

Smart Grid Interoperability Framework: Synchrophasor Metrology and Standards Support and Coordination

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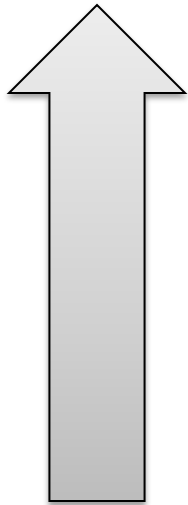
NASPI Meeting

October 5, 2010

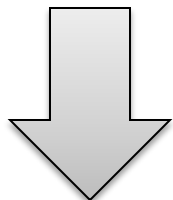


Government Roles in Smart Grid

Federal



Federal
Energy
Regulatory
Commission



State



Public Utility Commissions

The NIST Role

*Energy Independence and Security Act (EISA) of 2007
Title XIII, Section 1305.
Smart Grid Interoperability Framework*

In cooperation with the DoE, NEMA, IEEE, GWAC, and other 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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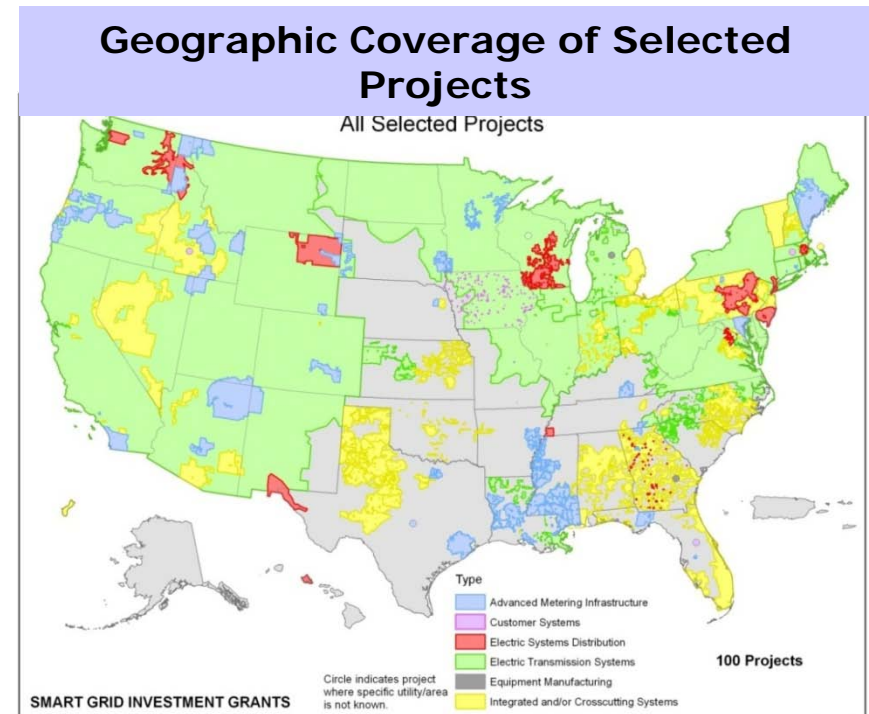
Role: Coordination of Interoperability Standards in United States



