

# Smart Energy Meter With Automatic Data Transfer

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## ABSTRACT

*The Smart Energy Meter with Automatic Data Transfer is designed to make the prevailing electricity billing system simple, Fast and efficient . The conventional metering system billing is done manually. The employee of the Electricity Board came to take the reading and enter it in the card. There are more chances of error in manual calculation and delay in process, tampering of the metering and misuse of the electricity by other sources. It requires large number of workers, some set of workers to note down the reading and others to cut the power if the payment is not paid at the right time and thus we have very poor servicing.*

*Instead of utilizing employees in billing system, we will automate the billing system and that man power will be utilized to provide quality and best service of billing .The system is installed at the site of a standard meter and is used for monitoring and operation by a user with the help of keyword command programming on a data terminal or by personal computer. In the Automatic Metering System designed , the units consumed are measured at the consumer place in the form of pulses , it is transmitted to the Electricity Board side where the total units consumed and amount equivalent is calculated and transmitted back to the consumer module. The monetary values can be displayed bh the consumer module and electricity board side .*

## INTRODUCTION

In Maharashtra , there are more than crore of electricity billing meter that are reads every month , which cost in salaries, transportation and other expenses that tops upto Rs. 3848.4 crore . A Automatic meter reading system still require someone driving by every meter and to get a reading through a employee , but by newer technology - called Smart Energy Meter - wouldnot require even that need to send employee to do it manually.

An Automatic Meter Reading is a sophisticated communication link directly from the meters to the central office computers that will also speed locating service interruptions, faulty meters and service theft, as well as allowing for

expanded services, such as flexible billing dates, time-of-use rates and prepaid accounts. Meters could also be turned on or off directly from the office rather

The study shows that Smart Energy Meter system will save almost 2 to 3.5 crores per year by eliminating meter-reading manually, automating disconnects or reconnects, reducing money and improving meter accuracy and reducing theft of service another good and the positive element of the project will be lower the costs for the services for the consumer as well.

Most of the service providers of electricity, water, are trying to implement this automatic system. For example Northern Ireland Water Supply Company had been specified its requirements and are waiting for the tenders. Maharashtra State Electricity board has also specified its requirements in 2007-2008.

### **CURRENT MANUAL SYSTEM**

Let us try to take the various problems in manual Meter reading on the basis following resources:

#### **1. Meter reading resource: Time**

1. Time require to access the various site.
2. Time require to read and calculate the meter manually.

#### **2. Meter reading resource: Accuracy and Manpower cost.**

1. Accuracy to note the readings.
2. Chances of errors at the time of reading.
3. Errors while recording that was read manually.
4. Errors during entry of the data.

#### **3. Meter reading resource : Hard to access meters : ( some of the meter which takes more than 10 minutes to access )**

1. Some Rural meters
2. Some Indoor meters
3. Various Obstacles

#### **4. Manual Meter reading : Commercial Implications**

1. Conveying tamper recording remains on the meter reader's loyalty.
2. No clue on demand/ over drawls by the consumer.
3. Delay in meter readings, delay bills, delayed revenue, delay in cash-flow

#### **5. Cost associated with meter reading**

The cost associated with meter reading can have the following headings:

### **PROPOSED SYSTEM**

Smart Energy Meter With Automatic Data Transfer . A device which digitally and remotely obtains meter readings and transmits that data to the systems computer by means of communication media such as phone lines, power lines, GSM, or cables for the processing. Smart Meter devices can detect outages remotely connect and disconnect the services, detects the tampering as well as other uses. Economic benefits includes increasing cash flow, lower labour and equipment cost, increased accuracy and lower costs. Benefits include improvement in service quality, more customer choices and faster response of time.

