# Innovative Solutions for NERC PRC-027-1

NERC PRC-027-1 requires protection engineers to be proactive in validating protection systems on an ongoing basis. Doble and SynchroGrid have teamed up to provide an innovative solution to assist power and utility companies in achieving compliance through automation.

## Compliance **Challenges**

Companies in the electric power industry face many challenges in complying with NERC PRC-027-1. In an already busy environment, these organizations must now find a way to establish a consistent process for developing relay settings, performing periodic wide area coordination studies of the entire system and conducting in-depth examinations of the short circuit case information. These tasks combined are an enormous undertaking and require more resources and experience than most utilities can provide. In addition, they are intensely time consuming, laborious, and expensive, adding an immense load to an already busy staff.

# State-of-the-Art **Solutions**

Given the tremendous amount of resources needed to comply with this standard, it is imperative for power and utility companies to use an automated process. SynchroGrid's SARA (Setting Automation Relay Assistant) and Doble PowerBase™ offer a cutting-edge solution for NERC PRC-027-1 by automating time settings calculations, reducing time spent on calculating and reviewing data, eliminating the error-prone process of copying and pasting, and generating comprehensive report documentation.

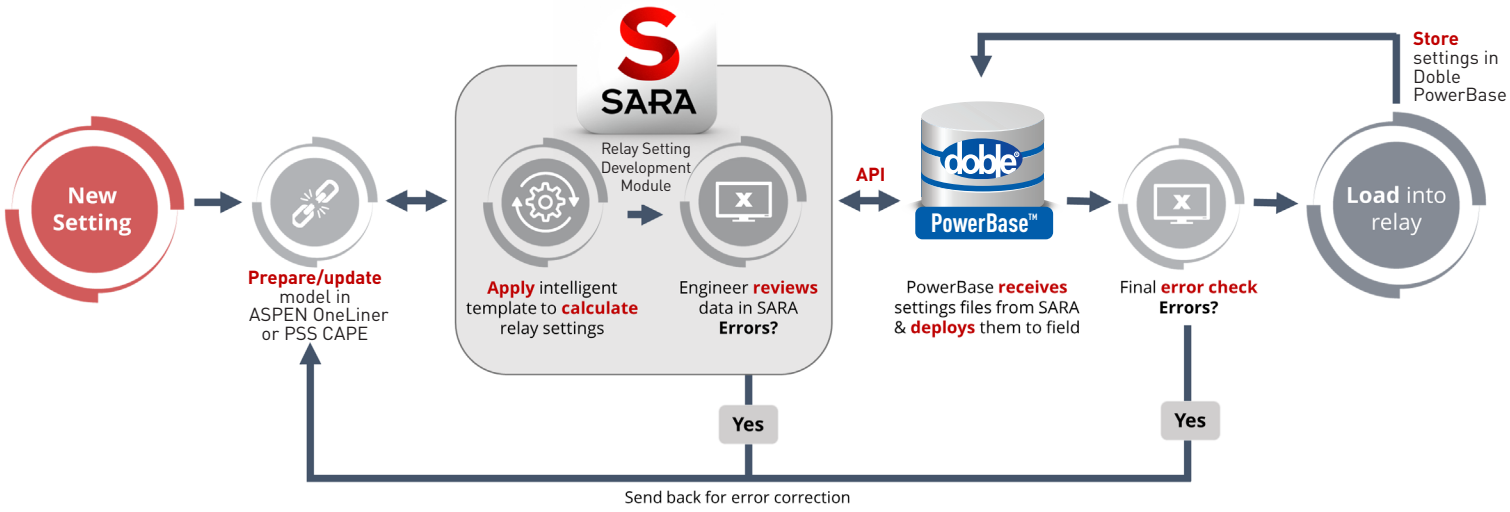
SARA and Doble PowerBase empower utilities to establish a streamlined process for relay setting development by automating the conventional workflow and simplifying the review process. This new, automated workflow involves SARA retrieving information from Doble PowerBase, communicating with the short circuit model (such as ASPEN OneLiner™ or PSS®CAPE) to auto-calculate faults, and generating a relay setting file and user-friendly reports for NERC compliance documentation.

SARA and Doble PowerBase also provide an efficient, automated solution for conducting wide area coordination studies, reducing the rigorous task of validating the model, analyzing the data and tracking violations. In addition, Doble PowerBase tracks, stores, and retrieves the latest settings minimizing unnecessary time spent on retrieving data.

By combining the benefits of both products, utilities are presented with a streamlined solution from relay setting development to wide area coordination, ensuring compliance with NERC PRC-027-1.

# Meeting Requirement One

Requirement 1 (R1) states that power and utility companies need to have a well-defined and well-documented relay settings development process. This process will consist of an accurate model, a defined protection philosophy, a rigorous review process, and the documentation of the relay settings data. SARA and Doble PowerBase provide a streamlined solution for R1 which removes risk-prone copy and paste processes and simplifies compliance through SARA's Relay Setting Development Module.




