IEEE Task Force on Big Data Analytics for Synchro-Waveform Measurements

Status: approved by BDA sub-committee, pending final approval by AMPS

Inaugural Officers:

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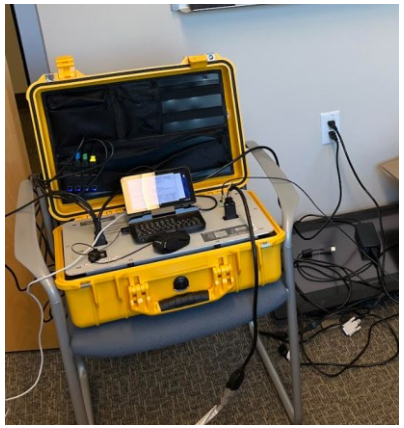
- Jhi-Young Joo, Lawrence Livermore National Laboratory
- Alireza Shahsavari, San Diego Gas and Electric

Contribution to Existing Activities

- Waveforms are the most authentic representation of voltage and current in power systems.

- With the latest advancements in power system sensor technologies, it is now possible to obtain time-synchronized waveform data, i.e., ***synchro-waveforms***, from different grid locations.



- By collecting data at a much higher reporting rate than synchro-phasors, synchro-waveforms create a new challenge in Big Data Analytics (BDA) in power systems.

Contribution to Existing Activities

- The only TF or Working Group (WG) across any sub-committee in IEEE PES that focuses on big data analytics for synchro-waveforms.

- Relevant TFs and WGs
  - TFs and WGs on synchro-phasors, including data transfer, applications, and standardization, do not cover synchro-waveforms (phasors versus waveforms).
  - TFs and WGs on power quality and power quality data
    - Traditional waveform analysis for power quality applications
    - Missing key aspects of data analytics for synchro-waveform applications.

This new TF is specifically concerned with the BDA challenges and opportunities, and the fact that synchro-waveforms are simultaneously obtained from many locations, time-stamped, and often collected through continuous data streaming.

Mission

- Promote big data analytics methodologies and applications of high-resolution waveform and synchro-waveform measurements in power systems, facilitate the industry acceptance of this new data-intensive technology, identify challenges and opportunities, and encourage academic and industry collaborations.

Scope

- Identify and promote new BDA methods for waveform and synchro-waveform data
- Identify and promote new applications for BDA for waveform and synchro-waveform data
- Identify and promote opportunities for collaboration among academia and industry
- Provide a platform for industry practitioners to share experience and lessons learned
- Facilitate access to real-world waveform and synchro-waveform data to promote research
- Close the gap between synchro-waveform BDA and other BDA domains, such as synchro-phasor BDA to promote a more comprehensive view to BDA in power systems.

Technical Needs

- High*er*-resolution data
  - For example, a three-phase waveform measurement unit (WMU) reports 7,962,624,000 readings per day (at 256 samples per cycle). As such, big data analytics is even more crucial.
  - High-speed, for real-time ingestion and analytics.

- High*er*-volume data
  - Data storage, compression
  - Analytics and interface to translate the data into actionable information and use cases

Developing new methods, tools, and techniques to ingest, store, and analyze waveform and synchro-waveform data in power systems is critical.

Planned Activities [A] and Outcomes [O]

- **[A1]** Developing a platform to promote R&D on BDA for synchro-waveforms
- **[A2]** Developing a white paper on road-map for BDA for synchro-waveforms
- **[A3]** Creating opportunities to share data and code for BDA for synchro-waveforms
- **[A4]** Promoting the applications of BDA for synchro-waveforms among the utility industry
- **[A5]** Webinars and tutorials on BDA for synchro-waveform data analysis and applications
- **[A6]** Panels at PES conferences on BDA methods and applications for synchro-waveforms

Potential Core Members

- Hamed Mohsenian-Rad, UC Riverside, USA
- Jhi-Young Joo, Lawrence Livermore National Lab, USA
- Alireza Shahsavari, San Diego Gas & Electric, USA
- Wilsun Xu, University of Alberta, Canada
- Steven Blair, Synaptec, UK
- Yang Weng, Arizona State University, USA
- Deepjyoti Deka, Los Alamos National Lab, USA
- Ruilong Deng, Zhejiang University, China
- Mario Paolone, EPFL, Switzerland
- Chris Mullins, Power Monitors Inc., USA
- Alvaro Furlani Bastos, Federal University of Viçosa, Brazil
- Mladen Kezunovic, Texas A&M University, USA.
- James Follum, Pacific Northwest National Lab, USA
- Alex McEachern, McEachern Labs, USA
- Carlo Muscas, University of Cagliari, Italy
- Surya Santoso, University of Texas at Austin, USA
- Hanif Livani, University of Nevada Reno, USA
- Innocent Kamwa, Laval University, Canada
- Yilu Liu, University of Tennessee, Knoxville, USA
- Mohasinina Kamal, Southern California Edison, USA
- Mir Mousavi, Sentient Energy, USA
- Walmir Freitas, University of Campinas, Brazil
- Evangelos Farantatos, EPRI, USA
- Panos Moutis, Carnegie Mellon University, USA
- Jeremiah Miller, Sense Inc., USA
- Lei Chen, Peking University, China

Potential Core Members

Interested to be a member of this TF? Please send an email to

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