

# *Performance and Standards Task Team*

## *Progress Report*

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

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**NASPI Meeting, Montreal, CA**

**September 6, 2007**

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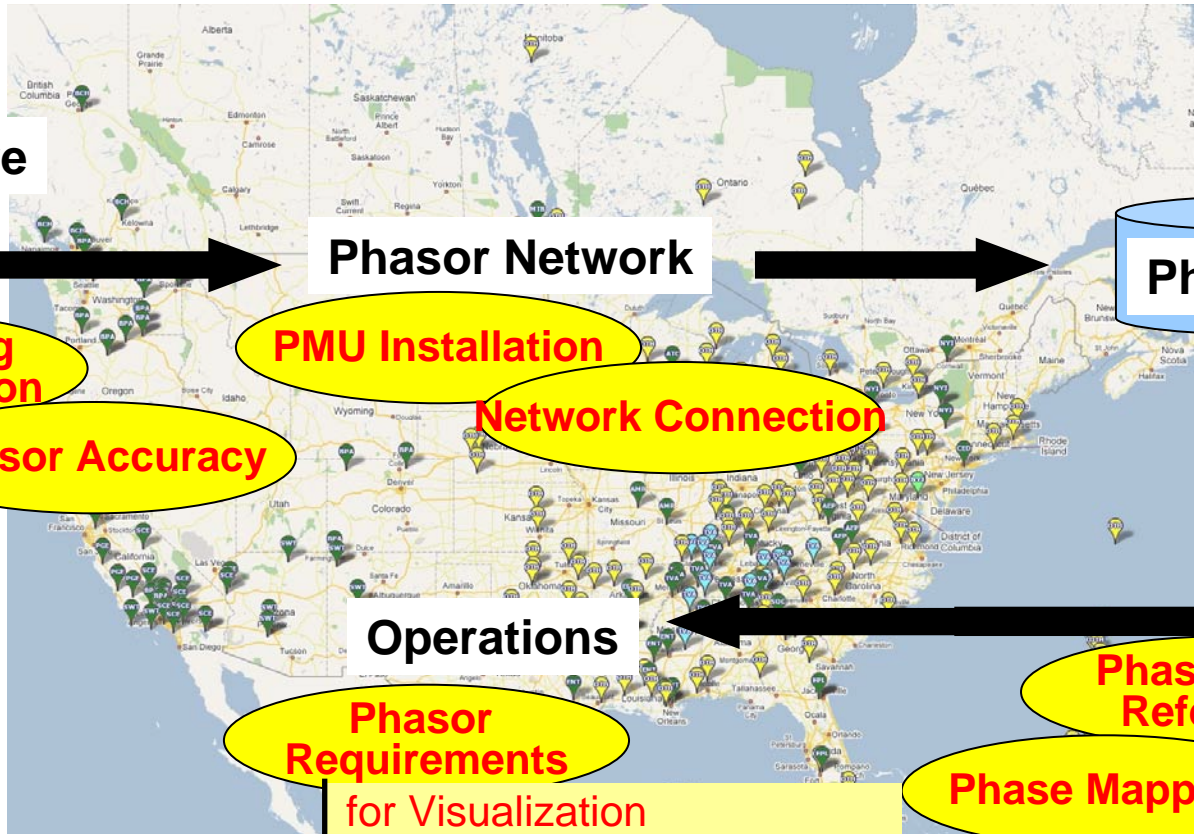


The scope of the Performance and Standards Task Team includes coordinating and acting as **liaison to standards efforts** and determining consistent and satisfactory performance of synchronized measurement devices and systems by creating **guidelines and reports** in accordance with best practices.



