

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

### Facilitated Discussion Questions (in blue font) and input from meeting participants, categorized and summarized by the Facilitator (in black font)

**Question 1: Biggest challenge to integration and alignment**– For information exchange to prosper between buildings devices, systems, and outside parties, such as other buildings and electric system operators, technology must integrate easily and reliably support the various types of interaction scenarios envisaged. Are standards consistently interpreted or are there ambiguities? Are products from multiple vendors certified to work with each other? Is communications performance and reliability an issue for some applications? Is translation between technologies a barrier to deployment? These and other issues are explored in this discussion with a wrap up to try and prioritize the biggest issues we face.

- **Utilities**
  - Regulatory uncertainty
  - Lack of financial incentives because of the legacy rate design that fails to reward sophisticated demand management needs
  - Diversity of utility programs and requirements and requirements that limit the market for manufacturers
  - Machine readable tariffs and rates
  - Encourage regulators to allow larger playground for smarter energy
    - Understandable
    - Flexible
    - Allow advantage from surplus, not just storage
  - Willingness of customers to let utilities and 3<sup>rd</sup> parties to control their devices impedes adoption
  - Diversity of load on the grid
    - Small vs large
    - Simple vs complex
    - Diversity of players
    - Dynamic nature of market
    - “This means that this should not be a one-size-fits-all solution that stifles innovation
- **Protocols and Standards**
  - Thoroughness of interoperability testing
  - Protocol verification
  - Differences in standards and protocols
  - Security concerns
  - Communications with priority driven access
  - Proliferation of too many standards
  - HVAC/R and water heating industry believes that Open ADR 2.0 and SEP2 are the most promising standards that current exist

- **Business Case for OEMs and Other Vendors**
  - Next Quarter Vision - Not taking the longer view on profitability
  - Benefits (of integration) usually judged in financial terms while products are sold by features and comfort
  - Interoperability challenge with 3<sup>rd</sup> party OEM that want to distinguish themselves
  - Different standards, practices, business models for residential vs small commercial vs medium and large commercial
  - High cost of building custom automation and integration
  - Developing understanding and communication of the business case (value) for interoperation and integration
  - How to get OEMs (especially in mass market) to adopt application standards for grid apps into their products
    - This is a cost adder that is not demanded by the people that buy their products
    - The benefits lie outside the OEM-device buyer relationship
- **Both the Business Case and Protocols**
  - May need a business model to help simplify Demand Response complexity (e.g. multitudes of protocols)
  - Too many standards and cost/complexity of market
    - Market size/timing
    - Lack of buyers network
  - Public Utility Commissions, Utilities, Technology Providers, and Consumers do not have the same “Value Judgment” via Standards
    - Need a standard way of thinking of standards
- **Between the Business Case and Protocols**
  - Encourage all to avoid trying to communicate all details of all internals
    - Drive shallow integration as the key to independent evolution
    - This is both an Action and a Challenge
  - Provision of a clear minimum profile
  - Timing of Standard
    - When is it going live?
    - Many emerging standards
    - Creates a chicken/egg situation for OEMs/Controls/Systems vendors
  - Understanding all the Internet of Everything standards efforts and how they integrate to each other
  - Vendors need to see utilities/Independent System Operators offering programs using standards to justify investment in R&D, sales, operations
    - Difficult to capture their attention without a known or very soon to be active program
    - “Can I sell to a customer who will benefit from it now?”

**Question 2: Standards gaps** – Given the results from the previous question’s discussion, what is missing from the portfolio of existing information exchange standards? Are new features needed? Is optionality making integration more difficult by introducing confusion and can reducing the number of options help? Is there redundancy in standards where we can benefit from a convergence on smaller number of

approaches? Do different standards create conflicts to deploying new technology with legacy components and can standards be revised to at least support co-existence? A discussion of these and other gaps can spawn activities that improve our ability to support new buildings interactions.

