

Document Title: EA005 - Using Synchrophasor Data to Analyze HVDC and SVC Response to Events Category: Event Analysis Time Horizon: Operations Assessment Party Involved: American Transmission Company Event Date: December 2018

Event Description: ATC implemented a back to back HVDC system in 2014 and a Static Var Compensation [SVC] system in 2017. We have SCADA data available from each site scanning every 4 seconds and we also have high speed fault recording at both sites but neither of these data sources provided a picture of the dynamic response of the devices to system events that was readily available.

Phasor Measurement Units were installed at both of these facilities to monitor the net output for each. As events occur the equipment response is reviewed, and oddities are investigated. The following plots show the response of each device to a significant double circuit trip event on the system as reference. Note that the SCADA data for each is also included and while it provides information on the general operation of the device the dynamic attributes are hidden.



Figure 1 – Static Var Compensator net MVAR output - derived from synchrophasor phase voltage and current data (30 samples per second) versus SCADA data (4 second sampling rate) – 45 second window





Figure 2 – HVDC net MW and Mvar output - derived from synchrophasor phase voltage and current data (30 samples per second) versus SCADA data (4 second sampling rate) – 45 second window

Operational Value

This example illustrates how synchrophasor data can provide enhanced situational awareness to Operations on the dynamic nature of the electric transmission system. By being able to observe and monitor the behavior of the response of these complex devices to system events the facility owner can better understand normal response characteristics and more easily identify when the facility does not respond as expected. Sharing these types of plots with vendors helps them to better analyze device behavior. If we can identify issues early on and start work to fix them we can potentially head off major problems.

Background

The mission of the North American Synchrophasor Initiative (NASPI) Control Room Solutions Task Team (CRSTT) is to work collectively with other NASPI task teams to advance the use of real-time synchrophasor applications for improving control room operations and grid reliability. This team utilizes its experience and regional diversity to provide advice, direction, support and guidance to NASPI stakeholders and other organizations involved in the development and implementation of real-time synchrophasor applications.

This is one of a series of operational use case documents being developed by CRSTT members to describe the various manners in which grid operators and electric utilities are using synchrophasor data to provide value in the Operations Horizon. Existing versions of these papers, along with other CRSTT work products can be found on the CRSTT page of the NASPI website (<u>https://www.naspi.org/crstt</u>).