DisTT Fall 2019 Goals and Action Plan

Our goal is to produce a well-researched study describing the needs and priorities for transmission and distribution operators for using time-synchronized measurements.

The Distribution Task Team has already identified a number of distribution specific use cases for synchrophasor data, some of which are described in further detail on 2-page Use Case papers, and others in the 2018 White Paper. A list of these use cases is below. Since distribution-level synchrophasor measurements are a relatively new data source, the Task Team's thinking on this has been largely informed by an academic research perspective. An important next step is to clarify specific needs and priorities as experienced and described by industry practitioners.

Our plan is to conduct a **series of focused interviews** (draft below) with transmission and distribution operators to ascertain the most important areas where time-synchronized measurement data can have a major near-term impact.

We also want to expand the scope of **time-synchronized measurements** under consideration to include

- synchrophasor data (i.e., 30-120 Hz frames reporting rms magnitudes and phase angles at various accuracies)
- time-synchronized data (e.g., rms magnitudes time stamped to within a fraction of a second, at various reporting rates)
- point-on-wave data (e.g. time domain waveform with kHz sampling, time stamped, streaming or archival)

In our study, we aim to relate the highest-priority expressed use case needs to the measurement data requirements. The successful study will inform decisions to deploy available measurement technologies to address urgent real-world needs, as well as the further development of measurement technologies to better respond to these needs. The term "measurement technologies" here includes sensor hardware, data platforms, and analytic software.

Distribution Use Cases

Two-page Use Case papers have been written by DisTT in previous years on the topics below. These are presently ripe for expansion:

- DG-load disaggregation
- Equipment Health Diagnostics (OLTCs)
- Phase Identification
- Fault Location
- Microgrid Automation

Additional use cases discussed in the 2018 DisTT White Paper include

- Event detection and identification (more generally)
- DG monitoring
- Fault detection
- Model validation
- Cyber-attack detection
- State Estimation
- Topology identification

New use case possibilities

- DER induced feeder power oscillation/resonance
- Issues related to customer self-generation (PV and Battery Energy Storage). *(Note: This is a take-off of the suggestion on page 9 of the "Reference Document for micro-PMU installation" paper as part of the ARPA-E DE-AR0000340 contract)*
- High speed community centric generation dispatch *(Note: Think community choice aggregation without the use of the CAISO)*
- Fire Risk Mitigation (Broken Conductor, falling conductor)
- Total Harmonic Distortion of circuits with ultra-high speed uPMU's

Proposed order of Priority 6/27/2019

1. Fire Risk Mitigation Topics
2. DG - Load disaggregation
3. DG Monitoring
4. Distribution system state estimation & model validation
5. Equipment Health Diagnostics
6. Microgrid automation

Draft Operator Questions for Discovery of concerns to real-time operations

1. What are the most challenging events on the distribution network that synchronized measurement data would assist you in addressing?
2. What Fire Risk Mitigation Strategies are employed by your utility? Could synchrophasor data facilitate better decision making for what and where to employ these strategies?
    a. Public Safety Power Shutoff?
    b. Falling / Broken Conductor?
    c. High Impedance Arc-Fault detection?
    d. Optical recognition of point-source fires?
3. Are distributed energy resources (PV, Battery Storage) posing challenges in the operations of circuits? If so, what specifically concerns you?
4. Is there value-added in validating distribution network models with empirical data derived from synchrophasors? If so, what times of data and examples of system configurations would be most useful (i.e. circuits with lots of industrial load or renewables distributed)?
5. How is equipment health currently being monitored for CBM and would synchrophasor data assist in the identification of events local to equipment that induce unnecessary stress be useful?
6. Does your utility employ microgrid solutions and would synchrophasor data assist in the deployment and enabling/disabling of such resources for use on the distribution network?