Document Title: EA004 - Using Synchrophasor Data to Identify System Voltage Oscillations
Category: Event Analysis
Time Horizon: Operations Assessment
Party Involved: American Transmission Company
Event Date: January 2018

Event Description: We have observed significant sustained voltage oscillations on the ATC transmission system that were not visible in our SCADA data. These oscillations are normally in the 0.6 – 0.75 Hz range and are lightly damped. They can persist for weeks and then disappear for weeks and even months.
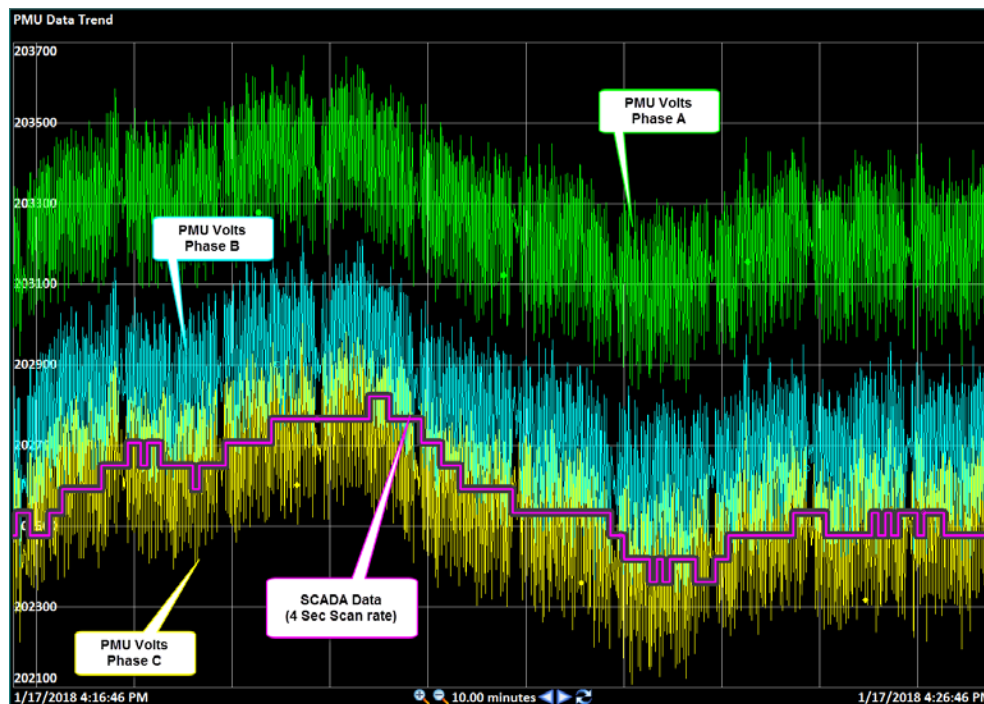

Figure 1 – Synchrophasor phase voltage data (30 samples per second) versus SCADA data (4 second sampling rate) – 10-minute window
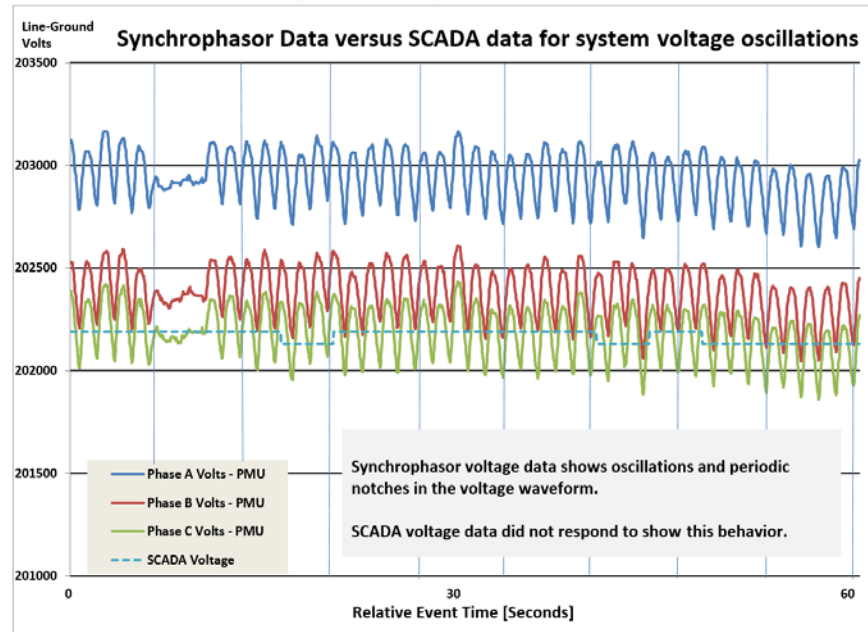
Line-Ground Volts
Synchrophasor Data versus SCADA data for system voltage oscillations

Phase A Volts - PMU
Phase B Volts - PMU
Phase C Volts - PMU
SCADA Voltage

Synchrophasor voltage data shows oscillations and periodic notches in the voltage waveform.

SCADA voltage data did not respond to show this behavior.

Relative Event Time [Seconds]

Figure 2 – Synchrophasor phase voltage data (30 samples per second) versus SCADA data (4 second sampling rate) – 1-minute 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 different oscillatory modes we can start to make determinations when things are changing and moving to an area that could potentially cause system stability issues.

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 (https://www.naspi.org/crstt).