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A NEW APPROACH FOR SMART METERING SYSTEM IN SMART GRID SCENARIO

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ABSTRACT

In Smart Grid, the smart meters plays an important role with intelligent capabilities in order to meet the consumer's demands and their each objective. Smart meters can measures and communicate detailed real time electricity usage and facilitate remote real time monitoring and control power consumptions and consumers are provided with real time pricing and analyzed usage information. In this connection Demand-side management (DSM) programs implemented by utility companies to control the energy consumption in residences appliances which are interfacing the digital meter with many DSM technical properties and Home energy management system is also implemented for the same cause. Future smart grids will likely to be more tightly integrated with the cyber infrastructure for sensing, scheduling, control, dispatch, billing and cyber attacks can be detected by using smart meters and also ordering the power demand through online.

KEYWORDS: Advanced metering Infrastrucure (AMI); Smart metering; Demand side management(DSM);Home energy Management system(HEMS); Interfacing the home appliance (THA);Demand Response(DR);Automated Metering management(AMM); Automated metering Reading(AMR); Real time Pricing(RTP); In home display (THD), Remote monitoring and control power socket (RMCPS); Power line communication(PLC);Back propagation network (BPN); Active power filter (APF).

INTRODUCTION

In Smart Grid, power consumption information at various levels needs to be gathered, integrated and analyzed, and a new type of metering system that has a certain level of intelligence, communication capabilities is accompanied. The advanced metering infrastructure (AMI) is such a system to be operated for real-time monitoring and control of electricity usage. An example of an AMI device is a smart socket which is employing in buildings and residences, AMI send energy usage information automatically to their electricity supplier and by acquiring the information on energy requests and balancing energy loads. In return, based on analyzed usage information the consumers are provided with real-time pricing. The main benefits by adopting AMI are tremendous and great, and many countries governments are preparing for the nation-wide implementation of various smart meters to collect the power consumption data from home appliances and it can have the capability of data transmission to report the meter data that is power demand. Alternatively, a smart meter may connect with the home gate way with a dedicated function of data transmission. The first step in this process is to determine the system's ability to generate and deliver interval data. Hourly readings are the usual interval for asset management purposes. The next step is to determine whether the current deployment sufficiently covers the targeted assets, a smart meter is an advanced meter that can be used to identify and measure power consumption electronically and can communicate this information to another device. Some of the smart meters are equipped with a display for sending data on the amount of power consumed or the corresponding cost to the customers. The IHD is an additional display for sending information to customers. The smart consumer project includes homes and commercial properties as a low voltage consumers and industrial factories as a high voltage consumers and is based on interactions with the utility company, such as automated meter reading, demand response (DR), direct load control (OLC), that are designed to optimize the use of electrical power and to reduce the overall electrical power consumption.

DEMAND SIDE MANAGEMENT AND HOME ENERGY MANAGEMENT FOR ENERGY CONSUMPTION SCHEDULING FOR THE FUTURE SMART GRID

Demand side management (DSM)

Demand side management (DSM) commonly refers to programs implemented by utility companies to control the energy consumption at the customer side of the meter these programs are employed to use the available energy more efficiently without installing new generation and transmission infrastructure. DSM programs include conservation and energy efficiency programs, fuel substitution programs, demand response programs, and residential or commercial load management programs. For the residential load control by home automation, users' privacy [lO],can be a major concern and an alternative for OLC is smart pricing, where users are encouraged individually and voluntarily manage their loads, by reducing their usage at peak hours. Popular pricing options are critical-peak pricing (CPP), time of- use pricing (To UP), and real-time pricing (RTP). In RTP tariffs, the price of electricity varies at different hours of the day. The prices are usually higher during the afternoon in the summer, and on cold days in the winter which is shown in fig no.1

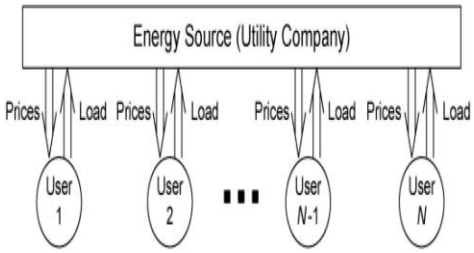

Fig. 1. Demand side management strategy focused on individual interactions between the utility and the user

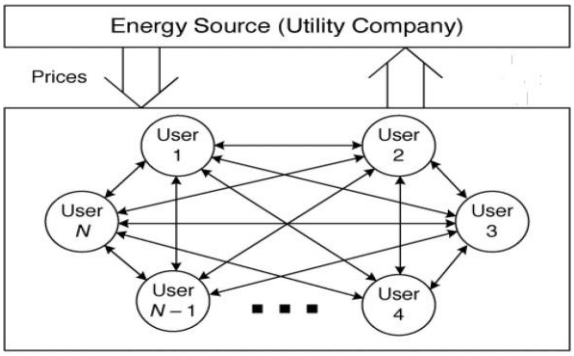

Fig. 2. Demand side management strategy in the smart grid with good interaction between customers and the utility company.

Recently, energy management has become one of the coordination is shown in fig.2. Smart meters can be used not only to monitor but also control electrical usage at individual power outlet ports directly.

PROPOSED SYSTEM

The aim of this project is to study and design the Prepaid Energy Meter Reading and Loads Controlling using mobile that can give an output of the information such as meter reading and bill data, alerting message from the GSM. By using GSM mobile we can monitor the energy meter reading and bill and also we can control the loads.

