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A REVIEW PAPER ON BROADBAND OVER POWER LINES

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ABSTRACT

Various aspects of broadband over power lines (BPL) in communication network are discussed in this paper. A variety of network architecture, technologies and transmission methods are being used to deliver broadband access and services. Objective of this paper is to highlight the features, working, drawbacks, developments and future challenges, advantages and scope etc of BPL access technologies. BPL is a growing communication network technology which is a competitive and fast hitting market of broadband internet services in international telecom environment.

	OFDM	Spread Spectrum Techniques (FH and DS)	Single Carrier
Spectral Efficiency	Good	Poor	Moderate
Robustness Against Channel Distortions	Excellent	Not Good	Good
Robustness Against Impulsive Noise	Fair	Fair	Good
Ability to adapt to channel changes	Excellent	Fair	Good
EMC Aspects	Good	Good-Excellent	Poor
Implementation Costs (Equalizers, etc.)	Fair	Poor	Poor (Equalizers required)

Figure 1 : OFDM Feature comparison

Keywords-..

Introduction

BPL provides a high speed access to internet and eliminates the need of excess copper cables for the same purpose. BPL technologies makes the use of the combination of wireless networking and modems etc.. It uses the infrastructure of the power grid to provide wide access. It is totally based on the concept of power line communication. BPL Is capable in gaining widespread acceptance as competitive broadband access technology. A number of devices are used

to place the signal over the wire, ensure its transport with enough strength and integrity, and finally to recover the original signal at the receiving end.

TYPES OF BPL

It has two types, inhouse BPL & access BPL.

In house BPL system works on low voltage of electricity. In-house BPL system faces a direct competition from coaxial cable, phone line, and wireless solutions. In-house BPL systems can be preferred more as all the areas of the house are wired for electricity where as only some parts have the phone cable outlets. The standard of transmission for in-house BPL were developed by the HomePlug Power Line Alliance. Much like the DSL standards, the HomePlug physical layer standards uses an Orthogonal Frequency Division Multiplexing (OFDM)⁷ but BPL uses a burst mode rather than a continuous mode.

Access BPL uses more power and for greater distances. It possesses high potential for interference. As the access BPL has a greater potential to enter broadband market, this study focuses primarily on the access BPL, I will be referring Access BPL systems simply as BPL unless specially stated. These signals have capabilities of being carried throughout the utility power distribution grid.

The important characteristic of OFDM includes the ability of spreading the data signal over a greater bandwidth which allows the signal to adaptively overcome the noise in communication system. Using OFDM also allows BPL to avoid certain frequencies.

