Modeling smart grid neighborhoods with the ENERsip ontology

G. López López; V. Custodio Ramírez; J.I. Moreno Novella; M. Sikora; P. M. Soares Moura; N. Fernández García

Abstract-

The electricity consumption in the buildings sector has been steadily increasing during the last decade, up to the point that energy efficiency in this sector has become a major problem for governments, utilities, customers, and the environment. The foreseen high penetration of distributed micro-generation facilities based on renewables can help to reduce the environmental footprint of buildings and households, although the complexity of managing effectively the electric grid increases dramatically under these conditions. The IEEE 2030 standard for interoperability in the Smart Grid remarks upon the importance of well-defined data models in such complex scenarios and puts emphasis on the benefits of ontologies and OWL (Web Ontology Language) for this purpose. This paper presents an OWL-based ontology that formally defines the vocabulary and taxonomy and captures the engineering and business semantics of this domain of knowledge (i.e., energy efficiency in the so-called nZEN - nearly Zero-Energy Neighborhoods). This ontology has been defined under the scope of the EU (European Union) research project ENERsip. The paper also highlights the main benefits the ontology brought to all the phases of the project life cycle, as well as how future work can make the most out of it.

Index Terms- Information and communications technologies for energy efficiency; Machine-to-machine communications; Modeling; Nearly Zero-Energy Neighborhoods; Smart Grid; Web Ontology Language