



PRC 027-1: An Automated Solution for CAPE/ASPEN Users

What are the Requirements?

R1. Establish a process for developing new and revised protection system settings.

R2. Perform a protection system coordination study or compare present fault current values to an established base line.

R3. Develop new & revised protection system settings by following your process.

Does your organization need to implement PRC-027-1?

Yes, if you are a:

- ◆ Transmission Owner;
- ◆ Generation Owner; or
- ◆ Distribution Provider that owns Protection Systems installed for the purpose of detecting Faults on BES Elements.

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Coordination of Protection Systems for Performance During Faults

PRC-027-1 is on track for approval by FERC in Early to Mid 2017. When this new NERC requirement goes into effect, utilities will be required to perform periodic reviews of their Bulk Electric System (BES) relay settings to ensure proper coordination between relays, including relays that are applied on tie lines with neighboring utilities.

Quanta Technology offers an automated solution for all **CAPE and ASPEN** users that *considerably* reduces the time spent in complying with this requirement and in documenting and demonstrating compliance. By combining our expertise in system protection analysis, applying the advanced protection modeling and simulation features in CAPE or ASPEN with other tools that we have developed in-house over several years, Quanta Technology is able to offer an elegant solution to meet PRC-027-1 requirements.

When does PRC-027-1 go into effect?

Effective Date: 24 Months after approval by FERC.
Time to Implement: 72 Months (6 years) from Effective Date.

What are the PRC-027-1 requirements?

The standard imposes three requirements (encapsulated in Figure 1), that:

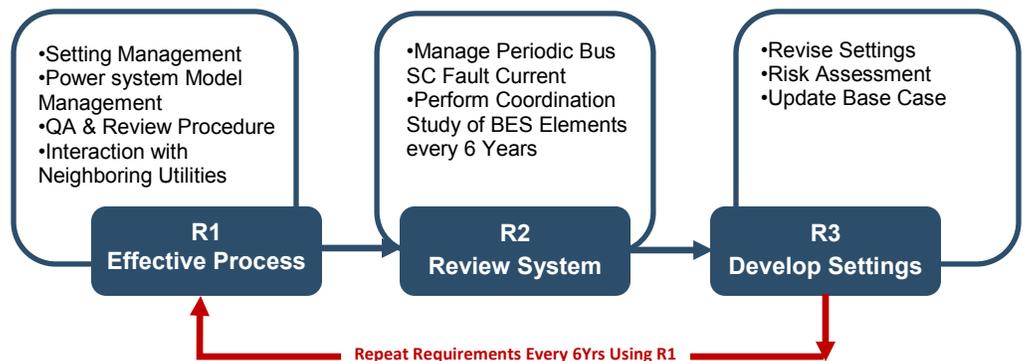
R1. Establish a process for developing new and revised protection system settings for BES elements such that the protection systems operate in the intended sequence during faults.

R2. This requirement applies to BES element protection system functions wherein either the fault current is used to develop settings or coordinated operation with other protection systems is required. For such protection systems, the standard provides three options:

- Perform a protection system coordination study in a time interval not to exceed six years, or
- Compare present fault current values to an established base line and perform a protection system coordination study when the comparison identifies a deviation greater than 15%, all in a time interval not to exceed six years.
- A combination of Option 1 & Option 2.

R3. Develop new & revised protection system settings by following the process developed in requirement R1.

Figure 1: Quanta Technology's Offerings to Support NERC PRC-027 Compliance



What should a Utility consider when deciding on how to implement PRC-027 compliance?

As the number of studies and the need to prove compliance increases, protection teams experience increased workload and therefore may want to consider improved efficiencies such as:

- Process consolidation
- Process automation through built in CAPE macros and 3rd Party tools such as Quanta's PSA (Protection System Analyser) including interface to asset management software.
- Elimination of manual processes

The result is increased efficiency of resource utilization and reduction of human errors.

Where is the best place to start?

The base case has several major components such as: the short circuit model, the relay settings, and the coordination review. In looking at each of these components, some items to consider include:

- Is my system primary model updated and correct?
- Are the relay field settings the ones available for the coordination study?
- What is the level of confidence in the system coordination in the base case?

The first two items are related to using accurate information and are associated with the process of updating the appropriate systems. The last item concerning coordination is obviously dependent on the first two, but even with completely accurate input data the overall BES system coordination is worth considering in more detail. Why?

Over the years, coordination reviews are not usually performed over a wide area. Additionally, primary system and protection system contingencies are considered in a very limited manner. Both items result in latent protection issues that need to be addressed prior to establishing the base case. The solution is to consider a Wide Area Co-Ordination Study for PRC-027 that will modernize your process to minimize time and effort for downstream reporting.

How quickly can you prove your system complies?

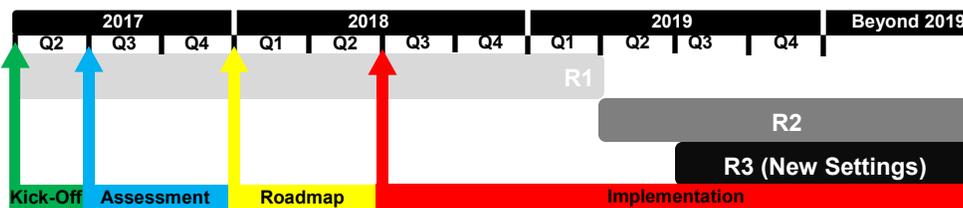
It is important to note that the effective date of the standard is the first day of the first calendar quarter that is 24 months after the date the standard is approved by FERC. Assuming FERC grants approval in early 2017, the standard will become effective in early 2019. The 6-year time interval of requirement R2 will then begin early 2019. It is also important to note that should the organization decide to use Option 2 of requirement R2, a base line case must be established by the *effective date* of the standard, which would be early 2019.

Quanta Technology suggests that the organization starts the preparation as soon as possible. We can assist in:

- reviewing your existing setting philosophy and management process
- assessing your existing network and protection models
- assessing the tools used to analyse your models

We can then make recommendations on changes that might be needed to any or all of the above so that compliance with PRC-027-1 can be achieved efficiently.

Figure 2: Quanta Technology's Offerings to Support NERC PRC-027 Compliance



A milestone schedule based on a Q2 Effective Date is shown above. An overall implementation plan includes an assessment of your current process, creation of a roadmap for implementation, a detailed timeline for the plan and implementation of the plan. We consider factors such as utility budget, priorities, resources, and the size of the BES when committing to timing. Getting started early in review of your process is a key milestone to successfully implementing PRC-027-1.

What is the Timeline?

Effective Date:

2 years after FERC approval.

Implementation Deadline:

6 years from Effective Date.

Getting Started:

Timeline to implement is a key factor, and as you would expect, to review your existing processes and tools takes time.

A plan can be created on how to move forward with the new tools and processes.

Depending on the system size, establishing a base case to review and update the system and relay data, as well as catch latent coordination issues takes time not only to perform the study but also time to correct any discovered issues.

To successfully meet the new workplace challenges and opportunities, getting started soon is the key.

About Quanta Technology:

Quanta Technology is a consulting and technology firm providing expertise, software and testing tools to solve strategic and operational problems for global energy utilities and industry. We focus on solutions for transmission and distribution in key areas of protection & control, planning, operations, asset management, as well as emerging technologies such as : distributed energy resource integration, storage and energy system automation.

Quanta Technology is a wholly owned subsidiary and technology arm of Quanta Services Inc. (NYSE: PWR).

Our Locations: Raleigh, NC headquarters and regional offices in Boston, Chicago, Oakland and Toronto, Canada.