

# SIEMENS

*Ingenuity for life*

## Digitalization of Station Level

Substation Automation with the Future built in

[www.siemens.com/digital-substation](http://www.siemens.com/digital-substation)

Electrical substations are at the core of power transmission and distribution grids, serving to connect grid sections of differing voltage levels. Substations each constitute a system comprised of primary equipment (such as gas- and air-insulated switchgear, transformers), secondary equipment (such as grid protection, automation and remote-control systems, voltage regulator controller, energy meters, and communications equipment), and the necessary infrastructure such as buildings. The basic functionalities on the station level are:

- Protection and bay control
- Substation automation and remote operation
- Reliable communication based on IEC 61850

### Substation automation and protection

Most important components of digital substations are the protection devices systems and the substation automation system. As the connecting link between the primary equipment – for instance the switchgear – and the grid instrumentation substation automation system and control center system, these components ensure optimum use of all systems involved.

### Benefits

- Prevent power outages
- Ensure greatest possible safety for personnel and financial investments
- Protection of primary equipment from damage e.g. generators, switchgear, transformers, cables
- Manage critical grid conditions and faults due to environmental influences or faulty operating equipment
- Greatest possible safety for personnel
- Seamless connection between primary technology and grid control technology



### SIPROTEC our solution for protection and bay control

SIPROTEC 5 is ideally suitable for protection, measurement and monitoring tasks for the operation and monitoring of modern power systems. The devices are not only pure protection and electronic control units; their performance enables them to assure functional integration of desired depth and scope. Beside typical measurements like voltage, current and power they provide phasor measurement and others. Different interfaces like IEC 61850 and Process bus are available.

SIPROTEC 5 includes all bay level control and supervision functions that are required for efficient operation of the switchgear. The large, freely configurable graphics display for control diagrams is available for convenient local control.

### SICAM our proven platform for substation automation and remote control

Versatile functionality and high flexibility are fundamental for a modern remote control system. SICAM RTUs and substation controllers add comprehensive options for communication, automation and process interfaces.

# Flexible and modular

The different components of SICAM offer optimal scalability regarding the number of interfaces and signals. Nevertheless, these components are all based on the same system architecture and the same technology, and are handled with the same engineering tool (SICAM TOOLBOX II and SICAM Web). All components of the SICAM family are using the same communication modules, and therefore they can use all available protocols.

## Ethernet-based communication on IEC 61850

In modern substations, substation automation systems with a digital station level – based on IEC 61850 – are standard today.

The chief advantages are:

- Simple substation structure: No more interface problems. With IEC 61850, protocol diversity and integration problems are a thing of the past.
- Everything is simpler: From engineering to implementation, from operation to service. Save time and costs on configuration, commissioning and maintenance.
- Reduction of costs: IEC 61850 replaces wiring between feeders, control switches, and signaling devices.
- Future proof architecture

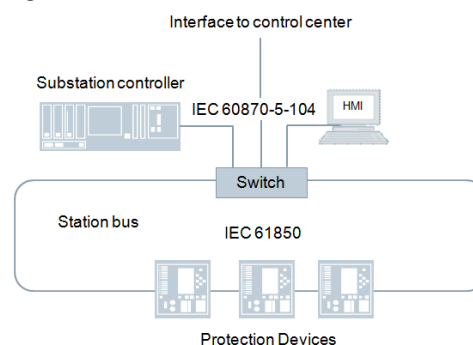
In the age of digitalization modularity and scalability of intelligent electronic devices (IEDs) throughout their lifetime and a smart split of the device hardware and its firmware is important to enable agile adaptation to new requirements in future. Major advantages of SIPROTEC and SICAM devices for the digital age are:

- Extension modules enable new communication features which can be plugged into existing devices even years after commissioning.

- Enabling of new protection functions in an existing relay is just an issue of configuration.
- Availability of IoT interfaces for new protection and automation devices and as well via FW upgrade for installed base products like SIPROTEC 4.
- Flexibility of IEDs is needed to keep pace with the dynamic development especially in the field of cyber security. Updating with latest security features throughout their life time is key. One example for SIPROTEC devices is the provision of cyber security-relevant events and logs in the standardized Syslog format.
- Extending an existing SIPROTEC 5 device with an IEC 61850-9-2 process bus interface is enabled by a communication module.
- Powerful automation devices like SICAM A8000 may host decentral, evolving applications that help to master arising challenges in a dynamic environment.

Above topics and product characteristics are very important to enable new features for digital substation in future. Above all, they provide the basis for further innovations; adapting new requirements in an agile manner, and ensuring investment security.

## Digital Substation Architecture



## Siemens AG

Energy Management Division  
Freyeslebenstraße 1  
91058 Erlangen, Germany

DSS Digitalisation of Station Level Profile.docx

Printed in Germany | © 12.17 Siemens AG

E-Mail: [support.energy@siemens.com](mailto:support.energy@siemens.com)

Tel: +49 180 524 70 00

"This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org>)"

"This product includes cryptographic software written by Eric Young ([eay@cryptsoft.com](mailto:eay@cryptsoft.com))"

"This product includes software developed by Bodo Moeller."