



Distribution Task Team (DisTT)

Co-Leads: Sascha von Meier

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Background / Motivation

Synchronized measurements exist mainly at the transmission level today, for good reasons:



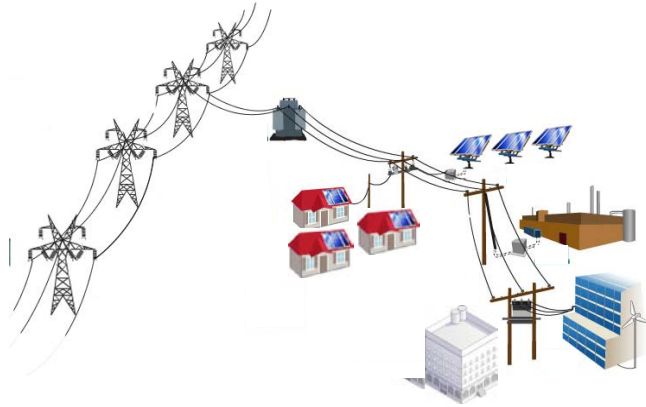
1. No need to monitor traditional, passive distribution systems
2. Distribution systems may require more precise measurements to give useful information
3. Cost-value proposition

Background / Motivation

Distribution systems are no longer just passive,
and divisions are blurring:

Prosumers - Utility grid

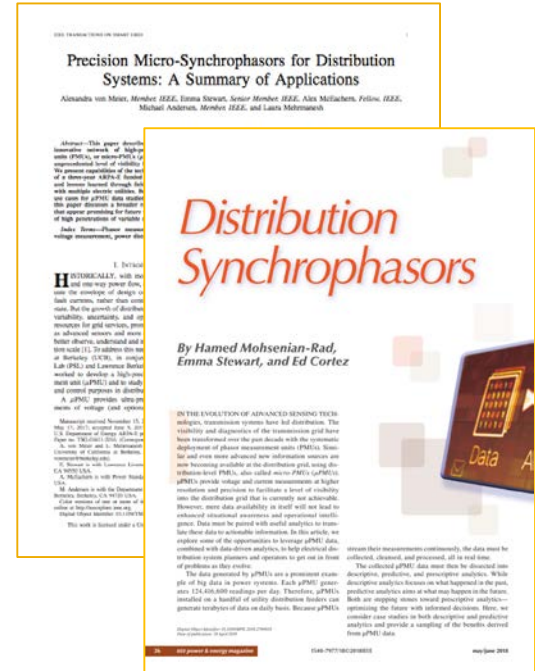
Transmission - Distribution



*Meters and substations still denote boundaries
but power system analytics must cross over*

Some Distribution PMU applications of local interest

- Event monitoring and analysis
Fault detection, fault location
- Asset monitoring
Equipment health diagnostics (tap changers, capacitor banks)
- Topology detection
Catching a falling conductor, breaker and switch status, island detection, system restoration
- Model validation
Phase ID, feeder hosting capacity for solar PV, impedance estimation
- DER Characterization
Feeder impacts of variable solar PV generation and electric vehicles



<https://ieeexplore.ieee.org/document/8340896>

<https://ieeexplore.ieee.org/document/7961200>

Some Distribution PMU applications of system-wide interest

- **Event monitoring and analysis**
Supporting wide-area diagnostics with data from behind the substation
- **Characterizing Distributed Generation**
DG-Load disaggregation to estimate actual generation and masked load behind the meter; diagnosing inverter trip behavior:
Understanding system exposure to loss of DG
- **Cybersecurity**
Cyber-attack detection through redundant monitoring
- **Control Applications**
Potential for new control strategies for DER integration and resilience (e.g. recruitment for ancillary services, intentional islanding, black start)



DisTT Past Activities

1. Work product: White paper
2. Internal presentations and discussions
3. Shared measurement data
4. Online survey

NASPI-2018-TR-001



Synchrophasor Monitoring for Distribution Systems:
Technical Foundations and Applications

