

Compliance Solutions

for NERC protection and control standards

NERC PRC-027-1 – Coordination of Protection Systems for Performance During Faults

At a glance

The goal of the North American Electric Reliability Corporation (NERC) Reliability Standards is to protect and maintain the reliability of the North American Bulk Electrical System (BES). The NERC Protection and Control (PRC) standards ensure that system protection is coordinated and designed properly.

The NERC Reliability Standard PRC-027-1 requires transmission owners, generator owners, and distribution providers (that own protection systems) to maintain the coordination of Protection Systems installed to detect and isolate faults on

BES Elements so those Protection Systems operate as intended during faults.

Requirements and measures

There are three notable requirements outlined in this standard.

- **Requirement R1** mandates that each transmission owner, generator owner and distribution provider establish a process for developing new and revised Protection System settings for BES Elements so those Protection Systems operate as intended during faults. This entails a review and update of the short-circuit model data for the

BES Elements under study, and a review of the developed Protection System settings.

- **Requirement R2** requires that a protection system coordination study be performed at least once every six calendar years, and/or compare current fault current values to an established fault current baseline. A protection system coordination study must be performed when the comparison identifies a 15 percent or greater deviation in the values at a bus to which the BES Element is connected.
- **Requirement R3** calls for each transmission owner, generator owner and distribution provider to utilize its process established in R1 to develop new and revised Protection System settings for BES Elements.

Our solution

Protection performance assessment with Siemens Power Technologies International's (Siemens PTI) SIGUARD® PSA enables protection engineers to automatically simulate, assess and improve selectivity, sensitivity and speed of the protection system performance for different network and operation conditions. For this purpose SIGUARD® PSA is offered as both software solution and consulting service.

SIGUARD® PSA supports the whole workflow from data collection, network and protection simulation and assessment to setting improvement. The underlying state of the art protection security assessment method is practice-proven and was deployed successfully for protection system reviews in transmission and distribution systems worldwide. The application of the protection security assessment has the following workflow:

