



Update on Standards Development and Implementation

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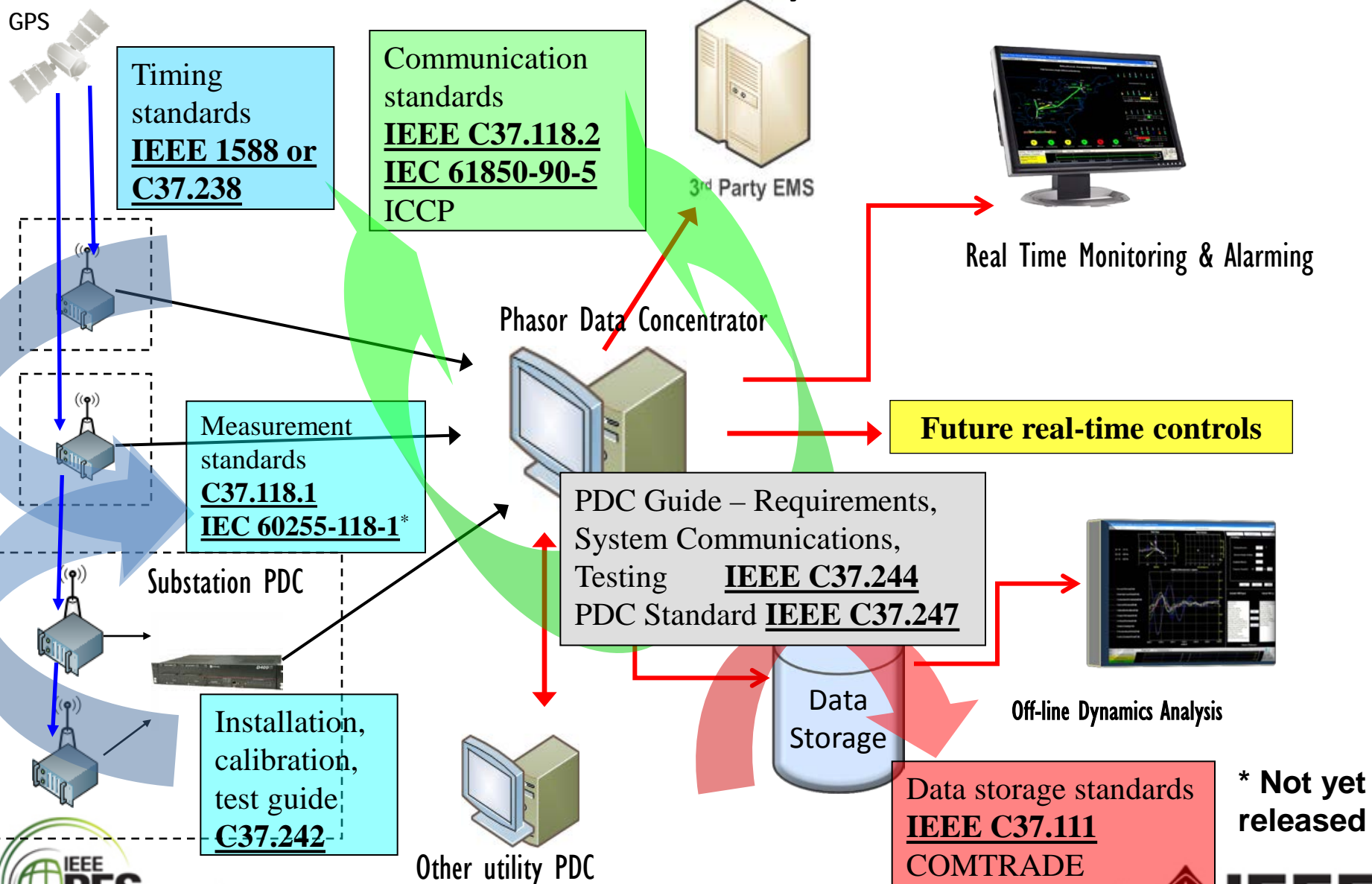
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Phasor Measurement Systems



