Testing and Verification of Interoperability in Synchrophasor Systems

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Gaps in Testing Interoperability

Priority for Industry Standardization?

Phasor Data Concentrator – PDC

- In an **integrated** wide area **synchronized** measurement **system**, the PDC is the *interoperability glue* connecting PMUs, various PDCs, and applications together.
- There are no standards for PDCs
  - PMU-PDC and PDC-PDC communication
- Need consistent and comprehensive requirements
- Need standards-traceable testing tools and techniques
- Over time, need accredited labs for testing

Consistency in User Requirements for Testing?

Two general approaches

1. Set application requirements, derive system and component requirements, conclude testing requirements.
   - Usually leads to rigorous testing requirements
     - "Ownership" of Testing
   - May require product enhancement and/or development to meet requirements
   - Easier system integration and interoperability
2. Observe available device performance, choose only applications that can be supported by devices available
   - Less comprehensive device testing requirements (focus on a few key features)
   - May result in ruling out (or postponing) potential applications
   - Complicated system integration (interoperability) and commissioning

User Requirements for Testing

- What approaches would have helped to clarify user requirements for testing?
  - Always keep the application(s) in mind (why are you doing it?)
  - Consider both normal and off-normal behavior expected.
  - Remember the entire data flow path, including instrument transformers, PMUs, PDCs, communication links, etc.
- Provide examples of challenges in meeting different user requirements
  - Applications with conflicting requirements
  - Tradeoff between “data” accuracy and dynamic range
  - Tradeoff between “data” accuracy and speed/bandwidth (M and P classes)

User Requirements for Testing

- Does split on “P” and “M” PMU in the IEEE 37-118-1 standard affect your testing?
  - In principle, YES.
  - As a minimum, testing process needs to accommodate different pass/fail criteria.
  - If the test set-up and instruments are significantly faster and more accurate than the PMU requirements, then the same set up can be used for both “M” and “P” class testing.
  - The split helps as a reminder to keep target application(s) in mind.