TRANSMISSION OF DATA THROUGH POWER LINE COMMUNICATION

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Abstract : In this paper, transmission of data over power line is carried out using control signals and communication signals. Broadband over power lines uses higher frequencies, a wider frequency range and various technologies from other forms of power-line communications to provide high-rate communication over longer distances and it allows data to be transmitted over utility power lines. It has the advantage of quicker, cheaper, and simpler to deploy in rural areas than higher cost, high-speed broadband over telephone cables. PLC is like any other communication technology whereby a sender modulates the data to be sent, injects it onto medium, and the receiver de-modulates the data to read it. Technical challenges including interference, signal attenuation, noise, lack of standards, and threat to data security are discussed.

Key words : *Broadband over power lines(BPL),Power Line Communication, digital subscriber line, Internet over power line*

I.INTRODUCTION

Power line communications (PLC) provides broadband data communications on conductors already used for electric power transmission using a modular signal. This is commonly done through home or premises wiring, but may also be done through the electric power distribution system. BPL is also sometimes called Internet over power line (IPL), power line communication (PLC) or power line telecommunication (PLT). The technology uses medium wave, short wave and low-band VHF frequencies and operates at speeds similar to those of digital subscriber line (DSL). BPL has existed for many years, but so far, hasn't been implemented in the United States on a broad scale because of technical difficulties involving interference. For instance, amateur radio operators have voiced concerns that BPL will interfere with ham radio, an important communication technology in times of disaster.

Power-line communication operate by adding a modulated carrier signals to the wiring system. Different types of power-line communications use different frequency bands. Since the power distribution system was originally intended for transmission of AC power at typical frequencies of 50 or 60 Hz, power wire circuits have only a limited ability to carry higher frequencies. The propagation problem is a limiting factor for each type of power-line communications. Narrowband PLC works at lower frequencies (3-500 kHz), lower data rates (up to 100s of kbps), and has longer range (up to several kilometers), which can be extended using repeaters. Broadband PLC works at higher frequencies (1.8-250 MHz), high data rates (up to 100s of Mbps) and is used in shorter-range applications.Power line communication has been around for quite some time ,but has only been used for quite some time ,but has only been used for narrow band tele remote, relay applications, public lighting and home automation.

II.RELATED WORK

Power line communication is like any other communication technology whereby a sender modulates the data to be sent, injects it onto medium, and the receiver de-modulates the data to read it. The major difference is that PLC does not need extra cabling, it re-uses existing wiring. Considering the pervasiveness of power lines, this means with PLC, virtually all line- powered devices can be controlled . Consumers may purchase powerline adapter sets to establish a wired connection using existing home wiring to set up their own LAN. Using an Ethernet port on their computer, many home entertainment devices may be connected using existing home wiring.

These devices may include TVs, game consoles, Blu-ray players, and Internet video boxes. The principle of PLC consists in superimposing a high frequency signal (1.6 to 30 Mhz) at low energy levels over the 50 Hz electrical signal. This second signal is transmitted via the power infrastructure and can be received and decoded remotely. Homeplug is the PLC solution in commercial use today for indoor installations, these are ideal for extending a local area network and sharing existing broadband Internet access, mainly for domestic or small business use, with easy installation. PLC units usually come with an ethernet or USB port and an electrical plug. All technology running on a defined frequency band must be part of a legal framework.

PLC networks are at the same time both electrical supply networks and telecommunications networks, with the result that the authorities have encounter difficulties defining their legal framework. Futhermore, no precise regulation exists for PLC equipment and networks.In power transformer locations where SCADA system cannot be used, the proposed solution provides a reasonable alternative that combines the use of microcontrollers and existing GSM infrastructure to send early warning SMS messages to users advising them to proactively reduce their power consumption

III.PROPOSED SYSTEM

An existing PLC network represents a considerable investment made over many years, and for reasons of cost and system operation it is seldom possible, or necessary, to replace it with a digital system in a short space of time.PLC is a communication technology that enables sending data over existing power cables. In Existing system PIC is used for controlling In proposed system we are using ARM7 microcontroller this system developed for automatic reading and instant billing and for utility off and on before and after paying bill.

