

## AMR for Electricity through Transmission Lines using PLCC

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**Abstract**—in this we have prepared Automatic Meter with using PIC microcontroller And Power line carrier communication in order to make Billing of the power consumption easy and provide a better communication between service provider and the user and we made power theft detecting and alerting system. The main purpose of implementing this project using PLCC is to reduce the man power, reduce the cost for taking meter reading, increase accuracy of the entire system along with theft detection and overload protection. When the IR Sensor is breached the signal is sent to microcontroller. Then signal is sent through power line modem of the AMR at the house to the Power line Modem at MSCB's Power line Modem which has information about the ID of the user and time of breached. The other output is given to the relay which cuts off the Power Supply of the user for certain time. The RTC is used to see the real time and all the accounts are handled by its time basis. The output of time meter reading and number of units burned is shown on LCD.

**Index Terms**— PLCC, AMR,

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### I. INTRODUCTION

Power is the soul of world which is related to the electricity and "electricity" is the word which now rules the world. Electricity is a very essential source in day to day life. Almost all industries use electricity. In commercial areas also electricity plays very vital role. Thus we can say that electricity is backbone of any developing nation. The electricity is provided to each and every consumer, then there is a measurement of electricity used, and the bills are generated. This project is used to take meter reading using Power Line Carrier Communication (PLCC). This project will provide the accuracy and speed in MSEB meter reading.

### II. LITERATURE SURVEY

The power-line network is a large infrastructure covering most parts of the inhabited areas. In Sweden the power is typically generated by, e.g., a power plant and then transported on high-voltage (e.g., 400kV) cables to a medium-voltage substation, which transforms the voltage into, e.g., 10kV and distributes the power to a large number of low-voltage grids. [1]

Each low-voltage grid has one substation, which transforms the voltage into 400 V and delivers it to the connected households, via low-voltage lines. Typically several low-voltage lines are connected to the substation. Each low-voltage line consists of four wires, three phases and neutral. Coupled to the lines are cable-boxes, which are used to attach households to the grid.

Many systems today use a topology with a central node (the sub-station) communicating with clients (the households). All communication is between the substation and the households and there is no communication between households. Because there is a physical connection between every two households it would also be possible to support this kind of communication. As an alternative, this communication could be routed through the sub-station. [2] Power-line communication is based on electrical signals, carrying information, propagating over the power-line. A communication channel is defined as the physical path between two communication nodes on which the communication signal is propagated. In a low-voltage grid there is a lot of different channels, in fact the links between

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the sub-station and each household are all different channels with different characteristics and qualities. If the communication system supports communication between households all these links are also different channels. [3]

### III. PLCC

Power Line Carrier Communication is system for carrying data on a conductor also used for electric power transmission. Electrical power is transmitted over high voltage transmission lines, distributed over medium voltage, and used inside buildings at lower voltages. Power line communications can be applied at each stage. Most PLCC technologies limit themselves to one set of wires (for example, premises wiring), but some can cross between two levels (for example, both the distribution network and premises wiring). Typically the transformer prevents propagating the signal so multiple PLCC technologies are bridged to form very large networks.

### IV. BLOCK DIAGRAM

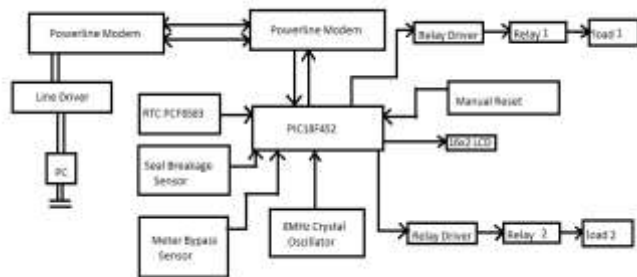


Fig.1: Block Diagram of the AMR for electricity through transmission Lines using PLCC

### V. BLOCK DIAGRAM DESCRIPTION

Block Diagram of the Automatic Meter Reading and Security using PLCC is as shown above. Microcontroller PIC18F458 is the heart of the project which works on 5V power supply. It monitors an analog meter- an electronic device that measures the amount of electrical energy supplied to a residence or business plant. It is electrically fed and composed of electronic controllers, a real time clock, current sensor for calculating the amount of input current, a seal breakage sensor in case there is any malpractice carried out with the energy meter such as breaking of seal or bypassing of power from outside the meter. An overload sensor is also used in case the consumer draws heavy current which might affect his home appliances. There is also an LCD display which will display the information provided to it by MSEB side. Its shape and size varies from application to application. Here we will use 16x2 LCD.

A power line modem is interfaced with PIC microcontroller. This power line modem is a bi-directional transmitter and receiver on which microcontroller sends and receives data. Power line communication (PLC) is a wire line technology that is able to use the current electricity

networks for data and voice transmission. The carrier can communicate voice and data by superimposing an analog signal over the standard 50 or 60 Hz alternating current (AC).

This bi-directional power line modem will receive the transmitted data from home side and provide it to the microcontroller for further process so that accurate billing process is carried out. It also helps the MSEB side to keep an eye on overload on home side and also detect the theft if any.

### VI. RESULTS AND SIMULATION

The programming for the PIC microcontroller was done in Micro C for PIC. Express PCB is used for designing the PCB. After replacement the down time of the machine is reduced and the efficiency of the machine is enhanced. Also the maintenance cost of the machine is reduced and the quality of the product is improved.

When the IR Sensor is breached the signal is send to microcontroller. This signal is informs the microcontroller about which sensor is breached (seal breakage sensor or line sensors) then the according message about the seal breakage is displayed on seven segment display. Then the working of PLCC comes into play , microcontroller sends the signal to the PLCC modem Then signal is carried through power line carriers giving information about the house having that meter to the Power line Modem at MSEB's which has information about the ID of the user and time of breached. The other output is given to the relay which cuts off the Power Supply of the user for certain time. The RTC is used to see the real time and all the accounts are handled by its time basis. The Billing is done by checking the date on the RTC it Calculates total number of unit burns between 1 month period (that is from in between two consecutive month first date of the month)The output of time meter reading and number of units burned is shown on LCD

### VII. ADVANTAGES

- Accurate meter reading, no more estimates
- Improved billing
- Reduction in human error
- Accurate profile classes and measurement classes, true costs applied
- Improved security and tamper detection for equipment
- Less financial burden correcting mistakes
- Transparency of "cost to read" metering
- Overload protection thus ensuring safety of the consumer and household appliances
- Reliability increases
- No signal-loss due to obstacles, concrete walls or slabs. Better communication range (hundreds of meter) than typical wireless solution
- Monitoring of consumption on hourly / daily / weekly basis
- Efficient resource (Gas/Water/Energy) monitoring.

- Robust in nature

## VIII. CONCLUSION

We can conclude that we have designed more efficient Meter which perform the Billing automatically and provides a better way to reach the data from the meter to the provider(from consumer's meter).This automatic meter prevents any kind of theft that can possible from the meter and inform to the provider(about theft).We used PLCC (Power Line Carrier Communication) to Carry the information through power lines which will reduce the efforts and the circuitry for the communication between provider and consumer.

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