

ENERGY AUTOMATION PRODUCTS

Virtualized Protection & Control

SIPROTEC V

What is SIPROTEC V?

SIPROTEC V is the virtualized version of SIPROTEC 5, enabling centralized substation protection and control. It runs proven SIPROTEC 5 protection algorithms on whitelisted, substation-grade hardware compliant with IEC 61850-3 or IEEE 1613, and scales to support up to 60 virtual IEDs.

Highlights

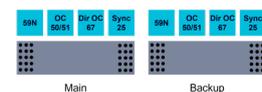
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IEC 61850 compliant: Compliance with IEC 61850 standard.
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Centralized protection and control: Centralizes up to 60 bays.
- 
Familiar engineering environment: Use of same engineering tool as SIPROTEC 5 - DIGSI 5 and IEC 61850 System Configurator.
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Proven protection algorithms: Reuse of trusted and proven SIPROTEC 5 protection algorithms.
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End-to-end cybersecurity: SIPROTEC V ensures secure, compliant operation with Role-Based Access Control, CIS-aligned hardening, and considers leading cyber security standards and guidelines such as NERC CIP/BDEW, while reducing hazards through closer merging units and minimizing commissioning risk via digital pre-testing.

From product approach ...



60+ Protection relays

... to software defined approach



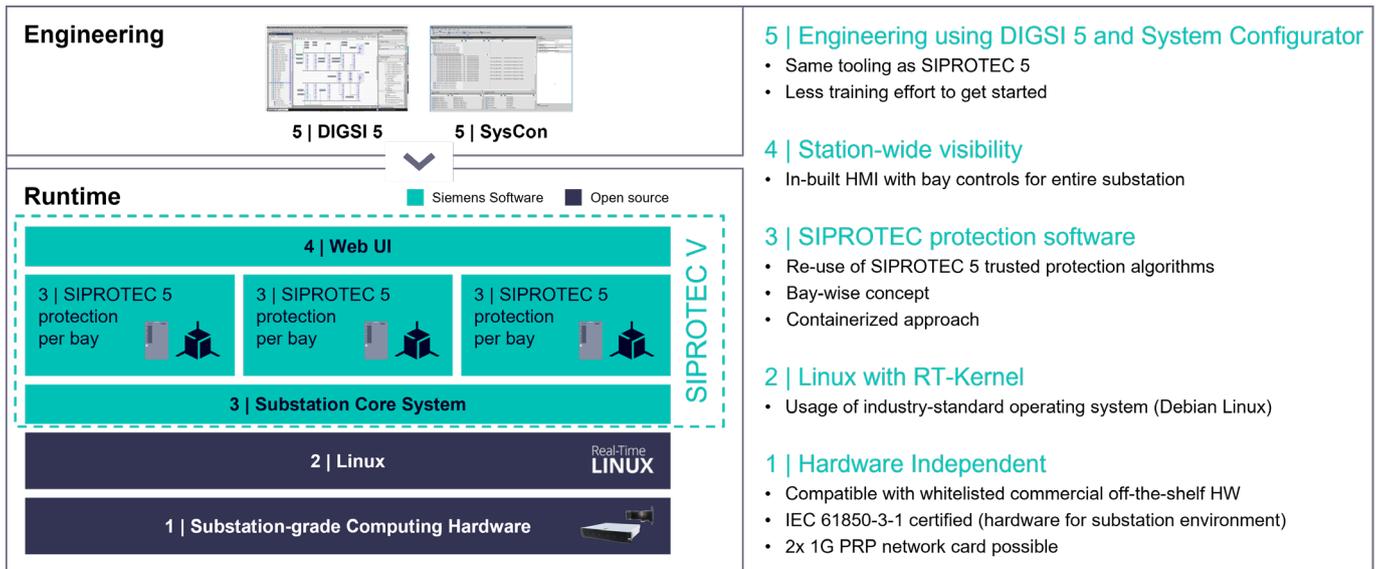
2 Centralized Protection & Control computing HW

