Weekly Data Quality Report Overview

Erkan Tuna

September 19, 2018

Weekly Reports

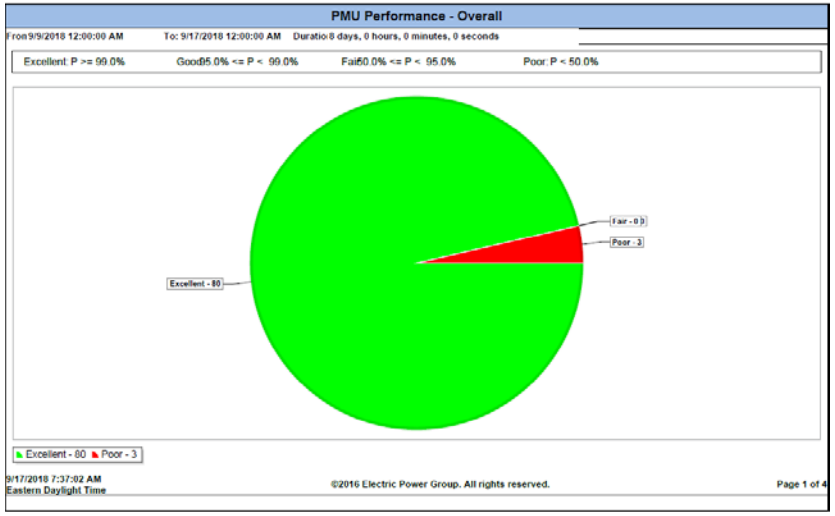
- Weekly reports consist of:
  - DataNXT generated data quality report
  - LSE Data Quality Report
    - AKA – The Murphy LSE
    - by Shaun Murphy

LSE Data Quality Report for:

AEP

For week from 9/9/2018 to 9/16/2018

Trans Owner	TOID	Percentage	Error Type
AEP	AA	94.42361649%	Good Data
AEP	AA	5.27554569%	Non - 0x0000 C37 Status Word
AEP	AA	0.29917714%	Voltage Magnitude Less than 0.7 Per Unit
AEP	AA	0.00155892%	Voltage Magnitude Equal to Zero
AEP	AA	0.00010177%	High Discrepancy between PMU Data and State Estimate



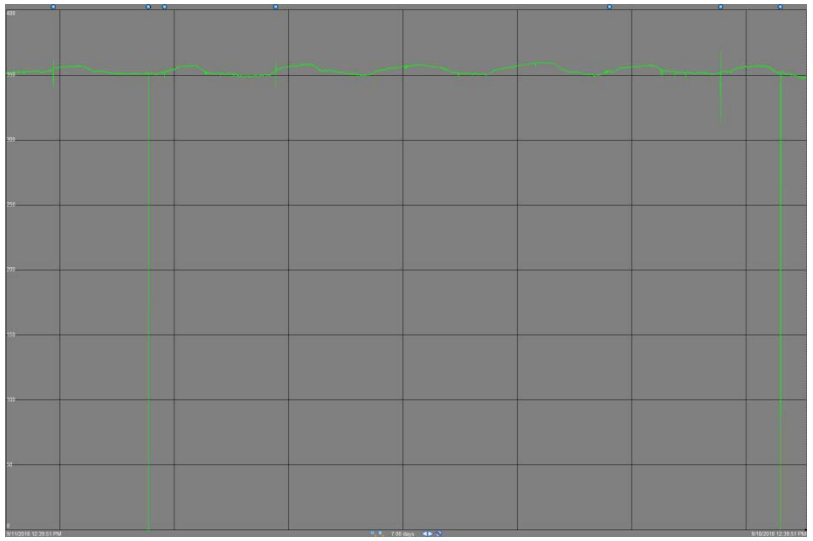
Interpretation of LSE Errors

- Most common question that gets asked:
  - What does non-0x0000 C37 Status Word mean?
    - 0x0000 Status Word = Good Data
    - Non-0x0000 Status Word = Non-Good Data?
    - Error Type Description: PMU signal encountered an issue prior to arriving to the LSE
    - Still not helpful in terms of interpreting issues
    - LSE assigns common C37.118 errors into one bucket
      - PMU Error
      - Drop Error
      - Synch Error
      - Error Samples

Percentage	Error Type
100.00000000%	Non - 0x0000 C37 Status Word
100.00000000%	Non - 0x0000 C37 Status Word
98.31688652%	Non - 0x0000 C37 Status Word
94.47150089%	Non - 0x0000 C37 Status Word
74.61258198%	Non - 0x0000 C37 Status Word
73.18511429%	Non - 0x0000 C37 Status Word
71.64159140%	Non - 0x0000 C37 Status Word
67.82133451%	Non - 0x0000 C37 Status Word

Interpretation of LSE Errors

- How to troubleshoot Non-0x0000 error
  - Issue is easier to spot when error percentage is 100%
  - Harder to troubleshoot error when it occurs periodically over time
  - Have to rely on historical data to troubleshoot
    - Can analyze the error by looking at the Status Word and analyzing bits/hexadecimal value
    - Trend all PMU signals within that weekly time period



Interpretation of LSE Errors

- Planned Outage
  - An outage was submitted for the specified timeframe, and is being compensated in the report
- PMU Signal Not Found
  - The signal cannot be found in the LSE model
  - Signal may have been deprecated
  - Output stream from DB might have issues
- Voltage Magnitude Equal to Zero
  - Live equipment should not have 0 magnitude
  - Likely equipment outage or configuration error
- Negative Magnitude
  - PMU magnitudes should not be negative, and should be greater than 0
  - Likely configuration error

