

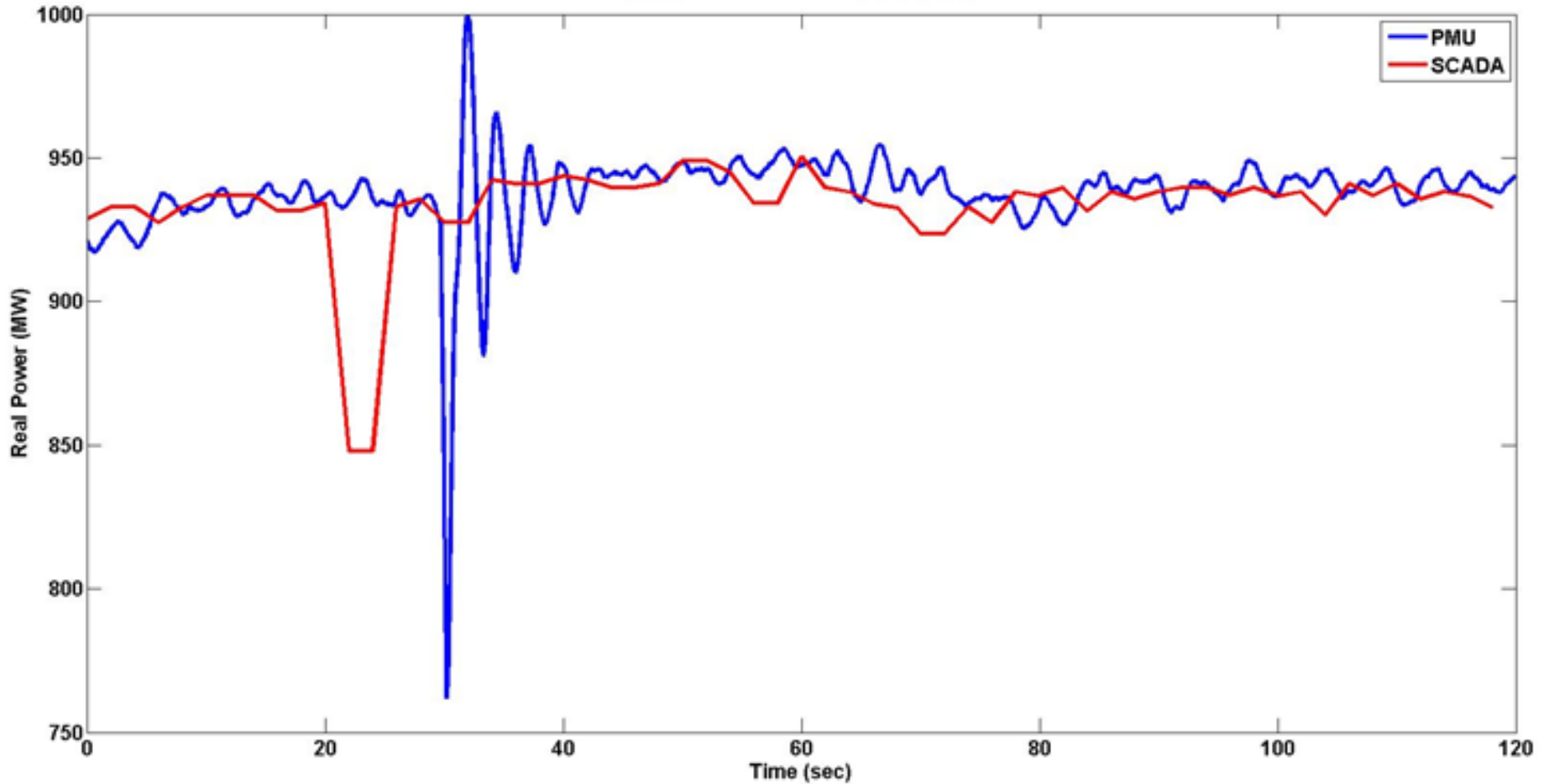
Synchrophasor Projects and Challenges at BPA

CIGRE Grid of the Future Symposium

October 21, 2013



PMU vs. SCADA



Project Background

- SGIG grant through WECC
- WISP project - BPA partner utility
- Stream data to WECC and to/from 11 other partners
- R&D to operational system
- C37.118-2005 at 60 frames per second
- Currently ~137,000 measurements/second
- Over 120 PMUs at over 40 sites
- More installations planned in next five years

Applications

- Wide area control – remedial action schemes
- Situational awareness, dispatch displays and alarms
- Post-event analysis
- Model validation
- Synchrophasor lab for application R&D
 - Streaming and archived data available for vendors and researchers

System Design

- Redundant field and control center installations, redundancy check at PDC
- Dedicated SONET channels
- Encrypted UDP multicast streams
- Primary/backup data streams
- Inter-control-center link
- Test mode switch in rack
- C37.118 “Data Validity” bit programmed

Data Quality/Validation

- Sources of quality issues
 - Bad timing, GPS issues
 - PT/CT inaccuracies
 - PMU failures
 - Field maintenance
 - Communications issues, dropouts
- Bad data detection and reporting
- Data cleansing and correction – R&D projects

Data Archiving

- OSI Soft PI for short term
 - Less than 6 months
 - Retrieval/conversion using OSI Soft tools
- Flat binary files
 - Up to 3 years
 - 200 TB when including all redundancy
 - Retrieval/conversion using BPA developed tools

Data Challenges

- Big data – spatial and temporal
- Data extraction/conversion
 - Efficient sharing with vendors, universities, etc.
- Real time vs. non-real time vs. pseudo-real time requirements
- Data silos – SCADA, PMU data, weather, etc.
- Consistently changing system conditions, baselining

Data Challenges

- How do we find “bad” data disguised as “good” data?
- How much “bad” data is acceptable?
- How do we store and retrieve large quantities of PMU data efficiently? Securely? Reliably?

Contact

Tony Faris

Bonneville Power Administration

ajfaris@bpa.gov