NIST
National Institute of Standards and Technology
U.S. Department of Commerce

NIST Smart Grid Interoperability Standards Update

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IEEE PES TC and ETCC "Late-Breaking" News Session,

July 25, 2011

Topics for Today

- EISA Mandate
- FERC Order on Smart Grid Interoperability Standards
- Draft NIST Framework and Roadmap, Release 2.0
- SGIP

National Institute of Standards and Technology Role: Coordination of Interoperability Standards in U.S.

U.S. Energy Independence and Security Act (EISA) of 2007 Title XIII, Section 1305.

In cooperation with [stakeholders], **NIST** has "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**…"

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… after [NIST]'s work has led to **sufficient consensus** in [FERC]'s judgment, the **Commission** shall **institute a rulemaking proceeding** to adopt such standards and protocols **as may be necessary** to insure smart-grid functionality and interoperability …

FERC Order

- **FERC Technical Conference on Interoperability Standards, January 31, 2011**

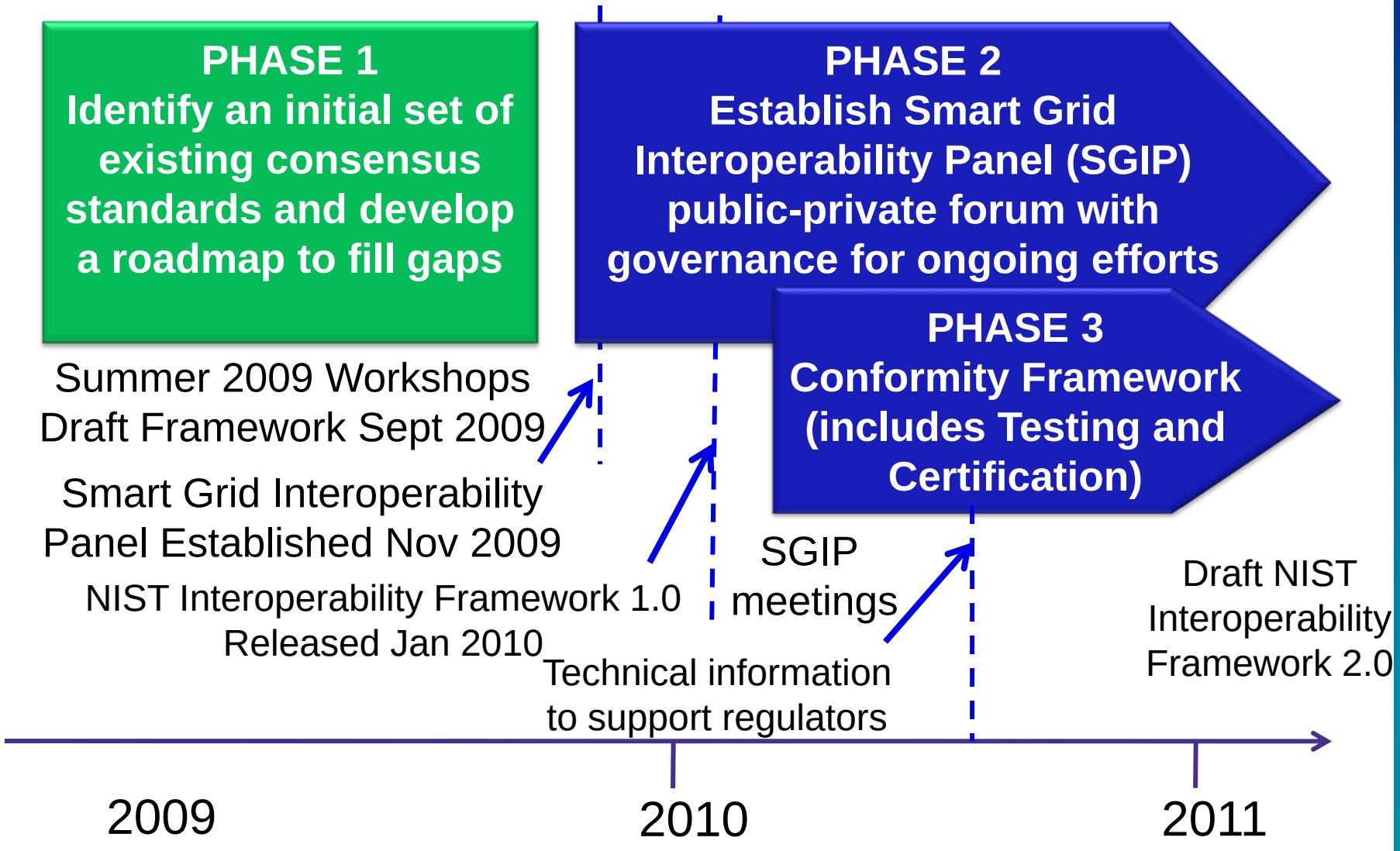
-Is there consensus on SG interoperability standards (five families of IEC standards from NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0)?

