September 2011

GridWise Alliance Principles for Grid Interoperability

The electricity industry is essential to all sectors of our nation’s economic life, more so now than ever before. Preserving the mission of the grid, which is delivering safe, reliable electrical energy at an economically-viable cost, is the primary task of all operators and service providers. From smart meters to smart appliances to more intelligent control of distribution, transmission, and generation, an advanced grid offers the potential of improved utilization of all generation and storage resources, increased operational efficiency and reliability, and enhanced opportunity for customers to make choices about energy use. A more interconnected, automated, and information-rich electricity delivery system also provides the opportunity to deliver a safer and more reliable interoperation, and to mitigate threats to the grid and electric user’s privacy from accidental and intentional harm. The Smart Grid Policy Center defines interoperability as “*the seamless, end-to-end connectivity of hardware and software from end-use devices through the T&D system to the power source, enhancing the coordination of energy flows with real-time information and analysis*”[1]. The GridWise Alliance believes that with sound planning, thorough design, and coordinated execution, a safe, secure, and reliable smart grid can be achieved. Interoperability and cybersecurity policies and legislation, and the resulting guidelines and standards will play a critical role in realizing a transformed electric grid. Outlined below are the key principles endorsed by the Alliance for interoperability.

1. **Promote Stakeholder Neutrality and Utilize Non-Discriminatory Language.**
   a. **Description**: Interoperability standards should not favor nor discriminate against any specific party or stakeholder in terms of standards implementation or usage. Interoperability standards should be developed in an open and collaborative manner so that they are embraced by all parties interested in smart grid interoperability.

   b. **Benefit**: Choice by participants/stakeholders requiring interoperability and market opportunity for vendors/suppliers to enter smart grid markets and develop products and solutions. Diversity of solutions and opportunity by both users and suppliers of smart grid solutions. Foster continued innovation by leveraging standards.

   c. **Example**: RFC-based standards have a rich ecosystem of providers

   d. **Implications**: Robust market for smart grid solutions, interoperability achieved at reasonable cost.

2. **Minimize Intellectual Property Encumbrances.**
   a. **Description**: It would be preferred that Smart Grid standards which are intended to drive public benefits be developed in the public domain and be freely accessible at reasonable cost and without burdensome intellectual property limitations to all parties. Where smart grid standards leverage proprietary intellectual property it is critical that related licensing terms allow implementation of interoperability solutions at reasonable cost and support continued innovation.

   b. **Benefit**: The impact and issues regarding standards would be known by a broad audience. More opportunity for comment, the development of solutions, and resolution earlier in the standard’s lifecycle. Ensure that all perspectives can influence, at least indirectly, the shape of a standard. Help minimize the likelihood that unintended “toll booths” are set up which raise the costs of achieving interoperability.

   c. **Example**: Linux-based license standards

   d. **Implications**: Rich supplier base and reasonable implementation costs for end users.

[1] Definition excerpted from "Paths to Smart Grid Interoperability” May 2011, Smart Grid Policy Center (SGPC). The SGPC is the research arm of the GridWise Alliance.

GridWise Alliance, All Rights Reserved

3. **Develop Standards Based on Protocols and Support Formal Testing.**
   a. **Description**: Interoperability standards must possess a complete and formal description that depicts all intra and inter network interfaces and related message models; between both devices and systems. These standards should include complete specifications of protocols needed by users of the standard to develop solutions. It is of critical importance that test cases be developed to ensure that standards compliance can be determined in an objective manner. **Standards should not be adopted if any of these criteria are not met.**

   b. **Benefit**: Assures that solutions can be produced by differing providers, integrators, and end users system can achieve true interoperability through adherence to the standards.

   c. **Example**: Electrotechnical Commission/Common Information Model (IEC/CIM) 61968 standard for meter data interchange; IETF/W3C HTTP

   d. **Implications**: Confidence that standards-compliant smart grid solutions will interoperate as planned and without additional testing or integration expense of the base standard.

4. **Incorporate Plans for Ongoing Evolution.**
   a. **Description**: The smart grid is continuing to evolve. Provisions in the standard must exist for future evolution to avoid building in obsolescence. These plans should include provisions within the standard for versioning and, where practical, backwards compatibility across versions.

   b. **Benefit**: Ensures that the users of the standards can evolve their systems to achieve interoperability over time.

   c. **Example**: EDI standards

   d. **Implications**: Allows for the realistic evolution of systems over time without wholesale changes or impractical levels of coordination between parties being required.

5. **Create Standards that are Cost-effective to implement, enhance, and maintain.**
   a. **Description**: Smart grid projects must be affordable for implementation by users of the technology. Among the best ways to ensure that smart grids deliver expected benefits is to base them on a framework of policy, legislation, and standards that is mission-driven. The core principles of this framework should be derived from real-world Use Cases and Requirements. Additionally, new and evolving standards may result in rendering existing, previously-compliant smart grid systems non-compliant. Allowances for the controlled replacement of the non-compliant systems should be considered in future definitions of standards implementation.

   b. **Benefits**: Minimize the first and on-going cost impacts to stakeholders and consumers of energy based on the adoption of electric grid technology and standards. Avoid creation of stranded assets that are not in compliance with evolving standards. Ensure that resulting solutions meet true system needs and deliver tangible benefits.

   c. **Example**: IEC 61850 standards development (based on in-depth analysis of Use Cases)

   d. **Implications**: Improved adoption of interoperability standards by all parties, delivering real-world benefits, thereby accelerating the achievement of smart grid goals.

GridWise Alliance, All Rights Reserved