Department of Energy (DOE) lead agency for U.S. Government

- \$3.4 billion of Stimulus-funded Smart Grid Investment Grants

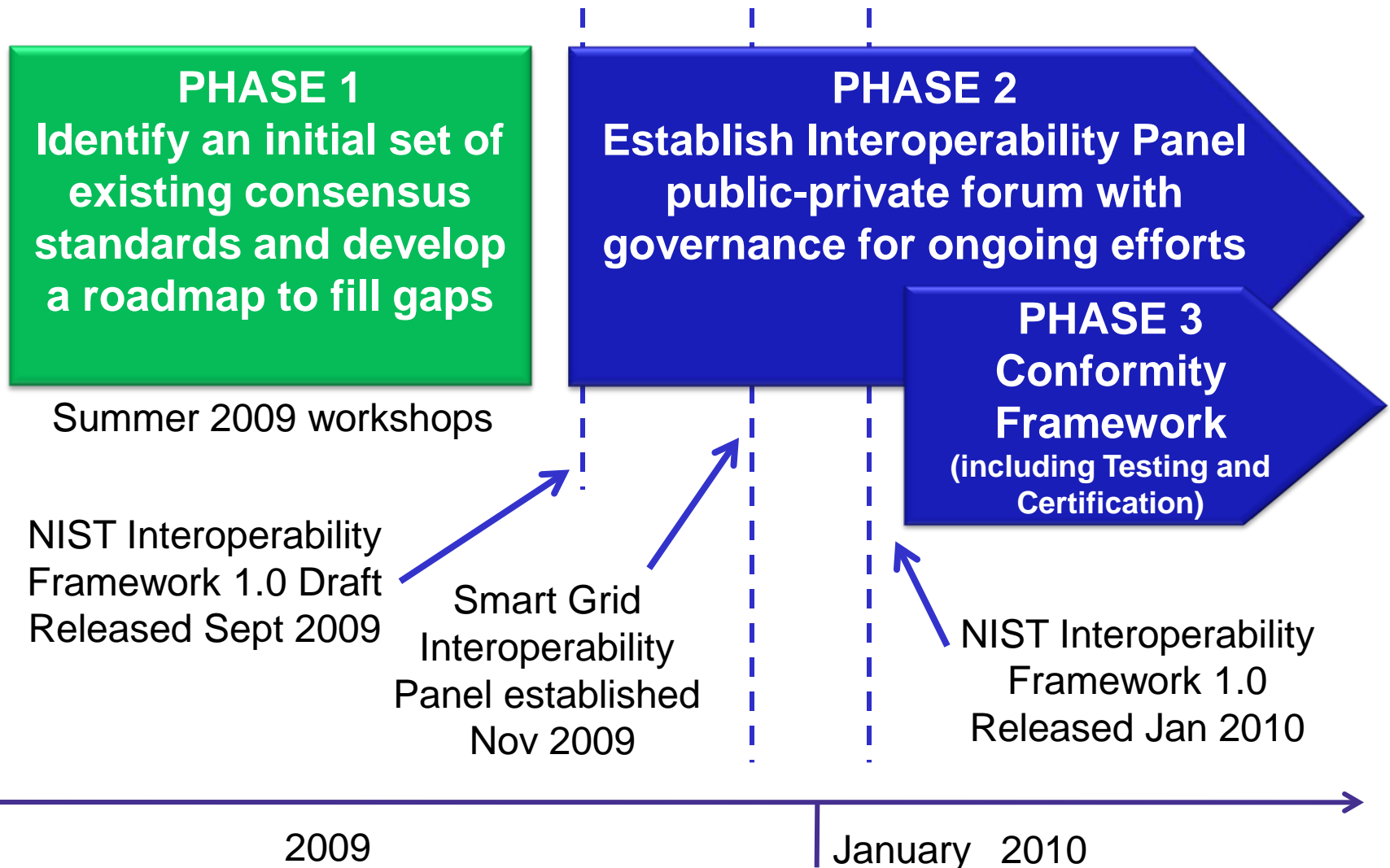
Category	\$ Million
Integrated/Crosscutting	2,150
Advanced Metering Infrastructure	818
Distribution	254
Transmission	148
Customer Systems	32
Manufacturing	26
Total	3,429



Oct 21, 2009

18M smart meters; 1.2M in-home displays
 206,000 smart transformers; **877 networked phasor measurement units**; 671 automated substations
 177,000 load control devices; 170,000 smart thermostats; 100 PEV charging stations

NIST Three Phase Plan



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)

