



Team IPKeys/Quanta SB134110CN0148 Smart Grid Interoperability Standard Assessment Methodology

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Agenda

- IPKeys/Quanta Task
- Release 1.0 guiding principles
- Challenges in applying guiding principles
- Objective of proposed methodology
- Suggested definitions for certain terms
- Proposed assessment process
- Assessment template
- Open discussion

IP Keys/Quanta Task

- One of the thirteen tasks of the project
 - Technical analysis for standards listed in the NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0, Table 4.2, “Additional Standards, Specifications, Profiles, Requirements, Guidelines, and Reports for Further Review.”
 - Analysis shall be performed on documents relative to the guiding principles listed in section 4.1 of Release 1.0
- Part of the task to update the NIST Framework and Roadmap for Smart Grid Interoperability Standards to be released as release 2.0

Release 1.0 guiding principles

1. Is **well-established** and **widely acknowledged** as important to the Smart Grid
2. Is an **open, stable** and **mature** industry-level standards developed in consensus processes from a standards development organization (SDO)
3. Enables the transition of the legacy power grid to the Smart Grid
4. Has, or is expected to have, **significant** implementations, adoption, and use
5. Is supported by an SDO or Users Group to ensure that it is **regularly revised and improved** to meet changing requirements and that there is **strategy for continued relevance**
6. Is developed and adopted internationally, wherever practical
7. Is **integrated** and **harmonized**, or there is a plan to integrate and harmonize it with **complementing** standards across the utility enterprise through the use of **an industry architecture** that documents key points of interoperability and interfaces

Release 1.0 guiding principles (cont.)

8. Enables one or more of the framework characteristics as defined by EISA or enables one or more of the six chief characteristics of the envisioned Smart Grid
9. Addresses, or is likely to address, anticipated Smart Grid requirements identified through the NIST workshops and other stakeholder engagement
10. Is applicable to one of the priority areas identified by FERC and NIST
11. Focuses on the semantic understanding layer of GWAC stack, which has been identified as most critical to Smart Grid interoperability
12. Is openly available under fair, **reasonable**, and nondiscriminatory term
13. Has **associated conformance tests** or a **strategy** for achieving them
14. Accommodates legacy implementations

Release 1.0 guiding principles (cont.)

15. Allows for additional functionality and innovation through
- Symmetry – facilitates bi-directional flows of energy and information
 - Transparency – supports a transparent and auditable chain of transactions
 - Composition – facilitates building of complex interfaces from simpler ones
 - Extensibility – enables adding new functions or modifying existing ones
 - Loose coupling – helps to create a flexible platform that can support valid bilateral and multilateral transactions without elaborate pre-arrangement
 - Layered systems – separates functions, with each layer providing services to the layer above and receiving services from the layer below
 - Shallow integration – does not require detailed mutual information to interact with other managed or configured components

Main challenges in using guiding principles

- Many terms used in the guiding principles are not clearly defined
- Guiding principle statements and many terms used in general are qualitative rather than quantitative
- Does not have a formal process about how the guiding principles should be used

Objectives of the proposed methodology

- Formalize the process of identifying smart grid interoperability standards and associated priority actions
 - With more clear definitions of terms used
 - A more quantitative rather qualitative
- Enable NIST / SGIP to use a formalized process to conduct the assessment on a regular basis (e.g. annually)
 - Smart grid technologies will continue to develop / evolve
 - Status of existing standards may change
 - New standards will emerge continuously

Proposed definition of terms

- Well-established: have many commercial-off-the-shelf implementations and multiple deployed systems. Generally is also widely acknowledged.
- Widely-acknowledged: majority users and vendors acknowledged?
- Open standard: Only refers to standard's access. Does not include standard development process. Adopt IETF and ITU-T's definition of open standard – It should also meet GP12 requirement.
- Stable standard: Standards with minimal changes expected in the foreseeable future. Part of a mature standard definition.
- Mature standard: It already has a number of solid implementations / products and is a stable standard.
 - There is a interoperability maturity metrics proposed by SGTCC, which defines levels of interoperabiliies as an indication of maturity

Proposed definition of terms (cont.)