## Complying with R1 begins by preparing the model within a short circuit program such as ASPENOneLiner or PSS CAPE. The latest data can be automatically retrieved from Doble PowerBase, minimizing time spent preparing new settings.

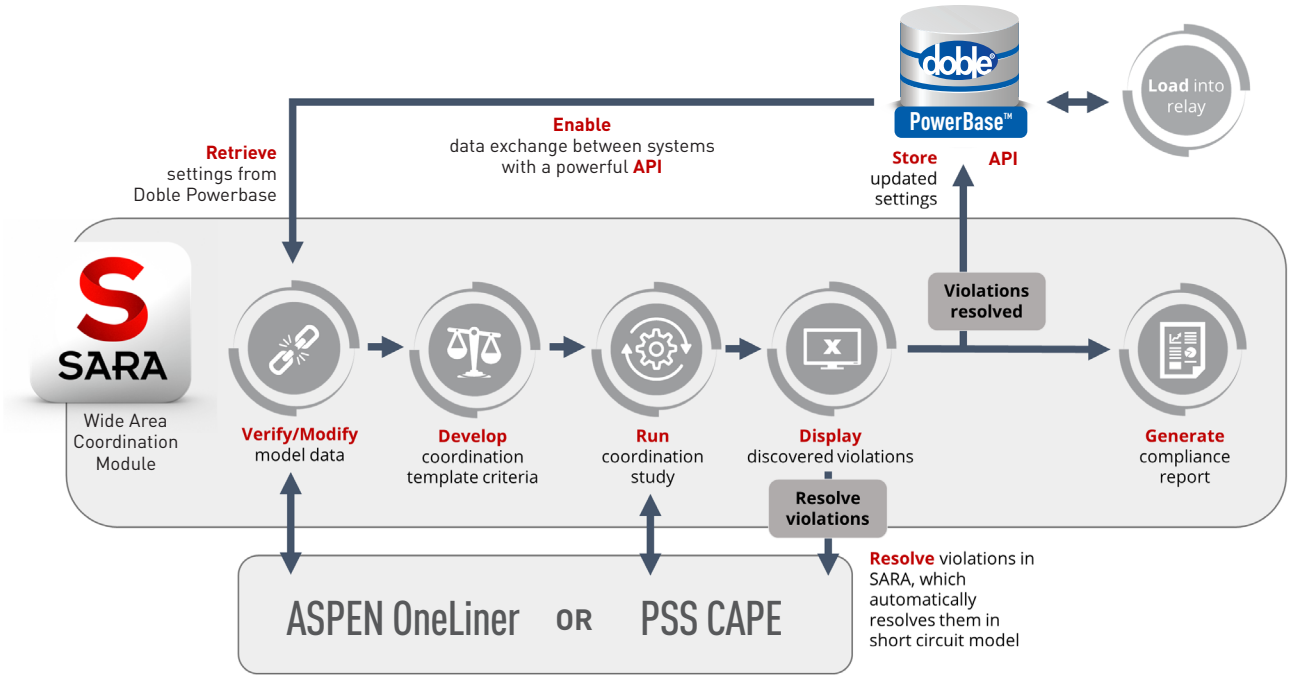
The engineer can then use a SARA intelligent template to create a set of equations and construct fault study specifications that define the utility's protection philosophy. When the template is run, SARA will bi-directionally communicate with the short circuit program to automatically populate data, and it will then export the results to an RDB file, minimizing the risk of any potential causes of human calculation errors or errors caused by transferring data.

SARA also systematizes the review process, allowing the review engineer to fully visualize the exact settings equations and values together with fault computations, thus reducing time spent on revising data. Through simple navigation within the software, the engineer can track the development process and evaluate specific settings without having to reapply all faults and equations a second time, as was previously required by the manual process.

After any settings changes are resolved, they will be sent to the field using the Doble PowerBase workflow, where the relay technician will download the new settings into the relay and check once more for errors by performing a number of injection tests on the relay. Once all the settings are verified for the final time, they will be saved back within Doble PowerBase. In addition, all settings calculations, comments, and flags will be properly documented in SARA's native file and setting report which can easily be exported into Doble PowerBase.

# Meeting Requirement Two

The purpose of Requirement 2 (R2) is to avoid mis-operations caused by dynamic changes in the power system by performing wide-area coordination studies at regular intervals. To fulfill R2 of NERC PRC-027-1, this process must be achieved using one of the three options defined in the standard. SARA and Doble PowerBase provide an efficient, automated solution for performing wide area coordination studies using either one of these options through SARA's Wide Area Coordination Module.




## Complying with R2 begins by verifying the model. After SARA retrieves the latest settings from Doble PowerBase, it can then import this data into the short circuit program to verify the model, eliminating the need for manually transporting data between the two programs.

Next, the criteria for the coordination study will be defined according to the company's requirements.

After choosing the criteria, the study can be run by applying the template in SARA. When the coordination study is run, SARA bi-directionally communicates with the short circuit program and creates a wide-area analysis of the specified region within minutes.

