

**May 1, 2014 Technical Meeting:
Data/Communication Standards and Interoperability
of Building Appliances, Equipment, and Systems**

**Summary of Questions, Answers and Comments
in the Discussion Periods Following Presentations**

Presentation: Introductions and purpose (Joe Hagerman)

Question (Q): What is the difference between the April 30 public meeting and this non-public meeting? What is the end goal / end game / timeline?

Answer (A): DOE is hosting a series of meetings to ensure we've done our due diligence before we take any action.

Q: This list of objectives that you gave is equal to the purpose of SGIP. How is this related to SGIP efforts?

A: The Building Technologies Office (BTO), consistent with its mission, is taking a very buildings-centric approach. It does not just involve building interactions "out" to the grid, but includes interactions between buildings, including campuses, and within individual buildings.

Presentation: Types of interactions (Rob Pratt, Steve Widergren – PNNL)

Q: What is meant by the term "buildings"? Residential, commercial or both?

A: Automation in the past has seen more progress in commercial areas so we will definitely pull from those learnings, but the intent here is to look at the entire sector, so "buildings" includes both residential and commercial. There are certainly many investments being made in residential interoperability that need to be considered. Non-process industrial also should be included because these are also buildings.

Q: What is the national benefit of doing this kind of work?

A: PNNL and EPRI have done work in this area, so there are people looking at this question. Annual benefit estimated at around \$20 billion (grid benefits alone) to \$30 billion (if you add energy efficiency benefits). This is based on [published work by McKinsey](#) and an unpublished estimate by PNNL for DOE.

Standards convergence efforts

- **ANSI EESCC Standardization Roadmap (Joe Hagerman - DOE)**
- **SGIP (David Hardin - consultant)**

Presentation: ANSI EESCC Standardization Roadmap (Joe Hagerman - DOE)

Q: Does ANSI plan to have a webinar on the EESCC Roadmap?

A: At this time, ANSI is not planning a general launch webinar for the roadmap, but there may be a presentation on it to the upcoming ANSI Smart Cities Network.

Q: Is the inventory database publicly available?

A: The link to the EESCC Inventory Database is available at www.ansi.org/eesc. It can also be accessed directly here <http://toolswiki.ansi.org/tiki-index.php?page=EESCCTabs>. Note that the database contains information about relevant standards, codes, guidelines, and conformance programs, but does not house the roadmap's recommendations.

Q: Is there a link to the EESCC Roadmap?

A: The EESCC webpage (where the roadmap will be posted) is www.ansi.org/eesc. To be added to the EESCC-info distribution list, send a note to eesc@ansi.org, and you will be informed when the roadmap is released.

Q: What is the origin of the "EE" term in EESCC? It seems unusual.

A: The initial focus was on energy efficiency (EE), and then expanded into water and other elements.

Comment (C): There are multiple M&V standards everywhere. It is a useful contribution by DOE to help "corral the cats" and organizing this meeting is helpful.

C: One participant commented that he has worked closely with EESCC to bring buildings/grid integration within the energy efficiency framework. The goal is ensure this kind of synergy is captured, though EESCC is mainly focused on energy efficiency within a building. It is useful to have buildings-to-grid and energy efficiency as part of one conversation, since getting this integration right benefits both.

Presentation: SGIP (David Hardin - consultant)

C: There are 1000 different utility tariffs nationally. But what matters is not the tariff, but when that watt is delivered or produced. Is it tomorrow, or is it next week? The underlying value can be very different. Service-oriented approach to tariffs is what's important and missing in approaches to building automation system. This is the essence of transactions.

A: You are invited to join SGIP and get involved with B2G working group activities with respect to tariffs.

C: SGIP paths 9 and 19 are now closed.

C: There is also a home-to-grid effort. AHAM was not available for this meeting because they are having their big annual meeting this week. But home-to-grid is also an area that needs to be part of the discussion.

Q: 1000 utility tariffs plus transactive energy equals more complexity. How can SGIP help?

A: One issue with transactive energy is that things are still too premature to move through the standardization process. There's already a lot of existing work, sitting on a good foundation on which to build.

Standards-based deployment initiatives

- **BACnet (Carl Neilson – Delta Controls)**
- **LonMark Intl – (Barry Haaser)**
- **OpenADR (Ed Koch – Honeywell)**
- **CSEP - (Tobin Richardson –Zigbee Alliance)**
- **USNAP (Chris Kotting)**

Presentation: BACnet (Carl Neilson – Delta Controls)

Q: In there a connection with BIM in the ASHRAE world?

A: Yes, there's an ASHRAE committee looking at BIM, and BACnet people are participating. We are looking to integrate our modeling with BIM.