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
 - Interoperability tests at proof-of-concept facilities have been essential
- IEEE C37.118.1 (from IEEE C37.118)
 - Measurement of and requirements for synchrophasors, frequency, & rate of change of frequency
- IEEE C37.118.2 (from IEEE C37.118)
 - Communication of phasor measurements, message format
- IEEE C37.238
 - The standard profile for use of Precision Time Protocol (IEEE 1588 Ver. 2) for transferring precise time over Ethernet for power system applications
- IEEE C 37.111 and IEC 60255-24, Edition 2 (Dual Logo) COMTRADE Standard

Standards and Guides in Process

- IEEE PC37.118.1a - Amendment 1 to C37.118.1-2011
 - Changes are minimal but address important points:
 - Fixes typos and clarifies wording
 - Relaxes or suspends ROCOF (so it does not drive designs)
 - Fixes Ramp test & further defines procedure for better consistency
 - Simplifies & clarifies Latency tests
 - Small changes in a few performance requirements
 - Improves model in annex – now meets all requirements
 - First ballot completed Oct 17; 13 comments to resolve
- IEC 60255-118-1 under TC 95: IEC synchrophasor measurement standard
 - Based on IEEE C37.118.1 - not expected to be very different
 - Work will start in January 2014

Other Relevant Standards / Guides

Approved

- IEEE 37.232-2007, *Recommended Practice for Naming Time Sequence Data Files*
- IEEE 37.239-2010, *Standard for Common Format for Event Data Exchange (COMFEDE) for Power Systems”*
- NERC CIP 2-9, Version #5

In process

- PC 37.240, “Standard for Cyber Security Requirements for Substation Automation, Protection and Control Systems”

Standards and Guides Released – Fast Track

- IEEE C37.242 Guide for Synchronization, Testing, Calibration and Installation of PMUs: ***Started 5/2010, Published 3/2013***
 - Combination of three NASPI PSTT Guides
 - Testing and calibration at the NIST Laboratory
- IEEE C37.244 Guide for PDC Requirements: ***Started 5/2011, Published 5/2013***
 - PDC functional requirements
 - Communication Needs & Requirements
 - Test techniques to verify core Functional Requirements
 - Supports both IEEE C37.118.2 and IEC 61850-90-5
- IEEE P1815.1 Standard for Mapping Between IEEE 1815 (DNP3) and IEC 61850

New IEEE PSRC Standards and Guides

- IEEE PSRC H21, “Mapping between IEEE C37.118 and IEC 61850 synchrophasor systems” – just started
 - Develop an IEEE Standard or Guide for mapping between IEEE C37.118 standards and IEC 61850-90-5 / IEC 61850
 - 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
- PC 37.247, “Standard for phasor data concentrators for power systems”
 - Started in 2013, completion expected in 2015

IEEE PES PSRC CTF23:

