Consolidated Comments to the *Report to NIST on the Smart Grid Interoperability Standards Roadmap*

Herein are the comments and responses to inputs received regarding the *Report to NIST on the Smart Grid Interoperability Standards Roadmap*,* prepared under contract by the Electric Power Research Institute (EPRI). Comments were solicited in a notice published in the Federal Register on June 30, 2009. This document contains all comments received as of July 30, 2009, the end of the comment period, as well as associated responses from the contractor team. EPRI also made corresponding revisions to its report to NIST. Submitted to NIST on August 10, 2009, the revised document, along with the original comments, will serve as resources as NIST progresses further in developing Release 1.0 of the NIST Smart Grid Interoperability Standards Framework, which is planned to be available in September 2009.

Under the Energy Independence and Security Act (EISA) of 2007, 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…"

Comments on the *Report to NIST* were divided among the EPRI technical team for resolution and response, as presented in the last column. Corresponding modifications of the original ERPI document (June 17, 2009) were merged and refined by the document editor. The revised version (August 10, 2009) is available at: http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/InterimRoadmapFinal.

Note: This document is formatted in "Tabloid" paper and landscape orientation.

____

*Deliverable (7) to the National Institute of Standards and Technology under the terms of Contract No. SB1341-09-CN-0031. A copy (PDF) can download from: http://www.nist.gov/smartgrid/InterimSmartGridRoadmapNISTRestructure.pdf.

#	DATE	WHO	SOURCE	COMMENT	Response
1	6.18.09	Sandy Aivialotis, Nexans	EM	I have the following comments: 1. First, I will deal with an OMISSION: Real Time (Dynamic) ratings of overhead transmission lines are omitted from the draft. This technology, related interoperability standards, and gap in standards were discussed at both workshops. Please see my e-mail to Mr. Jerry Fitzpatrick today, June 18. >>>Hello Jerry, I scanned the documents you attached in your e-mail today in preparation for this afternoon's teleconference and I did not see any reference to Real Time (Dynamic) Ratings of overhead lines as was documented as one of the outcomes of the two NIST/EPRI Workshops. The specific reference on the May 19-20 workshop under Grid Operations is on item 6c of the attached file published on the Twiki: Additional references and supporting materials are: i) FAC 008-2 - Which is the Federal Reliability Standard on "Facility Ratings" including overhead lines ii) Recommendation 27 of the "August 14th Blackout: Causes and Recommendations" published by the U.S. - Canada Power System Outage Task Force (see attached .pdf file) iii) FERC Smart Grid Policy entered into Federal Register March 26, 2009. The inclusion of dynamic ratings of overhead lines as part of the Smart Grid Roadmap would be best suited under the Wide Area Situational Awareness functionality, as referred to in the FERC Smart Grid Policy, paragraph 36. Please let me know if you need any additional information. <<<< 2. EDITORIAL Section 2.1: For the sake of clarity and to be consistent with the DEWG terminology as well as with the rest of the Roadmap document (ex. Paragraph 3.2.7), I would recommend adding the word "transmission" before network in the phrase "...high-voltage [transmission] network and distribution...", 5th line.	Sandy, 1) Transmission System management is addressed in the use cases, with Dynamic Rating called out there. 2) Thank you, this change is adopted. 3) The conceptual model is exemplary, not comprehensive. Many useful equipments are omitted and only widely used items were used as examples. 4) Standards do not address pricing and the Roadmap is not addressing that issue.

#	DATE	WHO	SOURCE	COMMENT	Response
				3. ADDITION In paragraph, 3.2.7, second paragraph, include "real time (dynamic) line capacity monitors" along with the other examples "...phasor measurement units, sag monitors, fault recorders..." 4. RECOMMENDATION Further to our discussion in the June 18 teleconference, I strongly recommend we separate the pricing model into wholesale and retail. One of the reason is that the market dynamic for each are different and also because certain technologies, such as real time (dynamic) ratings can affect directly pricing at the wholesale level but not on the retail level. Sincerely, Sandy K. Aivaliotis, P. Eng. Senior Vice President Operations, Technology and Business Development The Valley Group, a Nexans company Office: 203-431-0262 Mobile: 416-648-4382 Fax: 905-944-4380 Recommendation 27 from the August 14th Blackout: Causes and Recommendations report of the U.S-Canada Power System Outage Task Force: 27. Develop enforceable standards for transmission line ratings.39 NERC should develop clear, unambiguous requirements for the calculation of transmission line ratings (including dynamic ratings), and require that all lines of 115 kV or higher be rerated according to these requirements by June 30, 2005. As seen on August 14, inadequate vegetation management can lead to the loss of transmission lines that are not overloaded, at least not according to their rated limits. The investigation of the blackout, however, also found that even after allowing for regional or geographic differences, there is still significant variation in how the ratings of existing lines have been calculated. This variation—in terms of assumed ambient temperatures, wind speeds, conductor strength, and the purposes and duration of normal, seasonal, and emergency ratings—makes the ratings themselves unclear, inconsistent, and unreliable across a region or between regions. This situation creates unnecessary and unacceptable uncertainties about the safe carrying capacity of individual lines on the transmission networks. Further, the appropriate use of dynamic line ratings needs to be included in this review because adjusting a line's rating according to changes in ambient conditions may enable the line to carry a larger load while still meeting safety requirements.	

#	DATE	WHO	SOURCE	COMMENT	Response
2	6.19.09	John Gillerman, SISCO, johng@sisconet.com	SGC	I am a member of TC 57 WG 13, 14, 19. Here is a list of the places in the Roadmap Prioritized Actions and Appendix C that could be improved to more accurately represent existing IEC 61970 technology. In Roadmap Prioritized Actions Section 6.2.2: Key action (3): First sentence: ..."as well as develop interoperable messaging for IEC 61970." Should be changed to: ..."as well as extend existing IEC 61970 services." New key action (4) Develop and extend IEC 61970 Abstract Service for access to data from WASA related applications. The development of WASA applications is largely a matter of real time analysis of data stored in existing applications and devices. However, IEC TC 57 WG 13 and 14 work to date largely addresses business process automation, but do not address synchronous data access to heterogeneous data from applications critical to Wide Area Situational Awareness. IEC TC 57 WG 13 should work to apply the abstract service defined in IEC 61970 to specific applications and thus provide a common data access mechanisms based on the CIM. In Appendix C Section 11.2 Wide Area Situational Awareness: Subsection 11.2.1: Row 3 of the table about IEC 61970 does mentioned the existing use of IEC 61970 standards. The Requirements cell should be changed to: Extend IEC 61970 standards for sharing CIM data: The IEC 61970 CIM power system needs to be extended to include 3 phase network modeling. The IEC 61970 abstract services need to be updated to use web service technology. Also, while the abstract services are defined generically, IEC 61970 does not sufficiently specify how these services should be used to access data from applications involved with WASA. The Gaps cell should be changed to: Existing IEC 61970 abstract service definitions should be defined using web service technology such as IEC 62541 to enable model driven access to CIM data. Subsection 11.2.1: Row 7 of the table about exchanging network models incorrectly identifies the IEC 61970 and 61968 documents used for model exchange. IEC 61970 Part 552-4 and IEC 61968 Part 13 have been interoperability tested in the past and are scheduled to be tested again this fall. The Gaps cell should be changed to: "Standards for both transmission (IEC 61970 552-4) and distribution (IEC 61968 - 13) model exchange have been used defined. Previous EPRI sponsored Interoperability tests have tested the exchange of transmission and distribution system network modeling data using the CIM XML format. These efforts should be expanded to include exchange of three phase network models using CIM XML and also include a wider set of applications including but not limited to EMS, DMS, and GIS. Thank you, John Gillerman SISCO www.sisconet.com T: 732 937-9745 F: 586 254-0053 M: 732 979-9595	Accepted corrections directly into the document
3	6.19.09	David Haynes, Aclara, DHaynes@aclara.com	SGC	Dear NIST, I have two preliminary comments on the interim roadmap: 1.) A number of locations in the document cite NEMA as a responsible party for the development of and/or harmonization with IEC documents. I suspect there might be some confusion between NEMA and ANSI. I was certainly confused a few years ago when I found standards such as C12 cross listed under ANSI, NEMA, and IEEE. As you may know, “the CIM” is owned by the IEC Technical Committee 57. Every expert appointed to the IEC attends through their national committee. In the US, this is done via ANSI through the US National Committee. When mentioning the responsible party (such as at the top of page 155), NEMA needs to be removed as a responsible party. (They do some commendable work to help underwrite of many standards, but IEC 61968 isn’t one of them.) Similar mistakes can be found in the report on pages 144-146, and 158. 2.) I believe “time keeping” is a cross-cutting concern much like security. I see ASHRAE 135 cited frequently in the report as the only standard regarding time synch and sequencing. I’d like to mention that those of us in the metering industry have commonly relied on the timekeeping requirements stipulated in ANSI C12.1. Perhaps this can be added to the discussion list for AMI systems, for although C12.1 gives direction for ordinary metering applications, we may still be lacking the tolerances we need for smart grid operation. As you can	1) Will check and revise association of NEMA accordingly 2) Section 6.1.2 deals with all aspects of time synchronization and time keeping. Agree that scope is beyond any single standard that deals with time.

#	DATE	WHO	SOURCE	COMMENT	Response
				readily imagine, if one system reports or asks for some event to occur at a particular time, it is important that all of the devices subscribe to the same timesource and maintain reasonable tolerances for the application at hand, or unexpected results could occur. Also, what are we to do with Daylight Saving Timeshifts and timezone differences? I can only suggest that all devices subscribe to a NIST approved timebase, and communicate using UTC based formats such as ISO 8601. Thanks, David Haynes Staff Systems Scientist Aclara 314.895.6452 Member IEC TC57 WG14, and ANSI US NC Member ANSI C12 SC17 Sr. Member IEEE ---------- From: Frances Cleveland [mailto:fcleve@xanthus-consulting.com] Sent: Thursday, June 18, 2009 4:51 PM To: Haynes, David; Greg Robinson; aaron@enernex.com Cc: McLaughlin, Thomas Subject: Re: FW: [WG14] Release of the Interim NIST Roadmap David - Indeed NEMA should not be shown in those spots - just IEC (not even ANSI). The best thing for you to do is make a comment to NIST. Comments on this document can be made through the NIST TWiki site at http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/InterimRoadmapFinal or directly to NIST at the email address of smartgridcomments@nist.gov . Frances At 02:14 PM 06/18/09, Haynes, David wrote: Frances, Thank you for the email! By the way I believe there is a bit of a mistake in the NIST roadmap document. In a way, I'm glad I'm not the only one who confuses ANSI and NEMA, but the document lists NEMA as a responsible party for IEC documents when I believe it should cite ANSI. Examples can be found on pages 144-146, top of 155, and 158. Aaron and Greg, Do you agree? If so, whom should we take this to? David Haynes Staff Systems Scientist 314.895.6452 ---------- From: WG14@yahoogroups.com [mailto:WG14@yahoogroups.com] On Behalf Of Frances Cleveland Sent: Thursday, June 18, 2009 1:37 PM To: huberandreas@siemens.com; thierry.lefebvre@RTE-FRANCE.COM; cj@iec.ch; WG19@yahoogroups.com;	

#	DATE	WHO	SOURCE	COMMENT	Response
				WG14@yahoogroups.com; wg15@sisconet.com; WG17@yahoogroups.com; christoph.brunner@utinnovation.com; tsaxton@xtensible.net; John Newbury, Open University; claes.malcolm@swedpower.com; jim.wright@siemens.com Subject: [WG14] Release of the Interim NIST Roadmap IEC TC57 Members - Some of you may have been following the development of the Standards Roadmap by the US National Institute of Standards and Technology (NIST). It was released this morning and is posted on the NIST website at http://www.nist.gov/smartgrid. Direct access to the document is at : http://www.nist.gov/smartgrid/InterimSmartGridRoadmapNISTRestructure.pdf IEC TC57 is identified in this roadmap as playing a major role in Smart Grid standards. The NIST Roadmap does come from just one country, but it is hoped that many of the efforts identified in the document will be agreed to by the international community as being needed and/or useful. If some are not, then possibly some discussions can result in either modifying the direction or scope of those efforts, or agreeing to multiple, but hopefully harmonized, approaches. To help people navigate this very large NIST Roadmap document, the primary sections of interest to IEC TC57 are two sections: Section 6 - Prioritized Actions, and Section 11 - Appendix C, Requirements, Standards Gaps, and Discussion Issues for the Action Plan. Comments on this document can be made through the NIST TWiki site at http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/InterimRoadmapFinal or directly to NIST at the email address of smartgridcomments@nist.gov. There will also be a Workshop sponsored by NIST, probably in early August, for Standards Organizations. I hope this document will be a useful start of discussion not only within IEC TC57, but also across to the other IEC TCs and across to other Standards Development Organizations, such as IEEE, etc. as we work our way toward a truly Smart Grid. Frances ********** * Frances M. Cleveland * Xanthus Consulting International * 369 Fairview Ave * Boulder Creek, CA 95006 * Tel: (831) 338-3175 * Cell: (831) 229-1043 * fcleve@xanthus-consulting.com * fcleve@ix.netcom.com * www.xanthus-consulting.com ********** __.–,–.__ Messages in this topic (1) Reply (via web post) ; Start a new topic **********	
4	6.23.09	Toby Considine TC9, Inc	TW	1. Very important task left to be done: identify main control functions and map them to logical interfaces in the diagrams from the report and then map logical interfaces to the physical ones to identify matching protocols and standards. 2. Common pricing model has to be at least split between wholesale and retail levels, otherwise the task is impossible.	We believe this should be done in subsequent work on use cases and requirements analysis
5	6.24.09	Toby Considine, Toby.Considine@gmail.com	EM - B2G	The DEWGs need to press back. Diagram 4.4.5 has Grid Operations pushing right past the customer EMS to do direct control – the EMS is apparently limited to something that explains what was done to you.	The review team believes that this should be done in subsequent work on use cases and requirements analysis. The use cases to be developed should recognize this important difference. You are encouraged to participate. Work of this

#	DATE	WHO	SOURCE	COMMENT	Response
				Diagram 4.5.5 somehow lost any ability of the customer EMS to read its own meter. No communication between storage systems Diagram 4.3.5 – the best I can say is it's probably a simplified schematic of the current state of affairs Diagram 4.6.5 – Federal Agency involvement in Markets and SCADA – really? Diagram 4.7.5 – see 4.3.5 Diagram 4.8.5 – Distribution grid management and GID and service crews – and 5th incompatible model of premises architecture I feel like my daughters, when they were teenagers are running the diagrams (well I had to go to Raleigh to get shoes to match the dress I found in the thrift shop in Greensboro, but the stockings that look god with the shoes don't match the dress so now I need to go dress shopping) I felt the actor diagrams were not very important task when it started, but now it really highlights the worst remaining flaws in the roadmap very well. This is a problem, because these overly complex interfaces is what leads to the overly-developed semantics characterizing several of the existing committees and efforts-and turning them over like this will just encourage them… So: 1) Would like to see the interfaces normalized (at least 4 incompatible descriptions of the end node architecture) and simplified (because f you have simpler interfaces, you must abstract and simplify). 2) I would like to re-sketch all interfaces to let everyone *see* the meter, as that is the scorekeeper for all, as well as the cash register for the supplier 3) I would like to focus on applications. In this case, DR is an application that ends at the home/building/end node. Inside the end node there is another application – the consumer ems. 4) If we pursue the consumer EMS, there are logical groups to engage. ASHRAE and BACnet. LONMark. KNX. What information do you need to perform. What can you share back. How do we enable a vibrant market. 5) Storage has something more elaborate than a mere price, and less intimate than third party operations. This makes this interface a conversation between storage and supplier. (Yes! Thank you Jerry for requesting simplification of the diagrams on the call) Overall theme: The utilities have created the largest robot ever, to support the best life style ever created. Its reliability is no longer good enough for today's technology. It is quality is no longer good enough for today's technology and lifestyle. Social concerns will not allow them to build the infrastructure we need. There are great inefficiencies in addressing these problems only from the center. Environmental concerns constrain over-production as a solution to reliability. Margins of error and capacity are getting smaller and narrower. We may never get to the power quality demanded by the digital world relying solely on the central production and management. Introducing any significant amount of intermittent energy will make matters worse. We need to engage both ends of the grid, power generation and power consumption, to maintain and extend our civilization. We must more fully use the generation we have and new generation to come that will be less reliable and less professionally managed. We must rely on the consumer nodes (buildings, homes, and industry) to adopt new usage patterns, once that ease the stress on the core grid. This requires that we move beyond hierarchical control to sharing economic information, to fully engage these nodes.	nature is carrying forward in the Priority Action Plans found at http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/PriorityActionPlans and carried forward in the Phase II / Phase III of the NIST plan.

#	DATE	WHO	SOURCE	COMMENT	Response
				We must work together, using the smart grid to create collaborative energy, in which we all share responsibility for power supply and reliability. Individual nodes in collaborative energy will not be “too big to fail”, which means they are small enough to accept innovation. Accepting innovation enables markets built on innovation—and thereby will drive innovation. Collaborative energy connects the generation, distribution, storage, and consumption of energy directly to people and business. We are creating the internet of things and connecting it directly to human aspirations, business processes and financial markets. There is too much for anyone to know; each participant will be an agent, managing its own affairs and interacting with others based upon the information in the standard interfaces. Whenever there are enough agents, and enough diversity of agents, new behavior emerges beyond these directly predicted by the agents themselves. Emergent behavior, in fields ranging from economics or in biology, is always the most significant and least understood behavior. Collaborative energy will be an emergent behavior of the agents of the grid. tc PS – attached document was written for possible use in the Summit, and so has reduced Application focus. tc ---------- "If something is not worth doing, it`s not worth doing well" - Peter Drucker ---------- Toby Considine TC9, Inc Chair, OASIS oBIX Technical Committee Co-Chair, OASIS Technical Advisory Board Email: Toby.Considine@gmail.com Phone: (919)619-2104 http://www.oasis-open.org blog: www.NewDaedalus.com From: David Holmberg [mailto:remdavid@gmail.com] Sent: Tuesday, June 23, 2009 10:58 PM To: William Cox Cc: David Holmberg; Toby Considine; gerald.fitzpatrick@nist.gov Subject: Re: DEWG tasks Bill, Thanks! I was trying to get out the door, and didn't think to far about what exactly was appropriate for the DEWGs vs. EPRI vs. NIST to do. Anyway, appreciate the feedback. I'll add in any more thoughts I get tomorrow and pass around before the 5pm call. Thankfully, I don't need to be on the webcast (unless Jerry asks for support). See comments below. I copied Jerry in to this. On Tue, Jun 23, 2009 at 7:04 PM, William Cox <wtcox@coxsoftwarearchitects.com> wrote: David -	

#	DATE	WHO	SOURCE	COMMENT	Response
				I'm copying Toby on this - we discussed some of this after the call. Comments interleaved. Thanks! bill -- William Cox Email: wtcox@CoxSoftwareArchitects.com Web: http://www.CoxSoftwareArchitects.com +1 862 485 3696 mobile +1 908 277 3460 fax David Holmberg wrote: My thoughts on task list for DEWGs. Comments welcome: First, the DEWGs have become largely socially cohesive groups where good discussions and many decisions can be made (or at least consensus reached). This is true for I2G and B2G, don't know (but I've heard not-positive things about H2G. Don't know at all about T&D and B&P. Not sure this is necessarily what the DEWGs should do; I'd thought that some of this was key to the Interim Roadmap work BTW. Yes, Yes. Some of this is key--so, doesn't that mean we should get the consensus of experts, and then vet at a workshop and via public review of the next draft? Comments after the line commented upon. · DEWGs: o Identify other priorities that haven't been brought out by the FERC4+2 o Simplify the use case diagrams to capture all the interfaces that carry communications critical to the identified priority apps (FERC4+2+others) Yes. As Toby said, and I was said in a different way, some of these are far more detailed than useful. But I don't know about (e.g.) DGM. I probably know enough about the integration/interop interfaces for DR. I DO know enough about PEVs that I think the business case for a whole new payments clearing system is extremely weak - assign that to B&P? The "engineer's syndrome" is to try to make something work even if it doesn't make sense. I've fallen into that on PEV - witness the Advice of Charge emails I've sent. :- (My thoughts also on the PEV charge back issue. We need the gas station model in my opinion. And if you charge at a friends house, then give your friends some money. Or? It does sound like a B&P issue, as is customer access to the meter, and maybe some others. But those don't fit the FERC4+2 I think. o Prioritize the interfaces Key. So T&D would do distribution automation? How do you deal with avoiding the deep details that don't illuminate the interface needs? Give them a template and an example maybe to educate on the expected detail. Priority is temporal as well as practical/immediate/architectural..	

#	DATE	WHO	SOURCE	COMMENT	Response
				Good point. Need to identify today's architecture vs. tomorrow, then address priority actions to enable today and actions to get to tomorrow. These can be mixed in order I guess--but should note which is which if it's clear. I'm not sure how often this will come up. There's a strong architectural context that needs to be set. I put the entire GWAC on the invite list for Workshop3, incidentally. o In order of priority, list out requirements of interfaces and GWAC stack recommended standards for each interface If done at an appropriately high level this should be useful. Polishing (rather than differently analyzing) use cases is not. This is the item that I have the least clarity on. If you can help define the "high level" that would be appreciated. How much of the requirements are already spelled out in the FERC apps? How much are repetitive, or cross-cutting? How much of this work has been done already to say what the app requirements are--i.e., in some use case already? Maybe this is a straightforward step since we have the reqs and the standards (from the apdx domain GWAC stacks). o For each standard, note the work that needs to be done so that the standards meet the requirements (commenting on current RM) Partially done, I2G report for WS1 did this pretty well. Along the way, realize that "improving the profiles of each standard" isn't terribly useful, as only enough is needed for guidance -- something like the I2G work, not the details, and not the limited (and not always correct) level of info in the appendix. o Note thoughts on the “how” (commenting on current RM) Yes. I2G is doing DREE (incidentally, "Energy Efficiency" popped in in later sections) and Distribution Management. o Note NOW vs. future SG differences Yes - but there are two components IMO: (1) if you're building now, what should you choose? (2) what needs to be done to improve your specified "future" standard to make a good replacement? This gets back to the LHF list. We have standards that are in use today, but will be retired. We have standards that are in use and will be in use long-term, but need work. We have new standards (or not yet standards) that need developing. The LHF should classify standards into these buckets, or maybe its more politically correct to do that in the Roadmap. So, the LHF names the standards, then the RM prioritizes interfaces and thus where certain standards pertain and then what work is required to get those standards useful for today and tomorrow, and then the action plan to do the work. David Holmberg NIST Building and Fire Research Lab 301-975-6450	
6	6.25.09	Mike Truskowski, Cisco,	EM - B2G	David, I have a question here.. the current B2G, NIST and EPRI directions are pointed at electricity. But your first slide could actually be a slide for gas and water usage/billing/monitoring.	ANSI C12.19 is also known as IEEE 1377-2009. The SCC 31 committee of IEEE had support of gas and water as requirements. As such the referenced standard equally supports all three utilities. Thus an AMI system for each or all could be assembled with this building block, hence the

#	DATE	WHO	SOURCE	COMMENT	Response
				Have you thought of this? Where is deregulation of the electric industry at this moment? Will deregulation enable a common AMI per market? Mike David Holmberg wrote: > > Dear B2G, > > NIST is looking at giving the DEWGs some significant work items to > tackle in the next couple weeks. The highlights are below. I'm sending > this out as a heads up. More to follow. > > Attached are a couple figures that are trying to nail down the > architecture of the interface to the building (trying to cover R, C > and I). Please comment! > > Thanks, > > David > > DEWG work items (proposed). The goal is to push out some draft > versions of this for review. Consider the attached PPT as one of those > draft document. Please comment. > > 1. Simplify the use case diagrams to reduce the number of interfaces > to those important to the priority applications, eliminating any > internal interfaces, abstracting to higher level if needed. > > 2. Prioritize the interfaces for each application > > 3. For each top priority interface, list out requirements of > interfaces and GWAC stack recommended standards. > > 4. For each recommended interface standard, document work that needs > to be done so that the standards meet the requirements. This will > further develop the Roadmap and comments on the Roadmap. Use this > input to develop the EPRI Priority Action Plan docs as input to SDO > discussions. > > 5. Note thoughts on the "how", commenting on current RM, input to > Priority Action Plan docs. > > 6. Identify other priorities that haven't been brought out by the > FERC4+2 > > David Holmberg >	potential for the common AMI you seek.

#	DATE	WHO	SOURCE	COMMENT	Response
				> NIST Building and Fire Research Lab > > 301-975-6450 >	
7	6.29.09	Bob Old, Siemens Building Technologies, bob.old@siemens .com		The diagrams look pretty good. One feature that seldom exists today is the single interface to the meter. In our customers' buildings, the meter provides a tariff/revenue-grade communication path to the Utility, and a separate, minimal interface to the building management system. This second interface is usually called an Interval Meter and consists of a relay contact which opens and closes at a rate proportional to electric demand in kilowatts. I expect to see more information out of a meter, over a more modern data communication means, once the AMI-style meters are installed. I will still need the second meter interface because the tariff grade path to the utility is still typically very slow, e.g., 1200 baud. And as Marty points out elsewhere on this list, buildings need more timely information in order to do demand response. Also, I expect the Utilities to be very reluctant to grant access to the tariff grade path to the meter, no matter what security is in place. Best, B.O. June 29, 2009 -- Robert Old bob.old@siemens.com Siemens Building Technologies, Inc., HVAC Products 1000 Deerfield Pkwy., Buffalo Grove, IL 60089-4513 USA Phone: +1(847)941-5623, Skype: bobold2 http://www.usa.siemens.com/buildingtechnologies From: b2g_interop@nist.gov [mailto:b2g_interop@nist.gov] On Behalf Of David Holmberg Sent: Thursday, June 25, 2009 8:29 AM To: Multiple recipients of list Subject: Upcoming B2G tasks Dear B2G, NIST is looking at giving the DEWGs some significant work items to tackle in the next couple weeks. The highlights are below. I'm sending this out as a heads up. More to follow. Attached are a couple figures that are trying to nail down the architecture of the interface to the building (trying to cover R, C and I). Please comment! Thanks, David DEWG work items (proposed). The goal is to push out some draft versions of this for review. Consider the attached PPT as one of those draft document. Please comment. 1. Simplify the use case diagrams to reduce the number of interfaces to those important to the priority applications, eliminating any internal interfaces, abstracting to higher level if needed.	Thank you for the meaningful comment. Meters are indeed becoming more than the "cash register" and they need to be represented as having more functionality. The use cases to be developed should recognize this important difference. You are encouraged to participate. Work of this nature is carrying forward in the Priority Action Plans found at http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/PriorityActionPlans and carried forward in the Phase II / Phase III of the NIST plan.

#	DATE	WHO	SOURCE	COMMENT	Response
				2. Prioritize the interfaces for each application 3. For each top priority interface, list out requirements of interfaces and GWAC stack recommended standards. 4. For each recommended interface standard, document work that needs to be done so that the standards meet the requirements. This will further develop the Roadmap and comments on the Roadmap. Use this input to develop the EPRI Priority Action Plan docs as input to SDO discussions. 5. Note thoughts on the "how", commenting on current RM, input to Priority Action Plan docs. 6. Identify other priorities that haven't been brought out by the FERC4+2 David Holmberg NIST Building and Fire Research Lab 301-975-6450	
8	6.29.09	Marty Burns,	EM - B2G	All, The diagram on Meter, Facility Interfaces is a nice view of the authors Use Case. Although, let me note that it is not necessarily the view for all stakeholder use cases. For example, the Demand Response backend may need near real time data from the meter. It is valuable to create as many views of these relationships as authors (domain experts) can envision. By accumulating the necessary interface transactions as seen by these experts, a composite view of the requirements for each interface can be realized. If you look at the communications diagrams in the Interim Roadmap, you will see that many of these associations were indeed recognized by the workshop participants and reflected in the diagrams. Most saw the EMS as having access to the meter interface (see AMI association 32 or demand response association 16), although some did not have a direct need for this (see Electric Transportation). A minor criticism of both diagrams is the explicit representation of network clouds which implies that network communications, rather than use a shared communications infrastructure, relies on multiple separate networks for operation. This is probably not the most efficient and flexible way to configure the Smart Grid. I remember in the '80s if you went to a small commercial facility, you found workstations and remote connect modems for each subsystem. Naturally, they shared a common phone line but were otherwise unrelated. "Line seizure" devices allowed for a priority to be established for the remote connections. Naturally, each subsystem control did not have an interface to the others. So EMS could not talk to security and could not talk to the lighting controls. Marty	The Use Cases are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Note, also, that each Domain's actor has substantial overlap and duplication. Ultimately, these similarities need to be recognized and normalized as a Smart Grid clear set of actor definitions gets constructed in future work.
9	6.29.09	Ed Koch, Akuacom	EM - B2G	All, I think we need to look at breaking the meter functionality into two pieces and depict them in the diagrams as separate entities. One is data required for settlement (revenue grade data, low throughput) and the other is data for real time energy usage information (perhaps very high throughput). There is a tendency to want to combine these functions into a single meter device since in an ideal world that is what a meter would do, but I'm not sure that there is a hard requirement that this be the case. The reality is that these two functions are often provided by different devices depending on the requirements of the information flow. For example, for ancillary services in the wholesale markets where there are much higher requirements on the frequency and throughput of the "telemetry" data the real time usage data will probably not be coming from the revenue grade meter. -ed koch	The use cases to be developed should recognize this important difference. You are encouraged to participate. Work of this nature is carrying forward in the Priority Action Plans found at http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/PriorityActionPlans and carried forward in the Phase II / Phase III of the NIST plan.
10	6.30.09	Jim Luth, OPC Foundation	TW	The Report to NIST on the Smart Grid Interoperability Standards Roadmap dated June 17, 2009 appears to have an anomaly in the table of "Customer Industrial" Standards in Appendix A, section 9.1.7 on page 121. This table is almost an exact copy of the previous table for "Customer Commercial", where no Industrial Standards are mentioned. Similarly, Appendix B does not contain any Industrial Standards since there are none mentioned in Appendix A or anywhere else in the document. While there are many Industrial Standards in use today that should be cited in the report, in particular the OPC Foundation standards that	Will add annex on standards requested for inclusion but not discussed at the Interim Roadmap Workshop. Will divide annex 10 with paragraph unnumbered for boundary

#	DATE	WHO	SOURCE	COMMENT	Response
				have been widely deployed by virtually all major factory automation suppliers over the past 15 years need to be included. While there are many Industrial Standards in use today that should be cited in the report, in particular the OPC Foundation standards that have been widely deployed by virtually all major factory automation suppliers over the past 15 years need to be included. Possibly even more important than the original widely deployed OPC standards, the new OPC Unified Architecture (UA) standard (which is also internationally recognized as IEC 62541) should be somewhere in the roadmap. The OPC Unified Architecture is currently in the early adopter phase of deployment. The OPC Unified Architecture represents a state-of-the-art, cross platform, high performance standard that can be used to transport and expose data and metadata from information model standards defined by others. No other standards exist that were designed with this specific goal of exposing externally defined information models many of which will need to be defined and deployed for Smart Grid Interoperability to succeed. For this reason, we see OPC UA having a role in the Smart Grid even outside of OPC's traditional domain of industrial automation. In fact in the T&D arena, IEC TC 57 WG 13 is in the process of creating a standard for pairing the IEC 61970 information model with OPC UA. Regards, ~~~~~~ Jim Luth OPC Foundation Technical Director mailto:Jim.Luth_AT_opcfoundation.org phone: 775-254-1192 ~~~~~~	
11	6.30.09	Thomas Burke, OPC Foundation	TW	It's very important that standards exceed the expectations of the end users of the appropriate standards. Successful standards are deployed into real products and services because they solve problems that the vendors and end-users truly want. The importance of OPC to this initiative cannot be underestimated. OPC has been collaborating with a lot of other consortiums over the last 15 years and has had widespread adoption of the technology. My commitment is to help other consortiums and standards be successfully adopted in the marketplace into real products and services. Adding OPC UA to the roadmap would be a step in the right direction to achieve state of the art multiplatform multivendor interoperability. OPC is not a competing standard to the Smart Grid, rather it provides a mechanism to allow the information model to be discovered and transport services be provided such that generic applications are able to be developed to operate on the data and information.	Same resolution as comment 10
12	7.1.09	Jim Tillett, Endeavor Engineering, www.endeavorengcom	EM - B2G	All, We were tasked at Monday's conference call to provide prompt feedback on the roadmap document and I took a closer look at it, particularly sections 3 and 4. In general I think the roadmap does a great job of defining what the smart grid is and relevant use cases. With that I do have some observations in no particular order or priority as follows. One thing that stands out to me is that every use case has an aggregator category identified. This agrees with my expectation that as we progress through smart grid development the role of the aggregator is going to grow in relevance to the overall smart grid. With that in mind I'm just wondering if the aggregator should be better characterized in its description or even further identified or defined in the document. I see the aggregator as being kind of a catch-all of functionality that is going to be increasingly important. The current expectation of an aggregator is that they aggregate energy resources but I see that actor also aggregating data/information. For example, if an aggregator has distributed intelligent onsite assets then the information that those assets contains could be of value to others such as regular utilities or cross domain members. An example of an information aggregator would be Ziphany (http://www.ziphany.com/) but there are increasingly others, and energy aggregators such as DR are well known. So I see this as a growing role in the smart grid that will likely evolve and differentiate. I don't know exactly how the roadmap document should be changed to reflect this but one thing that might be modified would be the statement that "aggregators may not sell or take title to electricity". Imagine an organization that has an aggregation of real-time DER assets that adds up to MW in capacity. It seems that if the smart grid is moving to real-time pricing and commodity markets then this organization would have title to electricity and would currently fit in the aggregator role. This appears to be one likely trajectory of change for the smart grid. At ConnectivityWeek Metcalf's comparison between the growth of the smart grid and the internet struck a chord with me. Similar to deregulation of the telecommunications industry, smart grid capabilities combined with regulatory changes could lead to further similarities	As you point out, every Use Case has an aggregator category identified. The aggregators themselves are different and the Use Cases demonstrate that. The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Note, also, that each Domain's actors has substantial overlap and duplication. Ultimately, these similarities need to be recognized and normalized as a Smart Grid clear set of actor definitions gets constructed in future work.

#	DATE	WHO	SOURCE	COMMENT	Response
				such as a separation between my market and physical power provider. An example of this in the internet is that my office currently gets internet access from Integra Telecomm, but the actual data packets are carried over Verizon lines. In this roadmap document I see the aggregator role as the most likely to evolve in this direction. This is likely getting outside of the scope of the current roadmap document but is worthy of consideration and discussion. In going over the electric storage section there seems to be some inconsistency or ambiguity related to the terms energy storage and electric storage. It might be good to clarify or differentiate between the two. In the context of the smart grid electricity is the medium used to transfer energy, but energy storage comes in many forms that include electric, thermal, potential, and others. So to capture the storage accurately it may be better to refer to the storage component as energy storage (maybe its different forms) and identify the transfer medium as electrical. There are numerous communication diagrams that identify actors and their relationships. The numbered IDs of these associations are really getting to the heart of the interoperability standards necessary for the smart grid. I assume a follow-on activity will be to associate standards or standard gaps with these connectivity associations? If so then this might be more clearly identified in the document. The conceptual model doesn't directly capture the role of regulatory activities. Where do regulatory organizations fit into this model? I'm sure they were considered here and have a rather removed association, but they can also have a significant impact on smart grid development. It might be good to include them as actors. In going through the roadmap document these are the areas that stood out to me as needing further consideration in the progress of the smart grid. If anyone has comments or perspectives at any level in agreement or opposition I think we should fully incorporate everyone's thoughts into the review of this document because it likely will have significant future impacts. As a matter of fact I just took a look at the newly released DOE Smart Grid Investment Grant Program document and it says "One of OE's top smart grid priorities is the work with NIST and FERC on a framework for interoperability standards. This effort is focused on an accelerated timetable for the development of a standards development roadmap and a process for getting standards for interoperability in place as rapidly as possible." To me this reinforces the impact that our efforts are likely to have in future electric power markets and systems. Where there is funding there will likely be growth. Thanks, -Jim James Tillett P.E. Endeavor Engineering Inc. Ph: 503.336.1717 x101 Cell: 503.706.6913 www.endeavorengcom	
13	7.2.09	Dick Brooks, ISO-NE	EM	Colleagues, The points that Jay makes in his feedback are crucial to a successful Smart Grid implementation. On several occasions, both during the workshops and on teleconferences the point has been raised that more emphasis is needed on the development of standards to control/monitor the Smart Grid among power system control entities (especially network model information - which Jay points out). CIM and specifically the use of XML/RDF representations of the network models (all forms) is a fundamental building block of the Smart Grid for wide area system control and awareness, in my opinion. More attention is needed on the development of standards that the system control entities will need in order to keep the Smart Grid alive and well. Jay offers us a good starting point for this work	Jay Britton Comment 30 The review team agrees that the comments (number 30) are valuable. They are addressed at that point in the comment section.

#	DATE	WHO	SOURCE	COMMENT	Response
				Dick Brooks ISO New England http://www.iso-ne.com/	
14	7.2.09	Sandy Aivialotis, The Valley Group, a Nexans Company	EM	From: t_and_d_interop@nist.gov on behalf of Sandy.Aivaliotis@nexans.com Sent: Sat 7/4/2009 1:01 PM To: Multiple recipients of list Subject: RE: FW: Reminder - T&D Joint Teleconference Today, July 2, at 3:00 PM Eastern I agree. In my opinion, Interoperability alone is not sufficient to render the grid as smart as it can be, and keep it "alive and well". Also, I believe that, from a purely practical and resource availability point of view, utilities may not be able implement all the necessary technologies effectively along the evolving smart grid road map. Shouldn't the road map also show the preferred progression towards the smart grid, perhaps by showing "low-hanging fruit" technologies, along the "low-hanging fruit" interoperability standards? Enjoy the 4th of July weekend. Sandy K. Aivaliotis Senior Vice President Operations, Technology and Business Development The Valley Group, a Nexans company Office: 203-431-0262 Mobile: 416-648-4382 Fax: 905-944-4380 Surely Ron, A number of utilities are already strained for resources, namely engineers. It would make sense to have a progressive technology implementation roadmap. Such a progressive approach would also help guide investment decisions that will be aligned towards the eventual smart grid roadmap. Sandy K. Aivaliotis	Successor to Dick Brooks. Comment 13 Could we add a section on how the Smart Grid can evolve a piece at a time. Maybe seamless integration? Probably put out requirements for exposure/review/release date.
15	7.2.09	Ron Smith, ESCO	EM	"Ron Smith" <rsmith@escotechnologies.com> Sent by: t_and_d_interop@nist.gov 07/04/2009 02:14 PM Please respond to t_and_d_interop@nist.gov To Multiple recipients of list <t_and_d_interop@nist.gov> cc Subject RE: FW: Reminder - T&D Joint Teleconference Today, July 2, at 3:00 PM Eastern Sandy, I agree with the "practical" approach as many of the legacy systems will be part of the mix for many years to come as we progress. I think we should consider what is there today, hoe it may migrate, and what the grid needs to become.	Mention see comment response to Sandy

#	DATE	WHO	SOURCE	COMMENT	Response
				Ron	
16	7.2.09	Michel Kohanim, Universal Devices	EM	Section 3.2.2 – Customer Domain Although in this section there are explicit references to an EMS, however neither in Figure 7 nor Table 2 are there any references to EMS. I think EMS is used interchangeably with Gateway and Automation System. We have to be clearer on what we mean by an EMS vs. Gateway vs. Automation System. What are the boundaries, differences, and similarities? Section 4.4.2.2 & 4.4.2.4 & 4.4.2.8 – Demand Response Management System Manages Demand in Response to Pricing Signal Reference to "EMS/Gateway" … again, these terms are being used interchangeably which I believe will cause confusion since Gateway is usually associated with a passive entity where as EMS is more Active in its operations. Section 4.5.2.3 Building Energy Usage Optimization using Electric Storage In this section, BAS is used instead of EMS and/or Gateway where as in section 4.5.5, the diagram clearly and explicitly calls for an EMS. So, it seems that Gateway, EMS, and BAS are used interchangeably. In section 4.7.2.3 it has been clarified that EMS and BAS are used interchangeably. I think this should be done much earlier in the document. Section 4.6.3 Actors In this section (as well as Figure 18), EMS is now renamed to ESI (Energy Services Interface) and concatenated with a Gateway. So, we now have EMS, Gateway, BAS, and ESI used interchangeably. Furthermore, where as in Figure 7, an EMS was explicit and mandatory, in this section it has become optional. And then again, in section 4.7.2.1 EMS seems to have become mandatory. Section 4.7.3 Actors Table 12: In this table ESI and EMS are now two completely different entities. The main question is: wouldn't have to already implement all the interfaces for an ESI? If not, what are the differences? If so, why do we need an ESI? Section 4.8.3 Actors Table 13: In this table, now the Meter and HAN Gateway are used interchangeably while EMS is mandatory and listed as a separate entity. There's no mention of ESI. This is also represented in Figure 20. 6.1.3 Common Semantic Model Very important! Going through section 11.1.1, it seems that the semantic model has to support multiple media: Zigbee and Internet. While SEP has its own semantic model, this poses the question of the actors and the systems involved. i.e. we cannot expect Zigbee meters to conform to an XML schema and thus we'll end up with segmentation and translations between different devices. Sincerely, Michel Kohanim michel@universal-devices.com	The Use Cases in the roadmap are examples devised by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. A paragraph to this effect was added to the start of section 4 to make this clear.
17	7.2.09	Edward Koch, Akuacom	EM	All, I mostly looked at section 4 of the roadmap. I too think that the roadmap does a good job of identifying relevant use case. With respect to the Communications Diagram on page 58 it is not clear to me why the only communications paths between the Aggregator and Customer are through the EMS and the Meter, while the only communications paths between the DR Services Provider and the Customer are between the EMS and the Device/HAN. I can envision a rationale that makes that makes sense for either of those cases, but I don't understand why they would be different. That almost implies that the communications paths between those two entities are part of what makes them distinct. If we view the Aggregator and DR Services Provider as a type of third party "intermediary" then I'm not sure if the Roadmap adequately defines these actors in such a way that many of the envisioned intermediaries can be put into one of those two categories.. To me an	The review team agrees. Aggregators are defined as actors in the use cases. No definitive list of aggregators is provided because none would be complete. The use case itself must define the aggregator/actor to which it refers, The Use Cases in the roadmap are examples devised by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible.

#	DATE	WHO	SOURCE	COMMENT	Response
				intermediary is any third party entity other than the provider of electricity and the consumer of electricity that is involved in transactions and operations between those two. In the most general sense an intermediary can provide one or more of the following operational functions: (1) Aids the electricity provider (e.g. Utility within Operations domain in the Roadmap doc) and works on their behalf in the management of consumer loads with both control and information (2) Aids consumers (Customer) and works on their behalf in the management of their loads with both control and information (3) Is a broker for transactions between the electricity provider and the consumer For the sake of simplicity I will henceforth refer to the electricity provider as the "Utility". The task of "aggregation" is one type of service that falls under the first category while "Aggregators" can perform one or more of the above functions. Within the context of the roadmap an Aggregator is just one type of intermediary that in some cases is also a DR Services Provider. I suppose the main commonality by definition in the roadmap is that an aggregator "aggregates" two or more loads to make it look like one from the Utility point of view. Beside Aggregators there may exist other intermediaries that may help a Utility manage the consumers loads without doing aggregation. Within the context of the roadmap that sort of intermediary is classified as a DR Services Provider, but I'm not sure that the definition of a DR Service Provider captures all the roles that it may play from either the Utility or consumer perspective. It may do more than just deliver DR signals, but also actively manage loads on behalf of the Utility. How this differs from existing aggregation activities is that currently Aggregators are typically free to manage loads how they see fit to meet overall load profile objectives. What I am referring to here is the desire of the Utility to manage specific loads in a specific fashion (i.e. not aggregation) and working through an intermediary to achieve that. Note that this is different than managing loads on behalf of the consumer. Today there already exists a thriving marketplace of entities that manage loads on behalf of the consumer, but third party entities that manage loads on behalf of the Utility (non-aggregation services) is still developing. I suspect that when it comes to managing loads any successful intermediary will provide services that provides value to both the electricity provider and the consumer and will thus be managing loads on behalf of them both. My only recommendation would be to either make the communications paths between the DR Service Provider/Customer consistent with the Aggregator/Customer or make it more clear why they should be different. -ed Koch	A paragraph to this effect was added to the start of section 4 to make this clear.
18	7.2.09	Ed Koch, Akuacom	EM - B2G	All, I mostly looked at section 4 of the roadmap. I too think that the roadmap does a good job of identifying relevant use case. With respect to the Communications Diagram on page 58 it is not clear to me why the only communications paths between the Aggregator and Customer are through the EMS and the Meter, while the only communications paths between the DR Services Provider and the Customer are between the EMS and the Device/HAN. I can envision a rationale that makes that makes sense for either of those cases, but I don't understand why they would be different. That almost implies that the communications paths between those two entities are part of what makes them distinct. If we view the Aggregator and DR Services Provider as a type of third party "intermediary" then I'm not sure if the Roadmap adequately defines these actors in such a way that many of the envisioned intermediaries can be put into one of those two categories.. To me an intermediary is any third party entity other than the provider of electricity and the consumer of electricity that is involved in transactions and operations between those two. In the most general sense an intermediary can provide one or more of the following operational functions: (1) Aids the electricity provider (e.g. Utility within Operations domain in the Roadmap doc) and works on their behalf in the management of consumer loads with both control and information (2) Aids consumers (Customer) and works on their behalf in the management of their loads with both control and information (3) Is a broker for transactions between the electricity provider and the consumer For the sake of simplicity I will henceforth refer to the electricity provider as the "Utility". The task of "aggregation" is one type of service that falls under the first category while "Aggregators" can perform one or more of the above functions. Within the context of the roadmap an Aggregator is just one type of intermediary that in some cases is also a DR Services Provider. I suppose the main commonality by	This comment is a duplication – please see comment 17.

#	DATE	WHO	SOURCE	COMMENT	Response
				definition in the roadmap is that an aggregator "aggregates" two or more loads to make it look like one from the Utility point of view. Beside Aggregators there may exist other intermediaries that may help a Utility manage the consumers loads without doing aggregation. Within the context of the roadmap that sort of intermediary is classified as a DR Services Provider, but I'm not sure that the definition of a DR Service Provider captures all the roles that it may play from either the Utility or consumer perspective. It may do more than just deliver DR signals, but also actively manage loads on behalf of the Utility. How this differs from existing aggregation activities is that currently Aggregators are typically free to manage loads how they see fit to meet overall load profile objectives. What I am referring to here is the desire of the Utility to manage specific loads in a specific fashion (i.e. not aggregation) and working through an intermediary to achieve that. Note that this is different than managing loads on behalf of the consumer. Today there already exists a thriving marketplace of entities that manage loads on behalf of the consumer, but third party entities that manage loads on behalf of the Utility (non-aggregation services) is still developing. I suspect that when it comes to managing loads any successful intermediary will provide services that provides value to both the electricity provider and the consumer and will thus be managing loads on behalf of them both. My only recommendation would be to either make the communications paths between the DR Service Provider/Customer consistent with the Aggregator/Customer or make it more clear why they should be different. -ed koch	
19	7.2.09	Jim Tillett, Endeavor Engineering, www.endeavorengcom	TW	We were tasked to provide prompt feedback on the roadmap document and I took a closer look at it, particularly sections 3 and 4. In general I think the roadmap does a great job of defining what the smart grid is and relevant use cases. With that I do have some observations in no particular order or priority as follows. One thing that stands out to me is that every use case has an aggregator category identified. This agrees with my expectation that as we progress through smart grid development the role of the aggregator is going to grow in relevance to the overall smart grid. With that in mind I'm just wondering if the aggregator should be better characterized in its description or even further identified or defined in the document. I see the aggregator as being kind of a catch-all of functionality that is going to be increasingly important. The current expectation of an aggregator is that they aggregate energy resources but I see that actor also aggregating data/information. For example, if an aggregator has distributed intelligent onsite assets then the information that those assets contains could be of value to others such as regular utilities or cross domain members. An example of an information aggregator would be Ziphany (http://www.ziphany.com/) but there are increasingly others, and energy aggregators such as DR are well known. So I see this as a growing role in the smart grid that will likely evolve and differentiate. I don't know exactly how the roadmap document should be changed to reflect this but one thing that might be modified would be the statement that "aggregators may not sell or take title to electricity". Imagine an organization that has an aggregation of real-time DER assets that adds up to MW in capacity. It seems that if the smart grid is moving to real-time pricing and commodity markets then this organization would have title to electricity and would currently fit in the aggregator role. This appears to be one likely trajectory of change for the smart grid. At ConnectivityWeek Metcalf's comparison between the growth of the smart grid and the internet struck a chord with me. Similar to deregulation of the telecommunications industry, smart grid capabilities combined with regulatory changes could lead to further similarities such as a separation between my market and physical power provider. An example of this in the internet is that my office currently gets internet access from Integra Telecomm, but the actual data packets are carried over Verizon lines. In this roadmap document I see the aggregator role as the most likely to evolve in this direction. This is likely getting outside of the scope of the current roadmap document but is worthy of consideration and discussion. In going over the electric storage section there seems to be some inconsistency or ambiguity related to the terms energy storage and electric storage. It might be good to clarify or differentiate between the two. In the context of the smart grid electricity is the medium used to transfer energy, but energy storage comes in many forms that include electric, thermal, potential, and others. So to capture the storage accurately it may be better to refer to the storage component as energy storage (maybe its different forms) and identify the transfer medium as electrical. There are numerous communication diagrams that identify actors and their relationships. The numbered IDs of these associations are really getting to the heart of the interoperability standards necessary for the smart grid. I assume a follow-on activity will be to associate	This comment is a duplication. Please see comment 12.

#	DATE	WHO	SOURCE	COMMENT	Response
				standards or standard gaps with these connectivity associations? If so then this might be more clearly identified in the document. The conceptual model doesn't directly capture the role of regulatory activities. Where do regulatory organizations fit into this model? I'm sure they were considered here and have a rather removed association, but they can also have a significant impact on smart grid development. It might be good to include them as actors. In going through the roadmap document these are the areas that stood out to me as needing further consideration in the progress of the smart grid. If anyone has comments or perspectives at any level in agreement or opposition I think we should fully incorporate everyone's thoughts into the review of this document because it likely will have significant future impacts. I took a look at the newly released DOE Smart Grid Investment Grant Program document and it prominently mentions that this NIST effort must be coordinated in proposals. To me this reinforces the impact that our efforts are likely to have in future electric power markets and systems. Where there is funding there will likely be growth. Thanks, Jim James Tillett P.E. Endeavor Engineering Inc. Ph: 503.336.1717 x101 Cell: 503.706.6913 www.endeavoreng.com	
20	7.3.09	Tom McDermott, Meltran	SGC	MelTran, Inc. 90 Clairton Blvd., Ste. A Pittsburgh, PA 15236 Voice: 412-653-0407 Fax: 412-653-7045 Web: www.meltran.com July 3, 2009 George Arnold 100 Bureau Drive, Stop 8100 National Institute of Standards & Technology Gaithersburg, MD 20899-8100 Emailed To: smartgridcomments@nist.gov Subject: Comments on Smart Grid Interoperability Standards Roadmap Comments on Initial List of Smart Grid Interoperability Standards Dear Mr. Arnold, I recommend that NIST include MultiSpeak on the list of Smart Grid Interoperability Standards, which were posted in draft form on edocket June 9th. This listing should be in addition to IEC 61968 / 61970. The two main reasons for this recommendation are: 1. MultiSpeak is already a mature standard, with many vendor implementations and customer deployments. This can significantly shorten the lead time and cost for new projects in the smart grid arena. The EPRI report mentions this point, but without adequate emphasis. There are dozens of vendors supporting MultiSpeak version 3 interfaces, and they have been deployed at hundreds of customer utilities, all with little or no help from integration consultants. Versions 1 and 2 were less successful, but they led to version 3. Version 4 is now in the release process, as mentioned in the EPRI report. There is also an established MultiSpeak interface testing procedure that has been in use for several years. MultiSpeak has already traveled most of the learning curve. In contrast, the very first Distribution CIM (IEC 61968) interoperability tests are scheduled for December 2009. The DCIM is at less than version 1, and will take several more years to reach a maturity level comparable to MultiSpeak's. CIM implementations at U. S. utilities have generally required a lot of consulting help. The NERC has required CIM-based transmission system model exchange, but that has taken several years of testing to reach maturity. Likewise, several years will pass before DCIM is ready for smart grid projects. For example, the 2009 tests will cover less than half of the DCIM. 2. MultiSpeak is tailored to the North American style of distribution system. The IEC standards evolved from transmission systems (similar in both Europe and North America). The existing IEC 61968-13 standard Common Distribution Power System Model (CDPSM) was primarily developed, tested, and used in France. The North Page 2 of 2 American style of distribution system differs in having unbalanced loads, many single-phase and two-phase circuits, and different grounding systems. The 2009 tests will attempt to develop a model profile for North American distribution systems, but it's not yet clear	MultiSpeak has been added to the interim roadmap; see 10.53.

#	DATE	WHO	SOURCE	COMMENT	Response
				how quickly this can be incorporated into IEC standards. With CIM and IEC standards, it's necessary to work within the model structure already established for transmission and international-style distribution systems. There has been a perception that CIM is for large utilities and MultiSpeak for small ones, but this is mistaken. The difference is really between a transmission and international distribution focus (CIM) and a North American distribution focus (MultiSpeak). With some exceptions, such as urban networks, a large utility's distribution feeders look much the same as a small utility's – it just has more of them. But at least in rural and suburban areas, there are many similarities. To facilitate this recommendation, which is primarily based on technical grounds, I would also support MultiSpeak's affiliation with IEEE, ANSI, or another national standard-making organization. The EPRI report mentions IEC 61968-14, which is an effort to harmonize MultiSpeak and the IEC standards. Even when completed, this won't take the place of listing MultiSpeak itself in the Smart Grid Interoperability Standards. The relevant goal of Part 14 is to help users "implement MultiSpeak interface functionality using CIM objects". It's not a drop-in slot for MultiSpeak interfaces, and it also contemplates features in the CIM that aren't ready yet. MultiSpeak might always be ahead of CIM for North American distribution systems. My qualifications for making this recommendation are at www.meltran.com/staff.shtml. In brief, they include: A U. S. delegate to IEC TC57 / WG14, including the Part 11 modeling team, the Part 13 CDPSM team, and the 2009 interoperability test team. Member of the MultiSpeak Initiative; proposed some of version 4. Chairman of the IEEE / PES Distribution System Analysis Subcommittee. Performed a CIM gap analysis for EPRI during 2008-2009, addressing North American distribution feeders. Implemented CIM export for EPRI's OpenDSS software. Implemented a MultiSpeak interface for the Utility Wind Integration Group's Distributed Wind Impacts project. I continue to spend a lot of time on IEC, CIM, and CDPSM activities through 2009, but I also know that MultiSpeak is better suited for Smart Grid Interoperability in the foreseeable future. It would not be prudent to bet everything on the IEC 61968 / 61970 standards. Sincerely, Thomas E. McDermott, Ph. D., P.E. President	
21	7.6.09	Mike Cooper, National Grid	EM	Thank you for considering the transition from legacy systems to new infrastructure over a period of time. Given the concern by our regulators regarding stranded assets as a result of Smartgrid, it is important to be able to demonstrate that the standards process will not require wholesale replacement of imbedded infrastructure but rather a measured approach to asset replacements.	Mention see comment response to Sandy-note from Marty, talk to Bill for comment #14
22	7.6.09	Stan Klein, Open Secure Energy Control Systems, LLC, stan@osecs.com	EM	My first group of comments on the roadmap are attached as a pdf. Several of them have cybersecurity implications. If you need another format, please let me know. Stan Klein -- Stanley A. Klein, D.Sc. Managing Principal Open Secure Energy Control Systems, LLC 8070 Georgia Avenue Silver Spring, MD 20910 301-565-4025 Comment 1: Page 10 Sentence in "Consensus on Standards" needs completion. ... "Consensus- based standards deliver better results over [WHAT???]" Comment 2: Page 13, Section 2.4 FERC not only identified four application areas, they also identified two cross-cutting areas: cybersecurity and a common semantic framework. The cross cutting areas need to be recognized in the document. Cybersecurity is addressed extensively. Common semantic framework is identified as a NIST priority, but is not mentioned as being a priority in the FERC policy.	C1: Draft 'Interim Smart Grid RoadmapNISTRestructure200906141914.doc " had "…over time for both technical and political reasons." This was removed from draft 'Interim Smart Grid RoadmapNISTRestructure200906160943.doc' and subsequent revisions. C2: From the FERC document, the second is "Inter-system communication and coordination"; reviewer comment: I don't believe that further stressing that cyber-security and the properly titled semantic model are needed as explicit references given the mentions/language in the roadmap and the forthcoming extensive stand-alone security work. C3: The document does not discuss possible implementations of standards. The review team feels the summary is sufficient. C4: This point was discussed during the August 3-4 workshop. For the roadmap document, the review team feels the summary is sufficient.

#	DATE	WHO	SOURCE	COMMENT	Response
				Comment 3: Page 129, Section 10.27 (62351) Strictly speaking, 62351 is not an implementable standard per se but is an instruction to standards WG's to incorporate certain requirements in the standards for which they are responsible. This should be noted in this section. Comment 4: Page 129, Section 10.31 (C37.118) Efforts to harmonize C37.118 with IEC-61850 are ongoing in IEEE/PSRC WG H11 Revision of C37.118 Syncrophasor Standard Comment 5: Section 10.39 (IEEE 1686-2007) Maturity: Does not support strong authentication, required by FERC 706 to be included in future revision of CIP 002-009. (See NIST SP 800-63) Comment 6: Page 139, Section 10.76 (EXI) Maturity is beyond Last Call Working Draft and moving toward Candidate Recommendation. Process has included review and resolution of issues with the W3C Technical Architecture Group. Standard adapts proprietary technology that has been in commercial use and was selected based on performance and functionality evaluation. Open source implementation and initial library of encoded data for interoperability testing are available Comment 7: Add to Section 10: Comment 7a: IEC 61400-25 Application: Applies 61850 to wind power Actors: Wind turbines, other wind power and wind farm devices Interfaces: Adds communications mappings beyond those currently in IEC-61850, including a mapping to W3C Web Services (SOAP) Maturity: Basic functionality adopted. Some volumes (e.g., condition monitoring) still being developed. Has users group. Category: SDO – IEC Comment 7b: FERC 889 Open Access SameTime Information System and Standards of Conduct Application: Issued at same time as FERC 888. Defines information system for open transmission access. Also defines prohibited information flows (Standards of Conduct) among system operators and market participants. Actors: Various across the Smart Grid Interfaces: Various across the Smart Grid Maturity: Issued for several years by Federal Energy Regulatory Commission Category: Regulator Comment 7c: IEEE PC37.238 Application: Companion standard (profile) for applying IEEE 1588 in electric power systems Actors: Interfaces: Interfaces between time standard systems and field equipment Maturity: In development Category: SDOIEEE Comment 7d: IEEE PC37.239 Common Format for Event Data Exchange (COMFEDE) Application: XML Schema for event data. Intended to be compatible with IEC61850 and to define format for event data Actors: Interfaces: Equipment detecting events, equipment/systems handling and analyzing event data Maturity: In development Category: SDOIEEE	C5: Comment added to roadmap document. Searches in FERC 706 and NIST SP800-63 do not return hits on “IEEE” or “1686” to verify this information. C6: The review team feels the summary is sufficient as “…moving toward {status}…” is valid for many if not all non-approved standards. The claim of “Last Call Working Draft” cannot be substantiated. See following reference. 08/06/2009: http://www.w3.org/XML/EXI/#News “Present Status (In reverse chronological order, as of April 2009). In April 2009, the second draft note on the Evaluation of the EXI Format with reference to the Properties identified by the XBC Working Group, relative to XML, gzipped XML and ASN.1 PER, was published.” C7a-7g: Added to Section 10 in alphabetical order, not order cited here. C8: The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Note, also, that each Domain’s actors has substantial overlap and duplication. Ultimately, these similarities need to be recognized and normalized as a Smart Grid clear set of actor definitions gets constructed in future work. A paragraph to this effect was added to the start of section 4 to make this clear. C9: These profiles were compiled via workshop input and are illustrative examples. Complete revisions ultimately should be compiled. The review team does not feel further changes are necessary. C10: The “Customer” domain is already mentioned. The review team does not feel further changes are necessary. C11: The review team is well-versed in these technologies and does not feel further changes to the interim roadmap are necessary. C12: Wind power is but one of many DER, or distributed energy resources. The gaps and overlaps of this standard with others was extensively discussed during the August 3-4 workshop. How the hierarchy may be extended is an implementation

#	DATE	WHO	SOURCE	COMMENT	Response
				Comment 7e: FERC 706: Application: Acceptance and desired/mandated changes to CIP 002-009 Actors: Various across the Smart Grid (bulk power) Interfaces: Various across the Smart Grid (bulk power) Maturity: Formally accepted CIP 002-009 under Energy Policy Act of 2005. Changes in process at NERC. First group of changes (Version 2 of CIP 002-009) approved in May 2009 by NERC Board Category: Regulator Comment 7f: NIST SP 800-63 Electronic Authentication Guideline Application: Provides useful information on strong authentication. Actors: Various Interfaces: Various Maturity: Written as Federal Guideline. Unsuitable for citation in standard, such as IEEE 1696-2007. Requires revision to become suitable for citation to support compliance with FERC 706. Category: NIST Guideline Comment 7g: WS-Addressing Application: Supports message IDs, endpoint references, and stateful interactions Actors: Various Interfaces: Various Maturity: Maturity: Standard (W3C Recommendation), Implemented, Version 1.0. Category: Open, Industry Consortium Comment 8: Use cases and diagrams: The use cases and diagrams for Wide Area, PEV, Energy Storage, and Distribution need to be modified to allow for signals to be sent from the balancing authority (ISO, RTO, or utility) control center either directly or through an aggregator to PEV's, customer storage devices, other customer site DER (such as solar generation), and other customer site equipments (often involving Variable Frequency Drives) that are capable of raising/lowering their loads. Comment 9: Appendix A (Standards profiles per the GWAC Stack): These profiles need a lot of work. They have a lot of lower-level technical standards placed inappropriately at upper levels of the stack. The policy level of the stack should include items like Energy Policy Act 2005, EISA-2007, the NERC reliability standards and the FERC orders accepting them and mandating/requesting changes, other FERC orders (889 is probably at least as important as 888 because 889 provides the Standards of Conduct that have cybersecurity implications). Also, state laws and PUC regulations. The business objectives level of the stack should probably point to documents such as ISO/RTO operating policies. It might be useful to have model business policy guidelines for other asset owners. This is a potential standards gap. The business procedures level of the stack should probably be populated with model documents such as storm plans, dispatchers procedures, organization charts, and similar documents. At this level should also appear the policies and procedures required to be maintained and implemented by the responsible entity under CIP-002-R1 and CIP-003 (R1 through R6) and CIP-005-R2 and R3. For example, It is at the business procedures level that should appear the policies and procedures mandated under CIP-005-R2 and R3 that define the detailed rules on which role based access control is based. Example questions that would need to be addressed by such documents: 1. Authority for assigning and/or assignment of responsibility for aspects of field equipment by organizational unit 2. Authority and/or policies for determining access rules for field equipment (e.g., what	choice as the example in the comment mentions. The review team does not feel further changes are necessary to the roadmap document. C13: If this comment was targeted at the interim roadmap, insufficient information was given to allow an action to be completed. As formatted, it neither fits 11.6.1 nor 11.6.2. C14: This section will not be in the final interim roadmap. The review team does not feel further changes are necessary.

