Testing & Certification Process: Conformance and Interoperability

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Lead, NASPI TF
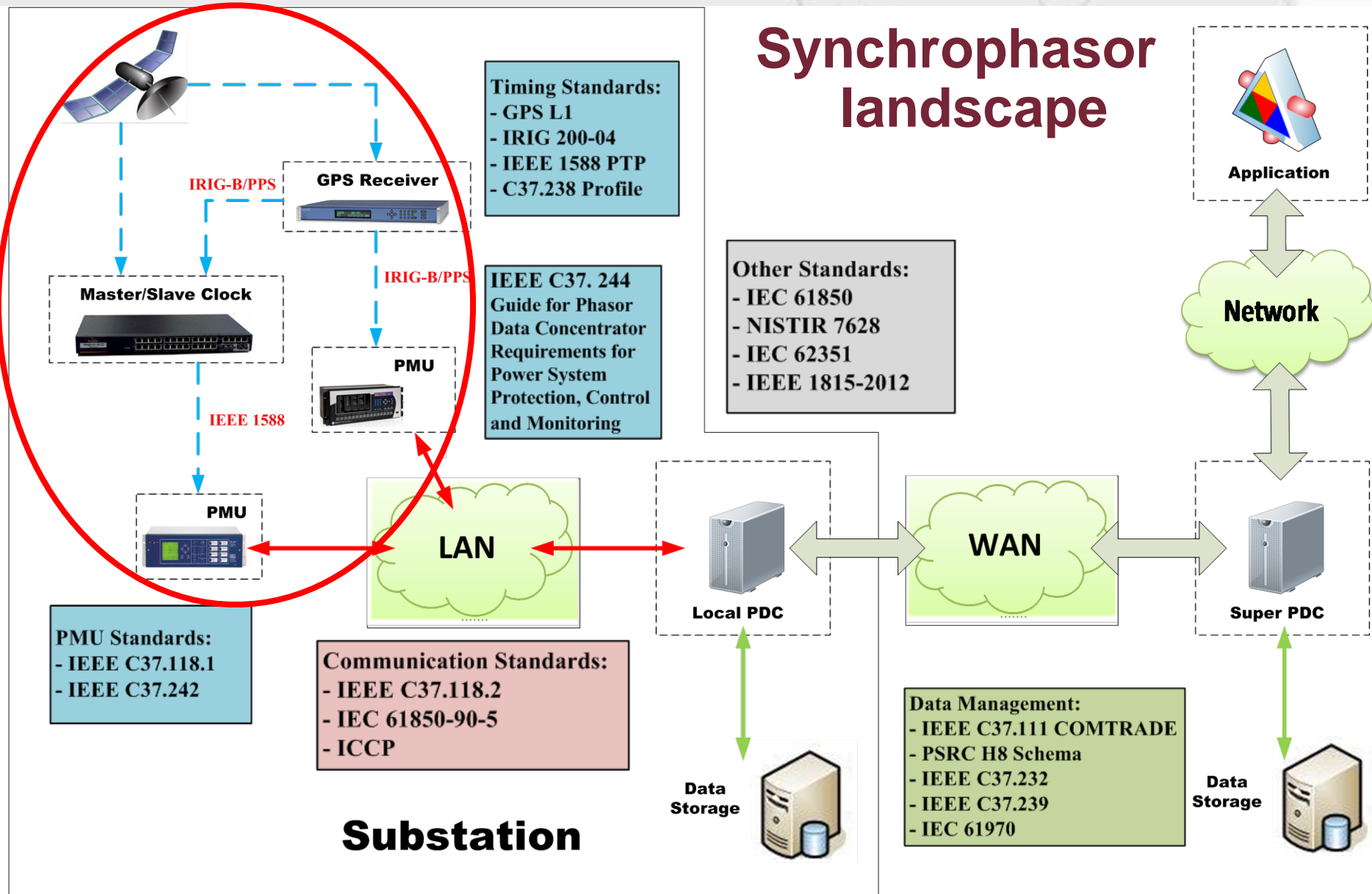
NASPI Meeting,
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Background

- TF Scope: Describe T&C *pocedure and process* and give recommendations
- TF duration: Dec, 2012-Sept, 2013 (nine months)
- TF Members:
  - M. Kezunovic, Lead, XpertPower Associates
  - F. Galvan, Entergy
  - A. Goldstein, NIST
  - L. Green, IEEE
  - Z. Huang, PNNL
  - M. Parashar, Alstom Grid
  - M. Patel, PJM
  - R. Schubert, Enernex
  - D. Sobajic, NY ISO/Gridengineering

Outline

- **What** is TF report focus?
- **Why** PMU certification matters?
- **When** to start _PMU testing_ procedure?
- **Who** should be responsible for the _certification_ process?
- **How** to proceed going forward: TF recommendations?

