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A Novel Approach In Demand Side Management For Smart Home

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Abstract

The development of smart grid technology acts as new brain to the power generation and distribution network. Through this technology, the network is not only going to get integrated and turn communicable all over the country but also the demand will be monitored by the control centers and at peak time the usage of electricity is going to cost higher than the nominal rate with intimation given to the customer through sms and mail. Hence it's time for the consumers to act smart or else they will end up receiving highly billed statements. This project presents an idea of having a power hub which has control over all the loads individually. The hub detects the peak time demand and reduces the load usage by switching off unwanted loads with a priority that is being set by the consumer based on game theory's algorithm which schedules load usage by creating several possible schedule vector for consumers such that demand is never raised. This could be done both individually and among multiple users of a community or area. The power hub can also monitor our energy usage and creates an order of importance among the loads, thus providing intelligence to the consumers.

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1. Introduction

In electrified parts of the world, a simple switch brings lights and luxury of other gadgets and appliances to life. This seemingly simple luxury requires a complex network, technically called Power grid, covering generation, transmission and consumption end. This network comprises of generation plants, transmission lines, and transformers. Communication between these entities is much complicated. This task is attempted efficiently by Smart grid. It actually doesn't specify any scale and it ranges from single chain to a power network of entire country

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The power transmission from the power plant to an individual's house is carried via a series of transformers and adjusted, often manually, to deal with fluctuations in demand capacity. Managing this network in a more responsive and efficient way is the goal of the smart grid. The emerging smart grid is the future generation "energy network". This is attained by improving the conventional electrical grid network to be more responsible in terms of Information and communications technology (ICT), and in particular, wireless communications will be integrated into the power grid to enable automation, active operation, and efficient demand response, load and energy management in the smart grid. Smart grid is the most convene of information technology, communications, and power system engineering to provide a more conditioned and potent power system. These features enable utilities to accurately predict, monitor and control the electricity flows throughout the grid. The smart grid supports bi-directional communication to facilitate real-time metering of customers. It also permits the utility to control consumer loads so as to maintain the system parameters within safer limits. The existing smart grid technology is shown in Fig.1 (a).

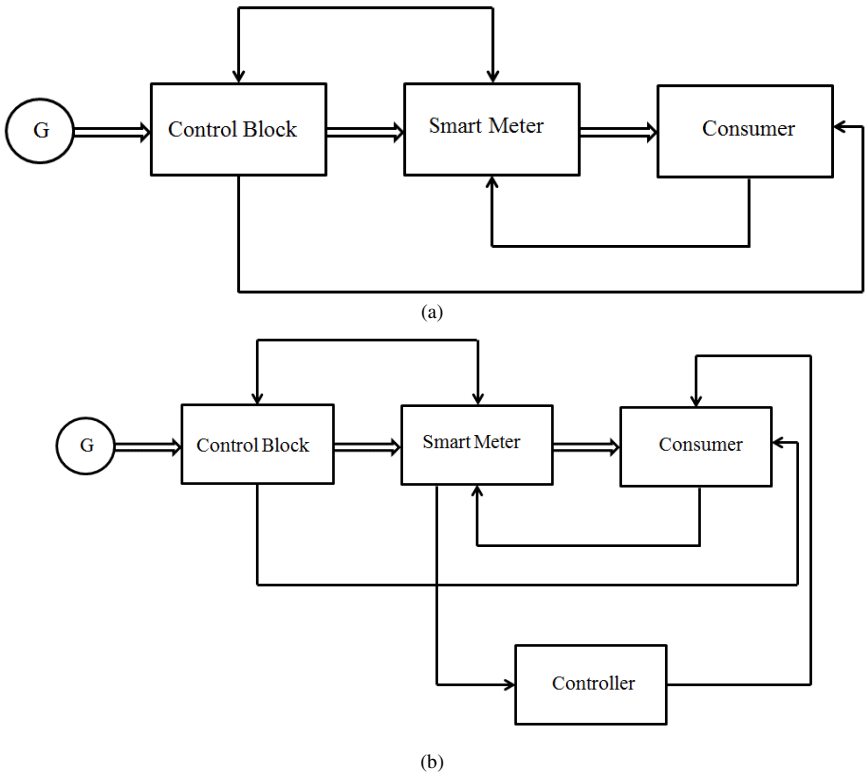

Fig. 1 (a) Block diagram of existing smart grid system (b) Block diagram of proposed smart grid system

Fig 1. (a) explains that the smart meter acts as two way communicator between the consumer and the utility. The utility (represented as control block in the diagram) sends the tariff to the consumer and gets the user's profile of power usage through smart meter. The smart grid uses computer technology to improve the communication, automation, and connectivity of the various components of the power network. This improves distribution by relaying information from consumers to the generation plants. One key element to this system is the installation of smart meters at homes and commercials. Unlike the traditional analogue meters, these digital devices are capable of two-way communication. They provide relaying information about both supply and demand between producers and consumers. The data possessed via smart meters is essential to function as a smart grid. By analyzing this data,