#	DATE	WHO	SOURCE	COMMENT	Response
				accesses should be restricted to the responsible organizational unit. Should others be allowed access and on what basis.) 3. Who has authority to grant emergency access and what are the detailed procedures for granting it. Recommendations section Comment 10: Page 143, Section 11.1.1 IEC 61850-7-420 can also be extended to other customer site equipments as discussed above in Comment 8 on the use cases discussion. Comment 11: Page 144, Section 11.2.1 The UCA, which is the basis of IEC-61850, was originally tested between substation and control center. In OSECS work on 61850, we found no technical impediment, other than possibly bandwidth, and numerous potential advantages to the direct use of 61850 between substation and control center. The existing limitation appears to be based on non-technical considerations. The existing IEC effort in this area is focused on harmonizing 61850 and 61970 (the CIM). However, note that the CIM was originally developed as technology for interfacing third-party applications (generally “advanced applications” such as improved power flow and contingency analysis) to an existing control center (hence the alternate name “EMS-API”). This illustrates that the existing focus on the CIM/61850 harmonization treats 61850 as an “outside add-on” rather than a native data model in the control center. Comment 12: Page 157 Section 11.6.1 IEC 61850-6 Substation Configuration Language also requires extension to cover wind power. The primary issue is the Substation section, which is “hardwired” to a substation-based hierarchy. OSECS has also found it useful to extend the hierarchy to cover multiple power system facilities in a single file. Comment 13: Add to Recommendations: Extend IEC-61400-25-4 Annex A (wind power extension of 61850) mapping to W3C Web services to 61850 itself. Move items from body that WS-Addressing handles in SOAP header (message ID, endpoint address) Comment 14: Section 12.1.1 AMI Meter Reading Services scenario The impact of tampering with meter readings might be high on the affected customer. For example, someone with a grudge against the customer could tamper with the meter reading to cause the customer financial or administrative difficulty.	
23	7.6.09	Joe Weiss, joeweiss16@yahoo.com	EM	Enclosed is a blog on the EPRI Roadmap. It can be found at www.controlgloabl.com/unfettered. Why is one of the most common substation protocols being summarily dismissed? Why is the good work that NIST has done effectively being pushed aside. I am very disappointed. Joe The NIST Standards Roadmap – very curious The Smart Grid Roadmap, Report to NIST on the Smart Grid Interoperability Standards Roadmap has some very curious conclusions and descriptions. They involve DNP3, NERC CIPs, NIST SP800-53 and NIST SP 800-82. These descriptions and recommendations (or lack therof) can have long term, expensive ramifications. They can even impact the reliability of the Smart Grid. Section 10 provides the following descriptions with my comments in parentheses and major issues in bold: 10.14 DNP3 Application: Substation and feeder device automation Actors: Protective relays, metering devices, cap bank controllers, switches, SCADA Master, applications Interfaces: Serial, Ethernet, IP over TCP or UDP,	10.14: “Deprecated” will be removed. The scope of this document was not to debate the merits of individual standards but to enumerate them based on contributions from the workshops. 10.58: The standard list and its details are by intent evolutionary. This section will be reviewed and revised when the details are able to be integrated. 10.61: no change is offered. 10.62: no change is offered. This paragraph has already been addressed. The term “deprecated” has already been discussed. The review team does not feel the document requires change to address

#	DATE	WHO	SOURCE	COMMENT	Response
				Maturity: Has security built in, has users group, has certification and testing Category: De facto, Open, Industry Standard, Deprecated for new work. (The dictionary defines “deprecated” as to express disapproval, deplore, or belittle.) 10.58 NERC CIP 002-009 The National Electric Reliability Corporation (NERC) Critical Infrastructure Protection (CIP) is a series of standards are directly relevant to the bulk power system critical cyber assets. CIP-002 states the means by which a critical cyber asset is identified. The remaining standards identify security management controls, personnel and training, electronic security perimeters, physical security of cyber assets, systems security management, incident handling and recovery planning. (no Actors, Interfaces, Maturity, or Category) 10.61 NIST SP 800-53 Application: NIST Special Publication 800-53 is a standard developed as a foundational level of security controls required for federal information systems. The standard provides a method for tailoring security controls to an organization. Appendix I of the document provides guidance for tailoring to industrial control systems (ICS). Actors: Federal information systems Interfaces: Interfaces between federal information systems Maturity: Widely used by federal information systems Category: Security –Gov NIST/ITL not a standard 10.62 NIST SP 800-82 Application: NIST Special Publication 800-82 Guide to Industrial Control Systems (ICS) Security is a draft standard covers security guidance for SCADA systems, distributed control systems and other control system configurations. The standard defines ICS characteristics, potential threats and vulnerabilities to these types of systems, developing an ICS security program, network architecture and security controls. Actors: Actors in distributed control environments Interfaces: Interfaces in distributed control environments Maturity: Just released Category: Security – Gov NIST/ITL not a standard Per one of the Roadmap author’s, Erich Guenther, DNP3 is the most popular utility automation protocol in North America. According to a 2004 Newton-Evans survey, over 75% of North American utilities were already using or planning to use DNP3 in their SCADA networks. It is applied throughout transmission and distribution networks, providing connections from master stations to substations, between devices within substations, and out to pole-top devices along feeders. DNP3 is an open standard and therefore a good candidate for the Smart Grid. DNP3 is recognized in the IEEE 1379 standard for communications with Intelligent Electronic Devices (IEDs). DNP3 is a viable Smart Grid technology. DNP3 provides limited self-description of data, can be configured using XML, operates over the Internet protocol suite, and has proven to be an extremely reliable and self-healing technology. Furthermore – at least until new additions are developed – there is no comparable IEC 61850 standard for the low-bandwidth and hostile distribution automation environment. Given Guenther’s description of DNP3, why does the EPRI roadmap explicitly want to get rid of it? The NERC CIPs are recognized as weak and inadequate. The NERC CIPs explicitly exclude electric distribution including home area networks which are the heart of the Smart Grid. NIST SP800-53 is quantifiably more comprehensive. Why aren’t the NERC CIPs “deprecated for new work”? NIST SP800-53 is mandatory for all federal computing systems including federal power utilities. Non-federal power utilities electronically interface with federal power utilities. NIST SP800-53 is also directly relevant to non-federal utility computing systems including Smart Grid. Why the short-shrift? NIST SP800-82 includes SCADA as well as process controls. However, the “Actor” and Interfaces” only includes process controls. NIST SP800-82 has been out in draft for several years and finalized almost a year ago. However, the Roadmap states it was just released.	this comment. From NIST SP800-53: “This guideline has been prepared for use by federal agencies. It may also be used by nongovernmental organizations on a voluntary basis and is not subject to copyright. (Attribution would be appreciated by NIST.)” The documents listed in the Roadmap will be used by the CSCTG as they select and tailor the security controls. NIST SP 800-53 is one of the documents that will be used. The base document that the CSCTG is using is the DHS Catalog of Security Controls document. This Catalog was developed using NIST SP 800-53 as one of the base documents. 08/06/2009: This document is still listed on the NIST website (http://csrc.nist.gov/publications/PubsSPs.html) as “DRAFT Guide to Industrial Control Systems (ICS) Security”.

#	DATE	WHO	SOURCE	COMMENT	Response
				Again, why the short-shrift? I have a hard time understanding the motives of the Roadmap. The DNP3 comment was particularly puzzling as it is widely supported, and it has security features that EPRI is currently testing. Also, NIST 800-53 and NIST 800-82 have a lot of good work and NIST SP800-53 is mandatory for federal entities. However, the Roadmap appears to be pushing them aside. What is going on here? Joe Weiss	
24	7.8.09	Robin Chase, MIT, rchase@alum.mit.edu	SGC	Ed Markey did an excellent job when he added the words "require the use of open standards and internet protocols." It is critical that not only the smart grid communications infrastructure adhere to this requirement, but all government-financed technology -- in particular transportation, health care, and education. We need all these systems to have the potential for interoperablity. one of the arguments for plug-in hybrids is that their batteries will be able to contribute to the power grid. Clearly, the technology that is used in vehicles for open road tolling, congestion pricing, parking systems, or whatever, needs to be compatible with the smart grid. Building out the smart grid will require the purchase of new devices, and the building of new networks. The data demands on these devices and networks is relatively insignificant (compare it to voice or video). There is an enormous amount of excess capacity that will be available. We must require that communications networks built with government dollars open up their excess capacity, so that it can be put to good use. Low income communities and government-built low income housing will be among the recipients of smart grid demonstration projects. Opening up excess smart grid network capacity brought to these dwellings will bring internet access to these homes for free. We should take advantage of this opportunity to help bridge the digital divide; and open up education and economic development opportunities. Opening up network excess capacity should be de facto, regardless of the infrastructure being connected. Many smart grid projects have plans to use closed and proprietary mesh networks among the sensors, devices, and gateways. Mesh networking makes sense since these provide the most resilient, redundant and reliable communications networks. These mesh networks should be opened up and should require open standards, as well. Fears surrounding cybersecurity are well founded. There is bountiful support for the proof that security does not require closed dedicated networks. Security can be acheived used VPNs, as well as IPv6 technology. Instituting the above recommendations on the smart grid demonstration projects will have profound and far-reaching effects. It will enable the $4.5billion to be useful and leverageable by the rest of the economy, and will maximize the return on taxpayer dollars. This article in Wired.com lays out some of these ideas. www.wired.com/.../the-grid-our-cars-and-the-internet-one-idea-to-link-them-all/ I would be happy to answer any questions you might have on my comments.	The commenter provides many good points, but lacking specificity needed to change the document. The review team does not feel the document requires change to address this comment.
25	7.9.09	Joe Zhou, Xtensible Solutions, Inc.	EM	Jerry, Attached are my comments to the Roadmap report. Joe Comments to the “Report to NIST on the Smart Grid Interoperability Standards Roadmap” Joe Zhou 7/9/09 Category: General Comment Title: Standards Development and Enactment Process Comment: 1. The role of users and user organizations in the Standards Process is not well defined in the report. There seems to be a lot of emphasis on SDOs and government bodies, but less emphasis on end users. User organizations should and can play a significant role in two areas: requirements specification and compliance testing. This would leave the SDOs focusing on the development of best fit technical solutions	Response to “Comment Title: Standards Development and Enactment Process” 1. Within the roadmap document, numerous users groups have been named explicitly, and enumerating the roles and interplay between all of the smart grid stakeholders is outside the scope of the document. In addition, they have been invited to all three workshops, participated in those workshops, and interfaced with NIST and project team personnel over the life of the project. 2. In fact, that is the aim of phases 2 and 3 of the overall NIST project. See slides from August 3-4. Response to “Comment Title: Common Semantic Model for Smart Grid” 1. Several stakeholders recommended the contrary, that indeed this should have special emphasis. The August 3-4 workshop

#	DATE	WHO	SOURCE	COMMENT	Response
				and leave the government agencies such as NIST focusing on overall coordination and facilitation. 2. SDOs have different standards development and certification processes. NIST could lead the effort to develop an overarching process from standards development, compliance testing and certification. This would allow various groups to align de-facto and de jour standards under one process. Category: Specific to section 6.1 Comment Title: Common Semantic Model for Smart Grid Comment: 1. Common Pricing Model should really be part of the Common Semantic Model for SG. What is missing right now is the detailed requirements and use cases across all domains of SG that pricing plays a role. Once the requirements are development, the information model and resulting interface standards can follow, but this does not require a new standards task force, and should leverage what already exist, such as IEC CIM and related standards. 2. Common Semantic Model is a key to not only enable interoperability across domains of SG, but also an enabling technology for managing the harmonization and evolution of overlapping standards at the syntactic layer. This is an area where a centralized effort could have significant impact on the overall development and coordination of various information standards within SG. The XML Schema is probably not the best technology for the CSM. Other technologies such as UML or OWL should be considered. The Common Semantic Model would have the following key characteristics: • A model that uniquely and precisely defines all relevant information concepts and their key relationships that intersect across all domains of the Smart Grid. It will be more of a controlled vocabulary than an information model. • It will focus on semantics that are used across multiple Smart Grid domains and have the highest impact in areas such as energy consumption, pricing, demand response, security events. • It is NOT a formal ontology of the Smart Grid, but could be used to develop ontology within the domains of Smart Grid where real needs arise. • It does NOT imply syntax and physical representation of data. • It is NOT intended to replace or extend existing information model standards such as IEC CIM. The Common Semantic Model can be used to provide the following value: • Focus across domain areas that are traditionally not the concerns of individual standards. • Provides a vehicle for developing information standards that impact multiple domains of the Smart Grid. • Reduce the effort in harmonizing overlapping standards, by providing a neutral and precise mechanism to represent common information semantics and the mappings to other standards. • Provide a way for standards to evolve within a defined framework, yet allow for innovation and cater to the needs of specific requirements within each domain. • Provide a mechanism for standards version management and migration of standards adoption. • Provide utilities and other enterprises that have Smart Grid information needs, a starting point and baseline for their Enterprise Semantic Model that can be leveraged for their own internal integration. This reuse of baseline information will reduce the total cost of ownership for	hopefully addressed the issue of common pricing model and its relationship with other standards. The review team does not feel the document requires change to address this comment. 2. The project team feels this is perfect input for the groups developing semantic models named in the “key actions”, but that the complete integration of this text within the roadmap would exceed the focus of providing a short overview of the issue.

#	DATE	WHO	SOURCE	COMMENT	Response
				Smart Grid implementation. • Provide the vendor community open and consistent mappings between standards and version of standards. • Provide a vehicle for Smart Grid domain standards to evolve towards a common semantic model over time.	
26	7.9.09	Bob Old, Siemens Building Technologies, bob.old@siemens.com	EM - B2G	Howdy David, From the B2G point of view, I would have to put a Demand Response Use Case at the top of my priority list. The Service Provider (whoever I have the contract with) tells me less than 24 hours ahead of time how much demand reduction he wants out of me, when, and for how long. Time of Use pricing and Critical Peak Pricing are probably simplified versions of this use case. Second on my list is Distributed Energy Resources. I may have an acre of photo-voltaics on my roof, or 500 plug-in electric vehicles in my parking lot. I want to sell that power or storage back into the grid. I expect to get a better price for power from renewable sources, not just "run the meter backwards." From the NIST perspective, I expect network security comes first. My guess is the security guys want it to all happen at once because they don't want any unauthenticated entities on their networks. Asking for a Meter Interface seems to draw an immediate, negative response from deep within the Id of the utilities folks. We might avoid that discussion by asking for Meter Data of a similar reliability. I don't see Direct Load Control happening in the B2G Domain. It happens in the H2G Domain, though. Best, B.O. July 9, 2009 -- Robert Old bob.old@siemens.com Siemens Building Technologies, Inc., HVAC Products 1000 Deerfield Pkwy., Buffalo Grove, IL 60089-4513 USA Phone: +1(847)941-5623, Skype: bobold2	The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Note, also, that each Domain's actors has substantial overlap and duplication. Ultimately, these similarities need to be recognized and normalized as a Smart Grid clear set of actor definitions gets constructed in future work. A paragraph to this effect was added to the start of section 4 to make this clear. Security will be treated outside of the final interim roadmap. This is a well-defined interface that has applicable standards. "meter data of similar reliability" is almost a complete well-articulated requirement that could be used by one of the many AMI groups developing requirements. The review team does not feel the document requires change to address this comment. The domains are illustrative and not normative. Direct Load Control happens at the point best suited to control the load directly. This could be at the building control interface. There are also building loads that are controlled directly, namely thermal storage units that are part of HVAC systems.The review team does not feel the document requires change to address this comment.
27	7.9.09	Jay Manotas, Panasonic Automotive Systems Company of America, Manotasj@us.panasonic.com	SGC	The OpenHAN Home Area Network device communication, measurement, and control using ZigBee(IEEE 802.15.4g)/HomePlug Smart Energy Home Area Network (HAN) does not have the best suited protocol or hardware for the SMART GRID to home interface. OpenHAN/ZigBee has a short range. It requires a gateway to get to Ethernet and the Internet. IEEE P1901 doesn't need a Gateway. P1901 uses the natural physical medium of the AC Power lines to get to and from the GRID and extends the LAN into the internet. It can be used in the home as the HAN and can communicate directly to the SMART GRID through the internet via P1901 routers or other Power Plant Internet interfaces. P1901 devices are more readily available and are currently supported by major network device manufacturers. Data security is also covered by complex modulation schemes and, or data encryption. The diagram below is from the IEEE 802.15.4g Workgroup. Note, this would require AP to Backhaul transmitters installed everywhere and would be costly; thus, defeating the purpose of reducing energy costs. Also note that there is no direct connection from the HAN to the	The commenter is directed to Section 10.40. This is perfect feedback for H2G (and other) DEWGs (home page: http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/WebHome). The review team does not feel the document requires change to address this comment.

#	DATE	WHO	SOURCE	COMMENT	Response
				Internet in the diagram below. The Report to NIST on the Smart Grid Interoperability Standards Roadmap (Contract No. SB1341-09-CN-0031—Deliverable 7) states: One of the highest priority actions include: “Conducting an analysis to select Internet Protocol Suite profiles for smart grid applications - NIST should commission a group to perform a comprehensive mapping of smart grid application requirements to the capabilities of protocols and technologies in the Internet Protocol Suite to identify Internet protocol Suite subsets as important for various applications in the various smart grid domains. “ Also important in priority is network capacity. The capacity of Wireless Mesh Networks (WMN)s like ZigBee is affected by many factors, such as network architecture, network topology, traffic pattern, network node density, number of channels used for each node, transmission power level, node mobility, etc. A good overview on WMS can be found in Akyildiz et al, Computer Networks, 2005. The issue of the capacity in WMS is still an open problem. Although there are analytical results, there are sometimes simplifying assumptions. However, it is today well understood that for increasing the capacity of WMN several techniques must be adopted. At the PHY level, one would need to add multi-channels per radio, multi-radios per node, directional antennas, multi-input multi-output (MIMO). At the network level, it would be necessary to increase infrastructure cost (large number of relays are needed or it is necessary to resort to hybrid architectures including base stations or access points for relaying packets via wired networks) and foresee for increased data overhead for network management (nodes must be grouped in clusters and clusters must be handled in a distributed way). All these techniques are not presently available in Zigbee radios, which among other things, have also a very low data rate of 256 kbps. Although this data rate is in principle more than enough to handle the requirements necessary to support AMR applications, this data rate will in practice, be insufficient to overcome the throughput reduction due to the interference created by neighboring radios, both Zigbee and other radios, as Zigbee uses a shared spectrum. On the other hand, PLC based solutions as the ones advocated in the IEEE P1901 standard can avoid the capacity bottleneck of WMN by relying on a wider bandwidth (at least 30 MHz), higher throughput of several tens or hundreds of megabits, on a centralized master/slave scheme, and on the possibility of piggybacking the in-home PLC network to directly interface with home appliances and have access to the Internet cloud.	

#	DATE	WHO	SOURCE	COMMENT	Response
				The Power Meter data could be accessed through a Computing Cloud or directly from a Power Plant Demand Response Automation Server (DRAS) server via TCP/IP, as proposed by Lawrence Berkley National Laboratory, without investing in Zigbee HAN and a ZigBee to Ethernet Gateway. An alternative is to have the user access their near real time power data through the Power Company file servers over P1901. Jay Manotas Sr. Systems Engineer Advanced Development Panasonic Automotive Systems Company of America 776 Hwy 76 South Peachtree City, GA 30269 770-486-3136 Office 770-771-9673 Cell CONFIDENTIALITY NOTICE: This e-mail including attachments, if any, is intended only for the person or entity to which it is addressed and may contain confidential and/or privileged material. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message. If you are the intended recipient but do not wish to receive communications through this medium, please so advise the sender immediately.	
28	7.9.09	Mark Hura, GE Energy, mark.hura@ge.com	SGC	GE Energy, in collaboration with other GE business units involved in end-to-end Smart Grid solutions, is substantially in favor of and is supporting the progress made by NIST in 2009. These efforts to provide direction and guidance in developing the Framework for Smart Grid Interoperability are much needed in this industry. Please accept our comments below as they specifically pertain to docket number 090520915-9921-01, entitled "Report to NIST on Smart Grid Interoperability Standards Roadmap". Our comments are intended to be constructive in terms of supporting the ultimate goal of the Obama Administration and the intent of the 2009 American Reinvestment and	The commenter is directed to Section 6.1.5. In addition, this was a focus area during the August 3-4 workshop, and there is still work needed on this topic. The review team does not feel the document requires change to address this comment.

#	DATE	WHO	SOURCE	COMMENT	Response
				Recovery Act. The particular issue that we would like to comment on is the discussion around licensed vs. unlicensed spectrum, and whether this decision enhances the overall goals and objectives for smart grid deployments. This argument has gotten much attention lately, and has caused some distraction and delay in viable projects that could and should be moving forward. There needs to be a definitive position put forth to the industry that resolves this concern and provides clear intent from policy makers and federal agencies. It's our opinion that there should be a collective statement issued by NIST, DOE, and the FCC that clearly articulates if there is a future decision to allocate certain spectrum for utility use, this will be done as an alternative for utilities to consider, but will not be mandated or retroactively required, nor cause impact/replacement to utilities installed base that meets existing FCC requirements. In support of the above, we offer the following points for consideration: * Licensed spectrum does NOT equate to a more secure solution. This is messaging that has made its way into this argument that is not factually based. Ensuring a secure solution is through the proper use of proven security applications and techniques and is completely independent of what spectrum the solution is operating within. * One can't ignore the fact that there are millions of electric utility devices in operation today that successfully operate in an unlicensed spectrum meeting existing FCC requirements. With continued advancement and evolution of technologies, the utility industry and technology providers of these devices successfully maintain these devices in operation in a safe and secure manner, and we are committed to continuing this trend. * Ultimately, the adoption of dedicated utility spectrum would be another option for utilities to consider as their solution approach for smart grid deployments ... but it should be an option. As we've stated above, there is no doubt that solutions today can be effectively deployed that use unlicensed spectrum ... and they are commercially available today, shovel-ready solutions, that are being manufactured and deployed in large scale production. * We emphasize the word option because there is no short-term, shovel-ready solutions that can be deployed in "dedicated utility spectrum", which to date have been focused either in the 700Mhz or 1.8Ghz ranges. Both of these spectrums would require ratification, evacuation of this spectrum by current users, and then ultimately development, testing, commercialization, and then production of smart grid solutions to operate within this spectrum. We believe this to be, at a minimum, a 24 to 36 month proposition. * There are positive aspects to dedicated spectrum for a given industry application, most notably the consolidation of radio technologies, efficiencies of supply chain scale, and certain interoperability advantages. These aspects need careful planning, require time to implement, and as we stated above, should be considered as another "option" for smart grid deployments. For the industry to meet the goals the 2009 American Reinvestment and Recovery Act, we believe an immediate resolution via a joint statement is required to clarify this pending issue and allow deployment of commercially available (and secure) smarter grid solutions providing proven utility, consumer, and operational benefits. We appreciate your consideration in addressing this matter as soon as possible, and are available for clarification or discussion upon request. Best Regards, Mark M. Hura Robert J. Gilligan Smart Grid Commercial Leader Vice President, GE Energy Transmission & Distribution Transmission & Distribution Mark M. Hura GE Energy Smart Grid Commercial Leader Transmission & Distribution	

#	DATE	WHO	SOURCE	COMMENT	Response
				T: 678-844-5879 C: 678-763-3167 E: mark.hura@ge.com	
29	7.9.09	Ryan Colker, ASHRAE, RColker@ashrae.org	SGC	Mr. Arnold, I am pleased to provide the attached comments on behalf of ASHRAE for the “Initial List of Smart Grid Interoperability Standards.” Please let me know if you have any questions. ---------- Ryan Colker, Manager, Government Affairs American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Direct Line: 202-833-1830 Fax: 202-833-0118 eMail: RColker@ashrae.org Web: www.ASHRAE.org 1828 L Street, N.W., Ste. 906 Washington, DC 20036 Be Green, Save Time - Renew And Join ASHRAE Online P Please consider the environment before printing this e-mail. July 9, 2009 George Arnold National Institute of Standards and Technology 100 Bureau Drive Stop 8100 Gaithersburg, MD 20899 Re: Initial List of Smart Grid Interoperability Standards Dear Mr. Arnold: We congratulate NIST for its leadership on development and implementation of a comprehensive framework for the implementation of a Smart Grid. We are pleased that you have recognized the utility of ANSI/ASHRAE Standard 135-2008 as an integral part of the framework. NIST has been a critical participant in the development of the standard and we appreciate the long-standing support provided by the Institute. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), founded in 1894, is an international organization of over 50,000 members. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. Since its initial development in 1995, the BACnet standard has provided an open, consensus-based standard establishing a common communication protocol in the building automation and controls industry. With the increased need for communications protocols between buildings and the Smart Grid, the BACnet committee has been considering updates to aid the development of protocols to assist in the implementation of the Smart Grid. The BACnet committee’s long-standing Utilities Integration Working Group has been engaging utility companies and working with national labs on grid related technologies like real-time pricing and automated demand response for many years. This group, which is being re-chartered as the Smart Grid Working Group (SG-WG), is well positioned to lead BACnet's efforts as the nation moves toward creating an interoperable Smart Grid. Aiding this effort is an update to the network security specifications for the BACnet protocol. The committee moved forward for publication an addendum that adds state-of-the-art digital signatures and encryption (SHA-256/HMAC and AES) to enable the creation of FIPS-compliant secure Comments to NIST Smart Grid Interoperability Standards July 9, 2009 Page 2 of 2 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. A N I N T E R N A T I O N A L O R G A N I Z A T I O N	This comment applies to the “Initial List of Smart Grid Interoperability Standards.”, NOT the interim roadmap document. The review team does not feel the document requires change to address this comment.

#	DATE	WHO	SOURCE	COMMENT	Response
				communications. This technology will be available on all BACnet media types and joins the capabilities of the certificate-based SSL/TLS that can be employed when using BACnet Web Services (BACnet/WS). Together, these technologies will serve the high security needs of the Smart Grid initiatives. BACnet has been communicating on standard IP networks for more than 10 years now. To ensure that BACnet continues to integrate well into corporate infrastructures and to expand it into the emerging market areas enabled by ubiquitous IP networking, the committee has formed a new working group to investigate the opportunities for adopting more key capabilities and best practices from the Information Technology industry. This group will be working to facilitate the continued convergence of the IT and Building Automation infrastructures. As NIST continues to develop the framework for the development of the Smart Grid, please consider ASHRAE and its BACnet committee as a resource. Should you have any questions or require additional information, please contact the ASHRAE Washington Office at 202-833-1830 or washdc@ashrae.org. Respectfully Submitted, Gordon V.R. Holness	
30	7.9.09	Jay Britton, Areva T&D, jay.britton@areva-td.com	EM - T&D	Jerry, I'm not sure what the proper protocol is for commenting on the Roadmap, but I would like to submit the attached for consideration. Thanks. "FitzPatrick, Gerald J. Dr." <gerald.fitzpatrick@nist.gov> Sent by: t_and_d_interop@nist.gov 07/07/2009 02:59 PM Please respond to t_and_d_interop@nist.gov To Multiple recipients of list <t_and_d_interop@nist.gov> cc Subject T&D Joint Teleconference Thursday, July 9, at 3:00 PM Eastern Comments from Jay Britton. Overall, I am very impressed with what the Roadmap team has accomplished with a very complex problem under difficult time constraints. I do, however, have a few criticisms, which I hope will be constructive. One general comment is that the CIM work of WG13 (61970 standards) is not very well presented – I suspect this reflects the fact that no one deeply involved with 61970 was part of the Roadmap team. The following are some specific comments by section. Comment 30a: Section 6.1.3 Common Semantic Model Probably there is no single topic that is more important to get a handle on in terms of Smart Grid Standards Planning. The decision to use a common semantic model has huge impact, both because it has potential value and because it is difficult to achieve – and it has to be taken early to achieve its goals. This Roadmap section simply does not communicate the cost/benefit picture of this critical standards option. Benefit. The big payoff from a common semantic model can be summed up in one word – consistency. Consistent methodology, consistent business terminology, consistent data modeling structures for 'data of record', leading inevitably to lower cost applications that deal with problems in a more consistent manner and present data to users in a more consistent manner. In the long run, big picture analysis, this potential is truly huge, but take note that these benefits only accrue with widespread adoption.	C30a: Section 6.1.3 discusses only a small sampling of important models that should be developed. While we agree that the CSM will play a key role in the development of the Smart Grid, this detailed explanation of the benefits of the CSM is out of scope in a summary roadmap document. The Interim Roadmap project, Phase I of the NIST plan, transitions in the next few weeks to the contractor selected for Phase II/PhaseIII. In this forward activity, the Interim Roadmap and efforts to date are to be continued and elaborated. Concerning your remark about the usage of XML as a modeling language, we agree that cross-links between model elements are occasionally needed, but the complexity of using UML does not seem to warrant its usage. XML Schema allows these links to be shown in annotation form, which should by acceptable to the user community. However, 6.1.3 has been changed to make XML Schema/XML only an example of a modeling language. C30b: The diagram in section 4.3.5 is a compromise between "showing everything" and "placing all high-level detail on one slide". The slide is merely illustrative and is not meant to indicate limitations of Smart Grid applications. Your point that Control Centers need models of the neighboring systems should be addressed in Phase II and/or Phase III of this NIST project. C30c: Section 11.2.1 has already been revised to remove the remark that 61970 has no messaging formats (although it does not elaborate on specific parts of 61970). We agree that

#	DATE	WHO	SOURCE	COMMENT	Response
				Timing. For business data exchange standards (i.e. information payload standards, rather than standards for delivering the payloads) most of the design work involves semantics. If you want the local semantics of a payload to conform to a common semantic, obviously that overall framework has to be there first, and then you need to spend extra time working with those knowledgeable in the overall framework to incorporate the details that you need. This creates two challenges: 1. From the overall Smart Grid perspective, the committees that work on the framework need to be very responsive very early, which is not exactly what usually happens with committees of volunteers. 2. From the perspective of individual groups needing a standard for problem X, Y or Z, these groups will not necessarily be very happy to have the extra overhead of integrating with a common semantic model. There are fortuitous circumstances where payloads get lots of 'free' modeling from existing semantic standards, but equally, there are many places where the global benefits are a local cost and a local delay and even a local frustration for those interested in a specific problem. Scope. The text in the Roadmap section focuses in the action item on the harmonization of various existing semantic models. Frankly, it is highly debatable whether the additional benefit of harmonized models would offset the difficulty created by increasing the scope of coverage and therefore increasing the number of subject matter experts that are trying to work effectively under the same roof. By far the more important issue would be to understand which Smart Grid problems need to be assigned to which of the current semantic model standards domains. Being part of one of these domains gets you 80% or more of the value. The next most important issue is to eliminate turf wars between the domains, so that when new problems are tackled we know very well why they are assigned to 61850, 61968, 61970, etc. The third most important scope issue is to understand how to move between the domains when an exchange touches the intersection of two of these semantic worlds. A subtopic of this third issue is whether or how harmonization takes place between the worlds. Note that it is completely inevitable that some problems are outside the control of the power industry and must be governed by different un-harmonized semantic models. The unequal return principle. I'm sure everyone recognizes that the payoff from a common semantic model is not the same everywhere. We don't absolutely need a single model, especially if the interfaces between multiple models are not critical interfaces. We don't absolutely need every interface to use the common semantics. In short, there can be some judgment and some prioritization. It is better if more of these judgments come from an aware top-level Smart Grid view, rather than happen ad hoc because of individual projects making tradeoffs. There needs to be some roadmap language about these cost/benefit items and some direction setting as to how the main semantic worlds are going to work with Smart Grid implementers. One final very specific remark. The action item text states that we should "devise a common semantic model using XML Schema and XML". XML schema is one way to define message payloads, but it is not a good way to define a common semantic model. CIM currently uses UML and that is the most likely candidate for any common semantic at this point. Comment 30b: Section 4.3.5 I attended both of the SmartGrid Workshops. In the second workshop, I raised the subject of transmission network model management to the working group to which I was assigned and it caught the attention of the group, but I find that the topic did not get much attention in the Roadmap. The model management problem is as follows: • Any systems that have general reliability as a responsibility, such as markets, regional reliability centers or TO operations centers, require accurate network models to support network analysis functions. o In interconnected systems, there are always multiple centers sharing responsibility. o Each center needs "external modeling data" from other entities. § TO centers need models of their neighbors. § Regional centers need constituent TO models as well as models of neighboring regional centers. • At present, o TOs develop good models of their own systems – very good models if they spend time getting their state estimators tuned up.	adoption of standards is needed, but the roadmap document scope does not include the mandate to adopt "all known good technology". C30d: The referenced statement in 11.2.1 has been revised to remove the assertion that "no specific standard exists".

#	DATE	WHO	SOURCE	COMMENT	Response
				o RTOs develop good models of their own systems by devoting large amounts of engineering labor to communicating with member TOs about models combined with careful attention to quality of their state estimator solutions. (Model communications are not standardized.) o In general the quality of external models is poor, as updates are infrequent and difficult. (See NERC Real Time Best Practices report, 2008). Model management is closely related to some other inter-control-center exchanges: • Exchange of planned outages. • Exchange of real-time measurements. The topic as a whole should be called “Inter Control Center Data Exchange”, and given that control centers are supplied by various different vendors, it is an obvious area for standardization. It is not terribly glamorous, but basically, none of the analytical stuff will work very well if these exchanges are not functioning well. The diagram above (in section 4.3.5) does not show this kind of exchange at all. Nor does it find much mention in the Roadmap at this point. Figure 2 in Section 2.5.5 does depict two networks with a bi-directional link between them, but the text doesn’t say anything about this link. The only other references I have found thus far are the gap entries in Section 11.2.1, which I will comment on in detail because they need work. Comment 30c: Section 11.2.1 Develop interoperable messaging standards for the IEC 61970 (CIM): The CIM for transmission (IEC 61970) does not specify formats or messaging methods for exchanging CIM information, thereby requiring many implementation to develop their own formats and messaging requirements. There is no interoperability between implementations unless they have explicitly worked together. IEC 61970 If CIM format and messaging standards were developed, then CIM implementations could be interoperable without custom development by vendors and lengthy interoperability tests for each implementation.. IEC TC57 WG13, NEMA The above statement from 11.2.1 is mostly incorrect. There is a specification (61970-552), which specifies a format for exchanging CIM information. It is based on RDF XML derived from a CIM profile. This specification has been used for some years by the 61970-452 model exchange standard, which specifies a profile for exchanging transmission model data between control centers. Interoperability testing has been conducted annually for some years. Considerable progress has been made such that if a group of control centers want to set up a regular business exchange, the amount of work involved is measured in weeks instead of years. The grain of truth in these comments is that interoperability is not perfect out of the box. This is not due, however, to the lack of a formatting standard, which exists and is quite well understood and is not the source of the problems. Interoperability problems come from the following: • This is a very complex set of information. • It has thus far been economically infeasible to develop and maintain test models that exercise all possible modeling information. • Real models have been difficult to get for testing due to data sensitivity. • Vendor teams tend to have different interpretations of fine semantic details, which only come to light when real implementations are attempted. • Real EMS installations are not the latest (more compliant) versions of vendor products, so they often need some sort of customization anyway. • The standard is being extended annually because business requirements demand new information to be exchanged. In the end, the economics of this sort of standard are quite different from what might be encountered in, for example, the substation equipment world or home appliance world, where volume components must be manufactured identically and must talk out of the box. In the EMS world, volume of identical product installations is very low and in order to be effective, a standard has to be backfit into unique existing environments that obviously could not have been pre-tested. When you consider the nature of the problem, the optimum standard is one that balances standards development and testing cost with the inevitable customization cost. The real GAP here is not in the standard. It is in the adoption of the standard. The big payoff for adopting the CIM model exchange is for an entire interconnection, or at least for an entire region to adopt (and test) the standard together. Exchange at present in North America is	

#	DATE	WHO	SOURCE	COMMENT	Response
				a hodgepodge of bilateral agreements of varying quality and formality, usually involving manual re-entry of updates. It is not easy to achieve the agreement of enough parties to create the “critical mass” that will realize the value of automated CIM exchanges. This is difficult a) because external modeling is still not a critical issue to most TOs who are the source of data, and b) because there is a price tag (in both $$ and resources) for each TO associated with implementing conformance that, although not astronomical, is still large enough to need approval of management. In 2009, there is one effort in Europe that I have been involved with that is implementing CIM on a broad scale. China is also adopting a version of CIM for interconnection model exchange. The only active North American effort, I believe, is a plan by ERCOT to use CIM between ERCOT and its constituents. I would also add the comment that if you had a different situation, where we were looking forward to deploying a new set of applications, and where we needed out-of-the-box interoperability based on a precisely defined payload, the 61970-552 formatting standard as a means of defining these payloads would work just fine. We have several active formatting techniques within the IEC working groups, and at this point, I am not sure anyone knows how to make a factual argument about which is best in which circumstances. Comment 30d: Exchanging both transmission and distribution power system models: As it becomes increasingly critical for transmission and distribution operations to have clear and accurate information about the status and situations of each other, they need to be able to exchange their respective T&D power system models including the merging of relevant databases for interconnected power systems. IEC 61970 & IEC 61968-11 Both transmission (IEC 61970) and distribution (IEC 61968-11) are being developed for exchanging power system models. They need to include messaging standards to be truly interoperable. No specific standards exist for merging power system databases. IEC TC57 WG13 & WG14, NEMA, IEEE/ NASPI/ NERC/ FERC For the most part, the comments made above apply here as well. However, this GAP also claims that “No specific standards exist for merging power system databases.” This is not up to date. In 2007-2008, WG13 introduced “model authority sets” as a means of identifying the model responsible party for different regions and for partitioning of models. This standard specifies how whole models may be exchanged and updated by authority. It defines a simple process for merging or extracting. In 2008-2009, we have added a method of partitioning by subsets of the overall CIM so that, for example, a standard for exchanging solution values for power flow variables only contains the variables, but can be “plugged into” a previously exchanged model to understand the whole model. Although the body of documentation for this particular body of work is still being completed in 2009,the technology is usable now, as is witnessed by the fact that it is a major part of the UCTE CIM application I mentioned earlier. As above, the real GAP here is in adoption. To close this, I want to be sure to stress that even though these GAPs are misstated, the existence of GAPs in standardized exchanges between control centers is very real and definitely needs attention. Smart Grid funding, it seems to me, could be very well spent if we could figure out a way to stimulate the adoption of the existing body of CIM work. The CIM standards are ready for implementation. This is “low hanging fruit” and a bit of incentive for TOs to implement CIM in a coordinated manner with their neighbors would drive this whole thing to a very successful end result. I also strongly recommend that the scope of this be extended to include exchange of long-term expansion plans, near-term planned outages and real-time measurements because they all relate back in one way or another to the exchange of models.	
31	7.10.09	Dwayne Stratford, AEP dstradford@aep.com nbbhatt@aep.com ; Dan Boezio; jasherry@aep.com; reallen@aep.com; pbjohnson@aep.com; jafleeman@aep.com;	SG	Good Afternoon, My name is Dwayne Stradford, Director Transmission Reliability for AEP, and I am submitting comments gathered on behalf our Transmission Team for the SmartGrid Report. The first set of comments are from the EMS/SCADA Applications Director (Ron Allen) from Transmission Operations. I skimmed through the paper referenced below and have no real problems with the direction stated within. It is at a very high level and spends as much time defining terms as it does laying out a roadmap, but overall I cannot not argue with it. Comment 31a: I looked over the "Communications Diagram" referenced below. This is not a communications diagram in the same sense that I would	C31a: The diagram represents a compromise between displaying the “big picture” and “displaying the details”. Addition of “how” information flows between the major blocks would obscure the “where” aspects of information flow. Concerning your cyber security concerns, we see no specific changes that you are requesting to the roadmap document. C31b: Conflicts between standards are inevitable, because the standards often involve regional issues. The goal is to make

#	DATE	WHO	SOURCE	COMMENT	Response
		jfburger@aep.com; mheyeck@aep.com		think of communications; it does not have any telecommunications aspects what so ever. It just shows which systems/devices "communicate" with other systems and devices. Overall, it does a fairly good job of showing the numerous diverse systems and where the information needs to flow. As far a cyber security goes, the main emphasis is for the security to be built in from the beginning, and not be a add-on. This is a great concept. If their expectation is correct that there will be numerous "new" devices introduced to accommodate Smart Grid applications, then I strongly support that these new devices meet certain minimum requirements (standards) before being integrated into the grid. With that said, I think that NIST is primarily interested in the "standards" associated with these new devices and how they contribute to the overall Smart Grid concept. Thanks, Ronald E. Allen The next set of comments is from Jeanne Sherry, who is the Manager of Protection and Controls Asset Engineering. Comment 31b: I also skimmed the document and agree that there is nothing of detail in the thousands and thousands of words put to paper. As I indicated to Navin this morning, I agree in theory that having standards for interoperability is a good thing. My main concern is that we don't create a separate set of standards that may be in conflict to the IEEE standards, etc. Another worry is the time that it will take to create these standards will not be in sync with the speed at moving forward in installing the devices today. How will these devices mix with the final standards? Will we have to remove these devices and put in new devices at that time the new SmartGrid standards are in place? This seems to be capital intensive. I do agree that PCAE will carry the Transmission flag for the standards associated with the components that get the information (non-wholesale metering) into the systems, but not for the parts of the standard that have to do with the Operations tools end that is similar to the Real-Time Tools Best Practices Task Force discussed earlier this month. The last set of comments is from me, Dwayne Stradford. Comment 31c: The NERC Reliability Standards are implicitly mentioned in this report (Section 2.5.1 - Requirements Must Be Mature), as it lays out bulleted points in regards to industry policies and rules of governance that Smart Grid applications should follow. The new SmartGrid standards should adhere to any and all NERC Reliability Standards. Comment 31d: The 'Actors' described in this report probably should have been laid out similar to the NERC Reliability Functional model. For instance, rather than talking about RTO(s) - Regional Transmission Operators and ISO(s) - Independent System Operators, the appropriate term to use would have been RC(s) - Reliability Coordinators. Comment 31e: Section 3.2.5 highlights the Operations function, from an extremely high level, and mostly details the communication network and protocols used for the network applications to properly function. There is also a table describing the interaction of Operations with all other business units within a utility company. In Section 3.2.7, this report is looking at the RTO/ISO function as the primary authority for transmission reliability on the bulk electric system. They are also looking at the SCADA function under the premise that the RTO/ISO (Reliability Coordinators) function will be	these standards work together, and not be at odds with one another. As we move forward with the roadmap in Phases II and III, the issue of “advancements without forklift upgrades” will be addressed. C31c: Although it is a goal of the roadmap to not explicitly disconnect from NERC reliability requirements, we feel there is no need to explicitly refer to the NERC requirements multiple times throughout the document. C31d: Each Domain’s actors has substantial overlap and duplication, both between use cases and with external use cases. Ultimately, these similarities need to be recognized and normalized as a Smart Grid clear set of actor definitions gets constructed in future work. C31e: This comment does not seem to address concerns with the roadmap document. C31f: The development of methods to determine monitoring thresholds and deadbands is out-of-scope for an overview document such as this roadmap. C31g: CPP is one tool in the mitigation action toolbox. CPP is the “easy” mitigation tool which can be used with little negative consequence. Other tools (such as Remedial Action Schemes) are much more difficult to implement and present many more challenges when they are activated. C31h: The Interim Roadmap project, Phase I of the NIST plan, transitions in the next few weeks to the contractor selected for Phase II/PhaseIII. In this forward activity, the Interim Roadmap and efforts to date are to be continued and elaborated. C31i: Future work in the Priority Action Plans can be found at http://collaborate.nist.gov/twiki-sggrid/bin/view/_SmartGridInterimRoadmap/PriorityActionPlans and this will be carried forward in the Phase II / Phase III of the NIST plan.

#	DATE	WHO	SOURCE	COMMENT	Response
				coordinating most of the transmission actions between the generation facilities and distribution end users. Comment 31f: For Wide-Area Situational Awareness (WASA), in Section 4.3, AEP is slowly but surely coming along in our tools, especially with the new AREVA state estimation project and the e-Terra Vision application. The main challenge that has to be met is a development of processes upon which the monitoring thresholds can be established, in order to determine what the good and bad operating parameters are for the bulk electric system. There is discussion in this section about the tools and what should be monitored, but there is not any discussion on the following topics * How much phase angle separation is devastating to bulk electric system and where? * How many TLR's must a transmission facility operate under before a new facility is built or parallel path(s) are upgraded? * If an area is constantly operating below its minimum voltage requirements, when should the installation of reactive resources be considered? These and other questions are the ones that need to be answered, in order for Situational Awareness to mean anything to an operator running the system, along with a planner charged with designing the system for future expansion and sustainability. There are sections in this report detailing EMS/SCADA applications and Cyber Security, i.e. Page 52 (Communications Diagram). Ron Allen has spoken on these topics, above. Comment 31g: I am concerned about the comments in this report on critical peak pricing, as a means to influence demand response during periods of high demand on the system. The thought that people are going to reduce their usage based upon pricing signals, as a means to 'manage' the stress on the system. I don't feel comfortable in using this as a mitigation strategy. I still believe the operators have to regularly evaluate the transmission system, and Transmission Operations has to be prepared with emergency operating plans for system emergencies. Comment 31h: Other than that, there are a lot of high level buzz words and concepts included in this report that have been thrown around the industries for years, but there are no concrete applications. The following is a list of those terms, just referred to above: * PMU Phasor Measurements * Self-Healing Grid via Protection and Controls * Situational Awareness * Real-Time Visualization Each of the previously mentioned topics could easily be studied, in depth, to the level of this SmartGrid initiative. Comment 31i: Pages 133 and beyond really deal with communication protocols, in addition to dealing with detailed SmartGrid scenarios on how this new operating strategy is envisioned to be used in the future. Some of the subtle factors that I didn't see addressed in this report are the amount of hardware (RTUs and IEDs) that are going to have to be installed in the field at the stations, in conjunction with the increased bandwidth and communication diversity that has to be in place for this SmartGrid concept to have any shot of succeeding. Not to mention, the increased computing power that will have to reside in the	

#	DATE	WHO	SOURCE	COMMENT	Response
				control centers across the country to issue pricing signals and perform a suite of contingency analysis (voltage, thermal, stability, optimal power flow, etc.) If you have any other concerns, please do not hesitate to contact me. Regards, Dwayne Dwayne Stradford Director - Transmission Reliability American Electric Power Company Transmission Operations NATOC 8400 Smith's Mill Road New Albany, OH 43054 Office Number: 614.413.2290 Audinet Number: 226.2290 Cell Phone Number: 614.832.5751 Code of Conduct Applies	
32	7.10.09	Karlheinz Schwarz, Schwarz Consulting Company, Germany, schwarz@scc-online.de	SGC	Dear Mr. George Arnold, dear All, It is my pleasure to provide you some comments on the “Report to NIST on the Smart Grid Interoperability Standards Roadmap” according to the "Request for Comments on “Report to NIST on the Smart Grid Interoperability Standards Roadmap” Federal Register, June 30, 2009, Volume 74, Number 124, p 31254, Docket Number: 0906181063-91064-01." As an expert in Automation and Interoperability Issues since the 80s I have studied the report. I agree with the report - it is a great work. I have some comments I want to share with you and the experts involved in the preparation of the final Interoperability Roadmap. I would appreciate receiving a confirmation that you received the comments and the attachments. If you need further detailed input on the comments presented below, please let me know. I am involved in German activities dealing with "Interoperability Issues" in the context of the German E-Energy projects. I am one of the authors of a 230 page report published erlier in 2009. The report "Untersuchung des Normungsumfeldes zum BMWi-Förderschwerpunkt „e-Energy - IKT-basiertes Energiesystem der Zukunft“" is written in German. The standards we have listed and discussed can be seen ... because they are in English. The report (Zusammenfassung = Summary and Studie = complete report) can be downloaded from the following link: http://www.e-energie.info/de/497.php Some information on the E-Energy projects in English (2 page flyer) can be downloaded from this link: http://www.e-energie.info/documents/BMWi_E-Energy_Flyer_english_april_2009(1).pdf Please find below my comments on the “Report to NIST on the Smart Grid Interoperability Standards Roadmap”	32a: IEC 61400-25-1 through 25-5 added to clause 10 32a: IEC 61499 added to clause 10 32c: Phases II and III of the NIST plan will further detail specific possible mappings of standards to domains.

#	DATE	WHO	SOURCE	COMMENT	Response
				There are two areas in the future Smart Grid that have been discussed from the requirement point of view - but no standard has been referenced that may meet these requiremenst. The two standards that would support these two requirements (IEC 61400-25 and IEC 61499) are missing in the list of standards and various clauses. Comment 32a: Smart Grid and communication within and with Wind Turbines ---------- The Wind Power Turbines are already playing a crucial role and will grow very fast. Communication with and within Wind Turbines will be based (step-by-step) on the standard IEC 61400-25 (Communications for monitoring and control of wind power plants). This standard series (6 parts) extends the standard series IEC 61850: additional semantic models and additional communication service mappings. Part 25-2 defines the required information models for wind turbines. Part 25-4 defines mappings of IEC 61850-7-2 ACSI (Abstract Communication Service Interface) to: – SOAP-based web services, – OPC/XML-DA, – IEC 61850-8-1 MMS, – IEC 60870-5-104, – DNP3. These mappings of IEC 61850-7-2 ACSI provide mappings to meet the various needs found in different application domains. Web services are one of the crucial protocols; see page 100 of the EPRI Report to NIST. These two standards (IEC 61400-25-2 and IEC 61400-25-4) should be included in the Interoperability Roadmap. A reference to the IEC 61400-25 Users Group should be included in the Roadmap (like the UCA International Usersgroup): http://www.use61400-25.com/ Comment 32b: Smart Grid and Distributed Automation ---------- According to Neil Higgins (Energex, Brisbane, Australia): "A truly intelligent, self-healing distribution network will necessarily rely on “plug-and-play” self-reconfiguration, “self-awareness” in various forms, and collaboration between subsystems to achieve optimum performance and natural scaling with minimum risk. Subject to the availability of pervasive communications, this behavior can be achieved with a distributed automation architecture. Properly implemented, a distributed system should be more robust than the equivalent centralised system. The large scale and longevity of the distribution network pose a challenge: Without standards for interoperability all levels – form, function and communications – the infiltration of distributed functionality will be severely impeded. IEC 61850 provides a solid standards base for a new generation of power system relaying and control functions. IEC 61499 (Function Blocks) promises a framework for gluing those functions together in patterns of increasing capability and complexity." The details of an "Implementation Roadmap - Proof of Concept for Distributed Fault Location, Isolation and Supply Restoration Using IEC 61499 and IEC 61850" are attached:	

#	DATE	WHO	SOURCE	COMMENT	Response
				<<20081117-RoadmapV1-0.pdf>> Details of the use of IEC 61850 and IEC 61499 are discussed in the following paper: Distributed Power System Automation with IEC 61850, IEC 61499 and Intelligent Control <<HVNS_SMC_IEEE final.pdf>> The combination of IEC 61850 (IEC 61400-25) AND IEC 61499 would implement several requirements found in the “Report to NIST on the Smart Grid Interoperability Standards Roadmap”. Comment 32c: Some instances of requirements that could be implemented with the combination of IEC 61850 and IEC 61499 are listed here: Page 6: • Power reliability and power quality. The Smart Grid provides a reliable power supply with fewer and briefer outages, “cleaner” power, and self-healing power systems, through the use of digital information, automated control, and autonomous systems. Page 9: • Anticipate and Respond to System Disturbances (Self-heal). The Smart Grid independently identifies and reacts to system disturbances and performs mitigation efforts to correct them. It incorporates an engineering design that enables problems to be isolated, analyzed, and restored with little or no human interaction. It performs continuous predictive analysis to detect existing and future problems and initiate corrective actions. It will react quickly to electricity losses and optimize restoration exercises. • Operate Resiliently to Attack and Natural Disaster. The Smart Grid resists attacks on both the physical infrastructure (substations, poles, transformers, etc.) and the cyber-structure (markets, systems, software, communications). Sensors, cameras, automated switches, and intelligence are built into the infrastructure to observe, react, and alert when threats are recognized within the system. The system is resilient and incorporates self-healing technologies to resist and react to natural disasters. Constant monitoring and self-testing are conducted against the system to mitigate malware and hackers. • Complexity of the Smart Grid. The Smart Grid is a vastly complex machine, with some parts racing at the speed of light. Some aspects of the Smart Grid will be sensitive to human response and interaction, while others need instantaneous, automated responses. The smart grid will be driven by forces ranging from financial pressures to environmental requirements. Page 9: • Software applications. Software applications refer to programs, algorithms, calculations, and data analysis. Applications range from low level control algorithms to massive transaction processing. Application requirements are becoming more sophisticated to solve increasingly complex problems, are demanding ever more accurate and timely data, and must deliver results more quickly and accurately. Software engineering at this scale and rigor is still emerging as a discipline. Software applications are at the core of every function and node of the Smart Grid. Page 48: 4.3.2.3 Wide Area Control System for Self Healing Grid Applications The objective of the Wide Area Control applications is to evaluate power system behavior in real-time, prepare the power system for withstanding credible combinations of contingencies, prevent wide-area blackouts, and accommodate fast recovery from emergency state to normal state. The Wide area control system functions comprise a set of computing applications for information gathering, modeling, decision-making, and controlling actions. These applications reside in central and in widely distributed systems, such as relay protection, remedial automation schemes (RAS), local controllers, and other distributed intelligence systems. All these applications and system components operate in a coordinated manner and adaptive to the actual situations.	

#	DATE	WHO	SOURCE	COMMENT	Response
				Page 49: Distribution A microprocessor-based controller of power system equipment, for monitoring and control of automated devices in distribution which communicates with SCADA, as well as distributed intelligence capabilities for automatic operations in a localized distribution area based on local information and on data exchange between members of the group. Page 50: Transmission A microprocessor-based controller of power system equipment for monitoring and control of automated devices in transmission which communicates with SCADA, as well as distributed intelligence capabilities for automatic operations. Page 75: Distribution Field equipment with local intelligence for monitoring and control of automated devices in distribution which communicates with SCADA, as well as distributed intelligence capabilities for automatic operations in a localized distribution area based on local information Page 80: Distribution Field equipment with local intelligence for monitoring and control of automated devices in distribution which communicates with SCADA, as well as distributed intelligence capabilities for automatic operations in a localized distribution area based on local information and on data exchange between members of the group. The standard IEC 61499 should be added to the Interoperability Roadmap. The combination of the standards IEC 61850 AND IEC 61499 should be added in the Interoperability Roadmap as an area that needs further investigation and standardization. ---------- If you have any question or comment please don't hesitate to contact me at your convenience. My experience profile can be found here: http://nettedautomation.com/download/Netted-Schwarz-Profile-en_2009-01-21.pd f I look forward to reaching consensus on the list of (hopefully International) Standards comprising the final Interoperability Roadmap. I am prepared to support the efforts in the U.S., Europe, Germany, ... all over. Best Regards, Karlheinz Schwarz Schwarz Consulting Company, SCC Im Eichbaeumle 108 76139 Karlsruhe Germany Phone +49-721-684844 Fax +49-721-679387 mailto:schwarz@scc-online.de Visit the IEC 61850 / IEC 61400-25 blog:	

#	DATE	WHO	SOURCE	COMMENT	Response
				http://iec61850-news.blogspot.com	
33	7.10.09	Dave Bakken, Washington State University	TW	This feedback comments on Prioritized Action 6.1.4 “Application of Internet-Based Networking Technology” and Prioritized Functionality Comment 33a: 6.2.2 “Wide Area Situational Awareness (WASA)”. A key thing missing in the report in these areas is middleware (MW) for wide-area situational awareness. (Middleware is a layer(s) above the network/OS but below the application that provides programmers with a higher-level building block that can not only provide QoS /security but also shield programmers from having to deal with heterogeneity (diversity) among different CPU types, operating systems, programming languages, and even different middleware vendors of the same standard. Middleware has been considered best practices for at least a decade for distributed applications in military, aviation, transportation, telecoms, and other industries. However, to date it has not penerated the electricity industry much, for a number of reasons. I can provide a lot more info on this if needed..... Dave Bakken, bakken@wsu.edu also read the first page of http://www.eecs.wsu.edu/~bakken/middleware.pdf for more info.) WASA clearly requires middleware to move past today’s state of the practice of being hard-coded which means tedious and error-prone to program and hard to change. Just like almost all programmers of single-process programs have long moved from assember to higher-level languages, few programmers of distributed applications (um, er, uh …. outside the electricity industry) program at the network/socket layer any more, they use middleware. That is to say, the “network” protocols of 6.1.4 are not sufficient. Additionally, middleware R&D over the last decade or more (for the military and others) demonstrates that middleware can also provide QoS (latency, rate, availability, security) in a coherent package. I note that both OPC and IEC 61850 do not use middleware but rather rely on TCP/IP, which is spectacularly inadequate for WASA (it does not support 1→many multicast, it does not support QoS , etc). Also, 61850 was done by the IEC’s process of having a committee specify it, rather than harmonize existing practice. To wit: a pioneer in middleware (worked for the company to build the first Internet (the ARPANET) and has been building middleware for wide-area applications since 1979) told me: any time you standardize beyond the state of the practice (note: not the state of the art in R&D) you are dead”. I can provide much more info on the above if you need ….. contact me per above.	C33a: The authors of the Interim Roadmap Report specifically excluded text which would require a specific middleware solution. The implementation of a specific technology for a problem would result in the stifling of innovation. Many middleware vendors exist with no clear technology leader at this time.
34	7.10.09	Jim LeClare	TW	10.21 notes Homeplug GP (Green Phy) which is part of an ongoing intiative - in definition http://www.homeplug.org/products/global_standards/ A mistake is made in the reference to maturity. Homeplug command and control is listed which is a different solution than Homeplug GP or Homeplug AV lite. This needs to be corrected.	Corrected to: Maturity: Ongoing activity
35	7.13.09	Stan Klein, Open Secure Energy Control Systems, LLC, stan@osecs.com	EM	My second group of comments on the roadmap are attached as a pdf. Several of them have cybersecurity implications. A group of comments has resulted from my effort to address the Electric Transportation interfaces for the CSCTG. If you need another format, please let me know. Stan Klein	C35a: Phase I of the NIST program (the roadmap document), does not recommend specific solutions such as your “test early and often” mantra. These recommendation are left to NIST project Phase II and Phase III. 35b: Discussion of specific capabilities of specific devices within the Smart Grid is outside the scope of this roadmap document. The requirement for continuous synchrophasor data distribution is well documented elsewhere for the support of post-fault system forensics. Many of the types of post-fault analysis, which

#	DATE	WHO	SOURCE	COMMENT	Response
					are sometimes performed long after the fault occurance, require data with high temporal resolutions.
				-- Stanley A. Klein, D.Sc. Managing Principal Open Secure Energy Control Systems, LLC 8070 Georgia Avenue Silver Spring, MD 20910 301-565-4025	C35c: Section 10 strives to partition the high-level protocols (such as SOAP, section 10.77) from transport machanisms (such as UDP or TCP). C35d: The roadmap document communication diagram are known to be incomplete. The second paragraph of section 4 states “The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible.”
				Comment 35a: Add to Recommendations: It is difficult to discover interoperability issues without attempting to actually apply these standards to specific systems. Jay Britton briefly commented regarding difficulty of getting real-world data for testing. Most real world data in the electric power grid is now Critical Infrastructure sensitive. Performing both interoperability and cybersecurity testing will require creation of one or more extensively detailed fictitious utilities. Examples of the level of detail needed include detailed substation design and detailed entity policies (GWAC levels 6 and 7) that drive determination of access controls. Here is an example of an interoperability issue that does not surface until application time. Many utilities around the world acquire their facilities (such as substations) as single-vendor, full-lifetime maintenance turnkeys. This is not the practice among US utilities, who want to participate in the design and maintenance of their facilities and want competition in the selection of facility components, i.e., multi-vendor facilities. Within 61850, the naming is focused on the device, not on the electrical equipment it is monitoring/controlling. A mapping of device objects to electrical objects can be optionally provided in the Substation section of the SCL file. However, even though 61850 is intended to be self-describing, there is no standard way to query an object within a 61850 device to determine the electrical object it is monitoring/controlling. There are appropriately placed description attributes within objects, and each vendor may have an internal standard on how to use them, such as to show the associated electrical object among other information. However, there is no attribute specifically for holding the associated electrical object nor is there a standard agreement on how to use the general description attributes. Comment 35b: OSECS submitted the following comment on the NASPInet specification. The comment addresses application of the Smart Grid standards, so it is repeated here: This comment is primarily focused on the specification provisions that call for PMU data to be streamed on the network at rates of 20 to 120 frames per second with low latency. We believe it will be difficult to support these requirements using NIST-identified Smart Grid standards. This specification will require either new standards or major extensions to existing Smart Grid standards. It also could require more expensive network facilities than would otherwise be needed. We strongly urge consideration of alternatives that perform processing at the PMUs and transmit only the information necessary to describe the measured data. We believe such alternatives are within the scope of Smart Grid standards and would provide a system that is at least as capable and has lower communications costs.	You are invited to participate in the extensions of this Electric Transportation use case in NIST Phase II and Phase III.

#	DATE	WHO	SOURCE	COMMENT	Response
				Having reviewed the Smart Grid use cases supported by wide area synchrophasor technology, we believe a better fit to the Smart Grid standards would be achieved by processing at the PMU to extract the data needed to actually describe the measurements. Processing closer to the data source will avoid the more stringent communications requirements. The IEC-61850 data and services model supports this approach. The measured data is processed at the device to determine if parameters are within a narrow range (a "deadband" in 61850 terminology). The deadband thresholds are settable parameters of the 61850 device model. Movement of a parameter outside its deadband triggers an event. A variety of event-based services are provided by 61850, including exception reports, data logging, and GOOSE messaging. The GOOSE messaging is designed to support the needs of protective relaying, including a latency of 4 milliseconds within a substation. GOOSE messages have also been used between substations and are deemed adequate for protective relaying requirements. Events in PMU data might be detected by examining the phase rate and frequency rate of the data sampled locally at the PMU at the specified (20 to 120 frames per second) rates. Alternatively, the next phase value could be predicted based on the measured phase, phase rate, and frequency rate. If the next measurement deviated from the predicted by more than a small acceptable error, an event would be triggered. In normal operation, the dynamics of a power system are slowly varying. Under these conditions, the measurements would be highly predictable and could be transmitted much less often than prescribed in the proposed specification. Occurrence of a transient, disturbance, or other anomaly would trigger event-based operations. Depending on the criticality of response, those operations might range from a GOOSE message that initiates remedial action to logging of the event for historical purposes. In addition, a system having less stringent speed and latency requirements would be less vulnerable to network problems or denial-of-service attacks focused on slowing speed and increasing latency. Comment 35c: Add to Section 10: SOAP over UDP Application: Provides binding for SOAP messaging over UDP. This allows multicast and other message exchange patterns not suitable for SOAP bindings over TCP. Actors: Various Interfaces: Various Maturity: Recently adopted. May 14, 2009 Category: Consortium SDO, OASIS Comment 35d: Diagram for electric transportation 18a: The diagram for Electric Transportation appears to assume a connection at the home. Provisions need to be included for connection to a charging station in a commercial, industrial, or multifamily residential parking lot/structure or on the street (e.g., combined with a parking meter as some jurisdictions are installing). 18b: It is unclear what function the Energy Market Clearinghouse performs. It is described differently in two locations in the workshop notes. It is either the market administration function commonly included within the ISO/RTO organization (as distinct from their operations function) or it is an entity that handles billing and payment functions when a PEV connects to a charging station not handled by its home utility back office. In the diagram it appears to relate more closely to the ISO/RTO market administration function (and is defined as such in the Roadmap document), and the other function is not shown, although it is subsumed into the utility back office functions in the Roadmap actors table.	