Q: Is there a timeline for the ASHRAE 201P committee?

A: Yes, but I'm not personally involved in that committee. We'll hear more on that later.

Q: What about connection to or differences with OpenADR?

A: BACnet web services will have standardized gateway to connect to openADR and thus, to the grid.

Presentation: LonMark International – (Barry Haaser)

Q: Where does this fall in the list of 50 companies trying to solve interoperability.

A: We have been working in the space, so I guess we are one of those 50 companies. We are on the docket for integration with SGIP.

Presentation: OpenADR (Ed Koch – Honeywell)

C: OpenADR does allow for 2 way communications, which allows for reporting back to utility or service provider.

Q: How many utilities are using OpenADR? How much adoption is there?

A: It is deployed around the world, and many utilities are using OpenADR. It is deployed in California, across the USA, Korea, and Europe.

Q: I see distributed wind on your diagrams, but buildings are getting more onsite renewable sources. Can OpenADR work with those distributed resources?

A: Distributed generation is hard to specify so big wind farms are not typically covered. OpenADR is mostly focused on buildings so if a customer has on-site distributed generation that will affect their load profile, then we can support it.

Presentation: Consortium for Smart Energy Profile 2 Interoperability (CSEP) - (Tobin Richardson – Zigbee Alliance)

Q: How do you contrast OpenADR and SEP?

A: SEP is more focused on device specific information. That is the biggest difference. Another participant agrees with this characterization.

Q: How do you graduate up from a fan to the HVAC system? From a video camera to the actual security system?

A: SEP focus is the device, not the system.

Q: What types of service does SEP allow?

A: We can provide many services, such as electric vehicle charging and other similar use cases. Demand response as a service is more prominent, but is not the only thing available.

Presentation: USNAP (Chris Kotting)

C: CEA 2045 being proposed as an international standard at ISO.

Q: What about the mutual self-discovery aspect of devices?

A: Some hand shaking has to be specified between modules and the protocol, but there is hand shake method between module and the device too. The module-device hand shake has to be handled by device manufacturers.

Q: We've used USNAP before with SEP and openADR. Are there security concerns?

A: USNAP is focused on the module as it's connected to the device, so security isn't as much an issue. If there are security concerns *between* the module and the device, then the bad people are physically already "in" your facility. USNAP's perspective is that the security concern burden is mostly on the network communication people.

Q: How much of the 'smarts' go into communication module and how much is in the device?

A: The device manufacturer needs to figure out what do with communications coming in. The device shouldn't have to do any translating but they will need to act on the information and commands coming through the module. The module is there to translate between communication protocols and the device, but doesn't know enough about the device to know what to do.

Relevant standards bodies

- **ASHRAE (Chris Kotting – EISA)**
- **NEMA (Patrick Hughes – NEMA)**
- **CEA (Bill Rose – WR Consulting)**
- **AHRI (Aniruddh Roy – AHRI)**
- **CEE (Don Brundage – Southern Co, Robert Wilkins – Danfoss)**
- **IEC PC118 Smart Grid User Interface (Dave Hardin – Consultant)**
- **OASIS (Bill Cox – Cox Software Architects, Toby Considine – TC9)**

Presentation: ASHRAE (Chris Kotting – EISA)

C: On limitations about not specifying a communications protocol layer for ASHRAE 201P, one participant does not see this as a limitation. Since ASHRAE 201P is focused on the information model many existing communications protocols that can be used to deliver messages that use the 201P information model vocabulary. Having a common information model helps advance interoperability.

Presentation: NEMA (Patrick Hughes – NEMA)

Q: You said that you have worked with members to identify gaps with interoperability, can you tell us more about those conversations?

A: At NEMA, Mr. Steve Griffith is really subject matter expert to talk to, but I'll try. NEMA has a smart grid council for interested parties. This year, the council is looking at hand-shake protocols in buildings. I do not have specifics on those gaps, but the council decided that there's enough of a gap in handshake protocols and plug and play to work on this further. In 2015, we are proposing to evaluate handshake protocols and plug-and-play methods.

Presentation: Consumer Electronics Association (CEA) (Bill Rose – WR Consulting)

Q: Can you provide more information on the Seattle CEA meeting?

A: CEA is hosting a 2014 Technology & Standards Spring Forum in Seattle, May 19-21, <http://www.ce.org/Events-and-Awards/Events/2014-Events/Technology-Standards-Spring-Forum.aspx>

Presentations: AHRI (Aniruddh Roy – AHRI); CEE (Don Brundage – Southern Co, Robert Wilkins – Danfoss)

Q: This is for AHRI - AHRI has said that OpenADR and SEP2.0 are the most favorable communication protocols and also that modular control for legacy systems may work. How do you envision the controls to be physically implemented on new systems?