- Significant implementations, adoption, and use: more than 50% of the installed base.
- Regularly revised and improved: (SDO or User group) has a standard review / revision cycle / process
- Integrated standards: a set of complementing standards addressing different aspects are merged / integrated to become one or a set of coherent standards.
- Harmonized standard: (1) Standards applying to same domain have proper mapping between them; (2) Standards have different definitions for same terms (e.g. naming, etc.) are unified to use the same definition.
- Complementing standards: Standards that complement each other
- An industry architecture: Generally refers to GWAC if no other architecture is explicitly mentioned.

Proposed definition of terms (cont.)

- Reasonable: ???
- Terms: Include restrictions, clause, fees, etc.
- Associated conformance [/ interoperability] tests: Include written test specifications / guidelines / procedures / programs, accredited labs to perform the tests, and certification process
- (Test) strategy for achieving conformance [/ interoperability]: A clear written plan how the conformance [/ interoperability] of a standard will be achieved

Proposed assessment process

- Step 1 – Analyze a standard against all guiding principles to determine if it satisfies each of these principles.
 - To ensure consistent application of the guiding principles, some principles are broken down to their basic elements that are able to be answered by a simple yes or no. For these principles, the answer to the question whether it satisfies any particular principle is depend on the collective answers to the broken down elements for that principle. Please note that some elements may be further broken down to sub-elements for the same purpose.
 - The analysis is performed using a standard form. In that form, all guiding principles are grouped into four groups as described in the previous subsection. The broken down elements / sub-elements are listed below each principles. In addition to Yes / No answer, it is also required that supporting information must be provided for each answer, such as the rational of the answer and sources used to support the rational.

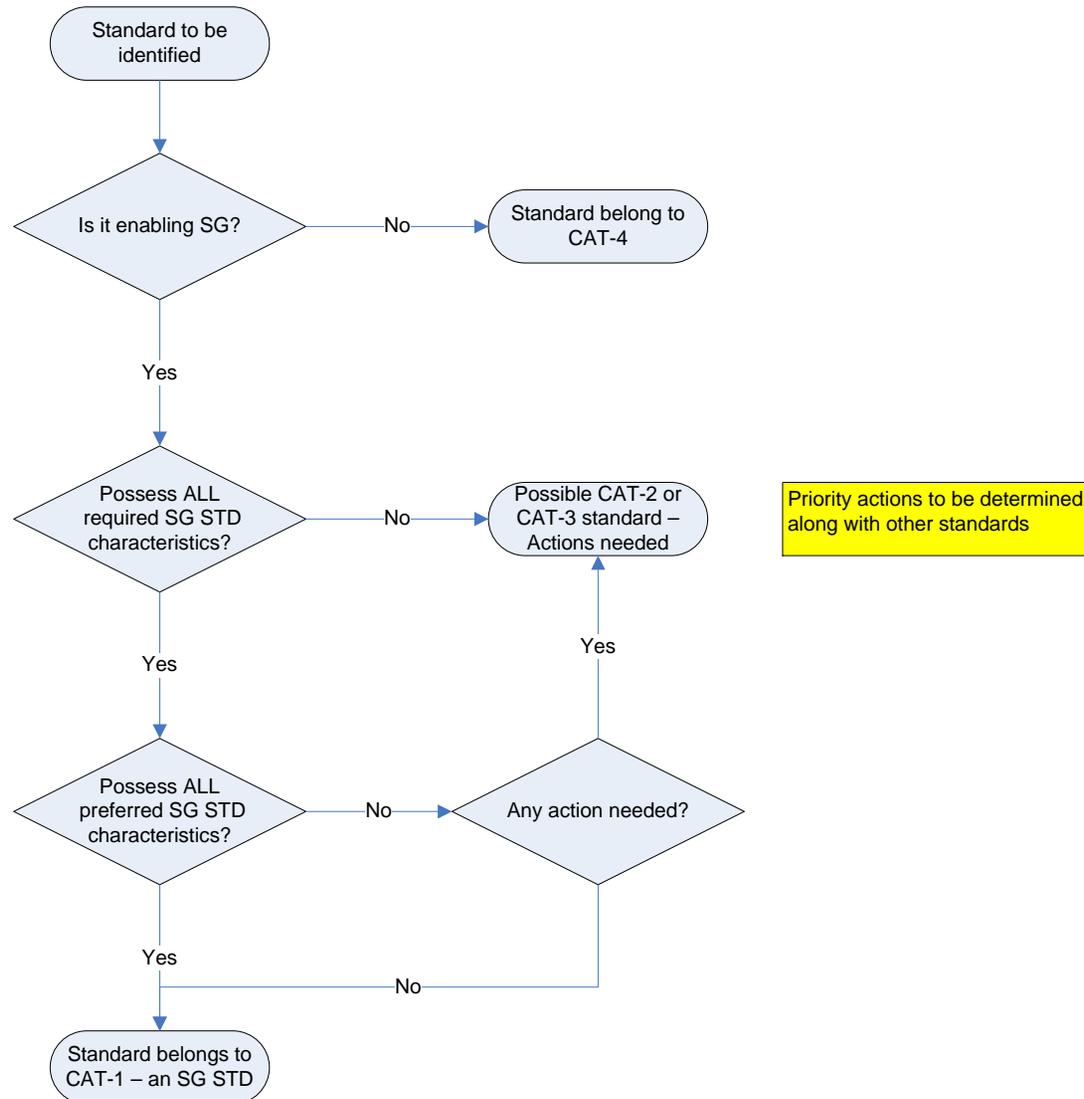
Proposed assessment process (cont.)

