SIPROTEC 5
The Core of Digital Substations
Substations are essential assets in the Energy Grid
Aspects of Digitalization

1. Digitalization of Station Level
   - Non-conventional Instrument transformers (NCITs)
     - Provide primary values to the merging units based on new principles

2. Digitalization of Process Level
   - Merging Units (MU)
     - Converts analog primary values of the NCITs in digital information (Sampled Measured Values)

3. Cyber Security
   - Sensors
     - Provide more information on current status of the electrical equipment

4. Asset Management
   - IoT
     - Value-adding central applications
     - Big data analytics
     - IT/OT integration
     - MindSphere

5. Grid Operation
   - Digital Control Room
     - More data acquisition, intelligent decentralized applications, cyber security

6. Integrated Engineering
   - Digital Control Room
     - Digital protection and automation with station bus based on IEC 61850

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Digital Substations with SIPROTEC 5 are the answer to trends and challenges

1. Digitalization of Station Level
   Digital devices and IEC 61850 station bus

2. Digitalization of Process Level
   Introduce digitalization on process level

3. Cyber Security
   An inseparable part and precondition of digitalization

4. Asset Management
   Make use of data from the digital substation to support substation maintenance

5. Grid Operation
   Make use of data from the digital substation and decentral applications to support grid operation

6. Integrated Engineering
   Make use of digitalization for efficient integrated engineering
Digitalization of Station Level
Modularity and flexibility of SIPROTEC 5

Benefits
• Long-term flexibility even after shipping
• Simple exchangeability and retrofitting
• Adding and removing functions throughout the entire life cycle
• Reduced number of device versions due to flexibility
• Minimization of space requirements
• Agile adaptation to future requirements
• Investment security
Digitalization of Station Level
Flexible communication capabilities of SIPROTEC 5

Benefits

• Adaptation to the topology of your communication structure using parameters (ring, star, network, etc.)
• Multiple communication channels to various higher-level systems
• Agile adaptation to future requirements, e.g. HSR/PRP, IEEE C37.118.1a-2014
• Flexible IEC 61850 Engineering
Digital Process Level
Process bus with SIPROTEC 5

- Reduced space
- 90% reduced weight of transducers
- Reduced SF₆ and CO₂ footprint
- Reduced OPEX

Primary equipment with NCITs

- Cost savings by reduced wiring
- Interoperability: multi-vendor solutions based on IEC 61850 standard
- Improved safety through minimized arc-flash risk due isolation of electronics in the control room.

Merging Unit

- Advanced functionality
- Enhanced flexibility and scalability

Process bus implementation
Features

- Mutually authenticated and encrypted communication
- Recording of security-relevant events and alarms
- Connection password according to BDEW White Paper, NERC-CIP, IEEE 1686, IEC 62443
- Confirmation codes for safety-critical operations
- Crypto-chip for secure information storage
- Siemens CERT and Patch management
Asset Management
IoT connectivity to MindSphere

Benefits

• Integrated IoT-Interface
• Secure plug and play connection of SIPROTEC with MindConnect
• MindApps for data analytics developed by Siemens and customers
• Scalable secure cloud infrastructure (private or on-premise, public)
• Optimizes strategies for investment, operation, and maintenance (CAPEX/OPEX)
Grid Operation
Wide Area Monitoring with SIGUARD PDP and PMU

Benefits
- Fast real-time monitoring
- Automated detection of power swings and islanding
- Archiving of dynamic grid data
- Precise reporting
- Condensed information
- Situational awareness on first sight
- Decision-making support

Ethernet-Interface and protocol
IEEE C37.118
integrated or easy to retrofit
Digitalization of the engineering process
Engineering and Test Suit in DIGSI 5

Benefits
- Integrated, consistent system and device engineering
- Simple, intuitive graphical linking of primary and secondary equipment
- Application templates for the most frequently used applications
- Integrated tools for testing during engineering, commissioning