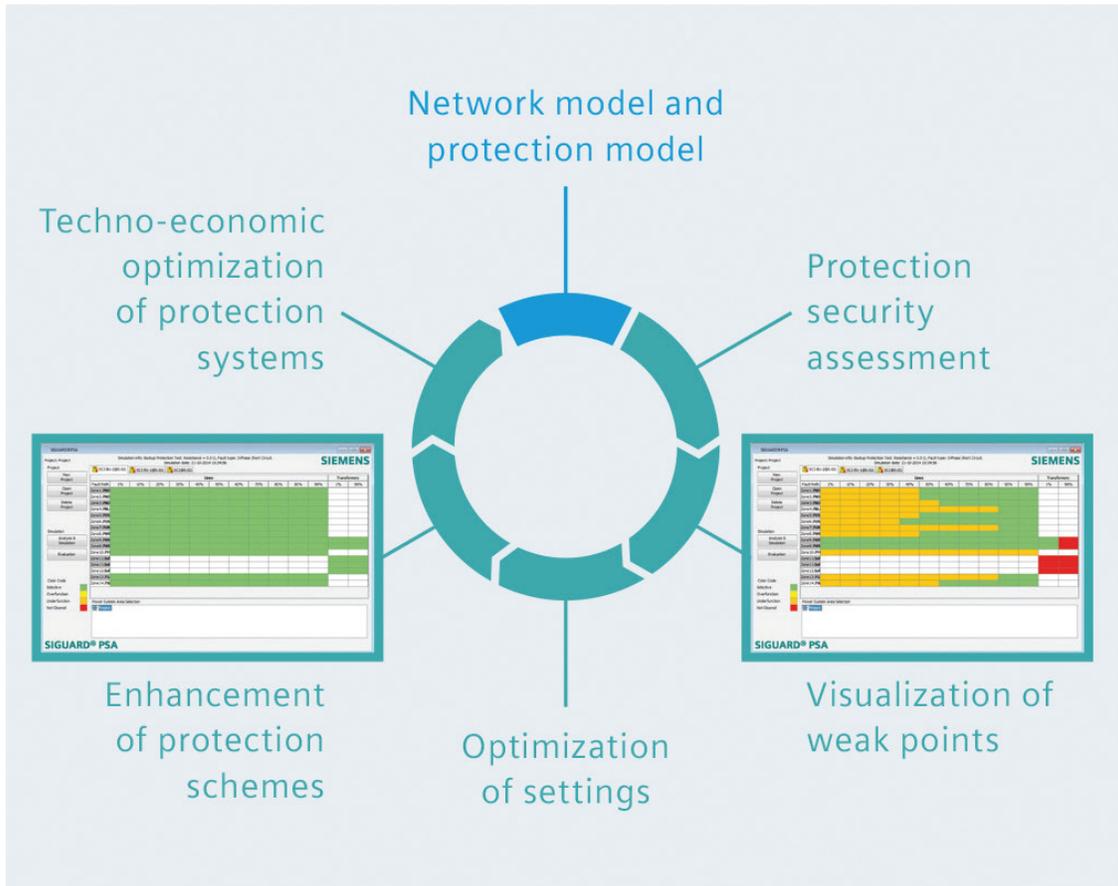


Figure 1: Continuous system-wide assessment of the protection system performance

Solution to support NERC PRC-027 compliance

Whether you are seeking consulting services, a software solution, or a combination of both, Siemens PTI can provide support your needs for compliance with NERC PRC-027-1 using SIGUARD® PSA. We offer a custom and flexible solution to fit your needs, including model development and maintenance, coordination rule creation and verification, and results analysis and verification.

SIGUARD® PSA offers NERC PRC-027-1 on the following aspects:

1) Requirement R1

- Electronically available short-circuit model data and protection data can be directly imported into SIGUARD® PSA. Alternatively, there are easy-to-fill data collection spreadsheets facilitating the data collection process.
- SIGUARD® PSA has multi-level data plausibility check tool to eliminate obvious data errors. This ensures high quality network and protection data.

In summary, SIGUARD® PSA helps to optimize both data management and reliable assessment of short-circuit an protection models.

2) Requirement R2

- SIGUARD® PSA can perform automated simulated of fault clearance sequence and protection device behavior on system-wide basis.
- SIGUARD® PSA can automatically summarize simulation results in color-coding. Simulation results are presented in layers to allow detailed analysis. All currents, voltages,

and impedances measured by protection devices are reported for explanation of the protection system behavior.

- SIGUARD® PSA can manage short circuit fault current calculation on system-wide basis.

In summary, SIGUARD® PSA assesses a large number of fault scenarios systematically and automatically. The visualized simulation results allow precise identification of issues associated with protection coordination.

3) Requirement R3

- SIGUARD® PSA can automatically improve or correct problematic protection settings based on pre-defined rules. The protection settings can also be optimized on system-wide basis.
- When no selective protection coordination can be achieved with improved settings, SIGUARD® PSA can clearly indicate that an adjustment of the protection scheme is necessary.

In summary, SIGUARD® PSA facilitates the automated protection coordination study and minimizes the need for individual manual treatment of special cases.

North American transmission owners, generator owners and distribution providers seeking a timely, cost-effective and proven solution can leverage Siemens PTI's vast industry expertise, from planning through operations, to comply with the PRC-027-1 reliability standard with a customized solution that fits their needs.

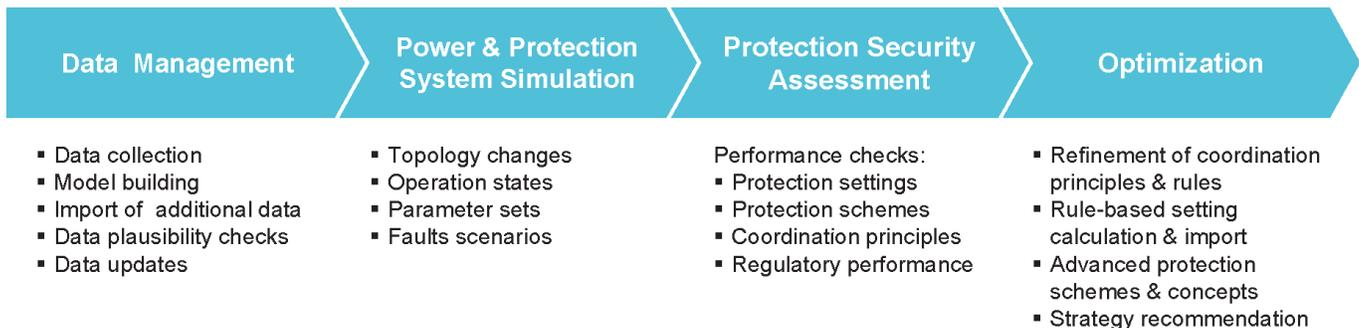


Figure 2: Flexible solution options to support NERC PRC-027-1 compliance

How to get started

For more information, contact Siemens PTI consulting sales at +1-518-395-5000 or send an email to: pti-consulting.ptd@siemens.com.

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