- public comment period
  - NIST advised that FERC … [recommend] use of the NIST Framework and that it would be impractical and unnecessary for the Commission to adopt individual interoperability standards.

- **FERC Order, July 20, 2011**

- **will not institute a rulemaking on standards**:
  lack of consensus, cyber security concerns, risk of unanticipated consequences of premature implementation
- **supports the NIST interoperability framework process,** including the work done by SGIP, for development of smart grid interoperability standards.
- **cites the NIST Framework as** comprehensive and representing **the best vehicle** for developing standards for the smart grid.
- **encourages SG stakeholders to actively participate** in and look to the NIST-coordinated process for guidance on smart grid standards.

NIST Three Phase Plan for Smart Grid Interoperability



NIST Framework and Roadmap, Release 1.0

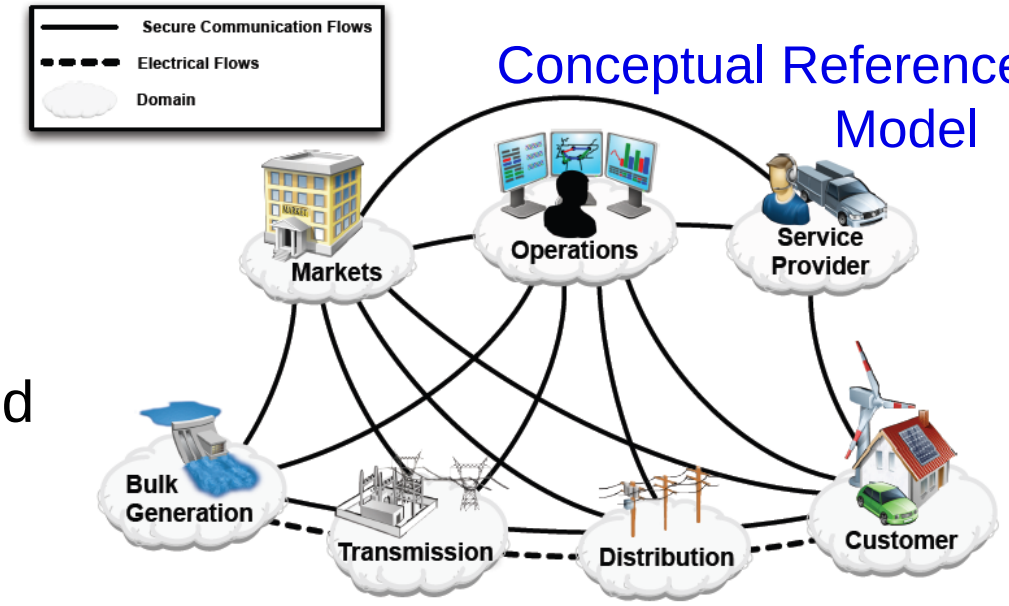
- Revised version Jan 19, 2010
- Smart Grid Vision / Model
- 75 key standards identified
  - IEC, IEEE, …
- 16 Priority Action Plans to fill gaps (one completed)
- Cyber security strategy
  - Companion document NISTIR 7628
- Next steps – keep standards acceleration going strong!
- Public comments reviewed and addressed

NIST Special Publication 1108

http://www.nist.gov/smartgrid/

NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0

Conceptual Reference Model



NIST Smart Grid Framework 1.0 January 2010

NIST National Institute of Standards and Technology

NIST Framework, Release 2.0, Chapter 1. Purpose & Scope Chapter 2. Smart Grid Visions

