

NIST Smart Grid Program



NIST Framework 3.0 Testing & Certification November 6, 2013

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Introduction

- High Level overview of the testing and certification section of NIST Framework 3.0 (FW3)
- Preliminary version available on the NIST Twiki
 - <https://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGridFramework/WebHome>
- A formal call for public review/comment will be forthcoming
- This presentation provides a kickoff for the public review period
- This session is meant to be interactive so your participation and comments are welcomed



What's New in FW 3.0

- Previous Framework version was issued in 2011
- Key new material covered in FW 3.0 includes:
 - IPRM Version 2
 - Engagement with ITCAs, Labs, Certifiers and Accreditors
 - Support Provided to Emerging ITCAs
 - Creation of the ITCA Development Guide
 - SGTCC CoS reviews relative to testing attributes
 - Identification of Priority Test Program Needs
 - Outreach and Advocacy for Test Programs
 - Future Directions



Testing and Certification in Framework 3.0

- Section 7 of the Framework Covers Testing and Certification Issues
- Six Primary Sections
 - 7.1 NIST Role in Smart Grid Testing and Certification
 - 7.2 NIST Initiated Efforts Supporting the Framework Development
 - 7.3 SGTCC Framework Development Activities
 - 7.4 SGTCC Progress since Framework 2.0
 - 7.5 Current Smart Grid Testing Initiatives
 - 7.6 Future Directions



7.1 NIST Role in Smart Grid Testing and Certification

- This section largely follows the material on testing and certification presented in Framework 2.0 with some minor editing
- NIST recognizes the need for a testing and certification framework for Smart Grid standards
- When NIST created the SGIP in 2009, it included a standing committee on testing and certification
- The SGIP/SGTCC continues to support NIST in its EISA responsibilities



7.2 NIST Initiated Efforts Supporting the Framework Development

- This section reviews the origins of NIST efforts on Smart Grid testing and certification
 - Discussion on reports developed for the use of the SGIP/SGTCC



Testing and Certification Framework Development Guide

- A development guide was produced by NIST to accelerate the development of a comprehensive operational framework
- Defines goals of the framework including:
 - Help ensure a consistent level of testing for products based on the same smart grid standards, as well as ensure consistency in the implementation of test programs among different standards;
 - Address test implementation and execution issues, including qualification criteria for test laboratories and accrediting organizations, and recommend best practices to ensure that test results achieve their desired intent
 - Take into consideration the evolutionary progression of the smart grid, and be structured to allow maturation of existing technologies and introduction of emerging technologies.



Assessment of Existing Smart Grid Standards Testing Programs

- NIST initiated and completed an in-depth study in early 2010 to assess the existing testing and certification programs associated with the priority smart grid standards identified by NIST
 - AKA – the “landscape” document
- The SGTCC updated the document in 2012 with key findings including:
 - There are currently 13 test programs that have been developed or are in the process of being developed. This remains a low percentage of the overall identified smart grid standards
 - Of these test programs, nearly half of them have begun to implement the SGTCC Interoperability Reference Manual (IPRM) recommendations.
 - Standards supported by users groups are more likely to have successful test programs.
 - Most test programs are based on conformance but there are growing trends to put increased efforts into interoperability aspects as their programs evolve.
 - More programs are introducing cybersecurity aspects as part of their testing regiments.



7.3 SGTCC Framework Development Activities

- IPRM
 - Introduction to the IPRM
 - IPRM updates with transition from informational to operational approach
- IMAM
 - Taken from Framework 2.0, but condensed to provide space for new sections (general desire to keep the section of reasonable length)



IPRM

- The Interoperability Process Reference Manual was developed and released in 2010
- Introduces Interoperability Testing and Certification Authorities (ITCAs) that support one or more Smart Grid standards
- A “how to guide” to set up an ITCA
- Specifies testing and certification processes for achieving interoperability
- An update to the IPRM was released in 2012 (described later in this presentation)

Summary of Roles and Requirements of an ITCA

- The requirements for an ITCA as specified in the IPRM are divided into the following five categories:
 - **Governance** defines the structures, policies, rules, and regulations associated with the ITCA certification program. For example, a governance process would require the ITCA to establish and maintain an independent and vendor-neutral testing and certification oversight authority.
 - **Lab Qualification** defines the requirements that shall be applied by ITCAs when recognizing testing laboratories. It should be noted that additional requirements are further detailed in International Organization for Standardization (ISO) 17025.
 - **Technical Design for Interoperability and Conformance Program Design** defines the requirements needed to effectively manage the procedures and processes associated with interoperability and conformance testing.
 - **Improvements** cover the continuing improvement controls that are required to support the interoperability testing processes.
 - **Cybersecurity** covers the requirements that shall be used by the ITCA to validate the security-related components of the interoperability testing program.

