

SIEMENS



Always an eye to security

SIGUARD® – the perfect supervision of your power system

www.siemens.com/siguard

Answers for infrastructure and cities.

Keeping the overview



SIGUARD is a suite of innovative software solutions from Siemens that helps ensure a reliable power supply at all times. System operators benefit from the software solutions' support in making the right decisions. This support facilitates the optimum use of all assets and can lead to the prevention of unnecessary trippings and blackouts. In addition to that, the workload for strategic and day-ahead system planning can be reduced noticeably thanks to intelligent result evaluation and aggregation. SIGUARD comprises three solutions that can be used together as well as independent of each other.

SIGUARD DSA, the dynamic security assessment, analyzes possible contingencies and assesses the system stability. It provides the operator with an overview of the current and near-future state of system stability.

SIGUARD PSA, the protection security assessment, analyzes the selectivity, sensitivity, and speed of the entire protection system. It enables a rigorous protection system performance audit.

SIGUARD PDP, the phasor data processor, uses PMUs – a cutting-edge phasor-measurement technology – to observe the actual state of the power system. It monitors system variables and informs about critical system states.

SIGUARD will soon be complemented by wide-area protection and control components.



Grid monitoring with SIGUARD® PDP

Reliable system operation with wide-area monitoring
 SIGUARD PDP (Phasor Data Processor) uses synchrophasors and facilitates the fast assessment of the current system status. It immediately indicates power swings as well as transients. This helps control center staff find the causes and take countermeasures.

Applications

- Analysis of the power flows in the system
- Power swing recognition
- Evaluation of power swing damping
- Monitoring of transmission corridor loads
- Island state detection
- Retrospective event analysis
- Alarms in case of limit-value transgression, including an alarm list and color changes on the geographic network overview map
- Display of the system status as a characteristic value for the power system stability

Synchrophasor technology

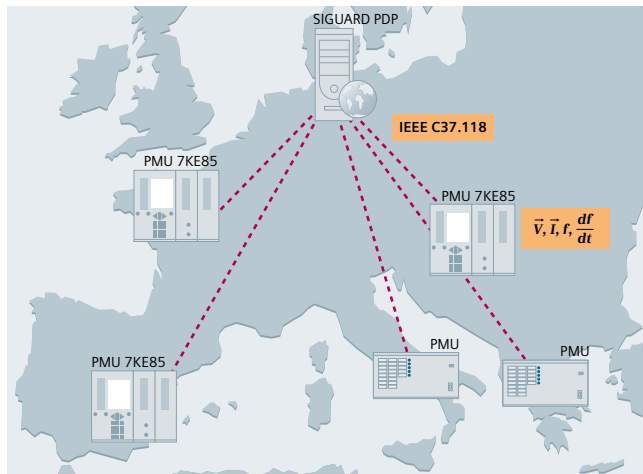
Synchrophasors are phasor-measured values. This means that the magnitude as well as the phase of the current and the voltage are measured and transmitted. A time stamp is added to the transmitted phasor-measured values, allowing the comparison of values from various network locations when they are brought together at a central point. Synchrophasors provide a dynamic real-time view of power swings and other phenomena during network operation.