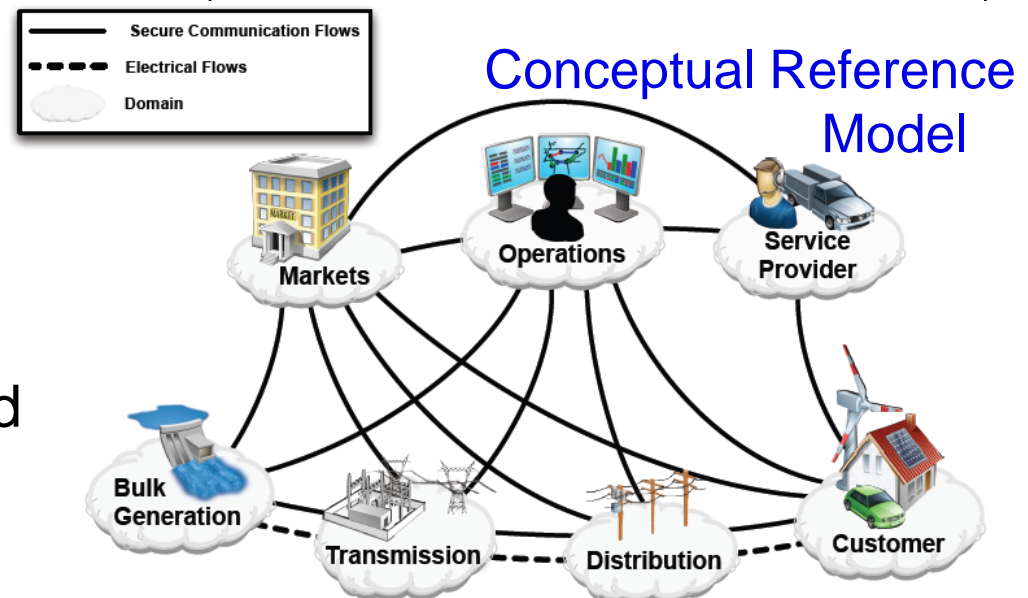
Cyber security strategy

- Companion document NISTIR 7628

Next steps – keep standards acceleration going strong!

Public comments reviewed and addressed

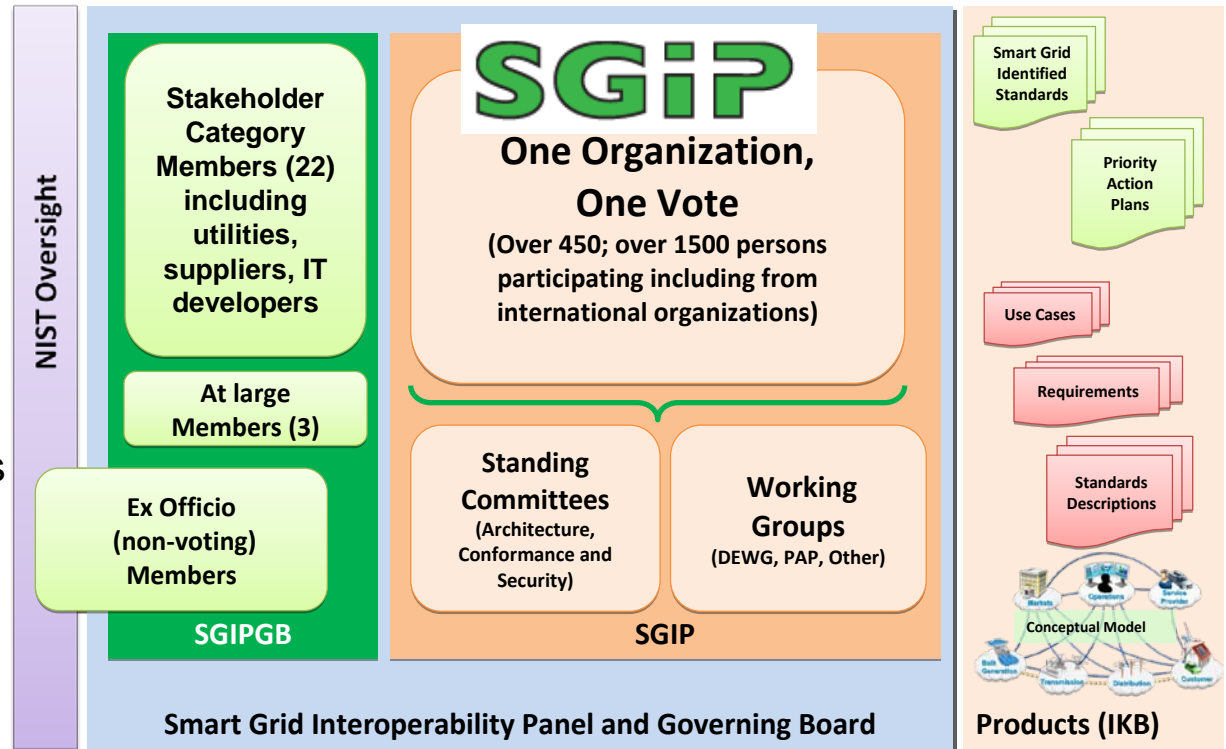
NIST Special Publication 1108
<http://www.nist.gov/smartgrid/>
NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0