A following Block Diagram is a Set up of the Smart Energy Meter

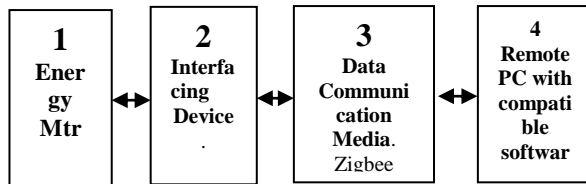


FIG 1: BLOCK DIAGRAM OF AMR SYSTEM

With the help of block diagram we can see that the Smart Energy Meter system consist of the following components

1. Energy Meter
2. Interfacing Device
3. Data Communication Media
4. Remote PC with compatible software

Automatic load control circuit is used to connect or to disconnect the power line of the electric meter. Also the relay circuit is used to switch the state of meter form as On to Off & vice versa. At the normal conditions the power remains On and during on condition load is connected to supply meters and consumes the generated energy. But when the tampering is detected or if in case someone fails to pay bill so in that case a operator from base station generates a command to disconnect the line then again a LED glows which generates and light energy. And this light energy completes the circuit for MCT2E on chip transistor; the output of this transistor is connected to the base of second transistor. When the base voltage is generated and also emitter is connected to the ground then the collector pin produces output and the relay changes its state from normally close to the normally open. Then the magnet activates and arm of relay goes down.

When the bills are paid by the consumer and the problem is completely solved at the tampering end then again the signal is generated by the base station and it deactivates the LED supply. But ,when there is no light source then MCT2E transistor becomes Off condition and the second transistor stops to produce a voltage at its collector pin and in turns a electromagnet of relay de- energizes and arm of relay goes to upward position and the power line is connected to energy meter.

Tampering detection circuit is made of a transducer circuit which senses the physical such as vibrations and converts those signals into the voltage. A piezo-electric transducer is generally used for vibrations detection. Best example in generall as a diaphragm. When a vibrations signal is detected to two levels of signals are generates ,it generated it means a normal signal is generated from vibration which can be ignore not consider as someone is trying to affect a electric meter. But when it generates it seems as a tampering signal consider as that someone try to open the meter or any of physical damage or any wear and tear to electric circuit cables.

In this model , ZigBee based wireless meter demonstrate how to replace the old traditional meters. This new model of Smart Energy Meter eliminates the difficulties which are presents in the older system like saving of the money and labour resources. The data is secure due to its unique ID technique. Wireless meter have an additional features which connects and disconnects the power line directly from meter. One of the advanced technique used in this model is the tamper detection and also the control system.

### ALGORITHM

BEGIN

Select a Zigbee Network Interface and Start capturing of packets

Check for type of packet

If packet=Data

then If SYN=1 and No. of packets> threshold then

```

Else if (source Port, Destination Port, Flags, TTL, total length, checksum)= invalid then
Else if Packet= data
If (source port, Destination Port, checksum, length) = Else if Packet=LNAD
If(Source post=Destination post)= data recived
END

```

Sometimes we have to serialize the objects, example to send them over a network , a store and restore them locally or for any other reasons. Now it can be useful if we know after the deserializing process , if the object has restored correctly. Especially , if you have objects which have internal states or if you must manage multiple instances of a class. A possible solution to this problem is using the `System.Guid` struct to identify the objects. But in this way, you cannot be sure that the internal states, etc. were deserialized correctly.

### **CONCLUSION:**

Smart Energy Meter is the unique solution for problems which is existing manual system. Smart Energy Meter is a self assured automation system. Implementation of the Smart Energy Meter with the help of the standalone system is innovative idea . There are more chances of manual errors , delay in processing, tampering of the meter and misuse of the Electricity by other sources but with the help of Automatic Meter Reading, we can easily overcome this anomalies.

Standalone Smart Energy Meter system is most suitable to implement transfer of the unit. Using prepaid services , we can make proper use or storage of the electricity. Economic benefits include increased cash flow, lower labour and equipment cost, increased accuracy and lower costs some customer satisfaction benefits include improved service quality, more customer choices and faster response time.

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