Interpretation of LSE Errors

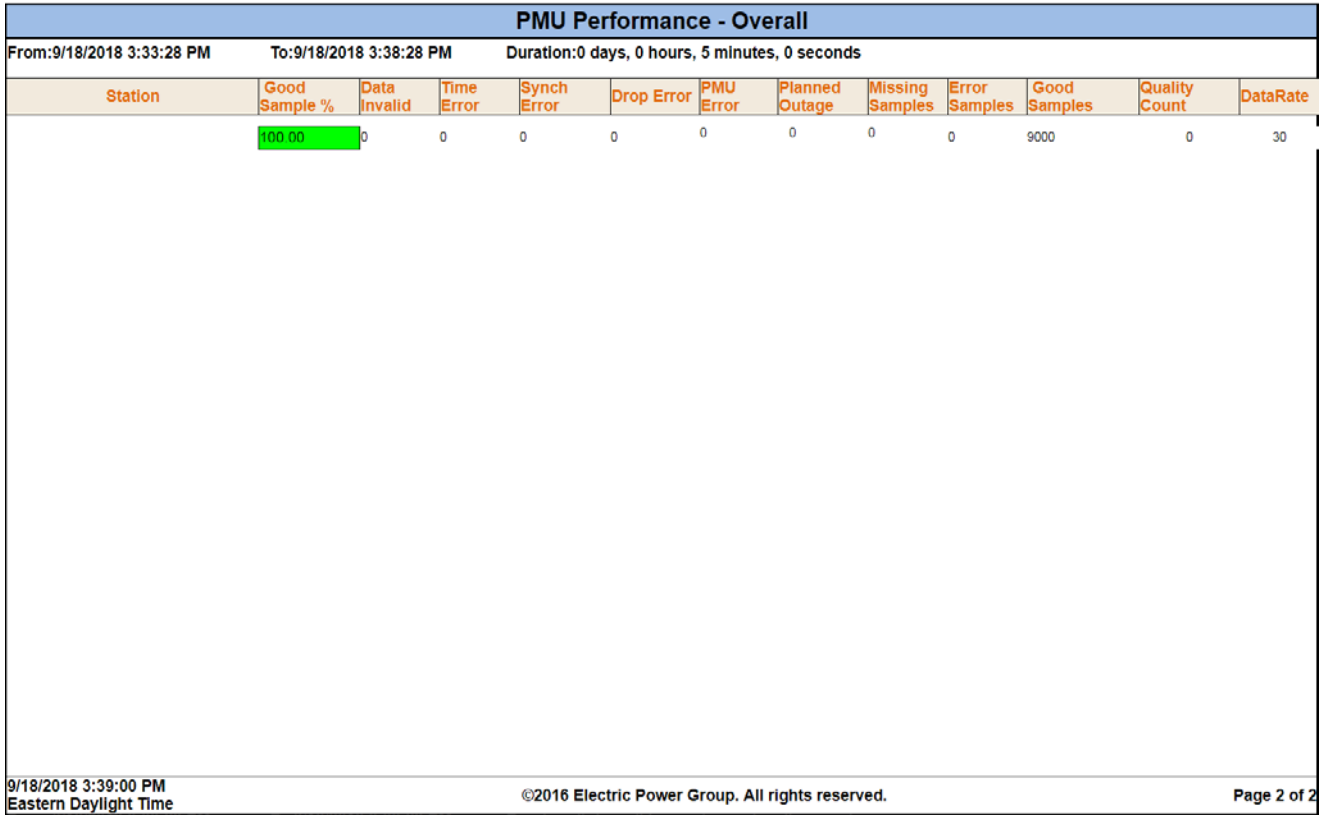
- Voltage Magnitude Too High
  - Voltage magnitude was greater than 1.3 p.u.
- Voltage Magnitude Too Low
  - Voltage magnitude was less than 0.7 p.u.
- Current Magnitude Equal to Zero
  - Live equipment should not have 0 magnitude
  - Likely equipment outage or configuration error
- Current Magnitude Too High
  - The current magnitude was greater than 50 p.u.
- High Discrepancy between PMU Data and State Estimate
  - PMU is marked as bad measurement when the residual between SE and PMU data is greater than 50%

Nominal Voltage	High Voltage Threshold
765 KV	994.5 KV
500 KV	650 KV
345 KV	448.5 KV
230 KV	299 KV
138 KV	179 KV
115 KV	149.5 KV
69 KV	89.7 KV

Nominal Voltage	Low Voltage Threshold
765 KV	535.5 KV
500 KV	350 KV
345 KV	241.5 KV
230 KV	161 KV
138 KV	96.9 KV
115 KV	80.5 KV
69 KV	48.3 KV

Interpretation of DataNXT Reports

- DataNXT pre-determined buckets of issues
  - Good Sample
  - Data Invalid
  - Time Error
  - Synch Error
  - Drop Error
  - PMU Error
  - Planned Outage
  - Missing Samples
  - Error Samples



PMU Performance - Overall

From:9/18/2018 3:33:28 PM To:9/18/2018 3:38:28 PM Duration:0 days, 0 hours, 5 minutes, 0 seconds

Station	Good Sample %	Data Invalid	Time Error	Synch Error	Drop Error	PMU Error	Planned Outage	Missing Samples	Error Samples	Good Samples	Quality Count	DataRate
	100.00	0	0	0	0	0	0	0	0	9000	0	30

9/18/2018 3:39:00 PM Eastern Daylight Time

Page 2 of 2

Questions?

- For any phasor inquiries or questions about reports:
  - PJMSynchroPhasorSupport@pjm.com