Synchrophasor landscape

Timing Standards:
- GPS L1
- IRIG 200-04
- IEEE 1588 PTP
- C37.238 Profile

GPS Receiver

IRIG-B/PPS

IRIG-B/PPS

Master/Slave Clock

IEEE 1588

PMU

IEEE C37. 244 Guide for Phasor Data Concentrator Requirements for Power System Protection, Control and Monitoring

Other Standards:
- IEC 61850
- NISTIR 7628
- IEC 62351
- IEEE 1815-2012

Application

Network

PMU

LAN

WAN

Local PDC

Super PDC

PMU Standards:
- IEEE C37.118.1
- IEEE C37.242

Communication Standards:
- IEEE C37.118.2
- IEC 61850-90-5
- ICCP

Data Storage

Data Management:
- IEEE C37.111 COMTRADE
- PSRC H8 Schema
- IEEE C37.232
- IEEE C37.239
- IEC 61970

Data Storage

Substation

Differentiation between Testing and Certification
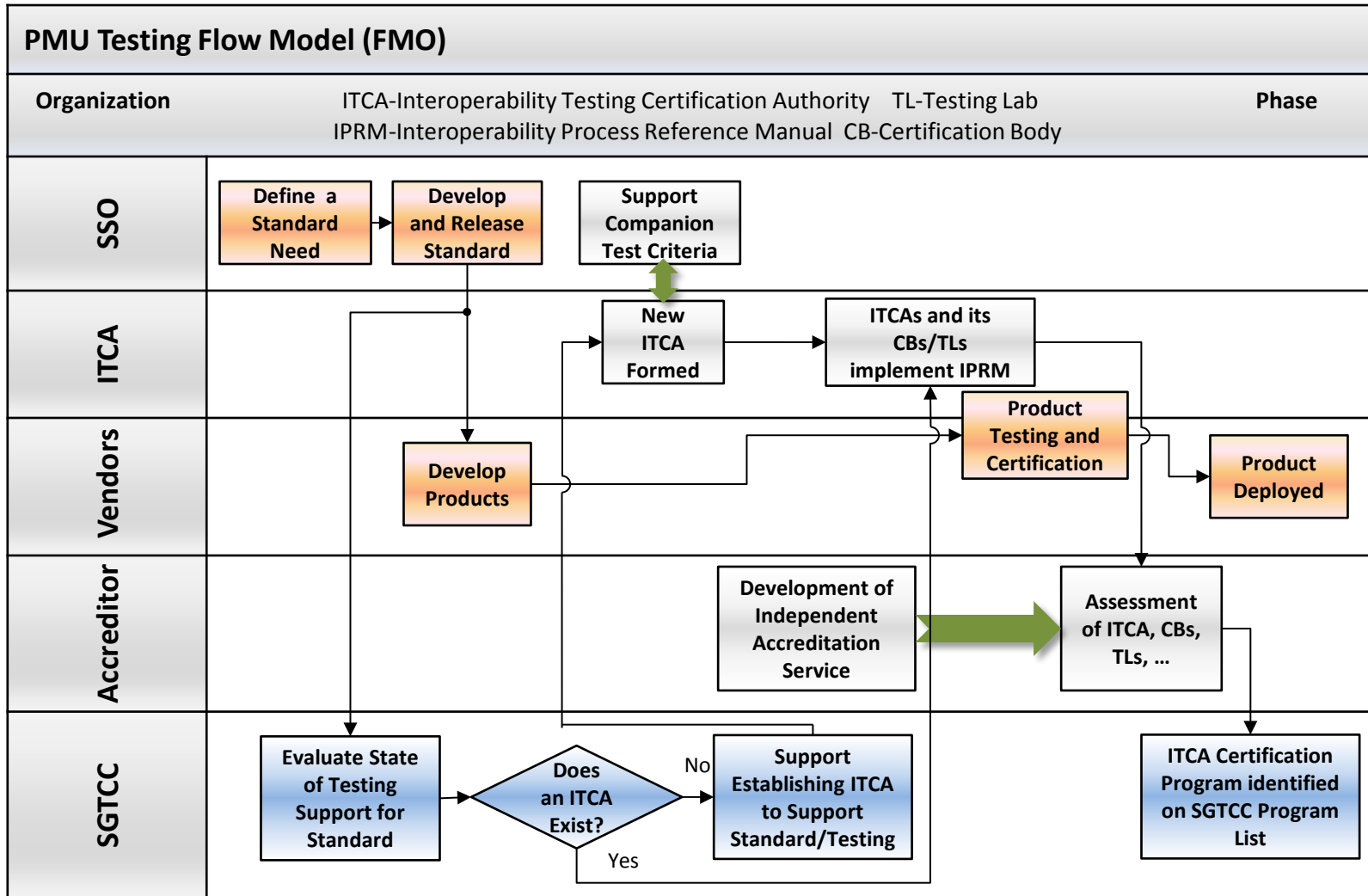
Testing is a _Procedure_
- The object of testing:
  - device, standard
- Test objective:
  - Conformance
  - Interoperability
- Test Lab:
  - Equipment
  - Test plan
- Test results:
  - yes/no
  - % deviation