#	DATE	WHO	SOURCE	COMMENT	Response
				18c: Interface 16 is defined in the Roadmap document as being between the ISO/RTO or SCADA/DMS or Aggregator/Energy Services Company and a Federal Agency that requires information on interactions involving electric transportation. It is unclear what agency that might be and under what legal authority they might be acting. This could be intended to cover the use case in Section 4.6.2.2 of the Roadmap document. This involves the exchanges necessary to file a tariff and apply for and receive approval. The agency would be either FERC or a state PUC. The exchange is part of a legal proceeding and is just as likely to come from a law firm engaged by the market participant as from the market participant itself. The SCADA/DMS is unlikely to be involved in the exchange. 18d: Interface 17 is shown as being between a customer gateway/ESI and a "third party". The function of the third party is unclear and the definition in the Roadmap document is open-ended (essentially any other authorized entity that connects to the customer gateway/ESI). 18e: Aggregator does not appear to have interface to metering and billing back office. How do they validate the financial aspects of their transactions? 18f: PEV related transaction data are likely to have the same privacy/confidentiality requirements as red-light-camera/speed-camera photographs and concepts for GPS-based highway mileage taxation.	
36	7.14.09	Evan Wallace, NIST, evan.wallace@nist.gov	EM	Some comments on the revised version of the Smart Grid Interoperability Standards roadmap released on 18 June 2009 (but dated 17 June 2009): Comment 36a: * The list of highest priority near-term actions for NIST included two for developing common semantic models. One for all of the Smart Grid and another for advanced metering, demand response, and electric transportation. Since presumably the first subsumes the second, are the areas listed in the second merely identifying the areas on which to focus initially? Comment 36b: * Definition of Domain provided in the Definitions section: The definition of domain actually describes a Domain Profile. A domain is not a profile and this definition is inconsistent with the way it is used in the conceptual model. This should be changed. Comment 36c: * W3C not an SDO? Each standard in the list of standards for the smart grid includes its authoring organization. In these places OASIS is categorized as an international SDO while the W3C is categorized as a consortium. Both are in fact consortia that develop standards with documented open processes. If anything, W3C has a more rigorous process and more international participation. How are these categories being assigned? Comment 36d:	C36a: The roadmap executive summary is a terse document. The first bullet, "Developing a common semantic model … with with [SDOs] to form a common representation. This is the "everything else not specifically mentioned in the third bullet "Develop a common semantic model for advanced metering, demand response and electric transportation". C36b: Definition changed to "Domain: A relatively cohesive set of actors and applications connected by associations." C36c: W3C has been changed to SDO C36d: Good catch. 10731:1994 is the wrong reference, it should be 7498-1:1994 C36e: The bullet for symmetry does not specify symmetric interfaces, only symmetric actions. In other words, services made available to one side of a transaction must also be made available to both side (the mechanism implementing the service in each direction, however, need not be identical) C36f: Your point on mandating XML has been accepted. The document will be changed from "… model using XML Schema and XML" to "…model (using, for example, XML Schema and

#	DATE	WHO	SOURCE	COMMENT	Response
				* Reference for OSI basic model: The reference list includes ISO/IEC 10731:1994 Information technology -- Open Systems Interconnection -- Basic Reference Model This is not the complete name for 10731. It leaves off "-- Conventions for the definitions of OSI services" I couldn't find where this reference was noted in the text of the roadmap, but if it means to identify the basic OSI model it should actually point to ISO/IEC 7498-1:1994 Information technology -- Open Systems Interconnection -- Basic Reference Model -- The Basic Model. Comment 36e: * section 3.1 outlines principles for the SmartGrid, on page 20 it reads: "For the evolving Smart Grid, each interface must also honor the principals of symmetry, transparency, and composition while addressing mangaement and cyber security." The bullet for symmetry then reads: Symmetry is the principle that each action can run both ways: buyers of power at one moment can be sellers at the next. Symmetry is a fundamental characteristic of Net Zero Energy buildings. Integrating Distributed Energy Resources need attention to symmetry for energy flow and management. I am not quite sure what this principle in intended to address, but insisting on it for interfaces is just plain wrong. It is a common and useful pattern to design interfaces with roles with asymmetrical capabilities and responsibilities for sending control signals or performing particular services. A given system could play either role or both service provider/ and service user role simultaneously. Asymmetric interfaces do not themselves constrain this. Policy and/or system design would determine what systems could perform which roles. There is no reason to limit the design freedom of the protocol/application layer designers in this way. Insisting on this will be anathema for certain kinds of applications like control systems and needlessly disenfranchises some middleware or application architectures. One may want to discourage imposing policies prohibiting or requiring certain roles for certain interfaces at boundaries between domains defined by the SG conceptual model, but again that is a different issue than the design of the interfaces (and it shouldn't be an absolute rule either). One would want to prevent the coupling of the configuration of underlying network services and the roles which could be played by the systems or applications sitting on top of those services. But that is a constraint on layering and not interface design. Again, my problem with the text is the wording stating that "each interface must also honor the principles of symmetry ..." The word "interface" is wrong, each is to comprehensive, and the word "must" is too strong.	XML)

#	DATE	WHO	SOURCE	COMMENT	Response
				Comment 36f: * 6.1.3 The Key Action states: "NIST should work wih IEC TC57, NEMA, ASHRAE SPC 134, and OASIS to devise a common semantic model using XML Schema and XML...." XML Schema is a language for restricting/constraining documents encoded using XML. Together XML Schema and XML define structure and syntax of conformant data, but do little to describe the semantics associated with that data (i.e. its meaning). I have been involved in a number of different projects at NIST that have been exploring modern systems integration problems and approaches, techniques, and languages for addressing these problems. We have concluded that integration of systems and partners in manufacturing enterprises involves two aspects: Technical Integration and Semantic Integration. Technical Integration requires choosing and consistently implementing protocols and on-the-wire data formats so that data can be exchanged without error between systems. Semantic Integration requires specification of the meaning of the data so that data successfully delivered will then be interpreted the same way by all communicating parties. Both types of integration are necessary for successful, error free communication. W3C XML Schema is an important technology for specifying content of message payloads (which is largely a technical integration concern). As such, it will have an important role in smart grid standards. But a technology specific way of specifying the format of message payloads is a very different function than specifying the semantics of common set of concepts for a set of standards. The requirements for this function are considerably different. For one, these models should be decoupled from the technology used to encode and/or deliver the data. XML Schema has two characteristics that make it particularly ill suited for defining semantic models: - its constraints are comprehensive, that is, everything not specifically allowed is forbidden. Common semantic models need to describe the qualifying characteristics only and say nothing about other characteristics (i.e. they should be permissive). This facilitates reuse, which otherwise can be difficult, especially for uses not envisioned at the time the model was originally created. - XML Schema is a language concerned with "documents", "document elements", "data types", and "validity". Again, it is about defining structures of documents (which can be a form of message content). The primary/popular XML Schema features for defining document strutures create tree structures. But semantic models are a combination of hierarchies and relations, both first class constructs. In other words, semantic models are graphs. Forcing a graph into a tree structure makes for awkward models that don't correctly match the semantics they "represent" causing them to be harder to understand/recognize and awkward to reuse. Efforts such as in OAG that have defined reusable components using XML Schema have resulted in at once complex and semantically weak models, since the comprehensiveness of the language requires every potential alternative entity and attribute to be specified, but to support reusability they must all be optional. Semantic integration is a fairly new concern in the standards world, so languages and supporting tooling specifically suited to this purpose	

#	DATE	WHO	SOURCE	COMMENT	Response
				are still evolving. However, we have used a subset of UML class diagrams for this purpose in past with good results (e.g. the ATHENA A3 project and Inventory Visibility and Integration standardization effort). Other standards efforts such as IEC CIM and ISA 95 have also used UML in similar ways following a model driven appproach. Such an approach allows decoupling from the information technologies in implementations, and can provide access to the power of a logic language like the Web Ontology Language OWL, without forcing domain experts to become conversent the technical details of such a language. I strongly encourage the editors of the Roadmap document to remove the words "using XML Schema and XML" from the key action (1) bullet of 6.1.3 (note that this is the only such action to specify the language for the common models to be developed), and perhaps add a separate section somewhere that discusses the considerations involved with creating models that must be reused across multiple standards and over time (meaning evolving models and changing technology standards). This would also be the place to clarify the how the word semantics is used in the document since clearly (as can be seen in the standards chosen for GWAC stack layers in the profiles appendix) their is not a common understanding of this amongst the contributors to the roadmap. Evan K. Wallace Manufacturing Systems Integration Division NIST	
37	7.3.09	Larry Colton, Echelon	SGC	Below is a comment that I would like to submit to NIST regarding the Report to NIST on the Smart Grid Interoperability Standards Roadmap. On page 155, section 11.5.2, “Coordination and Future-proofing AMI Systems”; The second paragraph in the “Discussion Issues” field states the following: “Need to ensure AMI communications systems use open standards capable of interfacing to DER and distribution automation equipment. ANSI C12.22 is being revised, Europe uses DLMS/COSEM, and AMI vendors are developing their systems over a wide range of media, from PLC, to BPL, to ZigBee meshed radios, to UtiliNet radios, to GPRS, etc.” The underlined part “Europe uses DLMS/COSEM” is not really correct. While it is being proposed to be used in Europe, it has only been used so far for meters associated with some large C&I customers and meters in some residential pilot projects. The vast majority of meters do not use DLMS and probably 1% or less use DLMS today. Up until now, Utilities have preferred to have interoperability at the system/enterprise level rather than the meter level for AMI type projects. This approach has been successful on many different utility AMI deployments involving multiple meter vendors. Please let me know if you have any questions regarding this comment. Thanks, Larry Colton Echelon	AMI systems using proprietary communication protocols creates a “lock-in” situation which inhibits later introduction of equipment from alternate suppliers. This is most obvious for the case of a locked-in vendor closing the business.
38	7.9.09.09	Scott Rogers, Powel Inc.	SGC	Please find attached, comments on the Report to NIST on Smart Grid Interoperability Standards Roadmap from Powel Incorporated. Should you have any questions, please don’t hesitate to call. We appreciate your consideration. Best regards Scott Rogers CEO Powel Inc. 930 Blue Gentian Road, Suite 1300, St Paul, MN 55121 Phone: (651) 251-3005 - Fax: (651) 251-3006 Direct line: (651) 251-2939 - Mobile: (724) 244-3509	MultiSpeak v4.0 is identified as a standard in section 10.53

#	DATE	WHO	SOURCE	COMMENT	Response
				Email: srr@powel.com www.powel.com Subject: Using MultiSpeak as a Work Order Management System Interface Dear Mr. Arnold, I write today to express our concern with the committee's decision not to include MultiSpeak as a recognized standard in the Report to NIST on the Smart Grid Interoperability Standards Roadmap. MultiSpeak is the most widely used interoperability standard in use today. Over 350 utilities, mostly cooperatives, are actively using the standard. It's widely accepted that Smart Grid technology can only be as smart as the accuracy of the underlying data. Comprehensive and reliable system integration will improve the utilities ability to maintain an accurate and up to date model of the transmission & distribution network. Maintaining this model is essential to realizing the Smart Grid vision. For years, the MultiSpeak standard has enabled utilities to quickly, reliably and economically exchange data between operational systems. Some advantages to the MultiSpeak approach are: • The standard is extremely extensible. We have learned that no two utilities have identical requirements. Additional information beyond the defined specification can be added easily on a per-utilities basis. • The versioning is interface specific. The means that a utility can upgrade one interface to a newer version without disrupting interfaces that are in production on an older version of the standard. • Utilities have a strong voice in driving revisions. In just nine years, MultiSpeak has released four versions and been put into production at over 350 utilities. The pace of these accomplishments has been driven by an active user community that has provided many real-life use cases that feed the ongoing refinement of the standard, leading to continued adoption. The report to NIST gives a specific example where the use of the MultiSpeak standard would be beneficial. Page 160 refers to the need to define interoperability standards for work management systems. MultiSpeak currently has a well defined and proven work management standard. Consideration should be given to immediately adopt this standard. For the past twelve years, Powel's design and work management software has helped over 100 utility customers maintain the accuracy of their transmission and distribution network models. The vast majority of these customers use MultiSpeak to enable the communication between our software and their system of record. In conclusion, while there are many areas of Smart Grid Interoperability where MultiSpeak could be valuable, the need for a Work Order Management integration identified on page 160 is one area where there is a particularly strong case to adopt the MultiSpeak standard immediately. We are requesting that you update the report to include MultiSpeak V4 Function "Field Design to BUS" and "BUS to GIS" to meet this specific need. Best regards, Scott Rogers CEO Powel, Inc Powel, Inc • 930 Blue Gentian Road, #1300 •St. Paul, MN 55121 www.powelinc.com	
39	7.7.09	Bryan Olnick, FPL Bryan.Olnick@fpl.com	SGC	Florida Power & Light Company supports the significant progress made by NIST in 2009 towards the development of an initial Framework for Smart Grid Interoperability. The comments below pertain to the report published by EPRI on June 17, 2009, entitled "Report to NIST on Smart Grid Interoperability Standards Roadmap" (docket number 090520915-9921-01). Although FPL generally supports the proposed steps identified in the initial EPRI/NIST roadmap, one particular issue has surfaced in	We recognize that the issue of wireless transport of the protocols defined roadmap is an important subject. However, from the viewpoint of the roadmap, it makes little difference WHICH wireless technology is actually used (it is region-specific). Therefore, we believe this comment to be out of the scope of the roadmap document.

#	DATE	WHO	SOURCE	COMMENT	Response
				recent months related to the value of utilizing licensed vs. unlicensed spectrum to enhance the overall goals of the smart grid. Much of this communication is not fact based and has caused uncertainty and doubt among all stakeholders. We cannot afford this distraction. It runs counter to the overall goals of the Obama Administration and will delay wide scale deployment of smart grid solutions, which goes against the intent of the ARRA legislation. We therefore strongly recommend that an immediate joint communication be issued from NIST, DOE and FCC stating that no mandate will be considered forcing utilities to exclusively deploy smart grid solutions in licensed or unlicensed bands or to cause replacement of equipment operating in unlicensed bands that meet existing FCC requirements for immunity and interference. To support our position, we offer the following observations: • There are currently multiple smart grid implementations providing cost-effective communication to millions of devices throughout the electric utility industry, a majority of which utilize unlicensed frequencies. • These time-tested and proven unlicensed systems work well in part because the FCC had the foresight to develop spectrum sharing regulations in CFR 15.247 ("Part 15") and subsequent Part 90 'Safe Harbor' ruling of August 1997 have provided an environment for rapid smart grid innovation and implementation. • Frequency adaptive solutions have proven to be reliable in mass scale in our country, not only in the utility space, but also in areas such as the military and health care. Continued innovation in this space mitigates many of the perceived benefits of Licensed Spectrum, at lower costs. • Any discussion related to Spectrum must have an associated discussion to a compelling business and funding model. To date, unlicensed spectrum solutions have been the dominant solution in our industry. • Interference to utility services operating in Licensed Spectrum does occur. While we recognize that resolution of these issues can be addressed in a more expeditious manner, the use of Licensed Spectrum should not be construed as “problem free” as many proponents advocate. • Licensed Spectrum does not equate to stronger cyber security practices as compared to unlicensed bands. • Investigation of any potential future band for utility spectrum should also consider consumer product expansion in several frequency ranges – the perception that only the 900 MHz band is under threat of saturation is false. This will require strong licensee control to ensure national interoperability and recreation of the very same issue we are trying to avoid – over subscription. In summary, we believe that any further delay in issuing a joint statement will further impede the deployment of "shovel ready" smart grid projects here at FPL and throughout the country. We appreciate your time and consideration in addressing this matter as soon as possible. regards, Bryan Bryan Olnick Senior Director Florida Power & Light Company 9250 W. Flagler Street Miami, FL 33174	

#	DATE	WHO	SOURCE	COMMENT	Response
				Ph: 305-552-2899 / Fax: 305-552-2288 Email: Bryan.Olnick@FPL.com CONFIDENTIALITY NOTICE: This e-mail and all attachments transmitted with it may contain privileged and confidential information that is intended solely for the use of the named addressee. If you are not the intended recipient, you are hereby notified that any review, dissemination, distribution, copying or other use of this message or its attachments is STRICTLY PROHIBITED. If you have received this message in error, please notify the sender immediately by reply e-mail and delete this message an all copies and backups thereof. Please consider the environment before printing this e-mail	
40	7.16.09	Mary Miller, Sigma Designs/Z-Wave Alliance	SGC	Thank you for your attention to the attached letter. Mary Miller Marketing Director Sigma Designs/Z-Wave Alliance 1778 McCarthy Blvd Milpitas, CA 95035 408 957-9885 cell: 510 386-2515 "Products that speak Z-Wave work together better." July 16, 2009 RE: Response to Federal Register, June 30, 2009, Volume 74, Number 124, p 31254, Docket Number: 0906181063-91064-01. Dear Mr. Arnold, After reviewing the document published by EPRI with respect to the NIST Smart Grid Interoperability Standards Framework which will describe a high-level architecture, identify an initial set of key standards, and provide a roadmap for developing new or revised standards needed to realize the Smart Grid we, the members of the Board of Directors of the Z-Wave Alliance, recommend that Z-Wave technology be added to the standards for	Zwave has been added to section 10 of the Roadmap Document

#	DATE	WHO	SOURCE	COMMENT	Response
				this initiative. Z-Wave is a short-range, wireless communications technology that is the accepted standard for wireless home control and automation by more consumer products manufacturers than any other standard. From thermostats to lighting and appliance controllers to motorized blinds and pool pumps, Z-Wave has the ecosystem of interoperable products that puts energy conservation and management into the hands of consumers. We believe there are many technology standard options in play for the HAN (home area network) and to best serve the American consumer there should not be exclusivity for any one technology. The Obama administration is looking to create a robust and secure energy grid infrastructure. Z-Wave should be considered as a prominent player in the effort to establish these standards for the following reasons: • The breadth of interoperable products currently available in the comsumer marketplace in new home construction, aftermarket ptofessional retrofits and retailers such as Amazon.com, Fry's, Lowe's and others. • Dozens of industry-leading manufacturers and blue chip brands worldwide have developed or are developing Z-Wave-based products, resulting in choices for the consumer – an important consideration for broad adoption. 1 Market competition has driven affordable mass-market pricing for Z-Wave products, making them available to the average homeowner for rapid deployment. • With its tradition of backward compatibility, Z-Wave is future-proof. Products developed with newer versions of the technology work with products based on earlier versions of the technology. • The American consumer has established a connection with Z-Wave. It is the mass market technology of choice in thousands of homes across the country. For the above reasons, we urge you to add Z-Wave to the list of technologies that are required to move this vision of an American Smart Grid forward. Thank you for your consideration.	

#	DATE	WHO	SOURCE	COMMENT	Response
				The Z-Wave Alliance Board of Directors Jason Sherrill, Cooper Wiring Devices Ian Hendler, Leviton Kevin Kraus, Ingersoll Rand Yan Rodriguez, Wayne-Dalton Graham Williams, Universal Electronics Raoul Wijgergangs, Sigma Designs 2	

#	DATE	WHO	SOURCE	COMMENT	Response
41	7.17.09	Todd Santiago, 2gig.com, tsantiago@2gig.com	SGC	July 17, 2009 RE: Response to *Federal Register,* June 30, 2009, Volume 74, Number 124, p 31254, Docket Number: 0906181063-91064-01 Attn: NIST: We have reviewed the document published by EPRI with respect to the NIST Smart Grid Interoperability Standards Framework which will describe a high-level architecture, identify an initial set of key standards, and provide a roadmap for developing new or revised standards needed to realize the Smart Grid. As a Z-Wave Alliance member, I strongly recommend that Z-Wave technology be added to the standards for this initiative. Our technology and equipment in the home security industry includes Z-Wave functionality and enables complete home automation (including HVAC, lighting, and appliance control). It will have a significant impact on reducing energy consumption nationwide. Z-Wave is a short-range, wireless communications technology that is the accepted standard for wireless home control and automation. From thermostats to lighting and appliance controllers to motorized blinds and pool pumps, Z-Wave has the ecosystem of interoperable products that puts energy conservation and management into the hands of consumers. We believe there are many technology standard options in play for the HAN (home area network) and to best serve the American consumer there should not be exclusivity for any one technology. In the effort to establish the standards that the Obama administration is looking for to create a robust and secure energy grid infrastructure, Z-Wave should be considered a prominent player for the following reasons: • The breadth of interoperable products currently available in the consumer marketplace in new home construction, aftermarket professional retrofits and retailers such as Amazon.com, Lowe's, Fry's and others. • Dozens of industry-leading manufacturers and blue chip brands worldwide have developed or are developing Z-Wave-based products, resulting in choices for the consumer – an important consideration for broad adoption. • Market competition has driven affordable mass-market pricing for Z-Wave products, making them available to the average homeowner for rapid deployment. • With its tradition of backward compatibility, Z-Wave is future-proof .Products developed with newer versions of the technology work with products based on earlier versions of the technology. • The American consumer has established a connection with Z-Wave. It is the mass market technology of choice in thousands of homes across the country. For the above reasons, I urge you to add Z-Wave to the list of technologies that are required to move this vision of an American Smart Grid forward. Thank you for your consideration. Todd Santiago President 2gig Technologies, Inc	Zwave has been added to section 10 of the Roadmap Document
42	7.20	William Li, Aeon-Labs	SGC	RE: Response to Federal Register, June 30, 2009, Volume 74, Number 124, p 31254, Docket Number: 0906181063-91064-01	Zwave has been added to section 10 of the Roadmap Document

#	DATE	WHO	SOURCE	COMMENT	Response
		wli@aeon-labs.com		Dear Congressman X/NIST Committee: After reviewing the document published by EPRI with respect to the NIST Smart Grid Interoperability Standards Framework which will describe a high-level architecture, identify an initial set of key standards, and provide a roadmap for developing new or revised standards needed to realize the Smart Grid we, Z-Wave Alliance members recommend that Z-Wave technology be added to the standards for this initiative. Z-Wave is a short-range, wireless communications technology that is the accepted standard for wireless home control and automation. From thermostats to lighting and appliance controllers to motorized blinds and pool pumps, Z-Wave has the ecosystem of interoperable products that puts energy conservation and management into the hands of consumers. Our company believe there are many technology standard options in play for the HAN (home area network) and to best serve the American consumer there should not be exclusivity for any one technology. In the effort to establish the standards that the Obama administration is looking for to create a robust and secure energy grid infrastructure, Z-Wave should be considered a prominent player for the following reasons: □ The breadth of interoperable products currently available in the consumer marketplace in new home construction, aftermarket professional retrofits and retailers such as Amazon.com, Lowe's, Fry's and others. □ Dozens of industry-leading manufacturers and blue chip brands worldwide have developed or are developing Z-Wave-based products, resulting in choices for the consumer – an important consideration for broad adoption. □Market competition has driven affordable mass-market pricing for Z-Wave products, making them available to the average homeowner for rapid deployment. □ With its tradition of backward compatibility, Z-Wave is future-proof .Products developed with newer versions of the technology work with products based on earlier versions of the technology. □ The American consumer has established a connection with Z-Wave. It is the mass market technology of choice in thousands of homes across the country. For the above reasons, we urge you to add Z-Wave to the list of technologies that are required to move this vision of an American Smart Grid forward. Thank you for your consideration.	
43	7.20.09	Jud Cary, CableLabs j.cary@CableLabs.com abs	SGC	Can you confirm these comments were received? Where are they posted? Thanks -jud Judson D. Cary Vice President Video Technology Policy, Deputy General Counsel 858 Coal Creek Cir., Louisville, CO 80027 j.cary@cablelabs.com; direct:303-661-3763 ;fax:303-664-8158 ;cell:720-217-6803 --- From: Jud Cary Sent: Thursday, July 09, 2009 2:35 PM To: 'smartgridcomments@nist.gov'	To: The Cable Television Laboratories. Thank you for the review of the roadmap. The DOCSIS Cable Modem Specification and The CableLabs PacketCable Security Monitoring and Automation (SMA) has been added to the list of Standards in section 10 of the Roadmap. With regard to enabling the consumer to control energy, the NIST Framework covers a variety of emerging open standards that can enable a variety of entities to integrate with customers both utilities as well as third parties. The roadmap includes options for forwarding pricing as well as direct load control and does not preclude any of a variety of business models that could allow third parties as well as utilities to participate. The identification of key standards within the framework does not preclude such a variety of operations nor do these standards preclude a variety of future business models for the energy industry and consumers. Any standards and associated technology for the smart grid must be ultimately subject to the requirements of scaleability,

#	DATE	WHO	SOURCE	COMMENT	Response
				Cc: Don Dulchinos Subject: Comments on NIST Initial List of Smart Grid Interoperability Standards Dear Sir or Madam: Please see attached comments from CableLabs on the NIST Initial List of Smart Grid Interoperability Standards. Please contact me or Don Dulchinos (cc'ed above) if you have any questions. Thank you for your consideration. Don Dulchinos d.dulchinos@cablelabs.com (303) 661-3803 Jud Cary j.cary@cablelabs.com (303) 661-3763 Judson D. Cary Vice President Video Technology Policy, Deputy General Counsel 858 Coal Creek Cir., Louisville, CO 80027 j.cary@cablelabs.com; direct:303-661-3763 ;fax:303-664-8158 ;cell:720-217-6803 National Institute of Standards and Technology DEPARTMENT OF COMMERCE Initial List of Smart Grid Interoperability Standards [090520915-9921-01] Comments of Cable Television Laboratories, Inc. Pursuant to the request of the National Institute of Standards and Technology (NIST) for comments on a preliminary set of smart grid interoperability standards and specifications identified for inclusion in the Smart Grid Interoperability Standards Framework, Release 1.0, CableLabs submits these comments. Cable Television Laboratories, Inc (CableLabs) is a non-profit research and development consortium dedicated to pursuing new cable technologies, and helping its member cable companies integrate those technologies into new products and services for their cable subscribers. CableLabs generally accomplishes this goal by writing common interface specifications to provide high value cable services such as interactive video, high-speed broadband data, and voice services. Our specifications are developed in a collaborative process by multiple parties and industries including consumer device manufacturers, software developers, application programmers, and cable operators. CableLabs also provides laboratory facilities, testing, and certification to the CableLabs specifications. Most notably, CableLabs facilitated and authored the DOCSIS cable modem specifications that define the interface between customer premise cable modems and the cable network for Internet access and data communications. This effort led to dramatic cost reductions in equipment, and widespread deployment of broadband communications.1 CableLabs' members networks pass over 95 percent of the homes in America. They are the leading provider of broadband service with over 40 million homes taking cable modem service. Given that these cable companies have a proven record of delivering interoperable communications services to so many consumers, the interoperability standards defined by NIST should be inclusive of cable industry	reliability, security and management.

#	DATE	WHO	SOURCE	COMMENT	Response
				specifications. This will enable and encourage cable companies to participate in the President's initiative to create a Smart Grid. Executive Summary The initial smart grid standards proposed by NIST provide a starting point for development. However, the standards omit or preclude mechanisms that would (i) facilitate consumer demand response action to save energy, and (ii) permit non-utility businesses, including those with communications and broadband experience, from being able to provide useful broadband energy management services to those consumers. Standards to enable consumer demand response capabilities are among the EISA Smart Grid primary goals, as noted below. Cable companies have existing networks that may be used by utilities and other service providers to communicate with utility customers. Cable companies may also desire to provide utility customers home automation services that include energy 1 See CableLabs.com for more information on CableLabs. National Institute of Standards and Technology DEPARTMENT OF COMMERCE Initial List of Smart Grid Interoperability Standards [090520915-9921-01] Comments of Cable Television Laboratories, Inc. Pursuant to the request of the National Institute of Standards and Technology (NIST) for comments on a preliminary set of smart grid interoperability standards and specifications identified for inclusion in the Smart Grid Interoperability Standards Framework, Release 1.0, CableLabs submits these comments. Cable Television Laboratories, Inc (CableLabs) is a non-profit research and development consortium dedicated to pursuing new cable technologies, and helping its member cable companies integrate those technologies into new products and services for their cable subscribers. CableLabs generally accomplishes this goal by writing common interface specifications to provide high value cable services such as interactive video, high-speed broadband data, and voice services. Our specifications are developed in a collaborative process by multiple parties and industries including consumer device manufacturers, software developers, application programmers, and cable operators. CableLabs also provides laboratory facilities, testing, and certification to the CableLabs specifications. Most notably, CableLabs facilitated and authored the DOCSIS cable modem specifications that define the interface between customer premise cable modems and the cable network for Internet access and data communications. This effort led to dramatic cost reductions in equipment, and widespread deployment of broadband communications.1 CableLabs' members networks pass over 95 percent of the homes in America. They are the leading provider of broadband service with over 40 million homes taking cable modem service. Given that these cable companies have a proven record of delivering interoperable communications services to so many consumers, the interoperability standards defined by NIST should be inclusive of cable industry specifications. This will enable and encourage cable companies to participate in the President's initiative to create a Smart Grid. Executive Summary The initial smart grid standards proposed by NIST provide a starting point for development. However, the standards omit or preclude mechanisms that would (i) facilitate consumer demand response action to save energy, and (ii) permit non-utility businesses, including those with communications and broadband experience, from being able to provide useful	

#	DATE	WHO	SOURCE	COMMENT	Response
				broadband energy management services to those consumers. Standards to enable consumer demand response capabilities are among the EISA Smart Grid primary goals, as noted below. Cable companies have existing networks that may be used by utilities and other service providers to communicate with utility customers. Cable companies may also desire to provide utility customers home automation services that include energy 1 See CableLabs.com for more information on CableLabs. monitoring and management. The CableLabs PacketCable Security Monitoring and Automation (SMA) specifications should be considered for inclusion on the NIST list of standards. Background and Stated Goals Title XIII of the 2007 Energy Independence and Security Act (EISA) defines the Smart Grid by listing ten primary goals. Several of the goals target consumer devices and the use or control of such devices in the home or business, including: (5) Deployment of “smart” technologies (real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer devices) for metering, communications concerning grid operations and status, and distribution automation. (6) Integration of “smart” appliances and consumer devices. (8) Provision to consumers of timely information and control options. (9) Development of standards for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid. Likewise, the NIST Home to Grid (H2G) Working group has identified consumer and demand side control as key to government, consumer, and product manufacturer goals: Government goals: … - promote customer participation in demand response and other programs, and have greater control over their electric energy usage… Consumer goals: - Offer tools to manage home energy consumption based on transparent and timely information costs - Allow consumers to set preferences and override smart grid… Residential product manufacturer goals: … - Introduce new products to the marketplace - Accommodate variety of communications methods and media - Avoid obsolescence of communications methods - Support price-to-device as well as home network energy management - Support energy management by user at appliance control panel2 The existing cable infrastructure and its broadband capabilities should be considered by NIST as a significant asset in setting interoperability standards to enable consumers to manage their electrical consumption and thereby achieve several important EISA Smart Grid and Congressional broadband objectives. Cable operators have unique experience in providing information services to consumers and interfacing with consumers through consumer premise devices. Separation of Supply and Demand Standards	

#	DATE	WHO	SOURCE	COMMENT	Response
				The initial selection of the OpenAMI specification, developed by investor-owned utilities, recommends direct control of individual consumer devices (e.g. A/C compressors and thermostats) in the home. We are concerned that the framework developed by NIST is based on only this utility-centric energy management model. In this scheme the utility chooses the in-home technical solutions and manages demand via direct load control over the usage of 2 See NIST SmartGrid Home to Grid Working Group twiki at http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/H2G. electricity all the way to the end device. The currently adopted “standards” are based on the utility sending messages to control the consumer devices. While utility companies are well suited to control the supply of electricity to the side of the house, consumers should have the option to manage the demand for the electricity within the home. Separate treatment of the supply and demand interfaces of the network allows all players to participate, and for innovation and competition to thrive. The selection of only a utility-centric model is contrary to the successful model of the Internet, where open interfaces at various layers have enabled everything from email to secure global commerce. NIST should adopt open standards that enable direct participation by communications providers with their customers in order to be consistent with the goals of Congress as outlined in EISA. Core Smart Grid Principles To Assure Consumer Choice and Control: In order to fulfill the NIST goals highlighted above, CableLabs recommends that the following core principles be incorporated into a comprehensive Smart Grid policy and should be followed by all standards endorsed by NIST. 1. Consumer choice and control should be a key tenet of the Smart Grid. Consumer behavior needs to be driven by incentives, not deterrents. Innovative technology will not be developed if the consumer energy management marketplace is closed off to entrepreneurship. While the current closed model may seem to expedite early deployment, this approach does not scale, nor does it create a sustainable competitive marketplace for energy management consumer products. 2. The utility domain should be separated from the consumer domain in developing and selecting “standards”. It is recognized that utilities need to agree on a small number of formal, well defined standards for large scale generation and transmission control of the supply of electricity. However, suppliers of electricity have motivations that differ from consumers of electricity, and therefore their requirements are different. These different requirements should be addressed separately (with appropriate interfaces between the two domains). A “demarcation point” (the meter) should define the supply and demand sides of the market. To underscore the lack of consumer perspective, there currently are no Use Cases in the NIST Roadmap that allow consumer choice or control of their electricity usage. 3. Consumers should have flexibility to control energy management and consumption beyond the meter. Load control can be done more effectively with long-term customer cooperation through pricing mechanisms and consumer-programmed energy management intelligence, rather than by direct load control, or shutting down devices in the home via commands from the utility. By publishing a price, and by giving consumers choice and control, utilities can indirectly control the demand for electricity. Consumers should have the option to make the final decision on price and value. With the assistance of innovative energy management tools, the customer should be able to set schedules, rules, and priorities for energy management among the controllable devices in their home or business.3 The current emphasis 3 Id. by NIST on only direct load control commands from the utilities could inhibit market development of customer choices for energy management. 4. The customer should be able to designate an agent (e.g., an energy management service provider) to act on their behalf in controlling energy usage. Such an agent should have the same rights and privileges as the customer, including access to all billing, pricing, and usage data. This agent may be the utility or an independent agent selected by the customer. This model would promote innovation and competition in the energy management services industry. 5. The Smart Grid should utilize the many communication options already available today. Metering and energy management networks should not be limited to the utility-owned advanced metering infrastructure (AMI) networks. Mechanisms and interfaces should allow the customer read their own meter in real time and provide preferences to the utility via existing networks, including the Internet. As Congress and the President recognized in the Recovery Act, utilities can leverage existing, secure broadband networks to provide the majority of AMI	

#	DATE	WHO	SOURCE	COMMENT	Response
				and advanced meter reading (AMR) capabilities. Public policy should not encourage subsidization of new redundant utility telecommunication networks. 6. There should be no limitation on how the pricing signals are sent to customers. One key standard that is required for consumer energy management is a specification for publishing pricing signals. This standard should allow a wide spectrum of signal dissemination means, ranging from newspaper, radio, television, to outbound phone calls, to text messages, emails, websites, and APIs for querying the price over the Internet. This will result in widespread notice to the consumer and a wide variety of devices that can utilize the pricing information. 7. There should be no limitations on the types of sensors, devices, gateways, or other in-home technology that the customer can utilize to manage their energy usage, so long as such devices do not harm the grid. Consumer should be able to leverage innovative third party in-home energy management and networking systems to meet their own unique needs, many of which exist today.4 8. Cybersecurity. Cybersecurity is not a new problem, and existing networks can address the cybersecurity issue. Policymakers should not create incentives for utilities to create entirely new redundant communications systems. The cable industry offers an integrated network with cyber security features that address network vulnerabilities. 9. Customer privacy. Industry best practices and a self-regulatory framework should be developed to appropriately protect consumer energy usage data and associated customer information. 10. Scalability. Scalability is an important issue that also impacts the home interface to the Smart Grid. Where possible, the Smart Grid architecture should leverage existing and emerging in-home communication and networking standards and systems that have already addressed many of these scalability issues. These standards and systems include IP, HTTP, XML and SSL. These Internet standards are widely adopted, secure, highly flexible, and scalable. They will 4Id. allow the Smart Grid to leverage the enormous capabilities inherent in Internet technology and will attract applications developers who will bring innovative new energy management solutions to consumers. Specific Comments on Proposed Standards The currently selected standards, OpenADR and Zigbee Smart Energy Profile, do not include open publishing mechanisms for pricing, as they are based on a closed system that sends secure messages that must be acknowledged by end devices secured by the utility. Despite this shortcoming, we do strongly support the general thrust of OpenADR to provide incentives to consumers to invest in energy efficient equipment or behavior. The initially selected standards for the home, specifically OpenHAN and ZigBee Smart Energy Profile, may not allow customer choice and control. Consumers appear to be limited to devices and information supplied by their utility energy provider. These standards will not enable consumers to choose among a variety of energy management products and services delivered from a number of service providers, and they will not allow consumers to control the usage of their electricity. CableLabs PacketCable Security Monitoring and Automation (SMA) The CableLabs PacketCable Security Monitoring and Automation (SMA) specification should be considered for inclusion.5 The SMA specification is a cable industry specification that was developed in collaboration with next generation IP-based “Smart Home” product companies and reflects the state of the art in IP-based home automation. It is designed to allow interoperability among products, systems, and devices, and supports a broad range of services, including energy management. This specification enables the use of a common shared gateway and shared devices in the home for all managed services, rather than the currently contemplated model where separate equipment is required for each set of capabilities in the home. Energy management does not need a dedicated system; it can run as an application on a shared platform that also supports home security, health care monitoring, video monitoring, HVAC controls, lighting, and the yet to be defined future managed home services. There is no standard under consideration by NIST that provides the level of interoperability comparable to the CableLabs SMA Specification. By adopting SMA as a Smart Grid standard, NIST will ensure that applications can interoperate. SMA can leverage the power of the Internet in building sustainable Smart Grid and Smart Home solutions. The SMA architecture sets forth a sustainable	

#	DATE	WHO	SOURCE	COMMENT	Response
				economic model based on free market innovation, and ensures very low barriers to entry. 5 The CableLabs PacketCable SMA Specification is freely available on the CableLabs public website, see http://www.packetcable.com/specifications/packetcableSMA.html . As with other CableLabs specifications, the PacketCable SMA Specification can also be submitted to other ANSI-accredited standard setting organizations (SSO), for example, the Society of Cable and Telecommunications Engineers (SCTE), or even international standards bodies such as the International Telecommunications Union (ITU). All specifications finally adopted by NIST, including industry or alliance specifications such as OpenADR, Zigbee and OpenHAN, should be placed through similar open due process organizations in order to reach a broad and fair consensus Conclusion CableLabs would welcome opportunities to work with NIST. We offer our technical expertise, consensus building experience, testing and certification knowledge, and our desire to encourage a robust market for energy management solutions. Contacts: Don Dulchinos d.dulchinos@cablelabs.com (303) 661-3803 Jud Cary j.cary@cablelabs.com (303) 661-3763	
44	7.20.09	Nathan Patrick, 4Home, Inc. npatrick@4home.com	SGC	NIST Committee, After reviewing the document published by EPRI with respect to the NIST Smart Grid Interoperability Standards Framework which will describe a high-level architecture, identify an initial set of key standards, and provide a roadmap for developing new or revised standards needed to realize the Smart Grid we, Z-Wave Alliance members recommend that Z-Wave technology be added to the standards for this initiative. Z-Wave is a short-range, wireless communications technology that is the accepted standard for wireless home control and automation. From thermostats to lighting and appliance controllers to motorized blinds and pool pumps, Z-Wave has the ecosystem of interoperable products that puts energy conservation and management into the hands of consumers. We believe there are many technology standard options in play for the HAN (home area network) and to best serve the American consumer there should not be exclusivity for any one technology. In the effort to establish the standards that the Obama administration is looking for to create a robust and secure energy grid infrastructure, Z-Wave should be considered a prominent player for the following reasons: • The breadth of interoperable products currently available in the consumer marketplace in new home construction, aftermarket professional retrofits and retailers such as Amazon.com, Lowe's, Fry's and others. • Dozens of industry-leading manufacturers and blue chip brands worldwide have developed or are developing Z-Wave-based products, resulting in choices for the consumer – an important consideration for broad adoption. • Market competition has driven affordable mass-market pricing for Z-Wave products, making them available to the average homeowner for rapid deployment. • With its tradition of backward compatibility, Z-Wave is future-proof .Products developed with newer versions of the technology work with products based on earlier versions of the technology. • The American consumer has established a connection with Z-Wave. It is the mass market technology of choice in thousands of homes across the country. For the above reasons, we urge you to add Z-Wave to the list of technologies that are required to move this vision of an American Smart	Nathan Patrick, 4Home, Inc. Thank you for the review and input on the NIST Interim Smart Grid Roadmap. Zwave has been added to section 10 of the Roadmap Document

#	DATE	WHO	SOURCE	COMMENT	Response
				Grid forward. Thank you for your consideration. Regards, Nathan ---------- Nathan Patrick Director of Product Management 4Home, Inc. 1235 Midas Way Sunnyvale, CA 94085 Main: 408.329.4218 Cell: 408.375.0081	
45	7.21.09	Calvin Heiling, HomePlug Powerline Alliance, cheiling@wellfordenergy.com		The HomePlug Alliance submits this letter in response to the Federal Register (74 FR 31254) request for comments on the Report to NIST on the Smart Grid Interoperability Roadmap of June 17, 2009. (Notification that this letter has been received would be greatly appreciated.) Thank you, -Calvin Heiling (Submitted on behalf of Rob Ranck, President HomePlug Powerline Alliance) HomePlug Powerline Alliance 5200 SW Macadam Avenue, Suite 470 Portland, Oregon 97239 USA Tel: +1.503.766.2516 Fax: +1.503.863.3881	Calvin Heiling thank you for the input and review of the NIST Roadmap. The HomePlug AV (HPAV), the HomePlug Green PHY (HPGP), IEEE P1901, and the ZigBee/HomePlug Smart Energy Profile 2.0 are include in the NIST Interim Smart Grid Standards Roadmap.

#	DATE	WHO	SOURCE	COMMENT	Response
				The HomePlug Alliance [Alliance] submits this letter in response to the Federal Register (74 FR 31254) request for comments on the Report to NIST on the Smart Grid Interoperability Roadmap [Report] of June 17, 2009. Background Founded in 2000, the HomePlug Powerline Alliance, Inc. is an industry-led initiative with more than 70 member companies that creates specifications and maintains compliance and interoperability certification programs for power line communications technology to enable reliable home networking and smart grid applications. The Alliance accelerates worldwide adoption for HomePlug technology by collaborating with international standards organizations such as IEEE and through market development and user education programs. Since August of 2008, the HomePlug Alliance has been actively working with the ZigBee® Alliance and leading electricity utilities including American Electric Power, Consumers Energy, Pacific Gas and Electric Company, Reliant Energy, Sempra, and Southern California Edison to develop the Smart Energy Profile 2.0, a common application layer integrated solution for advanced metering infrastructure (AMI) and home area networks (HAN). Comments The HomePlug Alliance strongly supports the inclusion of HomePlug AV (HPAV), the HomePlug Green PHY (HPGP), IEEE P1901, and the ZigBee/HomePlug Smart Energy Profile 2.0 in the list of Standards in the Report. These standards reflect Alliance's long standing commitment to the development of consensus-based open standards for power line communications and for cross-industry collaboration. Selection Criteria for Inclusion in Interoperability Standards Road NIST has carefully and correctly identified selection criteria for inclusion of standards in the roadmap identified in the Interoperability Standards Roadmap HomePlug AV is currently the top-selling broadband power line home networking technology. More than 8 million HPAV-certified devices have been deployed globally. In addition, HPAV is the only power line networking technology that meets all of the selection criteria1 set forth for inclusion in the Interoperability Standards Roadmap: 1 Report to NIST on the Smart Grid Interoperability Roadmap, submitted by EPRI June 17, 2009, page 112	

#	DATE	WHO	SOURCE	COMMENT	Response
				(1) Standard was supported by a Standards Developing Organization (SDO) or via an emergent SDO process. The Alliance has been a member entity of the IEEE P1901 Broadband Power Line (BPL) Networking Working Group for more than four years. As a result of the involvement of the Alliance and several of its member companies in the IEEE consensus-based standards development process, HPAV is fully interoperable the P1901 Draft Standard which is now under development. After completion of the baseline standard, the IEEE P1901 Working Group will provide a forum for continued evolution of BPL standards in the future. (2) Standard is also supported by a users community. The HomePlug Alliance is comprised of industry leaders at each level of the value chain - from Technology to Services & Content. The Alliance members bring necessary capabilities and a financial commitment to the continued success of the technology. Member companies include silicon providers, software developers, networking equipment OEMs, internet service providers, and electric utilities. The Alliance maintains a rigorous compliance and interoperability certification program that ensures consumers can purchase HomePlug certified products from multiple vendors and be confident of seamless interoperability. (3) Standard is directly relevant to Use Cases analyzed for the Smart Grid. HPAV, HPGP, IEEE P1901, and the ZigBee/HomePlug Smart Energy Profile 2.0 are ideally suited to support the FERC Four Priority Functionalities along with AMI and Distributed Grid Management (DGM)2. There are many specific examples of the commitment of the Alliance and its member companies to support Smart Grid applications and use cases. In June of 2008, a report was presented to the UCAiug demonstrating the ability of HomePlug technology to enable reliable communications with programmable communicating thermostats (PCTs)3, which is essential for Demand Response applications. HPAV has already been integrated into electricity meters to facilitate Demand Response and AMI implementations. HomePlug member companies have also been engaged in development of SAE standards for Plug-in Electric Vehicles (PEVs). The Alliance is currently developing the “HomePlug Green PHY” (HPGP), which is a	

#	DATE	WHO	SOURCE	COMMENT	Response
				low cost, low power fully interoperable version of HPAV that targeted specifically at Smart Grid applications. As already mentioned above, the Alliance is in collaboration with the ZigBee Alliance and several leading electric utilities to develop Smart Energy Profile 2.0. These examples represent a small fraction of the Alliance's efforts to enable key Smart Grid Use Cases. (4) Consideration was given to those standards with a viable installed based and vendor community. As of June 2009, more than 30 million HomePlug compliant devices have been shipped worldwide. HPAV is now the top selling BPL technology in the world and to date, more than 8 million HPAV-certified devices have been sold. Sales growth remains strong. By the end of 2010, total 2 Report to NIST on the Smart Grid Interoperability Roadmap, submitted by EPRI June 17, 2009, page 46 3 Thermostat Communications Link, presented by Intellon at UCAiug New Orleans, June 2008 unit sales are expected to exceed 20 million units. At present, there are two silicon vendors offering HPAV integrated circuits. In addition, four more chip makers have announced plans to ship HPAV silicon by the end of 2009. HPAV certified end products are available from dozens of vendors including retail OEMs and service providers. Adherence to Smart Grid Architectural Principles The HPAV, HPGP, and IEEE P1901 specifications describe MAC and PHY layers as defined in the Open Systems Interconnect (OSI) Reference Model. As a result, HPAV, HPGP, and IEEE P1901 support the Smart Grid architectural principles4 of loose coupling and layered systems included in the Report. The Report also emphasizes the importance of cyber security among the Architectural principles. HPAV/HPGP/P1901 employ advanced AES-128 bit encryption to ensure robust data security. In addition, HPAV/HPGP fully support server-based authentication via 802.1x and EAP, which enables end-to-end, scalable, and secure Smart Grid networks. Internet-Based Networking Technology The Report states that "specific protocols within the Internet Protocol Suite are fundamental to networking in general and smart grid application networking infrastructure specifically.5" HPAV seamlessly supports IP networking applications. The largest markets for HPAV	

#	DATE	WHO	SOURCE	COMMENT	Response
				products are home networking/internet access and service-provider IPTV. The ZigBee/HomePlug Smart Energy Profile 2.0 is being developed specifically to support IPbased protocols. HomePlug technologies and equipment will effectively and efficiently support IP-based networking applications. HomePlug Green PHY The Alliance maintains a close working relationship with the broad and diverse Smart Grid user community, including electric utilities, through its involvement and the involvement of member entities in activities such as the IEEE, ZigBee/HomePlug Smart Energy Profile 2.0 development, SAE electric vehicle standards development, UCAiug, and NIST Smart Grid Interoperability Workshops. As a result of feedback from key user groups, the Alliance is developing the HomePlug Green PHY. Smart Grid users have long been attracted to HPAV due to its robust performance and excellent in-home coverage. Smart Grid users service a number of cost sensitive applications and are always interested in reducing power consumption. At the same time, there was general recognition that many Smart Grid applications do not require the full HPAV 200 Mbps data rate. Based on this feedback, the Green PHY concept was developed based on the following objectives: 4 Report to NIST on the Smart Grid Interoperability Roadmap, submitted by EPRI June 17, 2009, page 19 5 Ibid, page 93 a.) Maintain HPAV/IEEE P1901 interoperability b.) Significantly reduced power consumption c.) Lower cost d.) Reduced data rate e.) Seamless integration HPAV in”mixed” network scenarios Based on the technical baseline that has already been adopted for HPGP, all of these objectives have been met. The HPGP specification is expected to be completed by the end of this calendar year. Conclusions The HomePlug Alliance is fully committed to ensuring the successful deployment of the SmartGrid. The Alliance heartily endorses inclusion of HomePlug AV (HPAV), the	

#	DATE	WHO	SOURCE	COMMENT	Response
				HomePlug Green PHY (HPGP), IEEE P1901, and the ZigBee/HomePlug Smart Energy Profile 2.0 in the list of Standards in the Report. HomePlug AV is the fasted selling BPL home networking technology in the world. As a result of the Alliance's four year commitment to open standards development, HPAV is fully interoperable with the emerging IEEE P1901 standard. As described above, HPAV is the only broadband power line HAN technology that meets all criteria set forth for inclusion in the Interim Roadmap. The HomePlug Alliance cautions against selection of alternative non-interoperable powerline communications standards that do not meet all of the criteria identified in the Report. Inclusion of noninteroperable communications technologies adds technical risks, undermine one of the fundamental principles underlying the Interoperability Standards Roadmap, and will inevitably delay deployment of essential Smart Grid products. The HomePlug Green PHY is being developed in response to specific feedback from the Smart Grid user community. It is fully interoperable with HPAV and IEEE P1901. In addition, it offers lower cost and reduced power consumption in comparison with HPAV. Both HPAV and HPGP support robust cyber security via advanced data encryption and device authentication. HPAV has amply demonstrated the capacity to efficiently support IP-based protocols. Development of the ZigBee/HomePlug Smart Energy Profile 2.0 in conjunction the ZigBee Alliance and leading electric utilities is another example of the Alliance's commitment to the successful deployment of the SmartGrid. The Smart Energy Profile 2.0 will enable utilities to exploit both power line and wireless as needed to optimize home area networks for Smart Grid applications. The Alliance looks forward to continuing collaboration across industry groups as well as with EPRI and NIST toward reaching the Administration's goal of accelerated deployment of the Smart Grid. Sincerely, Rob Ranck, President CH	
46	7.23.09	Martin Huddleston,		FAO: George Arnold, 100 Bureau Drive, Stop 8100, National Institute of Standards and Technology, Gaithersburg, MD 20899-8100. Dear George,	Martin Huddleston Thank you for the review and input to the NIST Interim Smart

#	DATE	WHO	SOURCE	COMMENT	Response
		CinetIQ, MEHUDDLESTO N@qinetiq.com		Subject: NIST on the Smart Grid Interoperability Standards Roadmap and comments 'ipdr' standards for usage measurement. In respect of the reports interoperability framework recommendations and where these concern usage, e.g. information model, common pricing model, semantic model for advanced metering and IP profile, I think it advantageous that NIST consider the ipdr.org standards on usage monitoring available at: http://www.tmforum.org/BestPracticesStandards/Aboutus/4502/Home.html Where ipdr supports "cost-effective usage measurement and exchange for next-generation services across the entire value chain." Whilst this originated in the telecoms industry I think the ipdr standards are highly relevant to Smart Grid and one common standard like ipdr for usage monitoring therefore highly relevant to the industries, both energy and telecoms. Good luck with the review. Best Regards Martin Huddleston QinetiQ Fellow, Management Systems Technical Leader Co-Chairman Government & Defense Group TM Forum AIMS Group QinetiQ Bldg A8 Rm 1004 Cody Technology Park Ively Road, Farnborough Hants, GU14 0LX Tel: +44(0)1252 392273 Email: mehuddleston@QinetiQ.com Mil. mehuddleston@qinetiq.r.mil.uk Mobile: +44(0)7974 952556 Fax: +44(0)1252 396320 Web: www.QinetiQ.com Stay informed, sign up at: http://cm.qinetiq.com/stayinformed/register.asp QinetiQ - The Global Defence and Security Experts The information contained in this E-Mail and any subsequent correspondence is private and is intended solely for the intended recipient(s). The information in this communication may be confidential and/or legally privileged. Nothing in this e-mail is intended to conclude a contract on behalf of QinetiQ or make QinetiQ subject to any other legally binding commitments, unless the e-mail contains an express statement to the contrary or incorporates a formal Purchase Order.	Grid Roadmap IP Detail Record (IPDR) standard has been added to the Report to NIST on the Smart Grid Interoperability Standards Roadmap

#	DATE	WHO	SOURCE	COMMENT	Response
				For those other than the recipient any disclosure, copying, distribution, or any action taken or omitted to be taken in reliance on such information is prohibited and may be unlawful. Emails and other electronic communication with QinetiQ may be monitored and recorded for business purposes including security, audit and archival purposes. Any response to this email indicates consent to this. Telephone calls to QinetiQ may be monitored or recorded for quality control, security and other business purposes. QinetiQ Limited Registered in England & Wales: Company Number:3796233 Registered office: 85 Buckingham Gate, London SW1E 6PD, United Kingdom Trading address: Cody Technology Park, Cody Building, Ively Road, Farnborough, Hampshire, GU14 0LX, United Kingdom http://www.qinetiq.com/home/notices/legal.htmlhttp://www.qinetiq.com/home/legal.html	
47	7.24.09	Jeremy Roberts, LonMark jeremy@lonmark.org	SGC	To the NIST Staff: Regarding the Smart Grid Report and the Federal Register of June 30, 2009 (Volume 74, Number 124), Page 31254, DOCID:fr30jn09-39, Docket Number: 0906181063-91064-01. We, Lonmark International staff, are providing our electronic comments before July 30, 2009 via smartgridcomments@nist.gov as requested. Please contact director@lonmark.org if there are any issues or questions. Kind Regards, - Jeremy **Jeremy J. ROBERTS** Technical Director To: Dr. George W. Arnold National Coordinator for Smart Grid Interoperability 100 Bureau Drive, Stop 8100 National Institute of Standards and Technology Gaithersburg, MD 20899-8100 Phone: (301) 975-5627 george.arnold@nist.gov From: Mr. Jeremy J. Roberts	Lonmark International Thank you for the input and review on the Report to NIST on the Smart Grid Interoperability Standards Roadmap. The ANSI CEA 709, IEC 14908 and IFSF Standards are listed in the Roadmap report. The standards across the report are not strictly limited to functional areas.

#	DATE	WHO	SOURCE	COMMENT	Response
				Technical Director LONMARK International 550 Meridian Avenue San Jose, CA 95126 Phone: (408) 938-5266 jeremy@lonmark.org July 24, 2009 Dear Dr. George W. Arnold, NIST Smart Grid Staff, and Participating SDOs: LONMARK International, the IRC 501(c)(6) trade organization for the promotion of LONWORKS ® control-networking technologies, has reviewed the content of the “Report to NIST on the Smart Grid Interoperability Standards Roadmap” (a.k.a., the “EPRI Report”). Per the Federal Register of June 30, 2009 (Volume 74, Number 124), Page 31254, DOCID:fr30jn09-39, Docket Number: 0906181063-91064-01, we are providing our electronic comments before July 30, 2009 via smartgridcomments@nist.gov. Appendix C contains areas where standards (referenced previously to Appendix C in the Report) are to fit the various case studies and situational gaps thus recognized by the Report. While it is understood that the report is not meant to be definitive or exclusive, our comments are presented to provide additional consideration for inclusion of LONWORKS control-networking standards in several of the areas discussed within Appendix C. We feel that LONMARK International and/or the LONWORKS technologies should be included in several areas that presently do not include either the SDO or the standards: 11.1.1 Requirements and Standards Gaps Related to Demand Response and Markets: □□Common Model for Price □□Provide energy usage information to Customer EMS □□Extend IEC 61850-7-420 standard for additional DER 11.1.2 Discussion Issues Related to Demand Response and Markets: □□Make available pricing and market information □□Consumer registration of out-of-the-box appliances 11.3.1 Requirements and Standards Gaps Related to Electric Storage:	

#	DATE	WHO	SOURCE	COMMENT	Response
				□□What standards and models are needed for distribution management system (DMS) to send appropriate signals to electric storage 11.4.1 Requirements and Standards Gaps Related to Electric Transportation: □□Common Model for Price+ □□Common Model for DR Signals □□Mobile Generation/Load Accounting □□Extend IEC 61850-7-420 standard for additional DER, including PEV, Storage, and Renewables 11.4.2 Discussion Issues Related to Electric Transportation: □□What standards and models are needed for DMS to send appropriate signals to PEVs and other DR devices □□Which standards should be used for information models of PEV □□If regulations change, there is a need to develop new Use Cases □□PEV accounting and settlements □□Submetering for PEV 11.5.2 Discussion Issues for AMI Systems: □□Should the Internet Protocol (IPv4 or IPv6) be mandated for all protocols □□Coordination and Future-proofing AMI Systems □□Concerns about unlicensed spectrum in AMI systems □□Should ANSI C12.19 be expanded for DER □□Discussion on which standards third party energy providers should use □□Should standard physical and mac layers be defined for AMI systems 11.6.1 Requirements and Standards Gaps Related to Distribution Management: □□Map IEC 61850 object models to AMI system protocols □□Develop IEC 61850-lite as efficient, compact protocol □□What standards should be used or need extensions to provide distribution operations with information about customer behavior and response to prices □□Discussions needed on modeling loads, given DER and mobile PEV The comments and additions included in yellow-highlighted text of the marked-up Appendix C (attached) are from the staff of LONMARK International.	

#	DATE	WHO	SOURCE	COMMENT	Response
				References are made in the marked-up Appendix C to LONWORKS technologies and to the following: □□ISO/IEC 14908-1 (protocol) □□ISO/IEC 14908-2 (media: twisted-pair cabling) □□ISO/IEC 14908-3 (media: powerline carrier) □□ISO/IEC 14908-4 (media: IP tunneling via TCP or UDP) □□pEN 14908-6 (profiles: metering, generator sets, transfer switches, and others) □□CEA- CEA-2021 Interoperable Self-Installation (ISI) draft standard Organizations added as potentially interested parties include: □□Consumer Electronics Association (CEA) – where the protocol used for LONWORKS technologies was initially standardized in 1999. □□International Forecourt Standards Forum (IFSF) – the group that sets standards for gasoline stations internationally, using LONWORKS technologies for POS, pumps, metering, measuring, and others. Your consideration of the additions and comments are appreciated. LONWORKS technologies already play a major role in many markets that are directly associated with what will become the Smart Grid. We feel that it would be prudent to consider these standards when determining the best solutions for the Smart Grid infrastructure. Sincerely, Jeremy J. Roberts Technical Director LONMARK International Encl. LONMARK International's mark-up of Appendix C	
48	7.24.09	Pamela Plass for Mark Siira, Kohler Co., Pamela.Plass@kohler.com Mark.Siira@kohler.com	<<SmartGrid Comments.docx>> Pam Plass for Mark Siira Kohler Co. Senior Secretary Sanitary Engineering Plumbing Americas P: 920-457-4441, Ext. 75180 F: 920-451-4402 E: pam.plass@kohler.com		Pam Plass Mark Siira Thank you for the review and input on the Report to NIST on the Smart Grid Interoperability Standards Roadmap. The Standards identified within the present draft of the report address the points made in your review in the following ways: Interactions between users and operators: The standards for customer communications and in-building operations are

#	DATE	WHO	SOURCE	COMMENT	Response
				Experience gracious living online at http://www.KOHLER.com George Arnold, 100 Bureau Drive, Stop 8100, National Institute of Standards and Technology, Gaithersburg, MD 20899-8100. June 28, 2009 Kohler Co. comments on the NIST roadmap for the SmartGrid. The roadmap presents a comprehensive systems view of the issues and the complexity of the challenge and an initial plan of trip to the future. The report provides details of current industry standards assessment for defining gaps that would be imperative for future Smart Grid. Many industry standards are pointed out as needed revision to reflect Smart Grid requirement. Following are significant comments: 1. There needs to be emphasis on the interactions between the users and the operators of the electric power system. Historically, the system operators in power generation, operators have demanded costly changes to distributed power systems to maintain their goal of safety and reliability, while at the same time the consumers and industrial customers desire to save energy, improve their power reliability and reduce their carbon footprint through various means of distributed generation. The barriers caused by these competing goals need to be addressed and mechanisms to make addition of distributed power need to be streamlined so consumers are not faced with a very complex process to install a distributed power system. 2. The roadmap needs to comprehend the existing population of appliances, power generation equipment, and storage (Estimates to be added Friday) that is available and they need to be retrofitted to have a truly seamless transition. In some respects this may be an opportunity to provide SmartGrid functionality with less investment in the near term. 3. The report admits that there is no easy and quick way to move forward. EPRI, the administrator of the report has historically centered on the interests of Electric Utilities. A number of participants were involved for data collections but each individual only represents a narrow segment, so none of them has broad knowledge of all applicable standards or requirements. I have found no record of who has participated so far in this development – no minutes were published from the workshops . As a result, no consensus truly exists. 4. I do not agree in the Executive Summary that this document is solely a reflection of President Obama's view to accelerate energy-related national priorities. The idea of Smart Grid started earlier by the Utilities and Suppliers to address issues with reliability, data collection, metering, transporting power across wide area, pricing structure, etc. The Smart Grid initiative started by Energy Independence and Security Act (EISA) signed into law in December of 2007. EISA Title XIII served as a catalyst for the deployment for the development of a smart power grid system and the advance metering infrastructure (AMI) in the United States. In fact, a number of manufacturers already presented new products for Smart Grid application. Companies that have acted on this vision should have a stake in the future. 5. The document covers the following major applications: Automated Metering Infrastructure (AMI), Demand Responds (DR), Plug-In Electric Vehicles (PEV), Cyber Security, Wide Area Situation Awareness (WASA), Market Communications, and Distributed Generation and Energy Storage (DG). All these modules are critical and well addressed in general. I especially like the high level attention to Cyber Security and future anticipation of power distribution change associated with PEV growth. However, Distribution Generation and Energy Storage (DG) category, starting from page 204, is not covered in sufficient detail. They only briefly mentioned metering to utility and customers. I think the document should expand on creating or revising standards the following topics: Combined-Heat and Power (CHP) generation to utility paralleling, communication protocols needed, distributed systems power quality, and more on interface for distributed generators paralleled to the utility grid. All of it has to be reflected in existing or future standards. 6. The document is vague on industry standards requirements for distributed generation and this is the only thing I found on page 205: "Traditionally, distributed resources have served as a primary or emergency back-up energy source for consumers that place a premium on reliability and power quality. Distributed resources include generation and storage devices that can provide power back to the electric power systems. Societal, policy and technological changes are increasing the adoption rate of distributed resources and smart grid technologies can enable the value of these systems".	intended to enable more dynamic interaction between consumers and energy system operators. The standards for Distributed Energy Resource integration are intended to lower barriers to implementation. The implementation of the standards however are subject to engineering practices that may differ by utility and by regulatory offsite organization. The marketplace will need to work out how the existing base of installed equipment can meet future requirements for meeting smart grid functions including retrofit of controls external to the consumers equipment. The roadmap report is neutral to any company that produces products or services that could be included in the Smart Grid. The roadmap report is not exhaustive in the requirements for all of the proposed smart grid applications and functions including the integration of Distributed Energy Resource (DER) equipment to the power system. However, several of the standards from key SDO's including but not limited to the IEEE and IEC include standards under development for full integration of DER equipment into grid operations.
49	7.27.09	Claire Kammer, UL	SGC	To Whom it May Concern: On behalf of Underwriters Laboratories Inc. (UL), I write today to submit the following comments for consideration in response to the	Claire A Kammer Underwriters Laboratories, Inc.

#	DATE	WHO	SOURCE	COMMENT	Response
		Claire.A.Kammer @us.ul.com		published "Report to NIST on the Smart Grid Interoperability Standards Roadmap," as published in the Federal Register on June 30, 2009. The comments are attached in a pdf document. Should there be any issues with transmission or viewing these comments, please do not hesitate to contact me at (202) 296-8092. Sincerely, Claire A. Kammer Manager, Government Affairs Underwriters Laboratories, Inc. 1850 M Street, NW Suite 1000 Washington, DC 20036 Claire.A.Kammer@us.ul.com Tel: (202) 296.8092 Fax (202) 872.1576 Cell (202) 374.3536 - For more information about UL, its Marks, and its services for EMC, quality registrations and product certifications for global markets, please access our web sites at http://www.ul.com and http://www.ulc.ca or contact your local sales representative. -- ********* Internet E-mail Confidentiality Disclaimer ********** This e-mail message may contain privileged or confidential information. If you are not the intended recipient, you may not disclose, use, disseminate, distribute, copy or rely upon this message or attachment in any way. If you received this e-mail message in error, please return by forwarding the message and its attachments to the sender. UL and its affiliates do not accept liability for any errors, omissions, corruption or virus in the contents of this message or any attachments. ********** July 27, 2009 Dr. George Arnold National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899-8100 Subject: Underwriters Laboratories Response, Review of Report to NIST on the Smart Grid Interoperability Standards Roadmap, Docket Number: 0906181063-91064-01 Dr. Arnold: On behalf of Underwriters Laboratories Inc. (UL), I write today to submit the following comments for	1850 M Street, NW Suite 1000 Washington, DC 20036 Thank you for the review and input on the Report to NIST on the Smart Grid Interoperability Standards Roadmap. The scope of the Roadmap document is primarily focused on the communications and interoperability enabled by the standards. The impacts of the use of any of the Smart Grid standards should take into account the safety impacts of the equipment as recommended by your review.

#	DATE	WHO	SOURCE	COMMENT	Response
				your consideration in response to the published “Report to NIST on the Smart Grid Interoperability Standards Roadmap,” as published in the Federal Register on June 30, 2009. Upon review, while the published Roadmap provides a discussion of Smart Grid (SG) infrastructure and interface issues, UL is concerned that the document does not appropriately address product and system safety with respect to essential performance criteria or risks of fire and electric shock. It is recognized that the effort to outline a workable framework under which SG-compatible technologies can be deployed quickly and efficiently is a monumental undertaking. However, such a framework cannot exist in a vacuum. It is imperative that any standards or protocols cited in such a framework be developed and/or evaluated not just in context of their stand-alone function in a future system, but also for their impacts on neighboring infrastructure and existing product standards. This is critically important when it comes to safety. Safety and the Smart Grid Products and systems that interface with the SG must operate effectively and safely under both normal and abnormal conditions. This applies to legacy products and systems already deployed, as well as those specifically designed for use in the SG. Safe products may be compromised. The current iteration of the SG Roadmap does not adequately address how the standards cited will be evaluated to determine if the protocols included will have any inadvertent or negative impact on the effective functioning or safety of systems around them. For example, pilot SG programs have already shown that the transmission protocols being used have a negative impact on the functionality of arc-fault circuit interrupters (AFCIs) and ground-fault circuit interrupters (GFCIs). AFCIs and GFCIs are safety devices required by the National Electrical Code that serve to cut electrical current if a person is exposed to electrical shock conditions or an electrical arc is detected. In some field cases seen already in SG projects deployed across the country, the transmission protocols of utility meters interfere with the communication interface of the AFCIs and GFCIs and create a situation whereby these lifesaving devices are either falsely tripping or being rendered unworkable. Consumers will be in their homes under the assumption that their family is protected when in reality the SG installed devices around them, in this case a meter installed on their behalf by a utility, defeated the safety products put in place creating risks to people or property.	

#	DATE	WHO	SOURCE	COMMENT	Response
				Standards for Safety may be compromised. The Roadmap cited standards do not include any direct considerations for how the incorporation of these communication and security protocols, determined necessary for SG operation, will impact already established product standards. These new standards may create new product safety situations that will need to be addressed in any SG product-specific safety standard. Appliances and other consumer devices will be built with new capabilities for the SG system, creating new situations where appliances may operate in a manner or under conditions different than traditional performance and in ways that elevate the risk of fire, shock, or mechanical injury. An example of a need in the area of consumer goods would be the safety of a gas or electric cooking range manufactured with two-way communication capabilities for interface with a utility. What protocols are being built in to the appliance to ensure the device is not inadvertently turned on by the utility? If a consumer seeks to turn on the device, but receives a message that due to load capacity cooking should be postponed, will the device remain off until the consumer manually engages in turning back on the system or will the device immediately turn on once load capacity needs are lessened? Many variations of such situations exist and the protocols being adopted for SG on both the consumer and utility sides need to be evaluated to determine how best to a protect a consumer from a range of serious risks. Safety systems may be compromised. In looking at the vision for a future state, the SG deployment efforts and the standards cited in the Roadmap include many communications protocols. This is because the new SG system is anticipated to utilize new communications channels, maximize use of wireless protocols, and create new interfaces between systems that have never been connected before. Consideration must be given to deployed systems previously built on similar communication structures. Any incorporation of new communication protocols in the home must be viewed in context with the impact that these new applications will have on legacy systems, many of which serve to protect a home and its inhabitants. This is the case with fire alarm and extinguishing systems, personal assault or property theft protection systems, emergency egress control systems, emergency responders signaling systems, and the like. These systems require functional communication channels in order to operate and any crowding of these channels or frequencies could compromise their intended safety functions. Management of these channels needs to be a consideration in all Roadmap efforts moving forward to ensure that SG deployment is not done at the sacrifice of other systems relied upon to protect the home.	

