

NIST COORDINATION OF SMART GRID INTEROPERABILITY STANDARDS

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Abstract

The National Institute of Standards and Technology has efforts underway to accelerate the development of interoperability standards to support the future modernized “Smart Grid” electric grid characterized by a two-way flow of electricity and information, capable of monitoring and responding to changes in everything from power plants to customer preferences to individual appliances. Through a high-visibility, rapid, and open process that brought together the Smart Grid communities, including utilities, equipment suppliers, government and consumers of electricity, NIST has developed and published its Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0 [1]. The purpose of this document is to create the basis for prioritizing, coordinating and accelerating the development of standards in private-sector standards setting organizations, including international standards development organizations such as the International Electrotechnical Commission (IEC) and the IEEE.

Introduction and Challenges

By incorporating communications, distributed computing, and new measurement capabilities, the new Smart Grid will improve the reliability and efficiency of electric power grids while enabling integration of distributed renewable energy sources and electric transportation and reducing energy usage in buildings and industrial facilities through intelligence and automation. Under section 1305 of the U.S. Energy Independence and Security Act of 2007, NIST is assigned the “primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of Smart Grid devices and systems...” [2] In response, NIST has developed a multidisciplinary Smart Grid Program to provide visible national and international leadership and effective coordination of Smart Grid interoperability documentary standards efforts within the private sector, including by international standards development organizations. This program will also support new internal NIST metrology research and

calibrations for measurement of power and energy and other electrical quantities important to revenue metering and the operation of the power grid.. The challenge is to coordinate the efforts of the standards development organizations (SDOs) so that standards gaps are filled and overlaps are resolved.

Three-Phase Plan

Recognizing the urgent need for standards to support Smart Grid interoperability and security, NIST developed a three-phase plan to (1) identify an initial set of standards that would promote the rapid development of the Smart Grid, (2) establish a robust framework for the sustaining development of the many additional standards, and (3) establish a framework for the conformity testing infrastructure that will be needed(See Figure 1). During the first phase, NIST held several workshops in 2009 and developed a NIST Framework and Roadmap for Smart Grid Interoperability Standards Release 1.0, published in draft form in September 2009 for public review and comment and finalized in January 2010. Release 1.0 describes a high-level conceptual reference model for the Smart Grid and identifies 75 existing standards that are applicable to the ongoing development of the Smart Grid. The document also specifies 15 high-priority gaps and harmonization issues for which new or revised standards and requirements are needed, documents action plans with aggressive timelines by which designated standards-setting organizations will address these gaps, and describes the strategy to establish requirements and standards to help ensure Smart Grid cyber security.

To launch the second and third phases, in November 2009 NIST established a Smart Grid Interoperability Panel (SGIP), a public-private partnership involving over 500 organizations in 22 stakeholder categories and over 1400 member representatives, including international participation. The SGIP provides a more permanent organizational structure to support the continuing evolution of the NIST Smart Grid Framework, including for conformity testing and certification of Smart Grid devices and systems. The purpose of the SGIP is to unify the many Smart Grid

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Stakeholders by bringing them together to develop consensus on the approaches to standardization and on the standards themselves. The SGIP has a Governing Board that serves to ensure fairness and balance in the SGIP standards activities and outputs.

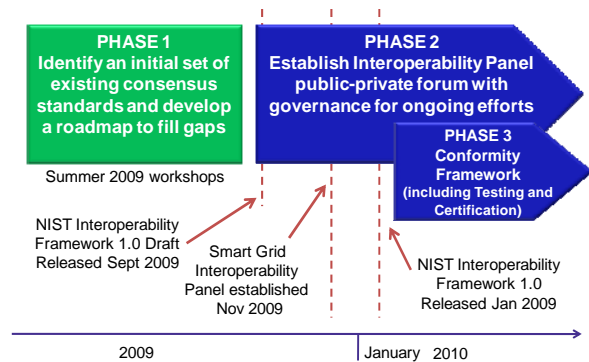


Figure 1. NIST Three Phase Plan

As part of the NIST Smart Grid Program, additional research and development of new or expanded calibration services is being supported, including in the areas of phasor measurement units, smart meters, building automation, networking, cybersecurity, and industrial control systems. Many new sensors and measurement devices need to be developed and deployed in order to realize the new capabilities envisioned for the Smart Grid. The NIST programs will provide the research necessary to support the development of the devices and standards, and address device performance and communication to ensure that the requirements are met. Additionally, testbeds will be developed to assess the interoperability and reliability of these devices and systems, as well as how they conform to the requirements of the standards.

Summary

Through timely development of the NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0, NIST is coordinating and accelerating the development of interoperability standards within national and international standards development organizations to support the new modernized Smart Grid. The NIST research programs will support the development of standards, devices, and systems, and ensure their interoperability to accelerate the deployment of the Smart Grid.

Acknowledgement

The work presented here represents the efforts of many NIST staff members working as part of the

NIST Smart Grid team, led by Dr. George Arnold, National Coordinator for Smart Grid Interoperability.

References

- [1] “NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0,” http://www.nist.gov/public_affairs/releases/smartgrid_interoperability_final.pdf
- [2] Energy Independence and Security Act of 2007, http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ140.110.pdf