- **More Information Required**
  - Schemas that encapsulate a device profile or object
  - Diagnostic information
  - Reliability over service life of HVAC/R and Water Heater
    - Are existing standards adequate for monitoring and verification
- **More Standards**
  - Protocol Implementation Conformance Suite
  - Standards of Smart Meter Data Collection
    - Data from smart meter to data concentrator to substation to data center
    - Cyber security standards are not available
  - Source of better standards for sharing and pricing
    - NOT tariff structures
  - Existing HVAC/R and Water Heating performance standards do not currently have performance metrics that quantify the “smartness” of a product
    - Existing Standards bodies should be allowed to take leadership on such issues
- **Fewer or Simpler Standards**
  - There is redundancy in standards and we would benefit from convergence or smaller number of standards.
    - Competition and adoption may solve this
  - Reduce the number of options in standards, at least at first or until the standard matures
    - This reduces interoperability issues when certified products are deployed in the field
  - May not be an issue if they are good, then good standards will take over
    - They must be open, not proprietary
    - They must be available
  - Common user interface practices
  - Ability to integrate physical systems with cloud solutions
- **Guides to Standards**
  - Clear guidance on how to apply standards in real world use cases
  - Buyers (Dummies) Guide to Standards
    - A universal overview of what information standards do and do not do
    - Future effect of collaborations among standards
  - Collect, describe, and guide use of many patterns for discovery
    - Of capabilities such as protocol
    - Of services available
    - Of versions and configuration information

**Question 3: Steps to fill gap or address challenge – Given the results from the previous question’s discussion, what actions can we take to fill identified standards gaps and enable the kinds of buildings interactions we envisage?** What existing standards need to be revised to address a gap? In what areas do we need new standards? What information exchange and communications technologies are emerging to support future buildings interactions that will ease integration with other business functions (such as Internet-based connectivity) and what steps can be taken to adapt them for our building interaction scenarios?

- Encourage use of business standards combined with energy interoperable enrollment service
- Need a map, or at least catalog of standards to show attributes like
  - What layer of the Open System Interconnected (OSI) model they operate
  - What standards compete with them
  - What market niches they support
    - Residential, Commercial, HVAC, etc.
  - Who are the users of the standards
  - Cost of not dealing with standard now
- Once finalized, need to ensure
  - Implementation guidelines for specific programs
  - Recommended/reference guidelines per use case are published
- Machine readable tariffs and transparent rate structure
  - Drive the Smart Grid Interoperability Panel (SGIP)
- Demonstrate specific use cases in a consortium of
  - Energy Service Providers
  - Manufacturers
  - Standards expert, referee, consultant, etc.
  - The demo must successfully demonstrate the use cases and create a business case to take the standards based interoperability implementation to national scale
    - A business case includes a business model and implementation plan and performance.
  - Take very different approach from NIST/SGIP20
  - Take narrow approach of interoperability for grid use cases
  - To do this, need to create a framework so that OEMs can move forward with interoperability efforts for their usual stakeholders
- Make interoperation software easier to build and deploy
  - Simple, affordable, consistent
  - Study and encourage application of Energy Market Information Exchange (EMIX) pricing descriptions to those zillions of tariffs
- Simple interface description between utility (or aggregator) and Energy Management System (EMS)/device
  - Diversity possible on either side but simple standard interface would ease testing and deployment
- Establish clear segmentation/map of protocols
  - E.g., where on SGIP diagram but with more detail behind the meter

- Catalog of Smart Grid Architecture mapped to protocols, e.g.
  - Direct device price awareness
  - EMS control
  - Peer to peer
- “Kahn’s Academy” for
  - Implementation
  - Example solutions
  - Certification of knowledge
- Publish a translation markup language framework so different standards can map data objects together to simplify communicating and data transfer
- Review standards-making governance
  - Ensure balance representation among users, producers, and general interest parties (e.g., ASHRAE standards process)
- Process suggestions
  - Keep process open and transparent
  - Consider global needs and requirements not just US
  - Let market forces work as much as possible
  - Avoid “top down” decision making
- A deeper dive into what legacy systems do, what can be leveraged, how can they be improved without dramatic change
- Collaborative effort between affected entities to avoid duplicative efforts
- Business case is needed to make this work.

#### Question 4: Who needs to be involved?

- Home Electronic Standards (ISO/IEC SC25/WG1)
  - ISO/IEC 15045 Gateway
  - ISO/IEC 18012 Interoperability
  - 15067-3 Energy Management
  - Other Standards
    - Application Models
    - Communication Protocols
    - Home Electronic System Architecture
- EPA
- National Association of Home Builders
- Public Utility Commissions
- Better Building Energy Alliance