#	DATE	WHO	SOURCE	COMMENT	Response
				Conclusion In summary, safety standards and related products will impact and be impacted by SG. While the necessary expediency for this effort is recognized, history has taught us that safety must be built into the front end to ensure that system deployment is not hindered by a serious safety incident(s) that creates negative public perception, lengthy delays, or requires massive retrofits of systems. As the SG infrastructure and interoperability protocols mature, consideration must be given to SG's impact on legacy products and systems. Further, new and revised product and system safety standards must anticipate SG compatibility. To achieve this: □□□Considerations must be built into the Roadmap to address the impact on stakeholder groups for all identified SG standards on legacy equipment, systems, and the full portfolio of standards already published. □□□Standards that address product electromagnetic emissions and immunity may need revision or development to address SG communications issues. The effects UNDERWRITERS LABORATORIES RESPONSE - Docket Number: 0906181063-91064-01 of SG on equipment and the effect of product emissions on other SG enabled devices must be addressed. □□□National installation codes and product standards must be evaluated for all necessary revisions or gaps to address power distribution and interconnection of energy sources. It was more than 100 years ago that mass use of electrical power became a reality and with that transmission came new hazards. Since that time, government and public stakeholders have worked to collaborate efforts to better understand associated risks and develop a safety system to address them. More than a century later, product safety standards and conformity assessment programs are in place to help protect the American home and workplace. It is imperative that we build on the lessons learned from these experiences and provide the same dedicated attention to safety as the nation moves toward SG electrical transmission. With 115-years of experience, UL welcomes an opportunity to continue working with NIST to advance SG in a way that continues to protect the American people. Respectfully; Claire A. Kammer Underwriters Laboratories Inc.	

#	DATE	WHO	SOURCE	COMMENT	Response
				Manager, Government Affairs (202) 286-8092 claire.a.kammer@us.ul.com	
50	7.28.09	Michel Kohanim, Universal Devices, Inc. michel@universal-devices.com	SGC	Section 3.2.2 – Customer Domain Although in this section there are explicit references to an EMS, however neither in Figure 7 nor Table 2 are there any references to EMS. I think EMS is used interchangeably with Gateway and Automation System. We have to be clearer on what we mean by an EMS vs. Gateway vs. Automation System. What are the boundaries, differences, and similarities? Section 4.4.2.2 & 4.4.2.4 & 4.4.2.8 – Demand Response Management System Manages Demand in Response to Pricing Signal Reference to "EMS/Gateway" … again, these terms are being used interchangeably which I believe will cause confusion since Gateway is usually associated with a passive entity where as EMS is more Active in its operations. Section 4.5.2.3 Building Energy Usage Optimization using Electric Storage In this section, BAS is used instead of EMS and/or Gateway where as in section 4.5.5, the diagram clearly and explicitly calls for an EMS. So, it seems that Gateway, EMS, and BAS are used interchangeably. In section 4.7.2.3 it has been clarified that EMS and BAS are used interchangeably. I think this should be done much earlier in the document. Section 4.6.3 Actors In this section (as well as Figure 18), EMS is now renamed to ESI (Energy Services Interface) and concatenated with a Gateway. So, we now have EMS, Gateway, BAS, and ESI used interchangeably. Furthermore, where as in Figure 7, an EMS was explicit and mandatory, in this section it has become optional. And then again, in section 4.7.2.1 EMS seems to have become mandatory. Section 4.7.3 Actors Table 12: In this table ESI and EMS are now two completely different entities. The main question is: wouldn't have to already implement all the interfaces for an ESI? If not, what are the differences? If so, why do we need an ESI? Section 4.8.3 Actors Table 13: In this table, now the Meter and HAN Gateway are used interchangeably while EMS is mandatory and listed as a separate entity. There's no mention of ESI. This is also represented in Figure 20. Comments on Smart Grid Roadmap Universal Devices, Universal Devices, Inc. www.universal-devices.com Page 2	Section 3.2.2 and Sections 4.x.x.x:: You are correct on the lack of clarity and the sometime interchangeability of the terms "EMS, Gateway, Automation System, BAS, and ESI". As for being mandatory or optional, these systems do not exist in most customer sites, so these systems will evolve as the Smart Grid evolves, and may eventually become mandatory for certain energy service functions. Therefore, the last part of the first paragraph in Section 3.2.2 has been updated to state, "The boundaries of the Customer domain are typically considered to be the utility meter and any communication gateways connecting to systems within the customer site such as a Customer Energy Management System (EMS), a generic term for a system that can manage energy usage within a customer site (the term "customer" added in front to distinguish this EMS from the transmission operations EMS). Alternate terms for a Customer EMS that are often used somewhat interchangeably are Facility EMS and Building Automation System (BAS), although the latter is usually associated with managing additional building systems such as Heating, Ventilating, and Air Conditioning (HVAC) and lighting. In some contexts, the term Energy Services Interface (ESI) is used to denote an intelligent gateway that may include some customer EMS functionality as well as gateway capabilities. These systems are still evolving: currently few customer sites contain these systems. As the Smart Grid evolves, these systems will become more common, better defined, and potentially mandatory for certain energy service functions." The definition of Gateway has been added to the appropriate Actors lists in Section 4. Section 6.1.3: In the NIST Priority Action Plans, significant effort will be undertaken first to separate the semantic models from the underlying network technologies and media, and secondly to map existing semantic models where appropriate to those network technologies and different media. For example, IEC 61850-7-420, the semantic model for Distributed Energy Resources, is expected to be mapped to the Smart Energy Profile.

#	DATE	WHO	SOURCE	COMMENT	Response
				6.1.3 Common Semantic Model Very important! Going through section 11.1.1, it seems that the semantic model has to support multiple media: Zigbee and Internet. While SEP has its own semantic model, this poses the question of the actors and the systems involved. i.e. we cannot expect Zigbee meters to conform to an XML schema and thus we'll end up with segmentation and translations between different devices. Sincerely, Michel Kohanim michel@universal-devices.com	
51	7.29.09	Edwin van Kessel, BeNEXT edwin@benext.nl (NOTE: he cc'd The.Secretary@hq.doe.gov & TheSEC@doc.gov	SGC	Dear Congressman X/NIST Committee: After reviewing the document published by EPRI with respect to the NIST Smart Grid Interoperability Standards Framework which will describe a high-level architecture, identify an initial set of key standards, and provide a roadmap for developing new or revised standards needed to realize the Smart Grid we, Z-Wave Alliance members recommend that Z-Wave technology be added to the standards for this initiative. Z-Wave is a short-range, wireless communications technology that is the accepted standard for wireless home control and automation. From thermostats to lighting and appliance controllers to motorized blinds and pool pumps, Z-Wave has the ecosystem of interoperable products that puts energy conservation and management into the hands of consumers. We believe there are many technology standard options in play for the HAN (home area network) and to best serve the American consumer there should not be exclusivity for any one technology. In the effort to establish the standards that the Obama administration is looking for to create a robust and secure energy grid infrastructure, Z-Wave should be considered a prominent player for the following reasons: • The breadth of interoperable products currently available in the consumer marketplace in new home construction, aftermarket professional retrofits and retailers such as Amazon.com, Lowe's, Fry's and others. • Dozens of industry-leading manufacturers and blue chip brands worldwide have developed or are developing Z-Wave-based products, resulting in choices for the consumer – an important consideration for broad adoption. • Market competition has driven affordable mass-market pricing for Z-Wave products, making them available to the average homeowner for rapid deployment. • With its tradition of backward compatibility, Z-Wave is future-proof .Products developed with newer versions of the technology work with products based on earlier versions of the technology. • The American consumer has established a connection with Z-Wave. It is the mass market technology of choice in thousands of homes across the country. For the above reasons, we urge you to add Z-Wave to the list of technologies that are required to move this vision of an American Smart Grid forward. Thank you for your consideration. Met vriendelijke groet, best regards, **Edwin van Kessel** Technical director	Z-Wave is now listed in Section 10

#	DATE	WHO	SOURCE	COMMENT	Response
				edwin@benext.eu Ter Gouwstraat 3 1093JX Amsterdam Nederland Tel. +31 (0)20 465 0105 Fax +31 (0)20 465 7966 please don't print this e-mail unless necessary _____ Information from ESET NOD32 Antivirus, version of virus signature database 4286 (20090728) _____ The message was checked by ESET NOD32 Antivirus. http://www.eset.com	
52	7.29.09	Pamela Plass on behalf of Mark Siira, Kohler Pamela.Plass@kohler.com , Mark.Siira@kohler.com	SGC	Please use this version of Mark Siira's comments for NIST report. Thank you. <<Kohler Comments on Smart Grid.docx>> Pam Plass for Mark Siira Kohler Co. Senior Secretary Sanitary Engineering Plumbing Americas P: 920-457-4441, Ext. 75180 F: 920-451-4402 E: pam.plass@kohler.com Experience gracious living online at http://www.KOHLER.com _____ From: Plass Pam On Behalf Of Siira Mark Sent: Friday, July 24, 2009 4:24 PM To: 'smartgridcomments@nist.gov' Cc: Siira Mark Subject: Request for Comments on Report to NIST on the Smart Grid <<SmartGrid Comments.docx>> Pam Plass for Mark Siira Kohler Co. Senior Secretary Sanitary Engineering Plumbing Americas P: 920-457-4441, Ext. 75180 F: 920-451-4402 E: pam.plass@kohler.com Experience gracious living online at http://www.KOHLER.com August 18, 2009 Dear : Mr. Arnold	Item 1: You clearly state the sometimes competing goals of consumers who want improved energy services and decreased costs for energy, and distribution operators who must operate reliably, safely, and efficiently the increasing complex distribution system with higher penetrations of DER, energy storage, and plug-in electric vehicles. Although standards cannot solve all of these issues, certain of the NIST Priority Action Plans are taking these concerns as some of the key issues that must be resolved. Item 2: Indeed, legacy equipment, appliances, and systems will need to be taken into account, and gradually updated as economically justifiable and feasible. Item 3: All records from the Workshops are public and published on the NIST TWiki site. The Workshops were attended by over 800 people representing many different interests, view points, and expertise. Clearly not all can be reflected in the EPRI document, but NIST is now moving forward with their Priority Action Plans and Phase 2, where additional input will be more than welcome. Item 4: You are correct that President Obama did not start the Smart Grid effort, but his administration has actively promoted and funded it. Item 5: One of NIST's Priority Action Plans is focused on Energy Storage and Distributed Energy Resources to move these standards efforts forward. In the meantime, IEC 61850-7-420, an international semantic object model standard, does address combined heat and power (as well as fuel cells, photovoltaic systems, and diesel generators), and is being updated with more models. IEEE 1547 will be updated to address electrical interconnection standards for higher penetration of DER on distribution systems and for establishing "microgrids". Additional standards efforts on power quality are also being addressed.

#	DATE	WHO	SOURCE	COMMENT	Response
				Subject: Kohler Co. comments on the NIST roadmap for the SmartGrid. This letter provides comments on the Smart Grid Interoperability Roadmap on behalf of Kohler Company. General Observations: The roadmap presents a comprehensive systems view of the issues and the complexity of the challenge and an initial plan of trip to the future. The report provides details of current industry standards assessment for defining gaps that would be imperative for future Smart Grid. Many industry standards are pointed out as needed revision to reflect Smart Grid requirement. Opportunities For Improvement: The following areas will require further discussion and some consensus for the roadmap to be credible. 7. There needs to be emphasis on the interactions between the users and the operators of the electric power system at the point of common connection, generally referred to as “distribution system”. This the improvement and upgrade of the distribution system is generally regarded as critical to any smart grid success. Historically, the system operators in power generation, operators have demanded costly changes to distributed power systems to maintain their goal of safety and reliability, while at the same time the consumers and industrial customers desire to save energy, improve their power reliability and reduce their carbon footprint through various means of distributed generation. The barriers caused by these competing goals need to be addressed. Distribution operators are generally not regulated by Federal Agencies, rather are operating under local and state oversight. This begs for some overreaching set of clear standards with some “ombudsman” recourse to rapidly settle disputes. Additionally, the mechanisms to make additions or upgrades of distributed power need to be streamlined so consumers are not faced with a very complex process to install a distributed power system. 8. On page 1 the document acknowledges the installed base, but generally discusses this as something that cant be solved. Retrofit and upgrades of conrols and communication systems are routine in North American businesses. The roadmap needs to comprehend the existing population of appliances, power generation equipment, and storage (Estimates to be added Friday) that is available and they need to be retrofitted to have a truly seamless transition. In some respects this may be an opportunity to provide SmartGrid functionality with less investment in the near term. 9. The report admits that there is no easy and quick way to move forward. EPRI, the administrator of the report has historically centered on the interests of Electric Utilities. A number of participants were involved for data collections but each individual only represents a narrow segment, so none of them has broad knowledge of all applicable standards or requirements. I have found no record of who has participated so far in this development – no minutes were published from the workshops . As a result, no consensus truly exists. 10. I do not agree in the Executive Summary that this document is solely a reflection of President Obama’s view to accelerate energy-related national priorities. The idea of Smart Grid started earlier by the Utilities and Suppliers to address issues with reliability, data collection, metering, transporting power across wide area, pricing structure, etc. The Smart Grid initiative started by Energy Independence and Security Act (EISA) signed into law in December of 2007. EISA Title XIII served as a catalyst for the deployment for the development of a smart power grid system and the advance metering infrastructure (AMI) in the United States. In fact, a number of manufacturers already presented new products for Smart Grid application. Companies that have acted on this vision should have a stake in the future. 11. The roadmap covers the following major applications: Automated Metering Infrastructure (AMI), Demand Responds (DR), Plug-In Electric Vehicles (PEV), Cyber Security, Wide Area Situation Awareness (WASA), Market Communications, and Distributed Generation and Energy Storage (DG). All these modules are critical and well addressed in general. However, Distribution Generation and Energy Storage (DG) category, starting from page 204, is not covered in sufficient detail. They only briefly mentioned metering to utility and customersThe roadmap should expand on creating or revising standards the following topics: Combined-Heat and Power (CHP) generation to utility-parallel connections, communication protocols needed, distributed systems power quality, and more on interface for distributed generators paralleled to the utility grid. These areas need to be reflected in existing or future standards. 12. The document is vague on industry standards requirements for distributed generation and this is the only thing I found on page 205: “Traditionally, distributed resources have served as a primary or emergency back-up energy source for consumers that place a premium on reliability and power quality. Distributed resources include generation and storage devices that can provide power	Item 6: Standards for Distributed energy resources (DER) is being very actively addressed in the NIST Priority Action Plan for Energy Storage, including both electrical interconnection standards and communication standards (see response to Item 5). Items 7-12: See responses to Items 1-6 respectively – these are repeated questions.

#	DATE	WHO	SOURCE	COMMENT	Response
				back to the electric power systems. Societal, policy and technological changes are increasing the adoption rate of distributed resources and smart grid technologies can enable the value of these systems”. Sincerely, Mark Siira Manager, Applied Technology Kohler Company George Arnold, 100 Bureau Drive, Stop 8100, National Institute of Standards and Technology, Gaithersburg, MD 20899-8100. */* * George Arnold, 100 Bureau Drive, Stop 8100, National Institute of Standards and Technology, Gaithersburg, MD 20899-8100. June 28, 2009 Kohler Co. comments on the NIST roadmap for the SmartGrid. The roadmap presents a comprehensive systems view of the issues and the complexity of the challenge and an initial plan of trip to the future. The report provides details of current industry standards assessment for defining gaps that would be imperative for future Smart Grid. Many industry standards are pointed out as needed revision to reflect Smart Grid requirement. Following are significant comments: 13. There needs to be emphasis on the interactions between the users and the operators of the electric power system. Historically, the system operators in power generation, operators have demanded costly changes to distributed power systems to maintain their goal of safety and reliability, while at the same time the consumers and industrial customers desire to save energy, improve their power reliability and reduce their carbon footprint through various means of distributed generation. The barriers caused by these competing goals need to be addressed and mechanisms to make addition of distributed power need to be streamlined so consumers are not faced with a very complex process to install a distributed power system. 14. The roadmap needs to comprehend the existing population of appliances, power generation equipment, and storage (Estimates to be added Friday) that is available and they need to be retrofitted to have a truly seamless transition. In some respects this may be an opportunity to provide SmartGrid functionality with less investment in the near term. 15. The report admits that there is no easy and quick way to move forward. EPRI, the administrator of the report has historically centered on the interests of Electric Utilities. A number of participants were involved for data collections but each individual only represents a narrow segment, so none of them has broad knowledge of all applicable standards or requirements. I have found no record of who has participated so far in this development – no minutes were published from the workshops . As a result, no consensus truly exists.	

#	DATE	WHO	SOURCE	COMMENT	Response
				16. I do not agree in the Executive Summary that this document is solely a reflection of President Obama's view to accelerate energy-related national priorities. The idea of Smart Grid started earlier by the Utilities and Suppliers to address issues with reliability, data collection, metering, transporting power across wide area, pricing structure, etc. The Smart Grid initiative started by Energy Independence and Security Act (EISA) signed into law in December of 2007. EISA Title XIII served as a catalyst for the deployment for the development of a smart power grid system and the advance metering infrastructure (AMI) in the United States. In fact, a number of manufacturers already presented new products for Smart Grid application. Companies that have acted on this vision should have a stake in the future. 17. The document covers the following major applications: Automated Metering Infrastructure (AMI), Demand Responds (DR), Plug-In Electric Vehicles (PEV), Cyber Security, Wide Area Situation Awareness (WASA), Market Communications, and Distributed Generation and Energy Storage (DG). All these modules are critical and well addressed in general. I especially like the high level attention to Cyber Security and future anticipation of power distribution change associated with PEV growth. However, Distribution Generation and Energy Storage (DG) category, starting from page 204, is not covered in sufficient detail. They only briefly mentioned metering to utility and customers. I think the document should expand on creating or revising standards the following topics: Combined-Heat and Power (CHP) generation to utility paralleling, communication protocols needed, distributed systems power quality, and more on interface for distributed generators paralleled to the utility grid. All of it has to be reflected in existing or future standards. 18. The document is vague on industry standards requirements for distributed generation and this is the only thing I found on page 205: "Traditionally, distributed resources have served as a primary or emergency back-up energy source for consumers that place a premium on reliability and power quality. Distributed resources include generation and storage devices that can provide power back to the electric power systems. Societal, policy and technological changes are increasing the adoption rate of distributed resources and smart grid technologies can enable the value of these systems".	
53	7.29.09	Nancy McNabb, NFPA nmcnabb@NFPA.org	SGC	**National Fire Protection Association** 1401 K Street NW, Suite 500, Washington, DC 20005 Phone: 202-898-0222 □□Fax: 202-898-0044 □□www.nfpa.org July 29, 2009 Dr. George Arnold National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899-8100 Subject: National Fire Protection Association Comments on Report to NIST on the Smart Grid Interoperability Standards Roadmap, Docket Number: 0906181063-91064-01 Dr. Arnold: On behalf of the National Fire Protection Association, I write today to submit the following comments for your consideration in response to the published "Report to NIST on the Smart Grid Interoperability Standards Roadmap," as published in the Federal Register on June 30, 2009. The proposed Roadmap lays out the need for a comprehensive series of programs to develop technology and information to enable the rapid transition to the next generation of power distribution through the Smart Grid initiative. This transition has major impacts for the safety of the built infrastructure as it interfaces with the grid through in-building energy storage systems, photovoltaics, metering and control systems, and other safety features. In order to receive widespread acceptance of this new technology, and to ensure that the safety regulatory framework is not a barrier to its implementation, its safety aspects must be addressed. The National Electrical Code® and the standards that it references embody the electrical safety codes and standards framework for the built environment. The National Fire Protection Association (NFPA) is the ANSI accredited developer of the NEC® and of other standards for fire and electrical safety in the built environment. Working with its partners in fire and electrical safety (including the National Electrical Manufacturers Association and Underwriters Laboratories), NFPA has the mechanisms in place to address the safety issues associated with Smart Grid and to develop the regulatory framework to expedite the removal of regulatory barriers to this new technology proactively.	Safety must be considered in all areas of the Smart Grid, and we appreciate the strong interest taken by the NFPA in on-going efforts. In particular one of the NIST Priority Action Plans (Energy Storage and DER) addresses the electrical interconnection standards, IEEE 1547, which will need to be updated to reflect high penetrations of DER and the management of DER during power system anomalies. NFPA, via Kathleen Almand, has agreed to participate in that effort.

#	DATE	WHO	SOURCE	COMMENT	Response
				NFPA standards development committees are in the preliminary stages of addressing the impact of Smart Grid and related emerging building electrical technologies (such as photovoltaics, energy storage systems including batteries, etc.) that will interface with the grid; however the pace of implementation of the transition to Smart Grid is not consistent with the electrical safety standards community's normal consensus standards development process NFPA's goal, shared by NIST, is to facilitate the safe integration of Smart Grid technology in the nation's electrical safety infrastructure. NFPA and its partner organizations believe that a priority element in the proposed Roadmap is a suite of regulatory development, technology transfer, and education programs in the fire and electrical safety community. We believe that the following activities should be part of the proposed Roadmap: □□a review of the emerging technologies associated with Smart Grid implementation (in the areas of, for example, service interface, electric load in-building data gathering and control, energy storage systems); □□a critical assessment made of their impacts on the safety features of the built environment; □□an assessment of the current weaknesses/gaps in the U.S. fire and electrical safety regulatory framework; and □□recommendations for regulatory development needed for requirements in the National Electrical Code®, Infrastructure Standards (such as those for parking garage safety), and First Responder Standards (such as those for emergency operations, protective clothing and equipment, and emergency equipment), partner organizations standards for electrical safety products and product testing, and other relevant documents to provide the safety regulation framework to facilitate widespread implementation of this technology. NFPA and its partner safety organizations are ready to work with NIST to implement this portion of the Roadmap to ensure that the electrical safety codes and standards do not serve as a barrier to the implementation of Smart Grid technologies and that public safety is an integral part of that implementation. Thank you for the opportunity to share our views concerning public protection through effective electrical safety and the development of the interim Roadmap for Smart Grid interoperability standards. If you have any questions or require additional information concerning this matter, please do not hesitate to contact me at (202) 898-1229 or Kathleen H. Almand, P.E., Executive Director, Fire Protection Research Foundation at (617) 984-7282. Sincerely, Nancy McNabb, A.I.A. Director, Government Affairs	
54	7.30.09	Bernd Gerhards, Schneider-Electric, bernd.gerhards@de.schneider-electric.com	SGC	Dear Congressman X/NIST Committee: After reviewing the document published by EPRI with respect to the NIST Smart Grid Interoperability Standards Framework which will describe a high-level architecture, identify an initial set of key standards, and provide a roadmap for developing new or revised standards needed to realize the Smart Grid we, Z-Wave Alliance members recommend that Z-Wave technology be added to the standards for this initiative. Z-Wave is a short-range, wireless communications technology that is the accepted standard for wireless home control and automation. From thermostats to lighting and appliance controllers to motorized blinds and pool pumps, Z-Wave has the ecosystem of interoperable	Z-Wave is now listed in Section 10.

#	DATE	WHO	SOURCE	COMMENT	Response
				products that puts energy conservation and management into the hands of consumers. We believe there are many technology standard options in play for the HAN (home area network) and to best serve the American consumer there should not be exclusivity for any one technology. In the effort to establish the standards that the Obama administration is looking for to create a robust and secure energy grid infrastructure, Z-Wave should be considered a prominent player for the following reasons: □□□□□□□□□□The breadth of interoperable products currently available in the consumer marketplace in new home construction, aftermarket professional retrofits and retailers such as Amazon.com, Lowe's, Fry's and others. □□□□□□□□□□Dozens of industry-leading manufacturers and blue chip brands worldwide have developed or are developing Z-Wave-based products, resulting in choices for the consumer – an important consideration for broad adoption. □□□□□□□□□□Market competition has driven affordable mass-market pricing for Z-Wave products, making them available to the average homeowner for rapid deployment. □□□□□□□□□□With its tradition of backward compatibility, Z-Wave is future-proof .Products developed with newer versions of the technology work with products based on earlier versions of the technology. □□□□□□□□□□The American consumer has established a connection with Z-Wave. It is the mass market technology of choice in thousands of homes across the country. For the above reasons, we urge you to add Z-Wave to the list of technologies that are required to move this vision of an American Smart Grid forward. Thank you for your consideration. Mit freundlichen Grüßen i.A. Bernd Gerhards Merten GmbH Lösungen für intelligente Gebäude _____ Bernd Gerhards ; Merten by Schneider Electric ; Installation Systems & Control (ISC) Business ; Product Line Manager CONNECT Phone: +49 2261 702 443 ; Mobile: +49 170 761 7325 Email: bernd.gerhards@de.schneider-electric.com ; Site: www.merten.de ; Address: Fritz-Kotz-Strasse 8, 51674 Wiehl, Germany Geschäftsführer: Dominique Bellot, Manfred Steffen Sitz Wiehl, RG. Köln HRB 63919 Vorsitzender des Aufsichtsrates: Jose Lorenzo Lista *** Please consider the environment before printing this e-mail	
55	7.30.09	Jean Pascal, Nathan DeSimone Z-Wave Technology & Automation jean@zwave.com.br cc'd The.Secretary@hq.doe.gov; TheSec@doc.gov	SGC	Dear Congressman X/NIST Committee: After reviewing the document published by EPRI with respect to the NIST Smart Grid Interoperability Standards Framework which will describe a high-level architecture, identify an initial set of key standards, and provide a roadmap for developing new or revised standards needed to realize the Smart Grid we, Z-Wave Alliance members recommend that Z-Wave technology be added to the standards for this initiative. Z-Wave is a short-range, wireless communications technology that is the accepted standard for wireless home control and automation. From thermostats to lighting and appliance controllers to motorized blinds and pool pumps, Z-Wave has the ecosystem of interoperable products that puts energy conservation and management into the hands of consumers.	Z-Wave is now listed in Section 10.

#	DATE	WHO	SOURCE	COMMENT	Response
				We believe there are many technology standard options in play for the HAN (home area network) and to best serve the end consumer there should not be exclusivity for any one technology. In the effort to establish the standards that the Obama administration is looking for to create a robust and secure energy grid infrastructure, Z-Wave should be considered a prominent player for the following reasons: The breadth of interoperable products currently available in the consumer marketplace in new home construction, aftermarket professional retrofits and retailers such as Amazon.com, Lowe's, Fry's and others as well as widely exported to other countries. Dozens of industry-leading manufacturers and blue chip brands worldwide have developed or are developing Z-Wave-based products, resulting in choices for the consumer – an important consideration for broad adoption. Market competition has driven affordable mass-market pricing for Z-Wave products, making them available to the average homeowner for rapid deployment. With its tradition of backward compatibility, Z-Wave is future-proof .Products developed with newer versions of the technology work with products based on earlier versions of the technology. The end consumer has established a connection with Z-Wave. It is the mass market technology of choice in thousands of homes across the country and overseas. For the above reasons, we urge you to add Z-Wave to the list of technologies that are required to move this vision of an Universal Smart Grid forward. Thank you for your consideration. Best regards, Jean Pascal Nathan De Simone Z-Wave Technology & Automation e-mail: jean@zwave.com.br	
56	7.30.09	Robin Lunt, NARUC RLunt@naruc.org	SGC	Attached please find the National Association of Regulatory Utility Commissioner's Comments on the Interim Smart Grid Roadmap. Thanks, Robin Robin J. Lunt ASSISTANT GENERAL COUNSEL 1101 Vermont Avenue, NW Suite 200 Washington, DC 20005 Telephone: (202)898-1350 Fax: (202)898-1559 COMMENTS OF	General Principles for Standards: These principles are excellent. Standards Must Support Various Regulatory Approaches: The NIST Priority Action Plan that is developing the Pricing Model recognizes the need for a very flexible model that can reflect the varied regulatory situations, utility requirements, customer choices, and need for experimentation over time, while including cyber security and safety requirements. Active participation by regulators would be very welcome. Concern about the Roadmap's Intention to Evaluate Regulatory Policy: It is understood that regulatory policies are the purview of the regulators and certainly not NIST. However, it is also clear that regulations will profoundly affect utilities, customers, and the vendors developing Smart Grid products and services. Some existing regulations will most likely have to be modified to reflect

#	DATE	WHO	SOURCE	COMMENT	Response
				THE NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS The National Institute of Standards and Technology (NIST) published a report from the Electric Power Research Institute to NIST on the Smart Grid Interoperability Standards Roadmap ("Roadmap"), and requested comments through a publication in the Federal Register on June 30, 2009.1 This Roadmap is not a formally reviewed and approved NIST publication, but will be the basis of their document which will outline NIST's approach to developing consensus around smart grid interoperability standards as directed in the Energy Independence and Security Act of 2007 Section 1305. NARUC's Interest NARUC is a quasi-governmental, non-profit organization founded in 1889. Our membership includes the State public utility commissions serving all States and territories. NARUC's mission is to serve the public interest by improving the quality and effectiveness of public utility regulation. Our members regulate the retail rates and services of electric, gas, water, and telephone utilities. We are obligated under the laws of our respective States to ensure the establishment and maintenance of such services and ensure that such services are provided under rates, terms, and conditions that are just, reasonable, and non-discriminatory. NARUC recognizes the significant work that NIST has undertaken to develop this roadmap and commends NIST on their efforts to create consensus around a robust set of smart grid standards. 1 74 Fed. Reg. 31254. 1 State Commissions Role in the Smart Grid State Commissions regulate the retail, distribution, and bundled transmission lines where much of the smart grid and its accompanying standards will be deployed and implemented. State commissions play an essential role in evaluating smart grid deployments and early deployments will influence the emergence of de facto standards and the State Commissions will adopt mandatory standards for their jurisdiction. Further, the State regulatory process plays an essential role in balancing the needs of the utilities, the grid system, and consumers. Some participants in the NIST standards setting process may not be familiar with the role of regulators at the federal and State level. All of the priority functionalities (Wide Area Situational Awareness, Demand Response, Electric Vehicle Integration, Electric Storage, Advanced Metering Infrastructure, and Distribution Grid Management) involve State Commission authority. The last two priorities, which were not included in the Federal Energy Regulatory Commission (FERC) Smart Grid Policy Statement, are exclusively within State jurisdiction. To that end, many of the standards, developed in the NIST process will have to be adopted by State Regulatory Authorities in order to become mandatory, de jure standards.2 2 The Federal Energy Regulatory Commission, in its final Smart Grid Policy Statement recognized the limitations on its ability to mandate standards outside of wholesale power and interstate transmission. "[T]he Commission finds that EISA grants the Commission the authority to adopt smart grid standards—such as meter communications protocols or standards—that affect all facilities, including those that relate to distribution facilities and devices deployed at the distribution level, if the Commission finds that such standards are necessary for smart grid functionality and interoperability in interstate transmission of electric power, and in regional and wholesale electricity markets. EISA, however, does not make any standards mandatory and does not give the Commission authority to make or enforce any such standards. Under current law, the Commission's authority, if any, to make smart grid standards mandatory must derive from the [Federal Power Act] FPA." Smart Grid Policy, 128 FERC ¶ 61,060, Docket No. PL09-4-000, ¶¶ 22-23, Issued July 16, 2009. While the standards development process is valuable on its own, and voluntary standards may have significant positive effect in shaping the smart grid, the role of the State Commissions in adopting standards should not be underestimated. General Principles for Standards To be successful, the smart grid, and the standards behind the smart grid, must be embraced by customers. To that end, Smart grid policies and standards should enhance interoperability consistent with ensuring cyber security and maintaining or improving reliability.	new realities, such as high penetrations of renewable generation and storage, cyber security requirements, and issues around plug-in electric vehicles. Therefore, it is hoped that regulators will indeed be able to participate actively in the NIST Priority Action Plans and Phase 2 efforts to better understand and respond to the evolving and novel regulatory issues facing utilities and customers as the deployment of the Smart Grid rapidly escalates. Policy Resolution for the Smart Grid: NARUC's policy resolution on the Smart Grid clearly identifies some of the key issues.

#	DATE	WHO	SOURCE	COMMENT	Response
				Smart grid standards should enable a common semantic framework and provide for interoperable communications through open standards (including Internet-based protocols and standards). These standards, should promote a flexible, non-proprietary, open infrastructure that is upgradable to avoid excess costs as a result of obsolescence. Similarly, smart grid standards should create interoperability in the electric grid and information services to foster a vast array of resources and information services. Standards Must Support Various Regulatory Approaches Standards should allow for the flexible, secure, interoperable deployment of the smart grid. Smart grid standards must enable a variety of regulatory policies that best meet the needs of individual States rather than having the standards drive or mandate a particular regulatory policy. In several places, the roadmap asserts the need for dynamic pricing mechanism. While standards may, and should, mandate a common semantic framework that allows smart grid devices to communicate with and respond to prices, these standards should not attempt to standardize a single regulatory pricing model. Significant structural and regional differences among the States preclude the effective implementation of a standard pricing model across the country. The standards recognized by NIST and developed under its direction should enable 3 regulatory flexibility to adopt and experiment with different rate models as smart grid technology evolves and consumer engagement changes. FERC, in its Smart Grid Policy Statement, reiterates this point: “it is not our intention to require the use of dynamic pricing in retail rates.” 3 NIST’s roadmap should follow FERC’s lead and expressly recognize the State’s jurisdiction over retail rates. Concern about the Roadmap’s Intention to Evaluate Regulatory Policy The next steps in the interim report suggest that NIST evaluate policy and regulatory choices to see if changes are necessary to enable new business models and complex technologies, and encourages standard regulatory cost-benefit analyses to address “broader economic and stakeholder issues.” It also suggests the development of an architectural and governance and policy integration process. It is unclear what a development of an architectural governance and policy integration process would entail, but we are concerned about the implication that the policies should be standardized to conform to an energy industry business model. Regulators need to independently evaluate utility decisions and determine if the utility decision are in the best interest of the rate payers. Regulators are mandated to provide just and reasonable rates to their consumers. The decision of what to include in a cost and benefit analysis of a smart grid deployment is an issue for regulators to determine for their State, not something that can or should be standardized. Although it is important to understand the effect of policy and regulatory choices on technology choices, the suggested next steps seem to exceed NIST’s core competency and statutory mandate to “coordinate the development of a framework that includes protocols and 3 Smart Grid Policy, 128 FERC ¶ 61,060, Docket No. PL09-4-000, ¶ 75. model standards for information management to achieve interoperability of smart grid devices and systems.” EISA §1305 (a). While NIST is directed to ensure that these protocols and standards “further align policy, business, and technology approaches in a manner that would enable all electric resources, including demand-side resources, to contribute to an efficient, reliable electricity network” EISA §1305 (a), NIST is not tasked with performing a regulatory review. Rather than focusing on regulatory changes, NARUC encourages NIST to focus its attention on developing flexible standards for the Smart Grid that will facilitate smart grid deployments. If NIST follows the recommendation to evaluate regulatory choices, regulators themselves (or their staff), from the States and FERC, should be the primary, if not exclusive, participants in this evaluation. These regulators have been underrepresented in the majority of the NIST workshops. Regulators have specific statutory obligations and duties that would need to be factored into any analysis. Utilities and other companies hoping to deploy the smart grid technologies that will be implemented under these regulatory policies should not evaluate the policies. Such an evaluation would present potential conflicts of interest, may not be able to clearly understand and address the issues	

#	DATE	WHO	SOURCE	COMMENT	Response
				regulators face, and would likely result in an evaluation with little or no credibility with the regulatory community. Policy Resolution for the Smart Grid NARUC sets policy through resolutions. During NARUC's Summer Meetings in July of 2009, NARUC's committees on Electricity, Critical Infrastructure and Energy Resources and the Environment sponsored, and the Board of Directors approved a resolution on the Smart Grid. The resolution provides recommended principles on which smart grid standards and policies should be based, and is enclosed with these comments for your information. 5 Respectfully submitted, /s/ Robin J. Lunt James Bradford Ramsay GENERAL COUNSEL Robin J. Lunt ASSISTANT GENERAL COUNSEL 1101 Vermont Avenue, NW Suite 200 Washington, DC 20005 Telephone: (202)898-1350 Fax: (202)898-1559 Attorneys for the National Association of Regulatory Utility Commissioners Dated: July 30, 2009 Encl. 6	
57	7.30.09	Bob Saint, NRECA robert.saint@nreca.coop	SGC	Attached are comments to EPRI's Report on the Smart Grid Interoperability Standards Roadmap. <<Comments on Report to NIST on Smart Grid Interoperability Standards Roadmap MultiSpeak 07302009.pdf>> Bob Saint Principal Distribution Engineer, Energy Policy National Rural Electric Cooperative Association (NRECA) 4301 Wilson Blvd Arlington, VA 22203 Phone: (703) 907-5863	Dear Mr. Saint, Thanks for your comments to the Smart Grid Interim Interoperability Standards Roadmap. Your comments have been reviewed with the following results: 2.5.2 – C1: The use of the term "SDO" was used in a liberal sense. The NIST efforts have attempted to include all the key stakeholders to be included in the process, and our recent workshop 3 activities reflect that pledge for fairness and inclusion in the harmonization and development of Smart Grid standards. 2.5.2 – C2: This was not part of this four month project, but it is recognized that profiles will be extremely helpful in supporting

#	DATE	WHO	SOURCE	COMMENT	Response
				Cell: (703) 283-5078 Confidentiality Notice: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, copy, use, disclosure, or distribution is prohibited. If you are not the intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message. To: Dr. George Arnold, National Institute of Standards and Technology From: MultiSpeak Initiative and National Rural Electric Cooperative Association cc: Dr. Gerald FitzPatrick, NIST Date: July 30, 2009 Subject: Comments on “Report to NIST on the Smart Grid Interoperability Roadmap” Introduction The MultiSpeak Initiative and the National Rural Electric Cooperative Association (NRECA) have reviewed the “Report to NIST on the Smart Grid Interoperability Roadmap” and are pleased to offer the following comments to NIST on that document. We believe that the Report is an important effort that gives preliminary direction to the electric power industry as it moves towards an enhanced grid. NIST is to be commended for its efforts to quickly focus the attention of a wide range of industry stakeholders on this critical goal. The comments offered by the MultiSpeak Initiative and NRECA are divided into two categories, those general comments that apply to the entire Report, and comments that pertain to a specific section of the Report. The general comments will be listed first, followed by the more detailed comments. General Comments Use of the term “Common Information Model”. We believe that one of the most important goals that will assist in the development of interoperable suites of applications, and hence, to bring about a smarter grid, is the development of a common semantic model for the various domains in the electric utility industry. In some parts of the Report, the term “common semantic model” is used; especially where the importance of harmonizing different data models - such as IEC 61970/61968 and MultiSpeak - is discussed. In other places where development of a common semantic model is discussed, the term “Common Information Model (CIM)” is used. Since the terms Common Information Model and CIM are commonly used to refer to the IEC 61970 and IEC 61968 families of standards, the implication given in those sections is that the work of IEC TC57 is to be understood to be synonymous with the common semantic model. We believe that there is value to the creation of a semantic model that brings in the best of all data models in common use in the industry on an equal footing. Tools exist to create and maintain such heterogeneous data models. We believe that the development of a true common semantic model will best serve the industry by assisting all stakeholders to converge toward a single semantic model as standards mature. Furthermore, we believe that it would be a serious disservice to the industry to force this semantic model to conform to just one of the candidate data models. Focus first on inter-system interoperability. We believe that the greatest benefits for the least effort industry-wide will result from development of interfaces between actors, so-called inter-system interoperability rather than on interfaces within one actor, such as within one utility. Focus on inter-application interoperability. Similarly, within a single utility, the greatest near-term benefits will accrue from focusing on interfaces between applications rather than those that have traditionally been within the scope of a single vendor’s application. The only domain where intra-application interfaces become truly significant is the customer domain, where many individuals will make device purchase decisions, and where such devices must work together interchangeably and transparently to the user. Specific Comments The following table outlines detailed comments on specific sections of the report. **Section** **Comments**	interoperability requirements. As the next phases of the plan are executed, a Smart Grid Panel and Governance Board will help plan activities and ensure coordination across the various ongoing standards harmonization and development efforts. Profiles will certainly be addressed by teams working within these standards activities. 6.1.3 – C1: MultiSpeak was added to key actions in the section. 6.1.3.1 – C1: Agreed. No additional action taken. 6.2.6 – C1: The Priority Action Plan (PAP08), CIM for Distribution Grid Management, is a living document, and is much more detailed than the synopsis within the roadmap. This PAP activity specifically addresses the effort described in Section 6.2.6 and was part of the past workshop activities August 3-4. By including you as a leading member of that team, we believe this has been properly addressed. 6.2.6 – C2: No action taken. 6.2.6 – C3: No action taken. 9.1.3 – C1: We believe that a harmonization effort between MultiSpeak and IEC 61968 is necessary and ongoing. 10.53 – C1: Changes made in roadmap document to reflect new description. 10.53 – C2: Changes made in roadmap document to reflect new description. 10.53 – C3: Changes made in roadmap document to reflect new description. 10.53 – C4: Changes made in roadmap document to reflect new description.

#	DATE	WHO	SOURCE	COMMENT	Response
				2.5.2 ***Background:*** Section 2.5 lists important measures of maturity of the smart grid landscape; section 2.5.2 addresses the metric "\ ***Comments:***	
				1) 2.5.2 – C1: The first bullet in Section 2.5.2 lists as a metric for mature standards availability that "Open stable and mature ind consensus processes from standards development organizations (SDOs) are available". While we agree with the importance of standards development, we believe that open industry consortia, such as MultiSpeak provide a valid alternative mechanism for t useful industry standards. The limitation of the choice of standards to those developed by SDOs eliminates valid alternative proc market more quickly than the traditional SDO process.	11.1.1 – C1: Text modified in roadmap document. 11.1.2 – C1: Text modified in roadmap document.
				2) 2.5.2 – C2: An additional requirement for well-developed standards to be in place that is missing from this list is the developn availability of a standard is often not adequate to ensure interoperability among applications in a multi-vendor environment; it is a agreements on how the standard will be constrained so that all vendors implement the standard in the same manner. Only after possible to have true interoperability that can be tested in a uniform and repeatable manner.	11.2.1 – C1: Text modified in roadmap document. 11.2.1 – C2: Text modified in roadmap document. 11.2.1 – C3: Text modified in roadmap document.
				6.1.3 ***Background:*** Section 6.1.3 addresses the need for a common semantic model that spans the commonly applied data models ir	11.2.2 – C1: Text modified in roadmap document.
				1) 6.1.3 – C1: The MultiSpeak data model should be included in the list of data models addressed in the common semantic mod elsewhere in Section 6 about the importance of harmonizing (i) MultiSpeak with IEC 61970/61968 CIM and (ii) MultiSpeak with II	11.4.1 – C1: Text modified in roadmap document.
				6.1.3.1 ***Background:*** Section 6.1.3.1 addresses the need for common meteorological and geospatial models. ***Comments:***	11.5.2 – C1: Text modified in roadmap document.
				1) 6.1.3.1 – C1: Although the discussion addresses the importance of including weather observations, the types of observations response use cases. It also will be important to include wind intensity and direction as well as lighting strike incidents to support optimal outage restoration.	11.6.2 – C1: Text modified in roadmap document.
				Sectio n **Comments** 6.2.6 ***Background:*** This section addresses distribution grid management initiatives. ***Comments:***	11.6.2 – C2: Text modified in roadmap document.
				1) 6.2.6 – C1: We agree with the goals addressed in this section, although clarification is needed on what is anticipat profile for MultiSpeak…". The current plan for developing a semantic bridge between CIM and MultiSpeak is twofold: MultiSpeak and CIM data models with the goals of identifying gaps in both models and facilitating electronic translatic the two standards, and (ii) development of a CIM profile (using CIM objects and messaging) that provides the same f a longer term effort that will be supported by the development of the common semantic model discussed in Section 6	
				2) 6.2.6 – C2: MultiSpeak has already developed an adequate and consistent profile and set of service definitions to The MultiSpeak effort plans to assist the CIM effort to complete their development of adequate object definitions and	
				3) 6.2.6 – C3: MultiSpeak development plans include support for distributed generation, PEV, distributed storage, de We plan to coordinate our development with the IEC CIM effort where it is possible to do so.	

#	DATE	WHO	SOURCE	COMMENT	Response
				9.1.3 ***Background:*** This section addresses the proposed standards profile for service providers. ***Comments:*** 1) 9.1.3 – C1: We believe that MultiSpeak will also play a key role as an alternative to IEC 61968 for interfacing serv especially at the "GWAC Stack" layer 4 – Semantic Understanding. 10.53 ***Background:*** This section is a description of the MultiSpeak Specification. ***Comments:*** 1) 10.53 – C1: The description of the application for MultiSpeak should read "Application: Integration for utilities, ven enterprise integration including the transmission, distribution, metering, demand response, and procurement domains 2) 10.53 – C2: The description of actors should read "Actors: Transmission and distribution components, meters, sof providers." 3) 10.53 – C3: The description for interfaces should read "Interfaces: Common semantics, message structure and bu to application information exchange and inter-application exchange of control signals." 4) 10.53 – C4: The description of maturity should read: Maturity: Three previous versions. Version 4.0 has been issu Version 4.0 is on-going. Has user group. Has extensive training for adopters and integrators. Has had robust certifica 11.1.1 ***Background:*** This section addresses "Requirements and Standards Gaps Related to Demand Response and Marke 1) 11.1.1 – C1: The requirement entitled "Extend IEC 61968 standard for DER" should be called "Extend IEC 61968 MultiSpeak must also be extended with DER models, just as must IEC 61968. We intend to perform this extension in discussed for IEC 61968. The MultiSpeak Initiative should be added to the parties concerned with this issue in the co section for this requirement. **Section** **Comments** 11.1.2 ***Background:*** This section addresses "Discussion Issues Related to Demand Response and Markets". This commen pricing and market information". ***Comments:*** 1) 11.1.1 – C2: The MultiSpeak Specification also needs to be updated to handle pricing information. MultiSpeak sho the "Discussion Issues" column and in the column entitled "Standards Potentially Involved".	

#	DATE	WHO	SOURCE	COMMENT	Response
				11.2.1 ***Background:*** This section addresses the "Requirements and Standards Gaps Related to Wide Area Situational Awa 1) 11.2.1 – C1: This comment pertains to the requirement entitled "Extend IEC 61850 standard from the substation t intends to include IEC 61850-formatted data, thus the same requirement for harmonizing IEC CIM with IEC 61850 als 61850. The MultiSpeak Initiative should also be included in the "Who" column for this requirement. 2) 11.2.1 – C2: This comment pertains to the requirement entitled "Exchanging both transmission and distribution po widely used in the industry to exchange both transmission and distribution power system models. All of the discussio models also pertains to MultiSpeak. MultiSpeak should be listed in the column entitled "Standards" for this requireme be included in the "Who" column for this requirement. 3) 11.2.1 – C3: This comment pertains to the requirement entitled "Broad discussion on functional integration of EMS be used for integration of the types discussed in this requirement listing. All of the discussion regarding the use of IEC MultiSpeak. MultiSpeak should be listed in the column entitled "Standards" for this requirement. The MultiSpeak Initia "Who" column for this requirement.	
				11.2.2 ***Background:*** This section addresses "Discussion Issues for Wide Area Situational Awareness". This comment addre standards to be used for data management". ***Comments:*** 1) 11.2.2 – C1: The MultiSpeak Specification also needs to be included as a potential standard in this domain. MultiS standards in the "Standards Potentially Involved" column and the MultiSpeak Initiative should be included in the colur	
				11.4.1 ***Background:*** This section addresses the "Requirements and Standards Gaps Related to Electric Transportation". ***C*** 1) 11.4.2 – C1: This comment pertains to the requirement entitled "Extend IEC 61968 standard for DER". MultiSpeak models and intends to do so in a manner consistent with similar development in IEC 61968 where possible. MultiSpe entitled "Standards" for this requirement. The MultiSpeak Initiative should also be included in the "Who" column for th	
				Section **Comments** 11.5.2 ***Background:*** This section addresses "Discussion Issues for AMI Systems". This comment addresses the issue "Disc energy providers should use". ***Comments:*** 1) 11.5.2 – C1: The MultiSpeak Specification also needs to be included as a potential standard in this domain. MultiS standards in the "Standards Potentially Involved" column and the MultiSpeak Initiative should be included in the colur	

#	DATE	WHO	SOURCE	COMMENT	Response
				11.6.2 ***Background:*** This section addresses "Discussion Issues for Distribution Operations and Management". ***Comments:*** 1) 11.6.2 – C1: This comment addresses the issue "What GIS standards should be specified, developed, or extende needs to be included as a potential standard in this domain. MultiSpeak should be added to the list of standards in th column and the MultiSpeak Initiative should be included in the column entitled "Who". 2) 11.6.2 – C2: This comment addresses the issue "Distribution operations access to bulk generation information". T to be included as a potential standard in this domain. MultiSpeak should be added to the list of standards in the "Star the MultiSpeak Initiative should be included in the column entitled "Who". Prepared and submitted by: Bob Saint MultiSpeak Program Manager National Rural Electric Cooperative Association Robert.saint@nreca.coop Gary McNaughton MultiSpeak Technical Coordinator Cornice Engineering gmcnaughton@corniceengineering.com	
58	7.30.09	Becca Dietrich, GridWise Alliance bdietrich@gridwise.org	SGC	Dr. Arnold: Attached please find the comments from the GridWise Alliance comments on the Report to NIST on the Smart Grid Interoperability Standards Roadmap. Please let me know if you have any issues with opening the document. Kind Regards, Becca Dietrich Becca Dietrich Director GridWise Alliance 1155 Fifteenth St, NW Suite 500 Washington, DC 20005 (202) 530-9740 Phone (202) 530-0659 Fax July 30, 2009 Dr. George W. Arnold National Coordinator for Smart Grid Interoperability National Institute of Standards and Technology 100 Bureau Drive Stop 8100 Gaithersburg, MD 20899-8100 Dr. Arnold: On behalf of the GridWise® Alliance, we would like to thank the National Institute of Standards and Technology (NIST) for the opportunity to review and provide comment on the Report to NIST on the Smart Grid	Dear Ms. Hamilton, Thanks for your comments to the Smart Grid Interim Interoperability Standards Roadmap. Your comments have been reviewed with the following results: C1: Workshop 1, 2, and 3 had nearly 400, 700, and 350 participants respectively. The process has been completely transparent and inclusive with outreach to a large variety of stakeholders and experts. We continue to work hard to ensure a fair and level playing field and appreciate your ideas on how to get greater participation. In Phase 2, which begins this month, a Smart Grid Panel will be created and the use of collaborative technologies will be utilized to minimize travel requirements. Also, the next large in-person gathering is being aligned with the Grid Interop meeting in Denver in November. C2: Respectfully, a roadmap should have a destination. The Interim Roadmap identifies this endpoint by defining a set of characteristics in section 2 Smart Grid Vision. The section 6 on priority actions are the specific near-term action recommendations that came directly out of the second workshop, The actual milestones for each of these actions will be ongoing. Specifically, in the third workshop that followed the publishing of the commented on draft, the 14 top priority actions identified by NIST were elaborated in significant scope and detail and actual action steps identified and scheduled. In the

#	DATE	WHO	SOURCE	COMMENT	Response
				Interoperability Standards Roadmap released June 17, 2009. The GridWise Alliance is a consensus-based coalition comprised of over 90 members from all along the energy supply chain including utilities, technology providers, software and communication companies, venture capitalists, and academia. The Alliance is technologyneutral in our advocacy for a smarter grid. The Alliance applauds NIST for undertaking this enormously important and essential effort in developing a roadmap for the creation of interoperability standards. These standards are critical to the realization of a fully integrated smart grid. The GridWise Alliance appreciates that the Congressionally-mandated deadline for completing this initial phase was proscribed in the Recovery Act. While the process is moving in a positive direction, we are concerned that the sense of urgency is driving the process forward at the expense of quality, consistency, true consensus, transparency and practicality. Our overall concerns include the following: • C1: Participation by the most knowledgeable participants.- Development of a standards landscape must be inclusive with an outreach approach that allows for adequate representation from key stakeholders. While we are pleased to see that NIST has continually emphasized the participation in the process from a broad base of stakeholders, the two Phase 1 workshops had less than 20% attendance from the utility community. Given the frequency and timing of the meetings and the requirement to participate in person, some key stakeholders, including smaller utilities (like coops and municipalities), utility software experts, and small manufacturers have been unable to participate in this process. The Alliance suggests that NIST consider a Regional Approach, allowing opportunities for stakeholder input from across the nation. There may be existing entities within the Departments of Commerce or Energy that have a structure to facilitate such an outreach. Every effort should be made to open the process to allow for more flexibility and ease of participation through multiple modes including scheduling of meetings in conjunction with other events, on-line video streaming of proceedings, hosting webinars, and providing email updates. It is vital to ensure that the broad range of stakeholders, especially asset owners, continues to be encouraged to participate in this vital effort. • C2: The roadmap as a continuum of steps - We believe there is a general lack of clarity around what the current state of the grid is, and toward what goal we are all working. NIST has accepted the EISA 2007 assignment to develop a standards roadmap resulting in an interoperability process, but this roadmap should not describe the end state. Instead, it should identify near-term gaps in standards, and map out a series of milestones that can guide us toward a future state that currently lacks definition and consensus. The grid should not be seen as static; the process should reflect this evolutionary quality and foster innovation. The workshop's lack of structure proved problematic for our members, and seemed to focus on obscure future outcomes rather	Phase II and Phase III of the NIST plan (Interim Roadmap was Phase I) NIST expects that the creation of a Smart Grid Standards Panel (SGP) will carry forward the work of further elaboration and execution of the roadmap steps. We believe that this supports your vision that the Smart Grid should indeed not be seen as static and is evolutionary in nature. With regard to immediate deployments, the recommendation was to go forward considering all rules and mandates allocated by parties unrelated to the Interim Roadmap document and process which by needs runs in parallel to the other ARRA activities. The aggressive involvement of the 600 stakeholders in the workshops should serve as a sound basis for discovery of the immediate needs and interests of those present. With regard to the GWAC stack, it was introduced briefly in section 3.2.1 "Scope of the Conceptual Model". It next is referred to in an Appendix A; Standard Profiles by Domain. In this section we believe we are artfully applying the valuable notions of GWAC stack as an extension of the earlier usage of the ISO 7-Layer model. That is, as an organizing and discussion principle, communications discourse in the 80s and 90s found great utility in the use of the gross definitions of the seven layers to discuss, as well as, to organize component standards. For example, when someone describes TCP as being a "Transport Layer Standard" most technical people will readily understand this and why. Similarly, IP is a "Network Layer Standard". This relation and recognition stems exclusively from the fact that the 7=layers as an organizing principle is well shared and understood. The Smart Grid, and modern communications as well, is more complex than the simple 7 layers envisioned by the OSI efforts. Today we know that application layer semantics and business processes that lie above the top of the 7-layer stack also need to be standardized to achieve interoperability. Thus, to take advantage of the extended definitions of the GWAC stack, the authors chose to use them as just such an organizing principle to allow relating various otherwise unrelatable standards (for example WiFi and ANSI C12.19) to some common framework. By this means, it was possible to illustrate the substantial overlaps in currently used and proposed standards-based technologies considered by those attending the second workshop.

#	DATE	WHO	SOURCE	COMMENT	Response
				than on real issues our smart grid deployments face today. The sequence and prioritization of activities should focus on what needs to happen in the near-term to accommodate near-term deployment of smart grid. Clarity of information - Supporting diagrams should be clear and concise in order to avoid confusion. The outcome would be better served by making the document as precise as possible. For example, the addition of the GridWise Architecture's (GWAC) Stack served to confuse participants. This document was unfamiliar to many and it was confused with the OSI 7-layer stack for data networking and communications. Going forward, the outcomes would be better served by making these documents accurately reflect the purpose for which they are being used. This clarity must also be extended to any subsequent reports. For example, the conceptual model used in the second workshop and in the EPRI report does not accurately describe the electricity system today, and may only marginally describe its future state. Furthermore, with the broad representation from our stakeholders (especially those new to the space), it is important that definitions are clearly spelled out for various terms that are used throughout the document. For example, there are various references to "systems" throughout including electric system, electricity delivery system, distribution system, and power system. These terms, without a clear definition, may be taken in a different way by the various stakeholders. Also, the key communications diagrams such as Figure 16 (Demand Response) depict communications paths that are not defined. • C3: The process used to generate this roadmap – The current roadmap document was developed through inputs from the various Domain Expert Working Groups, the two working meetings in April and May, plus a significant, but non-transparent effort by the EPRI/NIST team. This process has not flowed as an organized, logical, consistent, top-down analysis. For example, a number of standards were excluded from the list in the first report that were both broadly discussed in the first workshop and are broadly deployed in the industry. The result of this process is reflected in the roadmap document that we have today. Significant thought needs to be placed on the appropriate organization and process for moving forward to generate a useable roadmap that has acceptance from a broad set of stakeholders. Clarity regarding the full scope of the interoperability roadmap needs to be provided. • C4: Intended audience of document - . We would like to understand the intended audience of the release, whether it will be limited to the Untied States or if it will include all of North America. Moreover, it is important to recognize that this process and its outcomes may set precedence for countries like China and Korea to determine if they will need to develop standards on their own. In addition to the overarching comments discussed above, there are a number of specific comments on the	To address your observation that there isn't consistency between all elements of the Conceptual Model and section 4, the following was added to end of section 3.2 The Conecptual Model the following: "Note that the Conceptual Model, as presented, is not intended to comprehensive in identifying all actors and all paths possible in the Smart Grid. This achievement will only be possible after substantial time and additional elaboration and consolidation of Use Cases is achieved by stakeholder activities that are ongoing." Also, the first paragraphs of section 4 identify that normalization of the information within and external to section 4 (i.e. conceptual model) is recommended as subsequent work. With regard to the concern about definitions of terms, such as system, we have added the following definition to section 7.1 System a regularly interacting or interdependent group of items forming a unified whole; a group of devices or artificial objects or an organization forming a network especially for distributing something or serving a common purpose. C3: The document was developed with input from the DEWGs, EPRI/NIST, and a host of stakeholders. The process has been open and feedback has been solicited and received on the open, collaborative TWIKI. Input from the workshops and the TWIKI have been incorporated along the way as the document moved publicly from several draft versions to its current state as a final interim roadmap. C4: The intended audience is the United States, but other North American and International organizations have been fully engaged in the process. International harmonization and agreement on standards is desired and being pursued as part of the Priority Action Plans, but the desire is to accelerate the standards process. C5: The executive summary mentions: •Developing a common semantic model – Section 6.1.3 •Developing a common pricing model standard – Section 6.1.1 •Developing a common semantic model for advanced metering,

#	DATE	WHO	SOURCE	COMMENT	Response
				document itself: 1) C5: The Executive Summary identifies near-term actions that NIST can take to advance the Interoperability Framework; these are referenced as coming from Section 6. The prioritization between this listing and that in Section 6 is not in alignment. Moreover, there appears to be a disconnect with how these items support the long-term goals. It would be good to have a paragraph at the end this section that ties all of these pieces together and sets an expectation for the future. 2) C6: In Section 2.1.1 Smart Grid Benefits, Safety and Cyber Security Benefits, the statement is made that, "Higher cyber security is built into all systems and operations including physical plant monitoring, cyber security, and privacy protection of all users and customers." This statement is confusing as written since it appears to indicate that cyber security is built into cyber security. 3) C7: In Section 2.2.1, there are several benefits that are ascribed to the smart grid. These benefits should be supported with data and references to further clarify these items. 4) C8: In Section 2.3, communications and two-way communications should be defining characteristics of Smart Grid Equipment. 5) C9: In Section 2.3.2, there should be an introductory paragraph that includes a strategy about minimizing "stranded investment" and more accurately describes "islanding" equipment." Moreover, legacy equipment should be addressed in this section. The bullet titled "Information/data privacy" should be changed to read "Information and Data Privacy." Non-repudiation should also be mentioned in that description. 6) C10: In Section 2.6, there should be the inclusion of the Public/Private Standards Panel as part of the Phase 2 effort and how this will play a role in the government process. 7) C11: In Section 3.2.2 - Figure 7, Overview of the Customer Domain does not adequately describe the emerging components all customers will deploy – distributed wind and solar, electric vehicles, distributed generation, etc. These should be referred to directly, with a focus on standards and interoperability, and not to customer domains. 8) C12: In Section 3.2.5 - Figure 10, Overview of the Operation Domain – Revenue Protection functions should be included in this domain and should fall under either the Meter Reading & Control or the Financial applications. 9) C13: In Section 3.3.2, there is a discrepancy within the section. It states that NERC CIP standards are mandatory for a specific domain of the Smart Grid. As written, this could be misconstrued to imply that Smart Grid must comply with NERC CIP 002-009. 10) C14: Both in Section 4.7, AMI Systems, and throughout the document, there was no reference to NIST	demand response and electric transportation – Sections 6.2.5, 6.2.1, and 6.2.4 •Conducting an analysis to select Internet Protocol Suite profiles for smart grid applications – Section 6.3 •Investigating Communications Interference in Unlicensed Radio Spectrums – Section 6.1.5 •Developing common time synchronization and management – Section 6.1.2 •Coordinating efforts across Standards Development Organizations – Discussed throughout Chapter 6 C6: Changes made in roadmap document to reflect new description. C7: How would you propose clarifying? C8: Can you please provide further guidance? It is unclear what you are referencing. C9: Legacy equipment is discussed in multiple places within the document and the reviewer felt it was adequately addressed. Bullet was modified and references to data integrity and non-repudiation added. C10: Text modified in roadmap document. C11: All of the items are in the conceptual drawing. Please look again. C12: This item requires escalation. C13: The reviewer did not agree with this assessment. C14: There is a statement at the beginning of the section: The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Use cases were seeded from a number of different locations, including UCAIug OpenAMI and SCE. C15: A large parallel effort with cyber security is being managed by Annabelle Lee. Supporting documentation to the roadmap is being developed separately. Much more detailed

#	DATE	WHO	SOURCE	COMMENT	Response
				acknowledging the UCAIug's Open AMI Use Cases or the Southern California Edison (SCE) AMI Use Cases. These are the two prominent standard use case sets currently being used in the industry. If NIST is proposing a move away from these standards, then it should be noted, or an additional appendix should be added to address these AMI uses cases and their origin. 11) C15: In Section 5, there is a gap in the provision of a threat model. It is difficult to define and identify defensive measures upon which to build business decisions for managing risks without an understanding of the underlying threat itself. Additionally, the model should recognize that the nature of the threat may shift based on the geographic region. In addition, this section should include the many fundamental controls that are applied for all systems and smart equipment. 12) C16: In Section 6, the Key Actions are noted as "should" be done. These Key Actions are imperative activities and as such, should be described with a more definitive verb such as "will". Again, we appreciate the opportunity to provide this input. We hope that NIST will see and use the Alliance as a resource on smart grid policy issues and in developing the roadmap deliverables. Our members are vested in smart grid and want NIST to be successful with a positive outcome. Kind Regards, Katherine Hamilton President, GridWise Alliance	documentation is coming. C16: This was discussed at some length before publication. We decided to use "should" instead of "will" because the authors can only make recommendations, not provide orders.
59	7.30.09	Ryan Colker, ASHRAE RColker@ashrae.org		Dr. Arnold, ASHRAE is pleased to provide the attached comments in response to the EPRI report "Report to NIST on the Smart Grid Interoperability Standards Roadmap." Please let us know if you require any additional information. Ryan --- Ryan Colker, Manager, Government Affairs American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.	No comments found.

#	DATE	WHO	SOURCE	COMMENT	Response
				Direct Line: 202-833-1830 Fax: 202-833-0118 eMail: RColker@ashrae.org Web: www.ASHRAE.org 1828 L Street, N.W., Ste. 906 Washington, DC 20036 Be Green, Save Time - Renew And Join ASHRAE Online http://www.ashrae.org/certification/page/1683 Please consider the environment before printing this e-mail. July 30, 2009 George Arnold National Institute of Standards and Technology 100 Bureau Drive Stop 8100 Gaithersburg, MD 20899 Re: EPRI Report to NIST on the Smart Grid Interoperability Standards Roadmap Dear Dr. Arnold: We congratulate NIST for its leadership on development and implementation of a comprehensive framework for the implementation of a Smart Grid. We are pleased that NIST and the initial EPRI report have recognized the utility of ANSI/ASHRAE Standard 135-2008 as an integral part of the framework. NIST has been a critical participant in the development of the standard and we appreciate the long-standing support provided by the Institute. As NIST continues to engage the relevant stakeholders, ASHRAE is pleased to remain an active participant and explore the steps necessary to make the Smart Grid a reality. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), founded in 1894, is an international organization of over 50,000 members. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. As the report recognizes, mature open consensus standards with broad stakeholder buy-in are critical to implementation of the Smart Grid. Since its initial development in 1995, the BACnet standard has provided an open, consensus-based standard establishing a common communication protocol in the building automation and controls industry. With the increased need for communications protocols between buildings and the Smart Grid, the BACnet committee has been considering updates to aid the development of protocols to assist in the implementation of the Smart Grid. The BACnet committee's long-standing Utilities Integration Working Group has been engaging utility companies and working with national labs on grid related technologies like real-time pricing and automated demand response for many years. This group, which is being re-chartered as the Smart Grid Working Group (SG-WG), is well positioned to lead BACnet's efforts as the nation moves toward creating an interoperable Smart Grid. We look forward to interacting with other relevant SDOs to determine methods for common pricing, information, and weather models. Comments to NIST Smart Grid Interoperability Standards July 30, 2009 Page 2 of 2 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. A N I N T E R N A T I O N A L O R G A N I Z A T I O N Aiding this effort is an update to the network security specifications for the BACnet protocol. The committee moved forward for publication an addendum that adds state-of-the-art digital signatures and encryption (SHA-256/HMAC and AES) to enable the creation of FIPS-compliant secure communications. This technology will be available on all BACnet media types and joins the capabilities of the certificate-based SSL/TLS that can be employed when using BACnet Web Services (BACnet/WS). Together, these technologies will serve the high security needs of the Smart Grid initiatives.	