NIST Smart Grid Framework 1.0 January 2010

Smart Grid Interoperability Panel and Governing Board

- Public-private partnership, started in Nov. 2009
- Over 600 organizations, 2000 members
- Supports NIST in coordinating smart grid standards
- Governing Board elected
- SGIP Chair elected
- Committees established, PAP meetings ongoing
- Electronic collaboration tools, newsletters/communications
- Open, transparent process



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

Priority Action Plans (PAPs)

Smart meter upgradeability standard (PAP 00, completed by NEMA in 2009)	Harmonization of IEEE C37.118 with IEC 61850 and Precision Time Synchronization (PAP 13)
Develop common specification for price and product definition (PAP 03)	Transmission and distribution power systems model mapping (PAP 14)
Develop common scheduling communication for energy transactions (PAP 04)	Guidelines for use of IP protocol suite in the Smart Grid (PAP 01)
Develop common information model (CIM) for distribution grid management (PAP 08)	Guidelines for the use of wireless communications (PAP 02)
Standard demand response signals (PAP 09)	Energy storage interconnection guidelines (PAP 07)
Standard for energy use information (PAP10)	Interoperability standards to support plug-in electric vehicles (PAP 11)
DNP3 Mapping to IEC 61850 Objects (PAP12)	Harmonize power line carrier standards for appliance communications in home (PAP15)
Standard meter data profiles (PAP 05)	Wind Interconnection Standards (PAP 16)

PAP13: Harmonization of IEEE C37.118 with IEC 61850 and Precision Time Synchronization