A White Paper by the NASPI Distribution Task Team

January 2018

<https://www.naspi.org/node/688>



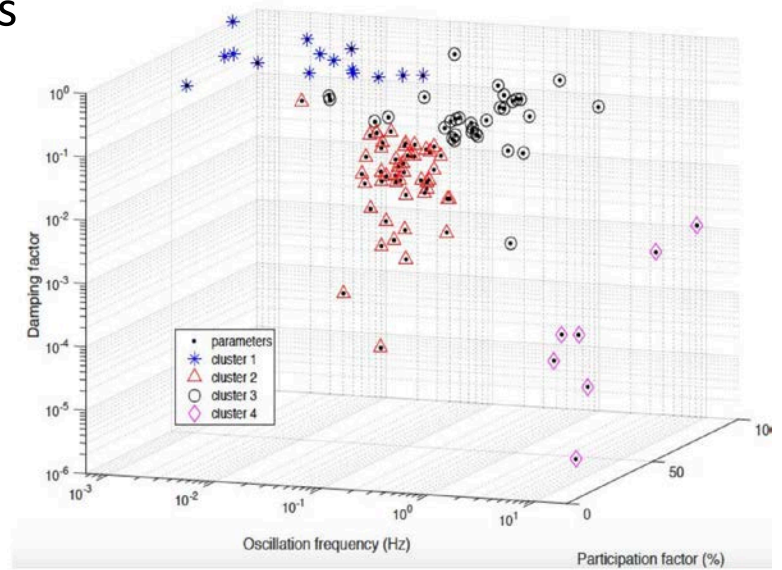
DisTT Past Activities

2. Internal presentations and discussions

Most recently

- Event detection and feature extraction (SyGMA Lab UCSD)
- Point-on-wave data (EPFL)

*Going forward:
Schedule new round of monthly webinars?*



Sai Akhil Reddy and Raymond de Callafon, UC San Diego

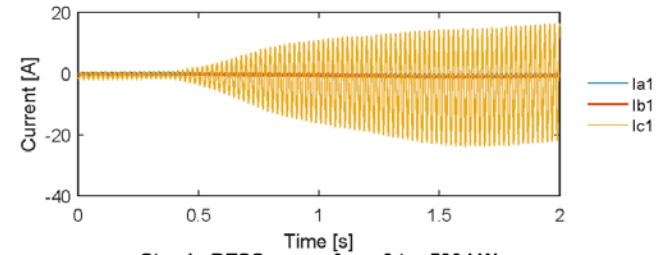
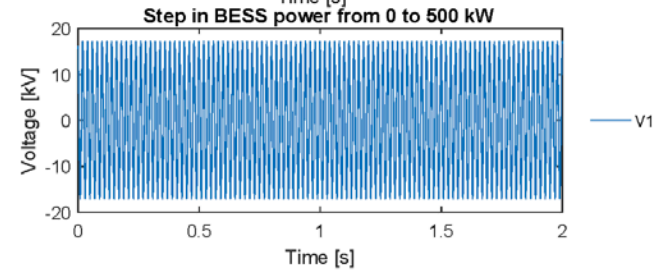
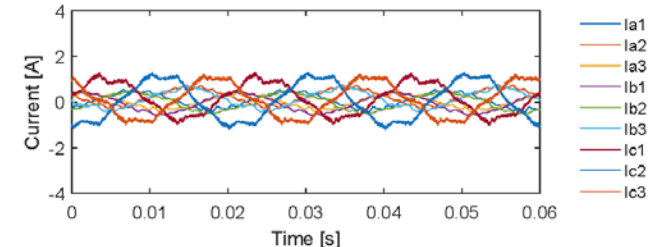
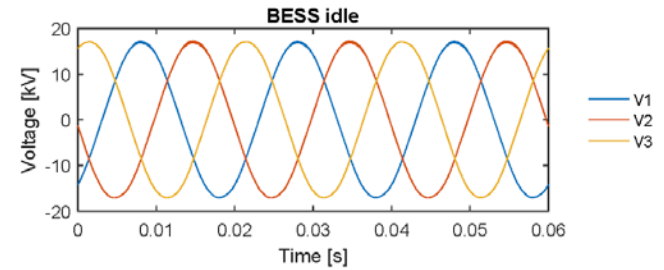
DisTT Past Activities

