
Facility Smart Grid Information Model (FSGIM) - Connecting OpenADR 2.0 to Existing Protocols

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Background on the FSGIM

- What is the FSGIM?
 - An abstract information model of what the Smart Grid looks like *from the perspective of a facility*.
 - An abstract model of the information that would need to be exchanged within a facility to participate in the Smart Grid.
 - It is *not* a protocol, but it can be used by other protocols to aid them in adapting to the Smart Grid.

- What is meant by a “facility?”
 - A home
 - A commercial office building
 - A factory
 - A campus
 - Basically anything on the customer side of the electric meter.

Background on the FSGIM

- Why is the FSGIM being created?
 - The Smart Grid Interoperability Panel realized that numerous facility level protocols were wanting to connect to the Smart Grid.
 - There was concern that having each of the protocol groups work totally independently could result in confusion when it came time to aggregate the information from all of the protocols that might be used in a facility.
 - It was realized that having a common semantic model would make it easier to exchange information between protocols and to aggregate data collected via multiple protocols.
 - For these reasons, the SGIP created PAP17 to develop a Facility Smart Grid Information Model.

Background on the FSGIM

- ASHRAE was asked to coordinate the effort because of its experience with facility level protocols, its experience with energy standards, and its experience with bringing large, diverse groups together to work on standards.
- ASHRAE assigned the work to the SPC 201P committee.
- Who is involved in the development of the standard?
 - Residential, commercial, and industrial automation equipment manufacturers.
 - Protocol groups
 - Utilities
 - Independent System Operators
 - Governmental organizations
 - Academia

EIS Alliance Use Cases and Information IDs

- The work on the FSGIM began with a set of Use Cases developed by the Energy Information Standards Alliance that described, in general terms, the information that would need to be exchanged within a facility and between a facility and the grid in order for facilities to fully participate in the Smart Grid.
- The SPC 201P committee then took this initial work and began creating a model capable of providing the identified information.
- This was done by creating four basic logical building blocks that can be used to model real devices within a facility.

The Four Model Components

Load

Used to model devices that consume energy.

Generator

Used to model devices that produce or store energy.

Meter

Used to model devices that measure power, energy, or emissions.

Energy Manager

Used to model devices that make decisions based on power, energy, emissions, price, weather, etc.

Reusing Existing Standards

- OASIS EMIX/Energy Interoperation – Market interactions
- OASIS WS-Calendar - Schedules
- NAESB adaption of the IEC CIM - Meters
- IEC 61850 – Generators and energy storage
- WXXM – Weather data

Reusing Existing Standards

- The SPC 201P committee did extensive work harmonizing existing standards. For example, there were initially three different, incompatible models for representing a power measurement.
- The committee also worked extensively with several of the standards groups providing feedback on portions of their models that had missing or inconsistent information or that had modeling errors.

Applying the FSGIM

- The FSGIM is broken up into Conformance Blocks which encapsulate a group of classes and associations that are necessary in order to achieve a certain functionality.
- Protocol groups are then free to decide, within certain requirements, which Conformance Blocks they will implement and how their protocol will map to those Conformance Blocks.
- Protocol groups self-certify their conformance to the FSGIM, but to do so they must publicly state how their protocol maps to the Conformance Blocks that they claim to implement.
- End products achieve conformance to the FSGIM by implementing a conforming protocol.

Making the FSGIM Easier to Use

- Modular
 - The standard is made to be modular so that users can ignore the parts that do not apply.
- Cross Referenced
 - The standard is extensively cross-referenced (including hyperlinks in the pdf version).
 - The standard also has information that ties each section of the printed standard to the appropriate part of the electronic model.
- Includes a User Guide section
 - UML Basics Tutorial
 - Use Cases
 - Implementation Examples

Using the FSGIM to Connect Facility Protocols to OpenADR 2.0

- The FSGIM uses the OASIS Energy Interoperation specification as the foundation for modeling market interactions.
- OpenADR 2.0 is also based on the OASIS Energy Interoperation specification.
- This makes it particularly easy to map OpenADR 2.0 into the FSGIM.
- Although OpenADR 2.0 is not explicitly a part of the standard, the FSGIM does use OpenADR 2.0b as part of an example of how the FSGIM could be mapped to a protocol.

Current Efforts to Use the FSGIM to Connect to OpenADR 2.0

- The BACnet Smart Grid Working Group is currently working on using the FSGIM to add OpenADR 2.0b support to BACnet, one of the major protocols used for the automation of large commercial buildings.
- Grid Cloud Systems is also working on using the FSGIM to add OpenADR 2.0b support to OPC-UA, one of the major protocols used for industrial automation.

Availability of the standard

- There are plans to release the standard for a Publication Public Review this spring.
- Once the Publication Public Reviews are completed, the FSGIM will become an ASHRAE/NEMA standard.
- The draft standard is also being considered for adoption within the International Organization for Standardization as ISO 17800.
- In addition to the normal paper-based and pdf versions of the standard, there are plans to offer it through RealRead which would allow for free viewing of the standard.
- The committee is also investigating how to make the electronic version of the model available.

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Q&A

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