#	DATE	WHO	SOURCE	COMMENT	Response
				BACnet has been communicating on standard IP networks for more than 10 years now. To ensure that BACnet continues to integrate well into corporate infrastructures and to expand it into the emerging market areas enabled by ubiquitous IP networking, the committee has formed a new working group to investigate the opportunities for adopting more key capabilities and best practices from the Information Technology industry. This group will be working to facilitate the continued convergence of the IT and Building Automation infrastructures. As NIST continues to develop the framework for the development of the Smart Grid, please consider ASHRAE and its BACnet committee as a resource. Should you have any questions or require additional information, please contact the ASHRAE Washington Office at 202-833-1830 or washdc@ashrae.org. Respectfully Submitted, Gordon V.R. Holness http://www.ashrae.org/IBDbroadcast	
60	7.30.09	Cora Peterson, Ohio PUC Cora.Peterson@puc.state.oh.us	SGC	The attached comments are submitted as directed in the Notice appearing in the June 30, 2009 Federal Register, 74 Fed. Reg. 31254 (June 30, 2009). Please docket them in Docket Number 0906181063-91064-01. Thank you. Cora G. Peterson Legal Secretary Public Utilities Section Ohio Attorney General's Office 180 East Broad Street, 9th Floor Columbus, OH 43215-3793 (614) 466-4396 (direct dial) (614) 644-8764 (fax) (see Attachment)	Conceptual Model: The conceptual model was developed by a team of experts over a 3 day period. Feedback has been very positive. It sounds like you would prefer a physical architecture, which is much different from what was presented in the roadmap. The reason we chose to use a conceptual model was because we wanted to capture functionality within domains and not limit future innovation and physical architecture. Common Pricing Model: NIST is not responsible for developing a common pricing model. As with all of the recommendations and Priority Action Plans moving forward, NIST is a coordinator and facilitator. The SDO community will develop the model. Over the last 4 months, NIST has engaged with a large cross-section of Smart Grid stakeholders and the lack of a common pricing model was actually the number one priority that came out of the second workshop. If you would like to get more engaged with that effort (PAP03), contact David Holmberg to be part of the team. Internet Protocols: See above. If you would like to become more engaged with this effort (PAP01), please contact David Su.

#	DATE	WHO	SOURCE	COMMENT	Response
				UNITED STATES OF AMERICA BEFORE THE DEPARTMENT OF COMMERCE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY Report to NIST on the Smart Grid Interoperability Standards Roadmap Contract No. SB 1341-09-CN-0031. : Docket No. 090618106B-91064-01 COMMENTS ON BEHALF OF THE PUBLIC UTILITIES COMMISSION OF OHIO July 30, 2009	
61	7.30.09	Ed Goff, IT&T Security, edwin.goff@pgnmail.com	SGC	To whom it may concern, Please accept the submission of the attached document as Progress Energy's comments to EPRI's Report to NIST on the Smart Grid Interoperability Standards Roadmap. Thank you Ed Goff, CISSP	This is the exact same comments as those from Katherine Hamilton. Dear Mr. Goff, Thanks for your comments to the Smart Grid Interim Interoperability Standards Roadmap. Your comments have been reviewed with the following results: C1: Workshop 1, 2, and 3 had nearly 400, 700, and 350 participants respectively. The process has been completely transparent and inclusive with outreach to a large variety of stakeholders and experts. We continue to work hard to ensure a fair and level playing field and appreciate your ideas on how to get greater participation. In Phase 2, which begins this month, a

#	DATE	WHO	SOURCE	COMMENT	Response
				System Architect - IT&T Security Progress Energy Mail Code: CDC P.O. Box 1551 Raleigh, NC 27602 m 919-812-2202 (see Attachment) Progress Energy memo Date: July 30, 2009 To: George Arnold 100 Bureau Drive, Stop 8100 National Institute of Standards and Technology Gaithersburg, MD 20899-8100 From: Ed Goff, CISSP System Architect - IT&T Security Progress Energy Mail Code: CDC P.O. Box 1551 Raleigh, NC 27602 m 919-812-2202 Subject: EPRI Report to NIST on the Smart Grid Interoperability Standards Roadmap Dr. Arnold, Let me start by stating that for the time and effort invested to date, I think this document is generally very good and on tract with the best direction for this initiative. However, I do have some specific questions and suggestions for improvement highlighted in the following sections. Based on our experience with this process and with a great deal of feedback from various peers, we feel there needs to be more transparency throughout all of the important steps in the process. For example, how the Public-Private Panel will be formed, how we will achieve balanced representation of stakeholders in this panel, the scope of the roles, and how governance will be realized. Another example is how we'll achieve true consensus of the stakeholders on the roadmap, standards, and other requirements as we go through this process. Also, based on our experience, we feel there are still far too few asset owner utilities actively engaged in this very important initiative. In every step of this process to date, asset owner utilities are outnumbered many-to-one. We need more active participation of the stakeholder asset owners by any means possible. Many interested parties and vendors do Progress Energy Service Company, LLC	Smart Grid Panel will be created and the use of collaborative technologies will be utilized to minimize travel requirements. Also, the next large in-person gathering is being aligned with the Grid Interop meeting in Denver in November. C2: Unsure how to respond. C3: The document was developed with input from the DEWGs, EPRI/NIST, and a host of stakeholders. The process has been open and feedback has been solicited and received on the open, collaborative TWIKI. Input from the workshops and the TWIKI have been incorporated along the way as the document moved publicly from several draft versions to its current state as a final interim roadmap. C4: The intended audience is the United States, but other North American and International organizations have been fully engaged in the process. International harmonization and agreement on standards is desired and being pursued as part of the Priority Action Plans, but the desire is to accelerate the standards process. C5: The executive summary mentions: •Developing a common semantic model – Section 6.1.3 •Developing a common pricing model standard – Section 6.1.1 •Developing a common semantic model for advanced metering, demand response and electric transportation – Sections 6.2.5, 6.2.1, and 6.2.4 •Conducting an analysis to select Internet Protocol Suite profiles for smart grid applications – Section 6.3 •Investigating Communications Interference in Unlicensed Radio Spectrums – Section 6.1.5 •Developing common time synchronization and management – Section 6.1.2 •Coordinating efforts across Standards Development Organizations – Discussed throughout Chapter 6 C6: Changes made in roadmap document to reflect new description. C7: How would you propose clarifying? C8: Can you please provide further guidance? It is unclear what you are referencing. C9: Legacy equipment is discussed in multiple places within the document and the reviewer felt it was adequately addressed. Bullet was modified and references to data integrity and non-

#	DATE	WHO	SOURCE	COMMENT	Response
					repudiation added. C10: Text modified in roadmap document. C11: All of the items are in the conceptual drawing. Please look again. C12: This item requires escalation. C13: The reviewer did not agree with this assessment. C14: There is a statement at the beginning of the section: The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Use cases were seeded from a number of different locations, including UCAIug OpenAMI and SCE. C15: A large parallel effort with cyber security is being managed by Annabelle Lee. Supporting documentation to the roadmap is being developed separately. Much more detailed documentation is coming. C16: This was discussed at some length before publication. We decided to use “should” instead of “will” because the authors can only make recommendations, not provide orders.
62	7.30.09	Gary Stuebing, Duke Energy Gary.Stuebing@duke-energy.com	SGC	Please find the Comments from Duke Energy related to the Roadmap attached. ========== Gary Stuebing Gary.Stuebing@duke-energy.com Strategic Planning Manager Phone: (704) 382-9787 Duke Energy Fax: (980) 373-9822 400 South Tryon ST17B Cell: (704) 519-9925 Charlotte, NC 28285 Aug. 18, 2009 Dr. George W. Arnold National Coordinator for Smart Grid Interoperability National Institute of Standards and Technology 100 Bureau Drive Stop 8100 Gaithersburg, MD 20899-8100	This is very close to the comments from Katherine Hamilton. It is very clear that Katherine got “her analysis” based on the input from Gary Stuebing and Ed Goff.

#	DATE	WHO	SOURCE	COMMENT	Response
				Dr. Arnold: Duke Energy would like to thank the National Institute of Standards and Technology (NIST) for providing the opportunity to review and comment on their Smart Grid Interoperability Standards Roadmap. Having a nationally recognized blueprint to align their smart grid initiatives with can reduce the opportunity for utilities to implement products and processes that would be incompatible or become quickly obsolete. As a point of reference NIST must recognize that many products that make up the smart grid architecture are commodity components. Products such as programmable thermostats, relays and switches, to name a few, must be interchangeable or easily replaceable. Technological evolution can render these products obsolete, sometimes within the time span of an implementation project. Therefore the standards surrounding these technologies must be flexible and quickly amended. We would request that clarity be provided on the timing for a release of the Roadmap after the comment period. Utilities are moving forward with their deployments and the document provides an excellent approach for resolving the issue of standards reliance. We would request that NIST move forward quickly to make the finished document available. We advocate a strong presence in the standards process by utilities. We understand that in the past, Utility involvement has declined or been non-existent. This is an evolving landscape and there is a renewed commitment from the utilities for greater participation. It is critical that utilities have a “place at the table” as the Smart Grid evolves and standards are developed. It is the Utilities who have the largest stake in Smart Grid standard outcomes. Our comments on the document are as follows. EXECUTIVE SUMMARY The Executive Summary identifies the near-term actions that NIST can take in advancing the Interoperability Framework. These were referenced as coming from Section 6. In reading through Section 6, it was difficult to align the priorities mentioned in this section with those of the Executive Summary. For example Section 6 has developing a “Common Pricing Model” prioritized ahead of developing a “Common Semantic Model” but these are reversed in the summary. The executive summary does not end with a statement which ties all the efforts to together or sets and expectation for the future. A paragraph to end this section is needed. Section 1 C1: Section 1.3: Duke Energy strongly supports the plan to develop an overall plan for testing and certification to ensure that Smart Gird devices and systems conform to standards for both cyber security and interoperability. A private sector market-based program(s) that is accredited by NIST is needed to certify that vendor Smart Grid products have undergone appropriate cyber security testing at all levels. Duke Energy recommends the development of such a security certification program in which Smart Grid components and systems would be subject to independent testing and certification, including chip testing. This type of a program would help utilities differentiate among the various vendor solutions and to select those solutions that provide appropriate cyber security. Additionally, Smart Grid vendors should be required to adopt personnel surety measures commensurate with those required of utilities. Also vendor contracts for Smart Grid implementations should address security testing and require vendors to disclose vulnerabilities to utilities. Section 2 As the Roadmap suggests the Energy Independence and Security Act of 2007 and its characteristics of “a two-way flow of electricity and information to create an automated, widely distributed energy delivery network” is a good definition for Smart Grid. We are also strongly supportive of the need for cyber security requirements. In addition, we note that NIST understands the challenges associated with integrating existing legacy technologies. However, it is difficult to understand how these characteristics can be satisfied unless significant upgrades to existing legacy technologies are not instituted and the recognition that this will most likely require mandates from local or national regulatory bodies. C2: In Section 2.2.1 Smart Grid Benefits, Safety and cyber security benefits, the statement is made that “Higher cyber security is built in to all systems and operations including physical plant monitoring, cyber security, and privacy protection of all users and customers”. The	C1: This will be part of the Phase 2 effort and will be driven by the Smart Grid Panel. It will leverage existing processes wherever possible. Your input in developing testing and certification plans would be welcomed. C2: Text modified in roadmap document. C3: This will be part of the Phase 2 effort and will be driven by the Smart Grid Panel. It will leverage existing processes wherever possible. Your input in developing a governance process would be welcomed. C4: The conceptual model was developed by a team of experts over a 3 day period. Feedback has been very positive. It sounds like you would prefer a physical architecture, which is much different from what was presented in the roadmap. The reason we chose to use a conceptual model was because we wanted to capture functionality within domains and not limit future innovation and physical architecture. C5: This item requires escalation. C6: The reviewer did not agree with this assessment. C7: There is a statement at the beginning of the section: The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Use cases were seeded from a number of different locations, including UCAIug OpenAMI and SCE. C8: The use cases were expanded to drive requirements in Workshop 2. The ID’s are merely numbers to show unique

#	DATE	WHO	SOURCE	COMMENT	Response
				previous statement is confusing in that it reads as though cyber security is built into cyber security which appears to be a bit redundant. C3: In section 2.6, the Road Map references the Governance process. Duke Energy strongly supports a governance model that would accelerate the implementation of a secure, intelligent, interoperable, and fully-connected Smart Grid. It will be essential that that ongoing governance of Smart Grid standards include the key stakeholder representatives, including utilities. The process must promote an environment of participation, openness, accountability, and transparency. For this reason, Duke Energy recommends that this process should be conducted and operated in the same manner as an ANSI-accredited Standards Development Organization ("SDO"). In doing so the governess process would be transparent, operating procedures would be accessible and the ANSI framework in itself establishes checks and balances that the governance body would have to adhere. We fully agree with the Procedural and Technological Challenges required in achieving Smart Grid interoperability. Section 3 Section 3 talks of the cross cutting issues as referenced by the GWAC Architectural Model. It would seem appropriate that a sub-section be included which provides a comprehensive list of cross cutting issues. C4: Figure 7: Overview of the Customer Domain. Distributed Wind should be added to the Building/Commercial sub-domain. There are several existing providers of wind turbines designed for roof-top/stadium installation that would currently supply these customers. Additionally, PEVs should be added to both the Home and Building/Commercial sub-domains. C5: Figure 10: Overview of the Operations Domain. Included in this domain should be the Revenue Protection functions and these should fall under either the Meter Reading & Control or the Financial applications. C6: Section 3.3.2 contains a major discrepancy. It states that NERC CIP standards are mandatory for a specific domain of the Smart Grid. As written, this could be misconstrued to imply that Smart Grid must comply with NERC CIP 002-009. Section 4 C7: Section 4.7 AMI Systems. Throughout the entire document and in particular this section there was no reference to NIST consulting the Open AMI Use Cases or the Southern California Edison (SCE) AMI Use Cases. These are the two predominant standard use case sets currently being used within the industry. Is NIST proposing a move away from these standards? A suggestion to resolve this possible gap would be to add an additional appendix addressing the AMI use cases and referencing their origin. C8: Section 4.7 Throughout this section there are a number of diagrams with connectors and ID's associated with the connectors. There are no references to these connectors in the documentation. Tables should be added as a reference for the ID's. Section 5 Cyber Security Considerations for the Smart Grid C9: A possible gap exists in that a threat model is not presented. It's difficult to define defensive measures upon which to make business decisions for managing risk without some underlying understanding of the threat itself. Section 6 Prioritized Actions See comments in Executive Summary. C10: Section 6.2.5 – Advanced Metering Infrastructure – Key Action 3. Duke would recommend that this task be assigned to the ANSI subcommittee which is presently working on C12.23. Throughout this section, Key Actions are noted as "should" be done. These Key Actions are imperative activities and as such, should be described with a more definitive verb such as "will". Section 7 Definitions	connections between actors. They are self-explanatory. The purpose of the document was to provide a first attempt at a Smart Grid roadmap, not exhaustively rework and document use cases. The use cases were shown to provide a reference for how the standards requirements are driven. C9: A large parallel effort with cyber security is being managed by Annabelle Lee. Supporting documentation to the roadmap is being developed separately. Much more detailed documentation is coming. C10: NIST's role in harmonizing and developing Smart Grid standards is as a coordinator and facilitator with the goal of accelerating the process. NIST, therefore, is working in an open and inclusive manner. Workshop 3 was focused on getting multiple SDOs and standards development and user group organizations together to address the Priority Actions described in Chapter 6. These organizations, working together, determine how best to manage and accelerate the activities necessary to meet the requirements discussed in the Priority Actions. C11: This was discussed at some length before publication. We decided to use "should" instead of "will" because the authors can only make recommendations, not provide orders.

#	DATE	WHO	SOURCE	COMMENT	Response
				No Comments Section 8 References No Comments Section 9 Appendix A: Standards Profiles by Domain No Comment. Section 10 Appendix B: Alphabetical Standards List No Comments Section 11 Appendix C: Requirements, Standards Gaps, and Discussion Issues for the Action Plan 11.2 – 61968: In regard to the CIM model, there needs to be a comprehensive list of all the things to model. 11.2 – 60870: Standards are needed for changing alarm limits on elements via ICCP protocol. For example, if PJM changes an alarm limit on an element, we have no way of knowing that today. Section 12 APPENDIX D: KEY USE CASES FOR CYBER SECURITY CONSIDERATIONS These use cases should be compared to the Open AMI Use Cases and the Southern California Edison (SCE) AMI Use Cases to be sure there are no gaps or incongruities. Section 13 APPENDIX E: VULNERABILITY CLASSES 13.2.2 – Platform Configuration Vulnerabilities. Please add the following: Default ID's are used Unneeded Ports left enabled 13.2.2 – Network Configuration Vulnerabilities. Please add the following: Inadequate network isolation Inadequate monitoring of network access points Section 14 APPENDIX F: CROSSWALK OF CYBER SECURITY STANDARDS Sections 2.4.1 and 2.4.3: Requiring a distinct physical security perimeter around all Smart Grid assets (e.g. AMI meters, HAN components) and have such perimeter meet NERC CIP standards (e.g. six walls, monitoring, 24 hr access removal upon termination) may not be operationally feasible for utilities. All references to "NERC CIP": It needs to be made clear that the NERC CIP requirements in relation to this roadmap are only limited to those assets that are in the scope of NERC CIP. In other words, NERC CIP should not apply to all Smart Grid components but only to those that may fall in the NERC CIP scope today. Again, we appreciate the opportunity to provide this input. Duke Energy is vested in smart grid and wants NIST to be successful with a positive outcome. Sincerely,	

#	DATE	WHO	SOURCE	COMMENT	Response
				Gary Stuebing Strategic Planning Manager	
63	7.30.09	Robby Simpson, GE robby.simpson@ge.com	SGC	In addition to comments previously sent on Thursday, July 9, 2009 by Mark Hura, GE Energy would like to submit the following additional comments consolidated from across our business regarding docket number 090520915-9921-01, entitled “Report to NIST on Smart Grid Interoperability Standards Roadmap”. For convenience, we have also attached these comments in Microsoft Word format. ~*~*~*~*~ C1: 2.2.2 Lower utility costs does not imply pass through to the consumer, but does increase margins for the utility. Also more information on consumer power usage provides utilities a means to shift increased price points to peak periods, which is a positive for the utility but potentially negative to the consumer. Not all rosy...cover the negatives as well. C2: 2.2.3 sub-bullet 6 (self healing) It is unlikely that critical decisions will be entirely turned over to software. The smart grid provides options for significant assistance in the decision process, including workflows and simulation and recommendation frameworks that improve and optimize human interaction. Human interaction should only be eliminated where error avoidance can be guaranteed. C3: 2.3.2 Smart Equipment also includes previously "dumb" switches, reclosers, voltage controllers, and other actuated hardware that have been retrofitted with sensors and controls used to monitor state, transmit that state to an external analysis point, and execute control commands returned from that point. Some of these packages are outfitted with local intelligence, used to carry out analysis and instructions when remote analysis is unnecessary or not economical. C4: 2.3.2 Data Management. In many cases entirely new data models and techniques (such as data warehousing and data mining) are being applied in order to handle the immense amount of synchronization and reconciliation required between legacy and emerging databases. C5: 2.3.2 Software applications. One of the most prominent software development tasks is shifting from a peer-to-peer integration environment to a shared services oriented architecture built upon on a robust analysis, simulation, and data management infrastructure. C6: 2.3.3 p12 line 13. The word "just" in "just 5 percent" should be omitted because it trivializes an efficiency increase of 5%. This represents a very significant improvement and is non-trivial to measure and obtain. C7: 2.3.3 p12, line 18. end-to-end interoperability will not guarantee reduction in greenhouse gases. A combination of improvements in grid efficiency reliability, and optimized power management will reduce gases, and the Smart Grid interoperability strategy will enable the pervasive pursuance and measurement of that reduction. C8: 2.5.1 p14 Line 4. Requirements do not "lay out" functions and applications. Requirements drive and specify customer expectations, and how they will be applied. I'm thinking this section is very understated. Reference the key requirements and use cases outlined in later sections. C9: 2.5.3 Architectures must also support interfacing with legacy applications and devices in a standard way, avoiding as much additional capital investment and/or customization as possible. C10: 3.1 pg 19 first bullet. Loose coupling is good for reuse, but generally associated with losses in performance and efficiency, not performance improvements. To promote a generic connection, you must give up the speed of a tightly coupled interface (i.e. DOS or Windows (tight and fast) vs. Java's cross-platform virtual machine (generic and slow)). Loose coupling increases the likelihood and speed of integration and reuse, not scale. Also the example used is more one of flexibility than of scale. You can decouple and increase the compatibility with more metering vendors and still not be able to process millions of transactions per second. C11: 3.1 Scalability and data consistency should be added as significant principles. The narrative discussions on security (sections 3.3 and 5) need more attention and seem incomplete. C12: 4.6 Should large-scale electric transportation initiatives (such as high speed rail) be part of this consideration? Obama currently has	Dear Mr. Simpson, Thanks for your comments to the Smart Grid Interim Interoperability Standards Roadmap. Your comments have been reviewed with the following results: C1: A sentence was added to address potential high prices during peak conditions. C2: No action taken. The reviewer believes that the current text reflects this adequately. C3: Text added verbatim to document. C4: Text added verbatim to document. C5: Text added to document. C6: The reviewer disagrees with this assessment. The word was used to emphasize the fact that small gains in efficiency (and there is much inefficiency in the power grid) have dramatic effects on greenhouse emissions. Also, this is the language used by the U.S. Department of Energy in its document, The Smart Grid: An Introduction. The intent was not to trivialize the effort involved, but the societal effect of the result. C7: Text modified to reflect comment. C8: Added paragraph and modifications to support concern. C9: Text added verbatim to document. C10: Text modified to reflect comment. C11: Text modified to reflect comment. C12: Yes, they should. Text modified to reflect comment. C13: Agreed. Renewables are key, but we deliberately scoped the document around the FERC 4, which did not include renewables. We did this simply to manage the amount of work we could complete in 4 months. Renewables are a huge part of the Smart Grid future and will be addressed head on going forward by the Smart Grid Panel with NIST’s assistance C14: .The common semantic model Priority Action Plan (PAP) work is primarily around the CIM. C15: The IP debate has been one of the most charged and contentious during this process. We have dedicated a PAP to address this head on. The title of the PAP is “Role of IP in the Smart Grid”. The NIST lead is David Su.

#	DATE	WHO	SOURCE	COMMENT	Response
				legislation in place for highspeed rail that will surely benefit from smart grid islands (10MW additional power req. for every 40 miles of high speed rail) C13: No use cases for renewables integration and operation? What about intermittency? C14: With regard to the prioritized action for a common semantic model, we believe such work should continue to occur within the IEC (61968/61970 – CIM). Many companies, countries, organizations, and efforts have been devoted to the CIM for quite some time and we fear that a reevaluation from NIST on where such work should occur will only serve to create uncertainty, lessen momentum, and potentially cause global fragmentation. We recommend that NIST advocate the work of a common semantic model continue within the IEC as well as the additional proposed work on a common semantic model. C15: We believe more attention should be given to the suite of Internet protocols and their applicability to AMI. C16: A lot of focus is given to harmonization of existing standards and work. Although we support harmonization and think such efforts are admirable, harmonization requires changes and consolidation of existing standards and can have a significant impact on those who have supported standards. We believe that harmonization should thus be a secondary priority behind filling gaps where standards do not exist. Further, we believe harmonization should really occur once the market has had time to use products and gain maturity, as standards are likely to evolve over time and will likely naturally harmonize, unlike areas where standards do not exist (gaps) which may maintain proprietary lock-in. C17: In several areas (section 6 especially), particular attention is given to SDOs. We believe language should be refined to "stakeholders" (as is done in other sections) as several organizations in addition to SDOs have been integral thus far in defining and maintaining standards for the smart grid. C18: The ZigBee+HomePlug Smart Energy Profile was previously mentioned as one of the initial 16 standards ("low-hanging fruit"), yet is not mentioned in section 6. We believe this work is foundational to moving forward and engaging the consumer and consumer electronics industry and should be a focus of efforts. C19: Section 6 appears to have a large number of references to OASIS although there is currently no work or standards around the smart grid within that organization and OASIS has not been a stakeholder in this space in the past. We believe the strong inclusion of OASIS in the process should either be justified or removed. C20: We have strong technical and marketing reservations around the ANSI C12.22 standard including those mentioned in the report as well as others. In particular, we believe ANSI C12.22 to be a meter-centric standard that is extended into the networking infrastructure and is thus not well suited for a larger smart grid view of communications. We also believe that ANSI C12.22 is unlikely to be adopted outside of North America and we would like to stop the global fragmentation of protocols that exists in the metering world. We also have concerns regarding layering, security, and over-reaching of what was designed to be an application-layer protocol. To that end, we believe ANSI C12.22 should not be mandated or recommended by NIST and that other layered architectures should be used to communicate with end devices, including meters, which have the ability to support true end-to-end communications. C21: Section 10.6 claims ANSI C12.22 has a testing and certification program. We are unaware of such activity and believe it to not be true. C22: Section 11.1.1 should include the ZigBee+HomePlug Smart Energy Profile work as part of the future work on a common pricing model as that specification contains pricing event information. C23: A long list of standards does not imply interoperability. NIST has not taken into account the Systems aspect of the Smart Grid and how all of these products and standards would be integrated together into a fully interoperating "System" . A section requirements for "System Engineering" the Smart Grid should be included. C24: Also each standard has its own nuances. Just because you specify IEC 61850 does not guarantee interoperability. Details of each of these standards have to be defined to guarantee interoperability C25: No electric utility will "fork lift" there legacy products for new Smart Grid products. NIST has provided very little detail on how to integrate legacy products. This will be the biggest issue that will impact the success or failure of the Smart Grid.	C16: Comment noted. No action taken. C17: The use of the term "SDO" was used in a liberal sense. The NIST efforts have attempted to include all the key stakeholders to be included in the process, and our recent workshop 3 activities reflect that pledge for fairness and inclusion in the harmonization and development of Smart Grid standards. C18: The SEP2 standard and its representatives are heavily involved in the PAPs. They have been included as part of the leadership team on all the PAPs that touch the customer domain. C19: No standards organizations were turned away. Several stakeholders insisted that OASIS should be involved and they have added valuable input to the PAPs. C20: Decisions on how or whether to include C12.22 as part of the Smart Grid standards harmonization and development efforts will be done by consensus. C21: You are correct. This reference has been removed. C22: Text modified to reflect comment. C23: Comment noted. Remember this is a roadmap document and was not intended to be a deployment manual. This is the beginning of the process. More detailed documentation, to include conformance testing and certification recommendations from the Smart Grid Panel, will follow. C24: No action taken. C25: No action taken. C26: No action taken. C27: DLMS/COSEM stakeholders have been engaged as active leaders in PAP05 (Standard Meter Data Profiles Standard) and PAP06 (Common Semantic Model for Meter Data Tables). C28: The intended audience is the United States, but other North American and International organizations have been fully engaged in the process. International harmonization and agreement on standards is desired and being pursued as part of the Priority Action Plans, but the desire is to accelerate the standards process. C29: The intent is to leverage existing standards and standards-related organizations and ongoing activities. NIST is working to coordinate these efforts, remove duplication of effort, and optimize peoples' time and work.

#	DATE	WHO	SOURCE	COMMENT	Response
				C26: The IT standards for integrating Smart Grid Standards together on a common information bus seem to be missing. C27: There is no mention of the conflict between the ANSI C12 standards and DLMS/COSEM (IEC). We recommend that NIST focus effort and attention on harmonizing these two mature standards. C28: There is no mention on the adoption of standards in other geographical locations. Many of the standards mentioned have large adoption rates in other locations and we believe a global view of standards and standards adoption would aid this process. C29: In general, we believe that NIST should not recommend moving work away from existing SDOs, consortia, etc., as such a move may in fact harm the fledgling standards activities that have begun in the market, some since long before the NIST activities. Instead, we would prefer that NIST work to strengthen and expand existing standards activities as well as help facilitate cooperation between the various stakeholders. We applaud the efforts of NIST and EPRI with this task and support the vast majority of the findings. In particular, we would like to reiterate the importance of the following standards: - IEC 61968/61970 (CIM) - IEC 61850 - DNP3 - ZigBee Smart Energy Profile (version 1) - ZigBee+HomePlug Smart Energy Profile (version 2) - ANSI C12.19 - OGC - The suite of Internet protocols including (but not limited to) IPv4, IPv6, TCP, UDP, EAP, TLS, IPsec - WiMAX - IEEE 802.* - IEEE 1901 - HomePlug AV - HomePlug Green PHY - ZigBee We would be happy to further discuss our concerns and recommendations with NIST. Sincerely, Robby Simpson, PhD System Architect Robby Simpson, PhD System Architect Transmission & Distribution GE Energy M: +1 404 219 1851 O: +1 678 844 4684 Robby.Simpson@ge.com www.geenergy.com	
64	7.30.09	Terry Coggins, Southern Company TJCoggin@southernco.com	SGC	<<Southern Company EPRI Roadmap Comments.pdf>> Mr. Arnold, We have attached comments from the Southern Company regarding the EPRI Roadmap document. Terry Coggins	Thank you for your comments. Under EISA 2007 NIST is not producing standards, but facilitating a roadmap of standards necessary for the development of the Smart Grid. A governance process will be defined going forward as part of phases two and three of the NIST Smart Grid standards

#	DATE	WHO	SOURCE	COMMENT	Response
				Manager of Transmission Policy Southern Company Services, Inc. (see attachment)	roadmap process. Your comments will be forwarded to the contractor responsible for those phases of the program. We hope that you will contribute to that effort.

SOUTHERN COMPANY
Energy to Serve Your World

Terry J. Coggins
Transmission Policy
Manager

Southern Company
Services, Inc
600 North 18th Street/13N-8812
Post Office Box 2641
Birmingham, Alabama 35291-8210
Tel 205.257.5514
Fax 205.257.6654

July 30, 2009

BY EMAIL
Mr. George Arnold
National Institute of Standards and
Technology
100 Bureau Drive
Stop 8100
Gaithersburg, MD 20899-8100

Re: Southern Company Services, Inc.'s Comments on Report to NIST on the Smart Grid Interoperability Standards Roadmap, as Requested Pursuant to the Notice Published in 74 Fed. Reg. 31,254 (Jun. 30, 2009)

Dear Mr. Arnold:

Southern Company Services, Inc., as agent for Alabama Power Company, Georgia Power Company, Gulf Power Company and Mississippi Power Company ("Southern Companies"), appreciates the opportunity to submit the following comments regarding the Report to NIST on the Smart Grid Interoperability Standards Roadmap (the "Report") dated June 17, 2009, prepared by the Electric Power Research Institute ("EPRI"), which comments were requested by the National Institute of Standards and Technology ("NIST") pursuant to notice published in 74 Fed. Reg. 31,254 (Jun. 30, 2009).

65	7.30.09	George Uram,	SGC	Attached please find a pdf file containing the Sensus comments on the EPRI Report to NIST on the Smart Grid Interoperability Standards	Thank you for your comments. We are grouping the responses

#	DATE	WHO	SOURCE	COMMENT	Response
		Sensus George.Uram@sensus.com		Roadmap. George Uram; VP Industry & Regulatory Affairs 1501 Ardmore Blvd ; Sixth Floor ; Pittsburgh, PA 15221 USA T: 724-425-7956 ; F: 724-430-3959 ; C: 412-736-6013; george.uram@sensus.com ; www.sensus.com Dr. George Arnold 100 Bureau Drive Stop 8100 300 North Salisbury Street National Institute of Standards and Technology Gaithersburg, MD 20899-8100 Dear Dr. Arnold: Please find attached the Sensus comments on the EPRI Report to NIST on the Smart Grid Interoperability Standards Roadmap. We would be pleased to discuss our comments or to answer any questions you may have regarding these comments Sincerely yours, George Uram Vice President Industry & Regulatory Affairs 1501 Ardmore Blvd T: 724-425-7956 Sixth Floor F: 724-430-3959 Pittsburgh, PA 15221 USA www.sensus.com Dr. George Arnold 100 Bureau Drive Stop 8100 300 North Salisbury Street National Institute of Standards and Technology Gaithersburg, MD 20899-8100 Dear Dr. Arnold: Please find attached the Sensus comments on the EPRI Report to NIST on the Smart Grid Interoperability Standards Roadmap. We would be pleased to discuss our comments or to answer any questions you may have regarding these comments Sincerely yours, George Uram Vice President Industry & Regulatory Affairs Sensus Comments on the EPRI Report to NIST on the Smart Grid Interoperability Standards Roadmap _____ Executive summary 1. Why are we “Conducting an analysis to select Internet Protocol Suite profiles for smart grid applications”? As with all protocols there are tradeoffs of performance, efficiency, and suitability for the application. Therefore, we should not presume that protocols developed for the Internet are the only candidates appropriate for a smart grid. In addition, Sensus and other market participants have remarked previously in comments to NIST that every AMI system vendor already uses the IP protocol suite in some portion of their system. Therefore, the AMI industry understands where to make tradeoffs regarding the pros and cons of choosing IP-based communications. 2. We do not understand what anecdotal evidence is prompting “Investigating Communications Interference in Unlicensed Radio Spectrums”? Sensus was in attendance at the NIST workshop where this issue was briefly raised and did not hear any specific examples. Additionally, we would note that, if interference in the unlicensed radio bands is an issue, there is the proven solution of using FCC licensed radio frequencies as a basis for system design. A number of market participants have already chosen that approach to system design. Many electric utilities own and use licensed FCC spectrum for controlling and monitoring their systems. 3. Standards organizations, by their nature, have very diverse agendas, schedules, and participants. What leverage does NIST propose to use for “Coordinating efforts across Standards Development Organizations”? Section 1.1 Background Why does EPRI think that “Existing systems and components must be encapsulated and re-engineered to be compatible with new standards and new innovations.” This statement again raises concerns that were expressed by the major AMI system vendors in a letter of	in the order in your remarks. Executive summary: There are Priority Action Plans in place for Internet Protocol Suite Profiles and Wireless spectrum and interference issues. These sessions and others at the Third NIST Smart Grid Roadmap Workshop appear to be effective in engaging the SDOs with their diverse agendas, schedules a and participants. We suggest that you participate in the relevant Priority Action Teams; information is at http://www.nist.gov/smartgrid/PAP_Combined_WorkshopFinalV1_0a_20090730.pdf. The http://www.nist.gov/smartgrid/ site will have links to the ongoing efforts in these areas. Section 1.1: The report has been modified to indicate that existing systems and components must be adapted, encapsulated, or re-engineered…” The intent, as stated elsewhere in e Report, is to use installed technology while providing a path forward. Section 3.2.1, 4.3, 4.4.2.4: Priority Action Plans 9 and 10 (at the link above) address many of these issues. We hope you will engage in the teams. Section 3.3.2 and other security comments: Cyber Security for the Smart Grid is being aggressively pursued by the Cyber Security Coordination Task Group. Rather than replicate the status of this ongoing activity here, the reader is directed to this project’s TWIKI pages. To follow this activity and review all related documents, use the following Web link: http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/CyberSecurityCTG Section 4.3, 4.3.5, 4.6.2.8, 4.7 and all Section 4 comments: The use cases are illustrative, not definitive. As such, any future evolution of these sections will be part of Phase 2 and Phase 3. Other specific comments in Section 4: 4.6.2.8 AMI retrieval of information would be as for any load that the meter can communicate with. Section 4.7.2.1 Your comment will be forwarded to the contractor responsible for Phases 2 and 3. The nature and characteristics of the gateway or energy services interface should probably be better defined along the lines you describe. Section 4.7.2.2 AMI may not be the only means of DR/DER signaling and load control. Signals to the ESI may serve the same purpose as more complex signals to devices (with the concomitant liability mentioned in your comment to 4.7.2.1. These comments will be forwarded to the contractor responsible for Phase 2 and Phase 3. Section 4.7.3 The illustrative use case shows a broad range of

#	DATE	WHO	SOURCE	COMMENT	Response
				May 14, 2009 to Dr. Arnold. We expressed concerns related to the initial NIST interoperability standards workshop “that the effort was directed at developing a new architecture for the Smart Grid rather than focusing on the issue of interoperability.” The letter explained that “Simplicity and focus on the key needs for interoperability are necessary for successful completion of this effort.” Sensus maintains this position and believes that the EPRI document should explicitly recognize that: 1. The existing grid works. 2. The existing grid consists of a “system of subsystems.” 3. Much of the grid already includes information technology (IT) that makes parts of the grid smart. 4. The priority should be to integrate the existing IT, to make existing IT subsystems interoperable, and to upgrade the systems gradually without disputing operations or incurring unnecessary costs. 5. The most significant challenge will be to make careful choices about where legacy systems need to be upgraded. Section 3.2.1 Customer Domain If AMI is the pathway for communicating between the utilities and customer energy management systems, the communications requirements must be specified. NIST should start with high level requirements such as a message set, message volume, message throughput, message addressing (broadcast, to a neighborhood, to a specific customer), customer interfaces, etc. Section 3.3.2 Smart Grid Cyber Security Strategy NIST should carefully choose cyber security specifications that have been developed by recognized organizations that follow a methodical development procedure. There should be ample opportunities to solicit expert opinions and to expose the proposals to critical reviews. The procedures adopted by Standards Developing Organization are recommended, such as ANSI, ISO, and IEC. We are concerned about a number of specifications cited in the EPRI report that were developed by groups or organizations that are not Standards Developing Organizations. These groups provide useful material, and Sensus participates in a number of them. However, they were often formed to help their members develop specific information such as useful content for bid documents. These groups do not necessarily have the same procedures as SDOs, such as critical multi-stage vetting of specifications. Given the importance that standards have for achieving interoperability among smart grid elements, we believe that it is necessary to differentiate between the output of SDOs and those of ad hoc groups. Section 4.3 Wide-Area Situational Awareness (WASA) Section 4.3.5 Communications Diagram AMI should be shown with parts in Distribution, Operations, and Customer. Section 4.4.2.4 External Clients Use the AMI to Interact With Devices at Customer Site If the AMI system is used for demand response, including the transport of customer data, the AMI system will need an interface to the customer relationship management system of the utility or the third party supplier. If a third-party supplier offers demand response services, the utility shall provide demand response data promptly in real-time to the supplier without any processing or filtering of the data. .	actors, including those engaged in setting prices and some of their inputs. Section 5.1: The Cyber Security sections have been removed; see link above. Section 6.1.4, 6.1.5, 6.2.1, and 6.2.5: The Priority Action Plans addressed above are working on these issues. We encourage your participation. Section 6.2.5 the comment on coercion reflects the layering issues described in the ANSI C12 standards references. Modifications of standards are done by the relevant SDO, ensuring the addressing of concerns expressed in your comments. Section 9: The Cyber Security sections have been removed; see link above. We encourage your participation in the Cyber Security Task Group to communicate these suggestions. Section 11: These are summary sections; the concerns have been addressed earlier in these comments. We encourage your participation in the Priority Action Plans for ANSI C12 harmonization, Internet Protocol profiles, and other relevant areas.

#	DATE	WHO	SOURCE	COMMENT	Response
				If that data includes meter reading data, then the normal verification, validation, and editing process that utilities use to vet meter data from the AMI system will need to be bypassed. Section 4.6.2.8 Impact of PEV as Load on Distribution Operations What are the characteristics and uses of the data referenced by, “AMI retrieval of near-time information on charging of PEVs that have communications interfaces to smart meters”? Section 4.7 AMI Section 4.7.2.1 External Clients Use AMI System to Interact with Devices at Customer Site The desire of any vendor to measure power consumption by specific appliances should not be a prime example of using AMI for energy management. Some vendors may offer this service, but they may then assume considerable responsibility for customer-premises equipment. Alternatively, there are schemes being proposed to use intelligent software to estimate the power consumption of appliances. In either case, it is preferable to have a well-specified interface, such as gateway, between the utility and the home area network (HAN). The AMI system could exchange demand response data with the gateway. Customers do not need to acknowledge compliance with a control request. This is reflected in the consumption data. The only acknowledgement that might be requested for a two-way communications network is receipt of the request, not execution of the request. Section 4.7.2.2 Demand Response Management System Manages Demand Through Direct Load Control Pricing and event notices are not needed with direct load control demand response; only control signals are required. Distributed load control demand response uses a premises-based energy management controller or sends “prices to devices”; distributed load control needs pricing and event data. Gathering individual appliance responses to direct control imply a considerable amount of data collection. The utility can judge compliance more cost-effectively from aggregated data that the AMI system can deliver. Collecting aggregated data rather than appliance data avoids the risk of compromising customer privacy. Section 4.7.2.3 Building Automation Software/System Optimization using Electric Storage A BAS system should provide local control for energy management so data from each subsystem, office, or apartment in a building is not communicated via the AMI system. Collecting device data from individual devices in a building would generate communications traffic requiring considerable bandwidth and burdening the back-office data processing or “cloud computing” resources. Section 4.7.3 Actors What roles do RTO/ISO and weather play in AMI? The term ESI (Energy Services Interface) should be replaced with separate terms: gateway and energy management controller. This distinguishes between the interface to the home area network and the energy management functions. Section 4.8.5 Communications Diagram Should the AMI Headend be part of operations rather than distribution? Where does the AMI Head end reside when the AMI network is used for demand response and field device monitoring in addition to meter reading? Section 5.1 Smart Grid Use Cases That Are Architecturally Significant for Cyber Security AMI-SEC is an ad hoc group that has developed cyber security requirements. We participate in AMI-SEC and support the goals of AMI-SEC but reiterate our comment on Section 3.3.2 about the importance of distinguishing between SDOs and other organizations. Section 6.1.4 Application of Internet-Based Networking Technology Nowhere is there a justification for using IP technology. Is it cheaper to write IP-based protocols; do IP-based protocols use less hardware; are IP protocols faster, extensible, etc? The answers are NOT necessarily YES. Adopting IP does not ensure interoperability. IP definitely has a role in the smart grid, but IP is not the answer everywhere. The following recommendation should not be limited to Internet Protocols: “What is missing is a comprehensive mapping of smart grid application requirements to the capabilities of protocols and technologies in the	

#	DATE	WHO	SOURCE	COMMENT	Response
				Internet Protocol Suite by experts well versed in the applications and the protocols. Such an analysis would permit selected Internet protocol Suite subsets to be identified as important for various applications in the various domains of the NIST Conceptual Model of a Smart Grid." What we are seeking is the best solution for smart grid communications protocols that fulfills the goals of interoperability, economy, extensibility, etc. In some cases Internet protocols are the choice, but not in all cases. The recommended action "Educate the Smart Grid Community on the Internet Protocol Suite" seems to imply that what is lacking is a basic understanding of the technology. This is factually incorrect; what is lacking is agreement that the benefits of using this technology outweigh the costs and performance for certain applications. As noted previously, all AMI system vendors use the IP protocol suite in parts of their system and have made the engineering tradeoffs related to appropriate use. Section 6.1.5 Communications Interference in Unlicensed Radio Spectrums Is there an interference problem? The vendors offering communications systems operating in the unlicensed RF bands certainly are not making that point in their presentations to utilities. As noted in our comments on the Executive Summary, Sensus participated in most tracks of the two NIST workshops; however, we did not hear that a desire for "Smart Grid Licensed Spectrum" was a "recurring theme." Is the utility industry or are segments of the vendor community using EPRI and NIST to lobby for the 700 MHz D-block that is now available with the reallocation of UHF TV channels 53-69? Section 6.2.1 Demand Response & Consumer Energy Efficiency (DRCEE) How can AMI-ENT help with standards for distributed energy resources? Section 6.2.5 Advanced Metering Infrastructure What is motivating coercion in, "The primary goal of standards activities, should therefore, be the coercion of at least a subset of these models [ANSI C12.19, IEC 61850, IEC 61968, SEP 1, SEP2, COSEM/DLMS] into cleanly nested complexity levels with common semantics for each shared subset"? In the push to align these standards and to amend ANSI C12.19 and C12.22, NIST should ensure that the functioning of existing AMI systems is not impaired. Rather, NIST should look at the edges of these systems to determine if interface specifications need to be changed. Such interfaces may involve meters, operations, customer databases, outage notification, distribution automation systems, and energy management systems at customer premises. Any changes to ANSI C12.19 and C12.22 should proceed cautiously through an SDO review procedure to ensure that all amendments are technically sound and justified. Section 9.1.5 Distribution Is AMI-SEC an appropriate security standard for distribution? Section 9.1.7 Customer Is AMI-SEC an appropriate security standard for transaction state management? Section 11.5 Action Items Related to AMI Systems Section 11.5.1 Requirements and Standards Gaps Related to AMI Systems Changes to ANSI C12.19 and C12.20 should be done with great care. Companion usage profiles may help clarify applications of these standards. Section 11.5.2 Discussion Issues for AMI Systems "Should the Internet Protocol (IPv4 or IPv6) be mandated for all protocols?" IP protocols are not the best solution in all cases. Many of the internal functions of AMI are optimized with non-IP protocols. In addition, IP is far from optimal when used with battery operated devices such as may be used in a HAN system or with water or gas meter applications that coexist with electric AMI applications at many utilities. NIST should focus on the interfaces between AMI and other subsystems. This would future-proof AMI while continuing a robust competitive market. Therefore, standards for physical and MAC do not benefit the industry. AMI systems use a variety of communications	

#	DATE	WHO	SOURCE	COMMENT	Response
				methods. There is no need to set standards for internal data gathering methods of AMI (such as type of RF network). Standards at the various utility and customer interfaces will ensure interoperability among AMI system and other parts of the utility, thus enabling a smart grid. The AMI industry is developing U-SNAP (Utility Smart Network Access Port – www.usnap.org) as a practical interface for linking meters with premises devices. This technology should be considered among the interfaces that will provide consumer choices for HAN equipment participating in demand response.	
66	7.30.09	Matthew Theali, HomeGrid Forum matthew.theall@intel.com	SGC	Dear Sirs/Ladies, The attached letter is sent on behalf of the members of the HomeGrid Forum. As noted in the letter, we kindly request that NIST include ITU-T G.hn technology as one of NIST's recommended technologies for smart grid applications. Thank you. Matthew Theall Chairman and President, HomeGrid Forum July 29, 2009 Dr. George Arnold National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899–8100 smartgridcomments@nist.gov Subject: Response to Federal Register, June 30, 2009, Volume 74, Number 124, p 31254, Docket Number: 0906181063-91064-01 Dear Dr. Arnold, This letter is being sent by the HomeGrid Forum™ (http://www.homegridforum.org)1. We are a U.S. -based industry trade group with members throughout the world whose purpose is to support the standardization and commercial success of the ITU-T G.hn home networking standard through technical and marketing efforts and through cooperation with complementary industry and regulatory organizations. We are writing to request that NIST include G.hn as one of the recommended technologies in the NIST Smart Grid Interoperability Standards Roadmap. Below is our proposed text to be included into the "Appendix B: Alphabetical Standards List": • 10.xx ITU-T G.hn	Thank you for your comments. We have added your suggested text in Appendix B. Maintenance of the Appendix A tables is the responsibility of the Contractor for Phase 2 and Phase 3. We will forward your comments to that Contractor when identified.

[1] **About HomeGrid Forum**

HomeGrid Forum is a global, non-profit trade group promoting the International Telecommunication Union's G.hn standardization efforts for next-generation home networking. HomeGrid Forum promotes adoption of G.hn through technical and marketing efforts, addresses certification and interoperability of G.hn-compliant products, and cooperates with complementary industry alliances. To learn more about becoming a HomeGrid member, please visit www.HomeGridForum.org/join.

#	DATE	WHO	SOURCE	COMMENT	Response

- Application: Networking and Smart Grid broadband physical communications over powerlines, coaxial cables, phone lines and CAT-5 (MAC/PHY)

- Actors: telecom and power utility equipment, consumer electronics, meter, HAN gateway, whole-house control products (energy management, appliances, climate control, etc.), PEVs, and various others across the Smart Grid

- Interfaces: Potentially applicable across the Smart Grid on multiple wiring types, including: Powerline, coaxial, telephone wire.

- Maturity: Physical Layer (G.9960) received consent on Dec 2008. Data Link Layer expected to receive consent in Oct 2009.

- Category: SDO - ITU-T

Below are examples of tables where we believe that G.hn should also be added.

Add "G.hn" in rows "2. Network Interoperability" and "1. Basic Connectivity" of Table 14, Appendix A.
Add "G.hn" in rows "2. Network Interoperability" and "1. Basic Connectivity" of Table 16, Appendix A.
Add "G.hn" in rows "2. Network Interoperability" and "1. Basic Connectivity" of Table 18, Appendix A.
Add "G.hn" in rows "2. Network Interoperability" and "1. Basic Connectivity" of Table 20, Appendix A.

Please include G.hn in others areas of the document where applicable.

G.hn is a wireline networking technology that allows 'smart' devices to share information throughout a building (typically a home) using any of the three most common wiring types found in homes today: electrical wires, coaxial cable and telephone wires.

G.hn is being standardized in the International Telecommunications Union (ITU), one of the world's foremost technology standards development organizations (SDOs). From the United States, over 70 private industry entities actively participate in the ITU as Sector Members and Associates under the auspices of the U.S. State Department.

The ITU-T's G.hn project was initiated in 2006 under Rapporteur group ITU-T Q4/15, which has approximately 40 active contributors, including: telecom operators, consumer electronics, computing, semiconductor, and other technology companies. The group has a successful record of producing widely adopted technology standards including Digital Subscriber Line (DSL), which is the world's most widely deployed broadband technology; approx. 64% of all broadband users worldwide according to industry analyst firm Point-Topic, and over 600 Million DSL chipsets have shipped.

The G.hn standard (referred to as a 'Recommendation' in ITU nomenclature) consists of a Data Link Layer (DLL) and Physical layer (PHY) for wireline networking. The PHY layer standard was Consented in December of 2008 as 'G.9960' and the DLL is expected to be consented in October of this year.

G.hn's is well-suited for Smart Grid applications and some of its key attributes include:

- whole-home networking coverage over 3 wire types, including electrical wires.
- very low-power-consumption modes of operation
- low-cost for use in a variety of consumer products
- multi-vendor support and interoperability
- a high degree of flexibility for future applications

#	DATE	WHO	SOURCE	COMMENT	Response
				• an open, international standard • broad support from a variety of industries and organizations. G.hn enjoys substantial support from a wide and diverse portfolio of U.S. and international companies that are instrumental in providing U.S. consumers with innovative products and services for the smart home. These companies include: AT&T, Best Buy, Intel, Infineon, Sigma Designs, Coppergate, Ikanos, Aware, DS2, Gigle and many others. HomeGrid Forum has developed considerable information regarding G.hn and we would be happy to provide more information about G.hn's role in Smart Grid applications. We appreciate your consideration and if you have additional questions please feel free to contact me at your convenience. Sincerely, Matthew Theall Chairman and President, HomeGrid Forum Technology Strategist, Intel Corporation Phone: 978-761-6518 matthew.theall@intel.com	
67	7.30.09	Brett Kilbourne, Utilities Telecom Council brett.kilbourne@utc.org	SGC	On behalf of the Utilities Telecom Council, please find attached comments on the EPRI "Report to NIST on Smart Grid Interoperability Standards Roadmap" (Contract No. SB1341-09-CN-0031--Deliverable 7) Please confirm that receipt of this filing by replying by email. If you have any questions, please do not hesitate to contact me. Thank you for your help in this matter. Best regards, Brett Kilbourne Utilities Telecom Council 1901 Pennsylvania Avenue, NW Fifth Floor Washington, DC 20006 (202)833-6807 . UTILITIES TELECOM COUNCIL The Voice of Critical Infrastructure Communications 1901 Pennsylvania Avenue, NW • Fifth Floor • Washington, DC 20006 USA • 1.202.872.0030 • Fax: 1.202.872.1331 • www.utc.org William R. Moroney	Thank you for your comments. The area on which you comment in detail is being moved forward in the Wireless Spectrum Priority Action Plan. (See section 2 of the document referenced below). We suggest that you participate in the relevant Priority Action Teams; information is at http://www.nist.gov/smartgrid/PAP_Combined_WorkshopFinalV1_0a_20090730.pdf . The http://www.nist.gov/smartgrid/ site will have links to the ongoing efforts in these areas. We will forward your comments to that group's NIST lead.

#	DATE	WHO	SOURCE	COMMENT	Response
				President & Chief Executive Officer Direct Line: 1.202.833.6801 Email: bill.moroney@utc.org July 30, 2009 Dr. George W. Arnold National Coordinator for Smart Grid Interoperability National Institute of Standards and Technology 100 Bureau Drive - Stop 8100 Gaithersburg, MD 20899-8100 RE: “Report to NIST on the Smart Grid Interoperability Standards Roadmap” (Contract No. SB1341-09-CN-0031--Deliverable 7) Dear Dr. Arnold: The Utilities Telecom Council is pleased to provide the following comments on the above-referenced Report (hereinafter “Report”). These comments are devoted to one issue of enormous importance to the future of smart grid: access to dedicated spectrum. In that regard, UTC applauds EPRI for recommending that NIST “determine the need for dedicated spectrum” in response to concerns regarding radio frequency interference to smart grid communications systems.1 UTC agrees with EPRI that “[c]ommunications is a key aspect of ensuring interoperability and increased efficiencies,” and that radio frequency interference is an issue of concern for smart grid interoperability.2 Therefore, UTC supports EPRI’s recommendation and it offers the following suggestions for improvement. Introduction By way of background, UTC represents the telecom and information technology interests of the nation’s electric utility industry and other critical infrastructure industries. Our 1 See Electric Power Research Institute, “Report to NIST on the Smart Grid Interoperability Standards Roadmap” at 95 (June 17, 2009) at http://www.nist.gov/smartgrid/InterimSmartGridRoadmapNISTRestructure.pdf 2 Id. at 94. Dr. George W. Arnold July 30, 2009 – Page #2 members include large investor-owned utilities that may serve millions of customers across an	

#	DATE	WHO	SOURCE	COMMENT	Response
				entire multi-state region, as well as relatively small rural electric cooperatives and municipal utilities that may only serve a few thousand customers. UTC was created in 1948 in recognition that all utilities – big and small – rely on private internal communications systems to support the delivery of essential electric, gas and water services to the public at large. These communications systems are used to provide remote monitoring and control of electric transmission and distribution infrastructure and to provide routine and emergency voice dispatch service to service crews in the field. With the advent of smart grid, these communications systems will also support a variety of applications both on the grid and in the home. As such, UTC's members have a direct and tangible interest in the development of interoperability standards for smart grid and UTC has actively participated in all of the NIST interoperability standards roadmap public workshops and other opportunities for input. I. NIST should address radio frequency interference to licensed as well as unlicensed communications systems used by utilities to support smart grid. At the outset, UTC wishes to emphasize that radio interference not only affects unlicensed radio operations, but also licensed radio operations, as well.3 Moreover, interference to licensed radio operations is an increasing problem due to consolidation and reallocation of existing spectrum that electric utilities use for their private internal communications systems.4 The consolidation of existing spectrum has led to spectrum congestion in which incompatible users operate in close proximity on co-channel and adjacent channels to frequencies used by electric utilities. The reallocation of existing spectrum has led to a shortage of available spectrum for expansion of existing systems and has forced utilities to migrate to other disparate parts of the spectrum, which may not be as suitable for utility purposes, due to poorer propagation characteristics and other factors. Now, as utilities must build new systems and expand capacity on existing systems in order to support smart grid applications, the potential for interference will only increase. Therefore, UTC suggests that NIST address interference to licensed operations as well as unlicensed operations in order to support smart grid interoperability. 3 But see Report at 94-94 addressing generally "Communications Interference in Unlicensed Radio Spectrums." 4 For example, utilities must share the 150-512 MHz and 900 MHz bands with a broad variety of other "Business and Industrial Land Transportation" users, and this has lead to spectrum interference and congestion due to	

#	DATE	WHO	SOURCE	COMMENT	Response
				increasing demand for these frequencies. In addition, utilities and other critical infrastructure industries were forced to relocate from the 1850-1990 MHz bands, the upper 2 GHz bands, the 12.2-12.7 GHz bands, and the 800 MHz land mobile bands when those band were reallocated/rebanded to accommodate commercial service providers. Dr. George W. Arnold July 30, 2009 – Page #3 II. NIST should take immediate action to address the issue of radio frequency interference. UTC believes that urgent action is needed to address the issue of radio frequency interference to smart grid communications systems. The issue of interference is fundamentally important; because if interference occurs to smart grid communications systems, there may be no operability, let alone interoperability. Moreover, these communications systems support the safe, reliable, efficient, and secure delivery of electric service to the public at large. They must be designed, built, and operated to perform at extremely high standards for connectivity, latency, coverage, and survivability. These standards often exceed those of commercial communications systems. As such, these demanding standards underscore the importance of these communications systems and the need for immediate action to address the issue of radio frequency interference. UTC is concerned that further study of the interference issue is unwarranted and will delay the deployment of smart grid systems.5 The interference threat is a clear and present danger that is recognized throughout the industry and has been thoroughly documented. Moreover, smart grid is an urgent national priority that requires immediate action, and a study of the interference issue will surely delay smart grid deployment. Therefore, UTC strongly suggests that NIST support an immediate allocation of at least 30 MHz of dedicated spectrum for utilities, rather than further study of the interference issue. III. NIST should support an allocation of at least 30 MHz of dedicated spectrum to support smart grid. UTC is also concerned that the 700 MHz D Block band will not provide sufficient spectrum to meet utilities' needs.6 The 700 MHz D Block band would only provide 10 MHz of spectrum, and there would need to be Congressional legislation in order to re-allocate this	

#	DATE	WHO	SOURCE	COMMENT	Response
				spectrum for any critical infrastructure application.7 That noted, we believe this spectrum 5 But see Report at 95 (stating, “NIST should commission a group of experts to study the issue of communications interference in unlicensed radio spectrums for smart grid applications and develop business and technical requirements on the optimal requirements for wireless spectrum usage for Smart Grid communications.”) 6 But see Report at 94 stating, “a recurring theme emerged desiring licensed spectrum for Smart Grid communications (for example the 700MHz D block)”. 7 Currently, the 700 MHz D Block is part of spectrum that must be auctioned and is not dedicated to utilities. As a practical matter, utilities and other critical infrastructure industries are unable to compete with commercial carriers in a spectrum auction, due to funding issues and licensing schemes that are not tailored to utility service territories. Dr. George W. Arnold July 30, 2009 – Page #4 could be allocated for smart metering applications like those currently in use in the 900 MHz bands with great benefit. There is, however, far more to smart grids than just smart metering. For this reason, UTC has concluded that an allocation of at least 30 MHz of dedicated spectrum on a nationwide basis will be necessary to support utilities’ smart grid communications needs.8 UTC has also identified the 1800-1830 MHz band for this allocation, because the band was recently allocated in Canada for utility communications purposes and a harmonized allocation in the U.S. would promote interoperability and reduce deployment costs.9 Furthermore, UTC believes that the methodology for allocating this spectrum could be based upon the FCC’s allocation of the 3.65 GHz band, which is assigned on a nationwide, non-exclusive license for up to 50 MHz bandwidth and which provides for equipment to operate using restricted and non-restricted contentionbased protocols. Alternatively, the spectrum could be licensed to a smart grid trust that allocates the spectrum to utilities, or service providers, seeking to provide support communications for smart grid applications. UTC understands that the 1800-1830 MHz band is designated in the U.S. for use by Federal government operations; however, this spectrum could be shared with incumbent Federal government operations and this would be consistent with Federal policies that have encouraged sharing government spectrum with non-government users.10 Therefore, UTC suggests that NIST support an allocation of at least 30 MHz of	

#	DATE	WHO	SOURCE	COMMENT	Response
				dedicated spectrum for utility purposes, and that it consider the 1800-1830 MHz band for this allocation. Of course, NIST should not mandate that utilities use spectrum, and it should not strand investment in smart grid systems. Instead, UTC believes that NIST should remain technology neutral and encourage investment in a variety of smart grid systems. Utilities should be 8 “The Utility Spectrum Crisis, A Critical Need to Enable Smart Grid,” Utilities Telecom Council, January 2009 at http://www.utc.org/fileshare/files/3/Public_Policy_Issues/Spectrum_Issues/finalspectrumcrisisreport0109.pdf. 9 Id. See also http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/sf08971e.html for more information on the proceeding reallocating the 1800-1830 MHz band for utility purposes in Canada. 10 See e.g. Presidential Memorandum on Spectrum Policy for the 21st Century, 69 Fed. Reg. 1568 (Jan. 9, 2004), 39 Weekly Comp. Pres. Doc. 726, 727 (May 29, 2003), available at http://www.whitehouse.gov/news/releases/2003/06/20030605-4.html. Pursuant to this directive, NTIA issued two reports. See, Department of Commerce, Spectrum Policy for the 21st Century – The President’s Spectrum Policy Initiative: Report 1, Recommendations of the Federal Government Spectrum Task Force (June 2004), available at http://www.whitehouse.gov/news/releases/2004/11/20041130-8.html; and Department of Commerce, Spectrum Policy for the 21st Century – The President’s Spectrum Policy: Report 2, Recommendations from State and Local Governments and Private Sector Responders (June 2004), available at http://www.ntia.doc.gov/reports/specpolini/presspecpolini_report2_06242004.htm (collectively “June 2004 Reports”). Dr. George W. Arnold July 30, 2009 – Page #5 allowed to choose the most appropriate smart grid communications technology, depending on each utility’s needs. In many cases, wireless will represent an attractive option, and NIST should enable utilities to make that choice by supporting an allocation of sufficient dedicated spectrum to support their needs. Utilities should not be forced to compromise because they lack adequate spectrum. In this way, NIST will provide additional technology options and encourage investment in smart grid systems, as well as promote smart grid interoperability. Finally, it is important to allocate this spectrum now, instead of waiting for devices to be designed and then allocating spectrum. Allocating spectrum to support a specific “smart grid design” is counterproductive, counter intuitive and would severely limit the vision of smart grid	

#	DATE	WHO	SOURCE	COMMENT	Response
				moving forward. Also, it is important this allocation be made in addition to spectrum that is already used by utilities. It should not be allocated as a substitute for existing utility spectrum. For all of these reasons, UTC supports the recommendation in the Report to determine the need for dedicated spectrum to support smart grid, as suggested herein. We look forward to working with EPRI and NIST to develop a roadmap for smart grid interoperability. All the best, William R. Moroney President & Chief Executive Officer UTILITIES TELECOM COUNCIL	
68	7.30.09	Louis Hecht, OpenGeospatial Consortium lhecht@opengeospatial.org	SGC	To Whom It May Concern: The Open Geospatial Consortium, Inc. is pleased to respond with staff comments for the subject Federal Register Notice dated June 30, 2009. Our comments regarding the Smart Grid Interoperability Standards Roadmap are contained in the attached MSWord document. Please note the comments attached are to be considered OGC Staff Comments, and do not represent consensus of the OGC membership. If you have any questions, please let me know. Louis Hecht, Jr. Open Geospatial Consortium, Inc. LL: +1 301 365 5907 M: +1 301 204 7375 [Federal Register: June 30, 2009 (Volume 74, Number 124)] [Notices] [Page 31254] From the Federal Register Online via GPO Access [wais.access.gpo.gov] [DOCID:fr30jn09-39] ---------- DEPARTMENT OF COMMERCE National Institute of Standards and Technology [Federal Register: June 30, 2009 (Volume 74, Number 124)] [Notices] [Page 31254] From the Federal Register Online via GPO Access [wais.access.gpo.gov] [DOCID:fr30jn09-39] ---------- DEPARTMENT OF COMMERCE National Institute of Standards and Technology [Docket Number: 0906181063-91064-01] Request for Comments on ``Report to NIST on the Smart Grid Interoperability Standards Roadmap" (Contract No. SB1341-09-CN-0031-- Deliverable 7) AGENCY: National Institute of Standards and Technology (NIST), Department of Commerce.	Thank you for your extensive comments. The issued that you raise regarding the cross-cutting nature of and the opportunities for consistency across multiple industries and platforms, are very important to the future of Smart Grid standardization work. We acknowledge OGC's extensive collaboration with other SDOs and stakeholders. The Roadmap is an overview, and as such cannot give great emphasis to any particular area, particularly one that has been so well served. We will forward your comments to the Contractor responsible for the NIST Interoperability Knowledge Base and for Phase 2 and Phase 3 of the Smart Grid project when that contractor is identified. That contractor, in conjunction with the Standards Panel and Governance Board is responsible for moving the Smart Grid Standards Roadmap forward. Specific comments that can be addressed in this minor revision include: P82: Modified the report with similar wording, also including emergency management systems. 3.1.3.1 Text changed. The tables in Appendix A will be moved forward by the Contractor for Phase 2 and Phase 3 when identified. As above, we will forward your comments to that Contractor. Section 10: Modified per your suggestions. Section 11: the crosscutting nature and value of Geospatial information will be communicated to the Contractor for the next

#	DATE	WHO	SOURCE	COMMENT	Response
				ACTION: Notice; request for comments. OGC's Comments on EPRI's June 17, 2009 "Report to NIST on the Smart Grid Interoperability Standards Roadmap" Submitted by: Open Geospatial Consortium, Inc. (OGC) Louis Hecht Director, Business Development July 30, 2009 Introduction Because "geospatial" is a universal cross-cutting issue, the OGC has considerable experience working on standards issues with representatives of different technology domains, application domains and standards development organizations (SDOs). OGC has worked with NIST and IEEE, for example, on resolving standards issues related to smart sensors (IEEE 1451). We look forward to working with NIST and its SDO and industry partners in the smart grid standards initiative. Overall comments: 1) The June 17, 2009 draft of the Smart Grid Interoperability Standards Roadmap provides some mention of geospatial standards, but too little is said about geospatial standards to ensure that implementors of smart grid standards will avoid non-interoperability in communications involving location, area, elevation and related geoprocessing services. 2) Geospatial interoperability requirements need to become a well-known part of the NIST Interoperability Knowledge Base (IKB). Suggested Revisions: 3.2.5 Operations Domain Table on p. 32: Application: Records and Assets Description: The Records and Asset Management actors track and report on the substation and network equipment inventory, provide geospatial data and geographic displays, maintain records on non-electrical assets, and perform asset investment planning. Comment: No edits suggested here, but note that the phrase "provide geospatial data and geographic displays" could apply as well in many other application descriptions. p. 74: Actor: Geographic Information System (GIS)	Phases. We suggest that you participate in the relevant Priority Action Teams; information is at http://www.nist.gov/smartgrid/PAP_Combined_WorkshopFinalV1_0a_20090730.pdf . The http://www.nist.gov/smartgrid/ site will have links to the ongoing efforts in these areas. Appendix D has been removed. Cyber Security for the Smart Grid is being aggressively pursued by the Cyber Security Coordination Task Group. Rather than replicate the status of this ongoing activity here, the reader is directed to this project's TWIKI pages. To follow this activity and review all related documents, use the following Web link: http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/CyberSecurityCTG

