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A Real Time operation and Control of Devices using Power Line Communication

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ABSTRACT: In order to improve the efficiency and reliability of power delivery, Future Smart Grid systems will intelligently monitor and control energy flows. This monitoring and control requires highly reliable communication between customers, local utilities and regional utilities and also low-delay. A vital part of future Smart Grids is the two-way communication links between smart meters at the customer sites and a (decentralized) command and control center operated by the local utility. Narrowband power line communication (PLC) systems operating in the 3-500 kHz band are attractive to enable these two-way communication links because they can be deployed over existing outdoor power lines. However, Power lines, have traditionally been designed for unidirectional power delivery and remain hostile environments for communication signal propagation. In this article, with the use of PLC systems we review signal processing approaches to model channel impairments and impulsive noise and mitigate their effects in narrowband PLC systems. We will study the ways to improve the communication performance based on emerging standards and current.

Keywords *–PDSL, FPGA, PLN, PLC Etc...*

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I. INTRODUCTION

Programming logic control is abbreviated as PLC Similar to power line communication. Programming logic control is programmed software which helps to operate electromechanical machines automatically according to commands or orders given by user through logical programming.

PLC can be seen as a platform for various Smart Grid applications. These applications include load balancing and real-time monitoring, improving grid robustness to disturbances, integrating alternate energy sources into the grid, and electric car charging and billing. Currently one of the main target applications for PLC is the smart metering. Frequent meter readings of up to one read per 15 minutes per meter can provide the utility and the end user with better information about the load usage. The utility can use this information to optimize power generation and perform load management with finer time granularity. To save on energy costs the users can use this feedback to adjust their usage patterns. The different frequency channels and other properties are given in Fig. 1.

The house hold meter collects usage information and sends this data across the low-voltage (LV) access network. Depending on the deployment environment, this information is aggregated at an LV router and passed through the transformer to an MV router (in Europe), or directly through the transformer to a medium-voltage (MV) router (in the US as shown in Fig. 1). Consequently, the MV routers forward the information to a concentrator that is connected to the utility company through a telecommunication backbone (such as WAN). Mainly a bus topology is used, other access topologies such as star and ring topologies are possible [2], [3]. Control data from the utility would flow in the opposite direction toward the customer, been developed to use in every part of the grid In Power line communication. With the use of existing power line we can provide the communication path between the devices i.e. without implementing the new path for communication we can carry the data on the conductor directly. Though power line communication is most economical way for communication but has lots of problems i.e. attenuation, losses etc. But in the recent year to make it suitable for high quality data communication lots of work has been done to reduce the drawbacks in power line communication. In this paper we proposed to develop programming logic control system for automation of machinery while carrying a data through

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power line communication which can control the automation of machineries dynamically and economically.

Fig. 1. Examples of different PLC channels in frequency domain and their corresponding RMS delay spreads

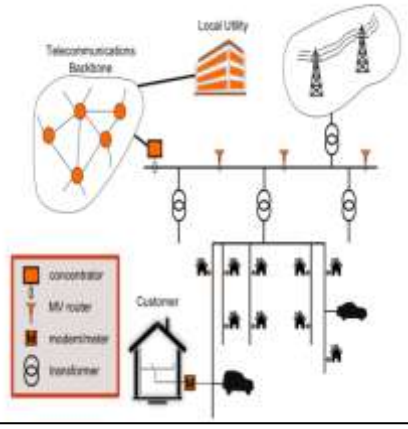

Fig. 2. Network-level system model for local utility powerline communications for US deployment: Meters transmit usage and load information on the LV access network through the transformer to a MV router. In turn, the MV router forwards this data to the concentrator that sends it to the utility company over a telecommunication backbone.

II. LITERATURE REVIEW

Various approaches have been used for power line communication and programmable logic control such as power-line communication (PLC) signal processing. We briefly review previous works used in power line communication based on different technology. In this approach we are going to develop programming logic control for power line communication which can be used for automation in industries and home using power line communication.

