North American SynchroPhasor Initiative

Performance and Standards Task Team

Progress Report

Vahid Madani, PG&E / Damir Novosel, InfraSource
Zhenyu Huang, PNNL

NASPI Meeting, Montreal, CA

September 6, 2007

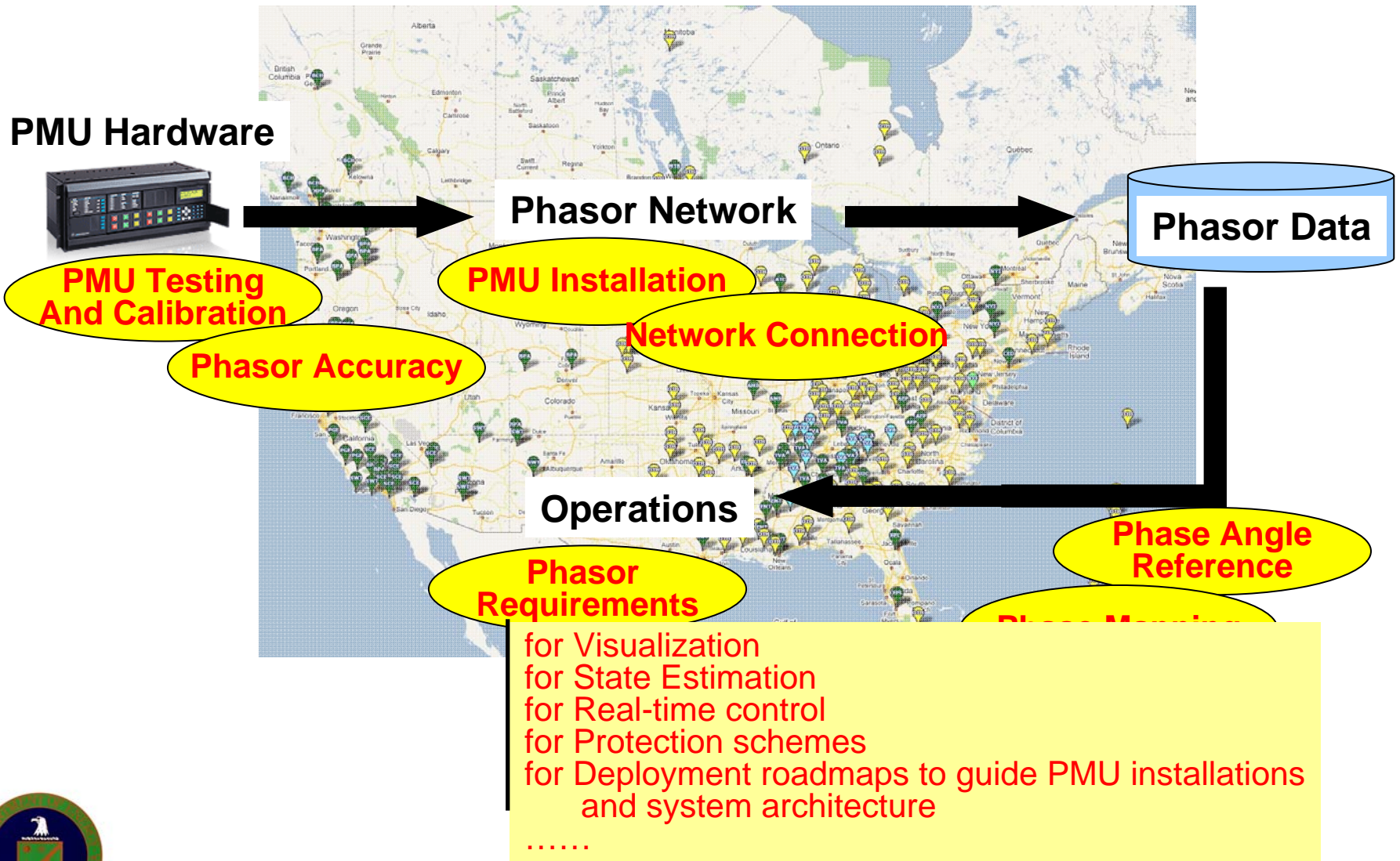The scope of the Performance and Standards Task Team includes coordinating and acting as liaison to standards efforts and determining consistent and satisfactory performance of synchronized measurement devices and systems by creating guidelines and reports in accordance with best practices.
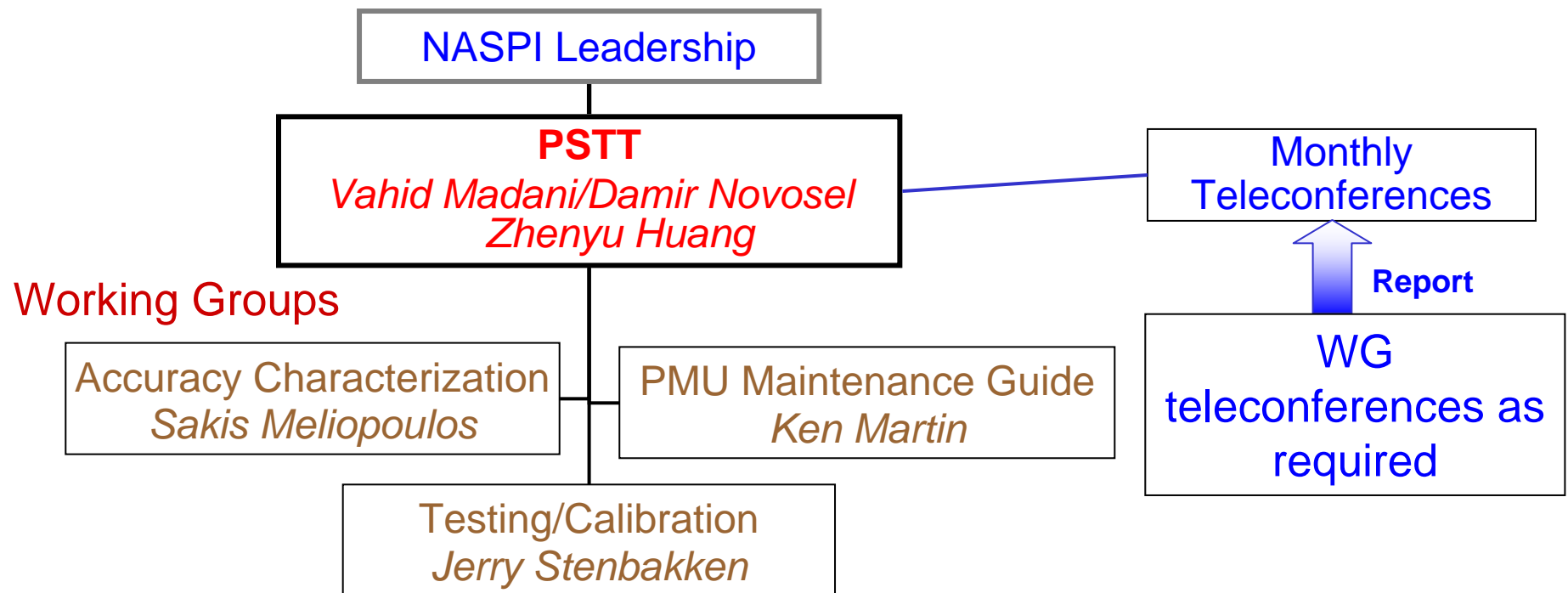
PMU Hardware