# Overview of PSTT Activities

## PMU Hardware



**Phasor Network**

**Phasor Data**

**PMU Testing  
And Calibration**

**PMU Installation**

**Network Connection**

**Phasor Accuracy**

**Operations**

**Phasor  
Requirements**

**Phase Angle  
Reference**

**Phase Mapping**

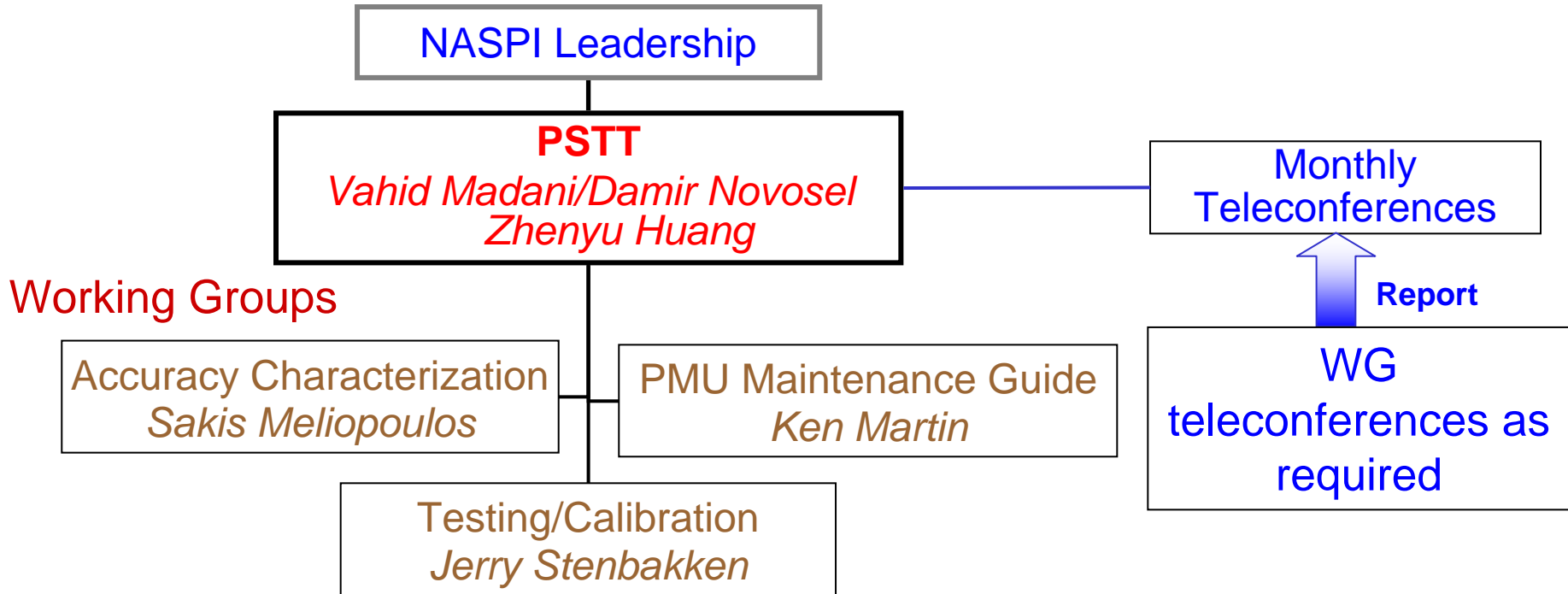
for Visualization  
for State Estimation  
for Real-time control  
for Protection schemes  
for Deployment roadmaps  
to guide PMU  
installations  
and system architecture

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# PSTT Organization and Present Activities

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**Task Team Members: ~80 total, ~30 active**

[http://phasors.pnl.gov/resources\\_performance.html](http://phasors.pnl.gov/resources_performance.html)

<http://www.eippshare.org/prtt/default.aspx>



# *Past Accomplishments*

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

*Ken Martin*

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

*Ritchie Carroll*

**PMU Installation/Commissioning/Maintenance Survey and Summary**  
*Virgilio Centeno*

**IEDs with Integrated PMU Functionality**

*Damir Novosel/Yi Hu*

**[Documents posted @ http://phasors.pnl.gov/resources\\_performance.html](http://phasors.pnl.gov/resources_performance.html)**

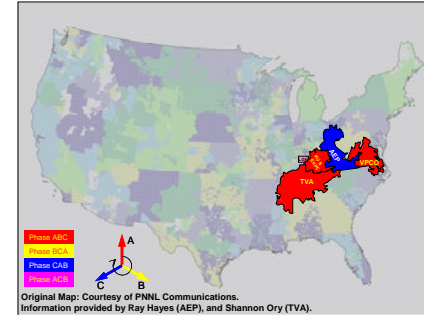


# *Past Accomplishments*

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## **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](http://phasors.pnl.gov/resources_performance.html)**



# *Current Activities:*

## *PMU Installation/Commissioning/Maintenance Guide*

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- **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



## *Current Activities: PMU System Testing and Calibration Guide*

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- **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*

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- **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*

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## **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



# *IEC 61850 Interoperability Considerations*

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- Time stamp method - Each Device connected to a common clock or other methods
- When devices can do different sampling rates - Do we (user) choose a fixed number of samples per second for all different devices?
  - Processing speed is not the same amongst different devices
  - 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?
    - Yes (Based on discussions with IEC leads)
- Process bus is covered under 9.2 of the IEC 61850 (Covered by IEC)
- GOOSE Messages - Values out of the dead band
- Synchronized Phasor implementation Agreements to be added to section 9.2 LE



## *PSTT 2008 Goals:*

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	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*

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- 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



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# *Questions?*

