Issues in handling Classes of Synchrophasors

Does more than One Class mean

A PMU with ≥ 2 Classes
or
A PMU with either P or M Class

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Examples of Synchrophasor Interoperability Issues

- **Data Consistency and Coherency**
- **Testing and Certification**
- **Support for Legacy Installations**

IEEE Synchrophasor Standards

- Near-term Smart Grid installations will involve PMUs that may comply with only one of the three different versions of IEEE synchrophasor standards
  - IEEE 1344 -1995 (reaffirmed in 2001)
  - C37.118 - 2005
  - C37.118.1 - ???? and C37.118.2 - ???? (proposed)

Synchrophasor Definitions

- Phasor measurement definitions in different versions of IEEE synchrophasor standards are different
  - IEEE 1344 defines only the UTC time synchronization requirements for inputs scanned and for phasors
  - IEEE C37.118-2005 defines Total Vector Error – TVE concept for phasor accuracy for two phasor types (Levels 0 and 1) for different ranges of signals
  - IEEE C37.118.1 (*proposed standard*) defines different phasor classes based on response time differences with P class for protection and M for measurement

Examples of Interoperability Issues in Handling Multiple Phasor (Data) Types

- Will or should the new standard (with P and M classes)
  - require use of separate phasor streams – one for protection and wide area visualization, and another for disturbance monitoring/recording?
  - explicitly support or explicitly exclude certification and use of “hybrid” algorithms that only partially satisfy the requirements of each (P and M) phasor class?
  - define testing requirements for all data acquisition for measurement, control and protection applications?

Specific Interoperability Issues

- Data Consistency and Coherency
  - Incompatible data sources – various generation of PMUs producing multiple classes of phasors and data from NERC PRC-002/005 compliant device
    - Operational decision making
    - Event analysis
- Testing and Certification
  - Scope of and procedures for certification “testing”
  - Periodic testing required by regulatory standards
- Support for Legacy Installations
  - Migration path for upgrades as the synchrophasor standards and usage practices continue to evolve

Summary

- Is there a mismatch between our interoperability expectations and our practices and processes?
- Where are the specific disconnects? – for example
  - Antiquated Legacy Practices
  - Inadequate Legacy Data Acquisition Platforms
  - Out-dated Industry Standards and Development Processes
  - Absence of Certification
  - Undefined and/or Unrealistic Interoperability Expectations
  - Inappropriate Business Model – Investment/Benefit Analysis
- The above adjectives while provocative are irrelevant
  - the real question is how should we – users and vendors – as NASPI invest our time and money **smartly** to define and build the foundation for a **Smart Grid** “before money runs out”?