

BROAD BAND OVER POWERLINE: Provides Internet Facility To Remote Areas

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ABSTRACT

High-speed Internet access anywhere the world, and at any time, that is what we have been increasingly come to expect in this century. With the use of broadband technologies in the last few years, there are still many areas in the world which does even had access to high speed internet, because of the additional expenditure of laying cables for the internet service providers. The solution for providing high speed internet access to remote areas for making a Digital India is BPL, Broadband over Power Lines is a technology that can be used for different applications which is ranging from home automation to accessing internet. If broadband is supplied through the power lines so that it can reach all over the remote areas because now a days they have been provided with the electricity services, So that there is no need to create a new infrastructure. Therefore, where there is electricity, there could also be also broadband facility. Broadband over Power line is mainly designed to offer an alternative method to provide a high speed internet access, voice over Internet protocol (VOIP) and many other internet services, using medium and low voltage lines. Which will reach customers all over the world and businesses by combining different principles of wireless networking, modems and Radio. It can able to transmit data having speed of 500 kilobits and 3 megabits per second which is equivalent to the cable DSL (Digital Subscriber Line). Thus the broadband power line developers could make partnership with the power companies and the Internet service providers in order to bring broadband to Remote areas with access to electricity.

Keywords: BPL (Broadband Over Power Line), High speed Internet Access, Power-line, broadband, remote areas

1. INTRODUCTION

As of 2015, 75 percent of households in urban having residential broadband connections, which is

compared with only 58 percent in rural households. This gap has remained over the time. Broadband adoption in rural areas can help to improve the economy in these remote areas and digitalization of India came to existence.

Now, the government of India has been able to lay 1.12 lakh km of optical fibre cable under Bharat Net for digital connectivity for providing internet access to remote areas, But only 66,000 gram panchayats have been provided with optical fibre connectivity, though still not having active internet connectivity.

The main target of power line communication is by using the power supply system for providing broadband services. Broadband over Power Line (BPL) can provide a very vast coverage for high speed internet services. The basic concept of this technology is that can offer high speed internet access to our homes through the commonly accessible electrical wires, shown in fig1 and thus it eliminates the need of transmission of data over very long distance through copper cable, optical fibre cable and wireless technologies like Wi-Max, Wi-Fi etc. This method have the capability to provide delivery of broadband data services in limited cost.^[2]



Fig 1: Broadband Over Powerlines

In BPL technology, by combining the technological principles of Radio, wireless networking, and modems, a new mechanism has been created, where the user can plug in to his system into any of the electrical device in his home. Thus having an instantaneous access to high speed internet. It can achieve 14 Mbps data rate and it has the potential up to 200 Mbps.

BPL uses power grid infrastructure for providing high-speed, broadband Internet access to remote areas and businesses. It is a new method based on existing Power-Line Communications (PLC) system.^[3]

2. EXISTING SYSTEM

2.1 TRADITIONAL BPL

Power line communication (PLC) shown in fig2 is a traditional communication method that used for electrical wiring to carry both data and electric power at the same time. Some of the Electrical companies had deployed technologies such as SCADA (Supervisory Control and Data Acquisition) along the powerlines to perform simple command/control functions at remote areas, uses the electric transmissions lines as the medium. Electric companies also used the transmission lines by tapping the wire with some special radios for communicating with each other through the line. These uses of power-line communication which is typically operated at lower level of frequencies, generally it is below 600 kHz. Modulation techniques can also be applied to this but it vary for traditional PLC, from FM to Wideband. While this technology appears to be promising in nature, but still there are a number of issues with respect to its operation.^[1]



Fig 2: Power Line Communication

3. BPL TECHNOLOGY AND ARCHITECTURE

Many of the remote areas in India doesn't have access to DSL, Wireless, cable or other telephone medium. But most of the rural users in India are having the power lines. And hence BPL technology is the method for those residents who want to get broadband service. On the other side that is in the urban side, BPL can be used as a cheaper technology for providing internet services. This technology is considered as an effective and it is less costly solution. The Broad Band Over Power Line communication network technologies are the new method for Indian telecom network and in the future it will grow extensively.^[6]