- Step 2 – Once the analysis is completed for a standard (i.e. the form has been properly completed), the following rules will be applied to determine which smart grid interoperability standard category that the standard belongs to:
 - Category-1 (CAT-1) determination: If at least one of the principles in “*Enabling the smart grid*” group is satisfied and ALL principles in the “*Required smart grid interoperability standard characteristics*” are satisfied, then a standard will be considered as belongs to CAT-1 and is labeled that it “*fully meet the requirements*” to be identified as a smart grid interoperability standard.
 - Category-2 (CAT-2) determination: If at least one of the principles in “*Enabling the smart grid*” group is satisfied but not ALL principles in the “*Required smart grid interoperability standard characteristics*” are satisfied, then a standard will be considered as belong to either CAT-2 and is labeled that it “*partially meet the requirements but need further actions*” to be identified as a smart grid interoperability standard
 - Category-3 (CAT-3) determination: If an analysis leads to a CAT-2 finding that finding may in fact be relabeled as a CAT-3 finding if compelling circumstances and or ongoing community activity is identified that merits the label of CAT-3 “*Potentially a candidate smart grid interoperability standard*”
 - If none of the principles in “*Enabling the smart grid*” group is satisfied, then the standard belongs to CAT-4 that is “standards not belong to other three categories”

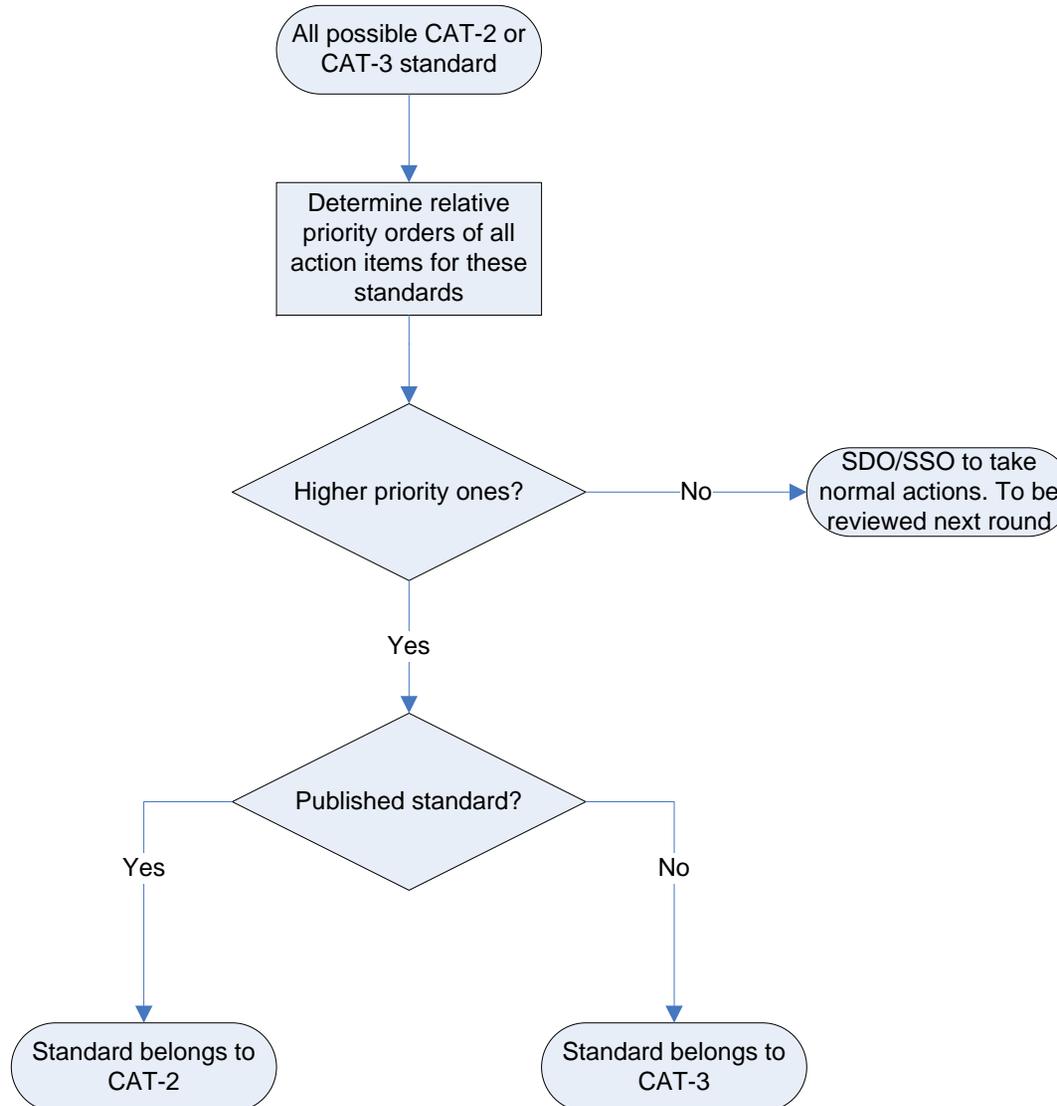
Proposed assessment process (cont.)

- Step 3 – Using the results of all analyzed standards that belongs to CAT-2 and CAT-3, and follow the following priority order to determine which standard has a higher priority to take actions.
 - The priority order of guiding principles in this group is GP-4, GP-11, GP-1, and GP-10.
 - Priority rules
 - If two standards meet at least one priority GP, (regardless how many GPs are met), the standard that has the highest order GP that is higher than the highest order of GP of the other standard has the higher priority
 - If having the same number of GPs satisfied, the one has the high priority one has the high priority
 - If having the same number of the GPs satisfied and the same GPs, the one has more sub-items satisfied has the higher priority

Process flowchart 1



Process flowchart 2





Open Discussions