Interoperability Between Smart and Legacy Devices in Energy Management Systems

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Abstract: Energy management systems can help to decrease energy consumption by giving user feedback or by directly controlling devices. Smart appliances create a network of devices that can be addressed and controlled via a defined network interface. However, legacy devices will establish a significant portion of a system's power consumption and, therefore, need to be included into the management system. We propose an open architecture to integrate smart and non-smart devices by using smart plugs and non-intrusive load monitoring methods. Devices are connected either as (i) smart appliances via a fieldbus or wireless network, (ii) legacy devices connected to a smart plug, or (iii) other legacy devices being detected from a time sequence of power consumption values, which are disaggregated into the power draws of different devices. At a service layer, device properties are presented in a unified way including a machine-readable description of their features and properties. The data layer provides an abstract representation of data and functionalities. It connects to the application layer where different applications can access the data. The system supports mechanism for service discovery, service coordination, and service and resource description.

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