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Group

SC C6
Distribution Systems and Dispersed Generation

Preferential Subject

PS 2
Concepts and technologies for active
distribution networks

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Subject

Semantic Web technology for Grid control

Summary (enclosed)

Semantic Web technology for Grid control

Semantic technologies are deployed in the representation of knowledge and the development of inference engines that can incorporate reasoning capabilities to the systems.

The S-TEN technology is extending the Semantic Web technologies for applications in industrial sectors. In the field of active distribution networks two objectives are addressed: to enable an automatic re-configuration of a microgrid and to facilitate the integration of demand resources into the control of the grid using market mechanisms.

The grids of the electrical network of the future will need to be highly automated, will require a reduced human intervention and will have a dynamic characteristic. Dynamic characteristic indicates the possibility of the equipment connected in the network to connect, disconnect and provide services to the central controller for managing the network. This capability will require plug and play capabilities that need the specification of standard protocols and data exchange models. But apart from this it also requires to provide self-describing capabilities to the devices and inference capabilities to the grid controller.

Within the EU project S-TEN, co-funded by the European Community's Sixth Framework Programme (FP6), two applications will be developed. One application is dedicated to microgrid control and the other one focuses on the mechanisms for demand side bidding and resources dispatch.

1. Microgrid control application

The application that is going to be developed is related with the secondary control of a microgrid, but taking into account that the knowledge about the components that can be controlled makes the re-configuration of the network simpler. This advantage of adjustable operation facilitates the penetration of renewables, and makes possible an intelligent and distributed reaction to disturbances that can deviate the operation of the microgrid from its intended purpose. In the paper, the components of the microgrid will be described as well as the normal operation scenario and a set of disturbances or deviations from a normal scenario. The kind of disturbances that will be considered are failures of generation sources, the shutdown of modules in charge of scheduling the resources or the failure of generators to give the assigned power to the network. Besides, it will show the ontology used for the self-description of each one of the components and the results of the experiment performed in the laboratory.

2. Demand-Side Bidding

Demand-Side Bidding (DSB) enables the supplier to adjust his Spot Market bids. Such optimized exploitation of loads during the planning phase requires appropriate measures during the operation phase in order to guarantee a balanced system.

Today DSB is only applied to dedicated large single consumers or groups of large consumers with similar behaviour. An appropriate Control, Metering and Communication (CMC) infrastructure is customized based on a case by case analysis.

The S-TEN approach suggests a more generic CMC infrastructure based on Semantic Web technologies. It reduces costs and enables wider DSB participation of smaller consumers.

S-TEN technology will support the self-description of devices and the publishing of services on the web, e.g. storage capabilities of heating and cooling devices could be published dynamically on the web. This information will be exploited for improved bids on one hand and a balanced system within a trading period on the other hand.