3.1 ARCHITECTURE

The most important components in BPL are the power lines. The architecture of BPL consists of many devices such as generators, substations, transformers and power lines, which is used to carry power from the power plants to the users in remote areas. Cables with very high voltage is used to carry voltage from

power station to the substation. Then by using different voltage levels it is then distributed to different places. The very high voltage lines carry high alternate power in the order of million volts. And hence because of the presence of very high electrical noise it is difficult to transfer data through it. Signals are in the range of 1.705-30 MHz or in some areas it is 80 MHz. The devices such as injectors are used in order to inject the signals into the medium voltage lines. Injector, it is a device which acts as head end for the BPL and it is then mounted on a substation. The Internet signal is given to the input end of the injector using a fiber line and medium voltage line which is then connected to the output of the injector. Injectors have three sectors receiver, signal convertor, and transmitter. These are used to convert the internet signal into the format that can be used to transmit data over power lines, which is known as Orthogonal Frequency Division Multiplexing (OFDM). OFDM is used by the most of the developers.^[7]

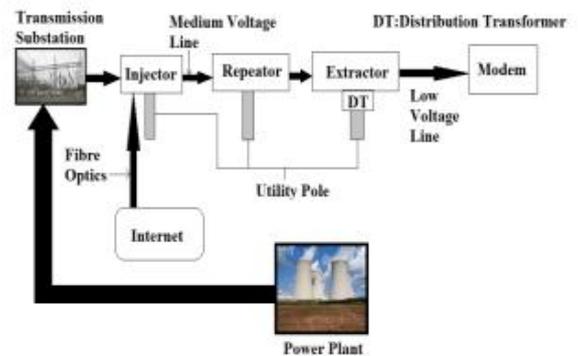


Fig 3: BPL Architecture

4. BPL ADVANTAGES

The major advantage of BPL technology is that it can cover a large geographical area and it can also provide internet access to areas where other broadband technologies does not provide internet services. Urban areas are well equipped with currently using broadband accessing technologies like DSL, cable or wireless broadband. But in the case of rural areas where these technologies are not yet installed and as this BPL technology does not even require a new infrastructure to be installed since it provides internet facility through already installed power lines and hence it can be used to provide broadband services in rural areas. This is the cheapest means of providing broadband services to homes in extremely remote areas. By Installing BPL technology will also leads to a greater competition in market for broadband service providers and thus it will result in better services and also reduces price for the consumer for using these facility. Costs of maintaining BPL are also extremely low. Thus the cost effectiveness and large scale broadband penetration are the two main distinct and unique advantages of BPL. In addition, the installation time is also less than 45 minutes.^[7]

5. BPL LIMITATIONS

Every newly introduced technologies face some initial problems and challenges that it needs to overcome:

- i) RF (Radio Frequency) noise: BPL signals are in the range 1.705- 30 MHz or in some cases it is 80 MHz. BPL uses power lines for providing broadband services when these broadband signals which are a very high frequency alternating current signals, which are guided through power lines in these lines act as antennas which are radiating electromagnetic waves which can possibly affect other radio communications falling in the same frequency range. This can be solved by standardizing the frequencies to be used by BPL service providers.
- ii) Cost: These BPL signals operate at a very high frequency range hence many repeaters may be required to cover large areas. Since it is a new technology, BPL service providers will have to compete with already installed and successful broadband services. To provide broadband services at lower rates which is one of the biggest challenges for BPL service providers. [8]
- iii) Issues in Compatibility: It is a new technology, there were no early standards fixed for BPL services providers and hence all companies established different architectures for BPL services. [7]

6. CONCLUSION AND FUTURE OF BPL

The BPL technology is not that much easy to implement as it can be thought. As the particular standard for BPL have not yet been developed more than that there are still many obstacles to conquer. We have given two types of BPL access services, Access BPL and In House BPL. The Access BPL has many issues at hand. There are interference, [10] cost problem as well as repeater problem in these types. So many other access technologies like cable, DSL, 3G are preferred over the Broadband over Power Line as they have developed greatly. The In-House BPL on other hand which has far more less problems as it distributes the internet using electrical lines in these buildings. Hence it can still be considered as an alternative to the current technologies which can domestically provide internet. All the problems faced by the BPL will be slowly overcome as the standards for BPL to be developed further more. Hence this technology can be widely adopted all over our country to provide broadband services there by making a digitalized Indian Economy and this can be further improved to resolve all its current limitations.

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