#	DATE	WHO	SOURCE	COMMENT	Response
				Domain: Operations Description: Repository of distribution system assets, their relationships (connectivity), ownerships, and activities. Comment: The description needs to include this: “(Note: Though such legacy databases continue to be necessary, the essential innovation of the smart grid is that it involves communication between many different devices. Thus it is also necessary for the presence of loosely coupled information architecture patterns and associated encodings and service interfaces that enable such communication to implement common ways to describe geospatial data and services and to request geoprocessing services.)” 4.7.5 Communications Diagram p. 22 4.7.3 Actors Table p. 75 Actor: Customer Information System (CIS): Operations: Operations Repository of customer information related to distribution company services. CIS contains load data for customers that are estimated for each nodal location on a feeder, based on billing data and time-of-day and day-of week load shapes for different load categories. Comment: This is one of the key places to assess the need for geospatial standards. The OGC Geography Markup Language (GML) Encoding Standard is apparently already being included in CIS, which is an important first step to “geo-enabling” the smart grid. 4.8.4 Requirements Drivers p. 82 Comment: In the paragraph that begins: “The distribution power systems comprise a multitude of information sources….” After the second to last sentence in this paragraph, add this sentence: “Interfaces and data encodings that enable communication between these sources will need to implement common ways of expressing location data and requests for geospatial processing services such as “lies within specified area” and “along corridor”. Section 6.1.3.1 Common Meteorological and Geospatial Models Key Actions: (1) Develop or adopt generic models for weather, pricing, Geographic Information Systems (GIS), and scheduling, using the Common Semantic Model – NIST should work with IEC TC57, NEMA, ASHRAE SPC 135, OGC/OpenGIS and OASIS to assemble and existing approaches to the representation of meteorological and geospatial information. The resulting common information would be represented in the common semantic model and then forwarded back to the individual standards bodies for harmonization. Comment: Good. The OGC Meteorology Domain Working Group provides an open forum for work on meteorological data interoperability, and a route to publication through OGC's standards process (Discussion paper / Best Practice / Standard, and, if appropriate, to ISO status). The goal is to develop standards that meet the specific needs of the World Meteorological Organization (http://www.wmo.int/pages/index_en.html) and benefit the world weather, water and climate data users and producers. This Working Group can provide sound advice on meteorological information systems issues that relate to the smart grid. (Minor edit: Remove “/OpenGIS”.) 6.2.2 Wide Area Situational Awareness p. 96	

#	DATE	WHO	SOURCE	COMMENT	Response
				Comment: In the first sentence, “The most critical elements of wide area situational awareness can be related to time” make this addition: “…can be related to time and space.” p. 100, “In the short term, standardized approaches for network management, cyber security, and managing point lists using DNP3 are needed. This would essentially apply some of the important principles of IEC 61850 to DNP3 applications. In the longer term, migration to IEC 61850 for distribution management applications will require a number of important extensions and developments.” Comment: We would add after “extensions and developments”, “For example, DNP3 will need to be interoperable with a wide range of smart grid actors that communicate geospatial and in-building location.” 6.3.1 Completion of the NIST Standards Evaluation Process and 6.3.1.1 Requirements Analysis p. 101 Comment: With respect to each of the three Key Actions, there should be review and capture of geospatial processing and location communication requirements which may be essential in many of the use cases but which have not yet been spelled out. 6.3.2 Architecture Framework Development and NIST IKB p. 102 Comment: The OGC has worked with many organizations (NGA, USGS and FGDC, GEO, UN, ESA, Canada’s GeoConnections, EC’s INSPIRE program etc.) to develop architectures and spatial data infrastructures. We look forward to contributing to smart grid architecture framework development and the NIST IKB. 6.3.3 Policy and Regulatory p. 103 Comment: By implementing OGC standards and specific complementary geospatial standards from other SDOs (notably ISO TC/211 Geographic information/Geomatics and IETF, which adopts profiles of certain OGC standards), NIST’s Smart Grid Roadmap will be consistent with a wide range of policies, guidelines, practices and trends in US federal, state and local agencies and governments and enterprises in other countries. 9 Appendix A: Standards Profiles by Domain In the tables beginning on p. 113: Table 14 – Standards Profile for Operations Domain Table 15 – Standards Profile for Markets Domain Table 16 – Standards Profile for Service Provider Domain Table 17 – Standards Profile for Bulk Generation Domain Table 18 – Standards Profile for Distribution Domain, Table 19 – Standards Profile for Transmission Domain Table 20 – Standards Profile for Customer Domain Comments: 1) “GIS Standards” are mentioned under “Semantic Understanding” in “Table 18 – Standards Profile for Distribution Domain”. It is important to avoid thinking that “GIS” will address the geospatial requirements of the smart grid. A GIS performs certain kinds of geospatial operations, but it is not necessary or adequate for many other operations. For the smart grid, what is necessary is that communication of location parameters and geoprocessing service requests and responses happens without glitches. Many of the standards developed and	

#	DATE	WHO	SOURCE	COMMENT	Response
				maintained by the SDOs in this set of tables involve or will participate in communications that involve location, area, proximity, elevation, distance, “in area”, “outside of area”, etc. Those SDOs will need to work with the OGC to be sure that such communications will be possible in the smart grid’s open network and not necessarily dependent on a central GIS, especially if that GIS uses proprietary means for storing and communicating geospatial information. 2) Wherever “Time Synch & Sequencing” is mentioned, there needs to be awareness of location with respect to time zones and distance-related communication delays. 3) Transactions may be subject to different conditions in different locations. 4) What will be done about standard encoding methods for indoor location of smart grid actors and standard interfaces for operations that use indoor location data? What other building-related data will be necessary in smart grid scenarios, which might depend on location-coupled energy parameters such as light and heat? Owners and operators of buildings and capital projects are beginning to push for Building Information Models (BIM) that will provide the standard means to answer these questions, and OGC, through our recent AECOO Testbed Activity, has begun to work on these issues with the buildingSmart alliance of the NBIMS Committee (the National Building Information Model Standard Project Committee), a project of the National Institute for Building Sciences. Much work remains, however. It would be worthwhile for NIST experts to consult with others who are involved with this effort, and the OGC may be able to suggest possibilities for sharing the costs of solving smart grid device location problems if those solutions can also benefit other BIM stakeholders. p. 95: “As DER (distributed energy resource) devices become pervasive and consumers can buy them at retail stores, the complexity of provisioning and tracking all the DER devices must be automated.” Comment: Location is part of the complexity that needs to be addressed in such provisioning and tracking. 10 Appendix B: Alphabetical Standards List 10.66 Open Geospatial Consortium Standards Application: Geospatial and location based services, Geographical Information System (GIS) standards. Actors: Spatial coordinates (three dimensional) Interfaces: Various Maturity: Wide international deployment, integrated with many technologies including building information systems, emergency management systems, and location databases. Category: Open specification, Open Geospatial Consortium, International Consensus Standards. Comment: Good. Please add after “emergency management systems”, “sensor webs and transducer control,” as the OGC Sensor Web Enablement standards may specify sensor/transducer encodings and interfaces in ways that will be useful to utilities as they implement smart grid solutions. 11 Appendix C: Requirements, Standards Gaps, and Discussion Issues for the Action Plan Comment: Geospatial is mentioned only once in this section, in Section 11.6.2 “Discussion Issues for Distribution Operations and Management”, p. 160, Domain: Distribution. Discussion issues: What GIS standards should be specified, developed, or extended? The status of GIS standards are not clear. Standards potentially involved: GIS standards, IEC 61968. Again, “GIS” is not the answer. For each Requirement listed in the tables in these sections, we suggest adding to the “Gaps” and “Discussion Issues” sections this sentence: “Review need for standard location encodings and geoprocessing interfaces.” Also, “OGC” should be added in the “Who” sections. “Geospatial” is not the main issue in any of these requirements, but it is a critical cross-cutting issue. In most cases, the geospatial interoperability solutions will probably be relatively easy to implement by using or making slight modifications to existing standards. In some cases no change will be necessary. But interoperability won’t be achieved unless each of the standards organizations whose standards include or should include location parameters is aware of potential interoperability issues related to those parameters. 12 Appendix D: Key Use Cases for Cyber Security	

#	DATE	WHO	SOURCE	COMMENT	Response
				Considerations p. 161 Comment: Geospatial standards are necessary in some but not most use cases involving security, intellectual property and access control. However, it is also true that geospatial use cases pose some unique problems with respect to these issues, and these problems are being addressed in OGC Working Groups. To know how these emerging solutions might be helpful in the area of smart grid cyber security, we will need to learn more about the smart grid cyber security use cases.	
69	7.30.09	Susan Miller, APPA SMiller@APPAnet.org	SGC	National Institute of Standards and Technology ATTN: George Arnold Dear Mr. Arnold: Attached are comments of the American Public Power Association ("APPA") submitted in response to NIST's Request for Comments on "Report to NIST on the Smart Grid Interoperability Standards Roadmap" (Contract No. SB1341-09-CN-0031—Deliverable 7). NIST published its Requests for Comments in the June 30, 2009 Federal Register under Docket No. 0906181063-91064-01. APPA appreciates the opportunity to submit comments in this proceeding. If you have any questions or need additional information, please contact Sue Kelly, vice president of policy analysis and general counsel, or Mike Hyland, vice president of engineering services. Ms. Kelly may be reached at 202-467-2933 or skelly@appanet.org, and Mr. Hyland may be reached at mhyland@appanet.org or mhyland@appanet.org. Thank you, Sue Miller Susan L. Miller Administrative Assistant, Policy Analysis 1875 Connecticut Avenue, N.W. Suite 1200 Washington, D.C. 20009-5715 BEFORE THE DEPARTMENT OF COMMERCE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY Report to NIST on the Smart Grid) Docket No. 0906181063-91064-01 Interoperability Standards Roadmap) COMMENTS OF THE AMERICAN PUBLIC POWER ASSOCIATION The American Public Power Association ("APPA") appreciates the opportunity to provide comments to the National Institute of Standards and Technology ("NIST") on the "Report to NIST on the Smart Grid Interoperability Standards Roadmap" ("Roadmap") prepared by the Electric Power Research Institute ("EPRI"). APPA's comments respond to NIST's Request for Comments on the Report to NIST on the Smart Grid Interoperability Standards Roadmap (Contract No. SB1341-09-CN-0031—Deliverable 7) that was noticed in the Federal Register on June 30, 2009 ("Notice").1 1 74 Fed. Reg. 31,254 (June 30, 2009). I. APPA'S INTERESTS	Thank you for your comments. Your comments related to "common pricing model" are very clear. The terminology chosen in the referenced document was not clear. We have changed the document, including the title of section 6.1.1 and related text, to use "common price communication" rather than "common pricing model." The intent in the published document was to enable communication of price in a consistent manner, not to attempt to standardize how prices are determined. We also added a reference to the NAESB work on eTariffs, which are relevant to price communication. Other uses of the word "pricing" as in "Real Time Pricing" are retained as they are common usage.

#	DATE	WHO	SOURCE	COMMENT	Response
				APPA is the national service organization representing the interests of not-for-profit, publicly owned electric utilities throughout the United States. More than 2,000 public power systems provide over 15 percent of all kilowatt-hour ("kWh") sales to ultimate customers, and do business in every state except Hawaii. Approximately 1,840 of these systems are cities and municipal governments that currently own and control the day-to-day operation of their electric utility systems. All APPA utility members are Load-Serving Entities ("LSEs"), with the primary goal of providing retail electric customers in the communities they serve with reliable electric power and energy at the lowest reasonable cost, consistent with good environmental stewardship. This orientation aligns the interests of APPA-member electric utilities with the long-term interests of the residents and businesses in their communities. Collectively, public power systems serve 45 million people. II. COMMENTS APPA generally supports the approach to the development of Smart Grid interoperability standards set out in the Roadmap. APPA staff participated in the NIST Smart Grid Roadmap meetings, and found them well organized and designed. The road to a smarter electric grid—from electric power generation through consumer products—will be a long and complex journey for all stakeholders in the electric industry. APPA supports the standards development process, but cautions that any expedited timetable undermining the security of the grid or imposing substantial financial burdens on customers will in the end serve neither retail electric consumers nor the Administration's goals. While APPA generally supports the Roadmap, it has substantial concerns with Section 6.1.1, entitled "Common Pricing Model Standard." In Section 6.1.1, the Report recommends that "NIST should work with IEEE, IEC, OASIS, ASHRAE, NAESB and other relevant SDOs to develop an approach for developing a common pricing model to traverse the entire value chain. The model must include price, currency, delivery time, and product definition." APPA certainly understands that from an interoperability standard development perspective, one common pricing model would be optimal. Given the structure of the electric utility industry, however, this simply is not possible. Retail electric service in the United States is provided by over 3,000 retail electric utilities, including for-profit investor-owned utilities, and not-for-profit public power systems and rural electric cooperatives. Retail electric service is regulated by public utility commissions ("PUCs") at the state level, or by public power systems' governing bodies and co-op boards of directors at the local level. For very legitimate reasons, their retail rate designs will vary substantially from locale to locale and from state to state. The Federal Energy Regulatory Commission's ("FERC") Smart Grid Policy Statement issued on July 16, 2009, in Docket No. PL09-4-000 reinforces this point.2 At P 75 of the Policy Statement, FERC notes that it is not its "intention to require the use of dynamic pricing in retail rates." Similarly, at P 76 of the Policy Statement, FERC makes clear that it "continues to recognize that state and local regulators have jurisdiction over retail rates and cost recovery." For this reason, APPA believes that this aspect of the Roadmap will have to be revised. The Smart Grid interoperability standards will have to be developed with the flexibility and capability to accommodate different retail rate designs (including, but by no means limited to, dynamic pricing) if they are to be at all useful. If NIST needs to consult with expert organizations regarding this subject, it should start with the National Association of Regulatory Utility Commissioners ("NARUC"), the trade association of the state PUCs. (NARUC's website is www.naruc.org.) APPA also stands ready to work with NIST to help it better understand the variety of retail rate designs used by the nation's 2,000-plus public power systems. Finally, the National Rural Electric Cooperative Association ("NRECA") would be a good source of information regarding the retail rate designs of rural electric cooperatives. III. COMMUNICATIONS APPA requests that any communications in this matter be directed as follows:	

#	DATE	WHO	SOURCE	COMMENT	Response
				Susan N. Kelly, Vice President of Policy Analysis and General Counsel American Public Power Association 1875 Connecticut Avenue, N.W. Suite 1200 Washington, D.C. 20009-5715 202-467-2933 skelly@appanet.org Michael J. Hyland Vice President, Engineering Services American Public Power Association 1875 Connecticut Avenue, N.W. Suite 1200 Washington, D.C. 20009-5715 202-467-2986 mhyland@appanet.org WHEREFORE, APPA submits these comments for NIST's consideration. Respectfully submitted, AMERICAN PUBLIC POWER ASSOCIATION By /s/ Susan N. Kelly _____ Susan N. Kelly Vice President of Policy Analysis and General Counsel Michael Hyland Vice President, Engineering Services American Public Power Association 1875 Connecticut Avenue, N.W., Suite 1200 Washington, D.C. 20009-5715 (202) 467-2900 Fax: (202) 467-2918 Email: skelly@appanet.org mhyland@appanet.org July 30, 2009	
70	7.30.09	John Booe, NAESB jbooe@naesb.org	SGC	Dr. Arnold, Please find attached the comments of the North American Energy Standards Board in response to the request for comments on the Report to NIST on the Smart Grid Interoperability Standards Roadmap noticed by the National Institute of Standards and Technology. If you have any questions or need additional information, please do not hesitate to contact me. Thank you, _____ Jonathan Booe Staff Attorney North American Energy Standards Board	Thank you for your comments. Your suggestions and comments are relevant for the creation of the Standards Panel and Governance Council, and will be forwarded to the Contract responsible for Phase 2 and Phase 3 of the NIST Smart Grid project when that contractor is identified. We encourage you to participate in those phases of the work. Your comments on transparency may be too limiting in that the application appears to be "industry acceptance and support." By emphasizing the importance of public and broad stakeholder participation many of your principles as stated clarify the issues for the Standards Panel and Governance Council.

#	DATE	WHO	SOURCE	COMMENT	Response
				1301 Fannin, Suite 2350 Houston, Texas 77002 (713) 356-0060 - office (281) 642-3912 - cell jbooe@naesb.org NORTH AMERICAN ENERGY STANDARDS BOARD 1301 Fannin, Suite 2350 □□Houston, Texas 77002 □□Phone: (713) 356-0060 □□Fax: (713) 356-0067 email: naesb@naesb.org □□Web Site Address: www.naesb.org July 30, 2009 comments filed via email to smartgridcomments@nist.gov Dr. George Arnold Deputy Director National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899-8100 Dear Dr. Arnold, NAESB appreciates the opportunity to offer these comments to "Report to NIST on the Smart Grid Interoperability Standards Roadmap" (Contract No. SB1341-09-CN-0031-- Deliverable 7) prepared by the Electric Power Research Institute (EPRI). We commend EPRI for the considerable organizational effort put forth in a compressed schedule to produce the report. We offer the following four general suggestions for consideration – which apply both to the creation and acceptance of the roadmap and the development of Smart Grid Interoperability standards: □□Transparency. Transparency in decision-making is a key factor in garnering support. Transparency includes both the identification of the decision makers and how decisions are made. Transparency applies to standards development, standards selection and it also applies to the development of the plans and strategies. While providing adequate transparency can take time, it has been our experience that it expedites industry acceptance and support. □□Inclusion. Stakeholders should be given the opportunity to take part in the decision making and standards development. Reaching out to trade associations and industry organizations to	

#	DATE	WHO	SOURCE	COMMENT	Response
				encourage their stakeholders to participate has proven essential in assuring that diverse groups are made aware of the planned standards development activities. Trade associations, industry organizations, regional groups and the industry itself play key roles in soliciting a broad and regionally diverse group of participants. Regulatory staff, both state and federal should be encouraged to participate to ensure that directions taken support their policies. □□Balance. Decision making, particularly for standards that have broad applicability, should not on July 30, 2009 Page Two balanced and there are a number of ways in which this balance can be achieved. Balance of geographic areas can be important when the decisions made or the standards developed are not specific to a given region, but rather are intended to apply more broadly. Equally important, those entities either politically accountable for the success or operationally accountable for the success of the standards and related decisions must have a strong voice in the overall planning and strategic sessions, and also in the identification of standards needed, the development of the standards and the ultimate adoption of the standards. □□Documented and Accessible Process. Participants should have access to the process by which the standards are developed and also the process by which related decisions are reached. Importantly, an appeal process should be defined not only as it pertains to endorsement of standards, but also to the standards development process itself. The four suggestions made are particularly important when the standards may be the subject of regulatory action either at the state or federal level. Ensuring the broadest level of inclusion, balance of interests, transparency in all aspects and easily accessible documentation on the process strengthens the work products and supports building industry consensus – crucial when the work products are intended to be forwarded to regulators for their consideration. We look forward to continuing to participate in your process as the needed Smart Grid suite of standards and specifications are adopted and put to use in the energy market, and we are grateful for the opportunity to contribute as co-leaders in the panels and working sessions set for August 3 and 4, 2009. With Best Regards, Rae McQuade	

#	DATE	WHO	SOURCE	COMMENT	Response
				Rae McQuade, President, NAESB cc: Michael D. Desselle, Chairman of the NAESB Board of Directors William P. Boswell, NAESB General Counsel Jonathan Booe, NAESB Counselly include the stakeholders who will be responsible for modifying their business processes	
71	7.30.09	Matthew B. Williams, AHAM MWilliams@AHAM.org	SGC	Mr. Arnold, AHAM's comments to Federal Register Notice [FR Doc. E9–15467], Request for Comments on "Report to NIST on the Smart Grid Interoperability Standards Roadmap."are attached. If you have any questions related to our comments, please feel free to contact me. Sincerely, Matthew B. Williams Director of Standards 1111 19th Street NW, Suite 402, Washington, DC 20036 t 202.872.5955 ext317 f 202.872.9354 e mwilliams@aham.org www.aham.org STATEMENT OF CONFIDENTIALITY: The information contained in this electronic message and any attachments to this message are intended for the exclusive use of the addressee(s). If you are not the intended recipient, or the person responsible for delivering the e-mail to the intended recipient, be advised you have received this message in error and that any use, dissemination, forwarding, printing, or copying is strictly prohibited. Please notify The Association of Home Appliance Manufacturers at (202) 872-5955 or unsubscribe@aham.org, and destroy all copies of this message and any attachments. July 30, 2009 George Arnold National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899–8100 smartgridcomments@nist.gov Dear Mr. Arnold, The Association of Home Appliance Manufacturers (AHAM) would like to take this opportunity to provide comment on Federal Register Notice [FR Doc. E9–15467], Request for Comments on "Report to NIST on the Smart Grid Interoperability Standards Roadmap." The Association of Home Appliance Manufacturers (AHAM) represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's more than 150 members employ tens of thousands of people in the U.S. and produce more than 95% of the household appliances shipped for sale within the U.S. The factory shipment value of these products is more than $30 billion annually. The home appliance industry, through its products and innovation, is essential to U.S. consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to U.S. jobs and economic security. Home appliances also are a success story in terms of energy efficiency and environmental protection, often representing the most cost effective choice a consumer can make to reduce energy use and costs.	Safety Related issues and smart grid interactions: agreed. Acknowledgment of safety issues and domain responsibility added to several of the 4.2.x sections. Tariffs: These comments appear to be a request for time of day, critical peak, and dynamic pricing approaches. Tariff design per se is beyond the scope of this document, as well as subject to regulation in each state. Common price information was identified as a significant cross-cutting issue, and is at the heart of three of the fifteen priority actions (price, sharing customer usage information, DR and DER). AHAM participation in all three efforts is encouraged. Fewer rather than more standards: Some variability is inevitable; the performance of something as simple as wireless in the large house, the tract house and in the apartment complex requires quite different business process and security needs. The decisions to present price and schedule decisions to the home (or commercial building) is anticipated to provide premises-based systems with a problem set unencumbered by grid technologies. This would free organizations such as AHAM to solve this problem on their own. One way or two way communications: The primary communication models are being addressed in the priority action plans, especially those for DR/DER. AHAM should be a participant.

#	DATE	WHO	SOURCE	COMMENT	Response
				AHAM is also a standards development organization, accredited by the American National Standards Institute (ANSI). The Association authors numerous appliance performance testing standards used by manufacturers, consumer organizations and governmental bodies to rate and compare appliances. AHAM applauds the leadership role NIST has taken in identifying the standards that will be needed in the development of the Smart Grid. AHAM's comments address the specific paragraphs highlighted below. Paragraph 4.4.2.1, 4.4.2.4, 4.4.2.5, 4.4.2.8 NIST should incorporate safety expectations into all use cases and requirements development discussions related to consumer-based products. Appliances are designed to meet rigorous safety standards. Detailed instruction manuals also are developed to illustrate safe operation of appliances within the home. Further, many final electrical inspections of new home construction include a check for a third party safety mark on appliances. An interruption and subsequent resumption of the operation of an appliance, for which the product has not been designed and tested, could be problematic, especially in AHAM Federal Register Comments Page 2 products incorporating heating elements and motors. Safe operation of consumer-based products must be the paramount concern in the development of the NIST roadmap. Paragraph 4.4.2.3 NIST should facilitate the standardization of the way peak load is measured and incorporated into residential tariffs for purposes of the Smart Grid. This will allow manufacturers to design their products in a way that maximizes benefits to the consumer and the grid. Products designed to reduce load are very dependent on the structure and implementation of price, event, and usage information (tariffs). Products may be designed that reduce wattages (kW), but take longer to perform a given task at the reduced wattage. In that case, the product may still use the same amount of total energy (kWh) and the consumer may or may not see a benefit. If a lower tariff (and its associated reduction in wattage) does not take into consideration a longer total run time, the program will be much less effective. Tariffs must be structured so that the benefit is visible to the consumer. Paragraph 4.4.2.2 Governance of standard protocols specified by utilities should be a high priority in the NIST Roadmap. The proliferation of HAN communication protocols complicates the implementation of a Smart Grid for manufacturers and consumers. Appliance manufacturing is an investment intensive operation resulting in standardized products for national and international distribution. Customizing products for various protocols specified by thousands of different utilities would be unworkable, and could inhibit the successful implementation of the Smart Grid. Paragraph 4.4.2.2, 4.4.2.8 The NIST road map should account for both one-way and two-way communication. During the early stages of the development of the Smart Grid, one-way communication from the home to the utility should be the focus. One-way communication is simpler to implement, less costly, and provides adequate functionality for most applications. Two-way communication is not necessary for initial implementation of the Smart Grid. A utility does not have the expertise or safety knowledge of appliances required in order to control how an appliance functions. The manufacturer, and ultimately the consumer, should determine how the appliance functions. Thus, a utility does not need to have two-way communication directly to appliances. Registration, which some argue requires two-way communication, can occur via other, simpler, means of communication. Because two-	

#	DATE	WHO	SOURCE	COMMENT	Response
				way communication is not necessary, and one-way communication will sufficiently allow the required communications, the NIST road map should consider one-way or two-way communication acceptable. We also note that a two-way communication assumption between a home and the utility has been forced into much of the Smart Grid standards development process with virtually no input AHAM Federal Register Comments Page 3 from manufacturers or consumer groups. NIST should seek input from manufacturers and consumer groups on the acceptability of two-way communication between the home and utility during the standards development process. AHAM strongly believes that NIST should intervene in this process to state that one-way communication is a viable option for a successful Smart Grid. If you have any questions or issues you would like to discuss, please feel free to contact me. Sincerely, Matthew B. Williams Director, Standards 202-872-5955 x317 mwilliams@aham.org	
72	7.30.09	Zolaika Strong, EEI ZStrong@eei.org	SGC	Dear. Mr. Arnold: The Edison Electric Institute, on behalf of its member companies, appreciates the opportunity to submit comments to the National Institute of Standards and Technology regarding Report to NIST on the Smart Grid Interoperability Standards as proposed n the Federal Register Notice dated June 30, 2009. Our comments are attached to this email. Please call or email me if you have any questions. Thank you, Zolaikha Strong _____ Zolaikha S. Strong Manager, Federal Regulatory Affairs Edison Electric Institute (202) 508-5715-Office (202) 731-5884-Blackberry (202) 508-5445-Fax July 30, 2009 George Arnold National Coordinator for Smart Grid Interoperability National Institute of Standards and Technology	Public-Private Governance and EEI participation: This phase of the smart grid project is specifically out of scope for the EPRI report, and a new contractor will soon be selected (August 2009) to manage the partnership. The comments of EEI will be forwarded to that group as it is formed and tasked. Testing and Certification: see above. Legacy systems and equipment: The report acknowledges that backward compatibility and legacy systems are and will remain one of the most significant challenges of smart grids. See above. While this reviewer agrees, the idea that “smart grids are systems of systems” and not “a system” was one of the more critical ideas to socialize in this report. As the roadmap evolves, the advice given by EEI is good. Inclusiveness and openness: Agreed. Most of these challenges are being met in the current process with the exception diverse locations. Even there, there has been a significant workshop with EEI involvement Santa Clara, and GridInterop is scheduled for Denver in Fall 2009. We hope that we can continue to count on active EEI participation and that EEI will assist the phase 2 project in encouraging participation in these efforts. DR, DER, and Consumer Participation: noted.

#	DATE	WHO	SOURCE	COMMENT	Response
				100 Bureau Drive Stop 8100 Gaithersburg, MD 20899-8100 Dear. Mr. Arnold: The Edison Electric Institute ("EEI"),2 on behalf of its member companies, hereby respectfully submits these comments in response to the National Institute of Standards and Technology's ("NIST") June 30, 2009, Notice regarding Report to NIST on the Smart Grid Interoperability Standards Roadmap ("EPRI Report" or "Report"), prepared by the Electric Power Research Institute ("EPRI"), that will be used as an input in the NIST Three-Phase Plan to expedite the development of interoperability standards for Smart Grid.3 EEI wishes to commend EPRI for its efforts and also to express the electric industry's appreciation that NIST has provided opportunity for interested stakeholders to provide comments on the EPRI Report. EEI believes that the framework presented in the EPRI Report represents a very good step forward and if given sufficient time to be properly developed with the type of governance model suggested in the Report it can be very beneficial towards the electric industry's efforts to develop the Smart Grid. NIST Role and Plans EEI supports NIST's plans to publish a report documenting stakeholder consensus on the Smart Grid Architecture standardization priorities for securing and assuring the interoperability of Smart Grid Components, an initial set of standards, and a roadmap for addressing remaining standards needs. See EPRI Report at 3. EEI also supports the plan to launch a formal public-private partnership to coordinate and facilitate development and evolution of additionally needed standards. However, further details on how this partnership will be governed and the role it plays in other governance processes should set forth more clearly in the EPRI Report. EEI is particularly concerned with the need to have balanced representation in the formation of this partnership and the need for transparency in the choice of the members to participate in this partnership. For example, the Report should be clear that such a partnership be developed and governed in the manner set forth in section 2.6 of the EPRI Report. See EPRI Report at 18. In addition, EEI strongly supports the plan to develop an overall plan for testing and certification to ensure that Smart Gird devices and systems4 conform to standards for both cyber security and interoperability. See EPRI Report at 3. In particular, EEI believes a private sector market-based program that is accredited by NIST is needed to certify that vendor Smart Grid products have undergone appropriate cyber security testing at all levels. EEI recommends the development of such a security certification program in which Smart Grid components and systems would be subject to independent testing and certification, including chip testing. This type of a program would help utilities differentiate among the various vendor solutions and to select those solutions that provide appropriate cyber security. Additionally, Smart Grid vendors should be required to adopt personnel surety measures commensurate with those required of utilities. Also vendor contracts for Smart Grid implementations should address security testing and require vendors to disclose vulnerabilities to utilities. Smart Grid Challenges EEI agrees that there are many procedural and technological challenges that need to be met as the Smart Grid evolves. EPRI Report at 9-10. Moreover, EEI strongly agrees that it would be impossible and unwise to advocate that all the existing equipment and systems need to be replaced at once. Id. Furthermore, the Report is correct to state that design should avoid unnecessary expenses and unwarranted decreases in reliability, safety, or cyber security. Id. However, EEI does not view this type of challenge as procedural, but rather the transition of existing equipment and systems is a technical matter. EEI also appreciates Report's definition of "Smart Equipment" and suggests that NIST should avoid generic reference to "systems," which is overly ambiguous. Instead, the Report should specifically refer to "Smart Grid systems" and "Smart Equipment" so that intelligent equipment is initially designed and implemented with the appropriate security controls and capabilities built-in. Id.	WASA: Noted Storage: we encourage EEI participation in the fast track semantic interaction with storage devices work identified in two of the priority action plans. It is far too easy to offer a pure technology solution, when business aspects of storage management need to be part of the signal as well. Remaining comments are affirmational or participatory, and EPRI recommends that they be forwarded to the phase to public private partnership.

[2] EEI is the trade association for shareholder-owned electric companies and serves international affiliates and industry associates worldwide. Our U.S. member companies serve 95 percent of the ultimate customers in the shareholder-owned segment of the industry and nearly 70 percent of all electric utility customers in the nation. EEI members own approximately 60 percent of the nation's circuit miles of transmission. EEI membership includes vertically integrated and stand-alone utility business models.

[3] *Report to NIST on the Smart Grid Interoperability Standards Roadmap'' (Contract No.SB1341–09–CN–0031—Deliverable 7); Request for Comments*, Fed. Reg. Vol. 74, No. 124, at 31254 (June 30, 2009).

[4] EEI notes that the word "system" is used throughout the EPRI Report to describe different things (e.g., market systems, electric systems, computer systems, and etc. EEI suggests that avoiding general references to "system" would serve the interest of clarity.

#	DATE	WHO	SOURCE	COMMENT	Response
				Smart Grid Interoperability Standards Governance EEI strongly supports a governance model for standards development that accelerates the implementation of a secure, intelligent, interoperable, and fully-connected Smart Grid. See EPRI Report at 17. EEI agrees it is essential for ongoing governance of Smart Grid standards development process to include the key stakeholder representatives, including utilities. Id. at 18. Furthermore, the EPRI Report is correct that this governance model for the standards development process must promote participation, openness, accountability, and transparency. EEI appreciates that NIST has also frequently advocated that the Smart Grid Interoperability Standards development process should be open and transparent in order to ensure that all those who wish to participate may do so. EEI also strongly agrees that the governance process for standards development must ensure balanced stakeholder representation for voting actions. EEI notes that an ANSI-based standards development process includes many of these needed features. This type of governance process for standards development will help to facilitate prioritizing standards to be developed and the adoption of such standards based on consensus and value. See Id. This type of governance process for standards development would also help to encourage inclusion, open participation, and early publication to provide transparency of efforts and to encourage collaboration among stakeholders. EEI also supports a governance process for the development of standards that ensures that deliberations and standards selection is published early and often for free-of-charge public web access to ensure the process is open, unbiased and fully documented. Id. It would also be very helpful to have documentation of decisions and results from all workshops and summits made available for timely publishing in a free public location. EEI also believes it is important that publicly announced workshops and summits are held in diverse locations to encourage easy participation of all stakeholders and interested parties. Id. Finally, as discussed above, it is important that any formal public/private partnership created to coordinate and facilitate development and evolution of additionally needed standards is subject to this type of governance model. See EPRI Report at 3. Smart Grid Conceptual Model EEI understands that one goal of the Smart Grid is to enable new technologies and support new business models. EEI supports a high level conceptual model to define principles, cyber security strategies, and methodologies that will be used in developing the architectures of the domains. See EPRI Report at 19. However, it is not appropriate for the EPRI Report to make predictions concerning which new business models may prevail, whether functions that are the responsibility of regulated utilities may be “outsourced,” or imply a preference for a “wires” company over other types of companies. See EPRI Report at 30. Any such prediction regarding business models or implied preferences for any particular corporate structure/model should be removed from the Report. Cyber Security Risk Management Framework and Strategy Smart Grid Cyber Security Strategy EEI supports that cyber security for the Smart Grid must be a high priority, and that the much of the Smart Grid components and infrastructure will necessitate fundamental cyber security controls (e.g., access control, network isolation, monitoring, personal surety, information protection, etc.). Smart Grid products should incorporate appropriate cyber security features to address known vulnerabilities. These vulnerabilities are significant concerns that require careful consideration to develop appropriate and effective mitigations. Additionally, given utilities understanding of the end-to-end design and operations of electric systems, utilities should play a central role in the establishment of cyber security requirements and standards for Smart Grid products that will be attached to their systems. Cross Cutting and Overarching Issues Common Semantic Model EEI agrees on the need for effective communication and coordination across inter-system interfaces – a common semantic model. See EPRI Report at 91. EEI believes that a common semantic model would ensure that cross-domain cutting issues can be more effectively resolved by facilitating identification of problems and issues. To this end, NIST should work with IEEE to ensure that the integration of utility T&D field operations with information technology is achieved. EEI also agrees that the activities of those organizations, which are currently working independently on consumer communications semantics for a variety of applications, should be brought together under one specific focused working group in concert with SDOs and Consortia activities. See EPRI Report at 91. EEI suggests that this effort should include balanced representation of key stakeholders,	

#	DATE	WHO	SOURCE	COMMENT	Response
				including utilities, and comply with the governance model set forth in section 2.6 of the EPRI Report. EEI supports the key action for NIST to work with IEC TC57, NEMA, ASHRAE SPC 135, and OASIS to develop a common semantic model using XML Schema and XML. Id. It is an appropriate objective to unify the models of CIM (IEC61970, IEC61968) and IEC 61850, including correspondences with ANSI C12.19 and ASHRAE 135 to form a common representation of information models constructed by these standards efforts for the Smart Grid. Id. EEI notes that NIST's recently released preliminary list of sixteen standards identified for the Smart Grid Framework also includes IEC Standards 61970 and 61968 (collectively, "Common Information Model") as well as IEC 61850 ("Communications Networks and Systems").5 EEI further notes that Federal Energy Regulatory Commission ("FERC") has found that these standards should serve as a starting point for controlling communications across interfaces.6 EEI supports this key action item and agrees with NIST that the standards development process should use existing standards when possible. EEI supports NIST recommendation in utilizing a merit based criteria for selecting SDOs to develop the standards needed to fill the gaps. Additionally, the SDO with the most knowledge base and one that already facilitates the development of the standard should be recommend by NIST to develop the standard or assimilate protocols needed to develop the appropriate standard. EEI also supports NIST recommending that an SDO assimilate a protocol needed to fill a gap when both the SDO and the protocol utilize a similar knowledge base. Additionally, NIST should be aware that international standards and international standards processes present the additional complexity of harmonizing these standards which may delay the process. EEI recommends that this area should be conducted pursuant to the governance model for standards development set forth in section 2.6 of the Report in conjunction with ANSI accredited organizations or with international organizations that have existing alliances with a domestic organization or with international organizations that will conduct themselves in accordance with the governance model for standards development proposed by NIST in section 2.6 of this Report. Communication Interference in Unlicensed Radio Spectrum EEI supports commissioning a group of experts that include utility technical representatives to study the issue of communications interference in unlicensed radio spectrums for Smart Grid applications and develop business and technical requirements on the optimal requirements for wireless spectrum usage for Smart Grid communications. See EPRI Report at 95. EEI also supports the objective of identifying the optimal usage of spectrum for Smart Grid purposes throughout North America. Id. This study should address how electric utilities can economically and expeditiously obtain the appropriate spectrum to support Smart Grid applications without creating security vulnerabilities. Finally, in assessing these issues, this study should take into account the diversity of utility systems and operating environments. Demand Response & Consumer Energy Efficiency The EPRI Report correctly identifies the key gaps or issues with demand response and consumer energy efficiency standards and specifications, and EEI supports the EPRI Report's recommended key actions in this area. It is important that NIST organize a meeting with IEC TC57, OASIS, NAESB, and AMI-ENT to specify a process for developing a common semantic model for standard demand response signals. See EPRI Report at 95. It is also important to develop market signals via a process that includes state and federal policy makers, market operators/RTOs/ISOs, and standards committees to develop a common syntax and semantics for communicating market opportunities through the value chain and all the way to the customers. See EPRI Report at 96. EEI agrees that this effort should develop policies that protect customers, but that still allows them to participate in markets in an appropriate manner. EEI also agrees that this is not an immediate need. See EPRI Report at 96. Wide-Area Situational Awareness EEI supports developing a standard to achieve the timely exchange of system model data and recognizes the need for synchronization guidelines for data and messaging. See EPRI Report at 96. EEI also supports investigation into harmonization and extensions of mechanisms to associate information captured with the current topology and with the source within the power network that the information was acquired.7 Additionally EEI supports the key actions identified in the EPRI Report for wide area situational awareness, but notes that there is a need to create a liaison connection between the stakeholder groups so there is greater harmonization and the end results are not	

[5] *See Initial List of Smart Grid Interoperability Standards*, Request for Comment, 74 FR 27288 (June 9, 2009).

[6] *See Smart Grid Policy*, 128 FERC ¶ 61,060 at P 51 (July 16, 200)("FERC Smart Grid Policy Statement").

[7] Id. EEI notes that ownership of customer data and the appropriate security requirements to protect this information need to be considered.

#	DATE	WHO	SOURCE	COMMENT	Response
				incompatible. Electric Storage EEI supports EPRI Report's proposals for key actions concerning electric storage. See EPRI Report at 97. However, EEI believes that NIST should also recommend that the working group that includes domain experts should address technical issues concerning the draining of storage devices. Additionally, any storage device electrical interconnection guidelines should ensure the safe and reliable operation of the utility system and end-users. Electric Transportation EEI supports the proposed key actions to develop and standardize common object models. In addition to considering the impact of Plug-In Hybrid Electric Vehicles ("PHEVs") on the planning and management of the distribution system and its impact on system protection, this effort should seek early input from key state and federal regulators since PHEVs will also have impacts on both retail and wholesale electricity markets. See EPRI Report at 97-98. Additionally, standardized common object models may need to differentiate between retail and wholesale participants and their requirements. Advanced Metering Infrastructure EEI agrees a primary goal of the standards activities going forward should be to produce uniformity between metering models currently in use. See EPRI Report at 98-99. EEI also agrees that the next highest priority in this area of work should be to determine how to infuse a common set of cross-cutting requirements into these standards to facilitate exchange of confidential and authentic information across various metering platforms in a secure manner. Id. Further 2009 Roadmap Activities EEI supports the proposal for actions to be taken beyond the initiation of the tasks set out in sections 6.1 and 6.2 of the EPRI Report. See EPRI Report at 100-103. However, EEI encourages NIST to identify more use cases and to bring the existing use cases to completion. EEI recommends NIST organize or make use of regional stakeholder groups to identify additional uses cases. A regional focus is appropriate since the process of generating, transporting and distributing electricity varies from one region to the next and the uniqueness of all regions of the country cannot be adequately addressed in generic one-size-fits-all uses cases. Factors such as the diversity of fuel types that make up the sources of generation in a particular region or the regional weather pattern may present challenges that the generic uses cases do not address. In addition, to completing the narratives, list of actors, etc., of the use cases that NIST has selected, it would be beneficial for NIST to compile a list of the use cases that were considered but not selected. This would help verify that NIST has selected the appropriate use cases. See EPRI Report at 101. With regard to requirements analysis, NIST should work with individual stakeholder groups in order to further develop this analysis. Id. Policy and Regulatory EEI agrees that policy and regulatory choices will have a major impact on technological choices and therefore recommends that the effort to develop architecture governance and policy integration processes should include liaison with not only utilities but with key state and federal regulators.8 Hence, this effort should inform key regulators on how the development of standards will address the broader economic and stakeholder issues, including the costs and benefits of the Smart Grid. Conclusion EEI on behalf of its members companies, respectfully requests that NIST ensure that future actions in developing the Smart Grid Interoperability Standards Roadmap will be consistent with the foregoing recommendations. Finally, EEI wishes to again commend EPRI for its efforts in developing the EPRI Report and express appreciation to NIST for the opportunity to provide comments. EEI looks forward	

[8] *See* EPRI Report at 103. In addition all stakeholders and regulators involved in Smart Grid standards development activities should be aware of existing jurisdictional boundaries. For example, FERC has found that it has authority to adopt an interoperability standard that will be applicable to all electric power facilities and devices with Smart Grid features, so long as the standard is necessary for the purpose of insuring "functionality and interoperability in interstate transmission of electric power, and regional wholesale electricity markets. FERC Smart Grid Policy Statement at P 22. FERC also recognized that it does not have the authority to make or enforce any such standards pursuant to the Energy Independence and Security Act of 2007. FERC Smart Grid Policy Statement at P 23

#	DATE	WHO	SOURCE	COMMENT	Response
				to working closely with NIST in the future. Respectfully submitted /s/ James P. Fama James P. Fama Executive Director, Energy Delivery Edison Electric Institute 701 Pennsylvania Avenue, NW Washington, DC 20004-2696 (202) 508-5000	
73	7.30.09	Cynthia J. Mahowald, AT&T cm5080@att.com	SGC	Dr. Arnold: AT&T Inc. respectfully submits the attached Comments and Appendices in the NIST Smart Grid Interoperability Standards Roadmap proceeding. <<Comments to NIST re Smart Grid Roadmap - final-format (7-30-09)pdf.pdf>> <<APPENDIX A Cyber Security final.docx>> <<Appendix B Cyber Security SME 73009.docx.pdf>> Cynthia Mahowald General Attorney & Associate General Counsel AT&T Services, Inc. * voice: (202) 463-4188 * fax: (202) 463-8066 * cell: (202) 374-8868 * email: cynthia.mahowald@att.com July 30, 2009 Dr. George Arnold, Eng.Sc.D Deputy Director, Technology Services National Coordinator for Smart Grid Interoperability National Institute of Standards and Technology 100 Bureau Drive Stop 8100 Gaithersburg, MD 20899-8100 Re: AT&T Comments on Draft Interim Smart Grid Interoperability Standards Roadmap Dear Dr. Arnold: AT&T Inc. submits the following comments in connection with its draft Smart Grid Interoperability Standards Roadmap.1 AT&T is an emerging leader in network services for Smart Grid devices, and its extensive network and capabilities make it an ideal partner for other	Use of Existing Commercial Carriers: this is appropriately handled by the smart grid standards board, soon in formation by NIST. The use of IP in the smart grid is a specific area identified for priority action. We encourage AT&T to get involved in that action. The appropriate use of VPNs within common carriers as part of the cyber-security structure of the is an explicit action plan. We encourage AT&T to participate. The appropriate use of wireless technologies in smart grids is being addressed an explicit action plan. We encourage AT&T to participate

#	DATE	WHO	SOURCE	COMMENT	Response
				innovators that are working to advance Smart Grid technologies, particularly in the areas of Advanced Metering Infrastructure ("AMI") systems and distribution management. As such, we have a direct interest in assisting the National Institute of Standards and Technology ("NIST") with its establishment of a final standards Roadmap that will enable efficient and effective Smart Grid deployment. 1 Report to NIST on the Smart Grid Interoperability Standards Roadmap, prepared by the Electric Power Research Institute (June 17, 2009) (the "Roadmap"). AT&T applauds NIST's efforts to expedite the development of Smart Grid standards, which are critical to achieving a fully integrated Smart Grid system. AT&T has participated in the NIST workshops and will continue to be constructively involved in the development of a comprehensive framework for Smart Grid implementation. AT&T submits these comments to underscore that a truly functional Smart Grid will require a coordinated effort that includes not just electric utilities, but also providers of IP networking capabilities and managed network security services. Specifically, we respectfully recommend that the Roadmap allow for and encourage the use of existing commercial carrier networks and services. In doing so, the Roadmap can ensure not only that investment will not needlessly be diverted from the more essential modernization of the grid infrastructure, but also that electricity ratepayers are not saddled with the significant additional costs that surely would result from the construction of multiple private networks. Providers such as AT&T offer reliable, robust and nearly ubiquitous network capabilities and services, including highly integrated cyber security options, that would be difficult, if not impossible, for an individual private network operator to economically and comprehensively replicate, particularly when also implementing Smart Grid capabilities. Thus, the effective partnership of electric utilities, communications providers and Smart Grid innovators will quicken the pace of sound Smart Grid deployment. July 30, 2009 Page 2 Indeed, leveraging today's advanced IP-based communications networks is likely the most effective way for the Smart Grid to evolve while minimizing the risks of technical obsolescence. There are a number of reasons for this. First, IP networks scale flexibly to accommodate new connections and adapt rapidly to changing load – a capability critical to Smart Grid evolution. This flexibility and adaptability is demonstrated by the public Internet. Billions of devices are connected globally with a multitude of new devices added each day. Users do not need to make prior connections to complete the communication, nor do they need to know the physical routing of the communication. Likewise, if there is a network failure, re-routing will automatically occur and the communication will be completed, all without knowledge of the end users. Like the Internet, the Smart Grid will need to implement flexible and adaptable connectivity to accommodate exchanges with millions of Smart Meters, take advantage of distributed generation and storage, assure real-time monitoring and control of critical infrastructure, and support a dynamic market for the sale of electricity. Second, IP enables applications to communicate flexibly regardless of the underlying physical infrastructure. Most practically, this means that, by committing to IP as a standard, the Roadmap need not resolve or fundamentally address the complexities of the underlying physical communications network. If the communications provider can accept and deliver IP packets at its network edge (i.e., conforms to IP/OSI Layer 3), the underlying OSI Layers 1 and 2 protocols used by the service provider become largely irrelevant. Thus, the scope of the standards specification process for the Roadmap would be materially reduced. Third, the ability of IP networks to self-heal is inherent in the technology and therefore can fulfill the articulated expectation that the Smart Grid is itself will be self-healing and resistant to attack.2 IP networks are connectionless, meaning that the communications path is not constrained to a particular unique physical path. Thus, in the event that a transmission link fails or a router malfunctions, the network will automatically take steps to avoid the failed element and deliver the communications. This capability will ensure a reliable Smart Grid communication infrastructure. 2 See, National Energy Technology Laboratory, A Vision for the Modern Grid, United States Department of Energy (March 2007), pp. 4-5. http://www.netl.doe.gov/moderngrid/docs/A%20Vision%20for%20the%20Modern%20Grid_Final_v1_0.pdf Fourth, the use of IP capabilities will minimize cost. As with electric service, communications capabilities have substantial fixed costs and scale economies. That is, IP networks are inherently cost-effective, demand is more reliably predicted, and capacity can more accurately be deployed and utilized. These same benefits cannot fully be realized by deploying multiple private networks of smaller scope and scale. Thus, respectfully, the Roadmap should not only endorse the use of IP, but it should also encourage, or at least not take steps that would discourage, the use of carrier-supplied IP networking. Fifth, and perhaps most importantly, the sophisticated communications networks that commercial providers already have deployed and operate are uniquely capable of combating	

#	DATE	WHO	SOURCE	COMMENT	Response
				Dr. George Arnold July 30, 2009 Page 3 cyber-security threats. The Roadmap is on target with its emphasis on identification, dissemination and adoption of security best practices. Indeed, many of the recommended practices are already embodied in procedures followed by network providers due to the need to combat cyber threats for their own business operations and those of their customers. In this regard, an example of a critically important practice that the Roadmap should recognize is the use of Virtual Private Networks (“VPNs”). VPNs offer the ability to authenticate the right to communicate that is currently absent from the public Internet. Thus, a carrier-provided IP VPN, coupled with network-based security and the adoption of security best practices, will provide a solid foundation for cyber security for the Smart Grid, all without sacrificing the interoperability delivered by IP networking.3 3 Attached as Appendix A is a more detailed summary of the cyber-security issue and the cyber-defense capabilities of the robust networks deployed by providers like AT&T. 4 Roadmap, pp. v and 94. On a related matter, the Roadmap proposes to study the issue of communications interference in unlicensed radio spectrums for Smart Grid applications, and notes that a recurring theme in the workshops was a desire for licensed spectrum to be dedicated for Smart Grid purposes.4 In considering these issues, NIST should first focus on the availability of existing commercial wireless services as a readily available Smart Grid solution. As a general matter, spectrum policy has moved away from private allocations to multi-purpose spectrum allocations, with auctions as the preferred method of efficiently distributing spectrum licenses. Encouraging utilities to build individual private radio networks not only would be enormously expensive, but would not effectively use the nation’s spectrum resources. Licensed wireless spectrum is a precious resource that must be utilized as efficiently as possible. Moreover, commercial wireless services offer high availability, reliability, capacity, and coverage today to more than 270 million customers in the United States. The ability to quickly reach customer locations and deliver cost-effective and secure connections for Smart Meters is a clear advantage of wireless technology. Because of the existing scale and scope of existing commercial wireless networks, it would be difficult, if not impossible, for an individual private network operator to economically and comprehensively replicate, particularly when implementing Smart Grid capabilities. In addition to high costs to build, wireless networks require a long period of time to deploy. This hurdle alone could delay the transition to the Smart Grid by years. Further delay could arise when the permitting process for new wireless towers must be undertaken. And, if sufficient contiguous spectrum is not available, issues of interoperability of individual networks could become an issue. In short, these potential pitfalls can be avoided by encouraging that the Smart Grid rely on existing commercial wireless networks. Dr. George Arnold July 30, 2009 Page 4 AT&T appreciates the opportunity to provide input into the agency’s ongoing evaluation of these issues. AT&T respectfully requests that NIST take these comments and recommendations into account in the development of the Smart Grid Roadmap.5 5 The current list of standards published by NIST properly emphasizes in-home/in-building connectivity for Smart Grid purposes. Although AT&T recognizes that the list of standards will continue to evolve, AT&T recently filed comments related to NIST’s preliminary set of Smart Grid interoperability standards and specifications identified for inclusion in the Smart Grid interoperability standards framework. Attached as Appendix B is a copy of AT&T’s recently filed comments in that proceeding, which comments articulate the benefits of the G.hn standard for Smart Grid purposes. Sincerely, /s/ Bruce R. Byrd Bruce R. Byrd APPENDIX A – CYBER SECURITY For AT&T, cyber security is the collective set of capabilities, procedures and practices that protect AT&T customers and the services AT&T offers them from the full spectrum of cyber threats. This assures that the information, applications and services AT&T’s customers want are secure, accurate, reliable, and available wherever and whenever they are desired. Cyber security is a leading corporate priority and, AT&T is investing significant resources in making its network and AT&T customers more	

#	DATE	WHO	SOURCE	COMMENT	Response
				secure. To this end, strong cyber security is essential to maintaining the integrity and reliability of the network as well as protecting privacy of personal customer information. Cyber security capabilities include understanding and identifying emerging threats in early phases of their development on the Internet. Network exploits, malware, flooding attacks, protocol anomalies and other threats are generally visible and often abundant on the Internet long before they have any significant affect on enterprise security. AT&T is uniquely established to understand threats on the Internet with capabilities that include: -- Operating as the largest provider of Internet services; -- Operation of a global IP network footprint; -- An Internet data analysis platform that examines internet threats including botnets; network worms, DoS attacks, network exploits and other activity anomalies; -- An analysis team that operates 24x7 to assess any significant activities on the Internet that could affect network services; -- An algorithm research team that continually investigates and test methods for automated detection of network threats; and -- AT&T Labs and Chief Security Office researchers, who participate in the security and networking research communities. The technology within AT&T's network is rapidly evolving to support new applications and services. In the course of 2009 alone, AT&T expects to invest $17-18 billion in expanding the capabilities of its network and infrastructure to meet the rapid global expansion of advanced information technology and services, and, to enhance reliability and security. The size and scope of AT&T's global network, coupled with AT&T's industry-leading cyber-security capabilities, gives it a unique perspective into malicious cyber-activity. AT&T's advanced network technology currently transports more than 17 Petabytes a day of IP data traffic and that load is expected to double every 18 months for the foreseeable future. AT&T's network technologies gives the Company the capability to analyze traffic flows to detect malicious cyber-activities and, in many cases, get very early indicators of attacks before they have the opportunity to become major events. For example, AT&T implemented the capability within our network to automatically detect and mitigate most Distributed Denial of Service Attacks within the AT&T network infrastructure before they affect service to AT&T customers. Indeed, AT&T has grown from one domestic scrubbing complex to multiple locations across the United States, as well as nodes in Europe and Asia. This gives the Company the ability to filter out attack traffic as close to the source of the threat as possible. AT&T has made significant investments in the security of its mobility network. AT&T's Radio Access Network (RAN) complies with 3GPP airlink security standards. The RAN uses secure protocols in order to maintain and manage communication with the mobile station as well as specific procedures including power control and handover management. An important security mechanism that protects the radio link against eavesdropping is encryption, which protects both user data and network control information. Airlink transmission and reception security is provided by encryption which occurs between the cellular towers and the mobile device. Following authentication and key agreement, the network and end-user equipment uses a 128-bit key and strong encryption algorithms. Significant resources have also been invested in the AT&T core mobility and wide area network area in order to comply with and exceed industry security standards. AT&T is responsible for managing the security of a worldwide data network, which consists of multiple components converging into a common Multi-Protocol Label Switching (MPLS) network. In order to support these objectives, AT&T maintains a comprehensive global security organization comprised of over 700 security professionals. This organization is dedicated to the physical and logical security of the AT&T global network and its service offerings. It supports a broad range of functions from security policy management to customer-facing security solutions. The AT&T global security organization reviews and assesses AT&T's security control posture to keep pace with industry security developments and to satisfy regulatory and business requirements. AT&T actively participates in a number of global security organizations, and maintains a comprehensive set of security standards based in part on similar leading industry standards	

#	DATE	WHO	SOURCE	COMMENT	Response
				(COBIT, ISO/IEC 27001:2005, etc.). Given the dynamic environment that AT&T supports, the library of AT&T security standards is continually re-evaluated and modified as industry standards evolve and as circumstances require. In addition, AT&T supports the following programs: Confidentiality. To ensure confidentiality, information is accessible only to those authorized. AT&T has implemented a three-tiered Information Classification framework for categorizing information based on sensitivity of the content and specific legal requirements. Physical Access Control Requirements. AT&T operates in a highly secured environment where physical access to staff office space, switching centers, global network and service management centers and other network facilities is strictly monitored and controlled. Network Element Access Controls. Access is provided to AT&T technical support personnel only on an as-needed basis for individuals with responsibility for network element maintenance and support. Network Perimeter Protection. AT&T external network connections are protected by firewalls that screen incoming and outgoing traffic based on source and destination address, protocol and port, in accordance with the security policy. Intrusion Detection. AT&T employs a combination of internally developed and commercial tools to detect attempts by unauthorized persons to penetrate AT&T Global Network. AT&T does not monitor individual customer connections for intrusions, except when part of a managed security service. Workstation Security Management. Workstation security policies protect AT&T and customer assets through a series of processes and technologies including verification of personnel workstation accesses, PC anti-virus protection, Operating System hardening and updates, full disk encryption where permitted by law to protect sensitive information on portable assets, along with a personal firewall intrinsic to remote access software implemented on workstations or portable PCs that remotely connect to the AT&T network. Security Status Checking and Vulnerability Testing. AT&T conducts regular tests and evaluations to ensure that security controls are maintained and are functioning in accordance with policy. These initiatives include Security Status Checking and Vulnerability Testing Security Incident Reporting and Management. AT&T uses a consistent, disciplined global process for the identification of security incidents and threats in a timely manner, to minimize the loss or compromise of information assets belonging to both AT&T and its customers and, to facilitate incident resolution. Business Continuity and Disaster Recovery. AT&T Corporate Business Continuity Planning Services provides technical consultation and program management expertise to address the business continuity, disaster recovery and managed security needs of AT&T and its customers. AT&T Security Products and Services. AT&T offers managed security products and services to its customers designed to assess and protect their vital network infrastructure, including managed services in the area of Intrusion Detection, Firewall Security, Endpoint Security, Token Authentication, Encryption Services, Security Email Gateway Services, Vulnerability Scanning, and Consultative and Engineering Security Services. AT&T Managed Services and Hosting. AT&T Managed Services take advantage of the security of AT&T's global Internet Protocol/Multi Protocol Label Switching (IP/MPLS) network. MPLS technology enables the creation of feature-rich network-based services coupled with AT&T's management expertise, tools and automation. AT&T's network-based managed services include Enhanced Virtual Private Network and Managed Internet Services. Hosting Services. Hosting services provide utility computing services that offer tailored or turnkey solutions. The mix-and-match tailored solutions offer IT infrastructure, hardware and/or software components, reliable & secure data center facilities, value-added services (i.e., security, backup and restore, professional services, monitoring, portal/reporting, utility, and disaster recovery), server virtualization and, integrated client networking. A fully managed turnkey solution provides capacity on demand, managed firewall and network Intrusion Detection System (IDS) functionality, proactive alerting and patching dedicated virtual servers and, total isolation of each client's data in a	

#	DATE	WHO	SOURCE	COMMENT	Response
				data center environment. **APPENDIX B – G.hn STANDARDS** Attached is a copy of AT&T's comments in connection with the National Institute of Standards and Technology's preliminary set of Smart Grid interoperability standards and specifications identified for inclusion in the Smart Grid interoperability standards framework.	
74	7.30.09	Elinor Orani, Honeywell	SGC	Subject: HON's (Honeywell International Inc.) Comments on "Report to NIST on the Smart Grid Interoperability Standards Roadmap" Document	Thank you for your detailed comments, not all of which can be met in a group-edited document.

#	DATE	WHO	SOURCE	COMMENT	Response
		International, Elinor.Orani@Honeywell.com		Reference: Federal Register Vol. 74, No. 124 Attention: Dr. George Arnold, National Director for Smart Grid Interoperability Dear Dr. Arnold: Honeywell International Inc. hereby submits comments on the “Report to NIST on the Smart Grid Interoperability Standards Roadmap” document that was published in Federal Register Vol. 74, No. 124 on June 30, 2009. Thank you for the opportunity to comment on the roadmap document. The comments were collected in-house from our technical experts. The attached Word document (total of 10 pages, including cover letter) includes our specific comments to several sections of the roadmap document. For our review process, we referenced the relevant section, page, bullet point, paragraph and sentence, and then, provided corresponding comments. Please review our comments and let us know if you have any questions or clarifications. Sincerely, (Mr.) Elinor Orani ACS Labs Strategic Marketing Automation and Control Solutions (ACS) Honeywell International Inc. 1985 Douglas Drive N. (MN10-132C), Golden Valley, MN 55422 Work 763.954.4222 Fax 763.954.4617 Elinor.Orani@Honeywell.com Dear Dr. Arnold: Honeywell International Inc. hereby submits comments on the “Report to NIST on the Smart Grid Interoperability Standards Roadmap” document that was published in Federal Register Vol. 74, No. 124 on June 30, 2009. Thank you for the opportunity to comment on the roadmap document. The comments were collected in-house from our technical experts. The succeeding pages (total of 10 pages, including this cover letter) include our specific comments to several sections of the roadmap document. For our review process, we referenced the relevant sections, page, bullet point, paragraph and sentence, and then, provided corresponding comments. Please review our comments and let us know if you have any questions or clarifications. Sincerely, (Mr.) Elinor R. Orani ACS Labs Strategic Marketing	Comments on 2.2.2. While we are agree that consumer choice is likely to result in economic benefits for that consumer, some consumers may make poor choices. Comments on 2.2.3. These sections are quotes from pre-existing documents. Therefore this laudable word-crafting is inappropriate. Comments on 2.3.3. Thanks – sentence edited for clarity. Comments on 2.5.1. When writing, we felt that cybersecurity is a meta-requirement that imbues all other requirements. You formulation is supportable as well. Comments on 2.5.3. Good suggestion – will submit it to the editors Comments on 2.5.5. Already covered Comments on 3.1 Report edited for clarity Comments on 3.2. Domains do include other domains. Upward of 50 process silos have been catalogued in commercial buildings, sharing little and each residing within its own domain. Microgrids are domains existing within the grid domain, whose contents are invisible to the larger domain and whose rules of operation may vary greatly from the larger distribution domain. Comments on 3.2.x and EMS. Agreed, There was some blurring over several sections of ESI and EMS. This series of comments reflects that. This section has been re-cast to maintain the distinction. Further comments in 3.2 have been accepted subject to the constraints of team editing documents with many inputs. Comments on 4.3.2.*. VAR documentation requirement submitted: Comments on 4.3.3. Section adjusted for consistent distinction between Comments on Section 9: forwarded for group consideration

#	DATE	WHO	SOURCE	COMMENT	Response

Automation and Control Solutions (ACS)

Honeywell International Inc.

1985 Douglas Drive N. (MN10-132C), Golden Valley, MN 55422

Work 763.954.4222

Fax 763.954.4617

Elinor.Orani@Honeywell.com

Section 2.2.2, page 7

- Comment: 1st bullet point; In addition to the sentence on variable pricing, the economic benefits for consumers should be mentioned. Additionally, this section should also mention that Smart Grid is a win-win for all stakeholders.

Section 2.2.3, page 9:

- Comment: Last bullet point; In addition to sensors, cameras …. 'actuators' should be included

Section 2.3, page 9:

- Comment:
  a. In 1st sentence; "Transaction" should be added in this sentence because the real challenge is in enabling peer-to-peer transactions of energy and information, not just interaction.
  b. In last sentence; "Storage" should be added in this sentence because Smart Grid will have fundamentally different paradigm for energy storage.

Section 2.3.1, page 9:

- Comment: 2nd bullet point: Note that Smart Grid complexity is due to the fact that it is a system of systems / network of networks.

Section 2.3.3, page 12: First sentence in 2nd para. mentioned

"A Department of Energy …. could supply 70 percent of the energy needs of today's car and light trucks …."

- Comment: For clarity, what this really meant is "70 percent of the number of cars and light trucks on the road today, if they were electric"? The sentence should be modified.

Section 2.5.1, page 14:

- Comment: 3rd bullet point; Isn't cyber security by itself a requirement?

Section 2.5.3 (page 15):

- Comment: The architecture must be flexible enough to incorporate evolving technologies.

Section 2.5.5, page 16

- Comment: We believe that the following is a very important goal, "Thus, any domain application could communicate with any other domain application via the information network, subject to the necessary network access restrictions and quality of service requirements."

#	DATE	WHO	SOURCE	COMMENT	Response
				Section 2.6, page 17: ➢ Comment: #3; More clarity about “systems” should be provided. Section 3.1, page 19: ➢ Comment: 2nd para. ; As an addition in the 4th sentence, “well-defined and formatted” should be added before ‘mutual information.’ Section 3.1, page 19: ➢ Comment: 3rd bullet point; The following sentence should be removed because it is confusing the reader; “The market operations and load curtailment for (say) electricity and natural gas might be the same.” Section 3.1, page 20: Third sentence in the 3rd bullet point mentioned “We cannot demand universal database models to proceed; and if we had such models they would be a barrier to innovation.” ➢ Comment: Such statement is unclear and confusing. The statement should either be removed or explanation and supporting statements should be included. Section 3.2, page 21: Last sentence of the 3rd bullet point mentioned, “Domain may contain other domains.” ➢ Comment: There is no evidence of such subsets of domains within the document and also, such definition of domains violates loose coupling. Such sentence should be deleted Section 3.2, page 23: ➢ Comment: 2nd para.; Insert “use case”, i.e. , “An example use case is, “Customers reduce demand …..” Section 3.2.2, page 24 ➢ Comment: 1st para.; Instead of using “boundaries,” description in terms of interface to the utility meter actor and EMS actor should be provided Section 3.2.2, 3rd para. in page 25: “Each sub-domain has a meter actor and an EMS that may reside in the meter or may reside in an independent gateway.” ➢ Comment: EMS is a separate actor in the customer sub-domain. The roadmap should not make any assumption of co-resident meter and EMS actors. Section 3.2.2, 4th para. in page 25: “The EMS may communicate with other domains via the AMI infrastructure or via another means, such as the Internet.” ➢ Comment: The AMI is an interface for the meter actor, not necessarily the interface for EMS.	

