Broadband Over Powerlines: A Paradigm Shift

An emerging technology may be the newest heavy hitter in the competitive world of broadband Internet service. It offers high-speed access to your home through the most unlikely path: a common electrical outlet.

With broadband over power lines, or BPL, you can plug your computer into any electrical outlet in your home and instantly have access to high-speed Internet. By combining the technological principles of radio, wireless networking, and modems, developers have created a way to send data over power lines and into homes at speeds between 500 kilobits and 3 megabits per second (equivalent to DSL and cable).

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Imagine a world where you don't have to dig up the earth to lay down co-axial cable lines, or where accessing the internet means plugging a small black box into a power outlet in your house. That world may be around the corner. Thanks to the Broadband over Power Lines (BPL), a technology, that threatens to turn the communications world upside down by bolstering broadband competition, lowering consumer prices and wiring rural India.

The key to broadband over power lines technology lies in a long established scientific fact that radio frequency (RF) energy can be bundled on the same line that carries electrical current. Since RF and electricity vibrate on different frequencies, there's not going to be any interference between the two. As such, data packets transmitted over RF frequencies are not overwhelmed or lost because of electrical current.

Model Link: Connecting To Net Over Powerlines
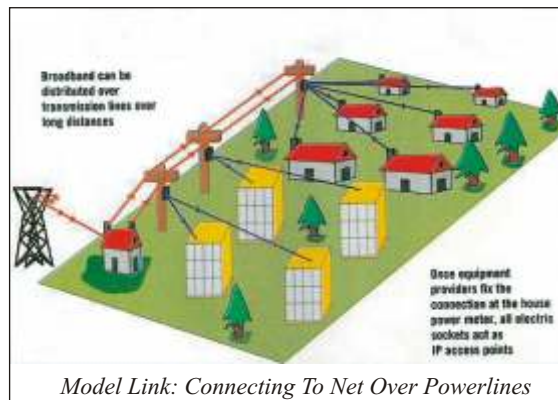
How it works

Equipment providers will fix a broadband connection at the end of the power meter right before the line enters your house. Once that is done, the broadband network runs across all available power sockets at home over the power line. A small, black box the size of a Blackberry phone will provide an internet connection when plugged into any electrical socket at home. Compared to other technologies available in India, BPL can be deployed for significantly less money, quicker and with lower maintenance costs,

A BPL network can be laid over a long distance using the 220 volts, 440 volts, 11 kV, 33kV, or 66kV transmission lines over vast distances. It is also capable of handling internet protocol television (IPTV) or even high definition television (HDTV), and is also faster than a wireless internet service.

The technology does have its detractors who claim that it is obsolete, impractical considering power outages in developing countries, and a major disrupter of radio frequencies that are used by government organs such as the military.

BPL's Uses and its Users

BPL, also called power-line communications, was invented in the 1950s in the US but was not considered a serious communication medium due to its limited speed, functionality and high cost then. However, since 1997, experimentation with higher data bandwidth transfer rates across

29
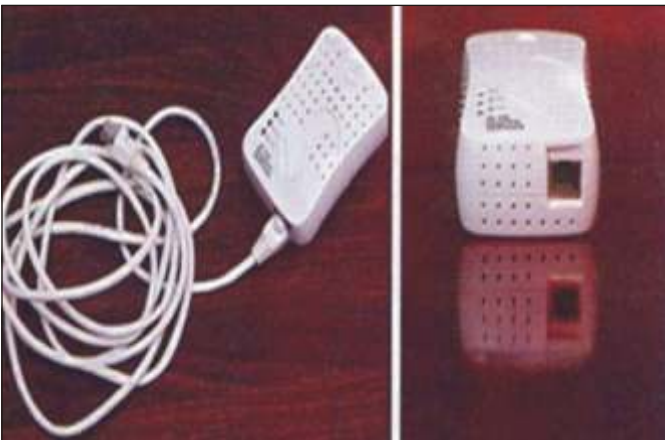
Non-intrusive equipments that convert electric sockets to broadband access points

electrical grids led to huge advances. In India, the Indian Institute of Information Technology (IIIT), Allahabad, has successfully tested BPL. Jamia Milia Islamia, New Delhi plans to use BPL during the Commonwealth Games 2010 to capture the hairline differences in track and field events that would decide the winner.