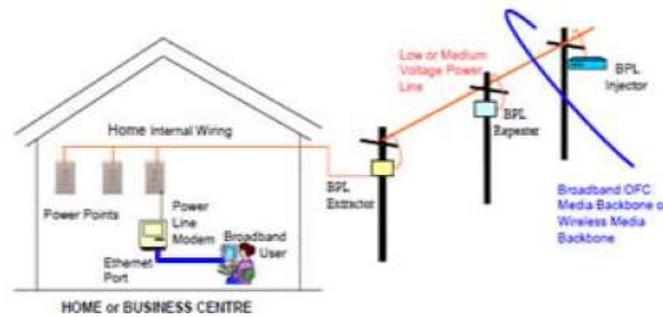


Figure 2 : BPL General Architecture and Schematic Diagram

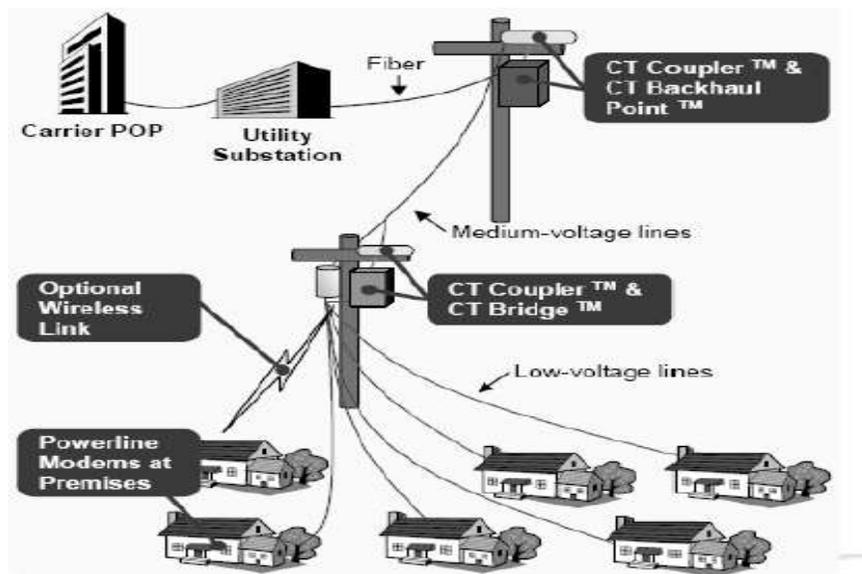


Figure 3 : BPL Power Line Bridge

Kinds of Available Broadband Access Technology

Electrical supply companies have developed SCADA (Supervisory Control and Data Acquisition) technologies to perform simple command/control functions at remote areas, such as sub-stations, by the use of transmission lines as a medium. Various modulation techniques like traditional PLC, FM or Wideband appears promising but they have a number of issues with respect to its operation with the possibility of interference into radio service in other ranges of frequencies.

Current Status of BPL in the World

Many foreign governments including USA, Australia, Austria, China, Finland, Hong Kong, Hungary, Ireland, Italy, Korea, Japan, Netherlands, Poland, and Switzerland are currently studying BPL technology and have permitted equipment trials.

BPL Architecture

To have a high speed internet access a computer or any other device would need only a BPL modem to be plugged into any power outlet in an equipped building.

Internet access Network Technologies								
Network type	Wired					Wireless		
	Optical	Coaxial cable	Twisted pair	Phone line	Power line	Unlicensed terrestrial bands	Licensed terrestrial bands	Satellite
LAN	Ethernet	G.hn	Ethernet	HomePNA	G.hn	Wi-Fi	-	-
				G.hn	HomePlug Powerline Alliance	Bluetooth		
WAN	PON	DOCSIS	Ethernet	Dial-up	BPL	Muni Wi-Fi	GPRS	Satellite
	Ethernet			ISDN				

Figure 4 : Internet Access Network Technology

Advantages

- [1] Wide Coverage
- [2] Economical

Disadvantages

- 1) High noise source over power line
- 2) Open circuit problem
- 3) Signal distortion and attenuation
- 4) Capacity

FINAL ANALYSIS

Broadband over power lines provides unique opportunity in making a universal broadband access using the existing power distribution grid. Despite the initial start, BPL has been able to overcome issues of harmful interference. Although optimal price setting methodology of a regulated utility should employ for entering the competitive

broadband services market remains uncertain, the utilities have found some added incentives for the deployment of BPL in efficiency improvements in the power distribution grid. Although BPL is having a difficult time in competing with cable and DSL access providers in established broadband service market on the criteria of price alone, but the enhancement of performance provided by intelligent network capabilities will make a tremendous headway towards eliminating the cost of infrastructure.

CONCLUSION

Although the direct socioeconomic impact of access to broadband services are well understood, presently only 4% of the Earth's population is having access to some kind of broadband services, typically through DSL or cable modem. BPL provides a new and probably more powerful way of providing high-speed net services with VoIP (voice over IP) and alternative broadband services to businesses and households by using the existing MV and LV power lines. BPL will play a major role in bridging the digital divide as roughly 60% of the Earth's population is having access to power lines. The BPL communication network technologies are new for Indian telecom network but will grow extensively in near future with higher capacity applications like Triple Play services (telephony, data and TV etc.). BPL is a better option with less cost for network operators. BPL is already on the scene with commercial products readily available. Green Energy like Solar, Wind etc. may be used as methods for power line solutions. Combining BPL with FTTX, DSL, PON etc. will make it an economic solution for access networks in future.

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