Leveraging Industry Best Practices

- The IPRM includes a list of recommended best practices and guidelines for ITCAs in their development and operation of interoperability and conformance testing programs.
- Recommendations were generated based on input from experienced testing organizations that have evolved interoperability and conformance programs through lessons learned in executing tests for both software and hardware applications.
- Three main focus areas:
 - General test policies—includes policies related to information that product vendors need to know relative to a specific testing and certification program;
 - Test suite specification (TSS) — includes the need to establish a common TSS for use by multiple test labs; a TSS that is test-tool agnostic; and revision control of TSS; and
 - Attributes of a test profile in lieu of complete test suite specification.

Interoperability Maturity Assessment Model

- The SGTCC developed and refined the assessment metrics used in the “landscape” document into a more rigorous Interoperability Maturity Assessment Model (IMAM).
- The IMAM includes metrics and tools for quick and high-level maturity assessment of a standard’s testing and certification program. It includes “filtering” metrics for evaluating critical characteristics of a successful test program, and “assessment” metrics for deeper evaluation of specific strengths and weaknesses of a test program.
- The IMAM was originally envisioned for use by the SGIP, standards bodies, and ITCAs in their analyses of standards and associated test programs. Over time, the SGTCC recognized that the content developed for the IMAM could be put to good use in two of its initiatives: Catalog of Standards reviews and ITCA Assessments of IPRM implementation

7.4 SGTCC Progress since Framework 2.0

- IPRM V2
- Engagement with ITCAs, Labs, Certifiers, Accreditors
 - Discussion on commitments by five accrediting bodies and outreach to labs, certification bodies
 - 7.4.2.1 Emerging ITCA Support (Green Button, NASPI, etc.)
 - 7.4.2.2 IPRM-ITCA Development Guide
- SGTCC Input for SGIP CoS Reviews

IPRM Version 2

- IPRM Version 2 was released in 2012, transitioning focus from informational to operational
- Significant changes in IPRM Version 2 as compared to the prior version include:
 - Greater emphasis on the importance of independent accreditation and adherence to internationally recognized standards for testing labs and certification bodies;
 - Restructuring the document sections to align with the interests of key stakeholder groups—ITCAs, cybersecurity testing organizations, certification bodies, and test laboratories (i.e., the revised sections are targeted at the interests and responsibilities of specific stakeholders);
 - An expanded section on cybersecurity providing much more detailed coverage in this new release, and the ITCA role in cybersecurity testing and certification is clarified further; and
 - The requirements tables were condensed to eliminate redundancy and non-measurable criteria. The requirements in IPRM Version 2 are intended to be more easily implementable for third-party accreditation and other assessment operations.

Engagement with ITCAs, Labs, Certifiers and Accreditors

- The testing and certification framework includes key stakeholder such as ITCAs, Test Labs, Certification Bodies and Accreditors. The SGTCC engages with these stakeholders to address:
 - Development and management of processes for use by industry third-party assessment organizations to help them evaluate ITCAs for IPRM implementation;
 - Maintenance of an informational tool that identifies available smart grid test programs, including links to their industry third-party accreditations and certifications that meet IPRM recommendations; and
 - Liaison relationships with ITCAs initially to monitor their IPRM implementation status and long term to capture lessons learned that may be used for future revisions of SGTCC documents and processes.

Emerging ITCAs Support

- The SGTCC has been engaging directly with newly emerging ITCAs by providing guidance as those organizations form and develop their processes with an aim towards IPRM implementation
- The SGTCC has worked closely with OpenADR, Green Button, NEMA, and a new PMU based ITCAs being developed, as well as maintaining relationships with established ITCAs such as UCA 61850, MultiSpeak and others

ITCA Development Guide

- In setting up and operating an ITCA, there are a series of activities and responsibilities that are addressed specifically or implied in the IPRM, most of them enumerated in a separate section. A guidance document has been developed and released to support these emergent ITCAs. It is intended to organize the IPRM's explicit and implicit requirements and suggested best practices for an ITCA into a roadmap to follow in launching its program.

