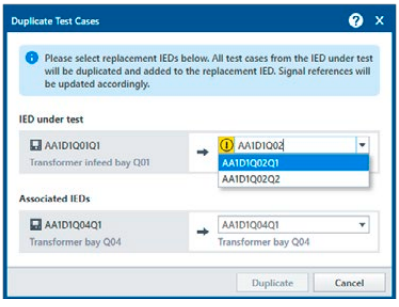


Test case

A test case can be executed, duplicated to other IEDs, and repeated.

Write tests only once

Tests can already be developed in the specification phase and test cases can be re-used as templates from bay to bay. During engineering and FAT/SAT, IED configurations will likely be supplemented and adapted, which also means that the SCL file is updated. StationScout allows you to re-import single IEDs or the whole substation configuration from the updated SCL file while keeping your test cases and custom signal names.
Test cases can be exchanged between different file.



Duplication of test cases

Ordering information

StationScout consists of a test set and either the Smart Overview License or the Commissioning License. For the test set, there are two options available. The mobile MBX1 test set or the rack-mountable RBX1 platform for permanent installation in substations.

Software licenses

The **Smart Overview License** helps you visualize substations' data models and communications in a tidy overview.

Features:

- Smart Overview
- ZeroLine View shows substation topology, feeders, and bays
- Multiple bays or whole substations with dozens of IEDs can be simulated comfortably
- Simulation of IEDs
- Detects communication problems
- IEDScout included

The **Commissioning License** has all the functionality of the Smart Overview License and comes with dedicated powerful features for testing and commissionig of IEC 61850 SAS.

Features:

- Smart Overview License functionality included
- Creation of own test cases
- Repeat tests previously created
- Re-apply test cases to other bays
- Documentation of all tests performed
- Assessment of test cases
- Automated execution of test cases
- SCADA signal testing support

Licenses
StationScout Smart Overview on platform (MBX)
StationScout Commissioning on platform (MBX)
StationScout Smart Overview on platform (RBX)
StationScout Commissioning on platform (RBX)

Upgrades
Upgrade IEDScout for MBX/RBX to StationScout Smart Overview
Upgrade IEDScout for MBX/RBX to StationScout Commissioning
Upgrade StationScout Smart Overview to Commissioning

We create customer value through ...

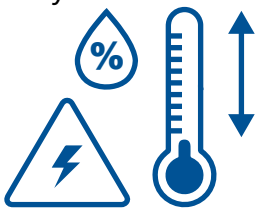
Quality

We always want you to be able to rely on our testing solutions. This is why our products have been developed with experience, passion and care and are continually setting ground-breaking standards in our industry sector.

You can rely on the highest safety and security standards

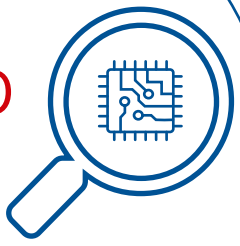
Superior reliability with up to

72



hours burn-in tests before delivery

100%



routine testing for all test set components

ISO 9001
TÜV & EMAS
ISO 14001
OHSAS 18001

Compliance with international standards

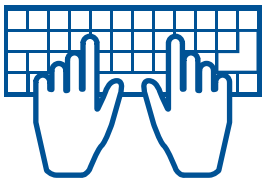
Innovation

Thinking and acting innovatively is something that's deeply rooted in our genes. Our comprehensive product care concept also guarantees that your investment will pay off in the long run – e.g. with free software updates.

... a product portfolio tailored to my needs

More than

200



developers keep our solutions up-to-date

More than

15%

of our annual sales is reinvested in research and development

Save up to

70%

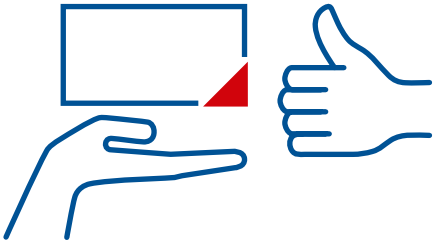
testing time through templates, and automation

We create customer value through ...

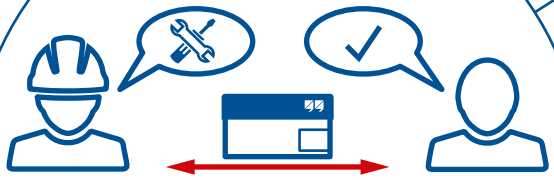
Support

When rapid assistance is required, we're always right at your side. Our highly-qualified technicians are always reachable. Furthermore, we help you minimize downtimes by lending you testing equipment from one of our service centers.

Professional technical support at any time



Loaner devices help to reduce downtime



Cost-effective and straight-forward repair and calibration

offices worldwide for local contact and support

Knowledge

We maintain a continuous dialogue with users and experts. Customers can benefit from our expertise with free access to application notes and professional articles. Additionally, the OMICRON Academy offers a wide spectrum of training courses and webinars.

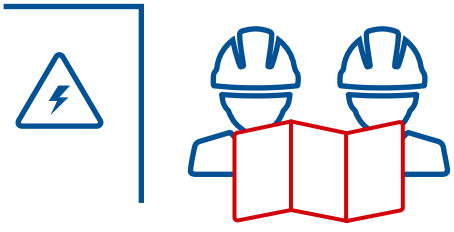
More than

300

Academy and numerous hands-on trainings per year

Frequently OMICRON hosted user meetings, seminars and conferences

to thousands of technical papers and application notes



Extensive expertise in consulting, testing and diagnostics

OMICRON is an international company that works passionately on ideas for making electric power systems safe and reliable. Our pioneering solutions are designed to meet our industry's current and future challenges. We always go the extra mile to empower our customers: we react to their needs, provide extraordinary local support, and share our expertise.

Within the OMICRON group, we research and develop innovative technologies for all fields in electric power systems. When it comes to electrical testing for medium- and high-voltage equipment, protection testing, digital substation testing solutions, and cybersecurity solutions, customers all over the world trust in the accuracy, speed, and quality of our user-friendly solutions.

Founded in 1984, OMICRON draws on their decades of profound expertise in the field of electric power engineering. A dedicated team of more than 900 employees provides solutions with 24/7 support at 25 locations worldwide and serves customers in more than 160 countries.

For more information, additional literature, and detailed contact information of our worldwide offices please visit our website.

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