PIC Microcontroller needs more clock cycles compared with ARM7 micro controller so its operation speed is low and PIC having separate memory spaces for RAM and program memory but ARM7 having harward architecture. C compiler choice is limited in PIC but in ARM7 compiler is more suitable for any operation it also more efficient in console functions. This proposed system operate with high speed and it will sends the messge before increasing of unit charge by using data provided in the main server system for this here using GSM system which uses GPRS network for connecting.Present unit charge for residential is: Consumption unit charge First 50 1.45 50-100 2.60 101-150 3.25 So,these will increase electricity bill more so by using this proposed system we can reduce majorly.Itusefull for both the user and electricity board it reduces human needs by providing services using cellular network and visual studio. An integrated coupler at the PLC receiver entry points eliminates low frequency components before the signal is treated.

IV.BLOCK DIAGRAM DESCRIPTION

Block diagram of proposed system is shown in Fig 1. The smart energy meter working is here to give a consumed units to the user and indicate the units to the user before reaching reference units that reference unit is fixed by the server of main pc at that reference unit .unit rate will be increase so before reaching that point smart meter indicates to the user for this purpose in this system ARM7 and energy meter and GSM network are using. In the power supply unit we used power supply circuit which required to convert AC signal to DC signal and also to reduce the amplitude of the signal.

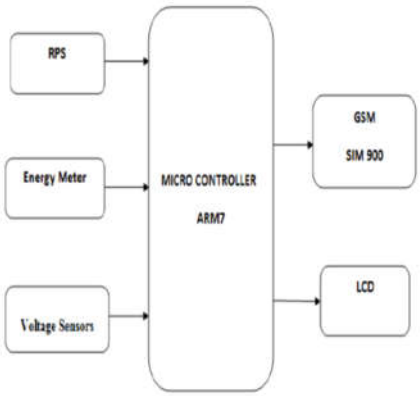

Figure 1. Block diagram of proposed system

The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage with the amplitude of +5V and +12V for various applications. In this section we have Transformer, Bridge rectifier, are connected serially and voltage regulators 7805 and 7812 for +5V and +12V via a 1000μF capacitor in parallel are connected parallel. Each voltage regulator output is again is connected to the capacitors connected parallel through which the corresponding output +5V or +12V are taken the LPC 2148 is operating with 3.3v so by using an adaptor which converts 230v to 5v dc is connected we connect either ac or dc converted adaptor in LPC 2148 we have bridge rectifier which converts into dc if we given supply in ac. The LPC2148 microcontrollers are based on a 32 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

V.EXPERIMENTAL RESULTS

This circuit contains key board, LCD display and microcontroller both side. We send the data using program prepared in Embedded C through serial port. This serial port is connected to power line communication module (PLM). This PLM is assigned supply of 230V mains. On the receiver side, same circuit is connected to power line on the same phase. This circuit receives data which is connected to pic 16F877A microcontroller. Whenever you press switch0, on the LCD screen it asks to enter the data. After entering the data you have to press switch then the microcontroller reads the data and transmits to the modem. This modem injects the data in power line. At the receiver side same modem is used to decode the data and it is fed to microcontroller. Finally the message that you entered is displayed on LCD. In order to transmit the message first you have to plug in the power supply for both transmitter and receiver. At the transmitter circuit, first to press sw0 (switch0) before that at the receiving end lcd display shows some message like “hello it is data transmission over power line ” and After pressing sw0, the corresponding assigned data will be send to the power line modem. Power line communication can be used for Remote control, Emergency alarms.

VI.CONCULSION

All technology running on a defined frequency band must be part of a legal framework. PLC networks are at the same time both electrical supply networks and telecommunications networks, with the result that the authorities have encounter difficulties defining their legal framework. Problems include lack of standards and dealing with the noisy environment of powerlines, which can result in pops or clicks in the line when devices are turned on or off.According to existing network architectures,buildings or technical constraints, either solution can be chosen, but one can also consider one solution to complement another. PLC bandwidths are set to increase, the Hompelug AV standard is being considered for broadcasting digital television. Many research projects are ongoing into these

solutions and their applications, it is all to come, and one should pay close attention to news about this technology

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