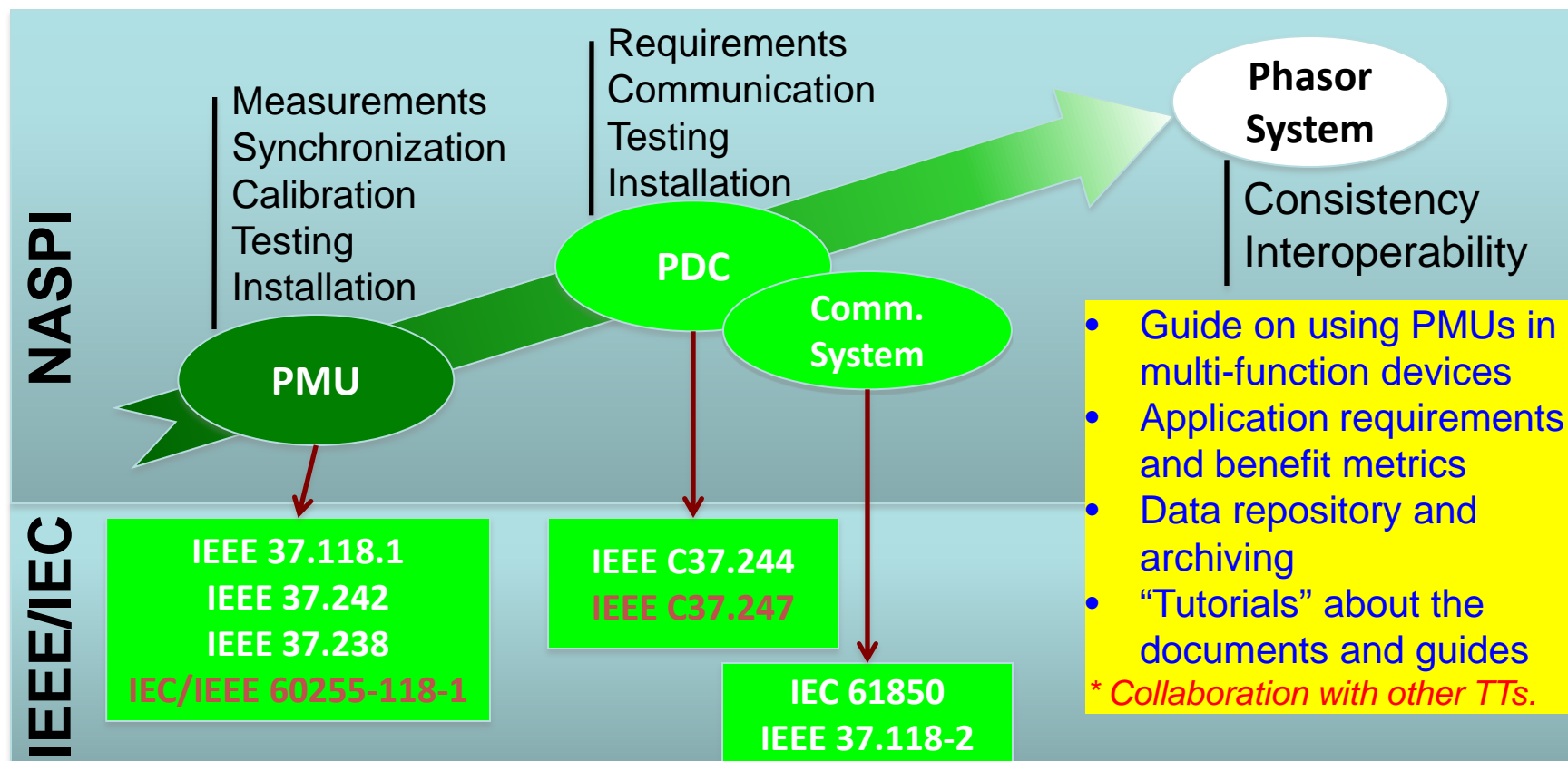
Coordination of Synchrophasor Related Activities

The Standing Task Force will provide three main functions:

- Liaison with NASPI (specifically the PSTT successor) to keep the PSRC in sync with the changes and needs in the industry with respect to the development and usage of PMU devices.
 - Formalize transfer process of PSTT developed documents to PES PSRC including making recommendations which PSTT activities should be transferred to IEEE reports, guides and standards.
- Make recommendations to PSRC for assignments that would require the creation of working groups in PSRC and also recommend what the output of those working groups might be (Guides, reports, etc.) based on the needs of the industry.
- Coordinate related activities with other IEEE PES committees (e.g. PSIM)

Chair: Jim O'Brien (Duke Energy)