Phasor Network

Phasor Data

PMU Testing And Calibration

PMU Installation

Phasor Accuracy

Network Connection

Operations

Phase Angle Reference

Phasor Requirements

for Visualization
for State Estimation
for Real-time control
for Protection schemes
for Deployment roadmaps to guide PMU installations
    and system architecture
……

PSTT Organization and Present Activities

NASPI Leadership

PSTT
Vahid Madani/Damir Novosel
Zhenyu Huang

Monthly Teleconferences

Working Groups

Accuracy Characterization
Sakis Meliopoulos

PMU Maintenance Guide
Ken Martin

Testing/Calibration
Jerry Stenbakken

Report

WG teleconferences as required

Task Team Members: ~80 total, ~30 active

http://phasors.pnl.gov/resources_performance.html
http://www.eippshare.org/prtt/default.aspx

Past Accomplishments

PMU Installation/Commissioning/Maintenance Guide
    Part II: Installation Procedures

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Ken Martin

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PMU Installation/Commissioning/Maintenance Guide
    Part I: Acceptance Checklist for Connecting to SuperPDC

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Ritchie Carroll

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PMU Installation/Commissioning/Maintenance Survey and Summary

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Virgilio Centeno

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IEDs with Integrated PMU Functionality

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Damir Novosel/Yi Hu

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Documents posted @ http://phasors.pnl.gov/resources_performance.html
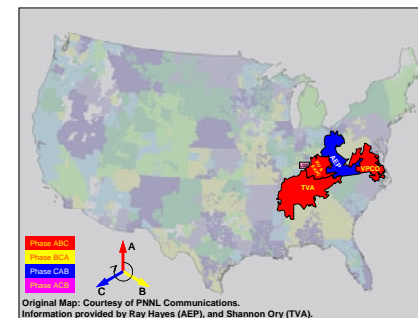
Past Accomplishments

Phase Inconsistency with Phase Mapping Examples

Virgilio Centeno/Henry Huang

Eastern Interconnection Phase Angle Reference

Henry Huang/Ritchie Carroll

Phasor Requirements for State Estimation

Lucy Wu

Phasor Requirements for Raw Data Utilization

Sakis Meliopoulos

Documents posted @ http://phasors.pnl.gov/resources_performance.html

Current Activities:
PMU Installation/Commissioning/Maintenance Guide

- **Goal:** provide guidelines for PMU installation/commissioning/maintenance
- **Contents:**
  - Part I: PMU acceptance test   May 2006
  - Part II: PMU installation procedures   June 2007
  - Part III: PMU maintenance procedures   June 2008
  - Part IV: PMU Commissioning / Acceptance procedures, June 2008
- **Users:**
  - Manufacturers: phasor system support
  - Utility Engineers: phasor system deployment
- **Team:**