Certification is a _Process_
- Identify Interoperability Testing & Certification Authority (ITCA), ISO 17065
- Accredit labs (equipment) and test plan, ISO 17025
- Define process and certification body for issuance of certificate
- Propose business model: how the process works and who pays?

What is T&C Focus

PMU Testing Flow Model (FMO)

Organization	ITCA-Interoperability Testing Certification Authority TL-Testing Lab IPRM-Interoperability Process Reference Manual CB-Certification Body	Phase

SSO: Define a Standard Need → Develop and Release Standard → Support Companion Test Criteria

ITCA: New ITCA Formed → ITCAs and its CBs/TLs implement IPRM

Vendors: Develop Products → Product Testing and Certification → Product Deployed

Accreditor: Development of Independent Accreditation Service → Assessment of ITCA, CBs, TLs, …

SGTCC: Evaluate State of Testing Support for Standard → Does an ITCA Exist? — No → Support Establishing ITCA to Support Standard/Testing; Yes → ; ITCA Certification Program identified on SGTCC Program List

Why PMU Certification Matters

- Standards are (will be) changing:
    - Synchrophasor measurement standard 118.1 is being revised
    - IEC is interested in including 118.1 requirements into IEC 61850-90-5
    - IEEE and IEC are discussing forming a joint working group
    - More standards are being contemplated: Cybersecurity standards

- Products are (will be) changing
    - New PMU designs
    - New PMU enabled designs
    - Open PMU and Open PDCs trends

- Applications are (will be) changing
    - Some have less stringent requirements (monitoring)
    - Some have more stringent requirements (control)
    - Some have very tight requirements (SIPS)

When to start PMU Testing Procedure?

- Testing Lab(s) have to be identified
- Standard revision has to be approved
- Test protocol has to be developed
- Test protocol has to be verified and agreed
- ITCA had to be in place to audit the lab(s)
- Cost schedule has to be developed

Who should be performing certification?

Some action is already taken

- IEEE Conformance and Assessment Program (ICAP) defined it's role as the "Certification Authority"
- ICAP Synchrophasor Assessment Steering Committee (SCASC) is reviewing the testing procedure
- NIST evaluated PMU test results and test plans/processes

Some action is yet to be taken:

- ICAP needs to define further details
- Test labs have to be certified
- The certification program has to be reviewed

TF Recommendations?

- A PMU testing and certification program should be developed and managed by an industry-recognized and -approved body.

- PMUs should be tested by an accredited test organization and the test results be certified by an accredited certifying authority using the latest PMU standard.

- Products successfully completing testing and certification should be placed in an electronic database which references the product and the certification date.

- Vendors should strive to meet the latest PMU standards by submitting products with PMU functionality to approved test organizations for test and certification.

- Should a product undergo a change or system update that could impact the performance or functionality, the PMU should be retested for compliance.

- The initial goal of PMU testing and certification should be expanded to include other components of the synchrophasor system defined by existing standards.

- The eventual goal is to develop performance assessment procedures for testing and certifying system solutions used to implement given applications.

- The cost of testing and certification should be carefully evaluated by specifying differentiated test and certification requirements for different PMU applications.

Recommended Reading

- **ISO 17065**-Conformity Assessment-Requirements for bodies certifying products, processes and services

- **ISO 17025**-General requirements for the competence of testing and calibration laboratories

- **SGIP TCC**- Interoperability Process Reference manual, 2012

- **SGIP TCC**- Interoperability Testing and Certification Authorities (ITCA) Development Guide, 2012

Thank you!
Questions?

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