A Dynamic Training Environment for Synchrophasor Applications

Jay Giri, Robert Fairchild, & Jean-Marc Moulin,
ALSTOM Grid, Inc., Redmond, WA, USA
Fred Howell & Lei Wang,
Powertech Labs Inc., Surray, BC, Cananda

Abstract

The utility industry at large has made significant investments in Wide Area Monitoring Systems (WAMS) and synchrophasor technology in recent years with now well over 4,000 Phasor Measurement Units (PMUs) globally. By some estimates, in North America alone, the PMU installations have grown several-fold over the past five years from approximately 200 research-grade units to over 1,700 production-grade devices. Worldwide, China has the largest PMU installation with an estimated 2,300 PMUs, while India has embarked on a country-wide synchrophasor deployment project with over 1300 PMU installations at 351 substations along with associated applications and visualization at 34 control centers across the country. This trend is only expected to accelerate as applications expand to harness this new source of information.

The traditional Dispatcher Training Simulator (DTS) has been adequate for SCADA-based EMS applications, and has served its purpose since the 1980s. With the introduction of synchronized measurements, conventional operator training tools need to be revisited. Operators need to be trained on the new class of "measurement-based" (and "model-free") analytics that utilize the sub-second PMU data and provide new metrics such as oscillatory mode damping which are related to grid stability.

Alstom has been collaborating with Powertech on extending its existing DTS infrastructure towards an advanced training simulator that is capable of simulating and streaming sub-second PMU type data at every bus to drive the PMU analytics and visualization. The fundamental difference between the traditional DTS and the advanced training simulator is that power system simulation engine is replaced with a transient stability simulation engine leveraging Powertech's Transient Security Assessment Tool (TSAT). Such a dynamic training environment to familiarize and train operators is very much needed as we roll-out the synchrophasor technology into control centers globally. Our presentation will provide an overview of the project, its objectives, and underlying architecture behind the dynamic DTS.