Use of the Framework Document

- Utilities and suppliers
  - Conceptual Architectural Framework (Chapter 3), compendium of reference standards (Chapter 4), Smart Grid privacy and security (Chapter 6); a taxonomy of the various Smart Grid domains (Appendix)
- Testing laboratories and certification organizations
  - New T&C (Chapter 7)
- Academia:
  - Next Steps (Chapter 8) and summaries of various Priority Action Plan (PAP) subgroups' efforts in Chapter 5
- Regulators:
  - a general introduction to the SG (Executive Summary and Chapter 1), a guide to workable standards (Chapter 4), Smart Grid privacy and security matters (Chapter 6)

NIST Framework for Interoperability Standards, Release 2.0 (R2.0)

Table of Contents

http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/IKBFramework

NIST Framework, Release 2.0, Chapter 1. Purpose & Scope, Chapter 2. Smart Grid Visions

Smart Grid - a national policy goal

- EISA
  - NIST 3-phase plan; NIST Framework, R1.0; SGIP

- NSTC report "*A Policy Framework for the 21st Century Grid: Enabling Our Secure Energy Future.*"
  - greater focus on standards achieve innovation.

International Cooperation

- International Smart Grid Action Network (ISGAN)
- ARCAM
  - Provide recommendations for actions APEC members to prevent trade barriers related to Smart Grid interoperability standards.

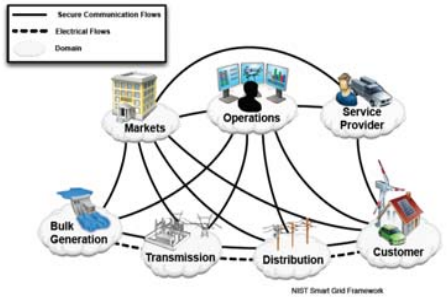
NIST Framework, Release 2.0, Chapter 3. Conceptual Architecture Framework

Used for two important purposes:

- to provide stakeholders a common understanding of the elements that make up the Smart Grid and their relationships
- to guide the various architectures, systems, subsystems, and supporting standards that make up the Smart Grid

The architectural framework includes:

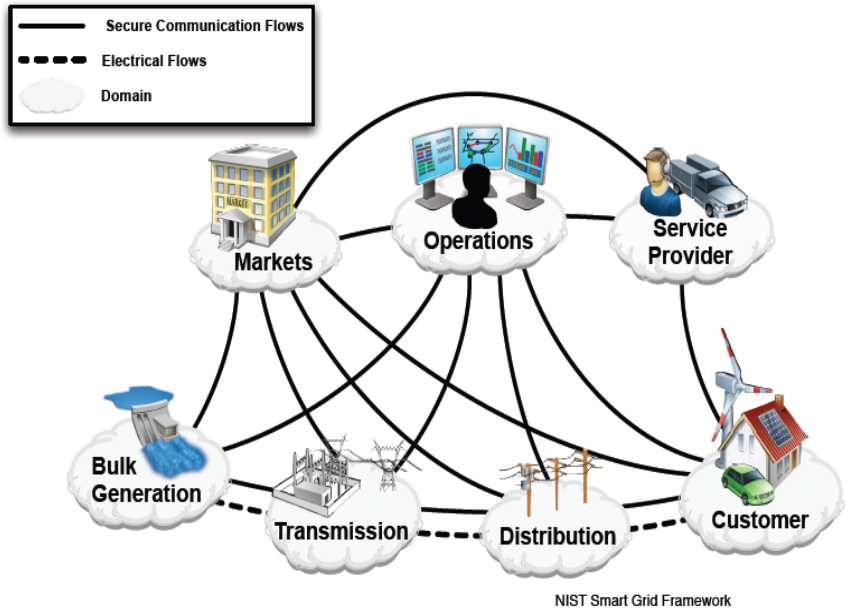
- *Architectural Goals for the Smart Grid* – options, interoperability, maintainability, upgradeability, innovation, etc.
- *Conceptual Reference Model*
- *Models for Smart Grid Information Networks*
  - Information Networks
  - IP-Based Networks
  - Standards Technologies for Smart Grid Communication Infrastructure
- *Smart Grid Interface to the Customer Domain*
- *Use Cases*



NIST Framework, Release 2.0, Chapter 3. Conceptual Architecture Framework

Update on work being done by the SGAC:

- Standards Review by the Smart Grid Architecture Committee
- Legacy Integration and Legacy Migration
- Common Understanding of Information
- Conceptual Business Services



NIST Smart Grid Framework

NIST Framework, Release 2.0, Chapter 4. *Standards Identified for Implementation*

