NASPI Phasor Network Performance

Observations & Recommendations

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NASPI Phasor Network Performance Issues

PMU Issues

- **PMUs not reporting** (extended outages)
- **Phasor data gaps** (PMU or network issues)
- **Phasor data with glitches and spikes** (noise that creates false alarms and makes signal processing and analysis more difficult)
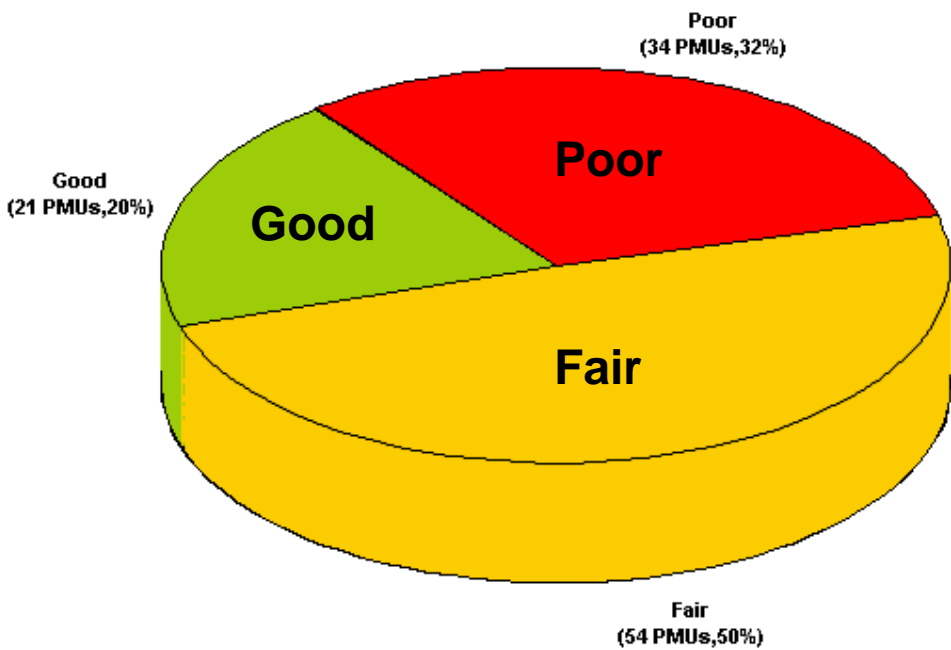
Concentrator Issues (creates "black holes" in wide area visibility)

Server and Communications Issues (generally a small chronic loss of data)

