DOE/OE Transmission Reliability Program

Synchrophasor Standards Support

Ken Martin
Electric Power Group
martin@electricpowergroup.com
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Electric Power Group

CERTS CONSORTIUM *for* ELECTRIC RELIABILITY TECHNOLOGY SOLUTIONS

Synchrophasor Measurement Standards

- IEEE C37.118.1
  - Published in 2011, Amended in 2014
  - Includes definitions, derivations
  - Performance characteristics
    - Phasors, frequency, & ROCOF measurements
    - Steady-state & dynamic conditions
    - Tests & performance requirements
- IEC/IEEE 60255-118-1
  - Essentially the same as C37.118.1
  - In progress, will finish in 2017(+)

Synchrophasor Communication Standards

- IEEE C37.118.2
  - Original message system developed for phasors
  - Simple & efficient for high speed
  - New revision starting to improve usability
- IEC 61850 TR 90-5
  - Methods developed using C37.118 adapted to 61850
  - Being integrated into standard
- Other standards
  - Current standards not well adapted to large data sets
  - New standards being developed for certain aspects (eg, ASP)

Complementary Standards & Guides

- Typical system uses data concentration (PDC) & storage
- C37.244-2011 PDC guide defines concentration functions
- C37.247-2017(?) PDC standard defines required features
- C37.242-2012 “features” guide describes error sources, synchronization, installation, and testing
- Chinese standards are similar to IEEE ones but are more comprehensive covering control and processing as well as measurement & communication

Coordination*

- Bi-annual meeting with Chinese Standards group
- IEEE – IEC coordination to support harmonization
- Workshop presentations (Canada, India, China, Denmark, Switzerland)
- Complementary work
  - ROCOF research in EU (Euramet)
  - Sample value development in China
  - Certification coordination through the IEEE ICAP

*Note: Most foreign activity is supported by non-DOE funding

Questions?

Presentation

- Introduction
- Historical development
- Ongoing activity

Introduction

- Synchrophasor measurement
  - Conceptualized in 1983
  - First PMU was produced in 1986
  - Tested in 1987-90
  - First commercial PMU introduced in 1990
- The first standard: started 1992, completed 1995
  - Included initial measurement & communication needs
- Standards have since paced and helped guide equipment development since then

Synchrophasor Standards

- Second standard C37.118-2005
  - TVE test & error limits, steady-state phasor only
  - Comprehensive messaging for communication

- C37.118 split into 2 standards in 2011
  - C37.118.1-2011 for measurement
  - C37.118.2-2011 for communication
  - Supports harmonization with IEC standards