TIP 446: CEATI – SEL: Protection System Maintenance Guide

Context
CEATI member utilities maintain their protection relays on different time intervals. Electromechanical relays are typically maintained once every 3 years. However, microprocessor-based relays vary from 3, 6, or 12 years. Moreover, what types of tests are required to verify relay functionality also vary amongst members. NERC (for utilities that own NERC applicable protection systems) has defined a minimum level of testing and frequency with which utilities must comply to avoid receiving penalties. NERC standards also dictate varying maintenance intervals for electromechanical versus microprocessor-based protection systems.

Project Description
This project intends to develop guidance for the CEATI members tasked with developing protection maintenance plans or asset management programs that will comply with NERC standard PRC-005-6. The guide will address what type of testing is required, how often, as well as how protection system designs and monitoring contribute to decreased testing frequencies while complying with NERC standards. Another consideration is when to use time versus conditioned based testing, and what that means.

SEL will define how to use a substation data acquisition gateway (RTAC) to use standardized protocols to perform “dynamic and automatic protection asset supervision, health and behavior auditing, and condition based maintenance recommendations”

The guide will support predictive alarming and the production of the necessary data to keep power system components online and avoid expensive downtime.

In addition, the data may be used to:
- Track changes in device settings,
- Compare power system measurements,
- Monitor communication channels, and self-diagnostics, Generate automated reports and log maintenance alerts

This guide will also support protection relays and scheme testing plans, provide protection design attributes that need be incorporated, as well as testing methodologies and other general recommendations.

Why It Matters
The use of SEL protection, monitoring, and communications equipment, coupled with equipment diagnostics information, improves system reliability, and enables health-based control of substation equipment. The practice of periodic maintenance in hopes of avoiding problems is replaced with real-time monitoring and management of apparatus.

The wealth of information available from the SEL solution enables utilities to perform appropriate maintenance by knowing precisely when to perform tasks based on equipment health and performance.

The RTAC can be used to turn all this asset management data into information to help maintenance personnel make timely and informed decisions.

Also, knowing what needs to be done allows field crews to arrive prepared to perform all necessary maintenance at a particular location during their visit

Goals and Objectives
The project goal is to develop standardized protection system maintenance best practices and guidance for electromechanical and microprocessor-based protection control systems. This guide will provide aid in complying with regulations and monitoring critical assets.

Deliverables
Schweitzer Engineering Laboratories, Inc. (SEL, Inc.) will provide a guidance document that will address what type of testing is required, how often, as well as how protection system designs and monitoring contribute to decreased testing frequencies while complying with NERC standards. This guide will also address protection relay and scheme testing plans, protection design attributes that need be incorporated to allow testing, testing methodologies, and general recommendations.
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Project Start Date: January, 2021
Project End Date: December, 2022

Links
CEATI Protection and Control Collaborative Program

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