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Instant Access of Power Usage through IP Enabled Electronic Power Meter

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Abstract:- Nowadays Electrical Energy is a vital resource for human being for their day to day activities. It is very important to know the usage of electricity to regulate the consumption. The power usage is a very important criterion in places like domestic purpose, industries, public places, etc. At the end of every month as soon as the electricity bill arrives we may be surprised because of over usage, we may get more bill amount and in turn electrical board may demand us pay more ASD (Advanced security deposit). To overcome this problem we propose the new idea of enabling the digital meters to send the instant power usage statistics through Internet. It is very important to know about the basic knowledge of what is electricity meter, how to measure the amount of electrical energy (in watt hour [Wh] units), and power consumption by house hold equipments or devices. We should also know the tariff of the Electrical board for each unit in various domains. By using all these data we can provide an effective regulation of power usage and in turn which leads to expected electrical bill amount. This paper gives a new approach towards instant access of power usage details through IP enabled electronic meter to minimize or reduce the day to day electrical power consumption.

Keywords:- IOT, IP enabled electronic meter, Advance Meter Infrastructure (AMI), kilowatt hour [kWh], ASD (Advanced security deposit),HMI (Human Machine Interface)

I. INTRODUCTION

Intelligent meters represent a prime example of a high-profile Internet of Things application. Rather than simply measuring power consumption, intelligent meters enable the communication between meters with consumers. The result is an awareness of electricity consumption by the household equipments and measures for minimization of power consumption further.

Fig.1: IP Enabled Electronic Power Meter

The above Fig.1 depicts intelligent meters, they are just one aspect of the emerging smart home. In addition to sharing computing files and multimedia content, connected home networks enable a wide range of security, monitoring and automation applications comprising intelligent lighting, smart appliances and other devices. The IoT also provides new ways to interact with devices.

Fig.2: IoT Types

The Internet of Things is generally about using the Internet (which people are accustomed to using for web browsing, SMS, social networking, and e-commerce) as the backbone for communication by sensors, actuators, devices, buildings, streets, machines and smart cities. Many governments deploy ubiquitous IT project, which aims to combine the latest wireless networks and wide-band technologies etc. to accomplish a ubiquitous wireless communication network. The ubiquitous wireless communication network can be utilized for the Advanced Metering Infrastructure (AMI). Therefore, we discuss the new wireless communication technologies to design and implement a IOT-based smart power meter. The proposed intelligent power meter cannot only be used for power consumption data collection but also for outage event data recording. One of the most important issues is to have effective approaches to planning various device actions to satisfy user requirements efficiently and securely in mobile IoT applications. A mobile IoT application can be composed of mobile cloud systems and devices, such as smart phones as shown in Fig 2.

II. LITERATURE SURVEY

Accessing electrical system information from any location allows the system manager to provide quicker command and control of intelligent devices. At the dawn of these devices, the manager could only access system parameters at the distribution location. As data communication techniques evolved, devices could be monitored anywhere within the building or within closely knit campus settings through proprietary protocols. Now, the Internet allows real-time access anywhere on the globe through open protocols [1].

Miscellaneous and electronic devices consume about one-third of the primary energy used in U.S. buildings, and their energy use is increasing faster than other end-uses. Despite the success of policies, such as Energy Star, that promote more efficient miscellaneous and electronic products, much remains to be done to address the energy use of these devices if we are to achieve our energy and carbon reduction goals. Developing efficiency strategies for these products depends on better data about their actual usage, but very few studies have collected field data on the long-term energy used by a large sample of devices due to the difficulty and expense of collecting device-level energy data [2].

Programmable setpoints and two assignable outputs allow control functions to be added for specific applications. This includes basic alarm on over/under current, voltage, power, power factor, frequency, unbalance factor or demand and pulse output based on Energy or Reactive Energy. Status monitoring is possible using the 4 switch inputs. It combines high accuracy measurement with intelligent multi-function and simple HMI interface [4].

