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DIGITAL SUBSTATION WITH SIPROTEC

Teleprotection Gateway –
SIPROTEC 5 Protection Communication Type 3

Sustainable success for high-voltage power grids

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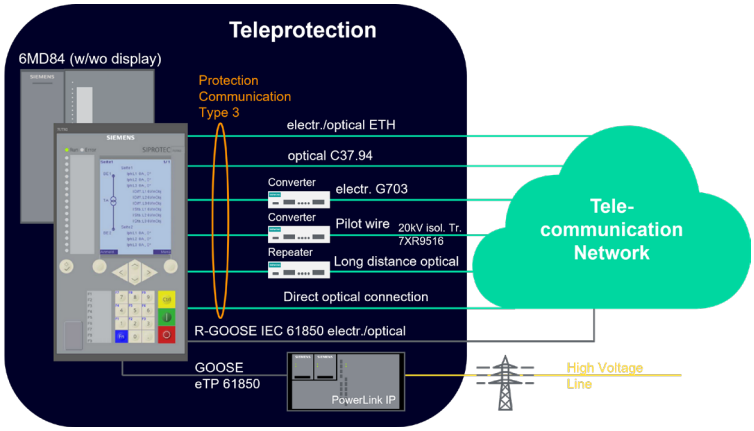
SIPROTEC 5 as Teleprotection Gateway

SIPROTEC 5 is the well-known family of proven protection devices for all kinds of electrical grids and components. With SIPROTEC 5 V11, a new teleprotection interface „Protection Communication Type 3" is released, which enables SIPROTEC 5 as teleprotection gateway.
If a stand-alone teleprotection device is needed, the SIPROTEC 5 IO-Box 6MD84 is the cost-optimal solution. However, Prot. Comm. Type 3 is available in all other SIPROTEC 5 protection and control devices.

SIPROTEC is known for its high degree of versatility, so it can be used in many different ways in various communication networks. In addition, it allows Migration of existing substations to the IEC 61850 communication standard. Operators can enter the new network era step by step – in line with their strategic objectives and available budgets. Whether operators want to connect two devices directly via fiber cables, or whether the transmission should run via MPLS, SDH or IP networks, whether different types of fiber-optic connections will be used.
Existing infrastructure is the decisive factor, and SIPROTEC with Protection Communication Type 3 accommodates its requirements – flexibly, affordably, and without Breaking the budget where SIPROTEC 6MD84 is the cost-effective solution for Teleprotection signalling.

Typical Use Cases (Schemes)

- **Distance Protection**
  SIPROTEC Protection Device direct interconnection via Protection Communication Type 3 or R-GOOSE
- **Hybrid**
  Teleprotection SIPROTEC 6MD84 to SIPROTEC Protection Device via Protection Communication Type 3 or R-GOOSE
- **Teleprotection Signalling**
  SIPROTEC 6MD84 to 6MD84 via Protection Communication Type 3 or R-GOOSE or GOOSE to PowerLink



System Architecture

1. Point to point over direct fiber
   - Hardware slot: use USART plug in FO modules
   - Optics: 820 nm for short links; 1300/1550 nm modules and Converter for medium/long distances (up to 100 km with internal communication module, up to 170 km with external converter)
   - Ethernet optical SFP in ETH-BD-2FO, ETH-BB-2FO
   - Ethernet electrical ETH-BA-2EL
   - Pilot Wire: Via Converter Option
2. Via Multiplexer / IEEE C37.94
   - Connect relay FO port to a C37.94 interface on the Mux; N×64 kbit/s channels (512kbps)
   - Connect relay FO via Converter to electric a E1 interface on the Mux N×64 kbit/s channels (512kbps)
3. Ethernet Packet networks (MPLS/Carrier Ethernet)
   - Ethernet interfaces of Siprotec 5 for connection to Carrier Ethernet, MPLS-TP or IP/MPLS systems providing support for quality of service

Functions / Features

Teleprotection functions / features

- Operation as teleprotection signalling system for up to 32 independent tripping commands Via up to 8 IO209 Interface module
- Protection Communication Type 3 for teleprotection signalling
  - IP (Fiber Optic / Electric)
  - C37.94 MM Fiber
  - E1 via converter
  - direct optical fiber Solutions
  - Pilot Wire Solutions
- Support of GOOSE and Routable GOOSE (IEC61850) interfaces
- System alarms via alarm contacts or remote monitoring
- Continuous line supervision
- Embedded Trip counting provision

Packet function / features

- Digsi 5 and Web-based administration
- RSTP & PRP redundancy
- Integration into network management system using latest SNMP technology

High-Speed Relay with Semiconductor Acceleration (Type HS)

- Rated voltage AC 200 V, DC 250 V
- Rated current (continuous) 5 A
- Permissible current per contact (switching on and holding) 30 A for 1 s
- Short-time current across closed contact 250 A for 30 ms
- Breaking capacity Max. 2500 W (L/R = 40 ms)

Cybersecurity

- Secure Role Based Access Control RBAC
- Firmware signature
- Firmware/Software Integrity Protection
- DoS attack prevention Features
- Communication Security Features (e.g. https://, 802.1x,...)
- X509 Certificate functions (IEC 62351-8/9)
- Security Logging
- Security Incident Response
- Non-volatile recording of SYSLOG events

Benefits

- Gateway with Migration path to direct Protection relay interconnection
- Cost efficient Teleprotection signalling Solutions
- Up to 32 binary contacts with 8x Io209 High Speed Relay Cards
- State of the Art Cybersecurity Features of SIPROTEC 5
- Optional Display and Keyboard on the Device

Standards

Performance/EMC/Environmental/Safety

- Performance and testing of teleprotection Equipment IEC 60834-1 (planned)
- EMC Immunity Tests IEC 60255-1, -26, EN 61000-6-2, IEC 61000-4-2, 4-3,-4-4,-4-5,-4-6,-4-8,-4-9,-4-16,-4-18, IEEE Std C37.90.1, IEEE Std C37.90.2
- EMC Electromagnetic Emission Tests IEC 60255-26, IEC 61000-6-4, CISPR 11, 22
- Vibration and Shock IEC 60255-21 and IEC 60068

Ambient Conditions

- Operation: -10 °C to +55 °C
- Storage: -25 °C to +55 °C
- Transport: -40 °C to +85 °C

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