SGTCC CoS Reviews

- In 2012, the SGTCC began performing reviews of CoS candidates with a focus on their testing attributes
- A set of filtering metrics measure the testing-related attributes of a standard with respect to the following five areas:
 - A series of considerations to assess whether the standard is implementable in products;
 - Status of ITCA availability and maturity to support testing and certification for the standard;
 - The quality of the standard itself relative to clear definition for assessing conformance;
 - Considerations that explore whether the standard addresses interoperability as well as conformance; and
 - Customer expectations relative to test programs for the standard and whether those expectations are being satisfied.

7.5 Current Smart Grid Testing Initiatives

- Prioritization of Test Programs – Gaps/Opportunities
 - Prioritization Initiative
- Outreach

Prioritization of Test Programs

- NIST developed and issued a white paper in early 2013 discussing the need for accelerated availability of testing programs, and a proposed process for industry to identify those programs that should be prioritized to best focus available resources on these needs
- The NIST white paper proposes the eventual creation of an SGIP PAP proposal for each of the top testing priorities identified for recommendation to the SGIP Board for approval. These action plans will be used to define the requirements to work with industry to develop a smart grid test program.

Outreach

- Several issues have been identified that have driven the need to develop a proactive outreach initiative for smart grid testing and certification:
 - The need to engage key stakeholders and product decision makers in advocating the value of smart grid test programs;
 - The need to better align end-user technology priorities with the areas where SGTCC can focus its efforts in accelerating the creation of new test programs;
 - The need to build broader awareness of testing programs, processes, and resources across the smart grid community; and
 - Testing and certification programs require demand drivers for their success. Demand drivers lead to widespread adoption of testing programs. Demand may be market driven or via regulatory mandate (e.g., product safety, FCC radio frequency). Market-driven programs are those where end users (e.g., utilities) require suppliers to provide testing data, certification, etc. as a condition within their product evaluation and selection process

7.6 Future Directions

- Incubation of New Testing Initiatives via Priority Action Plans
- Catalog of Test Programs
- IPRM Version 3
- International Engagement

Incubation of New Testing Initiatives via Priority Action Plans

- The migration of the testing prioritization initiative towards priority action plans to address identified needs will be an ongoing and long-term activity.
- Currently, planning for this PAP approach is in its early stages. With many needs anticipated as potential PAPs, and limited SGIP volunteer resources available, there is a need to develop a long-range plan for PAP development and execution that aligns with the priority needs.
- NIST will continue to interact with utilities and other stakeholders within the smart grid ecosystem to assure congruence with evolving needs and priorities.

Catalog of Test Programs

- NIST plans to engage with the SGIP on a proposed concept being referred to as a Catalog of Test Programs (CoTP).
- The concept is similar to the SGIP Catalog of Standards (CoS) approach.
- While the CoS provides a directory of standards that help to enable smart grid interoperability, the CoTP will provide a directory of industry test programs that support assessments against those standards.

IPRM Version 3

- It is anticipated that the IPRM will be revisited within the next two years to review the successes and challenges that ITCA's have experienced in building their programs using the recommendations.
- A third version of the IPRM is anticipated to address these lessons learned with refinements made to the document to better align with ITCA experiences.

International Engagement

- NIST is actively engaged with international smart grid organizations that provide similar technical and coordination initiatives that mirror the SGIP.
- Testing and certification activities by those international organizations are at an early stage, but have become more emergent in 2013. As these worldwide organizations progress their own initiatives, there will be a mutual benefit to aligning activities.
- Active collaboration on testing and certification issues and initiatives are anticipated going forward to assure smart grid interoperability is not impeded by geographic boundaries.

Additional Items

- There are several additional items that are planned to be incorporated into the document:
 - More details about the Prioritization Initiative to capture material developed after the draft FW3 was prepared, including results described in that report
 - Plans for next steps in the Prioritization Initiative including industry socialization and preparation for action plans to address the identified priorities

Closing

- The Framework draft link is:
 - <https://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGridFramework/WebHome>
- Please send us any comments you might have using the smartgrid@nist.gov email. NIST will only be using these comments to guide us in preparing the draft for formal public comment, and thus will not be providing responses back to you.
- Any questions, please contact:
 - Dean Prochaska (dean.prochaska@nist.gov)