Benefits

- Scalability:** Decoupling of protection & control software from fixed-function hardware allows applications to scale virtually – supporting up to 60 virtual IEDs on a single substation-grade server.
- Simplification:**
 - Asset management optimized:** Centralized architecture reduces hardware variants and simplifies maintenance.
 - Comprehensive pre-deployment testing:** Digital testing at the substation level minimizes errors and enables bay wise validation before commissioning.
 - Simpler patch-management and maintenance:** Modular software allows easy updates without operational disruption, increasing availability.
- Sustainability:** Centralization reduces panels and copper/cabling, lowering the physical footprint and material usage.
- Innovation & AI integration:** SIPROTEC V opens the door for integration of AI applications within the substation, unlocking predictive analytics and improved decision-making.

Product Architecture

SIPROTEC V product architecture comprises of different layers. The layers and their descriptions are shown below.



5 | Engineering using DIGSI 5 and System Configurator

- Same tooling as SIPROTEC 5
- Less training effort to get started

4 | Station-wide visibility

- In-built HMI with bay controls for entire substation

3 | SIPROTEC protection software

- Re-use of SIPROTEC 5 trusted protection algorithms
- Bay-wise concept
- Containerized approach

2 | Linux with RT-Kernel

- Usage of industry-standard operating system (Debian Linux)

1 | Hardware Independent

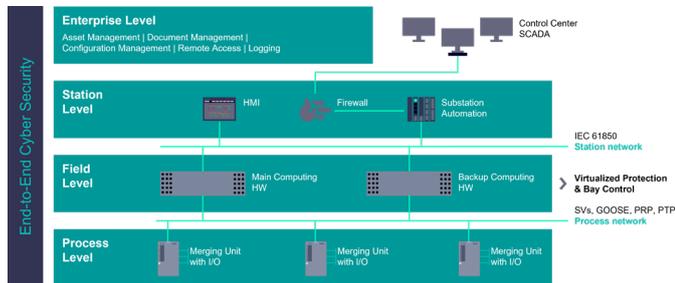
- Compatible with whitelisted commercial off-the-shelf HW
- IEC 61850-3-1 certified (hardware for substation environment)
- 2x 1G PRP network card possible

Product Delivery (Vendor Packaged Approach)

SIPROTEC V comes pre-installed with operating system and software on Siemens-approved hardware as a reliable hardware/software bundle. A software license is needed to activate desired functions.

Solution Architecture

Virtualized substations use process bus architecture with merging units, replacing field-level IEDs with hardware servers or industrial PCs.



Feature Overview

SIPROTEC V follows a bay-wise design, with each bay handling all protection, control, logic, and monitoring functions.

Key features:

- Base Functionality: Bay SLD with controls, event logs, fault recorder, CFC logics, measurements
- Communication Protocols: IEC 61850 GOOSE and MMS server, IEC 61850-9-2LE and 61869-9 SVs
- Cyber Security: RBAC, certificate management, CIS benchmark, Syslog, NERC CIP/BDEW

- Networking/Time Sync:
 - Time sync IEEE 1588/PTP (IEEE 61850-9-3 utility profile, C37.238 power profile 2011, C37.238 power profile 2017)
 - PRP and HSR redundancy
- Protection functions:
 - Line/feeder protection schemes covering distance, overcurrent, directional overcurrent, voltage/frequency, teleprotection, breaker failure, autoreclose, synchrocheck, and single-sided fault location.
 - Transformer protection with differential protection, overcurrent, thermal overload protection.
 - Protection for capacitor banks including current unbalance protection.
 - Busbar protection for various topologies including single busbar, double busbar up to 30 bays.

HMI for station-wide visibility:

- Substation-wide SLD
- Bay-wise SLD with controls incorporating RBAC
- Logging: Operational, Fault, Security
- Fault Recording
- Measurements
- Monitoring and diagnostics incl. IEC 61850 supervision
- Protection parameterization
- Signal state viewer (state of all signals in operation)
- Lifecycle management: Start/stop/test modes, update/configuration/license management, backup and restore

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[SIPROTEC V Webpage](#)

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