  Ken Martin/BPA (Lead), Ritchie Carroll/TVA, Henry Huang/PNNL, Virgilio Centeno/Virginia Tech, Damir Novosel/InfraSource, Yi Hu/InfraSource, Ray Hayes/AEP, Jerry Stenbakken/NIST, and Tony Weekes/Manitoba Hydro

- **Goal:** Develop Guide for Testing Procedures and Calibration to support inter-operability and prevent incompatibility ➔ "NERC Standard" and input to 37.118
- **Contents:**
    - Testing equipment
    - Types of tests and Methods for performing the tests
    - SynchroPhasor message format
- **Users:**
    - Manufacturers: phasor product design and certification
    - Utility Engineers: phasor product selection and phasor applications
- **Current Status:**
    - Draft in the final round of review – Target completion date September 2007
- **Team:**

    Jerry Stenbakken/NIST (Lead), Henry Huang/PNNL, Ken Martin/BPA, John Hauer/PNNL, Yi Hu/InfraSource, Virgilio Centeno/Virginia Tech, Sakis Meliopoulos/Georgia Tech, Ray Hayes/AEP, Krishnaswamy Narendra/NXTPHASE, Mladen Kezunovic/Texas A&M, Armando Guzman/SEL, Chris Anderson/SEL, Bogdan Kasztenny/GE, Tony Weekes/Manitoba Hydro, and Bill Dickerson/Arbiter, Vahid Madani/PG&E, Damir Novosel/InfraSource, .

Current Activities:
SynchroPhasor Accuracy Characterization

- **Goal:** Characterize phasor accuracy in the instrumentation channel including PTs/CTs, instrumentation, communication links, and PMUs
- **Contents:**
  - Characterization of GPS-synchronized measurement devices
  - Characterization of instrumentation channels
  - Characterization of instrumentation transformers (CT, VT, CCVT, MOCT, EOVT)
  - Instrumentation Nominal Precision/Standards
- **Users:**
  - Utility Engineers: phasor system deployment
- **Current Status:**
  - Draft ready for approval – Target completion date September 2007
- **Team:**

  Sakis Meliopoulos/Georgia Tech (Lead), Vahid Madani/PG&E, Damir Novosel/InfraSource, George Cokkinides/Georgia Tech, Ramiz Alaileh/CERTS, Bruce Fardanesh/NYPA, Henry Huang/PNNL, Matthew Ford/SEL, Fahrudin Mekic/ABB, Ullattil Manmandhan/ABB, Ray Hayes/AEP, Jim Hackett/Mehta Tech, and Steve Widergren/PNNL.

Future Activities

- **Key 2008 Goals:**
  - PMU maintenance guide, Existing WG … continuation
  - Define Standard PMU
  - Requirements to guide PMU deployment and system architecture needs, locally and regionally
    - ➢ System and device requirements for combined applications
    - ➢ Phasor Tools Listing - Requirements and specifications for phasor tools
    - ➢ Guidelines for synchronization techniques - Accuracy and Availability
    - ➢ Requirements for hardware and firmware upgrades
  - Procedures for testing PMU at the commissioning level
  - Standardizing PMU Configuration for IEC 61850 Applications
    - ➢ Implementation Agreements (Standards) for Interoperability of the Synchrophasor Values
  - Expand guidelines for using devices with Integrated PMU Functionality
  - Issues with "Dynamic Phasors"
  - Standards & requirements for Protection and Control Applications

- Share your experiences
- Time stamp method - Each Device connected to a common clock or other methods
- We know different devices can do different sampling rates - Do we (user) choose a fixed number of samples per second?
- Processing speed is not the same
- Types of data Sets from different vendors.
- Whether we need implementation Agreements pertaining to the interoperability - Is NASPI the place to set the higher level requirements?
- Process bus is covered under 9.2 of the IEC 61850
- Synchronized Phasor implementation Agreements to be added to section 9.2 LE
- GOOSE Messages - Values out of the dead band.

PSTT 2008 Goals:

	Priority*	Amount of Work
➢ Define std PMU:	High	Low
➢ Maintenance guide:	High	Medium
➢ Requirements #3:	High	Huge
➢ Expand guidelines for IED PMUs:	High	Medium
➢ Test PMU at commissioning level:	Medium	Medium
➢ Standardizing PMU Configuration for IEC 61850:	Medium to High	Medium
➢ Dynamic phasors:	Low	Huge
➢ Protection and Control:	Low	Huge

* Priority in terms of 2008 goals

Future Activities: Administrative Items

- Promote active participation by Task Team Members in WG activities

- Linkage and coordination with other Task Teams

- Coordination with IEEE, IEC, and CIGRE Activities

- Coordinate with Research Initiative TT

Questions?