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Carrier Communication for Domestic AC power Line

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Abstract*:* This paper aims at introducing an old technology in a new way. Now-a-days the most common thing for control systems is the power line carrier communication. The main aim of our paper is transmission and reception of digital data from one place to another place with the help of PLCC modem through transmission lines without installing new wiring. A power line carrier system includes three basic elements transmission lines, transformers and coupling devices. Our main motto is that it can be established in remote areas with existing power lines with high data rate and less cost. Using the existing AC power lines as a medium to transfer the information/data it becomes easy to connect houses, offices etc with a high speed network access point.

Keywords: Latest Technology, PLCC, Communication, EHV.

I. INTRODUCTION

Power line carrier communication is a communication method that uses electrical wiring for transmission of electric power as well as data. In this paper the main aim to give a clear idea of how transmission and reception of data can be done with the help of Existing Cable Wires (EHV transmission lines). As power lines were already available it made much more sense to use them either then investing in making of new lines. There is a need to additional wiring and makes it possible to retrieve information from the power outlets. This system consists of a transmitter section and receiver section and the communication between these two sections can be done with the power lines. These sections are actually PLCC modem which is used to convert the data into that signal which can be easily transmitted through the power lines. The main application of this project is to use for domestic purposes. Communication over the power line will have the following advantages:

- Electrical customers are higher than telephone, Cable or other wired communication customers. This will give a high potential market for the investors.
- It is available at a much lower cost in a much compact design.
- No separate wires are needed for communication purpose, as the power lines themselves carry power as well as communication signals.
- Power lines have higher mechanical strength compared with ordinary lines. They would normally remain unaffected by the conditions, which might seriously damage telephone lines.
- It provides the shortest route between the power stations.
- It have large cross sectional area resulting in very low resistance per unit length.
- Power lines are well insulated to provide only negligible leakage between conductors and ground even in harsh weather conditions.

II. REVIEW WORK

[1] The PLCC uses existing power line infrastructure for communication purpose. This technique is still used by several utilities that use analog or digital devices to transfer 9.6Kbits/s over many miles of electrical cable. This technology enables data transfer at narrow or broadband speed through power lines by using advanced modulation technology. The system basically consists of two modules, the transmitter and the receiver that can communicate with each other using the existing power lines. This technique is still employed by several utilities that use analog or digital devices to transfer 9.6 Kbits/s over many miles of electrical cable.

The basic block diagram of the transmitter for data communication using power line carrier communication system is shown in Fig. 1 .The existing electrical layout is used to transmit the data or command for the proposed control system from one point towards other without any interference in the electrical signal within the same house. The system can be used to transmit a data signal in the frequency range of 3 KHz to 148.5 KHz. Since we are using a PLC which is a data communication device. The data code generated is modulated using any of the popular modulation techniques and after that it is fed to the amplifier. Later the signal enters to the power line through the interface circuit that includes a

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resistor and a capacitor i.e. Line matching unit and coupling device. The coupling capacitor is used so that we can couple the 5V signal to the 230V signal so that the circuit will not get disturbed.

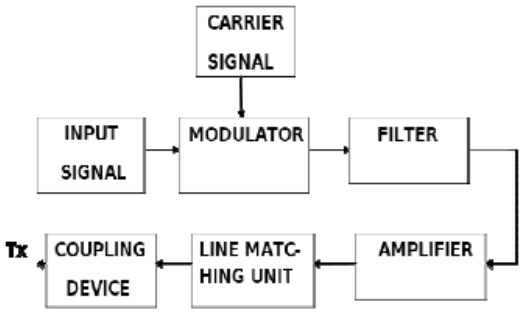

Fig. 1 EPLCS TRANSMITTER

The basic block diagram of the receiver for data communication using power line carrier communication system is shown in Fig. 2.The data that is received is first fed to the amplifier to strengthen the weak signal and then it is given to demodulator then we get the original message signal.

