MHEB
Smart Grid Investment Grant Update

Tony Weekes

NASPI Work Group Meeting
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NASPI North American SynchroPhasor Initiative

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Project Participants

- **Project Manager:**
- Mike Evans
- **Project Coordinator:**
- Geoff Ruchkall
- **Tech Lead (WAMS Functionality):**
- Tony Weekes
- **Tech Lead (System Integrator):**
- Daryl Godkin
- **EMS Networking:**
- Howard Green
- **PMU Installation:**
- Protection Maintenance Staff
- **As Built Design:**
- Vic Falkowski
- **PDC: RFP Contributer and Evaluator:**
- Tony Weekes, Brian Archer and David Jacobson
- **Client Tools: RFP Contributer and Evaluator:**
- Tony Weekes, Brian Archer and David Jacobson
- **As built review and approval and Stamp:**
- Station Design
- **IDN Networking:**
- Roger Ingram

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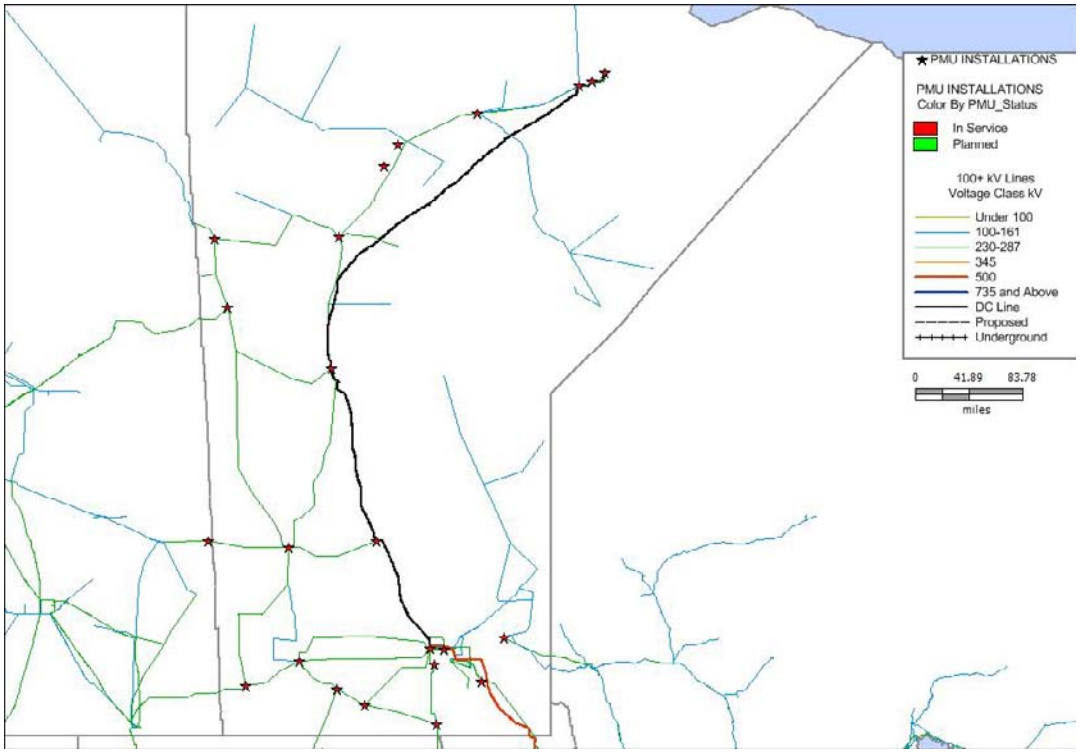
Project Map

MB



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Project Priorities From Here?