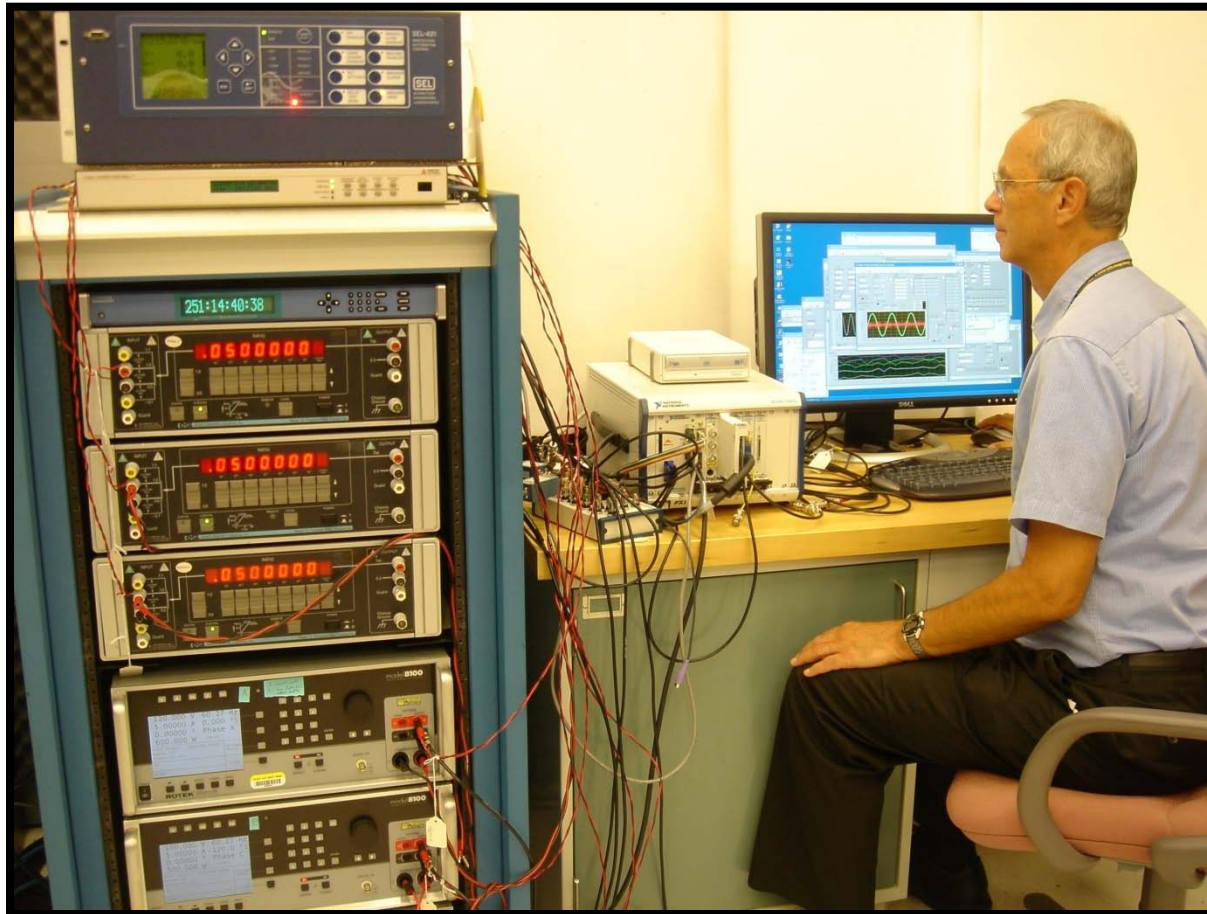
Value Proposition

Bridging the communication standards for synchrophasor data from current to more feature-rich standards which will accelerate the implementation of the Smart Grid. Expected benefits include reduced capital and lifecycle costs, improved reliability and the enablement of new applications.

PAP13: Harmonization of IEEE C37.118 with IEC 61850 and Precision Time Synchronization - Activities & Deliverables

D#	Deliverable
D1	<u>Harmonization requirements</u>
D2	<u>C37.118 Gap List</u>
D3	<u>IEC 61850-90-x Mapping document</u>
D4	<u>1588 Time Sync Demo</u>
D5	<u>1588 Power Profile</u>
A1	NIST has released an RFP for key work tasks for PAP13 (and PAP-12).
A2	The PAP-13 group reviewed the full draft of the IEC 61850-90-5 technical report
A3	IEC WG-10 meeting in Moscow on October 4 - review comments on the 90-5 document and decide on timing for balloting.
A4	Successful face to face meeting at PSRC on September 14 with largest (to date) participation and discussion on the 90-5 document and requirements.

NIST Synchro metrology Testbed: Static PMU Calibration System



NIST Support for PAP 13 and NASPI

– extension of NIST Synchro metrology Lab

Two contracts awarded by NIST to support PAP13, PMU, PDC work:

1) ESTA International, Quanta Technologies

- Develop recommendations for extension of NIST synchro metrology testbed to include communications to support PAP 13 (and PAP12) tasks
- Support harmonization/mapping of standards – text, models
- Develop requirements for PMU and PDC testing, extension of NIST synchro metrology testbed

NIST Support for PAP 13 and NASPI

– extension of NIST Synchro metrology Lab

Two contracts awarded by NIST to support PAP13, PMU, PDC work:

2) IPKeys, Quanta Technologies

- support NASPI PSTT and NIST to develop extended PMU-PDC and PDC-PDC communication methods / protocols
- Additional Support for the Requirements, Testing and Certification Approaches, and Calibration and Test Guideline for Phasor Measurement Units (PMUs) and Phasor Data Concentrators (PDCs)

Smart Grid Links

	<i>Link</i>
NIST Smart Grid Home Page	http://www.nist.gov/smartgrid/
NIST Smart Grid TWiki	http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/WebHome
NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0	http://www.nist.gov/public_affairs/releases/smartgrid_interoperability_final.pdf
Harmonization of IEEE C37.118/ IEC 61850 and Precision Time Synchronization	http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PAP1361850C27118HarmSynch
EPRI Roadmap Report	http://www.nist.gov/smartgrid/Report%20to%20NISTIAugust10%20(2).pdf
DOE Smart Grid Site	http://www.oe.energy.gov/smartgrid.htm