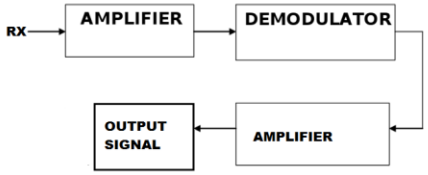

Fig. 2 EPLCS RECEIVER

[2]This paper gives an overview of PLCC technology, its importance, its standard etc. Power transmission towers and lines are some of the most robust structures ever built. With the arrival of broadband access, the demand for sending digital voice, video and internet data within the home is increasing continuously. Automatic meter reading*:* In this technology, data from energy meter is automatically collected and transfer to the central database for bill and analysis. The main aim for the automation of meter reading is not to reduce labor cost but to obtain data rate that is difficult to obtain. In most of the places, users have demanded that their monthly bill be based on actual reading, instead of the bill which is based on prediction. Home networking and Internet Access: More number of computers is connected in a building by using existing network as a Local Area Network (LAN). Home Automation: for remote control of lighting and appliances it is power line communication technique which is used. Power line communication uses existing wiring in the home. Transmitting radio programs: Over power line some time power line communication was used for transmitting radio programs. It is known as carrier current system when operated in the AM radio band. For communication large portion of the radio spectrum might be used for high frequency communication.

[3] In this paper design and implementation of a smart power monitoring distribution system is given. Now a days Data transformation and voice communication is done in EHV transmission line through PLCC for the efficient production, management and safe transmission and there is no perfect tool or monitoring system available for distribution management. In power system operation regarding communication is critical and vital. To effectively monitor the consumption of industrial domestic and commercial power utilization, our project energy and power data transfer through the domestic power lines is the best for power consumption monitoring system. This technology has some salient features like capital cost of the PLCC equipment is less, it saves a lot of time by collecting many readings in few minutes time, and this technology has high accuracy in data transmission and no data loss.

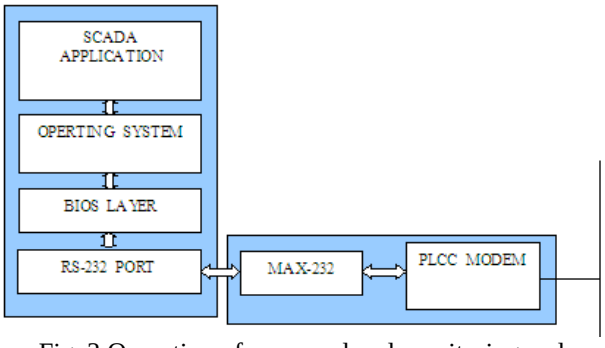

Fig. 3 Operation of users end and monitoring end

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[4] Power-line communication technology is applied to identify cables in power Distribution system. The application area of power-line communication will be extended in this paper. Power cable circuits have only a limited ability to carry higher Frequencies. Also, transformers prevent propagating the higher frequency carrier Signal. The proposed method uses its limited propagation ability to identify the cable. A new cable identification system is proposed and implemented. The system consists Of a transmitter and a receiver with power-line communication module. Some Experiments are conducted to verify the theoretical concepts. For the proper application of the cable identification technology, characteristics of higher frequency carrier propagation are analysed through several transformers. Experiments shows also that the carrier signal is not transferred over the higher level transformer. For the further research topics, more experiments are considered.

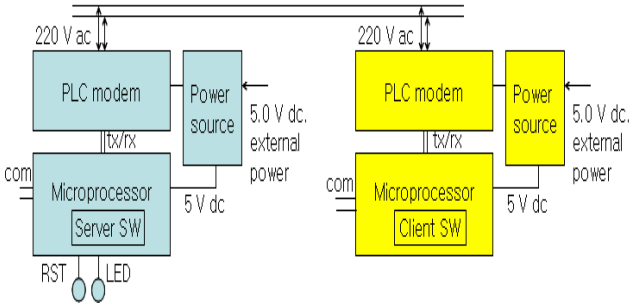

Fig. 4 Architecture for cable identification system

[5] Renewable energy resources for electric power generation have got the spotlight by Industry and academia as greenhouse effect has become more severe. Micro Grid is an isolated power system that has generators and power loads. For isolated area Micro Grid is an ideal power system for generating electrical power with renewable energy Resources like the solar and wind energy. However generations with renewable energy Resources cannot meet the demand of loads securely. So smart applications with Communication infrastructure are required to control and monitor the power system. Many technologies including cellular network and PLC are competing for Communication in Micro Grid. This paper provides discussion of power line Communication technologies for Micro Grid Micro Grid is an ideal power system to use renewable energy resources for electric power generation. Generation using renewable energy resources can reduce greenhouse effects; however, it cannot meet the demand of loads securely. Therefore intelligent applications have to play a big role to operate Micro Grid securely and the communication infrastructure for a smart application is also necessary. In this paper, Power line communication technologies for Micro Grid have been discussed.

