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NIST Interoperability Standards Update

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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**…"

NIST Definition - Interoperability

"The capability of two or more networks, systems, devices, applications or components to exchange and readily use information – securely, effectively and with little or no inconvenience to the user. The Smart Grid will be a system of interoperable systems. That is different systems will be able to exchange meaningful, actionable information. The systems will share a common meaning of the exchanged information, and this information will elicit agreed upon types of response. The reliability, fidelity and security of information exchanges between and among Smart Grid systems must achieve requisite performance levels".

Note: This is the simplified version. See the Grid Wise Architecture Council's (GWAC) Interoperability Framework for a more detailed version.

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First 16 NIST Framework Standards

	Domain Expert Working Groups							
1	AMI-SEC System Security Requirements	✓	✓	✓			✓	✓
2	ANSI C12.19 End Device (Meter) Tables		✓	✓				✓
3	BACnet Building Automation & Control Net			✓	✓			✓
4	DNP3 – Distributed Network Protocol		✓		✓	✓	✓	
5	IEC 60870-6 – Inter-Control Center		✓					
6	IEC 61850 – Comms Nets in Substations		✓		✓	✓	✓	
7	IEC 61968/61970 – Common Info Model		✓	✓				
8	IEC 62351 – Data Comms Security		✓		✓	✓	✓	
9	IEEE C37.118 - Synchrophasors		✓			✓		
10	IEEE 1547 – Distributed Resources		✓		✓	✓	✓	
11	IEEE 1686 – IED Cyber Security				✓	✓	✓	
12	NERC Critical Infrastructure Protection	✓	✓	✓	✓	✓	✓	✓
13	NIST SP 800-53/82 Fed Info Sys Security	✓	✓	✓	✓	✓	✓	✓
14	Open Automated Demand Response	✓	✓	✓				✓
15	Open Home Area Network Requirements							✓
16	ZigBee/HomePlug Smart Energy Profile							✓

IEC/IEEE Joint Standard for Synchrophasors

- Joint development of the entire standard, not just harmonization with IEC 61850.
- Any parts of the synchrophasor standard that need to go into IEC 61850 will be part of that standard, not a separate standard.
- IEEE C37.118 could be split into measurement and communication standards which could simplify the joint IEC work.
- The IEEE C37.118 communication method is widely used for Phasors at this time.
- Transition time would be needed once / if transition from C37.118 to 61850 is to occur

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PAP-13 Activities

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

Updated February 11, 2010.

Current Activities and Accomplishments
Created list of requirements
Identify C37.118 Gaps
1588 Plugfest
Continue with C37.118 standard upgrade - split standard
Continue with IEC 61850-90-1 Mapping work (Task 2)

S	D#	Deliverable
	D1	Harmonization requirements
	D2	C37.118 Gap List
	D3	IEC 61850-90-x Mapping document
	D4	1588 Time Sync Demo
	D5	1588 Power Profile
	D6	Amendments to IEC 61850 documents
	D7	[[SmartGrid.PAP13Objective7][]]
	D8	[[SmartGrid.PAP13Objective8][]]
	D9	[[SmartGrid.PAP13Objective9][]]
	D10	[[SmartGrid.PAP13Objective10][]]

PAP-13 Activities - 2

Issues, Concerns & Help Needed
Need contracted help to move the work along
IEEE Std C37.118 Standard upgrade delayed

S	T#	Task	Plan	Actual	Resp	D#
	T1	Requirement document for Synchrophasors	Sep-2009		Mark Adamiak	
	T2	Create IEC mapping document	May-2010		HTF3 - Joint IEEE/IEC	
	T3	Synchrophasor demo	July-2010		TBA	
	T4	IEEE PSRC H7 guideline	Jan-2010		IEEE H7/C7	
	T5	Interop demo 1588	Sep-2009		IEEE H7/C7	
	T6	Validate time synchronization requirements	Oct-2009		NIST	
	T7	Differences in time stamps C37.118 / IEC 61850	Nov-2009		TC57/WG10	
	T8	Amendments to IEC 61850	Jan-2011		TC57/WG10	
	T9	NIST Testbed for 1588	Mar-2010		NIST	

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IEEE PSRC – Activities Related to SGIP PAP-13

Feb 15, 2010

Group	Title	Output	Chair	Start	Projected end date
H7	IEEE 1588 Profile for Protection Applications	Standard C37.238	G. Antonova	2008	Aiming to initiate balloting 05/2010
H11	Revision of C37.118 Synchrophasor Standard	Standard C37.118	K. Martin	2006	TBD
HTF3	IEEE/IEC Joint Standard for C37.118 and IEC 61850	TBD	K. Martin	2009	TBD
C5	Investigation of NASPI Guidelines for Incorporation in IEEE standards	Guide	TBD	2010	TBD
Related activities	**Title**	**Output**	**Chair**	**Start**	**Projected end date**
H2	Protective Relaying Applications Using Smart Grid Communications Infrastructure	Report	M. Simon	2006	
H3	Timetagging in Protection and Disturbance Recording IEDs	Recommended practice	B. Dickerson	2006	
H8	Application of COMTRADE for Exchange of Synchrophasor data	Report	E. Allen	2008	
H17	Establishing links between Comtrade, IEC61850 and CIM	Report	C. Brunner	2010	
C14	Use of Time Synchronized Measurements in Protective Relaying Applications	Report	J. O'Brien	2008	
C2	Role of Protective Relaying in the Smart Grid	Report	A. Apostolov	2010	