A: Manufacturers have said that OpenADR or SEP2.0 communication can be built in (Wi-Fi), or be implemented through an internet connection. The modular part of legacy system control is a new idea that hasn't been totally fleshed out.

C: You should consider a modular solution for new equipment too.

A: We know we have a problem with legacy systems, so that's why we've created the modular solution. But for new systems, let's look forward to figure out what we will do with better, more advanced systems. In that case, manufacturers don't think they'll need add-on modules for future systems, only for older systems. We deliberately chose to look into the modules with a future-state vision. Given that orientation, how do we address and integrate "backwards" into legacy systems? OpenADR and SEP are initially seen as the best current standards approaches.

C: EPRI is prototyping a building system for communicating with variable speed heat pumps. They have worked with manufacturers so they can figure out how to connect these with demand response.

C: The collaborations to date with manufacturers and utilities have been very valuable. Active collaboration between utilities and manufacturers is critical to market success.

C: Some utility customers are very poor, or renters, and few will be buying new, high end appliances. Twenty percent of one utility's customers do not have bank accounts, for example. We need to have simple DR systems with inexpensive equipment. We need to figure out how to deal with older equipment in useful way.

Q: Are you are only focused on HVAC and domestic hot water in homes, or are you looking at all end uses in buildings?

A: We are initially focused on the equipment types that contribute to the biggest loads, such as air-conditioners, as a way to stream line the process . We expect to deal with smaller loads later.

Presentation: IEC PC118 Smart Grid User Interface (Dave Hardin – Consultant)

C: Global aspects of this problem are very important. Most of the companies working in this space are international so being able to work on this globally is huge.

Q: How does IEC work fit with Facility Information Model?

A: ASHRAE model is being discussed and proposed to IEC but OpenADR is really the focus of this group, though the Technology Report does include other standards in the discussion.

A: Priority is to develop interface between grid interface and building systems.

C: I completely agree with the importance of international standards activity, but we are missing ISO/IEC Home electronics systems sub-committee. They've standardized many low level protocol and interoperability standards. They should be part of our conversation as it brings in home and small commercial buildings

Presentation: OASIS (Bill Cox – Cox Software Architects, Toby Considine – TC9)

Q: Can you talk more about the reference to COBie on slide 8 of your presentation?

A: COBie is Construction Operations Building Information Exchange. The COBie approach is to enter the data as it is created during design, construction, and commissioning. COBie enables the BIM to be handed over to building operations – equipment, spaces and zones.

Working lunch (Wendy Seltzer – World Wide Web Consortium, W3C)

Q: How is the Web of Things different from the Internet of Things?

A: Internet is more the protocol layer and the application is the web. Web is relating to scripted communications on top of the bare communication protocols that might be the internet of things

Q: Re the Web of Things, can you identify some of the “things”?

A: It’s early. One area which is exciting: facilitating the end user to interact. Giving the user ways to interact with devices, like the ‘nest thermostat’ as a thing that gives user more interfaces. Why should user be limited to those controls, user may want to map out his/her own energy use more granularly.

Q: Another context of web is spider web. The internet traps prey. How does the consortium help mitigate the bad guys?

A: The web can be used by good or bad actors. Trying to put the end user intents at the end of this. Looking at protocols to protect internet browsers and make the Web robust against attacks. Web application security group looks at ways the web has been used beyond its initial design, to help protect against those attacks.

Q: Curious about the consensus process in the W3C. What happens when you hit the proverbial brick wall?

A: We approach this issue by looking for the least strong objection. The question might be phrased: can you live with this? Consensus within working groups is judged by the working group chairs. Objections can be brought to the attention of the Director if that “consensus” is unsatisfactory to a party. Allows groups to rethink the issue.

Q: You think that the next version/age of the web is now because of scale and actors, and not controls. Is it a different evolution? Will the web have to change to suit the needs of people instead of being just about information as it was intended?

A: Web needs to morph around it... how to create something globally accessible even while others have values that may fragment the web, or go toward more specific instances. The core architecture,

power of hyperlink and the core principles behind that should not change. The techniques of implementation will certainly change. We want innovators at the edges to have platforms to use.

Q: Does equality of opportunity and net neutrality become threatened by internet security and performance concerns as we look to enable buildings and grid control applications?

A: There are lots of layers to the question. With regard to net neutrality, we are mostly focused on market oriented issues, how the transport will look and how the interconnection works. There will be a lot that changes but the core will be an open process and a neutral forum. We hope that spirit will remain to allow for social and technical innovation to continue.