After completing the analysis of the system, SARA will display the discovered violations, which can be classified by study or by criteria, depending on which data the engineer would like to view. The engineer can then fix the violations within the SARA dashboard which will automatically resolve the issues in the short circuit program.

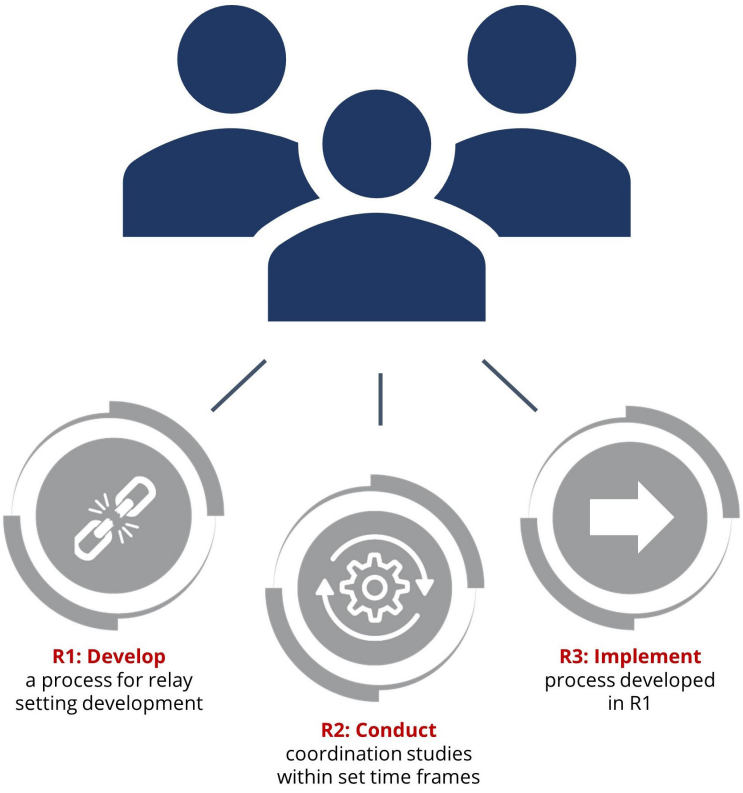
As with the relay settings development process, SARA will generate reports summarizing the discovered violations and how they were resolved, which can be used for NERC compliance documentation. SARA will also automatically update the short circuit program case with the changes required for proper coordination, reducing time spent sifting through numerous lines of data. Once the settings have been reviewed and approved, they will then be sent back to Doble PowerBase to be deployed to the field within the workflow process.

# NERC PRC-027-1 Consulting Solutions

While SynchroGrid and Doble have teamed up to provide integrated software solutions for NERC compliance, SynchroGrid also provides consulting solutions for NERC PRC-027-1. SynchroGrid has helped numerous power and utility companies develop an established workflow from relay setting development to wide area coordination.

The collaboration with Doble Engineering strengthens this consulting capability by bringing Doble's extensive protection testing, development, knowledge and experience to the team.

SychroGrid's methodical workflow utilizes well-defined protection philosophies, sanitizes and verifies the short-circuit model, and includes a thorough review process using automation scripts to crosscheck results and ensure reliability. In addition, if companies choose to use SynchroGrid's consulting solution, SARA is deployed as part of the overall project.




The wide area coordination study required by NERC PRC-027-1 produces enormous volumes of raw data, making it nearly impossible for an engineer to analyze and review the results. SynchroGrid has established a process for completing these coordination studies with the help of automation, which filters the data into user-friendly formats that can be easily reviewed and analyzed to determine issues and violations that need immediate attention.

The reports produced by SynchroGrid also prioritize the discovered issues from highest to lowest, allowing the engineer to focus their attention on the largest issues first. In addition, SynchroGrid provides comprehensive, well-organized documentation for all steps of the compliance process to ensure that all reporting requirements are achieved.

For more information on the collaboration between Doble and SynchroGrid, please visit **www.doble.com/PRC-027**.

SynchroGrid
Achieving Simplicity in System Protection

# About SynchroGrid

SynchroGrid is an innovative power engineering consulting company that specializes in system protection, providing the exceptional level of talent, experience, and innovation necessary to enhance the reliability of the power system. SynchroGrid's consulting services include the following:

- Relay setting development
- Relay coordination studies
- Protection & control
- Substation design
- Arc flash studies
- NERC Compliance
- Standardization of drawings & settings
- Customized automation solutions

# About Doble

The team at Doble Engineering Company ensures reliable, safe and secure power for all. We do this by providing comprehensive diagnostics and engineering expertise for the energy industry.

Founded in 1920, Doble is committed to the continuing education of our customers, and the support and training of the next generation of power industry workers – uniting the utility sector for an innovative future.

Doble serves customers around the globe; our companies and product lines include Manta Test Systems, Morgan Schaffer and Vanguard Instruments.