PMUs Not Reporting (A Single Day)
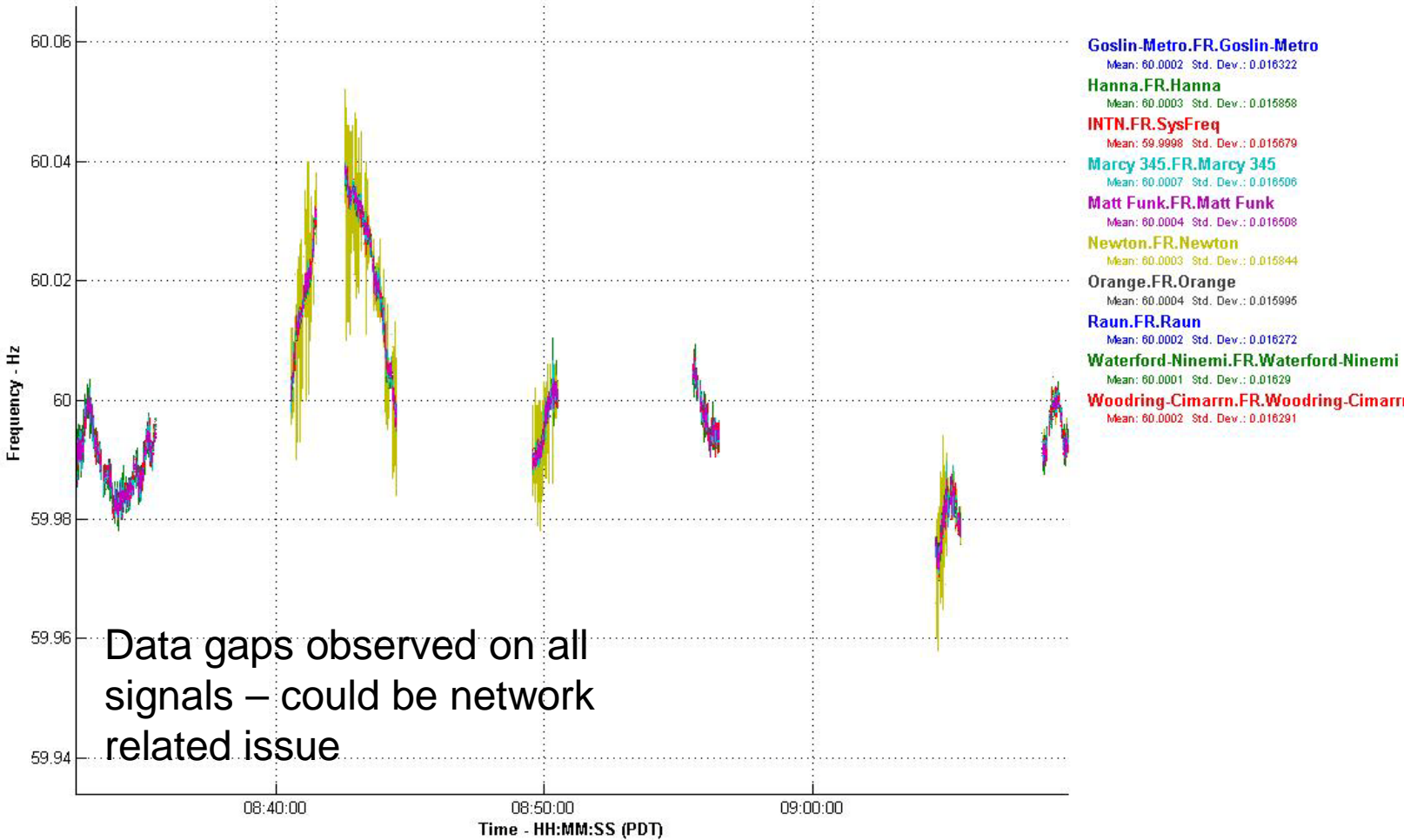
September 23rd 2010

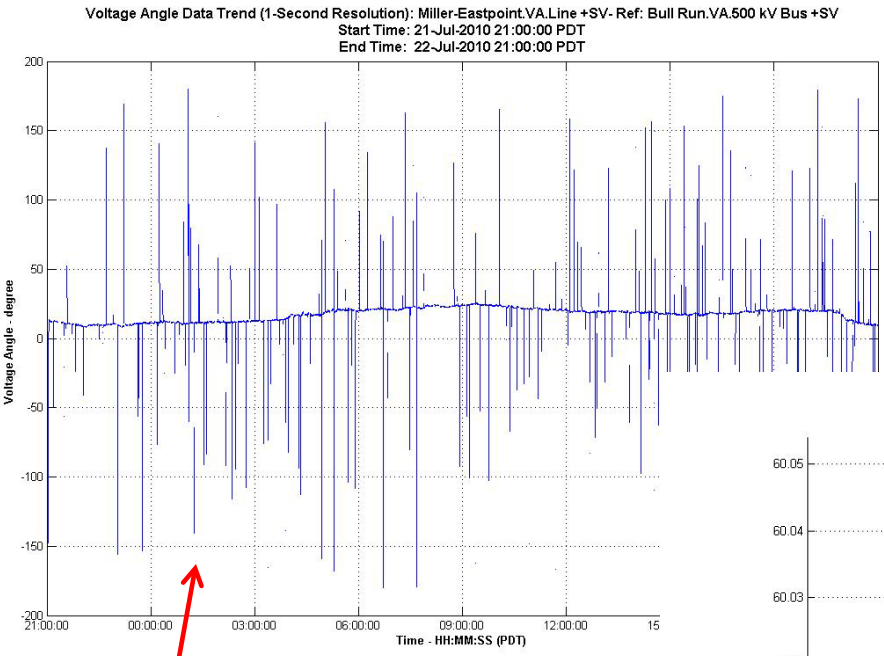12 Key PMUs that did not report data this day, 6 from one provider.

