NIST Smart Grid and Cyber-Physical Systems Newsletter

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Testing and Certifying the “Sync” in Synchrophasors and PMUs

Last month, Allen Goldstein of the NIST Physical Measurement Laboratory (PML) was awarded the Bronze Medal for Superior Service for his work accelerating the integration of renewable energy into the power grid. The award spotlights the synchrometrology effort at NIST, begun at NIST in 2006 with support from the Department of Energy, and now led by Mr. Goldstein.

NIST research efforts in this area have supported the establishment of the IEEE Conformity Assessment Program (ICAP) for certification of phasor measurement units (PMUs). Mr. Goldstein led a team that developed a test suite specification for PMU performance that was subsequently adopted by the ICAP program, and he also developed a portable calibration system for PMU calibrators.

PMUs are deployed extensively to monitor power flows, voltage, frequency, and phase angle in electric transmission systems throughout the world to provide better visibility of grid conditions for system operators. This wide-area situational awareness enables system operators to take preventive measures before cascading wide-area blackouts can occur.

The increasing penetration of renewable resources, such as wind and solar, makes power flows more variable in the grid, which can contribute to the imbalances that lead to outages. Originally designed for transmission systems, PMUs are now also being tested for electric distribution systems, in response to the increasing use of rooftop solar in residential areas.

The ICAP accreditation and test program enables conformance of PMUs with the requirements of IEEE standards, such as IEEE C37.118.1, so that certified PMUs are reporting accurately and reliably for better control of the grid. Future research efforts at NIST will support interoperability testing of PMUs, including the development of an interoperability test specification for PMU communication conformance with IEEE standards.

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Green Button: Growing Up and Gaining Recognition

The Green Button initiative, an industry-led effort that responds to a White House call-to-action, is

growing up. Green Button provides electricity customers with easy access to their energy usage data in a consumer-friendly and computer-friendly format via a "Green Button" on electric utilities' websites.

Initially launched in January 2012, utilities committed to provide Green Button capability to nearly 12 million households in 2012. As of July 2015, more than 150 utilities and service providers have committed to providing more than 60 million U.S. households (including altogether 100 million people) access to their own Green Button energy data. Similar efforts are also taking hold internationally. In Canada, for example, more than half of Ontario-based consumers, totaling three million residences and businesses, now have access to their Green Button data.

The Green Button initiative provides a good example of federal agencies working with each other and with industry. Since the beginning, NIST has been an important partner in this effort, along with the Department of Energy, the White House's Office of Science and Technology Policy, the Smart Grid Interoperability Panel (SGIP), the North American Energy Standards Board, the Utility Communications Architecture International Users Group (UCAIug), and others.

In recognition of the key role played by the NIST Green Button team, the U.S. Department of Commerce (DOC) recently awarded the Silver Medal for Exceptional Service, to David Wollman (NIST), Martin Burns (NIST), and John Teeter (formerly a NIST Presidential Innovation Fellow and now in private industry). Their award citation reads, "For leadership in developing 'Green Button,' which enables informed consumers everywhere to reduce energy costs and promote a more sustainable environment." The second highest honor awarded by the U.S. Department of Commerce, the Silver Medal Award is bestowed for "exceptional performance characterized by noteworthy or superlative contributions that have a direct and lasting impact within the Department."

The team also helped to inspire the creation of the Green Button Alliance (GBA)—a non-profit, IRS 501(c)(3) corporation formed in 2015—which is now the focal point for Green Button activity. With a mission to foster the development, compliance, and wide-spread adoption of the Green Button standard, GBA is the "single, definitive go-to-place for all things related to the Green Button initiative—from certification of implementations to marketing and education."

For more information about Green Button, here are some useful links:

- The Green Button Initiative website
- The Green Button Alliance website
- "Green Button Initiative Makes Headway with Electric Industry and Consumers," an article in the White House blog, written by Kristen Honey (DOE), David Wollman (NIST), and Dipayan Ghosh (OSTP)
- "Building an Interoperable Ecosystem," an article in EnergyBiz magazine, written by the NIST Green Button team

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NIST Establishes Group to Help Develop an IoT-Enabled Smart City Framework

NIST is establishing an international technical public working group to help develop an "IoT-Enabled Smart City Framework" that will identify pivotal points of interoperability across the many existing and deployed architectures. The motivation for this activity is the great interest in the Internet of

Things (IoT) envisioned and deployed in smart cities around the world. At the present time, dozens of unconnected standardization and specification activities are competing for mind and market share throughout the world. This international group will be holding workshops in Europe (February 2016) and the United States (March 2016). More details will be available soon. The collaboration project web site is https://pages.nist.gov/smartcitiesarchitecture/. To join the mailing list for this group, send an email to smartcitiesarchitecture-request@nist.gov and include "subscribe" in the subject line. For more information, please contact Martin Burns (martin.burns@nist.gov).