III. ARCHITECTURE OF PROPOSED SYSTEM

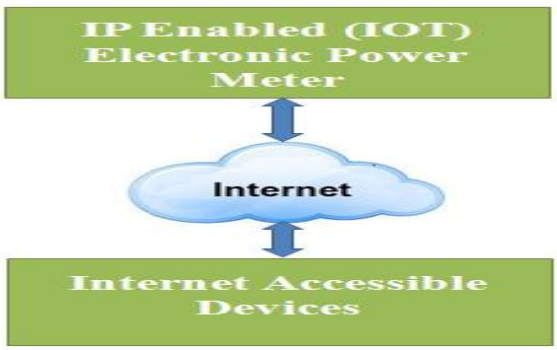

Fig.3: Block diagram of Proposed System

An IP enabled electronic power meter (Fig.3) is a device that measures the amount of electric energy consumed by a residence or electrically powered devices with IOT enabled technology. Electric utilities use electric meters installed at customer's premises to measure electric energy delivered to their customers for billing purposes. They are typically calibrated in billing units, the most common one being the kilowatt hour [*kWh*]. They are usually read once each billing period. This power meter constantly sends the data required by the customer as and when they need through the internet. Using smart phones we can access the complete statistical data calculated and produced by power meter through mobile application.

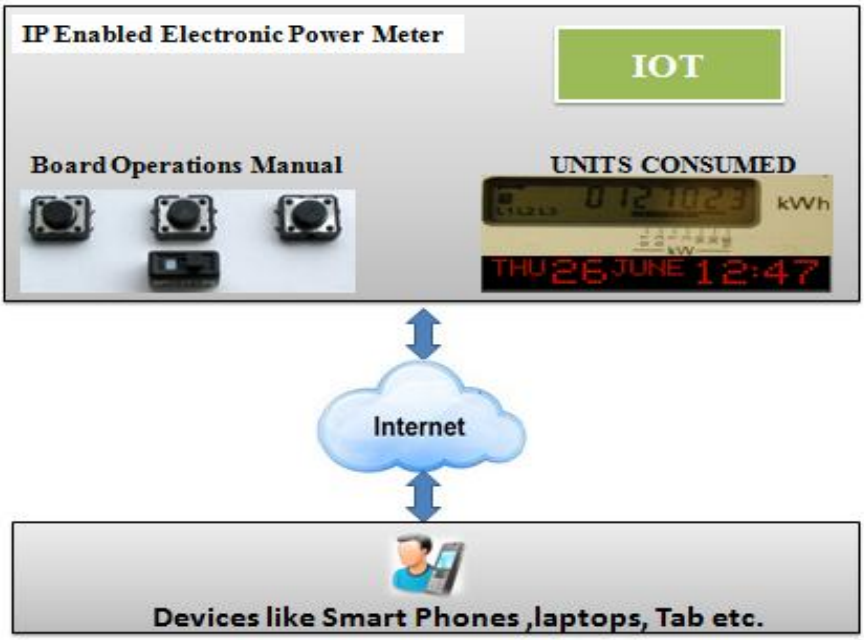

Fig.4: Detailed Architecture of the IP Enabled Electronic Power Meter

The above Fig.4 shows that the detailed architecture of the IP Enabled Electronic Power Meter, which contains the manual operation board, using which user can manually get the instant readings of power usage on the display panel, which shows the units in kWh. Display panel also contains current date and time. The IOT is the device which is connected with Internet and assigned a particular IP address from ISP(Internet Service Provider), this device read the readings from the internal sensors and in turn process the request from the consumers of electricity. This device has to be programmed using embedded systems and it should have the intelligence to calculate the instant bill for the consumed units for power. Once this device calculates the bill details for a particular period, the details are sent to the Consumer's devices like Smart phones, Tablet Phones or even it can a Laptop through the Internet. The hardware can be Rassberry Pai Board at the IP enabled electric meter and it can control the operation of the meter and supports automation.

IV. RESULTS

When IP enabled electronic devices can be managed over a network, users have the ability to access the device through the network anywhere and anytime using the mobile applications. The monitoring of devices is greatly simplified as well. For example, from Intelligent meter instead of a displaying only power consumption, it can communicate with the application available on smart phone to display daily, weekly and monthly reports as and when required with proper interface.

These interactions are from device-to-device and require minimal user involvement. Rather than each system working independently and making decisions with limited data, the IoT enables systems to share information to greatly expand their capabilities and value beyond their original design. In this paper an effective approach to fetch the Instant power usage through the Internet from the intelligent IoT enabled electric meter is presented as a concept. This approach includes a learning technique for dynamically assessing the users' mobile IoT application.

V. CONCLUSION

In conclusion, Instant Access of Power Usage through IP Enabled Electronic Power Meter the virtual world of information technology connected to the real world of things to monitor power usage can be extended

to other house hold appliances like refrigerator, television, washing machine etc.. The technologies of Internet of things such as Sensors and microcontrollers make our life become better and more comfortable.

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