Poor
(34 PMUs,32%)

Good
(21 PMUs,20%)

Poor

Good

Fair

Fair
(54 PMUs,50%)

Bad: 0% – 50%   = 34 PMUs
Fair: 50% – 95%   = 54 PMUs
Good: 95% – 99% = 21 PMUs

Data with Frequent Gaps

September 19th 2010

Data gaps observed on all signals – could be network related issue

Phasor Data with Glitches and Spikes

Voltage Angle Data Trend (1-Second Resolution): Miller-Eastpoint.VA.Line +SV- Ref: Bull Run.VA.500 kV Bus +SV
Start Time: 21-Jul-2010 21:00:00 PDT
End Time: 22-Jul-2010 21:00:00 PDT

Noise in frequency (40mHz spikes)

Frequency Data Trend (Sub-Second Resolution)
Start Time: 21-Sep-2010 22:34:00 PDT
End Time: 21-Sep-2010 22:39:00 PDT

Goslin-Metro.FR.Goslin-Metro
Mean: 60.0041 Std. Dev.: 0.0088282

Spikes in voltage angle on
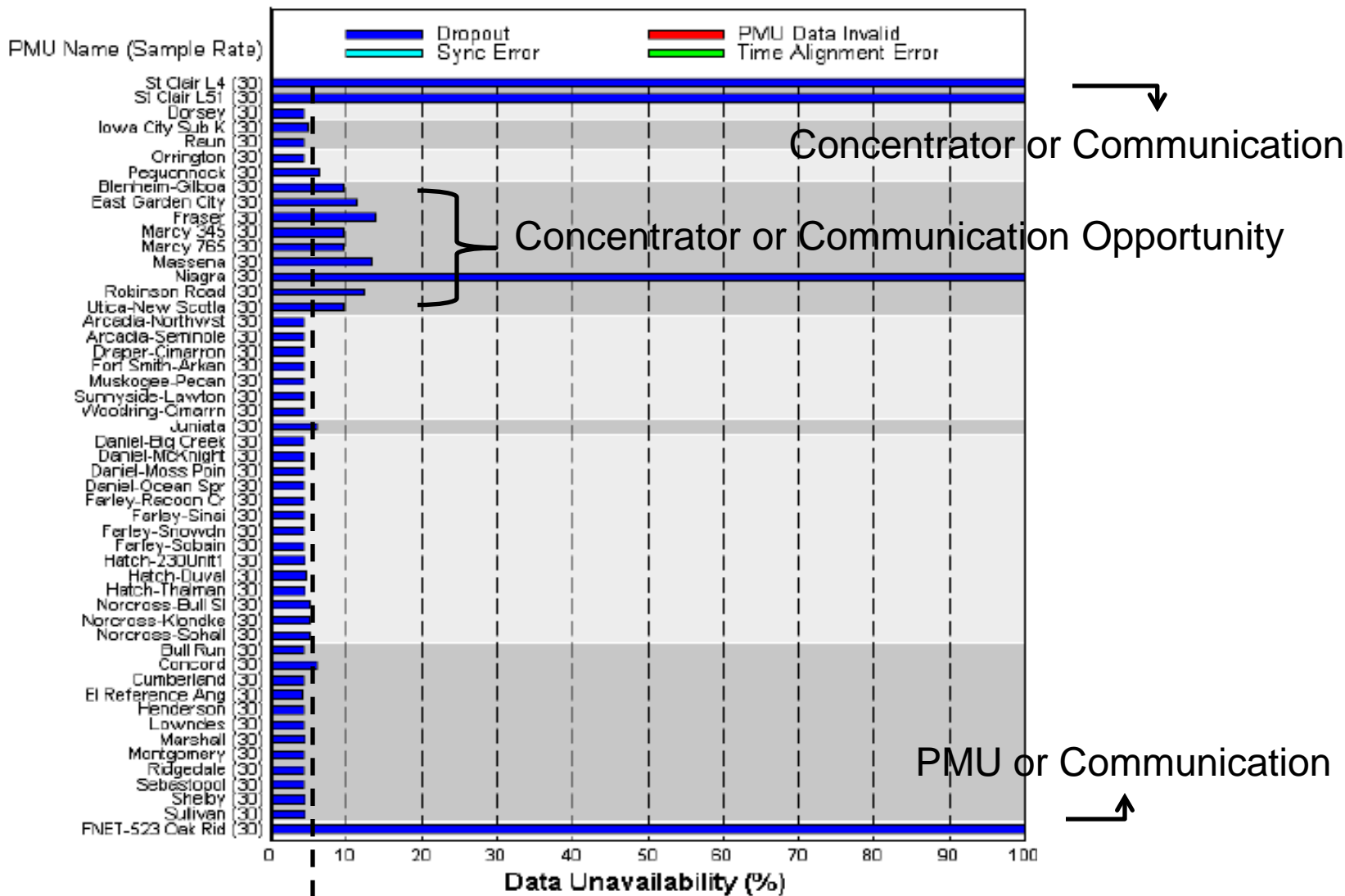one PMU observed
throughout the day
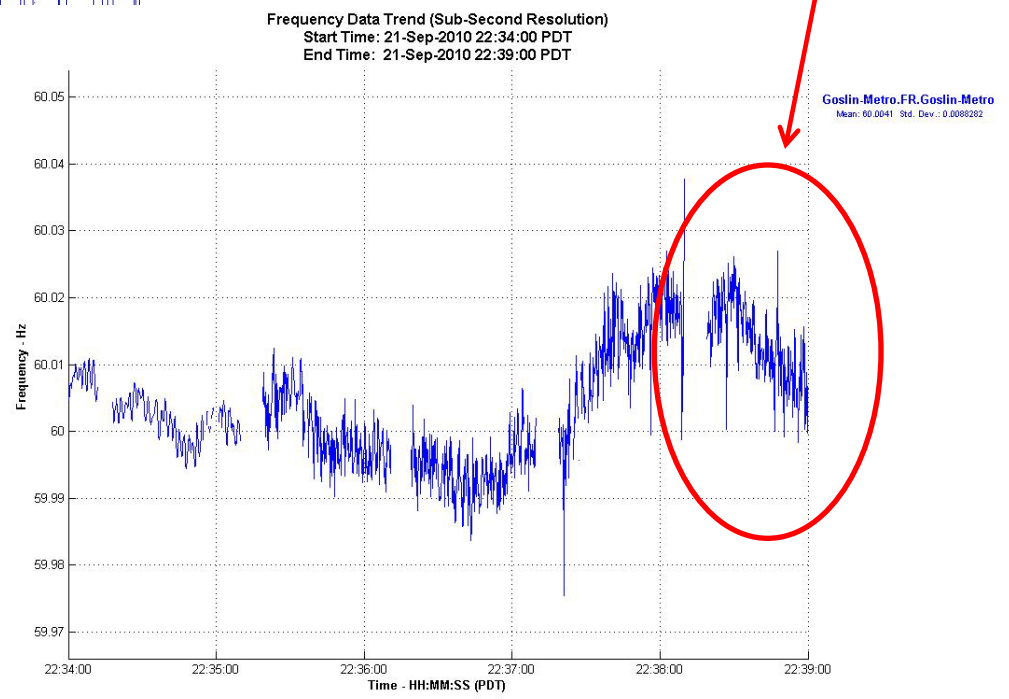
Voltage Angle Data Trend - Ref: Bull Run.VA.500 kV Bus +SV (Sub-Second Resolution)
Start Time: 14-Jul-2010 14:10:00 PDT
End Time: 14-Jul-2010 14:40:00 PDT
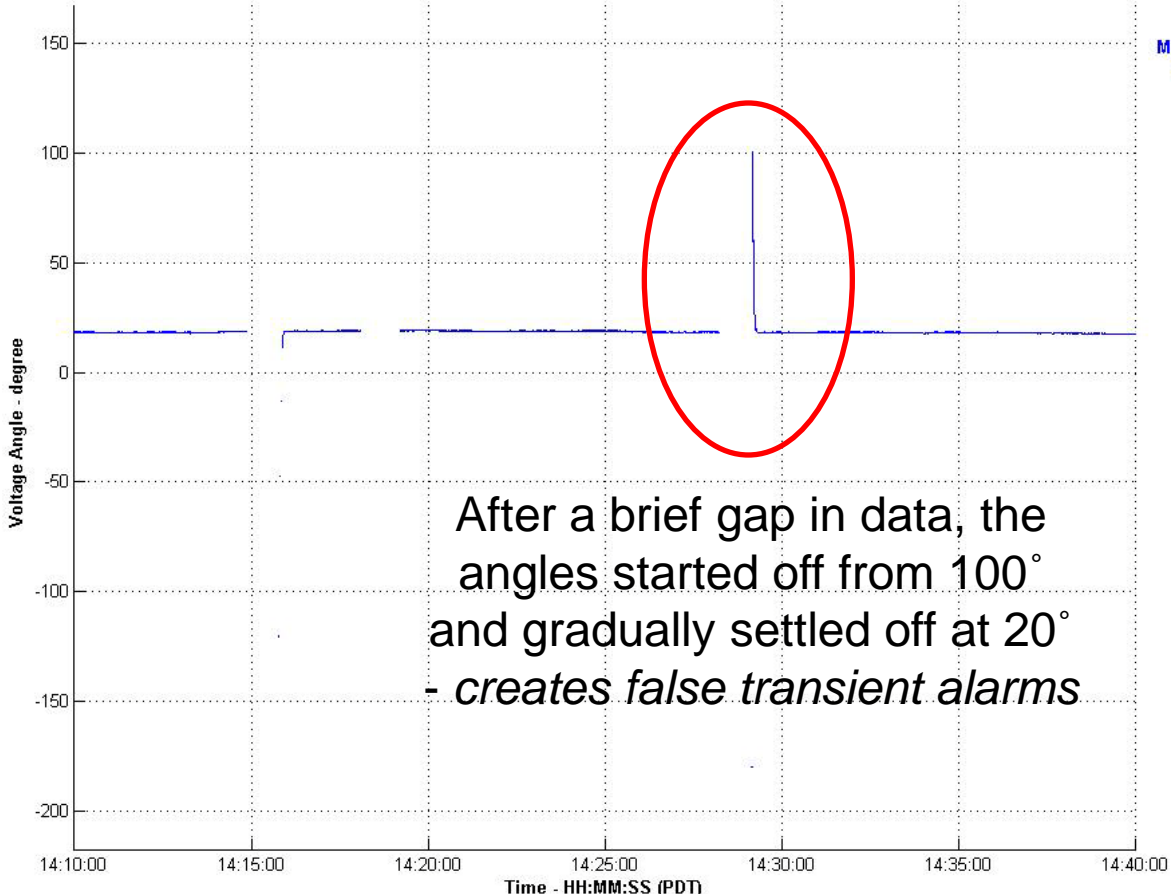
After a brief gap in data, the
angles started off from 100˚
and gradually settled off at 20˚
- *creates false transient alarms*

Most PMUs Very Good, Some Not

Recommendations

- Analysis Project to find Common and Special Causes of Data Problems

- Develop a Knowledge Base on Issues and Fixes

- Use PMU registry to facilitate analysis and correction
  - PMU and Concentrator Vendor, Communication Path
  - Quality Status Metric
  - Contact for Support

- Notification/Escalation Tool/Process
- Share Data Filtering Methods to Improve Real Time Monitoring and Alarming