Standards Associated with Synchrophasors

Anthony Johnson
Chair PSRC C23
Coordination of Synchrophasor Related Activities
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Many of these documents originated in the NASPI organization.
Phasor Measurement Systems

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

Communication standards
- IEEE C37.118.2
- IEC 61850
- IEC 60870-6 ICCP

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

Installation, calibration, test guide
- C37.242

Substation PDC

Phasor Data Concentrator

Data storage standards
- IEEE C37.111
- COMTRADE

Other utility PDC

3rd Party EMS

Real Time Monitoring & Alarming

Future real-time controls

Off-line Dynamics Analysis

Data Storage

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

* Not yet released
Standards and Guides – Released

• IEC 61850-90-5
  – Addresses new communication requirements to take advantage of IEC 61850 environment (includes cyber security features)
  – Joint efforts by IEC, IEEE, DOE, NIST, NASPI PSTT, users and vendors
  – Incorporated into IEC 61850 Standard

• IEEE C37.118.1-2011* (from IEEE C37.118)
  – Measurement of and requirements for synchrophasors, frequency, & rate of change of frequency (ROCOF)
  – C37.118.1a-2014 includes changes to ROCOF requirements
  – Certification possible via ICAP

• IEEE C37.118.2-2011* (from IEEE C37.118)
  – Communication of phasor measurements, message format

* Indicates an approved document that is under revision
Standards and Guides – Released

• IEEE C37.238-2011*
  – The standard profile for use of Precision Time Protocol (IEEE 1588 Ver. 2) for transferring precise time over Ethernet for power system applications

• IEEE C37.111-2013 COMTRADE (IEC 60255-24, Edition 2)

• IEEE C37.242* Guide for Synchronization, Testing, Calibration and Installation of PMUs:
  – Combination of three NASPI PSTT Guides
  – Testing and calibration at the NIST Laboratory

* Indicates an approved document that is under revision
Standards and Guides – Released

• IEEE C37.244 Guide for PDC Requirements:
  – PDC functional requirements
  – Communication Needs & Requirements
  – Test techniques to verify core Functional Requirements
  – Supports both IEEE C37.118.2 and IEC 61850-90-5
  – http://standards.ieee.org/findstds/standard/C37.244-2013.html
Standards and Guides in Process

- IEEE PSRC Work Group H11 with IEC - IEC 60255-118-1 under TC 95: IEC synchrophasor measurement standard
  - Based on IEEE C37.118.1
  - Includes use of data from digital instrument transformers (merging units)
  - Joint IEC (TC 95) / IEEE (PES-PSRC) effort

- IEEE PSRC Work Group H24 - Revisions to IEEE C37.238-2011
  - The standard profile for use of Precision Time Protocol (IEEE 1588 Ver. 2) for transferring precise time over Ethernet for power system applications
Standards and Guides in Process - Continued

• IEEE PSRC Work Group H21, “Mapping between IEEE C37.118.2 and IEC 61850 synchrophasor systems” – on going
  – Will describe use cases, conceptual architecture, and the general mapping considerations
  – Will define the standard mapping of individual data objects, related configurations and naming conventions, and data and message conversion methods

• IEEE PSRC Work Group C19 - PC 37.247, “Standard for phasor data concentrators for power systems”
  – Started in 2013
  – Refining C37.244 (PDC Guide) to develop a PDC standard

• IEEE PSRC Work Group C28 - Revision to IEEE Std. C37.242
  – A PSRC Task Force approved to create a WG to revise C37.242 (Guide for testing and installation of PMUs)
Standards and Guides in Process - Continued

• Substation Work Group C20 Use of Databases in Substation Automation Systems - Home of Synchrophasor historian work.

• IEC 61869 Series of standards includes stand alone Merging Unit and Electronic Transformers which may provide Sampled Value input to PMU algorithm
Other Relevant Standards / Guides

Approved


- **IEEE C37.239-2010**, IEEE Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems


- **NERC CIP 2-11**, Version #5
Other Standards

• IEEE C37.118-2005 IEEE Standard for Synchrophasors for Power Systems
  – Superseded by IEEE C37.118.1, IEEE C37.118.1a
  – Superseded by C37.118.2
  – Recommendation is to not use. Still available to provide reference.