

Broadband Over Power Lines

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Abstract: In the present generation internet plays a key role in the development. For developing countries like India, internet plays one of the key role. Due to huge investment and the less usage of internet in the rural area of India, network operators are not coming forward to provide the internet. This paper discusses about the low cost method of internet that transmit data through electric wiring “Broadband Over Power Lines” its working, advantages, disadvantages.

Keywords: Broadband over power lines (BPL), internet, power lines, repeaters, modems.

1. Introduction

Since many years the telecommunication companies and researchers to find a less cost method for transmission of high speed data and they came up with an idea of transmitting data through power lines. This process also called as “Internet through power lines”. This can be accessed through medium voltage power lines. It is created as an alternative to other wired broadband network systems, such as cable modems, but it failed to get widespread use. This can be accomplished by coupling RF energy with alternating current to the power line operating at a frequency from approximately 2 to 80 MHz, these systems currently provide data ranges ranging from 1 to 10 Mbit/S and employ either orthogonal frequency division multiplexing (OFDM) or Direct sequence spread spectrum modulation (DSSS). Further we are going to look various BPL technique, various parameters and limitations related to this technology.

2. History of BPL

The idea of power line communication is not new. In late 1970’s research was concentrated on automatic meter reading and load control. But only high speed can be attained through short distances but in long distances only low speed can be attained. In 1972 first BPL system to appear metering system by general electrical in the range of 5-40 KHZ for one directional data signal but there are so many losses again in 1997 the first test for bidirectional data signal transmission over the electrical supply network and the beginning of research by aslom and nofer. Later in 2000 first tests carried out in france by EDF R&D and as com.

A. Types of BPL

There are two types of BPL

1) In-house BPL

Electrical wiring is to network computers and devices

with in the buildings.

2) Access BPL

It is a technology that provides broadband access over medium voltage power lines.

3) BPL Architecture

The architecture and the schematic diagram of Broadband over power lines has been shown in the fig. 1.

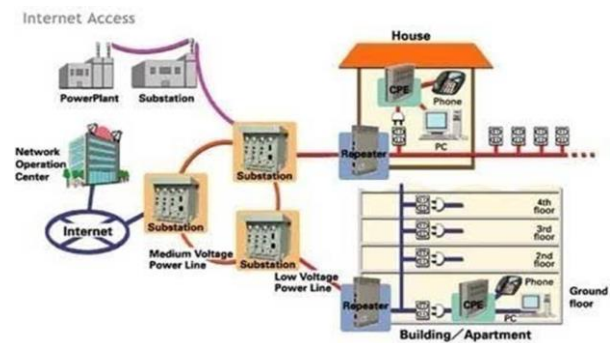


Fig. 1. Architecture of broadband over power lines

B. Overview on working of BPL

In BPL the data is dropped into the medium voltage lines by coupling with RF energy the only thing is needed to access the high speed internet is ‘BPL MODEM’ into any outlet in a plug. The broadband signal is dropped at a medium voltage line by using fiber cable but it cannot travel too far before it degrades. To overcome this problem we use a special device which acts as a repeaters are installed at medium voltage lines to amplify data for further smooth transmission and the data reaches the destination in healthy condition and it can be extracted and accessed by using BPL modems.

The schematic diagram of the transmission of data is shown in fig. 2.

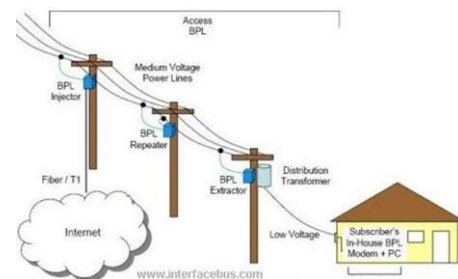


Fig. 2. The schematic diagram of the working of BPL

The access BPL network in the diagram consists of,

1) *BPL injector*

BPL signals may be injected onto medium voltage power lines with the injectors.

2) *BPL extractors*

Provide interface between medium voltage lines and the customers.

3) *Repeater*

For long power medium voltage lines, repeaters are employed to maintain signal strength. Repeater picture is shown in fig. 3.



Fig. 3. Repeater connected to the electric pole

3. BPL Modems

It is actually a very simple device that you will connect to alternating current outlet. The devices have standard plug on one end and the other end has Ethernet plug for connecting to the PC, routers and small cells. This modems are capable of transmitting signals over power lines using silicon chip located inside the modem. The speed has been changing as the technology evolves now have the ability to send signals with minimal interference. The newer modems have the capable to handle large amount of noise generated from a power line. The BPL modem has been shown in the fig. 4.



Fig. 4. Represents the picture of BPL modem

A. Advantages of BPL

BPL is good solution for home networking than other available solutions as no other infrastructure is required.

1. Access BPL systems have the potential in increasing the availability of broadband services to homes and business.
2. Easy installation.
3. Upload speed as fast as your download speed.

4. One wire offers both the power and communication.
5. Improves the competitiveness of the market for broadband services.

B. Issues of BPL

1. *Noise*: The power lines are inherently very noisy in environment for the transmission of data. Every time it produces a pop noise when the device turns on or off.
2. *Interference issue*: The system is expected to use a frequency of 1 to 30 MHZ which has been used for radio operators. Power lines are shielded and have potential to interfere.
3. *Signal attenuation*: In power cables the attenuation of signal immense due to reasons such as physical topology of power network and load impedance fluctuation over power cable. In addition, there is significant signal attenuation at specific frequency bands due to wave reflection at the terminal points. Therefore, there is loss in signal due to high signal attenuation.

4. Conclusion

I like to conclude though it is a difficult one there is a definite scope for Broadband Over Power lines in future if we overcome the issues and it helps in the achievement of "DIGITAL INDIA".

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