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PSTT Activities Related to PAP13

Goal #	Goal	Metric	Industry Needed Deliverable	Priority	Lead	Funding Required to Reach the Target
1	Oversee the process of moving PSTT documents to IEEE Standards and Guides and to expedite the process	Form WG addressing: - Test and calibration procedures - Synchronization techniques - PMU Installation requirements and typical station configurations	IEEE TF initiated. Documents to be completed on December '10.	High	Group effort: Paul Myrda (lead), Mladen Kezunovic, Vahid Madani, Damir Novosel	NO
2	Identify and formalize the gaps not in present standards	Develop white paper	October '10	High	Farnoosh Rahmatian	YES: to speed up and reach the target
3	Define cerification of PMUs	Develop white paper	October '10	High	Jerry Stenbakken	YES: to speed up and reach the target
4	Sharing Specification and Functional Requirements	Review and Approve documents submitted by NASPI members	on-going	High	Vahid Madani/ Damir Novosel	NO
5	Phasor Data Concentrator Requirements	Develop specification or use existing one (see item 4)	November '10	High	Tony Weekes	YES: to speed up and reach the target
6	PMU-PDC/PDC-PDC Communication Methods	Develop a guide to be used by and coordinated with **IEEE** to develop a guide	March '11	High	To identify (Coordinated between PSTT and DNMTT)	YES: to speed up and reach the target
7	Phasor Data Concentrator Testing and Calibration Standard	Develop a guide to be used by and coordinated with **IEEE** to develop a standard	March '11	High	To identify	YES: to speed up and reach the target
8	Guide on using PMU as part of the multi-function devices.	Develop a guide	March '11	Medium	Krish Narendra	May be needed to speed up and reach the target
9	Develop guide on Requirements for Combined Applications using Synchronized Measurement Data.	Develop a guide	July '11	Low	Yi Hu	Low priority
10	Support other TT as needed	Request for support and identifying the type of support needed (e.g. Coordination with DNMTT on NasPInet)		High	Vahid Madani / Damir Novosel & Respective TT Leads	TBD

SGIP-GB Resolution for the Smart Grid Architecture Committee (SGAC)

RESOLUTION 1: "The SGAC shall prepare and submit to the SGIP GB a roadmap and work plan to develop architectural templates and other artifacts necessary to ensure that investments under way now will interoperate, are upgradable, are secure and minimize the impact of technology change that would otherwise result in stranded assets. Another task is that the SGAC shall map Priority Action Plans to the existing Conceptual Model in the "NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1."

SGIP-GB Resolution for the Smart Grid Testing and Certification Committee (SGTCC)

RESOLUTION 2: The SGTCC shall prepare and submit to the SGIP GB a roadmap and work plan to develop processes, testing methods, and other artifacts necessary to ensure that testing and certification programs are implemented that ensure secure interoperability between systems in smart grid applications. The roadmap includes requirements and concepts of methodology and operations for interoperability testing which will be provided to the SGIPGB by March 31, 2010."

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Please Join the PSTT Breakout Session to discuss coordination with IEEE, IEC, NIST on Synchronized Measurements Related Gaps and the Roadmap to Standards

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Task Description	Responsible	Completion Date	Notes
Task 1: Requirement document for Synchrophasors		9/7/2009	Create a document discussing the requirements to transport synchrophasor data including NASPI-NET requirements. This shall be an input for the first meeting of the IEC / IEEE task force to harmonize IEEE C37.118 with IEC 61850. The document will be prepared by Mark Adamiak.
Task 2: IEC 61850-90-x		Draft DC 2010-01 Draft DTR 2010-05	Prepare a report with IEC 61850-90-x "Using IEC 61850 to transmit synchrophasor data according to IEEE C37.118". The report shall include the following chapters: * Requirements / Use case * Impact on models (IEC 61850-7-4x) * Impact on communication services (IEC 61850-7-2, -8-1, -9-2) * Impact on engineering That report will be prepared by the joint task force IEC / IEEE under the lead of Ken Martin.
Task 3: Synchrophasor demo		7/1/2010	Organize rapid prototyping efforts for synchrophasors and interoperability demos. This shall be done during a NIST meeting.
Task 4: IEEE PSRC H7 guideline		Jan 2010 ready for balloting	Finish within IEEE PSRC working group H7 the IEEE PC 37.238, IEEE 1588 (Precision Time Protocol) profile for power systems.
Task 5: Interop demo 1588		9/1/2009	Do Interoperability demos of products following the IEEE 1588 profile defined by IEEE PSRC H7. This is planned for the next PSRC Meeting in September 2009 as well as for the January 2010 PSRC meeting.
Task 6: Validate time synchronization requirements		10/1/2009	Validate the detailed requirements from Smart Grid applications on common time synchronization and time management and verify, that they are covered by IEEE PSRC H7 work. The responsibility for this task is NIST.
Task 7: Differences in time stamps C37.118 / IEC 61850		11/1/2009	Resolve the differences between timestamp formats of 61850 and C37.118. The result shall go in the report according to task 2. Responsible for this task is IEC TC57, WG10.
Task 8: Amendments to IEC 61850		1/1/2011	Create amendments to IEC 61850 based on the results from report IEC 61850-90-x that is the result of task 2. This will be done by IEC TC57 / WG10.
Task 9: NIST Testbed		3/1/2010	Create a testbed for IEEE 1588 and Synchrophasor communication at NIST.