

AN EMBEDDED SYSTEM FOR WIRELESS PREPAID BILLING OF DIGITAL ENERGY METER

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Abstract

The present system of energy billing is error prone and also time and labor consuming. Errors get introduced at every stage of energy billing like errors with electro-mechanical meters, human errors while noting down the meter reading, and errors while processing the paid bills and the due bills. There are many cases where the bill is paid and then is shown as a due amount in the next bill. There is no proper way to know the consumer's maximum demand, and usage details. The major drawback of a post paid system is that there is no control of usage from the consumer's side. There is a lot of wastage of power due to the consumer's lack of planning of electrical consumption in an efficient way. Since the supply of power is limited, as a responsible citizen, there is a need to utilize electricity in a better and efficient way. The distribution company has to receive huge amounts in the form of pending bills, which results in substantial revenue losses. The remedy for this drawback is prepaid energy meter means "pay first and then use".

Keywords: Wireless communication, EB office, RF system.

I. INTRODUCTION

The trend of the time has always been in favor of that technology which finally become cost-

effective as well as an elegant one. Technology using the embedded technique has an edge over the other clumsy ones that are done. With the advancement of civilization, the need for wireless prepaid billing system which is meticulous in use will surely be a welcome thing for the society. Human weakness is prone to partiality, but scientific ways, that too, through electronic devices are free from this. The desirability of this embedded system for wireless prepaid billing arises due to the inconvenience of the conventional mode of billing, as mentioned under.

- In post paid system, there is no control of usage from the consumer's side. There is a lot of wastage of power due to the consumer's lack of planning of electrical consumption in an efficient way.
- Visiting every consumer's home is something that causes a bit of inconvenience. Sometimes room/houses is found locked this comes as an embarrassment for the employee on duty also.
- For manual reading, in different houses, conditions vary, leading to somewhat erratic/ approximated results, especially when the meter are inside the home or in a hard-to-access place. In the typing stage again there

are chances of errors. All these lead to not so accurate billing.

- Consumer is not aware of the costs and service consumption until the statement charges are received. This might crest problems for the customer at the time of payment.
- Payment is required by the customer periodically at a fixed period. If the customer does not pay within the period, the service is disconnected manually until payment is made.
- The billing system is required manpower, which significantly increases the network operation costs.

Based on the above, the conventional billing systems are discrete, inaccurate, costly, slow, and lack of flexibility as well as reliability.

I. ARCHITECTURAL DESIGN

1.1. Proposed System Architecture:

- For billing purpose RF communication is used, because they are practical, versatile, simple, easy to use and economical.
- This wireless communication operating in a license free frequency band proves to be relatively inexpensive.

1.2 Module Description:

There are two modules in the automated EB billing system. They are:

- EB office module
- Consumer home module

1. EB office module: The EB office module has a complete database of the voucher card number at the back end as shown in fig 1.1. After the voucher card number are got from the home units. EB office module checks whether this number is accurate or not. If the number is accurate then units are transfer to the consumer's house.

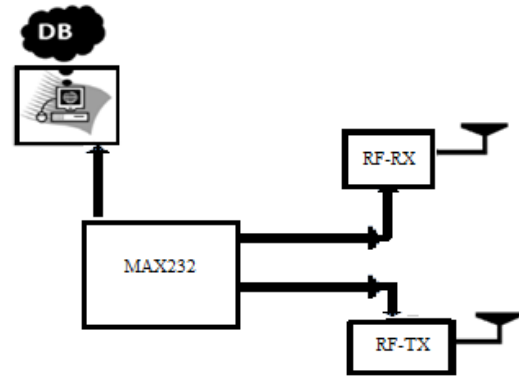


Fig-1.1 Module 1-Block diagram



Fig-1.2 Transmit Data Frame format from EB Office side

And they are displayed in the LCD display for the user to make note for it. The transmit data format from EB office to consumer side is shown in figure 1.2

The data's are transmitted and received using RF transmitter and RF receiver. The max232 is a line driver which converts the RS 232's signal to TTL voltage level and vice versa.

2. Consumer home module: The home unit consists of a microcontroller, a LCD display unit, RF transceiver and keypad as shown in fig 1.3. The major component of the home interface is the AT89S52 which has an 8K Bytes of In-System Reprogrammable Flash Memory. The unique ID which is assigned to each home unit is stored in this memory. The microcontroller checks the message which reaches from the central EB office; if the destination ID matches its ID then the work is done else the message is passed on to the next unit in the network.

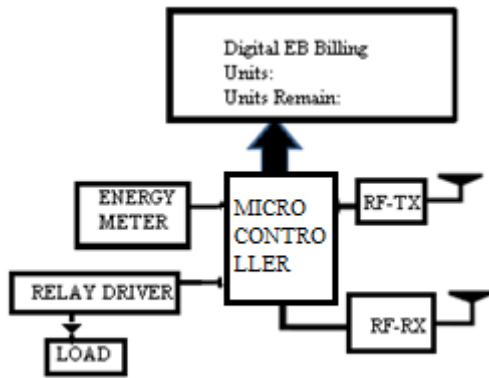


Fig-1.3 Module 2-Block diagram

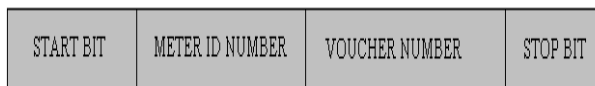


Figure 1.4 Transmit Data Frame format from consumer's side

The home unit is connected to the EB office via RF frequency waves which transmit data to the EB office. When user enters the voucher number then the microcontroller sends a frame which is shown in figure 2.2.

This frame is used by the EB office and check either the number is accurate or not. After checking the EB office sends the units back to the home unit which is displayed on the LCD display.

II. CONCLUSION:

A new automated measurement and billing system Electricity is designed. It is proposed to replace the existing traditional discrete systems with an integrated system. The new

system provides the flexibility and reliability for customers to pay any time using a credit card. Also, the system reduces significantly the overall utility network operation costs. This proposed Automated EB model includes an office module which has a PC with its back end connected to a database. The other module is the consumer's home module which is present at the home this module is used to display the number of units remain and to recharge the meter. This EB office module checks the voucher number and units are send to the consumer's house. The advantages of this model are:

- Automation of all features including communication from the EB office to the consumer's home.
- Saves data using automatic control and storage systems.
- It involves less cost to communicate.
- This system increases productivity.

III. REFERENCES:

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