3. Shared measurement data

<https://github.com/DESL-EPFL/Point-on-wave-Data-of-EPFL-campus-Distribution-Network>

*Guglielmo Frigo, Asja Derviškadić, Mario Paolone,
Ecole Polytechnique Federale de Lausanne (EPFL)*

*Going forward:
Add new resources to the shared repository?*



DisTT Past Activities

4. Online survey of applications

https://docs.google.com/forms/d/1aWHT_BsEhHsIDlbzQgTbLsDeidp7CMWPqwSJzWXOhF4/viewform?edit_requested=true

Erik Desrosiers, Charles River Associates

22 respondents from 7 countries

Going forward: Re-open Survey?



North A... x Survey: Distribution PMU appli... x +

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NASPI North American SynchroPhasor Initiative

Survey: Distribution PMU applications

The purpose of this survey is to gather information that will be used in a North American SynchroPhasor Initiative (NASPI) study by the Distribution Task Team (DisTT). The information you provide will be kept confidential unless you indicate it can be shared. Respondents to this survey will be provided priority access to anonymized results and will be invited to an exclusive industry working group that includes utilities, vendors, and other organizations interested in the development of distribution system applications enabled by synchronized measurements. Some respondents may also be invited to present their applications to NASPI members at an upcoming Work Group Meeting.

Technologies of interest include any streaming, time-stamped measurements at high resolution (>1 report per second) even if they do not report phasors. Examples include control sensors, protection system based waveform instruments, and advanced feeder monitoring equipment, as well as frequency disturbance recorders, PMUs or micro-PMUs. For simplicity, this survey refers to all of the above in the context of "synchrophasors" and "PMU-based" applications.

We expect this survey will take ca. 20 min to complete. A technical manager or development engineer involved with distribution system operations would likely be best prepared to answer these questions. We would sincerely appreciate your response by October 5, so that we can discuss preliminary survey results at the NASPI Work Group Meeting in Philadelphia October 23-24, 2018. If you're not already registered, please consider joining us: www.naspi.org.

Thank you in advance for your input!

Sascha von Meier, UC Berkeley
Luigi Vanfretti, Rensselaer Polytechnic Institute
Teresa Carlon, PNNL

* Required

Name *

Your answer

DisTT Areas of Interest

- DER behavior and recruitment
- Black start and islanding, recovery from extreme events
- Event Identification, deep learning
- Optical sensors vs. potential and current transformers
- Impact of number and heterogeneity of sensors
- Defining distribution PMU data quality needs
- Understanding the value of synchronized non-phasor data, point-on-wave data



DisTT Areas of Interest

- DER behavior and recruitment
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Going forward: Form focused study groups on some of these items?

Overlapping interest with CRSTT – coordinate work?



DisTT Areas of Interest

- Defining distribution PMU data quality needs
- Understanding the value of synchronized non-phasor data, point-on-wave data

Some dimensions of data quality:

- *time resolution, reporting rate*
- *precision and accuracy of measurement and time stamp*
- *latency and continuity of data stream*

Going forward:

Produce a DisTT study focused on what we know today about data quality requirements of various applications in distribution context?

Please Do:

- email Teresa Carlon to be added to DisTT mailing list
- talk to Sascha von Meier or Dan Dietmeyer to suggest DisTT webinar topics and presenters
- provide synchronized measurement data that can be shared with colleagues
- volunteer to lead one of the study groups
- contribute to the Data Quality Requirements Study (DaQuiRiS)
- suggest other important things DisTT should do, and volunteer!