

Steering Committee to Review Test Plan for IEEE 1588 Precision Time Protocol for Power Systems

“Timing is everything.” According to internet search engines, this tired cliché appears in over a million web pages and documents. In the case of the smart grid, however, the cliché rings true—synchronization of timing across the grid is extremely important. With the upsurge of distributed energy resources, the increasing number of microgrids, and the expansion of synchrophasor networks throughout North America for meeting real-time control demands, the requirements for precision timing in power systems are becoming increasingly stringent.

For example, how can the time stamp of a sensor in southern California and the time stamp of a sensor in New York be synchronized with a margin of uncertainty of less than a microsecond? As the sensors are being instrumented for real-time control within and between microgrids, how can we have confidence in the accuracy synchronization? And how can these requirements be met consistently, reliably, securely, and at reasonable cost?

IEEE 1588TM defines the Precision Time Protocol (PTP), a network protocol that enables precise synchronization of the real-time clocks of devices in networked distributed systems. The standard was established in 2002 and revised in 2008, and a further revision began in 2013. In 2011 the IEEE Power & Energy Society’s Power System Relaying Committee (PSRC), through its Power Profile Working Group (H24, subcommittee 7), published IEEE C37.238, an IEEE 1588 profile for use in power system applications. That working group is currently developing a revision of C37.238 for publication in 2016.

Corresponding test plans for IEC 61850-9-3 and IEEE C37.238 are currently being developed to enable conformity and interoperability testing and certification. The IEEE-SA Conformity Assessment Program (ICAP) is guiding this process. Recently various stakeholders including clock and synchronization system vendors, utilities, testing laboratories, universities, and government agencies are beginning to undertake this challenge.

The University of New Hampshire InterOperability Laboratory (UNH-IOL), with the help of funds awarded by NIST, is drafting a test plan for the 1588 Power Profile and related IEEE 1588 power profiles to accelerate the adoption of conformity assessment efforts and complementary conformance test software based on the IEEE 1588-2008 version of the standard and the updated IEEE C37.238 power profile.

“Through the grant to UNH-IOL and the establishment of the IEEE 1588 Power Profile CASC, NIST is pleased to support the power and energy industry in this important initiative,” said John Messina, Cyber Infrastructure Group Leader, Information Technology Laboratory Software and Systems Division, NIST.

Bob Noseworthy, UNH-IOL’s Chief Engineer and 1588 Consortium manager said, “Building on 28 years of networking experience, UNH-IOL is uniquely positioned to assist in the development of the associated standards, test plans and tools to deliver a robust IEEE 1588 power profile test plan in 2016. During the development effort, UNH-IOL will also be exposing and preparing students for the needs of the power industry.”

ICAP is convening the IEEE 1588 Power Profile Conformity Assessment Steering Committee (CASC) to review and approve the test plan and also to assess the viability of a certification program. The CASC held its inaugural meeting on January 13, 2016 in Memphis, TN. Ravi Subramaniam, Technical Director, ICAP, and CASC secretary said, "Participation from end-users of the technology will help us understand their perspective and specific needs. ICAP has continually worked with industry partners to identify gaps and assisted with development of conformity assessment and interoperability."

The CASC consists of experts from the timing and synchronization domain, utilities, and device manufacturers. It will also include several representatives from NIST. Aaron Martin from Bonneville Power Administration has been elected as the committee chair. Chan Wong from Entergy Delivery has been elected to serve as vice-chair, and Ya-Shian Li-Baboud from NIST will serve as secretary.

Aaron believes the effort to approve a test plan allows the industry to consider a certification program. This will, in turn, enable utilities to have confidence that the equipment they choose for their timing needs is not only 1588 compliant, but it is also certified. The CASC hopes to complete its work by late 2016, whereupon the final test suite specification will be available for industry use.

With the pace of change taking place in the smart grid industry, this new effort is coming none too soon. As they say, "timing is everything."

To join the IEEE 1588 Power Profile CASC please contact the ICAP administrator at icap-team@ieee.org.