Updates to Table 4-1

- Standards moved from Table 4-2, (for further review) to Table 4-1 (identified standards).
  - emerged from the PAPs, recommended by the SGIP GB, and approved by the SGIP plenary for the SGIP CoS:
    - IETF Internet Protocol Standards for Smart Grid – RFC 6272 (PAP1)
    - NAESB WEQ19, REQ18, Energy Usage Information (PAP10)
    - SAE J1772, J2836 EV Standards (PAP11)
    - NEMA Smart Meter Upgradeability Standard SG-AMI 1 (PAP0)
    - Guidelines for Assessing Wireless Standards for for SG Applications, NIST IR 7761 (PAP02)

- Guidelines from SGIP Committees
  - SGTCC Interoperability Process Reference Manual (IPRM)
  - NISTIR 7628 Guidelines for SG Cybersecurity

NIST Framework, Release 2.0, Chapter 4. *Standards Identified for Implementation*

Updates to Table 4-2

- Standards that did not exist in January 2010
  - OASIS Energy Interoperation (EI) (PAP9)
  - ASHRAE 201P Facility Smart Grid Information Model (PAP17)

- Standards recommended for review by SGIP WGs
  - EMI and EMC standards from EMI WG

- Future additions/changes:
  - Using the CoS as a major source of input for the NIST Framework

NIST Framework, Release 2.0, Chapter 6. *Cybersecurity*

CSWG

- Structure, subgroups, major outputs and activities
  - NISTIR 7628
  - CoS Standards Reviews
  - CSWG 3-year plan

- Future activities
  - Risk management framework

NIST Framework, Release 2.0, Chapter 7. *Testing and Certification*

Framework for SG Interoperability T&C

- Phase III of NIST plan

- Major efforts:
  - Existing Conformity Assessment Program Landscape
    - evaluated testing and conformity assessment programs for 31 SG standards
  - SG T&C framework development guide
    - presents scope, rationale, and need for developing a comprehensive framework and action plan for SG interoperability T&C

- IPRM – for adoption by ITCAs
  - specifies the mandatory T&C and certification processes for achieving interoperability

NIST Framework, Release 2.0, Chapter 8. Next Steps

Framework and Interoperability Standards Evolution

- The framework will continue to evolve as Smart Grid deployments are rolled out, innovative technologies emerge, and new standards needs and issues are identified
- Support the implementation of the policies set out in the NSTC report by continuing to catalyze the development and adoption of open standards
- Take ”lessons learned” from DoE SGIG deployments to further identify standards needs, and work with SGIP, SSOs, and other stakeholders to fill the gaps and improve the standards that form the foundation of the Smart Grid.
- Continue efforts in coordination of development of international standards with organizations

Input from the SG Stakeholders IP

- Draft Release 2.0 Framework & Roadmap document now posted

  http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/IKBFramework

- FRN for public comment solicitation in next few weeks

- Comments received will be reviewed with SGIP

- Release 2.0 Framework posted in the Fall

Smart Grid Interoperability Panel (SGIP)

SGIP GB and SGIP Charter

"The Smart Grid Interoperability Panel (SGIP) is a membership-based organization ... to provide an open process for stakeholders **to participate in providing input** and cooperating with NIST in the ongoing coordination, acceleration and harmonization of Standards Development for the Smart Grid. "

Smart Grid Interoperability Panel

Public-private partnership created in Nov. 2009

Over 675 member organizations, 1790 participants

Open, public process with international participation

Coordinates standards development

- Identifies Requirements
- Prioritizes standards development programs
- Works with over 20 SDOs including IEEE, IEC, ISO, ITU, …

Web-based participation

SGIP Twiki:
http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/SGIP

Organization

Governing Board

SGIP Officers

NIST

SGIP Administrator

Test & Certification Committee (SGTCC)

Architecture Committee (SGAC)

Cyber Security Working Group (CSWG)

Standing Committees & Working Groups

PAP 1 | PAP 2 | PAP 3

PAP 4 | PAP … | PAP 17

Priority Action Plan Teams

Program Mgmt Office (PMO)

Comm. Marketing Education (CME)

Bylaws & Operating Procedures (BOP)

Coordination Functions

BnP | H2G | B2G

TnD | I2G | PEV2G

Electromagnetic Interoperability Issues

Domain Expert Working Groups

SGIP Membership

Further Information

Web portal: http://www.nist.gov/smartgrid

NIST Collaboration SG Website (SGIP):

http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/WebHome

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