Synchronized Waveform Measurement and Applications in Power Systems

Summary
Synchronized power system measurements, particularly synchronized phasor measurements, have received a lot of attention recently for wide area situational awareness and various other functions. Phasors, however, effectively filter out a lot of information that may be useful for other applications, particularly in the presence of power system disturbances and heavy deployment of inverter-based resources (IBR). Waveforms, depending on sampling rate/resolution, provide a more granular and authentic representation of voltage and current in power systems. With the recent advancements in grid sensor technologies, synchro-waveforms open the door for a more advanced power system monitoring, situational awareness, and system performance assessment. Areas of particular interest are asset monitoring, incipient fault detection/location, protection, as well as control. Faster synchro-waveforms also can play a critical role in monitoring inverter-based resources (IBR), their dynamics and their responses to system disturbances.

In this presentation, Dr. Rahmatian will give an overview of advanced voltage and current sensors providing synchro-waveforms and their potential application, with focus on grid resiliency. The presentation will be focused on one or two applications, i.e., accurate fault location and high-frequency harmonics detection near IBRs.

Speaker
Dr. Rahmatian is a co-founder and president of NuGrid Power Corp. He has contributed to several techniques for power system measurement and automation over the past 30 years. He is a Professional Engineer and a Fellow of the IEEE for contribution to optical voltage and current sensors. He is a past Chair of the IEEE Power & Energy Society’s (PES) Technical Council, active at PES Power System Relaying and Control as well as Power System Instrumentation and Measurements committees. He is also active in CIGRE (Distinguished Member), IEC, and NASPI (North American Synchrophasor Initiative). His present technical focus is on wideband optical sensors, synchronized measurement systems, digital substations, integration challenges of distributed energy resources, high-speed measurement of voltage and current, traveling-wave-based fault location, and grid resiliency efforts. Farnoosh has over 100 technical papers and 12 patents to his credit.