The power line communication is primarily used to control machines. For PLC a program is written, which operates the functionality of machines based on the internal program and the input conditions. A Programmable Logic Controller i.e. PLC or Programmable Controller is a digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. Many industries and machines uses PLC. Unlike general-purpose computers, the PLC is designed for multiple inputs and output in this aspect PLC is similar to computer. However PLC is designed to programmed once and run repeatedly as needed. In fact a crafty programmer could use a PLC to control not only simple devices such as a garage door opener, but their whole house , including monitoring a custom built security system and switching light on and off at certain times, etc.

Most commonly, in an industrial environment a PLC is found inside of a machine. An automatic machine can be run by PLC for years with little human intervention. They are design to withstand most rough and harsh environments. So, in this concept we will going to design and developed PLC concept using programming in embedded c, Dot Net languages which will be executed and run the machineries automatically in power line communication network.

III. POWER LINE COMMUNICATION

Power line communication (PLC) carries data on a conductor that is also used simultaneously for AC electric power transmission or electric power distribution to consumers. It is also known as power line carrier, power line digital subscriber line (PDSL), mains communication, power line telecommunications, or power line networking (PLN).

Fig 3: PLC Communication

IV. POWER LINE MODEM

Power line modem is useful to send and receive serial data over existing AC mains power lines of the building. It has high immunity to electrical noise persistence in the power line and built in error checking so it never gives out corrupt data. The modem is in form of a ready to use circuit

module, which is capable of providing 9600 baud rate low rate bi-directional data communication. Due to its small size it can be integrated into and become part of the user's power line data communication system

Fig 4: PLC Modem

V. BLOCK DIAGRAM:

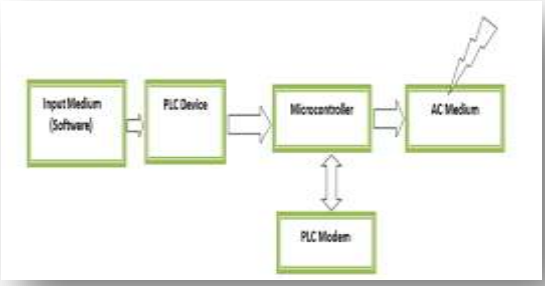

Fig 5: Block Diagram Transmitter

In the transmitter case the input medium will be the software (Programming logic and control) interfaced with the the microcontroller for process the information to the PLCC Modem. Here PLC Modem will be act as a transmitting medium of communication via AC Medium.

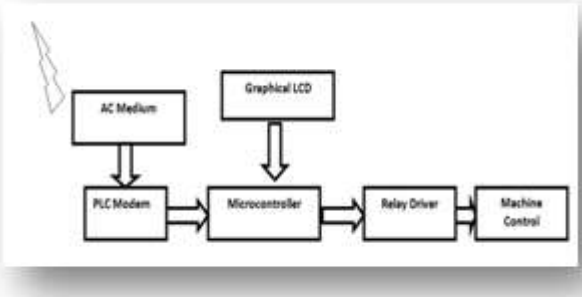

Fig 6: Block diagram Receiver

In the receiver end the PLC modem will receive the signal from the electrical lines and send it to the microcontroller for its further processing. Here the digital signal coming from the microcontroller will be directly given to the relay driver for driving the relay and switch on the machine as per the logic.

VI. APPLICATIONS:

- Automatic Meter Reading
- Lighting Control
- Intelligent Buildings
- Heating & Ventilation, Air conditioning Control
- Lighting Control
- Status Monitoring and Control
- Low Speed Data Communication Networks
- Home Automation
- Fire and Security Alarm System
- Sign and Information Display
- Remote Sensor Reading
- Data/File Transfer Process Control
- Fire & Security Alarm System
- Power Distribution Management

VII. CONCLUSION:

In the transmitter case the input medium will be the software (Programming logic control) interfaced with the the microcontroller for process the information to the PLC Modem. Here PLC Modem will be act as a transmitting medium of communication via AC Medium. In the receiver end the PLC modem will receive the signal from the electrical lines and send it to the microcontroller for its further processing. Here the digital signal coming from the microcontroller will be directly given to the relay driver for driving the relay and switch on the machine as per the logic.In this way we are going to interface programmable logic control in power line communication so as to work efficiently and economically.

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