Coordination of Synchrophasor Related Activities

IEEE PES PSRC C23
(last met virtually in Sept, 2021,
next PSRC meeting January 9-12, 2022)

Presented by:
Allen Goldstein
Chair
Phasor Measurement Systems

PMUs in Distribution Systems: WG C41: Report

Timing standards
IEEE 1588 or C37.238 or IEC 61850-9-3*

Communication standards
IEEE C37.118.2
IEC 61850-90-5
ICCP

Measurement standards
C37.118.1
IEC 60255-118-1*

PDC Guide – IEEE C37.244
PDC Standard IEEE PC37.247*

Installation, calibration, test guide:
C37.242

Other utility PDC

Substation PDC

Data storage standards
IEEE C37.111
COMTRADE

* Not yet released

GPS

Real Time Monitoring & Alarming

Future real-time controls

Off-line Dynamics Analysis

Phasor Data Concentrator

Data Storage

3rd Party EMS

IEEE 1588 or C37.238 or IEC 61850-90-5 ICCP

IEEE C37.118.2
IEC 61850-90-5
ICCP

* Not yet released
IEEE PES PSRC Activities

• C23: Coordination of Synchrophasor Related Activities
• C28: C37.242 IEEE Guide for Synchronizing, Calibration, Testing, and Installation of PMUs – Accepted by RevCom, now in final-final edit.
• CTF46: Prepare a summary transactions paper on C37.242 – becoming a working group. Meets monthly
• H40 C37.1.2 Databases used in Utility Automation Systems
• C41: Investigate Measurement Performance Requirements for PMUs in Distribution System Applications – Draft a report. - meets regularly, expected completion 1 year from now.
• C40: Tutorial on C37.247 Standard for Phasor Data Concentrators (possibly at PES General Meeting)
• H50: Requirements for Time Sources in Protection & Control Systems
IEEE PES PSCC activities

- P1: Std. Profile for ... 1588... in Power Systems...Amendment adding a TLC for leap second.
- P8: Recommended Mapping Approach between IEEE C37.118.2 and IEC 61850
  - Available now at IEEE Resource Center
- P9: Revision of C37.118.2 Synchrophasor Data Transfer for Power Systems
  - Sponsor Ballot expected 2022: please indicate interest on IEEE SA website
  - Possible ballot in 2022
- P16 & T&D: P1864 Review by PSCC/T&D for Communications and Cyber Security Requirement
- P20: Joint revision of IEC 61850-9-3 (IEEE 1588) Power Utility Profile
- S5: Revision of IEEE C37.240 Cyber Security Requirements for Power System Automation, Protection and Control Systems
- S8: P2658 Guide for Cybersecurity Testing in Electric Power Systems
- S15: Guide for Securing Generic Object Oriented System Events (GOOSE) and Sampled Values (SV) Protocols of IEC 61850 using IEC 62351-6 and IEC 62351-9
  - Particular interest to NASPI is R-GOOSE and R-SV security.
NASPI past work

• **CRSTT:**
  – Using Synchrophasor Data to Determine Disturbance Location.
  – Using Synchrophasor Data for Oscillation Detection.
  – PMU versus SCADA Video Events Library.
  – Time synced measurements training for operators.

• **DNMTT:**
  – NASPInet 2.0 Architecture Guidance (led by PNNL’s Dr. Taft)
  – Utility survey of those collecting PMUs for architecture structure and analytics interface.

• **PSRVTT:**
  – Categorizing Phasor Measurement Units by Application Data Requirements.

• **DisTT:**
  - Synchronized Measurements and their Applications in Distribution Systems: an update
  - DG-Load Disaggregation Use Case
  - Equipment Health Diagnostics Use Case
  - Fault Location Use Case
  - Phase Identification Use Case
  - Wildfire mitigation webinar

• **EATT:**
  – Data Mining Techniques and Tools for Synchrophasor Data.
  – Integrating Synchrophasor Technology into Power System Protection Applications.
  – Phase Angle Calculations: Considerations and Use Cases.
NASPI current work

**CRSTT:**
- System Inertia Monitoring use case.
- Time synchronized measurements *simulation* training virtual course. Hope to get the course face to face again as the country opens.
- Coordination with DisTT.
- Michael Cassiadoro stepped down as a co-lead and replaced by Cody Parker (SPP).
- NASPI WG Spring 2022 panel session with operations personnel presenting.

**DNMTT:**
- Synchrophasor Archive and Network Strategy Task Force (SANSTF) co-led by Laurel Dunn and Manjari Asawa are working on a Synchrophasor Application-Based Guide for Archive and Network Strategies (SABGANS).
- Renewed focus on data exchange formats, naming conventions and clock issues.
- Investigation of network architecture for synchrophasor edge computing solutions.
- Looking for new co-lead.
NASPI current work

• **DisTT:**
  – Use Case documents development with CRSTT.
  – Provided feedback on “Distribution Synchronized Measurements Roadmap” – Draft Final Report, Quanta Technology and Oak Ridge National Laboratory.

• **EATT:**
  – Shaun Murphy stepped down as co-lead and was replaced with Matthew Rhodes.
  – Continues to make progress on the white paper, “Advanced Model Validation & Calibration” led by Honggang Wang.

• **PSRVTT:**
  – Survey of PMU connected instrument transformers.
  – Development of three white papers nearing completion:
    o Survey of Existing PMU applications Around the World and Classification.
    o Analyzing Synchrophasor Performance Requirements for Synchrophasor based Control Applications.
    o Data Quality Impacts on Synchrophasor based Control Applications.
NASPI Work Group

• Completed the NASPI 2021 Webinar Series on:
  – merging units
  – synchrophasor cybersecurity for grid operations
  – digital voltage and current sensors
  – system inertia monitoring
  – FOA 1861 awardee report updates
  – human factors, human-machine teaming.

• IEEE-NASPI Oscillation Source Location Contest.
• “Phasors or Waveforms: Considerations for Choosing Measurements to Match Your Application” Report, Jim Follum (PDF).
• NASPI Work Group Virtual Meeting and Vendor Show, October 5-7, 2021 (details here).
Discussions and new business

• “High speed measurements” (focus on IBR (load as well as gen.))
  – Just POW or other processed info (high-speed phasors?)
  – Goodness of Fit
    • Synchrophasors are a form of signal compression (lossy)
• Advanced Networks (technologies on the horizon (MPLS, etc.)
• Applications of the measurements (AI, ML, Data Mining, etc.)
  – What data needs to be archived? (compression?)
    • What about retrieval?
• Cybersecurity – both streaming and archival
  – Not particularly applicable to NERC – should be discussed
    • How do we pass data between organizations? CIP compliance
• How do these map to PES work?
Thank you
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