Highlights

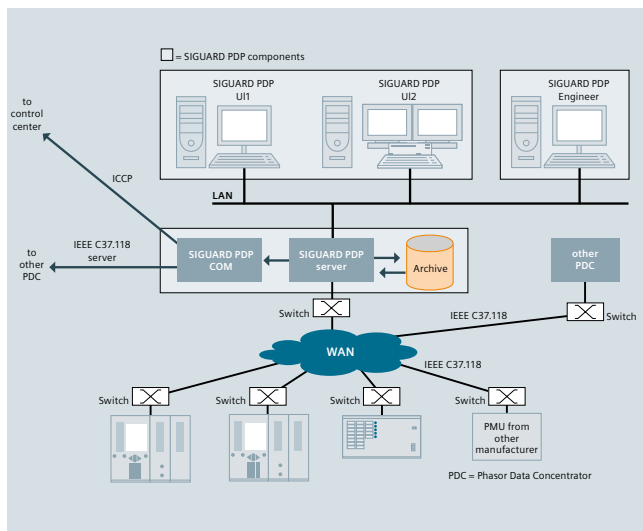
- Two monitoring modes can be selected: online mode and offline mode for the analysis of past events
- Phasor view and time-chart view can be selected for all phasors
- Calculation and display of the power system's status curve
- System monitoring, including communications link and PMU status
- Geographic overview
- Basis for fast reporting after faults
- Flexible analysis with a formula editor for calculations based on measured values
- Limit values can be changed online



SIGUARD PDP UI map



Principle of geographically distributed measured values



Structure of the SIGUARD phasor data processing system

Dynamic security assessment with SIGUARD® DSA

Network security

Power system stability plays an increasingly important role in system operation and planning today. The stability limits of these systems are often reached far earlier than their thermal or rated limits. Plus, the growing complexity of power systems increases the risk of blackouts. This means that network operation cannot rely on data acquisition and static n-1 analyses only.

Dynamic Security Assessment

The highly sophisticated algorithms of the PSS® Product Suite perform dynamic contingency simulations. The computation power required for this is scalable from a single laptop all the way to computation clusters. The dynamic stability problems

- transient stability,
- voltage stability, and
- oscillatory stability

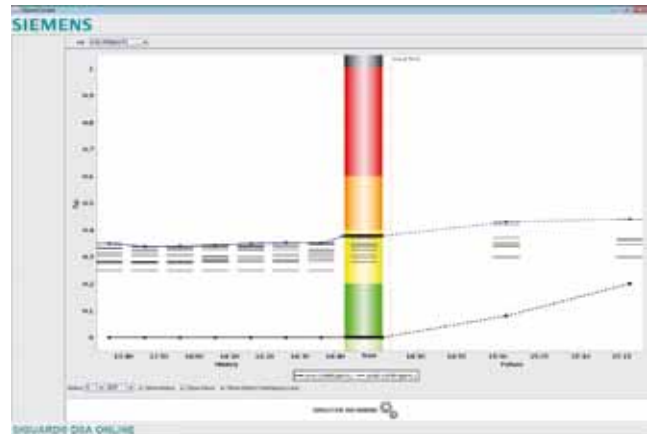
are taken into account. The high-speed simulation engine makes it possible to analyze the entire range of stability issues ahead of real time – with a single tool that uses a single system model. Cascading outages caused by system dynamics can be observed and analyzed with the embedded protection simulation in order to prevent blackouts of the power system.

Solution and service

The solution includes customization and integration of SIGUARD DSA into any IT environment. The adaptation and long-term maintenance of the power system model as well as consulting services are offered.

Highlights

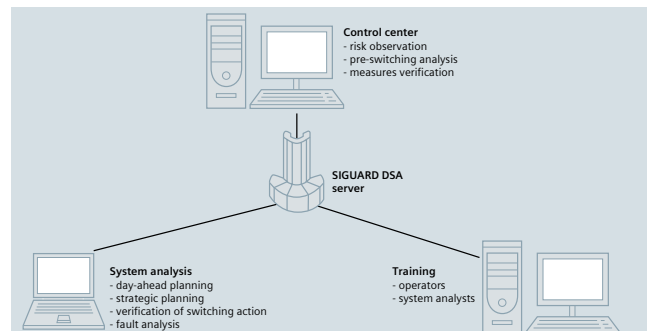
- Early recognition of stability problems
- Find proper and verified measures to keep the system stable
- Increase security and utilization of transmission system
- Platform-independent, multiuser ability, Web applicability
- Meets control room requirements (security, redundancy)
- Extremely fast and accurate even for the largest power systems