#	DATE	WHO	SOURCE	COMMENT	Response
				Section 3.2.2, Table 2, page 26: ➢ Comment: Are Industrial and Building Automation systems part of Smart Grid? Section 3.2.2, Table 2, page 26: ➢ Comment: Under the Description column for Solar Generation and Wind Generation – “may not” should be deleted in the second sentence. Section 3.2.2, Table 2, page 26: ➢ Comment: Similar to Table 7 in page 35, a list of common actors (such as those mentioned in last paragraph in page 34 for the Bulk generation domain) would be beneficial for the Customer Domain section. Section 3.2.2, Figure 7, page 26: ➢ Comment: Energy storage representation within Home should be included. Section 3.2.3, Table 3, page 28: ➢ Comment: Similar to Table 7 in page 35, a list of common actors (such as those mentioned in last paragraph in page 34 for the Bulk generation domain) would be beneficial for the Markets Domain section. Section 3.2.4, Table 4, page 30: ➢ Comment: The row “Others” should be deleted from the Table because it is irrelevant, i.e. not a Typical Application Section 3.2.4, Table 4, page 30: ➢ Comment: Similar to Table 7 in page 35, a list of common actors (such as those mentioned in last paragraph in page 34 for the Bulk generation domain) would be beneficial for the Service Provider Domain section. Section 3.2.5, 1st para. in page 30: Last sentence mentioned, “No matter how the Service Provider and Markets domain ……. needed for planning and operating the service delivery points of a “wires” company.” ➢ Comment: For clarity, be more specific on what is being referred to as “wires” company. Section 3.2.5, Table 5, pages 31-33: ➢ Comment: Similar to Table 7 in page 35, a list of common actors (such as those mentioned in last paragraph in page 34 for the Bulk generation domain) would be beneficial for the Operations Domain section. Section 3.2.6, page 34: 2nd para. in page 34 mentioned, “The Bulk Generation domain must communicate key performance and quality of services issues such as scarcity (especially wind and sun) and generator failure.”	

#	DATE	WHO	SOURCE	COMMENT	Response
				➢ Comment: Quality of service issues should refer to both the electrical distribution and information networks Section 3.2.7, 2nd para. in page 36: Last sentence mentioned, "They typically perform the applications shown in the diagram and described in Table 7 above." ➢ Comment: Figure 12 should be included in the sentence, i.e. "They typically perform the applications shown in the diagram (Figure 12) and described in Table 7 above. Section 3.2.8, last para. in page 38: Last sentence mentioned, "They typically perform the applications shown in the diagram and described in Table 7 above." ➢ Comment: Figure 13 should be included in the sentence, i.e. "They typically perform the applications shown in the diagram (Figure 13) and described in Table 7 above. Section 3.3.3, page 44: ➢ Comment: Are there other technical issues? What about standards and interoperability issues, continuous improvements, etc. Section 4, page 45: Second para. mentioned "information objects" ➢ Comment: "Information objects" should be defined and located or indicated in the Smart Grid Communication Model. Section 4.1, Figure 14 page 46: ➢ Comment: Noted that Figure 14 shows "ID", however description of "ID" should be noted in the figure. Is it the ID of the association? Section 4.3.1, page 47: First bullet point in page 47 mentioned, "What is the state of the power system components?" ➢ Comment: WASA requirements should also be influenced by "the state of the information system" Section 4.3.1, page 47: Second sentence of the 2nd to the last paragraph mentioned, "They, in turn, consist of a number of also large and complex components, such as bulk generation…" ➢ Comment: "Actors" instead of "components," use the Smart Grid Communication Model. Section 4.3.2.1, page 47: First sentence mentioned, "Contingency analysis (CA) is an Energy Management System (EMS) application……." ➢ Comment: Readers may confuse this with Home Area Network. Section 4.3.2.4, page 48: Last sentence mentioned "dispatchable VAR sources." ➢ Comment: Definition of VAR should be provided. Additionally, VAR should also be included in list of acronym section.	

#	DATE	WHO	SOURCE	COMMENT	Response

Section 4.3.2.6, page 48: Heading mentioned VAR.

- Comment: Definition of VAR should be included. Additionally, VAR should also be included in the list of acronym section.
- Comment: Is section 4.3.2.4 part of 4.3.2.6?

Section 4.3.2.6, page 49: First sentence in page 49 mentioned “voltage controller of LTCs”.

- Comment: Definition of LTC should be included. Additionally, LTC should be included in the list of acronyms section.

Section 4.3.3, page 49: On actor “AMI/ Customer EMS”

- Comment: AMI (i.e. a meter) and EMS are two separate actors.

Applies to all Figures in Section 4 :

- Comment: It would be beneficial to mention why a particular association is necessary.

Section 4.4.2.1, page 53: Second sentence mentioned;

“It accomplishes this by managing the transmission of direct load control actions to direct-load-control-enabled devices, shown as device, HAN device and smart appliances.”

- Comment: What actor is the device (in bold fonts) referring to and in what domain initiates this control? How is this validated?

Section 4.4.2.2, page 54: Last sentence mentioned;

“….communication is shown via the meter or the Facility EMS/ Gateway.””

- Comment: The meter is just an aggregator of current load, thus meter should be deleted.

Section 4.4.2.4, page 54: Heading is “External Clients Use the AMI to Interact with Devices at Customer Site”

- Comment: The communications infrastructure is not necessarily the AMI. In real time pricing, the AMI will be bandwidth-constrained to send metering information. Interaction of external clients with HAN devices should be independent of AMI

Section 4.4.4, page 57:

- Comment: Meter actor is the device used in measuring watts, vars, var-hours, volt-amperes, or volt-ampere-hours. It is called a Smart Meter when it becomes part of an advanced metering infrastructure (AMI). Today, it is typically located at the customer’s facility and owned by the distributor or retail provider. Based on above definition of meter actor, since an association is a logical connection and not a physical connection, there should not be any logical connection (association) between the meter actor and HAN device and Smart appliance. Only the EMS has a logical connection. Associations 20 and 21 should be removed.

Section 4.4.5, page 58:

- Comment:
  a. It would be beneficial to mention why a particular association is necessary.
  b. Source of this diagram should be mentioned to facilitate endorsement (or not).
  c. The diagram mixes function and equipment. For clarity, functional diagram should be included.
  d. The indices are not referenced or not well integrated in the document.

#	DATE	WHO	SOURCE	COMMENT	Response

Section 4.5.2.3, page 59: Second sentence mentioned “email”

- Comment: Email is very particular and should be replaced with “a communication network”.

Section 4.5.2.6, page 60:

- Comment: A brief explanation of “fast voltage sag” should be provided.

Section 4.5.5, page 62:

- Comment:
  a. It would be beneficial to mention why a particular association is necessary.
  b. Source of this diagram should be mentioned to facilitate endorsement (or not).
  c. The diagram mixes function and equipment. For clarity, functional diagram should be included.
  d. The indices are not referenced or not well integrated in the document.

Section 4.6.5, page 70:

- Comment:
  a. It would be beneficial to mention why a particular association is necessary.
  b. Source of this diagram should be mentioned to facilitate endorsement (or not).
  c. The diagram mixes function and equipment. For clarity, functional diagram should be included.
  d. The indices are not referenced or not well integrated in the document.

Section 4.7, page 71: AMI Systems

- Comment: It should be made clear that AMI is just another communication medium for the 3rd party to talk to the Customers’ EMS. Internet cellular, etc. are other communication medium. No logical connection is needed to AMI appliance.

Section 4.7.2.3, page 72:

- Comment: What is the role of AMI in this use case? Note that AMI is just another communication medium with no application services. The same use case can be achieved using the internet instead of AMI.

This comment applies to all clauses of Section 4

- Comment:
  a. Why is the meter an actor in the Customer Domain? Should it not be an actor in Operations Domain? Just because a meter physically resides in the customer’s house does not really mean it has logical interface to the customer, Customer’s devices and EMS. From the perspective of a consumer, “The only way I know my electricity consumption is from the bill I receive from the utility. I never read my meter and don’t see a need to in the Smart Grid.”

Section 4.7.5, page 77:

a. Self-association of 22 should be explained

b. It would be beneficial to mention why a particular association is necessary.
c. Source of this diagram should be mentioned to facilitate endorsement (or not).
d. The diagram mixes function and equipment. For clarity, functional diagram should be included.
e. The indices are not referenced or not well integrated in the document.

#	DATE	WHO	SOURCE	COMMENT	Response
				Section 4.8.2.4, page 79: ➢ Comment: Definition of WACS should be included. Additionally, include WACS in the list of acronyms section. Section 4.8.3, Table 13, page 81: ➢ Comment: Meter/ HAN Gateway are two actors with different association. "Meter" should be deleted. Section 6.1.1, page 90 : ➢ Comment: "…machine-readable description of tariffs" is extremely important and we support NIST's goal to develop standard pricing model to provide better services across utilities/ ISOs Section 9, Appendix A, page 112: ➢ Comment: a. 1st para. , second sentence: Missing reference to section ?. (Should that be section 3?) b. 1st para., last sentence: A brief introduction about GWAC stack would be beneficial. Section 9.1.2, Table 15, page 114: ➢ Comment: a. In row "2. Network interoperability," (i) Zigbee should be deleted and (ii) 802.15.4 should be added. b. In row "1. Basic Connectivity," (i) TCP/IP should be deleted and (ii) 802.x should be added c. Page 115, in row "Time Synch & Sequencing," NTP should be added Section 9.1.3, Table 16, page 115: ➢ Comment: a. In row "2. Network interoperability," Zigbee, HomePlug, WAN, GPRS should be deleted b. In row "1. Basic Connectivity," (i) Ethernet should be deleted, and (ii) Zigbee, HomePlug should be added Section 9.1.6, Table 19, page 118: ➢ Comment: a. In row "3. Syntactic Interoperability," IEC 61850, DNP3, W3C should be added b. In row "2. Network Interoperability" IEC 61850, DNP3, W3C should be deleted Section 9.1.7, Table 20, page 119: ➢ Comment: a. In row "2. Network Interoperability," (i) HTTP, Zigbee SEP, WAN, LAN, WLAN, GPRS should be deleted, and (ii) UDP/IP should be added b. In row "1. Basic Connectivity" (i) Internet, Zigbee/HomePlug should be deleted and (ii) HomePlug should be added Page 120: ➢ Comment: a. Provide section heading, Table no. b. In row "2. Network Interoperability," (i) WAN, LAN, WLAN should be deleted, and (ii) UDP/IP should be added	

#	DATE	WHO	SOURCE	COMMENT	Response
				c. In row “1. Basic Connectivity” Internet should be deleted. Page 121: ➢ Comment: a. Provide section heading, Table no. b. In row “3. Syntactic Interoperability,” HTTP should be added c. In row “2. Network Interoperability,” (i) WAN, LAN, WLAN, GPRS, should be deleted and (ii) UDP/IP, ISA 100.11a, 6LowPAN should be added d. In row “1. Basic Connectivity,” Internet should be deleted Page 122: ➢ Comment: a. Provide section heading, Table no. in page 121 b. In row “3. Syntactic Interoperability,” HTTP should be added c. In row “2. Network Interoperability,” HTTP should be deleted. Section 12.12.1, Page 173 ➢ Comment: Scenario doesn’t seem to match with Demand Response but more appropriate under DER (Distributed Energy Resource) Section 12.13.1, Page 174 ➢ Comment: Scenario doesn’t seem to match with Demand Response but more appropriate under DER (Distributed Energy Resource) Section 12.14.1, Page 175 ➢ Comment: a. Scenario doesn’t seem to match with Demand Response but more appropriate under PHEV (Plug In Hybrid Electric Vehicles). b. Under Scenario, “Customer connects PEV at places of employment” should also be included. General comments 1. 3rd parties must be given access to smart grid networks, to foster a vibrant market of differentiated products and services to rate payers. 2. Meter data must be made available to the rate payer, and any 3rd parties who can offer products and services to the rate payer (to maximize demand response, and to reduce energy cost, energy consumption, carbon footprint, etc.) 3. Smart grid standards must be written in a way that enables this open access to networks and meter data	
75	7.30.09	Julie Polonetsky, Future of Privacy Forum, julespol@futureofprivacy.org	SGC	Attached plz find the comments of the Future of Privacy Forum. Thanks. Jules Polonetsky Future Of Privacy Forum	Thank you for your comments. I hope that you will work with the Smart Grid Standards Board (soon in formation) to make sure that critical privacy and autonomy issues are addressed.

#	DATE	WHO	SOURCE	COMMENT	Response
				www.futureofprivacy.org Before the DEPARTMENT OF COMMERCE national Institute of standards and technology Request for Comments Report to NIST on the Smart Grid Docket# 0906181063-91064-01 Interoperability Standards Roadmap Comments of the future of privacy forum Jules Polonetsky co-chairman and Director christopher wolf co-chairman future of privacy forum 919 18th st, suite 925 washington, dc 20006 202-263-2579 july 30, 2009 INTRODUCTION Information is what will charge the smart grid. The many ways in which data about consumer demand will be used for smarter electricity provision have the potential to revolutionize the electricity industry and to benefit society. However, this very same information about consumers will create major concerns if consumer-focused principles of transparency and control are not treated as essential design principles from start to end of the standards development process. Principles of privacy by design must be part of the overall design for smart grid data flows. NIST should create a stakeholder group that can be positioned to look at the grid data flows as a whole and from a consumer perspective. Flagging privacy risks by specific technology or business need is unlikely to allow for useful guidance that captures the range of potential impacts to consumers. OVERVIEW Smart meters are being installed throughout homes across the country. The Federal Energy Regulatory Commission (FERC) recently reported that 52 million smart meters will be installed throughout the country over the next five to seven years. As a result of these devices, detailed information about consumer electricity usage will travel from residences to electric utilities and other providers. Electric utilities	

#	DATE	WHO	SOURCE	COMMENT	Response
				and other providers may have access to information about what customers are using, when they are using it, and what devices are involved. Furthermore, as plug-in hybrid electric vehicles are deployed and customers engage in electricity sales on the grid outside of their homes, an electricity usage profile could become a source of behavioral information. Responsible management of this information could support energy efficiency efforts and demand-side management initiatives. However, insufficient attention to transparency and consumer control, given the could lead to consumer resistance due to privacy concerns., If information is gathered responsibly, in keeping with consumer-centric principles of transparency and control, advancing demand side initiatives, efficiency investments, and conservation efforts will all be possible. A loss of consumer trust would create significant opposition to smart grid deployment efforts. It is thus essential that all actors in the smart grid recognize the user centric customer focus that must underlie interoperability decisions planning. The NIST Standards Roadmap can ensure consumer trust by ensuring that privacy is addressed in more than a piecemeal manner. We applaud the fact that, in numerous locations in the document, the draft interim Standards Roadmap recognizes the importance of protecting the privacy of consumer information. NIST should create an advisory group of advocates, academics and business experts who can be positioned to look at the grid data flows as a whole and from a consumer perspective. Flagging privacy risks by specific technology or business need is unlikely to allow for useful guidance that captures the range of potential impacts to consumers. Principles of privacy by design must be part of the overall design for smart grid data flows. The Future of Privacy Forum (FPF) is a Washington, DC based think tank that seeks to advance responsible data practices. The forum is led by Internet privacy experts Jules Polonetsky and Christopher Wolf and includes advisory board comprised of leading figures from industry, academia, law and advocacy groups. FPF was launched in November 2008, and is supported by AOL, AT&T, Deloitte, eBay, Facebook, Intel, Microsoft, The Nielsen Company, Verizon and Yahoo.	
76	7.30.09	Patricia J. Stevens for James Prendergast, IEEE P.Stevens@ieee.org	SGC	Patricia J. Stevens Assistant to James Prendergast - Executive Director & COO IEEE 445 Hoes Lane Piscataway, NJ 08855 Tel: 732-562-6351 Fax: 732-562-6010 email: p.stevens@ieee.org . ********** IEEE. Fostering technological innovation and excellence for the benefit of humanity. Celebrating 125 Years of Engineering the Future. www.ieee125.org ********** (see Attachment)	Thank you for your comments and support.

#	DATE	WHO	SOURCE	COMMENT	Response

Phone: +1 732 562 5400
Fax: 1 732 562 6010
E-mail: james.prendergast@ieee.org

IEEE
Celebrating 125 Years
of Engineering the Future

E. James Prendergast, Ph.D.,
Executive Director & COO

29 July 2009

DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
[Docket Number: 0906181063-91064 01]
[Federal Register: June 30, 2009 (Volume 74, Number 124)]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]

Reference: Request for Comments on "Report to NIST on the Smart Grid Interoperability Standards Roadmap" (Contract No. SB1341-09-CN-0031--Deliverable 7)

IEEE commends Dr. George Arnold and the NIST community for the significant progress achieved in the creation of the NIST Smart Grid Interoperability Standards Roadmap (the EPRI Report).

The identification of the Initial List of Smart Grid Interoperability Standards allows industry, in collaboration with the federal government, to initialize their respective efforts in moving forward with near term opportunities to develop a Smart Grid deployment. This allows industry to pursue a coordinated program for developing standards supporting the long term evolution of a Smart Grid platform.

On behalf of its more than 375,000 members, IEEE appreciates being provided with the opportunity to participate in this process and to be included as one of the key organizations identified in the Energy Independence and Security Act of 2007 (EISA).

IEEE is committed to working with NIST to expeditiously achieve the goals set forth in this important effort. As a community, IEEE looks forward to continued engagement and involvement with NIST in the planning and deployment of the US next-generation Smart Grid system.

Sincerely,

James Prendergast, Ph.D.
Executive Director & COO

445 Hoes Lane • Piscataway, NJ 08854 • +1 732 562 5400 • Fax +1 732 562 6010 • www.ieee.org

77	7.30.09	Girish Ghatikar, LLBL GGhatikar@lbl.gov	LLBL	Attached are the comments on "Report to NIST on the Smart Grid Interoperability Standards Roadmap (Contract No. SB1341-09-CN-0031—Deliverable 7)" by Lawrence Berkeley National Laboratory, Demand Response Research Center. Please let us know if you have any questions on this submission. More information:	Replies are numbered as are the questions. 1. The phrase "competing standards" does not necessarily refer to any sort of market completion. The rest of the paragraph has been revised to emphasize the competing terminologies rather than technologies.

#	DATE	WHO	SOURCE	COMMENT	Response
				http://www.lbl.gov/ http://drrc.lbl.gov/ -- Rish Ghatikar Lawrence Berkeley National Laboratory 1 Cyclotron Road, MS: 90-4000, Berkeley, CA 94720 GGhatikar@lbl.gov ; +1 510.486.6768 ; +1 510.486.6996 [fax] This email is intended for the addressee only and may contain confidential information and should not be copied without permission. If you are not the intended recipient, please contact the sender as soon as possible and delete the email from computer[s]. Organization Summary Organization Name Demand Response Research Center, Lawrence Berkeley National Laboratory (DRRC, LBNL) Organization URL http://drrc.lbl.gov/ and http://www.lbl.gov/ Contact: AutoDR@lbl.gov Organization Type Federal government research. Organization Description Berkeley Lab is a member of the national laboratory system supported by the U.S. Department of Energy through its Office of Science. It is managed by the University of California (UC) and is charged with conducting unclassified research across a wide range of scientific disciplines. More information - http://www.lbl.gov/LBL-PID/LBLOverview. html Document Review Summaries Document Name Report to NIST on the Smart Grid Interoperability Standards Roadmap (Contract No. SB1341-09-CN-0031—Deliverable 7)1 Referred as “roadmap report” in DRRC, LBNL comments. Publication Date June 17, 2009 Publisher or URL http://www.nist.gov/smartgrid/InterimSmartGridRoadmapNISTRestructure.pdf Document Review Comments We would like the opportunity to comments on the “Report to NIST on the Smart GridInteroperability Standards,” (roadmap report). The roadmap report has come a long way and indicate a significant effort from NIST, EPRI, and other teams involved in completion of this report in a short time. The comments from DRRC, LBNL are emphasized on the OpenADR, which is one of the Smart Grid standards recommended in the roadmap report. Comments on other sections, which may have relevancy to OpenADR in some form, are also included. 1. OpenADR and NAESB (Pg. 95, 137): The document states that OpenADR is competing with NAESB standards (and others) but we understand that this is not the case. In fact, this is ascertained in the Appendix B, “Alphabetical Standards List,” of the document that describes all the standards. There is no competition between OpenADR and NAESB (or others). It is also our understanding that the	2. The term OpenADR has been removed from EMIX notes about cost and grid reliability have been added to the OpenADR description 3. Agreed. Have updated definition of DRAS in this section. 4. Noted. The recommended direction of development for OpenADR is toward an integration interface with fewer different variants. 5. Noted. 6. Noted. It is often difficult to get agreement on mappings to the GWAC stack. 7. Agreed (which is why no re-editing OpenADR areas.) 8. Agreed, and references moved to EnergyInterop Reprise of earlier comments 1. Agreed. It is not clear where specifically to fit this openness into the current document, as it is general comment applicable to many places. This reviewer recommends that NIST keep these principles in mind as they prepare the final roadmap. The principles herein were embraced in several of the Priority Action Plans. 2. See (1). This indeed a priority area as acknowledged in section 6.1.4. It would be useful to consider each of the standards listed in (10) against this standard; such an effort is outside of the scope of this project. This is recommended as a future activity for NIST. 3. Noted, and recommendation to be forwarded to Roadmap Development team; it is consistent with their initial tasking. 4. The roadmap has deliberately shied away from full definition of building systems and networks as inimical to the level of innovation this work would like to stimulate. A clear set of visible and well socialized performance metrics, would enhance that innovation. Such an effort is at the nexus of several efforts, including LEEDs to NZE buildings, and green leases. A clear set of informational interfaces is part of the existing priority action plans. 5. Agreed. This is due to historical reasons, and this perspective should be kept in mind during each of the roadmap re-writes. Clear barriers and demarcations between utility and building functions are critical, and we have striven to strengthen these in each re-write.

#	DATE	WHO	SOURCE	COMMENT	Response
				NAESB DR standards relate to business-side of DR programs and emphasize on DR terminology and Monitoring and Verification (M&V) in the areas of equipment, technology, and procedures to quantify the DR value delivered (e.g., DR settlement, performance evaluation, etc.). However, we do think that it might be useful to be consistent with "terminologies" in OpenADR and those defined within NAESB standards. We would like the report to be consistent and clear on standards that compete.[9] 2. OpenADR Description (Pg. 126, 137): The description of OpenADR states that it is being used "in some DR programs in California." We think that it is important to be very clear in the report that OpenADR is being used with price based programs (e.g., Critical Peak Pricing2) and applies to any dynamic-pricing models and reliability programs as well. This was also indicated in our earlier comments, following Workshop #1 and LHF standards release, that DR "information and signals… should not only encourage customer choice, it should also encourage grid reliability and pricing-based information. OpenADR does all of this!" In fact, on page 126 (and elsewhere), it is indicated that eMIX could be interface to "information carried by OpenADR and Dynamic Price communication." 3. OpenADR and DRAS Definition (Pg. 137): The document describes DRAS as "aggregation server." This term could also be confused with "Aggregator's" or Curtailment Service Providers (CSPs). Aggregators or CSP's are 'third party responsible for managing a collection of facilities while providing a single interface to the utility or ISO for the management and billing of those facilities." The DRAS is a "system" that was the emphasized in the "OpenADR Communications Specification Version 1.03" released by LBNL in April 2009. We think that it's important to define that the DRAS is not an aggregation server, and could also be part of the utility information systems (UIS). 4. OpenADR Supported Interfaces (Pg. 137): The document seems to indicate that interface between the Utility/ISO and DRAS using SOAP is required. As in comment above, the DRAS could be part of UIS and there would be no need for SOAP communication. Also, the communication between DRAS is mentioned to be only SOAP and REST. While part of this is true, the communication interface in OpenADR V1.0 also supports BACnet Web Services (which SOAP-based). We think this should be clearly mentioned to indicate that OpenADR could be harmonized with other interfaces as needed. 5. OpenADR and GWAC Layers (Pg. 112, 113, 118): The OpenADR is included in GWAC layer 6, "Business Procedures;" however, not included under layer 5, "Business Context" for "Operations" domain. We are not clear of differences that exist between the layers. I think, it's important to mention that OpenADR supports both dynamic-pricing (e.g., RTP) and reliability models, which is also related to the business context and operation of Utility/ISO DR programs. It would be useful to add clarity to individual layers and domains as opposed to general statement, "Upper layers 4-8 represent application-specific information that binds closely to the function of the Actor, as opposed to where the Actor is located." 6. OpenADR and Domains (Appendix A): Follow-up to above comment on GWAC layers. Under "Customer" domain, OpenADR is included in "Business Context" and rightfully so. We think this should also be true when the layers are interchangeable within "Customers Home, Commercial, Industrial, PEV, etc." sub-domains. The OpenADR inclusions within some of the GWAC layers are not consistently represented within other layers of each of these sub-domains.[10][11] 7. OpenADR and OASIS Energy Interop (Appendix A): OpenADR and OASIS Energy Interop are used interchangeably. I think it would confuse readers if it's not made clear that the current version of OpenADR Version 1.0 is a CEC/LBNL report and is being formally standardized under OASIS Energy Interop. I think for the reference of this report, the OASIS Energy Interop work is more relevant and the OpenADR Version 1.0 (standard development activity) is a building block of OASIS work and should be used in accordance of context of the document. 8. Standards Gaps and DR Markets (Pg. 142, 144): The gaps identified for "Common Model for Price" explicitly mentions "commercial and industrial" as an Actor or Interface and does not include "home." We think that common pricing model for residential customer is equally important. OpenADR is explicitly singled out as one that "needs to be vetted as if it becomes a standard." This is true of other standards included in the roadmap report (E.g. Zigbee SEP) and should be treated equally and consistently in the roadmap report. 9. Open Standards Definition (General): This was also a topic of conversation of NIST/EPRI Workshops 1 and 2 – what is the "Open Standards" and what constitutes the selection process of standards within this roadmap report. As this roadmap report is a result of those	(1)

[9] http://www.nist.gov/smartgrid/InterimSmartGridRoadmapNISTRestructure.pdf

[10] http://www.pge.com/mybusiness/energysavingsrebates/demandresponse/cpp/index.shtml

[11] http://drrc.lbl.gov/openadr/pdf/cec-500-2009-063.pdf

#	DATE	WHO	SOURCE	COMMENT	Response
				workshops (and other follow-up interactions), it would be very helpful if the definition of "Open Process" and the inclusion of standards within this roadmap report. A clear outline of requirements would benefit of readers and subsequent stakeholders. Additional Review Comments The below comments were included in original DRRC, LBNL comments resulting from Workshop #1. These comments are again included here as it is not clear how they were addressed in the roadmap report. 1. Open Architecture: The definition of open architecture(s) for Smart Grid should precede the open standards process. While this may be less of an issue in some domains where general agreement on system architecture already exists, it is of primary importance in the X2G domain. In this domain, the architectural landscape is still the subject of serious debate and, lacking a sufficiently clear view of overall system functionality, it is likely that the promotion of "favored" communications standards will determine the ultimate system design. In terms of the "good design practices" being promoted, this methodology is essentially "inverted" and will lead to a less-than-optimal system design. Furthermore, in order to achieve an architectural definition that serves all stakeholders, it is critical that both the architecture and the design process be open. For example, in the H2G domain, this dictates explicit engagement of consumer, appliance manufacturer, and home automation communities. 2. Network Architecture and Interoperability: The communicating network protocols for Smart Grid standards are applicable to different layers of the Open Systems Interconnection Reference Model (OSI model). At this point, the standards selected for initial Smart Grid implementation operate at different levels of the OSI model – some specify data communications behavior while others describe application level capabilities. Although the initial standards selection process was very compressed (2 days), aggregating these standards into a single target list presents a very confusing architectural picture (see e – above) and obscures any clear, layer-to-layer view of network architecture. A clear picture of network layer interaction has become one of the hallmarks of modern, "best practice" network design and will be critical in describing overall system behavior and codifying network interoperability, reliability and testing. 3. Modeling and Testing: All or most of the standards recommended in roadmap report are not all tested and made to work in an integrated, interoperable form. Since the Smart Grid is a new design initiative, this is to be expected. However, given that this is a new design effort of unprecedented scope, there are few tools at present that can validate ultimate performance. We need a well defined, vendor-neutral process for modeling, testing and subsequently validating co-existence and reliability of Smart Grid network communications and control components in a simulated environment. Public and governmental organizations such as national labs should be primary agencies to undertake such a task to build public consensus and confidence. 4. Smart Grid and Building Networks: This document is a roadmap report for the Smart Grid. We also need a parallel process to develop a roadmap for Building Networks as they're inextricably linked. NIST may be a good organization to lead this, and EPRI could be involved as a representative of grid stakeholders. This document should call for creation of the process, and better define the nature of the edge interfaces of the smart grid in terms of information flow (each direction), authority, privacy, security, reliability, etc. OpenADR client interface allows such process. 5. Consumer Choice and Direct Load Control: Most of the document content seem to be utility centric. While this is important, the key point of having standards those are procustomer and makes sure that information that's sent and received facilitate it. An example of it is OpenADR, which facilitates intelligent DR event information by utility that customers integrate with pre-programmed strategies. Effort should be made to identify different kinds of demand response signaling needs such a dynamic prices, directly load control, bidding, and both wholesale and retail transactions.	
78	7.30.09	Paul Schomberg, Panasonic SchomburgP@us.panasonic.com	SGC	Dear Mr. George Arnold: Please see attached Panasonic's comments in response to Request for Comments on Report to NIST on the Smart Grid; Docket Number: 0906181063-91064-01. Best regards, Paul Paul G. Schomburg, Sr. Manager	HD-PLC was added to section 10. We have added a part of section 10 for those references that were provided to the Interim Roadmap team during the comment period.

#	DATE	WHO	SOURCE	COMMENT	Response
				Panasonic Corporation of North America Government & Public Affairs 1130 Connecticut Ave., N.W., STE 1100 Washington DC, 20036 Tel: (202) 912-3800 x114; Cell: (202) 550-2230 Have questions about HD??? Ask the 'Answerman' at www.panasonic.com/lihd July 30, 2009 Dr. George Arnold National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899–8100 smartgridcomments@nist.gov Subject: Response to Federal Register, June 30, 2009, Volume 74, Number 124, p 31254, Docket Number: 0906181063-91064-01 Dear Dr. Arnold, Panasonic Corporation of North America (“Panasonic”) would like to take this opportunity to provide comment on Federal Register Notice [FR Doc. E9–15467], Request for Comments on ”Report to NIST on the Smart Grid Interoperability Standards Roadmap.” Panasonic is the founder of the High-Definition Power Line Communication (HD-PLC) Alliance (http://www.hd-plc.org/)1. The HD-PLC Alliance is a global, non-profit trade group with members throughout the world whose purpose is to support the standardization and commercial success of the HD-PLC broadband over power line technology. The HD-PLC Alliance is very active in the definition of networking standards based on power line communications and is a voting member in the IEEE P1901 Working Group that has recently issued a Draft Standard that includes HD-PLC technology. HD-PLC is a power line networking technology that allows devices to share information throughout a building and to establish connectivity with the Internet through outdoor power line wiring. HD-PLC technology has been included in the recent IEEE P1901 Standard Draft. HD-PLC technology is well-suited for Smart Grid applications and some of its key attributes include: • very low-power-consumption modes of operation, the lowest in the world • very RF-friendly as its wavelet technology allows it to cause very low interference • whole-home networking coverage • low-cost for use in a variety of consumer products • broad support from a variety of industries and organizations • very secure with encryption code of the AES128bit. 1 The HD-PLC Alliance was established in September 2007 as an alliance of voluntary groups, which aims to expand the use of the HD-PLC power line technology and further improve communication compatibility among products employing HD-PLC. The Alliance activities include promotion of the technology as well as operational study of compatibility verification systems for communication among different HD-PLC-based devices, technical and marketing efforts, certification and interoperability of HD-PLC compliant products. To learn more	

#	DATE	WHO	SOURCE	COMMENT	Response
				about the HD-PLC alliance, please visit http://www.hd-plc.org/modules/membership/index.html . July 30, 2009 Page 2 HD-PLC technology is today available to consumers in the US and abroad and is also being used successfully in Smart Grid field trials. Panasonic requests that NIST include HD-PLC technology as one of the recommended technologies in the NIST Smart Grid Interoperability Standards Roadmap. Below is our proposed text to be included into the “Appendix B: Alphabetical Standards List”: • 10.xx HD-PLC • Application: Networking and Smart Grid broadband physical communications over powerlines • Actors: telecom and power utility equipment, consumer electronics, meter, HAN gateway, whole-house control products (energy management, appliances, climate control, etc.), PEVs, and various others across the Smart Grid • Interfaces: Potentially applicable across the Smart, including Residential Equipment operating over power lines. • Maturity: Released 2006. • Category: Consortia Please include HD-PLC also in others areas of the document where applicable. We appreciate your consideration and if you have additional questions please feel free to contact me at your convenience. Sincerely, / s / Peter M Fannon Vice President, Technology Policy, Government & Regulation Panasonic Corporation of North America	
79	8.1.09	Donald S. Berkowitz, S&C Electric Company, DBerkowitz@sandc.com	SGC	To whom it may concern, Attached is an update to the comments S&C submitted on Friday, and are based upon some last minute input that was received. We respectfully request that the attached comments replace the previous ones submitted electronically and by mail. If that would be considered unfair to the other comment writers, our original comments will suffice since the latest update provides only minor clarifications. Please let us know if you would like a paper copy of the updated comments. Respectfully yours, Donald S. Berkowitz --- From: Berkowitz, Don Sent: Friday, July 31, 2009 9:53 AM To: 'smartgridcomments@nist.gov' Cc: Bik, Witold; Tobin, Tom; Estey, John Subject: Dear Mr. Arnold,	Don, response to your valuable comments follow in order: General Comments: 1) We accept that the imperatives you describe are important for a successful Smart Grid deployment. The scope of this roadmap effort, however, was to address the specific mandate of the National Institute of Standards and Technology to ““…shall have 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…”. We therefore have limited our scope to interoperability through standards coordination and leave other governmental actions to others. 2) Perhaps the section on “2.5.2 Well-Developed Standards are in Place” addresses part of this concern. Also, while substantial effort is required to add “new levels of interoperability”, there is also a substantial return in life cycle cost of deploying more easily integrable standards then is the present case. In any

#	DATE	WHO	SOURCE	COMMENT	Response
				Attached please find S&C's comments to NIST on the Smart Grid Interoperability Roadmap. Best regards, Don Comments to NIST on the Smart Grid Interoperability Roadmap S&C Electric Company, Inc. General Comments: 1) Our greatest concern is that the report suggests that the Country's energy independence and environmental goals can only be met by implementing the Roadmap as generally described, including the provisions for a high degree of interoperability, and that the lack of standards is a primary impediment to reaching that goal. It is our belief that, while interoperability is a desirable goal, on the most fundamental level, the primary impediment is the lack of economic and regulatory policy and incentives to drive the energy market forward. Many of the technological advances and achievements are already available or are coming along very well without intervention in the marketplace (see response for Section 2.3.3). Likewise, many of the standards needed for implementation already exist. However, a nationwide commitment to deployment of these technologies, at a very substantial cost, and over a lengthy time frame, without mixed signals coming as a result of of temporary oversupply is (and has been) the major impediment. Such a commitment would have to come from state and local authorities with leadership from the Federal Government. While we have every hope that such a commitment is coming, until it is in place, investments by all stakeholders are entirely at risk. 2) While we agree that new standards will obviously be required to support the emerging technologies such as plug-in electric vehicles, as stated above, standards insuring a high degree of interoperability are not a fundamental impediment. The report overemphasizes their importance, and underemphasizes the level of effort and the amount of time it will take to create significant new levels of interoperability which could be many years. It would be unfortunate to hold the Country's energy goals hostage to subtle, difficult to quantify, interoperability goals. 3) Although the report recognizes the overwhelming acceptance in North America of DNP3.0 as the primary distribution automation communication protocol, it assumes that there is a compelling need to phase out DNP in favor of IEC 61850 over time. The assumption is based on the belief that the "plug-and-play" potential of the 61850-based protocols cannot be accomplished with a DNP-based infrastructure. We would ask that NIST and DOE engage the necessary resources to work toward a DNP-based plug-and-play capability which could preclude the need to replace a very extensive legacy of installed products and protocols with newer but more costly products and less-efficient protocols . 4) None of our comments above should be interpreted as if to suggest that concerns for addressing the emerging Cyber Security vulnerabilities are unfounded. We strongly support the efforts to asses and mitigate these risks. 5) Although this is probably not a major issue, the report talks very little about the need for condition-based maintenance or the need for similar, maintenance-oriented features. Despite our present shortage of jobs, historically it has been very difficult for utilities to provide adequate, ongoing support of installed automation systems. 6) In general, it would seem that people are viewing the Roadmap primarily as a guide to the development of standards. However, for example, it also appears to be guiding, to some extent, the procurement of "Smart Grid" systems under the DOE Stimulus funding. Perhaps some use cases that describe how the Roadmap should be used would make sense. Should it serve as a procurement guide? Will it define in some way what a "Smart" system or product is (and what it is not)? Section 1.4 1) The statement: "The greatest benefit from the smart grid will be interoperability that will open up every aspect of the generation distribution and use of energy to innovation." This statement could be considered to be in conflict with the opening statement of the Executive Summary, which cites energy independence as the greatest benefit. We would argue that interoperability, although a desirable goal, may be difficult to achieve and as mentioned in the report, is not an end point but rather a continuum of function. Furthermore, Section 6.3.2 states the need for a scoping task to substantiate the need for an interoperability architecture. Once again, we wholly support the development of an interoperability architecture but want to recognize the tremendous effort this will take to achieve. 2) The six bulleted points on page 4 imply that the DEWG working groups were incapable of reaching broad consensus due to their narrow	event, the Interim Roadmap envisions a continuous improvement model rather than a "wait till it's done" one. 3) Your concerns here are likely to be addressed to your satisfaction in the Priority Action Plan work for PAP 12 IEC 61850 Objects/DNP3 MappingIEC 61850 Objects/DNP3 Mapping 4) Thanks. 5) Agree. The second bullet in section 2.2.1 was revised to; • Power reliability and power quality. The Smart Grid provides a reliable power supply with fewer and briefer outages, "cleaner" power, and self-healing power systems, through the use of digital information, automated control, condition-based maintenance and autonomous systems. 6) We recognize that there may be ancillary uses of the document. However, its intended purpose is to respond to the requirements of the NIST RFP for a standards roadmap. Section 1.4 1) Revised statement to: "A key benefit from infusing the smart grid with a high degree of interoperability is that it will open up every aspect of the generation, distribution, and use of energy to innovation. Innovation will create change, and change will increase diversity. Diversity is always, and always will be, one of the greatest challenges not only to initial integration, but to maintenance management and to operational integrity of the grid." 2) Paragraph after bullet list was revised to: "These patterns make rapid consensus difficult. So, it is appropriate that these results be built upon through further analysis and refinement. NIST desires to accommodate existing technology while relying on technical experts that aid in successfully developing a standards roadmap to achieve an innovative smart grid. It is expected that this further analysis and refinement will occur in subsequent phases of the NIST 3-phase plan [20] which will set up governance and deep coordination with SDOs to achieve the appropriate level of depth and openness that this work merits. 3) Section end added sentence: "Yet this challenge must be met gracefully and steadily." 4) We consider that the phrase " Encapsulation of existing systems for interoperation with the Smart Grid will remain a significant challenge" addresses this notion.

#	DATE	WHO	SOURCE	COMMENT	Response
				backgrounds, limited representation and individual prejudices toward proprietary interests. We would argue that it was an impossible task, given a period of only 4-6 hours of meeting time, an architecture document with very limited details, no opportunity for detailed, prior review, and no access to the Internet for reference to perhaps 20,000 pages of applicable standards specifications. We do agree with the authors that technical experts will need to expend significant time to achieve the desired goal. However we are concerned that the comments will serve as a rationalization to complete the effort behind the scenes rather through an open, public process. Furthermore, we see no explanation in the text as to how such experts will be selected, how stakeholders will be assured fair and equitable representation, etc. While we can understand the desire to fast-track the development of standards, the process has not been explained satisfactorily. 3) The implications of the statement: "The great challenge, then, for Smart Grid interoperability, and for the standards that support it, will be to support diversity and innovation. This requires loosely coupled standards that enable shallow integration of diverse technologies." are not well explained in the report, but are extremely important. In order to achieve interoperability we must first select or develop a set of standard protocols, data, and data exchange formats that serve all of the relevant applications and provide some level of self-discovery where possible. THEN, we will select a minimum subset of protocols, protocol options and data necessary to create interoperability (This latter step could be considered the development of implementation agreements.) THEN we can build the applications and communication infrastructure for interoperation. Thus the challenge is to do this in a way that truly supports innovation, and to do it in a way that does not unfairly penalize early adopters for committing to engineering and deployment prior to finalization of the standards and agreements. We believe the report goes a long way toward promoting this process and treating early adopters fairly, however the scope and length of the effort is not well characterized and will be lengthy. Managing expectations is crucial to precluding the establishment of unattainable goals. 4) (Page 5) The report cites that support of legacy systems, and particularly for migration paths will remain a challenge, but does not seem to attempt to address that challenge in any way. For example, making provisions for retrofit of security to legacy devices and systems seems to be essential – what is the plan for meeting this requirement? Section 2.2.2 1) Why is the benefit of reducing our dependence on foreign oil not explicitly called-out? As stated in the Executive Summary, this objective, combined with minimizing energy costs and the reduction of our carbon footprint are what the President and Congress are asking for. Many of the other benefits mentioned are valuable but less important. Why does Section 2.2.2 not reflect the goals in the executive summary? 2) Why are the suppliers of equipment and communication technology not considered a primary stakeholder, since the Smart Grid is impossible to achieve without commercial products and enabling technologies? We recognize that the suppliers are not primary beneficiaries as energy consumers. The re-engineering of the power grid represents a huge business opportunity, but also represents an even larger risk with its unique dependence on investment tied to changes in local, regional and national energy policy. 3) The list of primary stakeholders, and the list of key stakeholders in Section 2.6 don't seem to align. Section 2.3.1 1) The procedural challenges to the migration to a smart grid overlooked two of the greatest challenges: • To maintain a consistent regulatory and energy policy framework over a transition period that, as mentioned in the report, will be lengthy. • To achieve a National modernization of the distribution grid since the regulation of the grid is delegated to local and statewide authorities. 2) Another regulatory challenge is related to the financial support of the Roadmap: Specifically, in order for electric utilities to deploy Smart Grid as it is proposed in the Roadmap, including, but not limited to, compliance with the cyber security requirements, there must a regulatory/policy support for accelerated depreciation and amortization of assets,	Section 2.2.2: 1) We agree with the goal that the president states. However, the scope of this activity was limited to standards interoperability and the Smart Grid, which agreed is a subset of the entire task before the nation. 2) Agree. Added as 3rd bullet for critical stakeholder group: "• Manufacturers. Manufacturers must produce and service the myriad components that actually comprise the Smart Grid. The burst of innovation in products will propel producers to new business developments and existing business enhancements." 3) Good catch, added to intro to section 2.6 parenthetical: "Ongoing governance of smart grid standards should include key stakeholder representatives, including (breaking down into greater detail the primary stakeholder groups described in section 2.2.2):" Section 2.3.1: 1) Accept suggested additions. Added bullet: "• Regulatory and Policy. To maintain a consistent regulatory and energy policy framework over a transition period that will be lengthy. Further, to achieve a National modernization of the distribution grid since the regulation of the grid is delegated to local and statewide authorities." 2) The sentence in section 2.3.2 helps put us on notice of this requirement: "This embedded computing equipment must be robust to handle future applications for many years without being replaced." Financial support is always needed and welcome. Section 2.3.3: Point taken. No additional modifications needed. Section 2.5.3: We quote back your prior statement "It is not uncommon today to expect 20 to 30 years life from field devices". Section 2.5.4: Revised first bullet to: "• Up-to-date system-modeling tools to manage both the documentation and the complexity of the system." This bullet deals with manufacturers of products that talk to each other being able to interoperate. Second bullet revised to: "• Independent vendors are able to produce components

#	DATE	WHO	SOURCE	COMMENT	Response
				specifically electronic communications and control devices, and software. It is not uncommon today to expect 20 to 30 years life from field devices, but with an increasing risk of cyber attacks, it is unlikely that any electronic hardware/software platform-based product will be useful beyond 5 to 8 years. It is imperative that the cost related to frequent upgrade and/or replacement of such devices is well understood and factored in the overall SG deployment and to ongoing electric utility regulation and rate decisions.. Section 2.3.3 The stated goals for 2020 on Page 12 would appear to be achievable and could even be accelerated by converting current distribution automation technology for volt-VAR control, and peak load shaving into products and deploying them within the next three to five years. The cost of doing so would be higher, obviously, than a delayed deployment. With current energy storage technologies, costs could approach the cumulative cost of supplying energy to distribution substations for 10 years at present rates. However, it seems clear that such costs will plunge in the next few years. Strategic management of this tradeoff would greatly reduce the overall cost and allow a more responsive deployment as the technologies decline in cost. By "strategic management" we mean prioritized deployments of infrastructure that will be required but will either not change substantially or are relatively easily upgraded. This would necessarily flow from the regulatory environment through financial incentives. The point here, is that we don't want to over-emphasize the goal of interoperability versus the goal of energy independence. Section 2.5.3 Bullet point 3 seems to point to a design lifetime of 30 years for networking media and or components. This is a simply insane requirement, to put it bluntly. Such requirements should be removed as they only serve as an unrealizable distraction. Section 2.5.4 First bullet - …"to manage the documentation and complexity…" We have no idea what this means – it looks like a misprint. Second bullet point. This goal seems to conflict with the goal in Section 3.1 to encourage innovation. In general, innovative concepts become patented technology which is not necessarily sharable. Therefore there may not always be multiple vendors. Does that mean patented products are at an extreme disadvantage? There are also other ways in which innovation is retained by a specific provider. Once again, how can we think we will encourage innovation if we require that that innovation be made available to other suppliers? Section 3.1 Please see second comment to Section 1.4. Section 3.2.8 The distribution model is so simplistic and cursory that it does not provide any insight into the conceptual model. The list of actors differs greatly with the lengthy list in Section 4.8. Section 3.3.3 The text contains one numbered item but it appears that there are numerous items that have been inadvertently omitted from the text. With regard to Item 1, this is an excellent point – in addition, mechanisms for funding lengthy support of cyber assets need to be established. These mechanisms need to support products for considerably greater periods of time than their commercial viability as sales products. Section 4 General Comments: 1) As stated earlier in the report, the use case models need to be completed. The communication diagrams vary greatly from use case to use case and conflict with each other. For example, locate the EMS or the DMS functions on each graphic. This is not a criticism, but an observation. We would hope that these would be unified and then a single diagram developed to show all the functions that need to exist	that can interoperate." Section 3.1: Hopefully, this is successfully addressed in that response. Section 3.2.8: Section 3.2 had added a paragraph to address this issue for another commenter: "Note that the Conceptual Model, as presented, is not intended to comprehensive in identifying all actors and all paths possible in the Smart Grid. This achievement will only be possible after substantial time and additional elaboration and consolidation of Use Cases is achieved by stakeholder activities that are ongoing." Section 3.3.3: This section is being removed. Cyber Security for the Smart Grid is being aggressively pursued by the Cyber Security Coordination Task Group. Rather than replicate the status of this ongoing activity here, the reader is directed to this project's TWIKI pages. To follow this activity and review all related documents, use the following Web link: http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/CyberSecurityCTG Section 4 General: 1) We have added text to section 4 that emphasizes that the use cases in section 4 are examples not definitive or complete: "The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Note, also, that each Domain's actors has substantial overlap and duplication. Ultimately, these similarities need to be recognized and normalized as a Smart Grid clear set of actor definitions gets constructed in future work." 2) Same as above. Section 4.8.5: 1) Same response as above. 2) As these are examples, they were used as is. 3) If you can point us to the missing input in the raw results up on TWIKI we will migrate it into a future version of the set of Use Cases evolving in the NIST work.

#	DATE	WHO	SOURCE	COMMENT	Response
				in each environment. 2) If we want a high level of interoperability and we want a good system design as well, it would be helpful to include components of the management functions such as EMS or DMS on each side of some of the critical interfaces. For example, a component of the AMI system that aggregates load to each segment of the feeder, providing statistics on maximum, minimum and average load and voltage, if available, over a time period, would drastically reduce the amount of data that has to flow from the AMI system to the DMS or DMSs. Section 4.8.5 1) The box inside the Operations area, labeled "DMS functions" should be broken out into separate boxes. Considering all the DMS functions as part of one box detracts from the goals of promoting interoperability. DMS functions are not always performed by one system or even in the same operating environment. For example, circuit reconfiguration can and is frequently performed by a distributed software agent that is not integral with a DMS. A similar comment was made at the Interop Workshop (Working group table 6, Pages 11-12 – See document named: "Roadmap_WS_DistribGridManagement_UseCase_VoltageVarAndWattControl DGMG1 Table 6 Notes Day 2 Session 5.doc".) Apparently this comment was either ignored, rejected or overlooked, as were several others. We realize that it was a difficult job to condense the workshop deliverables into the report. 2) What process was used to reach agreement on the recommendations that flowed into the final work product? How can we effectively provide input without traceability or opportunity for dialog? 3) A second input from the Workshop Table 6 was the request for a D/A database with much more technical content than what is found in a GIS database, including both detailed electrical properties, connectivity, and communication addressing information. This request appeared to be lost. Can you explain? 4) None of the extensive information exchange input from the Workshop was included. Why? Section 6.1.3 We wholeheartedly support the development of a common semantic model for the Smart Grid. The need for a common data exchange language is, if anything, understated in the report. We have endorsed[12] the MultiSpeak platform, as opposed to other application layer languages and protocols stacks such as IEC 61850 or C12.22 as the ideal "least common denominator" to use for this model for the following reasons: • It's based on the Internet suite of protocols and related tools which, worldwide, are the most widely-used and deployed information sharing technologies. These protocols support XML data representation, as endorsed in Section 6.1.3. • The MutliSpeak toolset is highly-scalable since it's based upon Web technologies. Other, electric industry protocols have good purposes but are relatively weak in terms of their scalability and supporting infrastructure. • The speed of implementation of new Smart Grid applications will require a large number of software professionals, which are already trained on the Web tools. • MultiSpeak was developed specifically for information exchange within the electrical grid. • MultiSpeak was developed for and has been supported by the NRECA, an electric power industry organization. Section 6.1.5 It should be noted that conversion of communication equipment to new frequency bands could actually slow the process of grid modernization, substantially increase the cost of the communication equipment and reduce the number of available, competitive options. Section 6.2 This section contains many good recommendations but is very confusing in terms of defining the way we will communicate across domains. For example, if we're communicating between metering and the substation, are we communicating using MultiSpeak (Section	4) The information exchanges are indeed important and in completing the Use Cases this will need to be done. For the present report, the standards implicit in supporting the information exchanges were captured in Annex A as the semantic layer exchange models required. Section 6.1.3: We have added Multispeak as a component of the Common Semantic Model task. The least common denominator may not be the best approach for a common semantic model. A most robust basis allows for subsets to be interoperable and different complexities to be used for different requirements. Additionally, a Common Semantic model, although represented in XMLSchema (or UML as some suggest) does not imply instantiation with Web Services. This is but one syntax necessary to convey the semantics of the model. Section 6.1.5: Noted. Section 6.2 The responder thinks that some domains justify different transfer syntaxes and messaging to convey Common Semantic Model information. When the basis is the same semantics, gateways between the syntaxes are straightforward and algorithmic and need to be performed only at the domain boundary. Section 6.3.1 1) Sorry. 2) Focus on the FERC 4 + 2 did not allow sufficient coverage of transmission and distribution Use Cases. 3) The principle is that through a collected and scoped ontology, a constancy of meaning of terms within a context can be achieved. Successfully? We'll see. 4) Agree. See response to 2) Section 6.3.1, and 6.3.2: Could be. Section 10.14: Removed inappropriately added term "deprecated". Section 11.2.1

[12] It should be noted that S&C Electric Company has no installed base of MultiSpeak or any of the other candidate integration tools.

#	DATE	WHO	SOURCE	COMMENT	Response
				6.2.6), C12.x (Section 6.2.5), DNP (Section 6.2.2), or 61850(Section 6.2.2)? If we have options, interoperability is severely impacted. Selecting one common application layer protocol for all high-level applications, inside and outside each domain creating an "interoperability highway" would greatly simplify interoperation. Section 6.3.1 The statement in Section 6.3.1 "These are in recognition that some key areas were not covered to the depth necessary to cover the full landscape of standards that could be applied to the Smart Grid". We recognize that the use cases are not complete but for the purpose of standards review, what standards were not considered? What areas have not been roadmapped adequately for this decision making? How will we know when this first phase of review is complete? 1) General comment - This entire Section is extremely confusing. 2) What "key areas" of applicable standards were not covered? 3) We assume that by IKB you're referring to the NIST Interoperability Knowledge Base. A Google search suggests that the IKB doesn't yet exist, so its difficult to determine if this vehicle will be effective. 4) The draft Roadmap provided to the NIST Interoperability workshop in June did not serve as an adequate foundation for developing an interoperability framework, at least as it relates to the distribution system. Specifically, the roadmap lumped all of the major distribution system substation automation functions into one big box labeled DMS, or Distribution Management System. In order to provide for interoperability, the individual application functions need to be broken out, with interfaces between them and to external systems clearly identified. For example, the functions associated with service restoration (circuit reconfiguration) are largely different and separate from the functions associated with Volt/VAR control). They may have some interrelationships, but those interrelationships are of a much less important nature. Furthermore, breaking these individual functions out would help to identify the other interface requirements such as the need to concentrate and compare voltage information, when available, between measurements on the feeder versus at the customer meter. Section 6.3 Given the complexity of the task identified in this Section, the process of completing the work of Section 6.3.1-2 would appear to be many years in length. Section 10.14 What is the origin of the statement with regard to DNP3 "Deprecated for new work"? Is that EPRI's postion? NIST's position? We have been in contact with representatives on the various IEC and DNP Users Group and no one understands where this statement comes from. Also, what is defined as "new work"? If we add a new function or system to an existing substation, is that "new work"? Section 11.2.1 We would be opposed to extending 61850 outside the substation to the control center. MultiSpeak would be a much better choice. Please state that the mapping from 61850 objects to DNP is really bidirectional – the mapping is from 61850 to DNP and from DNP to 61850. This work item should be shown as being performed at least in part by the DNP Users Group. With regard to the integration of EMS, DMS and MOS, we strongly recommend the use of MultiSpeak to form a data highway. Section 11.2.2 We completely agree with the need for a detailed architecture, data models, etc. This statement really applies to all of the distribution-related applications, not just the ones related to this section. With regard to the continuing role of DNP, the protocol should not be changed but XML-based mapping to DNP point lists would allow integration layers to be written for the purpose of creating application interoperability.	a) Opinion noted. b) Modified description of DNP/61850 as: "For transition between using DNP3 and converting to IEC 61850, the IEC 61850 object models need to be mapped to DNP3 and vice versa. c) Opinion noted. Section 11.2.2: Opinion noted. Section 11.6.1: 1) Opinion noted. 2) Common semantic model envisions unification of CIM (Multispeak)/61850/C12 models. Thus progression from field devices through enterprise goes through 61850 on way to CIM. 3) Section 11 contains all recommendations from workshop and some additions from the team. This is one of the former. 4) DNP is listed among the standards in some of the discussion issues in section 11.6.2. Section 11.6.2: Multispeak is referenced in at least one discussion item. No, at this time 61850 Lite is a notion not formally being worked on yet to our knowledge, but soon to be within IEC TC57.

#	DATE	WHO	SOURCE	COMMENT	Response
				Section 11.6.1 1) Distribution device models should be supplemented by models of distribution automation applications such as Volt-VAR control, circuit fault isolation and service restoration, load management, etc. 2) “MAP IEC 61850 Models to AMI system protocols…” Why not 61968 CIM models??? 3) “MultiSpeak and 61968 Interoperability Testing” Why is this called out? Interoperability testing is necessary for everything we do, no? 4) The role of DNP in distribution system operation seems to be largely ignored as an issue to be addressed. Section 11.6.2 General Comment. Why is MultiSpeak not in the list of standards potentially involved in all of the data exchanges between these subsystems? We strongly-support the concept of a “61850-lite” protocol for communications outside the substation. If there is a proposal or proposed specification, please make it publicly-available for comment and consideration.	
80	7.31.09	Michelle Mindala-Freeman, Landis & Gyr Michelle.Mindala@landisgyr.com	SGC	Dr. George Arnold National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899-8100 Re: Request for Comments on ``Report to NIST on the Smart Grid Interoperability Standards Roadmap'' (Contract No. SB1341-09-CN-0031-- Deliverable 7)  Attached, please find Landis+Gyr’s responses to the NIST report entitled ``Report to NIST on the Smart Grid Interoperability Standards Roadmap'' (the ``EPRI Report''), prepared by the Electric Power Research Institute (EPRI) under a contract (Contract No. SB1341-09-CN-0031--Deliverable 7). To ease NIST’s assessment of comments, Landis+Gyr has provided specific comments in the word document attached. We have added comments to each relevant “gap” or “discussion topic” as written in the EPRI Report Appendix C, Section 11. Thank you for the opportunity to comment. Please let us know if you have any specific questions about our comments. Sincerely, Michelle Mindala-Freeman Ruben Salazar VP, Marketing/Product Mgmt Director of Technology michelle.mindala@landisgyr.com ruben.salazar@landisgyr.com (678) 258-1623 (678) 258-3165 Michelle Mindala VP, Marketing & Product Management Landis+Gyr Energy Management Solutions Office: +1 678 258 1623 Michelle.Mindala@landisgyr.com www.landisgyr.com	We recognize the interest of the commenter in Smart Energy Profile as a solution to many aspects of HAN device communications. We have added SEP to many of the items in the recommendations section. Additionally all the work in actually resolving the recommendations will be done in future forums as described in the NIST 3-Phase Plan. See modifications to Interim Roadmap described in response to comment #79 above. We also must note, that while SEP has indicated a move to the IEC umbrella, it should be recognized that SEP 2 is currently in its requirements phase so specification of SEP 2 does not exist. Nor is the process cleared for incorporation into IEC TC 57. That being said, the authors recognize the large impact this activity has had in the marketplace and the fervent efforts of its stakeholders. It is therefore considered prominently in the priority action plans which will forward the actions in this section. We note here that most of the balance of your excellent comments is related to the implementation and scope of actions, rather than their inclusion. In this regard, we point you to the ongoing work in priority action plans and the further efforts of the evolution of the roadmap in the second and third phases of the NIST plan. In that regard, we would encourage your wholehearted participation and leadership. You ask a specific question about the concept of 61850 Lite. Our understanding is that this is a notion of a highly compressible implementation of a section 8 transfer syntax and protocol for IEC 61850 suitable for 19200 baud radio communications infrastructures. The idea is to be able to benefit from the richness of the IEC 61850 model with more efficient transport. Note that many aspects of 61850 transport are highly compressed. This effort would add to those achievements, without sacrificing expressability.

#	DATE	WHO	SOURCE	COMMENT	Response
				manage energy better June 30, 2009 Dr. George Arnold National Institute of Standards and Technology 100 Bureau Drive, Stop 8100 Gaithersburg, MD 20899-8100 Re: Request for Comments on ``Report to NIST on the Smart Grid Interoperability Standards Roadmap'' (Contract No. SB1341-09-CN-0031-- Deliverable 7)  Attached, please find Landis+Gyr's responses to the NIST report entitled ``Report to NIST on the Smart Grid Interoperability Standards Roadmap'' (the ``EPRI Report''), prepared by the Electric Power Research Institute (EPRI) under a contract (Contract No. SB1341-09-CN-0031--Deliverable 7). To ease NIST's assessment of comments, Landis+Gyr has provided specific comments in the word document attached. We have added comments to each relevant "gap" or "discussion topic" as written in the EPRI Report Appendix C, Section 11. Thank you for the opportunity to comment. Please let us know if you have any specific questions about our comments. Sincerely, Michelle Mindala-Freeman Ruben Salazar VP, Marketing/Product Mgmt Director of Technology michelle.mindala@landisgyr.com ruben.salazar@landisgyr.com (678) 258-1623 (678) 258-3165 11 Appendix C: Requirements, Standards Gaps, and Discussion Issues for the Action Plan The following tables of requirements and standards gaps were derived primarily from the results of the Smart Grid Workshop #2, with clarifications, edits, and a few additions from the Project Team. These tables form the basis for the NIST Action Plan described in Section 6 and provides the detailed actions that NIST should promote. In addition to the specific requirements and standards gaps, some issues were identified that need further discussion before concrete actions on standards can be taken. The complete results from the Workshop #2 are shown in the Gaps Assessment Spreadsheet in a separate annex to this document. 11.1 Action Items Related to Demand Response and Markets 11.1.1 Requirements and Standards Gaps Related to Demand Response and Markets The following requirements and related gaps in standards were identified, where the activities can be commenced (or have already commenced) relatively quickly, after brief discussions with the organizations identified.	We note also, your criticisms of ANSI C12.22 applicability. Clearly this is a matter of differing opinions and interpretations in the industry. The actions of the recommendations were intended to foster a forum where the best applicability of this standard could be achieved. Note that none of the content of the Interim Roadmap prescribes where and exclusively where any standard or protocol must be applied. In this regard, the Interim Roadmap was more a discovery process than a resolution one. The activities described in the roadmap should help narrow these questions in the future as further work is performed.

Requirements	Standards	Gaps	Who	L+G Comments/Responses
Common Model for Price As PEVs move from area to area, a common interoperable model for price and energy characteristics and time for dynamic pricing across areas, markets, providing a consistent	NAESB, EMIX, OpenADR, IEC 61850-7-420, others	Common interoperable price formats, characteristics, time, and units are needed to abstract away the complexities of markets	SAE, IEC, NEMA, NAESB, OASIS	***Currently, the mechanism for energy management and price signals to the edges of the network (premise-style devices) is the meter and ESP/HAN. The "language" for delivery of information is SEP (smart energy***

#	DATE	WHO	SOURCE	COMMENT					Response
				integration model.		to actionable information for the PEV.		***profile), which will move into IEC standardizations process. IN the event we anticipate an go-to-market model for PEV includes using a meter/ESP, then SEP (or its subsequent IEC variant) needs to incorporate these proposed functions into future SEP profiles. We strongly suggest this work be lead by (or ay a minimum incorporate the organization that is currently leading the definition of SEP.*** ***In the definition of the PEV profiles, profile data should also contemplate frequency with which prices can be update.*** ***More generally, this concept of "new edge devices" coming into a system (mobile or otherwise) needs to be expanded beyond PEVs. Discussed in some prior sessions was the need for a common "device profile" so devices can clearly communicate to systems what they are, what they can do and how they behave so the connected system can determine how to interact with that new "edge" device.***	
				Provide energy usage information to Customer EMS: Customers and/or their energy management systems would like or require energy usage information in order to help make decisions, such as what parameters to set for demand response, whether to change DR plans, or whether to take specific actions now in anticipation of future DR events.	OpenHAN Smart Energy Profile ANSI C12.19	Open access protocol needed for timely access to metering information by the premises management system	OpenHAN, ZigBee/HomePlug Alliance, NEMA	***As relates to protocol, we believe that SEP is the basis for this and evolution of SEP will define what information will be accessible. On the surface, this gap would then, appear to be addressed.*** ***What s unclear, however, is if there is a deeper issue or gap that is not yet clearly articulated? Is this gap intended to suggest that any device should be allowed unfettered access to meter data? If so, while there is interest in having non-utility entities access timely data (via a std protocol) there are security issues and privacy issues here which must be addressed. Further, there is also some responsibility to set the right expectations with consumers and ensure we don't create unintended consequences (eg: floods of customer care calls) with unfettered access. As relates to data access, there does need to be validated and authorized connectivity to what is, ostensibly the "gateway to the grid" in the home. This should, we suggest, go through utility ESP/HAN and should leverage the SEP protocol.***	

#	DATE	WHO	SOURCE	COMMENT	Response

				Before inventing a new standard/solution to fill the gap, has the group fully explored if the current SEP definition already addresses or contemplates this?
Extend IEC 61850-7-420 standard for additional DER: In order for DR signals to interact appropriately with all types of DER devices, additional types of DER equipment need to be modeled. These models will need to take into account how the DER could be used for demand response and/or load management, which DER information can be simple extensions to existing DER models, and which need new development.	IEC 61850-7-420, OpenADR, Smart Energy Profile	Currently IEC 61850-7-420 for DER covers wind (actually IEC 62400-25), photovoltaic systems, fuel cells, diesel generators, batteries, and combined heat and power (CHP). These models need to be extended to include updates or new models of DER devices.	IEC TC57 WG17, NEMA, OASIS, ZigBee, Policy	***We support, but want to ensure that adding in these new models does not slow the progress in process on SEP2.0. We strongly suggest that these new models be framed for next iterations of the protocol standard.***
Extend IEC 61968 standard for DER: IEC 61968 needs DER models, but should be harmonized with the existing DER object models in IEC 61850-7-420, as well as all on-going DER 61850 development. IEC 61850-7-420 has architectural issues to be addressed.	IEC 61968-xx, eBusiness, others TBD	IEC 61968 needs DER models to carry the IEC 61850-7-420 models of DER and PEV to integrate with the enterprise. Address issues in IEC 61850-7-420,	IEC TC57 WG14, NEMA	***We recommend that there be a discussion with the SDO groups regarding implications to metering. Both 61968(enterprise service bus layer tying applications together for integration) & 61850(substation layer – devices to device) have metering sections open -- the various groups need to ensure there is harmonization and little duplication of requirements.***

11.1.2 Discussion Issues Related to Demand Response and Markets

The following table lists the topics that need to be discussed and resolved before the appropriate standards can be developed or extended, usually to ensure that standards which were already developed are used (rather than re-inventing the wheel) or that the most appropriate standard is selected to extend.

