Consumer Energy Management System with Integration of Smart Meters

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Abstract— ***This paper develops an energy management system with integration of smart meters for electricity consumers in a smart grid context. The integration of two types of smart meters (SM) are developed: i) consumer owned SM and ii) distributor owned SM. The consumer owned SM runs over a wireless platform - ZigBee protocol and the distributor owned SM uses the wired environment - ModBus protocol. The SM are connected to a SCADA system (Supervisory Control And Data Acquisition) that supervises a network of Programmable Logic Controllers (PLC). The SCADA system/ PLC network integrates different types of information coming from the several technologies present in modern buildings.***

The developed control strategy implements an hierarchical cascade controller where inner loops are performed by local PLCs, and the outer loop is managed by a centralized SCADA system, which interacts with the entire local PLC network.

In order to implement advanced controllers, a communication channel was developed to allow the communication between the SCADA system and the MATLAB software.