III. METHODOLOGY

A. PLCC Transmitter and Receiver:

This block diagram explanation will give the basic idea about the flow of data from one end to the another end. We first generated a sequence of random bits i.e. a digital data. This will act as the input given by the user which is to be transmitted to the receive. This digital input which is considered as data cannot be directly sent over the power line because the data is bound to introduce an error due to noise present in the power line. Noise on the line cannot be curbed but the error introduced can be detected and corrected. For that Hamming codes are used which is capable of detecting multiple errors and can correct multiple errors. Now we have a bit stream of data and check bits.

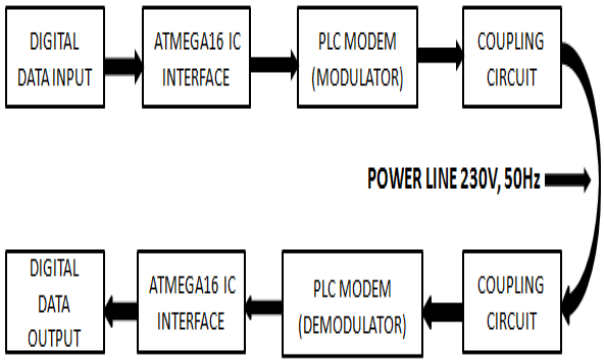

Fig. 5 Block Diagram of PLCC Transmitter and Receiver

We need an interfacing device and we are interfacing a controller IC ATMEGA16. These are some of its specifications it has16K BYTES of System Programmable Flash, 512 BYTES of System Programmable EEPROM, 1K Bytes SRAM, Analog Comparator, Watchdog, 2 8-bit Timers plus prescaler,16-bit Timer with extra features, 4 PWM, 8 channel 10-bit ADC, UART, SPI,2-wire byte orientated serial interface, Low power and Idle modes, External and External interrupts, selectable on-chip Oscillator. ATMEGA 16 IC is interfaced with PLCC module .PLCC module is used to inject our digital data to power lines i.e. to convert the digital data into analog one. These are some of the specifications of PLCC module –It Transmit and Receive serial data at 9600 bps, it is powered from 5V , it has low cost and is simple to use, it has built in Error Checking ,direct interface with microcontroller uart txd, rxd pins. Coupling provides the necessary isolation between low and high voltage. The functioning of the receiver side blocks is the exact opposite as that of transmitter side. The coupling circuitry on the receiver side not just provides the isolation but also acts as a tuner circuit which allows only the high frequency in a selected band. The PLCC demodulator does the exact opposite of PLCC modulator. It decodes the two frequencies into respective 1's and 0's. The hamming decoder will detect and correct error if any. By using the check bits the hamming decoder can detect multiple errors but correct only single bit errors. After the corrected code is received the decoder will remove the check bits so that the original data transmitted is extracted and displayed.

IV. CONCLUSION

India's image as a low cost development country in the world would get a major boost by the implementation of this technology on a wider scale. The power sector in India is expanding exponentially and so are the losses which include power theft. This technology has some salient features like capital cost of the PLCC components is less, it saves lot of time, this technology has high accuracy in data transmission and no data loss. Power Lines Communication would result in a very large scale savings of the tax payers' money. Efficiency of the existing infrastructure would be enhanced thus giving more value for money. It aims to ensure that the PLCC system can be used as a plug and play device without any major investments on the part of the consumer. PLCC is a technology that has the potential to revolutionize communication and to change the lives of the citizens if factors such as cost, effectiveness and security are carefully handled. As it includes many advantages over other types of communication, it can be constructed or structured into compact form or portable form. The duplex form of PLC is used now a days which allows the user to transmit and receive the data from the same platform. This is the biggest revolution in PLCC technology as far as communication over small houses, office networks and hub communication is concerned.

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BIOGRAPHIES

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