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Make available pricing and market information: Market information must be delivered across all domains: Generation, market, DER, T&D, customer, etc. (Wholesale and retail real-time pricing available to everyone.) IEC 61970, IEC 61968, and IEC 61850-7-420 need updates for handling prices. OpenADR needs to be vetted as if it becomes a standard, Smart Energy Profile provides communications at the Customer site.	FERC's OASIS, IEC CIM for Markets, IEC 61850-7-420, OpenADR, Smart Energy Profile	FERC/PUC IEC TC57 WG13, NEMA, WG14, WG16, WG17 SAE, OASIS	***OpenADR, like the other OpenXXX groups appear to be groups centered on developing use cases/user requirements. That being the case, we do recommend that "user groups" continue to be in place to have that open and candid discussion of market needs.*** ***However, those interests and requirements need to be handed over to SDOs for development into standards. We expect that it's not the Open ADR group that does this, rather an SDO.*** ***On a more precise point, SEP doesn't provide "communications" as noted in the last sentence, but rather an***

#	DATE	WHO	SOURCE	COMMENT	Response

			application layer to the customer site.
Consumer registration of out-of-the-box appliances;: open up and authenticate on someone's smart home network; how to authenticate – how will this happen in future	IEC 61850-7-420, OpenADR, Smart Energy Profile	IEC TC57, NEMA, OASIS, SG Users Group	***There has been significant real-world work in this regard, where there are volume deployments of AHN-enabled meters today. Recommend we look to markets such as TX to discover specific requirements and needs – in TX this process has been developed and inspected by T&D vendors, REPs, vendors and consumer groups, regulators. These use cases for practical in-market implementation are well in development.*** ***In any event, one concept critical to secure, real time management of this sensitive data and connectivity is the concept of a" Secure Gateway", embodied in the concept of the ESP in SEP.***

11.2 Action Items for Wide Area Situational Awareness

11.2.1 Requirements and Standards Gaps Related to Wide Area Situational Awareness

The following requirements and related gaps in standards were identified, where the activities can be commenced (or have already commenced) relatively quickly, after brief discussions with the organizations identified.

Requirements	Standards	Gaps	Who	L+G Comments/Responses
Extend IEC 61850 standard from substation to control center: Since the data in the substation uses the IEC 61850 information model, this data should be reported to the control center using the same information model. This will also simplify the harmonization efforts between the models of data collected from the field and the CIM.	IEC 61850	IEC 61850 models all the equipment and functions in the substation. If those models could be brought back to the control center, then this same powerful information model would be used for SCADA and other applications, thus minimizing translations and expensive and data maintenance activities that sometimes lead to insecure and/or unsafe situations.	IEC TC57 WG10 & WG19, NEMA	
Extend IEC 61850 standard between substations: Some protective relaying and certain other functions require communications between substations, but still rely on legacy, or proprietary protocols. Since IEC 61850 is used within substations, the same protocol should be used between	IEC 61850	IEC 61850 needs to be expanded to handling substation-to-substation protective relaying and other information exchanges.	IEC TC57 WG10, NEMA	

#	DATE	WHO	SOURCE	COMMENT	Response

substations.				
Develop interoperable messaging standards for the IEC 61970 (CIM): The CIM for transmission (IEC 61970) does not specify formats or messaging methods for exchanging CIM information, thereby requiring many implementation to develop their own formats and messaging requirements. There is no interoperability between implementations unless they have explicitly worked together.	IEC 61970	If CIM format and messaging standards were developed, then CIM implementations could be interoperable without custom development by vendors and lengthy interoperability tests for each implementation..	IEC TC57 WG13, NEMA	
Extend the time synchronization standard: Time synchronization to millisecond based on GPS clock is needed by Phasor Measurement Units (PMUs) for accurate timestamping. Specifically IEEE 1588, Network Time Protocol (NTP), and IRIG-B need to ensure they can handle this time synchronization, and mappings to IEC 61850 and DNP3 need to ensure they can transport the results.	IEEE 1588, Network Time Protocol, IRIG-B	Timestamps at the accuracy required for PMU's are not specifically covered in the time protocols.	NASPI-PSTT IEC TC57 WG10, NEMA, IEEE PSRC H7	***If this requirement gap is related to other areas beyond PMU networks, we recommend we make a distinction between time accuracy and time resolution. What is the need here? We believe the goal is to focus on resolution, Unless every device is fit with its own time source locked to a GPS constellation, we do not think that microsecond accuracy will be achieved.*** ***Furthermore, we should also draw distinctions between the need to have millisecond timing in the transmission vs the distribution network. If this standard is driven to the distribution network, this will add substantial cost to the system. This level of accuracy is probably not required, as the system can be flexible and not overreact to small disturbances.***
Develop calibration rules for PMUs: Standard rules for calibration & update of measurement devices, common tolerances, depending on application	No Standards Exist	Standard Needed for PMU, Real Time Rating System	NASPI/NERC/ NIST IEEE/IEC TC95	
Map IEC 61850 objects to DNP3 for legacy interfaces: For transition between using DNP3 and converting to IEC 61850, the IEC 61850 object models need to be mapped to DNP3	DNP3 - Application Layer	IEC 61850 object models need to be mapped to DNP objects	IEC TC57 WG03, NEMA	

Requirements	Standards	Gaps	Who	L+G Comments/Responses
Exchanging both transmission and distribution power system models: As it becomes increasingly critical for transmission and distribution operations to have clear and accurate information about the status and situations of each other, they need to be able to exchange	IEC 61970 & IEC 61968-11	Both transmission (IEC 61970) and distribution (IEC 61968-11) are being developed for exchanging power system models. They need to include	IEC TC57 WG13 & WG14, NEMA, IEEE/ NASPI/ NERC/	

#	DATE	WHO	SOURCE	COMMENT	Response

their respective T&D power system models including the merging of relevant databases for interconnected power systems.		messaging standards to be truly interoperable. No specific standards exist for merging power system databases.	FERC	
Broad discussion on functional integration of EMS, DMS, & MOS: As transmission operations and distribution operations become increasingly intermeshed with electricity markets, both to set prices and to respond to prices, there needs to be functional integration of EMS and DMS functions and market operations systems (MOS) and corresponding information exchange. At the same time, rules and regulations for these information exchanges between unbundled entities need to be established and monitored.	IEC 61970, IEC 61968, IEC61850, DNP3, ANSI C37.1, ANSI C37.118, ANSI C12.19-12.22, IEC 60870-6 (ICCP)	There is a lack of coordination or understanding on to achieve functional integration of EMS, DMS, and MOS systems.	IEC TC57 WG13 & WG14 & WG16, NEMA	
Integration of the relay settings and other field component management functions: Applications that perform an automated verification of the different settings of the components of a power system will be essential in the future to prevent system failures due to miss configurations that may create blackouts.	IEC 61850	One of the required pieces to enable such applications is the standardization of relay settings and other field component management functions. One first step in that direction is the work currently done within IEEE PSRC, H5a working group.	IEEE PSRC, IEC TC57, NEMA	***A precursor to this is bridging the gap between DNP3 and 61850 for this. Specifically ensuring relay settings are available in 61850***
Object models of bulk generation plants: Due to the fact that IEC 61850 is today and for the foreseeable future the communications protocol for integration of power system equipment, object models of power plants will need to be developed**.**	IEC 61850	Bulk generation plants are not modeled in IEC 61850. Workshops with power plant domain experts from utilities involved in Smart Grid development projects and IEC 61850 modeling experts can be used in order to determine and document the functional and modeling requirements.	IEC TC57, NEMA, bulk generatio n experts	

11.2. 2 Discussion Issues for Wide Area Situational Awareness

The following table identifies the issues that require further discussion before any specific work on the relevant standards can be undertaken. Often this discussion involves the identification and agreement on exactly which of the existing standards should be extended to cover the issue, while other discussions reflect resolving issues in on-going standards activities.

#	DATE	WHO	SOURCE	COMMENT	Response

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Discuss cross-utility handling of major events: Major events, like the blackout of August 2003, could have been avoided if adequate event information had been provided to the right place within the appropriate time frame. If (and when) a major event does occur, there is an additional need to have a mechanism or system to support the restoration of communication systems across utilities, to federal and state agencies, and to first responder organizations.	NASPInet, ANSI C37.118 IEC 62351-7, NEMA	NAESB, NEMA, IEC	
Systems and Network Management Infrastructure Development for the Smart Grid The Smart Grid represents a System of Systems/Networks of Networks that must be able to operate across traditional industry boundaries such as States, Service Territories, and Consumers. Development of an open systems based infrastructure that can effectively manage the envisioned networks of systems is a significant challenge that has not been resolved. The Architecture of the networks is intimately connected with its management infrastructure and this issue needs to be investigated systematically. The experts from the fields of networking, systems management, cyber security, and communications technology need to investigate Smart Grid requirements emerging from the NIST Roadmap and Workshops and industry projects as a starting place to examine the issues surrounding Management infrastructure. The topic is multidisciplinary and will take in depth work to fully understand the plausible Smart Grid build out and the scenarios for network scaling and growth. The management functions include but are not limited to Fault, Configuration, Accounting, Performance, Security, and Applications. The topic overlaps significantly with Security issues but it includes many functions that are not directly security.	OSI Management Standards: CMIP, CMIS Internet Based Management Standards: SNMP Vx Data Management and Directory Services Standards Distributed Desktop Management Task Force Standards: Common Information Model Applications Management Standards Related IEC and IEEE Management Standards associated with key networking and end device communications Other	ISO/OSI, IETF, ITU, IEEE, IEC and Associated Working Groups: UCA International Users Group Other	
Detailed architecture to be used for T&D operations, down to the customer: A high level architecture was identified in this NIST roadmap document, but it needs to be extended to the actual transmission and distribution operations, including the interactions with customers who are participating in demand response, own DER units, operate PEVs, and may have electric storage facilities..What additional standards need to be developed or extended in order for systems and tools to process and aggregate data from across the grid to make it actionable? What information exchanges are needed to coordinate across all levels of the energy system, behavioral models and data sharing (i.e. between transmission, distribution, consumer, system planning, etc. including commercial data, i.e. AMI data)	Although applications should not be standardized, the input/output can be provided by many standards. However, there are both too few and too many standards to chose from. Which should be used for which functions?	IEEE/ NASPI/ NERC/ FERC UCA SG Users Group, IEEE 2030, IEC TC57 WGs, NEMA	***In any overall architecture and harmonization efforts that transcend domains, we must allow for differentiation in performance characteristics between the transmission and the distribution systems (e.g.: latency, resolution, responsiveness…)*** ***Furthermore, standards and common data models defined in earlier sections for HAN/DR/DER (e.g.: SEP and 61968) need to be considered and discretely maintained.***
Development of a common weather information model:	DWML, IEC 61850	NOAA, IEC, NEMA	***We are concerned, as relates to personal weather systems,***

#	DATE	WHO	SOURCE	COMMENT				Response
				A common weather information model needs to be developed that includes a format for observations as well as for forecasts. This model could be used when querying local weather stations and even personal weather systems. The Digital Weather Markup Language (DWML) is an existing specification developed by the National Oceanic and Atmospheric Administration (NOAA). IEC 61850 has models for retrieving weather data from field equipment.			***presentment and reporting that over-standardizing here may stifle innovation. We recommend this model is defined specifically as needed in the back-end systems and outside the home/consumer arena.***	
				Clarification of standards to be used for data management. What additional standards need to be developed or extended for supporting efficient data management, farming, analysis and reporting? Hierarchical aggregation of data; down and up the hierarchy. User-specific object models	Applications should not be standardized, but input/output can be provided by IEC 61850 and CIM	IEEE/ NASPI/ NERC/ FERC UCA SG Users Group, IEEE 2030, IEC TC57 WGs, NEMA	***Insofar as there are some core commonly used fields, this could be "standardized (a la c12.19 data tables for meters). However, we must leave the development of value-added data management and innovation of data models and delivery to the market and to innovation. We should not over-standardize here in any way to stifle innovation.***	
				Transmission transfer capacity (TTC) information to Distribution Operations and C&I Customers. What additional standards need to be developed or extended in order for Transmission Transfer capacity to be available to T&D operation (and major customers) in real time? There is a need to know impact of distribution activities on the capacity issues and deliver this knowledge to transmission.	Guide in Process: CIGRE WG B2.36 Applications should not be standardized, but input/output could be provided by IEC 61850 and CIM	CIGRE/IEEE/ NEMA UCA SG Users Group, IEEE 2030, IEC TC57 WGs, NEMA		
				What should the continuing role of DNP be: DNP does not support CIM or network management functions. Should it?	DNP3	DNP Users Group	***We support evolution and integration of this standard into IEC, however, we MUST ensure that legacy products are continued to be supported.*** ***There are also other critical and widely used DA protocols, eg: ModBUS, PGE2179, Allen Bradley, which also need legacy support and harmonization.***	

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Discussions are needed on the integration of COMTRADE and PQDIF	COMTRADE	IEC TC57, NEMA	
Harmonize IEC 61850 with IEEE C37.118	IEC 61850 IEEE C37.118	Joint work IEC TC57 WG100 and IEEE PSRC, NEMA	

#	DATE	WHO	SOURCE	COMMENT	Response

11.3 Action Items Related to Electric Storage

11.3.1 Requirements and Standards Gaps Related to Electric Storage

The following requirements and related gaps in standards were identified, where the activities can be started (or have already started) relatively quickly, after focused discussions among the organizations identified.

Requirements	Standards	Gaps	Who	L+G Comments/Responses
Extend IEEE 1547 standard for Electric Storage if necessary: IEEE SCC21 needs to review whether any changes are needed in the IEEE 1547 standards for static and mobile electric storage, including both small and large electric storage facilities. In particular, the management of storage in islands needs to be studied. \	IEEE 1547	Need to extend the IEEE 1547 standards as necessary to include the electrical interconnection of electric storage	IEEE Standards Coordinating Committee 21 (SCC21)	***For clarification / reinforcement, we expect that the data model and info exchange models for storage are covered in IEC CIM (as with DER)***

11.3.2 Discussion Issues Related to Electric Storage

The following table lists the topics that need to be discussed and resolved to guide standards work, primarily to ensure that standards which are appropriate and already developed are used (rather than re-inventing the wheel) or to select

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
What standards and models are needed for distribution management system (DMS) to send appropriate signals to electric storage? Distribution management systems must be able to influence charging profiles and discharging incentives of electric storage, either through price signals or through direct control signals to energy service interfaces, to help manage the distribution system, especially during reconfiguration, unusual loading conditions, and emergencies.	IEC 61850, ANSI C12.19, BACnet, OpenADR, ANSI C12.22, DLMS/COSEM, Smart Energy Profile, etc.	IEC TC57 WG17, NEMA, ZigBee/HomePlug Alliance, BACnet	***Need to ensure that through this discussion that we continue to draw distinctions between performance expectations of storage vs. say, the real-time performance expectations of SCADA.***

11.4 Action Items Related to Electric Transportation

11.4.1 Requirements and Standards Gaps Related to Electric Transportation

The following requirements and related gaps in standards were identified, where the activities can be started (or have already started) relatively quickly, after focused discussions among the organizations identified.

Requirements	Standards	Gaps	Who	L+G Comments/Responses
Common Model for Price+: As PEVs move from area to area, a common interoperable model for	NAESB, EMIX, OpenADR,	Common interoperable price formats,	SAE, IEC, NEMA, NAESB, OASIS	***Needs to align with DER / section 11.1. SEP needs to be included here.***

#	DATE	WHO	SOURCE	COMMENT	Response

price and energy characteristics and time for dynamic pricing across areas, markets, providing a consistent integration model.	IEC 61850-7-420, others	characteristics, time, and units are needed to abstract away the complexities of markets to actionable information for the PEV.		
Common Model for DR Signals: As PEVs move from area to area, a common model for signaling DR events in addition to price is needed. This model should address signaling to other curtailment & generation resources. Must be able to influence charge profiles and discharge incentives.	IEC 61850-7-420, OpenADR Smart Energy Profile, SAE J2836, Price+	Common model for DR signals, including grid safety, environmental, and price is needed to broaden markets and decrease customization. Premises Management Systems are important partners in collaboration.	SAE, IEC, NEMA, ZigBee/HomePlug Alliance, OASIS, NAESB	***Strongly recommend we use the DR standards /protocols that are in-place/works today (SEP) and enhance to include the new approaches to PEV, rather than inventing new.***
Mobile Generation/Load Accounting: Determine how costs and payments for PEV are settled.	SAE J2847, OpenADR, SEP Advice of Charge (Cell phone)	Mobility introduces billing model issues; similarity to gasoline purchase may be useful.	SAE, ANSI, Policy, IEC TC57, NEMA	
Extend IEC 61850-7-420 standard for additional DER, including PEV, Storage, and Renewables: Need to extend IEC 61850-7-420 for more Distributed Energy Resource (DER) equipment. Currently IEC 61850-7-420 for DER covers wind (actually IEC 62400-25), photovoltaic systems, fuel cells, diesel generators, batteries, and combined heat and power (CHP). Needs extension to PEV, additional storage devices, microturbines, gas turbines, etc., including operations and for dynamic and flexible protection systems.	IEC 61850-7-420, OpenADR, Smart Energy Profile	Need to extend IEC 61850 for more Distributed Energy Resource (DER) equipment such as Storage and PEVs, and to cover additional functions, such as dynamic protection settings, load shedding, etc.	IEC TC57 WG17, NEMA, OASIS, ZigBee, Policy	***See other DER comments herein (11.1 & 11.4)***
Extend IEC 61968 standard for DER: IEC 61968 needs DER and PEV models, but should be harmonized with the existing DER object models in IEC 61850-7-420, as well as all on-going DER 61850 development. IEC 61850-7-420 has architectural issues to be addressed.	IEC 61968-xx, eBusiness, others TBD	IEC 61968 needs DER models to carry the IEC 61850-7-420 models of DER and PEV to integrate with the enterprise. Address issues in IEC 61850-7-420,	IEC TC57 WG14, NEMA, others TBD	***See other DER comments herein (11.1 & 11.4)***

11.4.2 Discussion Issues Related to Electric Transportation

The following table lists the topics that need to be discussed and resolved to guide standards work, primarily to ensure that standards which are appropriate and already developed are used (rather than re-inventing the wheel) or to select to extend.

#	DATE	WHO	SOURCE	COMMENT	Response

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
What standards and models are needed for DMS to send appropriate signals to PEVs and other DR devices? Distribution management systems must be able to influence charging profiles and discharging incentives (through price signals or direct control signals to energy service interfaces) to help manage the distribution system, especially during reconfiguration, unusual loading conditions, etc.	IEC 61850, ANSI C12.19, BACnet, OpenADR, ANSI C12.22, DLMS/COSEM, Smart Energy Profile, EMIX, SAE J2836 etc.	IEC TC57 WG17, ZigBee/HomePlug Alliance, NEMA, LONWorks, BACnet, SAE IEC TC13, OASIS	***See other DER comments herein (11.1 & 11.4)***
Which standards should be used for information models of PEV? A decision needs to be made on which information modeling standards should be used to model PEVs, and in which domains. Then they could be tasked to develop those models. In all cases, need harmonization across domains for PEVs	IEC 61850, IEC 61968, Smart Energy Profile, OpenADR, ANSI C12.19, eBusiness integration	SAE, IEC TC57 WG17, IEC TC57 WG14, , NEMA OpenADR	***See other DER comments herein (11.1 & 11.4)***
If regulations change, there is a need to develop new Use Cases and the standards that would be derived from them if reselling stored retail power were permitted by regulators	SAE J 2836 ™, markets	SAE, SEP, OpenADR, NEMA, IEC TC57, Policy, EMIX, NAESB	
PEV accounting and settlements: Currently regulations do not permit electricity to be resold. This means that all the accounting and settlement issues must be handled by utilities (or energy service providers) without the middleman reseller as is the normal market method. This puts the burden on the utility or ESP to manage the complex accounting and settlement processes usually handled by credit card companies or other retail accounting providers. However, if regulations were to change to allow the unbundling of electricity so that stored electricity could be resold, then the accounting model would change dramatically, since normal retail methods could be used. Models for the settlement of PEV charging and discharging pricing, costs, and cross-utility payments are developing slowly, with significant technical and policy/regulatory unknowns. Proposals range from complex schemes for billing back to the driver's (or the owner's) home utility, simple charging as with current gasoline stations, to mixtures of prepaid and billed services as with cellular phones. When charging stations are ubiquitous, these issues will become even more important.	SAE J 2847, others	SAE, IEC, OASIS, ZigBee Alliance, NEMA	
PEV charging/discharging constraints and regulations. May need some type of weights and standards seal for charging/discharging *(issue needs clarification)*	SAE J 1772 ™	SAE, PUC/Policy	
Submetering for PEV. May need submetering standard for non-utilities, so need policies, regulations, and testing as well as understanding whether existing standards for metering and retrieving metered data are adequate	ANSI C12.19	SAE, NEMA, OpenADR, Service Providers	***If there is an intent to use PEV data for billing / reconciliation, the same metering standards for premises (re: quality measurement & metering) need to be in-place for the vehicle.***

#	DATE	WHO	SOURCE	COMMENT	Response

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Role of government and emergency responders with PEV: There is a missing actor, or even domain – the government agencies (state or federal); as they'll be playing active role with respect to PEVs; emergency, disaster response; charge rates, giving first-responders with priority. Elevating ability to charge PEVs. Government access in bidirectional way – getting information from, or sending information down through the system	SAE J 1772, IEC 61968	SAE, FEMA, Emergency First Responders	

11.5 Action Items Related to AMI Systems

11.5.1 Requirements and Standards Gaps Related to AMI Systems

The following requirements and related gaps in standards were identified, where the activities can be commenced (or have already commenced) relatively quickly, after brief discussions with the organizations identified.

Requirements	Standards	Gaps	Who	L+G Comments/Responses
Interoperability of ANSI C12.19: ANSI C12.19 has too much flexibility, so that implementations of different meters are often not interoperable. Some standard meter profiles need to be developed to constrain that flexibility for common types of meters and metering requirements.	ANSI C12.19-2008 Exchange Data Language	One or more standard meter profiles need to be defined using the ANSI C12.19 Exchange Data Language.	NEMA	***This activity is handled by an independent NIST exercise headed by NEMA. In general agree that a profile should be available that every meter tool and every system can access and understand.*** ***Still at issue is how deeply we need to go (to attributes/bytes). Concern that both vendors and utilities lose flexibility the deeper we create this common profile.***
ANSI C12.22 not meeting future requirements: ANSI C12.22 is viewed as mixing the roles of various communications layers for functionality beyond what is traditionally the application layer. Extremely detailed knowledge of the standard is required to recognize where the boundaries exist for the application layer and, perhaps, where it replicates the functions of lower layer functionalities.	ANSI C12.22	A conformance classification for ANSI C12.22 needs to be defined to constrain its scope	NEMA	***Currently, there is no evidence that C12.22 will forward the interoperability of systems or meters in a way that delivers value commensurate with the expense / impacts. First - we believe that C12.22 creates another application layer standard to be maintained, while CIM could more easily serve this purpose with tokenized C12.19 tables and also align with the balance of the common information modules planned for the NSIT standards list. Further - instituting an application layer at the meter while meters and comms continue to have unique PHY/MACs,, which prevent interoperability at the meter level, again adds complexity without equivalent value. Lastly – as relates to application interop, Application interoperability for the***

#	DATE	WHO	SOURCE	COMMENT	Response

				functions defined in c12.22 could be achieved by implementing of c12.22 at the head end and representing the totality of endpoints via a c12.22 gateway . Not only is this allowed by the standard, but it is a sensible implementation, given C12.22 is not peer-to-peer , but use a master/slave approach, where all application functions are routed through a master relay. A C12.22 application then, can be "endpoint app layer agnostic", running any/all applications requests through its master relay - the head end system. The head end will take on the task of data gathering and exchange through to the endpoint and within the AMI system. The master relay (head end) could then effectively communicate with the connected c12.22 application
IEC 61968 Testing: Interoperability testing, along with conformance testing, is the best method for confirming that a standard is performing correctly and actually doing what it is supposed to do. These tests can also feed back to the standards group on issues where the standards are unclear, missing, or incorrect.	IEC 61968-9	Interoperability testing for IEC 61968-9 needs to be performed (this is expected to take place in late 2009).	IEC TC57 WG14 , NEMA	***Agree: interoperability testing must be defined and required at conformance level. We believe the current work within IEC61968 is appropriate.***

11.5.2 Discussion Issues for AMI Systems

The following table lists the topics that need to be discussed and resolved before the appropriate standards can be developed or extended, usually to ensure that standards which were already developed are used (rather than re-inventing the wheel) or that the most appropriate standard is selected to extend.

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Should the Internet Protocol (IPv4 or IPv6) be mandated for all protocols: Assuming that the issue is whether or not IPv4/v6 (rather than whether the Internet Protocol Suite of hundreds of protocols) should be specified for all protocols, what are the requirements? For instance, should ZigBee and all AMI and HAN protocols be required to use IPv4/v6? Can certain protocols get exemptions for specific justifiable reasons? What about IPv4 versus IPv6? What about IPsec?	ANSI C12.22, ZigBee, HAN, Smart Energy Profile	ZigBee/HomePlug Alliance, NEMA, SAE	***Use of IP suite is an evolution process for smart grid. Recommend ensuring we don't exclude the use of bridges/proxies to bring IP and IP addressability into the AMI domain for legacy.*** ***Need to further ensure we draw distinction about HOW/WHERE IP transmissions occur – while appropriate for RF systems and for backhaul/broadband connections, there are limitations of use for long-range PLC, which is a cost effective technology for smart metering systems for over 25% of American served by RECs.***

#	DATE	WHO	SOURCE	COMMENT				Response
							Existing deployed systems and utility assets must be addressed. Also ongoing deployments, under contract, must be considered acceptable via a gateway, bridge or proxy approach. If IP at the device level becomes an objective, then we should also standardize on 2 or 3 phy/macs to ensure interoperability. IP through a gateway is enough to ensure intra-system interoperability which is the biggest benefit. Interim NIST report clearly defines smart grid as a 'system of systems', so intra-system interoperability via a gateway will achieve the vision. However, if interoperability must be taken inter-system, to the device level, then along with networking standardization there should also be physical communication layer standardization, without which we won't achieve device level interoperability.	
				Coordination and Future-proofing AMI Systems: Since AMI systems are going to become widespread, they will inevitably want to be used for more than meter reading or other purely metering functions. They could be used for monitoring DER at the customer site, for DA monitoring and possibly control, for access by third parties to gateways into the customer HAN, etc. The AMI systems should be able to handle, at a minimum, the IEC 61850 object models mapped to an "appropriate" protocol (possibly IEC 61850-lite when it is developed). Need to ensure AMI communications systems use open standards capable of interfacing to DER and distribution automation equipment. ANSI C12.22 is being revised, Europe uses DLMS/COSEM, and AMI vendors are developing their systems over a wide range of media, from PLC, to BPL, to ZigBee meshed radios, to UtiliNet radios, to GPRS, etc.	Smart Energy Profile, ANSI C12.22-2008, DLMS/COSEM	ZigBee/HomePlug Alliance, NEMA, SAE, IEC TC57 WG14, IEC TC57 WG17, IEC TC13	***There seem to be too many things cited here – not all these thing relate to the real issue of "future proofing" AMI. In particular, cited standards like C12.22 have no relation to ensuring the AMI system can evolve or integration DER and DA.*** ***Rather, what is critical is the development of specific upgradability standards, which is in process via a special NEMA task force.*** ***As relates to AMI communications capable of interfacing to DER/DA, there seem to be several key protocol already around which the AMI community is rallying – specifically SEP for DER, DNP3 and 61850 for DA and 61968 and Multispeak for connectivity at the head-end.*** ***What will be critical is to bridge the newer CIM standards, such as 61968 and 61850 and ensure that there aren't overlaps between them (as example, 61968 already includes some distribution modeling requirements)***	
				Concerns about unlicensed spectrum in AMI systems: Use of unlicensed spectrum	AMI meshed radio systems, ZigBee, Smart	FCC, NEMA, ZigBee, SAE	***Definitely agree with the concern, the behavior of AMI systems in***	

#	DATE	WHO	SOURCE	COMMENT	Response

leaves utilities competing with other industries for bandwidth. There is risk of non-utility applications emerging that would greatly increase the utilization of unlicensed spectrum. This could result in reduction of performance of utility systems with little warning or recourse. Does the "critical infrastructure" aspect of utility systems justify the allocation of dedicated spectrum with bandwidth comparable to the unlicensed ISM bands?	Energy Profile, ANSI C12.22-2008		***specifically allocated spectrum is desirable. In absence of it the industry is making the best use of the unlicensed spectrum including and preferring topologies that support unreliable links like mesh networks, and techniques that fight successfully against permanent interference like Frequency hopping.***

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Should ANSI C12.19 be expanded for DER? ANSI C12.19 may have extension requirements for distributed resource information, forecasts, etc. But should ANSI C12.19 be extended for non-metering devices or should IEC 61850-7-420 objects be used?	ANSI C12.19, IEC 61850-7-420	NEMA, IEC TC57	***C12.19 is associated with metering and should be associated with DER as long as these make use of metering functions, which most likely will need to happen. However non metering aspects should be handled outside c12.19, most likely within SEP or associated IEC standard***
Discussion on which standards third party energy providers should use. What additional standards need to be developed or extended in order to transfer data across various energy providers?	No specific standard exists: CIM and/or IEC 61850 could be used	UCA SG Users Group, IEEE 2030, IEC TC57 WGs, NEMA	***There are PLENTY of standards to which new entrants can adapt. Perhaps this needs to rolled into the pricing / settlement discussions. OASIS should be added***
Which standards should be used or extended with pricing models? Ability to include real time pricing information and other pricing models in both information model standards and information transfer standards	OpenADR, IEC 61850-7-420	{SDO for Open ADR} IEC TC57 WG17, NEMA	***Ensure that SEP is involved. As relates to presentation of real time usage and pricing data in the home, this has been designed such that it can be presented by SEP in the home.***
Should standard physical and mac layers be defined for AMI systems? This would include standards for the common AMI approaches: wireless mesh, wireless star (point to point), and long range power line carrier. Do the benefits of vendor interoperability outweigh the risk of stifling creativity?	IEEE 802.15.TG4g Other IEEE standards	IEEE, ITU	***This effort is already underway via IEEE. If meter/device level interoperability is required then a common MAC and PHY must be defined.***
Should an open standard be developed for routing and connectivity in wireless AMI networks? Notionally, such a standard would be built upon open standard phy/macs and would be a necessary part of allowing devices from multiple vendors interoperate and exchange data as part of a single network.	ANSI C12, IEEE?, ZigBee	NEMA, IEEE, ZigBee Alliance	***Same as above, if device level interoperability is required it can only be achieved by harmonization/standardization of all the layers of the protocol stack.***

11.6 Action Items Related to Distribution Management

#	DATE	WHO	SOURCE	COMMENT	Response

11.6.1 Requirements and Standards Gaps Related to Distribution Management

The following requirements and related gaps in standards were identified, where the activities can be commenced (or have already commenced) relatively quickly, after brief discussions with the organizations identified.

Requirements	Standards	Gaps	Who	L+G Comments/Responses
ICCP legacy transition: ICCP standard may need information models for interaction with aggregators of distributed resources and even distributed resources directly	IEC 60870-6 (ICCP), IEC 61850-7-420	Decision by IEC TC57 needs to be made on whether ICCP or IEC 61850-7-420 should be used for DER information exchanges with Service Providers	IEC TC57 WG19, NEMA	
Extend IEC 61850-6 standard: The System Configuration Language (SCL) that is used for configuring the communication networks and systems for substations is not yet capable of configuring DER or distribution automation networks and systems.	IEC 61850 WS-DD WS-DP	IEC 61850-6 SCL needs expansion to distribution automation and DER, possibly in coordination with WS-DD/WS-DP	IEC TC57 WG10 & WG17, NEMA, OASIS	
Extend IEC 61850 standard for Distribution Automation: IEC 61850 has been selected by the IEC for all field communications with power system equipment. It currently has models for substation equipment, large hydro power plants, and many types of DER. However, it does not yet have object models for distribution automation equipment	IEC 61850-7-xxx	Object models for Distribution Automation equipment need to be added.	IEC TC57 WG17, NEMA	***Support evolution and integration of this standard into IEC, however, we MUST ensure that legacy products MUST continue to be supported.***
Harmonize IEC 61968 and MultiSpeak: MultiSpeak and IEC 61968 overlap in many areas, but not in all areas. MultiSpeak already has a wide base of implementations, primarily with small utilities, while IEC 61968 is designed for larger utilities, but has not yet become a standard nor been implemented anywhere. MultiSpeak is working closely with the IEC 61968 effort on the overlapping areas, but further harmonization is necessary. As the IEC 61968 CIM profiles become available as standards, it will be important to minimize any conflicts with MultiSpeak and to develop mappings between the existing MultiSpeak interfaces and the new IEC 61968 interfaces so that products and software developed to be compatible with the different standards can interoperate.	IEC 61968, MultiSpeak	The gaps and overlaps between MultiSpeak and the IEC 61968 standards under development need to be minimized and harmonized.	IEC TC57 WG14, NEMA, NRECA MultiSpeak	***Critical difference here between adopted de facto standard, MultiSpeak, and standards in process. By its use across the industry MultiSpeak is showing already that it fulfills the mandate of NIST for interoperability and until it is absorbed within an adopted and accepted IEC 61968 it cannot be ignored, but rather the opposite, encouraged and enforced where appropriate.*** ***Multispeak includes a functional model, including schemas, that can be readily employed. IEC does not include these schemas. It would be important to retain these more practical tools from Multispeak.*** ***Furthermore, we also recommend avoiding re-invention of existing specifications in IEC that already exist in Multispeak.*** ***Lastly, we may want to discuss***

#	DATE	WHO	SOURCE	COMMENT	Response

				keeping in the US an adjunct group that "tightens" and operationalizes IEC 61968, retaining Multispeaks value added role in the US market today.
Revise and update IEC 61968 standard: The IEC 61968 CIM for distribution is currently not usable except for the very latest part (Part 9), since the messaging schemes and the CIM model for the earlier parts were not well enough defined to allow vendors to implement them. However, if these older parts are revised, then interoperability of the messages may be achieved. These revisions are in the IEC TC57 WG14 roadmap, but will need significant effort to be achieved.	IEC 61968	Some of the earlier parts of the IEC 61968 standards are not implementable and do not yet specify the types of interoperable messaging schemes being developed. The roadmap is expected to take a long time to achieve and could benefit from significant support.	IEC TC57 WG14, NEMA	***Development of messaging within IEC 61968 may be at the core of a true application layer standard for metering instead of c12.22. We strongly recommend pursuing this and truly agreeing on standard application layer for the AMI system.*** ***If, in fact there are some expected delays for 61968, this further reinforces the need to allow Multispeak to be specifically supported by NIST in the near term***
Extend IEEE 1547 standard: Voltage support specifications (electrical interconnections) for distributed resources need to be defined for scenarios where such voltage support is needed or permitted.	IEEE 1547	The IEEE 1547 standard currently states that "The DER shall not actively regulate the voltage at the PCC." However, for islanded systems or for Area-EPS operations-approved actions, voltage support should be permitted, and specifications for these situations should be developed..	IEEE 1547, IEEE P2030	***The mandate for IEEE2030 seems to overlap with other activities. In particular the communications component of it is not addressing IEEE specific standards, MAC/PHY but touching into IETF domain looking at networking.***
Map IEC 61850 object models to AMI system protocols: If IEC 61850 object models are going to be used to exchange information with equipment (such as DERs) at customer sites, then these models need to be mapped to AMI communications protocols	IEC 61850, ANSI C12.22, DLMS/COSEM, Smart Energy Profile	IEC 61850 objects need to be mapped to AMI communications such as ANSI C12.22. This may or may not be the same solution as IEC 61850-lite.	IEC TC57, NEMA, IEC TC13	***It is unclear what is the meaning of "mapped to AMI communication protocols" but as much as possible applications should not be mapped to communications. If a mapping needs to occur, this should be between protocols, such as between 61850 and 61968 such that the systems could connect and communicate.***
MultiSpeak and IEC 61968 Interoperability Testing: Once a mapping between MultiSpeak V4 and IEC61968, Part 9 has been finalized (planned for late 2009), then it will be critical to test for interoperability between appropriate profiles of the two standards.	IEC 61968, MultiSpeak	Perform interoperability testing on harmonized profiles between MultiSpeak and IEC 61968.	IEC TC57 WG14, NEMA, NRECA MultiSpeak	***Agree. And only then one could start considering the phasing out of MultiSpeak in favor of a more general IEC standard.***

11.6.2 Discussion Issues for Distribution Operations and Management

The following table lists the topics that need to be discussed and resolved before the appropriate standards can be developed or extended, usually to ensure that standards which were already developed are used (rather than re-inventing the wheel) or that the most appropriate standard is selected to extend.

#	DATE	WHO	SOURCE	COMMENT	Response

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Develop IEC 61850-lite as efficient, compact protocol: Since many communications systems still have limited bandwidth, such as those used in rural environments and/or to wide-spread distribution automation devices, one or more efficient, compact communication protocol profiles need to be specified for IEC 61850 and other object models to be mapped to. Therefore, there is a need to develop "IEC 61850-lite" profile to which these object models can be mapped. In addition, some inexpensive devices (e.g. sensors, collectors, or "software agents") may not want or need to implement the full IEC 61850 capabilities, in order to minimize compute constraints or development costs.	IEC 61850, Smart Energy Profile, NEMA C12.22, and other compact profiles	IEC TC57 ZigBee/HomePlug Alliance, NEMA, telecom providers	***What is different between this concept and and 61968?*** ***We need to really understand this? Is this like "SEP LITE" for distributed less "intelligent" devices at the edges of the network?*** ***Are we considering defining edge device "profiles" (a la UAProf for wireless devices). This may allow AMI system owners to implement a single standard and put the burden for determining what aspects are really needed/used by the device on the edge device itself.***
What GIS standards should be specified, developed, or extended? The status of GIS standards not clear.	GIS standards, IEC 61968		
What standards should be developed or extended for Work Order management? Could include IEC61334, IEC61968, or MultiSpeak	IEC 61968, MultiSpeak		
What standards should be used or need extensions to provide distribution operations with information about customer behavior and response to prices? This information must be available to distribution management systems for development of accurate models that can be used to manage voltage, component loading, etc.	IEC 61850, ANSI C12.19, BACnet, OpenADR, ANSI C12.22, DLMS/COSEM, Smart Energy Profile, SAE etc.	IEC TC57 WG17, ZigBee/HomePlug Alliance, NEMA, BACnet, SAE,	
Transmission operations access to DER information. What additional standards need to be developed or extended in order to use distribution resources in the bulk electric system infrastructure for contingency analysis, mitigation and control (incl. Restoration)?	CIM, IEC61850, DNP3, 37.1, 37.118, ANSI C12.19, 12.21, 12.22, ICCP (IEC 60870-6), IEC 61850-7-420	UCA SG Users Group, IEEE 2030, IEC TC57 WGs	***Strongly recommend extending or mapping. There are already DER information standards, like SEP and 61968, which can be mapped/interfaced to Transmission protocols, particularly though back office integrations.*** ***On a finer point, we believe C12.22 has no applicability here.***
Distribution operations access to bulk generation information. What additional standards need to be developed or extended in order for bulk generation to be available to T&D operation (and major customers) in real time. Need to know impact of distribution activities on the capacity issues and deliver this knowledge to transmission.	CIM, IEC61850, DNP3, 37.1, 37.118, ANSI C12.19, 12.21, 12.22, ICCP (IEC 60870-6), IEC 61850-7-420	NERC/FERC UCA SG Users Group, IEEE 2030, IEC TC57 WGs, NEMA	***See comment above.***

Discussion Issues	Standards Potentially involved	Who	L+G Comments/Responses
Discussions needed on modeling loads, given	Load models themselves	IEEE/ NASPI/	

#	DATE	WHO	SOURCE	COMMENT	Response
				DER and mobile PEV. Need to develop behavioral models to plan for diversity and allocation of loads. The aggregated model will be used in T&D. Base load profiles may be required to define benefits for demand response and alternate load profiles associated with PEV charging. This requires accurate definition of customer loads as a function of parameters. The information is needed from AMI systems and must be provided to system models and model management systems. | should not be standardized, but the information exchanges could involve IEC 61850, ANSI C12.19, BACnet, OpenADR, ANSI C12.22, DLMS/COSEM, Smart Energy Profile, SAE Jxxxx etc. | NERC/ FERC, UCA SG Users Group, IEEE 2030, IEC TC57, NEMA, ZigBee/HomePlug Alliance, BACnet, SAE |	
81	8.2.09	Ed Lambert, PE gelambert@charter.net	SGC	Before leaving the second paragraph of section 1.1 I came to question the entire document: You refer to the participation of "The International Electrical and Electronic Engineers"?! Why was the "Institute of Electrical and Electronic Engineers" not asked to participate? I am not familiar with the International EEE? If you don't even have the name of the organization right, is anything else credible? And, if you did not have the participation of the real IEEE, I think the entire document's deneration left out a very key player. Ed Lambert, P.E. Ann Arbor	Embarrassing no? Corrected in final draft.
82	8.2.09	Will Bell, GridNet will@grid-net.com	SGC	Hello, The Common Open Policy Service (COPS) family of IETF protocols was inadvertently left off the Standards section of the Roadmap: Internet-Based Management Standards (COPS) Application: Data Communications Networking, Routing, Addressing, Multihoming, Fault, Configuration, Accounting, Performance, Security and other management Actors: Routers, Intermediate and Edge Devices Interfaces: Routers, Intermediate and Edge Devices Maturity: COPS mature and in widespread use in utility, telecommunications and cable industries Category: SDO – Internet Engineering Task Force (IETF) During the Breakout Sessions of the May Workshop, I presented the following points, and consensus was reached to include the COPS suite in the Roadmap: - the COPS family of IETF protocols have been approved as Standards Track RFCs beginning in January 2000 - COPS is widely used as a Network Management Control Plane in the utility, telecommunications and cable industries	Common Open Policy Service (COPS) was added to section 10 to correct the omission of a standard that was referenced at the workshop.

#	DATE	WHO	SOURCE	COMMENT	Response
				- COPS was developed by the IETF NWG as a more scalable, reliable, and transactional successor to SNMP - COPS Provisioning mode provides full FCAPS support for SmartGrid devices - COPS Outsourcing mode is very well suited for the distributed logic plus centralized decision making requirements of Distribution Automation - General Electric, Landis+Gyr and Grid Net have several SmartGrid deployments in North America and Asia-Pac utilizing COPS technology Thank you for your consideration, Will Bell VP, Software Engineering Grid Net 340 Brannan St, Suite 501 San Francisco, California 94107 (o) 415.442.4623 x220 (c) 415.846.8845 One important point I forgot to mention, that was also discussed at the May Workshop: Grid Net will be publishing a Standards Track Smart Grid Policy Information Base (PIB) RFC in the IETF this year. Publishing an IETF Smart Grid PIB allows for true interoperability: any vendor can write a PIB-compliant policy client or policy server and inter-operate with any other compliant server/client. Thanks, Will -----Original Message----- From: Will Bell <will@grid-net.com> To: smartgridcomments@nist.gov Cc: Leena Manwani <leena@grid-net.com>, Stephen Street <stephen@grid-net.com>, Ray Bell <ray@grid-net.com>, Rob Zagarella <rob@grid-net.com> Subject: Interim Roadmap Comments Date: Sun, 02 Aug 2009 16:17:18 -0700 Hello,	

#	DATE	WHO	SOURCE	COMMENT	Response
				The Common Open Policy Service (COPS) family of IETF protocols was inadvertently left off the Standards section of the Roadmap: Internet-Based Management Standards (COPS) Application: Data Communications Networking, Routing, Addressing, Multihoming, Fault, Configuration, Accounting, Performance, Security and other management Actors: Routers, Intermediate and Edge Devices Interfaces: Routers, Intermediate and Edge Devices Maturity: COPS mature and in widespread use in utility, telecommunications and cable industries Category: SDO – Internet Engineering Task Force (IETF) During the Breakout Sessions of the May Workshop, I presented the following points, and consensus was reached to include the COPS suite in the Roadmap: - the COPS family of IETF protocols have been approved as Standards Track RFCs beginning in January 2000 - COPS is widely used as a Network Management Control Plane in the utility, telecommunications and cable industries - COPS was developed by the IETF NWG as a more scalable, reliable, and transactional successor to SNMP - COPS Provisioning mode provides full FCAPS support for SmartGrid devices - COPS Outsourcing mode is very well suited for the distributed logic plus centralized decision making requirements of Distribution Automation - General Electric, Landis+Gyr and Grid Net have several SmartGrid deployments in North America and Asia-Pac utilizing COPS technology Thank you for your consideration, Will Bell VP, Software Engineering Grid Net 340 Brannan St, Suite 501	

#	DATE	WHO	SOURCE	COMMENT	Response
				San Francisco, California 94107 (o) 415.442.4623 x220 (c) 415.846.8845 One important point I forgot to mention, that was also discussed at the May Workshop: Grid Net will be publishing a Standards Track Smart Grid Policy Information Base (PIB) RFC in the IETF this year. Publishing an IETF Smart Grid PIB allows for true interoperability: any vendor can write a PIB-compliant policy client or policy server and inter-operate with any other compliant server/client. Thanks, Will -----Original Message----- From: Will Bell <will@grid-net.com> To: smartgridcomments@nist.gov Cc: Leena Manwani <leena@grid-net.com>, Stephen Street <stephen@grid-net.com>, Ray Bell <ray@grid-net.com>, Rob Zagarella <rob@grid-net.com> Subject: Interim Roadmap Comments Date: Sun, 02 Aug 2009 16:17:18 -0700 Hello, The Common Open Policy Service (COPS) family of IETF protocols was inadvertently left off the Standards section of the Roadmap: Internet-Based Management Standards (COPS) Application: Data Communications Networking, Routing, Addressing, Multihoming, Fault, Configuration, Accounting, Performance, Security and other management Actors: Routers, Intermediate and Edge Devices Interfaces: Routers, Intermediate and Edge Devices Maturity: COPS mature and in widespread use in utility, telecommunications and cable industries Category: SDO – Internet Engineering Task Force (IETF) During the Breakout Sessions of the May Workshop, I presented the following points, and consensus was reached to include the COPS suite in the Roadmap: - the COPS family of IETF protocols have been approved as Standards Track RFCs beginning in January 2000 - COPS is widely used as a Network Management Control Plane in the	

#	DATE	WHO	SOURCE	COMMENT	Response
				utility, telecommunications and cable industries - COPS was developed by the IETF NWG as a more scalable, reliable, and transactional successor to SNMP - COPS Provisioning mode provides full FCAPS support for SmartGrid devices - COPS Outsourcing mode is very well suited for the distributed logic plus centralized decision making requirements of Distribution Automation - General Electric, Landis+Gyr and Grid Net have several SmartGrid deployments in North America and Asia-Pac utilizing COPS technology Thank you for your consideration, Will Bell VP, Software Engineering Grid Net 340 Brannan St, Suite 501 San Francisco, California 94107 (o) 415.442.4623 x220 (c) 415.846.8845	
83	7.20.09	Ron Melton ron.melton@pnl.gov	EM	To: Dr. George Arnold, National Institute of Standards and Technology From: GridWise Architecture Council Subject: "Report to NIST on the Smart Grid Interoperability Standards Roadmap" – Section 6 Date: July 20, 2009 cc: Dr. Gerald FitzPatrick, NIST Introduction Members of the GridWise Architecture Council (GWAC) have reviewed section 6 of the subject document and are pleased to offer these comments to the National Institute of Standards and Technology (NIST). Section 6 of the report to NIST provides an important identification of possible prioritized actions. The Electric Power Research Institute (EPRI), their team and the NIST team are to be commended for their efforts to quickly assemble information from a diverse set of stakeholders and make it available for review by the electric power industry. The GWAC comments are organized first into general comments that apply to section 6 in its entirety and in some cases to the report as a	GC1) We refer to the EISA act which uses the "Smart Grid" as a noun for the purposes of the document. While we agree that this can be debated, we will stick with the EISA precedent for consistency. GC2) As recognized in the Conceptual Model, bulk power is a key element of the Smart Grid as you observe. The applications focus of Use Cases done in the workshop and used to populate the results in section 4 did indeed focus away from bulk generation. Additionally many commenters found insufficient focus on the transmission and distribution system. We have added text to section 4 that emphasizes that the use cases in section 4 are examples not definitive or complete: "The Use Cases, therefore, are examples devised and extended by participants in the workshops and not definitive scenarios of the smart grid. As more extensive use cases are developed to enhance and complement these, the fuller extent of the interfaces for the actors in the Smart Grid will be visible. Note, also, that each Domain's actors has substantial overlap and duplication. Ultimately, these similarities need to be recognized

#	DATE	WHO	SOURCE	COMMENT	Response
				whole. These are followed by specific comments on each of the prioritized actions contained in the sub-sections of section 6. General Comment 1: Use of the term smart grid The council recommends that NIST use the term “smart grid” without capitalization and without reference as a singular entity, e.g., “the smart grid”. Reference to smart grid as an entity, as implied by capitalization or singular reference, creates a false impression of a monolithic structure. This is not consistent with consideration of smart grid as a loosely coupled system-of-systems and is confusing in a discussion of interoperability. General Comment 2: Bulk power system versus distribution system The report to NIST is focused on distribution management with little consideration of the bulk power system (generation or transmission.) This gives the impression that NIST does not consider the bulk power system as being included when considering implementation of smart grid technology and functionality. In section 6 it would be useful to identify to which smart grid domain each priority action applies. This is not to say that distribution doesn’t merit a large portion of the discussion. The point is to make clear which priorities apply to which domain. General Comment 3: Recognize and incorporate the standards development lifecycle In the report there is a tendency to state that a solution to a technical challenge is to hand it over to a standards body. Standards bodies depend on documents submitted by private companies, government organizations, consultants, etc. The standards bodies and activities should not lead technology development; they should follow the emergence of technology that is proven in practical application and in the marketplace. NIST should be identifying technology research and development needs to DOE and others who fund such activities. The necessary technical results will come from research and development, not process. Such an approach will allow the standards development organizations (SDOs) to focus on what they do best. An additional problem may occur if the SDOs are prematurely engaged. If the US takes the problems to the international standards community before the technology is ready then other countries will take advantage of the situation to drive solutions favoring their solutions resulting in standards that may not meet the needs of smart grid evolution and deployment in the United States. What DOE did in funding NREL to develop 1547 is a positive example of accelerating the standards development process. Realize, though, that the technology already existed, NREL facilitated pulling it together into a standard. General Comment 4: The grid isn’t broken As written, the report gives the impression that we have a broken electrical system that needs to be replaced rather than a functioning system that needs to be improved. The electric grid in the United States is a system of subsystems many of which function well. The GWAC and others have focused on the communications / information technology (IT) overlay on the electric power system with particular attention to the inter-system interfaces. General Comment 5: Focus on Inter-system interoperability Priorities should be focused on inter-system interoperability. The document should be reviewed to confirm that any intra-system interoperability priorities are appropriate and justified (given that they cross the line into market place differentiation.) Specific Comments by sub-section: Section Comment 6.1.1 Common Pricing Model • There should be clarification that the focus is on a common pricing signal model. Pricing models are a different topic. The	and normalized as a Smart Grid clear set of actor definitions gets constructed in future work.” Finally we observe that “6.3.1 Completion of the NIST Standards Evaluation Process” focuses the reader on the need for expansion of the analyses and subjects as you suggest. GC3) Point taken. We believe the paragraph in section 2.3.1 supports your point: “• Development and Support of Standards. The open process of developing a standard benefits from the expertise and insights of a broad constituency. The work is challenging and time consuming but yields results more reflective of a broad group of stakeholders, rather than the narrow interests of a particular stakeholder group. Ongoing engagement by user groups and other organizations enables standards to meet broader evolving needs beyond those of industry stakeholders. Both activities are essential to the development of strong standards.” Additionally, we added the following paragraph to the end of the introduction to section 6: “In the recommended actions in this section standards development organizations are identified for engagement in the solutions. These were identified by the Interim Roadmap team as likely candidate SDOs that could codify solutions to the problems posed by the actions primarily through the harmonization and enhancement of existing standards. Additionally, it should be expected that active participation by all interested stakeholders would accompany these activities as they are pursued. Significantly it is recognized that active users groups often can play an accelerating role in advancing standards to fruition.” GC4) On the contrary, you will find relatively few recommendations for any new standards. And in the “vision” section we devote a whole subsection to the assertion: “2.5.2 Well-Developed Standards Are in Place” GC5) The Interim Roadmap tries not to recognize specific devices and groups of devices as required components of the Smart Grid. Rather, it seeks to expose such groupings through the investigation of Use Cases that involve the use of logical entities, “actors” that participate in information exchanges. Ultimately we agree that many of the instantiations of Smart Grid components at the boundaries of various subsystems may be through a local controlling entity. Section 6.1.1: The section defines the scope of the term intended in the body. The responder does not see the clear distinction in the alternate terminology suggested but recognizes that it may to some. The tariff aspect was deemed germane by the writers. Also see

#	DATE	WHO	SOURCE	COMMENT	Response
				paragraph discussing tariffs does not really fit in the discussion and should be deleted to emphasize that the pricing signal model (data model) is the focus of this section. • This is a critical issue and the GWAC is glad to see it as the first item in section 6. In terms of actions we recommend that NIST also meet and work with state regulators in addition to the organizations listed. Interaction with state regulators would have two-way benefit --it would build understanding among state regulators with respect to the technical challenges that overly-complicated regulated rate tariffs present, and it would also enable NIST to understand what the dimensions are of price that will be important in states that retain vertical integration and retail rate regulation. • Another group with whom NIST should interact in this area is the RTOs/ISOs. RTOs like PJM, MISO, ERCOT, CAISO, NYISO, ISO-NE have developed organized wholesale power markets, but each of them has developed their own "bespoke" platforms, with very little commonality in design. As currently written this subsection is directed primarily at the retail arena and not the wholesale market place. Wholesale systems already have methods for market participants to submit offers. There is a need for careful consideration of new pricing models and interoperability with existing market structures. To facilitate this discussion it is important to clearly state which market segment (wholesale or retail) a given approach applies to. • One main policy objective should be introducing some commonality and standardization across regional wholesale power markets, better enabling them to interact with existing financial markets and with burgeoning retail markets that will evolve as end-use transactive capabilities increase. • FiXML is an existing standard in financial markets that should be a starting point. Whatever pricing model NIST develops should be interoperable with financial markets, which use FiXML. Furthermore, encouraging standardization of pricing and product specification across wholesale power markets, as mentioned above, is crucial, and mentioning FiXML in this section would facilitate that process. Reference to FiXML in this section also ties in to the discussion of developing a common semantic model. • We also recommend investigating pricing models already used by utilities even if not within the United States. It is important to learn from the experience of other utilities. This should be done before asking SDOs for help. SDOs depend on their members for technical proposals. Proposals may originate from proprietary corporate research, academia, government research labs, or consultants offering specialized knowledge and experience. In all cases we should start with real-world experience before we write standards that can impact utility operations and customer activities. 6.1.2 Common Time Synchronization and Management • Recommend that the first sentence be revised to say: "A smart grid will be a platform for a dynamic marketplace with many participants." • NIST should also identify a standard for representing time that accommodates local time zones. ISO 8601 is specifically recommended. 6.1.3 Common Semantic Model • This section gives the impression of a monolithic model -not a collection of models. Also – there is a need to clarify what is meant by "semantic model". What is the actual need? The meaning of terms needs to be clarified too. • The point of the section seems to be that a set of common information models is needed. If this interpretation is correct, then the section should be revised to make the statement more directly. • In the statement “A common semantic model for application level communications is necessary in several areas of the Smart Grid. Key areas, for example, are the integration of utility T&D Field operations with Information Technology and Back Office Systems.” it is not clear what “utility T&D Field operations” are being referred to. 6.1.3.1 Common Meteorological and Geospatial Models • Note that the list of organizations should be expanded to include NERC and NAESB 6.1.3.2 Common Scheduling Mechanism • There needs to be recognition that the needs of the wholesale and retail markets may be different. This section does not clearly recognize the distinction. • Add NAESB to the list of standards bodies with demand response standards that need to be coordinated with work on scheduling standards. 6.1.4 Application of Internet-Based Networking Technology • This section gives an impression of trying to sell IP technology. There is an unbalanced emphasis with the focus on IP technology.	response to GC3) above. Section 6.1.2: Modified first sentence. Added sentence to second paragraph as “Appropriate time zone representation based on ISO 8601 should be included.” Section 6.1.3 Revised introductory paragraphs to: “A common semantic model for application level communications is necessary in several areas of the Smart Grid. Key areas, for example, are the integration of utility Transmission and Distribution field operations with Information Technology and Back Office Systems and ultimately with Customer Premise Systems. Several applications require integration and harmonization across these operating domains. In addition convergence on common semantics for communications with Consumers including but not limited to pricing and control signals exchanged with consumer equipment would minimize the complexity of adding services to the Smart Grid.” Section 6.1.3.1 See response to GC3 Section 6.1.3.2 The topic here emphasizes scheduling not what is being scheduled. Advantage should be taken of a generic scheduling mechanism that through association with other data can meet the specific goals you identify. Section 6.1.4 Added to first paragraph a clarification: “Internet Protocol standards will have applicability in many parts of the Smart Grid although not necessarily all.” The last paragraph summarizes the need for analysis to determine this applicability: “What is missing is a comprehensive mapping of smart grid application requirements to the capabilities of protocols and technologies in the Internet Protocol Suite by experts well versed in the applications and the protocols. Such an analysis would permit selected Internet protocol Suite subsets to be identified as important for various applications in the various domains of the NIST Conceptual Model of a Smart Grid.” Section 6.1.5 This section deals with the issues of interference and exclusivity

#	DATE	WHO	SOURCE	COMMENT	Response
				• When and where the different technologies should be applied is not made clear. This concern about the emphasis on IP technology is an example. Where IP technology should (or could) be applied should be explicitly stated. The section should explicitly state that the best technology (based on performance and cost) should be applied. What we are seeking is the best solution for smart grid communications protocols that fulfills the goals of interoperability, economy, extensibility, etc. In some cases Internet protocols are the choice, but not in all cases. 6.1.5 Communications Interference in Unlicensed Radio Spectrums • This section doesn't seem to have anything to do with the interoperability standards problem. • This section should be deleted or put in the context of interoperability standards. 6.2.1 Demand Response & Consumer Energy Efficiency • There is some ambiguity in this section that should be removed. • Why are DR and energy efficiency combined in this section? These are two separate issues. • There is no discussion of interoperability problems and energy efficiency. What is the interoperability context for including energy efficiency in this section? • OpenADR has not been developed with a wide audience or full range of review within the industry. It is focused on California and may or may not work well in other whole sale markets. Thus it should be considered as a possible starting point or reference for a particular approach to demand response but not considered as a completed solution for broad use. • When discussing the problem of providing market information within a common framework one should keep in mind that most customers will not participate directly in whole sale markets. • Is this section meant to encompass dynamic pricing (DP)? We think it should, and the discussion should be expanded and made explicit that in this case we are talking about transactive, autonomous price response functionality at the device level, in addition to responses to "DR events" as currently used in wholesale power markets. • Note also that in this section the use of DER to refer to end-use devices generally, which seems to include in-home appliances and devices. But later, in 6.2.3 discussing electric storage, the IEEE 1547 defines a DER as a "small-scale electric generator ..." One major objective in this document should be reconciling these conflicting definitions. • The first sentence of this section refers to three gaps, but this section only discusses one gap. What are the other two? • Before standards bodies are consulted a model of a demand response system is needed. The NIST Home to Grid (H2G) Domain Expert Working Group (DEWG) has developed such a model (H2G-Req5.pdf) that should be considered and referenced. ISO/IEC 15067-3, “Model of an Energy Management System” prepared by JTC 1/SC 25 should also be considered as a reference. 6.2.2 Wide Area Situational Awareness • This section makes no mention of the need for standards for phasor measurement unit (PMU) devices and standard representations of PMU data. We recommend that this section include the use of the IEEE C37.118 standard. • A data exchange standard is also needed for communication of PMU data among entities. • The boundary between interoperability / standards roadmap issues and technology issues has been clouded in this section. In Key Action 1, for example, DOE, FERC and/or NERC should have the action, not NIST. 6.2.3 Electric Storage • The use of the term islanding is problematic. The referenced FERC order has to do with back feeding power which is not necessarily islanding but isolation. The specific situation envisioned needs to be clarified. There are safety concerns with isolation (which seems to be what is described) as opposed to a section of the grid choosing to island itself for operational purposes. • This is an example of the need to differentiate between distribution and the bulk power system. • This section fails to address the fact that there are already interconnection policies, procedures and practices in use within the ISO/RTO's that also need to be factored in when deciding on interconnection standards for electric storage devices. Failure to "harmonize" interconnection standards with the practices that are already in place, and proven, may result in inefficiencies that can be avoided. 6.2.4 Electric Transportation • Much of the discussion has to do with what is a retail market issue. SDOs should not be developing pricing or business models. The reference to 6.1.1 should be clarified to be the price signal model -not a pricing model. • There is no mention of V2G as a technology to be considered for PHEV standardization. All of the PHEV pilots undertaken by the ISO/RTO's have employed the V2G technology.	of the usage of RF bandwidth for the Smart Grid. As such it does represent an interoperability problem, albeit of a different nature than the other issues described in the report. This was a subject of substantial discussion at the workshop so we believe it belongs in the Interim Roadmap. Section 6.2.1 Corrected title to “Demand Response”. OpenADR is indeed considered a starting point as it moves into evolution via UCAIug and OASIS. Here it should get the wide review and enhancement you suggest. All the references you suggest should be incorporated into the activities that resolve these gaps going forward. Third paragraph of section revised to expose importance of dynamic transactions to: “Customers and/or their energy management systems would like or require energy usage information in order to help make decisions, such as what parameters to set for demand response, whether to change demand response (DR) plans, or whether to take specific actions now in anticipation of future DR events. Other informational interactions include curtailment and energy market operations; the best solution allows for easy interaction between these services. Energy sales and purchases, dynamic bids and acceptances, including the non-price attributes of that energy, are the basic transaction of transactional energy; a common shared understanding of each transaction proximate to the operating decisions that influence energy use is essential to collaborative energy on the smart grid.” The first paragraph is revised to explicitly describe the three gaps addressed: “There are 3 key gaps or issues within Demand Response (other than the pricing model, which was discussed in 6.1.1). The first gap is in standardizing the DR signals to DER devices. The second gap is the need for robust DER discovery and interaction. The third gap is in provision of information to consumers about their energy consumption.” Section 6.2.2 The Interim Roadmap is a document recommending actions that NIST should take. For this reason, all actions start with a suggested direction for NIST. NIST’s role is that of facilitator not problem resolver. Hence the wording. We suggest that the issue of PMU modeling be addressed in the context of section 6.1.2. Section 6.2.3 The actions in this section focus on interconnection and

#	DATE	WHO	SOURCE	COMMENT	Response
				• NAESB's applicable standards should be referenced. 6.2.5 Advanced Metering Infrastructure • As a general comment, the discussion should focus on interfaces, not internal functionality of the meters. 6.2.6 Distribution Grid Management Initiatives • Relative to key action (4): The settlement of charging/discharging away from "home" is a retail electricity market issue and should be kept separate from Wholesale market issues. Otherwise, FERC must establish the rates to be applied. This will become a serious problem in those areas of the country where electricity is not under FERC jurisdiction. Each state needs to decide or FERC needs to claim under the Interstate Commerce clause that mobile PEV rates should be consistent across the country. To further elaborate, action (4) is not particularly interoperability related but does recognize DOE's responsibility to address these large infrastructure issues. Implementation ends up being an issue for local markets. 6.2.7 Cyber Security Strategy • No comments on section 6.2.7 since it is simply refers to section 3.3.1. 6.3.1 Completion of the NIST Standards Evaluation Process • No comments 6.3.2 Architecture Framework Development and NIST IKB • This section does not currently reflect the loosely-coupled system of systems and needs to be revised or removed. As a loosely coupled system of systems one cannot expect there to be a "smart grid architecture". The individual systems and sub-systems will have architectures as determined by and appropriate to the needs of their owner-operators. • The interoperability priorities should focus on the inter-system interfaces between these systems, not on the internal architectures or features of the systems themselves. 6.3.3 Policy and Regulator • Based on the comments above on section 6.3.2 the GWAC disagrees with the need for development of an architecture governance activity. Referring to our first comment relative to use of "the smart grid" as opposed to "smart grid" architecture governance implies a tightly coupled system rather than a loosely coupled systemof-systems. Given the diverse nature of the electric power industry and the large number of owner-operators smart grid functionality will be created by facilitating communication across with interfaces within the system of systems. Referring to the smart grid conceptual model described in section 3 of the report one sees that even within an individual utility there exists the possibility of a system of systems. While individual utilities will need to consider enterprise architectures for the systems they implement one cannot and should not expect a uniform approach across the entire industry. To do so would be contrary to achieving many of the expected benefits of smart grid technology and functionality. • We recommend that NIST add an action item to communicate with state regulators to facilitate the evolution of both technology and regulatory institutions.	information modeling. Thus it recommends the organizations that are likely to produce standards for these. There are clearly additional dimensions to Electric Storage. However, the roadmap team tried to limit this report to interoperability and not policy. Section 6.2.4 Added NAESB to action recommendation. Section 6.2.5 We believe the section does focus on the communications interface to the meter and not within the meter itself. The issue here, and especially with action 4), is that the C12.19 meter model is quite comprehensive. However, it affords so many degrees of freedom that the client complexity has caused related standards efforts to eschew C12.19 in favor of a non-interoperable custom simplified solution. This action seeks to remedy this problem so that C12.19 remains the core meter information model for the Smart Grid. Debatable of course. Section 6.2.6 Good points. Section 6.3.2 System of systems is an important component of architecture but is not the exclusive descriptor of Smart Grid interoperability requirements. EISA clearly states that internal architecture of Smart Grid Domains is an essential ingredient in the scope of the Smart Grid. Section 6.3.3 Your recommendation for the additional action item will fit well with the ongoing evolution of this roadmap.