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Transactive Energy: Upcoming Events

Two upcoming events will provide the smart grid community with snapshots of progress being made in a number of areas related to transactive energy (TE).

Webinar on Progress with the TE Challenge – February 23, 1–2 p.m. Eastern time

The "NIST Transactive Energy Modeling and Simulation Challenge for the Smart Grid (TE Challenge)," launched in September 2015, has the goal to serve utilities, regulators, and policy makers by:

- developing simulation tools
- increasing our understanding of TE and applicability of TE approaches
- developing the foundations for successful utility pilots that demonstrate the use of TE methods to enable integration of distributed energy resources (DER) into the electric grid

This webinar will highlight the recent progress of several of the TE Challenge teams. It will include:

- a review of the draft white paper from the TE Business and Regulatory Models team
- an update on plans and deliverables from the TE Demo for Microgrid Energy Management team
- an introduction to a new effort in the OpenADR Alliance to develop Transactive ADR

The webinar will be hosted by the Smart Grid Interoperability Panel (SGIP), and registration details will be available soon on the SGIP webinar webpage. For more details on the TE Challenge, including details on how to get involved, visit the collaboration website.

Third International Conference and Workshop on Transactive Energy -- May 17-19, 2016, in Portland, Oregon

The GridWise® Architecture Council and Smart Grid Northwest will be hosting the Third International Conference and Workshop on Transactive Energy, to be held May 17-19, 2016, in Portland, Oregon. The meeting, which is titled "Transactive Energy Systems: Harnessing Flexibility in an Evolving Electric Power System (TES 2016)," will bring together representatives from government, industry, utilities, vendor organizations, and academia who have an interest in advancing TE.

The conference will feature keynote talks from energy industry leaders, international expert panels, and presentations of selected papers on topics critical to the success of TE. There will also be four different interactive workshops where attendees can discuss and develop answers to important

questions about the future of intelligent electricity.

One of the highlights of the conference will be presentations by teams participating in the TE Challenge.

For more details on the conference, see the TES 2016 website. The call for papers will close January 31.

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Global City Teams Challenge: Upcoming Events

The Global City Teams Challenge (GCTC) is a collaborative network of project teams, or "Action Clusters," working on groundbreaking Internet of Things (IoT) applications within the smart city/community environment. For additional information, please visit the GCTC program's websites at http://nist.gov/cps/sagc.cfm and at https://www.us-ignite.org/globalcityteams/. Here's an update on a number of upcoming events and opportunities:

GCTC 2016 - Participation Guide

Because of the strong interest from organizations that want to participate in GCTC 2016, a detailed Participation Guide has been developed. This online guide provides information about worksheet submissions, upcoming events, and participation deadlines. The guide also includes due dates for applicable grants and links to applications for the tools that GCTC partners IBM and Intel have made available to GCTC participants.

Tech Jam – March 2016

The Global City Teams Challenge (GCTC) is working to host its annual "Tech Jam" event in March 2016. Information about the dates and location of the event will be announced soon. At the Tech Jam, each registered Action Cluster will have an opportunity to present its project plans. The due date to submit the project worksheet to be considered for Tech Jam presentation is February 26.

Department of Transportation (DoT) Smart City Challenge

The U.S. Department of Transportation has announced a Smart City Challenge for city leaders across America to integrate emerging technology into their transportation networks and define what it means to be a smart city when it comes to transportation. The city that develops the most innovative plan to harness technology and data to reimagine how people move will receive up to $40 million to implement it. Interested cities should act fast, because initial proposals are due by February 4.

NSF Issues Dear Colleague Letter to Support GCTC

The National Science Foundation (NSF) is accepting EArly-concept Grants for Exploratory Research (EAGER) proposals from teams participating in the Global City Teams Challenge (GCTC). The deadline for submission is April 1, 2016, but earlier submissions are encouraged, and decisions will be made on a first-come, first-served basis. More information is available online.

SCOPE w/GCTC at CPS Week – April 11, 2016 in Vienna, Austria

The First International Workshop on Science of Smart City Operations and Platforms Engineering with Global City Teams Challenge (SCOPE w/GCTC) will take place on April 11 in Vienna, Austria. This conference provides an opportunity for GCTC teams and smart city stakeholders to present and publish their technical accomplishments. To learn more or submit a paper, please visit http://cps-vo.org/group/SCOPE-16. The due date for submission of a SCOPE workshop was extended to January 29.

GCTC LinkedIn Group

GCTC has created a LinkedIn group, which is intended to serve as the GCTC Online community. (Join the group by typing “Global City Teams Challenge” in the Search Bar at the top of your LinkedIn home page.) Group members receive GCTC-related news, partnership opportunities, events, and other helpful announcements. The LinkedIn group is also a place to exchange ideas, create new Action Clusters, and reinforce existing Action Clusters with additional team members.

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