- What are the most important tasks and applications ahead for your project?
- Model verification and integration into EMS SCADA
- How are phasor data applications being used (or will be used) in your control room?
- Initially they will be used to corroborate existing EMS SCADA information and benchmark other tools (like on-line tools)
- How are phasor data applications being used (or will be used) by your planners?
- Our planners can use the applications for future possible designs like HVdc reduction or GIC monitoring.
- What outcomes will mean success for this project by the end of 2015?
- Future integration into EMS SCADA and improving our solution as well as operators using the information and other models being validating will comprise what we will call success.
- What key obstacles stand in the way or what problems need to be solved to achieve these outcomes?
- Some obstacles are the time-lines for the EMS SCADA integration to be on schedule. Other obstacles are training and confidence in the new information (no nuisance alarming).

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Success Stories So Far

Name and explain three significant accomplishments or benefits achieved to date from this synchrophasor technology project.

1) More efficient commissioning of power system stabilizers (cost reduction and confidence in final settings by being able to see the modes at the instance of tuning in real time)

2) Post mortem analysis of modes and power angles seen on the system during disturbances has been improved.

3) Confirmation of existing model data for representing modes seen on our system have been confirmed and analysis of a slow governor mode has identified one plant as having more of an influence than the others.

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Challenges and Lessons Learned

- What have been your biggest technical challenges?
- Cyber security issue remains loosely defined and could change
- What have been your biggest programmatic or execution challenges? None
- Other lessons or insights about
  - PMU performance, installation experience or cost?
  - Minimal cost while using existing recorder infrastructure
  - Communications system design and performance?
  - Still have some days when availability does not meet 99%
  - Operator or staff training?
  - We are not in the control room yet so training has been minimal so far.
  - Other lessons or insights about
- Managing vendors, contractors or TO partners?
  - Vendors have been very helpful in providing knowledge for the existing system as well as possible future designs and applications.
- Research needs – what do we need to figure out next?
  - One area of R&D would be to look at forcing solutions in EMS SCADA integration to PMU data as opposed to just collecting additional point for either redundancy or observability. This would require weighting the PMU data higher than RTU data and forcing different solutions.

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Synchrophasor Training

The broader MISO has been providing very good training to MB Hydro through webex

We expect to offer further training to our operators but only after we go into the control room with new screens and at that time we expect to know what we want them to see and exactly what to act upon.

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Project Timeline

In the context of the SGIG project:

- 2 remaining PMUS will be installed by the end of 2013

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Phasor Data-sharing

- How many TOs and RCs receive data from your PMUs/project?
  - MISO only
- How many TOs and RCs send you their data?
  - MISO only
- Do you share phasor data for research purposes?
  Alstom, FNET (UTK), U of M

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PMUs

[Total (completed) project data]

- MHEB is sole owner
- 230, 138, and 500 KV
- 20% coverage of 230 kV which is the voltage level of the majority of stations (only one 500 kV station and only a few at 138 kV).
- Typically one PMU per substation (except Dorsey)
- PMU installation rate
  - 33 MHEB PMUs, 31 shared with MISO, 25 stations, 2 PMUs to be installed by the end of 2013

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PDCs and Communications

[data below for completed project]

- PDCs
- PDC availability > 99.5%
- Communications system:
  - System centralized or distributed ownership? If owned, by whom, and who is the vendor? System centralized, owned by MHEB
  - Communications system availability rate (%/year) – Communications availability > 99.5%

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Communications and Data

- Psymetrix PhasorPoint centrally hosted for collecting all data, nothing is stored in the field permanently but the TESLA recorders have the ability to store PMU data for 10 days.
- Approximately 1 year of data storage online.
- 30 samples per second
- 406 phasors measured and recorded

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Data Quality and Availability

- ~90% good data (> 99.9% availability)
- ~90% timely data (< 1 second)
- Low bandwidth connections have been problematic. Working on upgrading / or changing problematic communication paths.

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Major Operational Applications Using Phasor Data

- Wide-area situational awareness
  - Software/vendor used TESLA recorders
  - Integrated into other control room applications? NO
- State estimation
  - Software/vendor used Alstom
  - Operational readiness date (future 1-2 year window)
- Other?

Are your operators and operations support engineers using these applications? What impacts or benefits are you anticipating; nuisance alarms, must be well thought out so they know what to act upon.

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Thank You

Any questions??

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