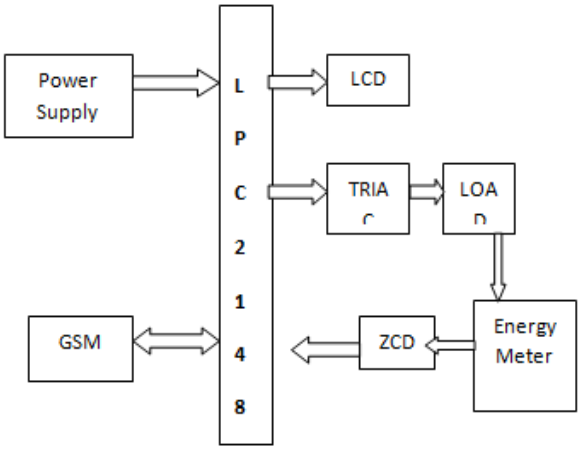

Fig3: block diagram of proposed system

SIMULATION PLATFORM FOR HOUSE HOLD APPLIANCES

A simulation framework that can design with various home appliances and next generation smart metering devices. The power dissipation profiles of individual appliances in house can predict by simulator as well as in a realistic manner the cumulative energy consumption of the house. Using simulation platform, every electricity consumer interested in energy saving as well as the design of a new smart metering system which will be able to simulate and test their respective system from energy perspectives and the total peak power of a house can be reduced significantly by using the information provided by the proposed simulator. We can improve the house energy efficiency by measuring and profiling the power consumption for individual appliances inside the house and we cannot manage what we cannot measure. A few online services have been introduced that can give information on house-level energy consumption those are Google Power Meter and Microsoft Hohm is another webbased platform. To monitor the power consumption of individual appliances, it is needed to attach a metering device to each appliance and without monitoring individual appliances it would be diffIcult to determine how to optimize the appliance consumption for energy reduction, even if the user is informed of excessive total consumption, model simulation with different loads shown in fig.4

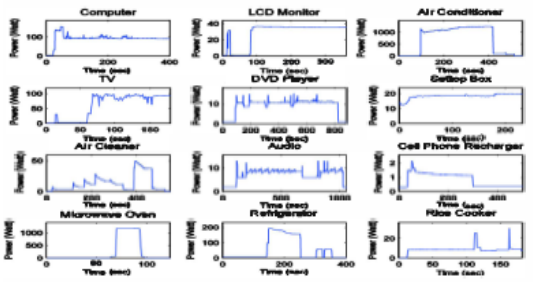

Fig.4The power dissipation patterns of typical home appliances

Recently, more advanced types of wattmeter's have been come up in the market are equipped with communication capabilities for automatic measurement and management those referred as a smart socket through which not only monitor but also control specific appliances through smart sockets. Smart socket based metering systems is still to be addressed some technical challenges. A typical smart socket is equipped with various components such as communication devices, sensors, microprocessors, and the power consumption of each component should be optimized to minimize overhead shown in fIg.5. Core Simulation platform is useful for designing and verifying complex smart metering systems and the designer can model a system, which consists of various home appliances and smart sockets, and simulate its behavior from energy perspectives.

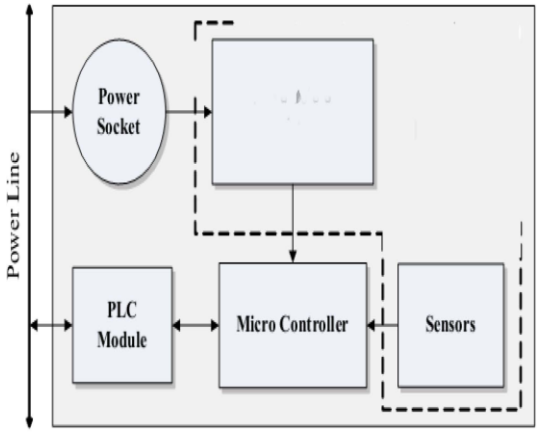

Fig.5. The block diagram ofRMC.

The three key features of Homer are simulation, optimization and sensitivity analysis. Remote monitoring and controlling power socket (RMCPS) can measure energy consumption in real time and store the measured data into its internal memory. U sing IT devices that can access the Internet, the user can acquire the information from RMCPS on the current temperature, the status of ambient lights and the usage of electricity. The consumer can even remotely turn on or off an appliance connected to the RMCPS. The main component of a next generation smart metering system would be the ability to measure the energy usage of individual appliances and to transfer this information to a metering server which can communicate with the electricity supplier about the cumulative usage and real time price information. The conventional electricity supply system to energy aware smart metering system model is shown in the Fig. 6, this type of smart metering functionality is usually not supported.

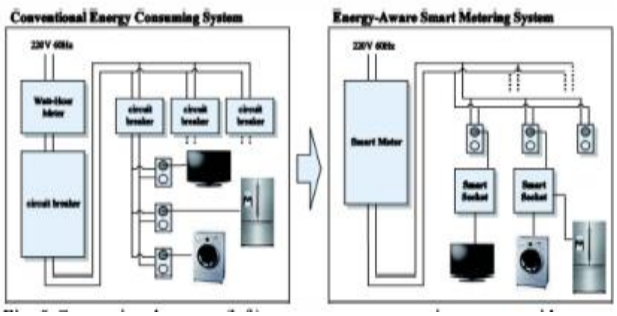

Fig.6 Conventional system (left) versus a next generation system with smart metering supported (right)

CONCLUSION

The versatile use of smart meter in smart grid scenario is great and to be employed in order to meet the consumers objectives in terms of monitoring and control of power consumption and it detailed feedback for billing , saving energy, monitor the load demand by demand side management programs, home energy management system which are been explored. The smart meters are interfacing with the house hold appliance, to know the each appliance power consumption and to save the power by inter coordination between the home appliance, which system is also to be simulated and evaluated based on which simulator can predict the power conservation by controlling the loads on the each home appliance, while doing this harmonic analysis to improve the power quality in the system and it detection, mitigation techniques are have been addressed.

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