

A Semantic Testbed for Smart Grid Information Standards

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One of the distinguishing features of the emerging smart grid is that the flow of electricity is augmented with a complex flow of information about the electricity. This information is about power consumption rates, prices, tariffs, control signals, security, authentication, and many more topics. All of this information must be exchanged among utilities, Independent System Operators, facility managers, smart meters, etc. without error. This interoperability problem is much more than simply having connectivity – the proper interpretation of the data is critical.

To achieve information interoperability, information standards are under development in support of the smart grid, and many of them take the form of information models that specify concepts and their relationships to one another. These information model standards must be tested. Integration testing of information standards generally falls into three categories:

- Verification & validation testing, which assesses the correctness of a specification (verification, i.e. consistency, proper structure, data type declarations, proper use of subsumption relations, cardinalities), as well as adherence to the requirements (validation),
- Conformance testing of implementations that claim to use the standard, typically involving the use of testing suites that cover a range of scenarios, and
- Interoperability testing that involves two or more conforming implementations, designed to reveal integration failures due to the “wobble room” of different interpretations of a specification.

This presentation will focus on the verification testing of smart grid information standards, and will illustrate how semantic technology has been used to identify problems with a standard during its development.