Cockpit for program navigation and clear risk level overview

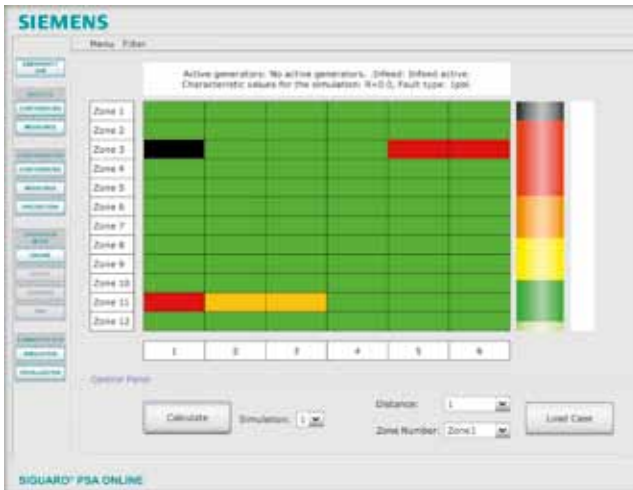


Detailed result representation for system analysts

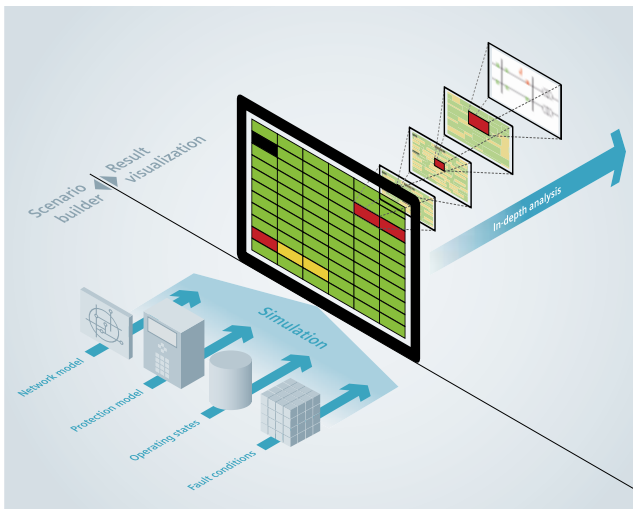


SIGUARD DSA overview and fields of application

Protection security assessment with SIGUARD® PSA



System protection selectivity fingerprint



Data aggregation and in-depth analysis

Protection and network security

Protection systems are crucial for system security because they limit the impact that faults have on power systems. Continuously evolving power systems and quickly changing operating conditions make it a complex task to calculate, verify, and validate protection settings. Rigorous protection security assessment that takes into account all relevant network, operating, and fault conditions is required to review the adequacy of protection settings. Such protection security assessments should be carried out in regular intervals and only automated solutions can manage them efficiently.

Protection security assessment

SIGUARD PSA offers a comprehensive protection security solution that comprises:

- Network and protection data management (including data collection and update)
- Network and protection simulation
- Protection security assessment, such as the detection of non-selectivity and of hidden as well as critical faults
- Online result visualization and documentation
- Protection-setting improvement

SIGUARD PSA enables protection engineers and operators to perform fast protection security assessments for reliable protection-setting determination, secure system operation, and of cascading trippings prevention.

Solution and service

The solution includes customization for application in planning, operation, and training. Protection system audits and certification are offered as consulting services.

Highlights

- Concise and detailed depiction of protection system performance by fingerprint analysis
- Relief from time-consuming simulation tasks
- Prevention of avoidable supply interruptions
- Identification of incorrect settings and limitations of the protection system
- Improvement and verification of new settings

Published by and copyright © 2013:
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Order No. IC1000-G220-A139-V1-4A00

AL=N ECCN=N

Printed in Germany

Dispo 6200, c4bs No. 767

fb 5615 WÜ WS 07132.0

Printed on elementary chlorine-free
bleached paper.

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