Synchrophasor System Standards/Guides Roadmap



NASPI North American
SynchroPhasor Initiative

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION



NIST

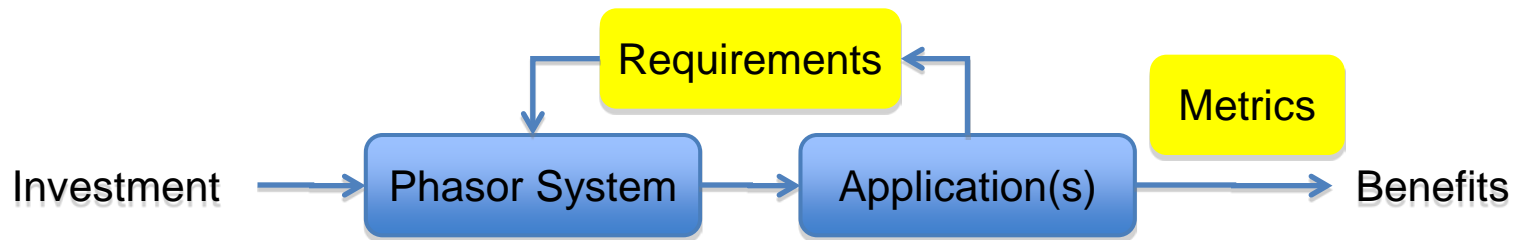


PSTT Initiatives

- Participate in ICAP* Synchrophasor Conformity Steering Committee for PMU certification.
- PSTT Task Force on PMU Certification Process
 - Presented to NASPI February 20, 2013.
- Coordination with IEEE PSRC (CTF23) and IEEE PES Technical Council
- Guide on Application Requirements and Benefit Metrics - Phasor Return on Investment (ROI)
- Guide on Data Archival Systems
- Guide on Using PMUs in Multi-Function Devices
- Synchrophasor System Tutorials

Guide on Phasor Application Requirements and Benefit Metrics (*Phasor “ROI”*)

- **Scope:** Develop a guide for developing phasor system specifications and evaluating benefits of intended phasor applications - Defining phasor Return on Investment (ROI)



- **Background:** Post-SGIG needs investment from utility companies to sustain phasor development. This guide will help them to determine their ROI in decision making
- **Status:** Defined requirements and metrics. In the process of writing the guide.

Guide on Phasor Data Archival Systems

- **Scope:** Develop a guide that addresses the following topics:
 - Archiving system hardware requirements
 - Data types and categorization
 - Data Management and Administration
 - Data query and reconstruction
 - Data compression
 - Testing, training, and information dissemination
 - Cost vs. performance
- **Background:** Multiple formats for phasor data archiving exist, limiting data sharing, storage capabilities, portability, and interoperability.
- **Status:** Outline developed. In the process of writing the guide.

Guide on Using PMUs in Multi-function Devices

- **Scope:** Develop a guide on the use of phasor functions in multi-function devices.
- **Background:** More and more multi-function devices (relays, DFRs, ...) provide phasor functions. Concerns exist about availability, interference, resource competition, and cyber security.
- **Status:** Draft developed. In the process of review via regular teleconferences.

Synchrophasor “Tutorials”

- **Scope:** Develop a series of tutorials based on PSTT-developed documents and IEEE/IEC standards as well as today’s practices.
- **Background:** Documents and standards exist on individual topics. Users want a systematic view of synchrophasor technology.
- **Status:** Developed tutorial outline.
- Target to present the tutorial at IEEE PES different venues
 - ISGT International (November 2013)
 - ISGT (February 2014)
 - T&D (May 2014)
 - GM (General Meeting, July 2014)

Proof of Concept (POC) Facilities

- Risk management : Identifies and remedies product and system integration issues
- A conduit to the industry standards
- Tests have resulted in:
 - Identification of gaps and solutions related to standards
 - Remedied product and system integration issues with potential for serious delays during field installation and commissioning
- Fine tuning applications for functionality and performance
- Transition from development to operation for training future users



PG&E POC along with other established test facilities have provided the platform for gathering the knowledge to provide the industry with direction and a fast track process for maturing the standards such as the IEEE C37.118.2, C37.238, C37.242, C37.244, and IEC-61850-90-5

Source: PG&E