However, its most significant undertaking - one that promises to revolutionise communications in the country much like the ubiquitous STD booths did more than a decade ago - is to wire rural India.

The technology could be a life-saver for schools, hospitals as well as internet kiosks which could relay invaluable information about crop prices and weather patterns.

Consequently, a BPL pilot project has been started in villages within 3-10 km of Amethi and Allahabad, all of which have power, but no telephone or internet connectivity. No company will lay down co-axial cable here because the business would be unsustainable, but the BPL solution would cost much less. "The cost of the wireless and this technology is almost the same; hence, both can be adopted according to the terrain;' says B.B. Bhatia, vice-president of Telecom Equipment Manufacturers Association (TEMA).

"It (BPL) is a proven technology and can be a boon for the rural parts of the country," says Ravinder, chief of engineering at Central Electricity Regulatory Commission (CERC). "However, the economics of its commercial applications need to be established."

Not everyone is so upbeat about BPL. Critics stress that talk of the technology has been around for years, with nothing to show for it. "BPL does not hold promise at a time when Wi- Fi and WiMax are on the prowl," says Joel Perlman, president and co-founder of Copal Partners, a London-based financial analytics and Research Company. "It has potential but has to survive strong competition from other technologies," agrees Vijay Madan, executive director at Centre for Development of Telematics. "Further, a number of technical issues need to be resolved."

Another charge levied against BPL is that power lines are great radiators of the frequencies that BPL occupies. Copper wires, co-axial cable, and fiber are all non-radiating, self-shielded mediums, but power lines act like natural antennae and can 'lose' the BPL signal in the air. Consequently, it remains to be seen if the government will allow BPL to thrive if it inconveniences the military, air force or the aviation industry, all of which heavily use radio frequencies.

BPL also is a little dicey in developing countries such as India where the power situation is in shambles, say critics. When even metros such as Delhi and Mumbai suffer power outages for several hours a day, it is unlikely that too many people will opt for an internet connection that is solely reliant on fickle power transmission.

However, proponents of BPL argue that its benefits far outweigh its drawbacks. In many parts of the world, there is as much as a 30 per cent non-technical loss of power distribution in various areas of the power grid. The BPL project, however, is part of the 'Intelligent Grid Network' which utilises advanced technology to remotely monitor power meters. Using a BPL backbone, a utility company is able to deploy a loss detection application that identifies when and where power is being lost.

Offices in corporate India could very quickly embrace a BPL solution despite its drawbacks because of its inherent advantages over Ethernets. Setting up Ethernet LANs involves the breaking of walls or the chiseling of multiple holes in order to snake network cables around the office. Installing external conduits on top of existing construction is often required. This process causes much disruption to an office environment. It mars the aesthetics of the interiors and generates unnecessary additional expenses.

Plug-and-play BPL networks have no such problems. "BPL uses existing electrical power cables or co-axial cables to create an IP network," says Maple Leaf's Parimoo. "Hence, every power outlet in the network automatically becomes an access point for any IP device. This is not possible in an Ethernet LAN environment."

Still, BPL has a long way to go to establish its reliability. But for countries such as India, whose rural populace has no access to affordable communication capabilities, BPL technology might just be the solution.

Upcoming ICT Events

The Fourth International Conference on Internet and Web Applications and Services (ICIW)
May 24th -28th May 2009
Venice, Italy
http://www.iaria.org/conferences2009/ICIW09.html

6th Annual European Semantic Web Conference
May 31st - 4th June 2009
Heraklion, Greece
http://www.eswc2009.org/

iGov Global Exchange
June 15th -19th June,2009
Singapore
http://www.igovexchange.com/

e-Gov India 2009
August 4th - 6th August
India Expo Centre, Greater Noida, India
http://www.indobase.com/events/details/egov-india-2009-2055.php

Eighth international EGOV conference 2009
August 30th - 2nd September
Johannes Kepler University of Linz, Austria
http://www.egov-conference.org/egov-2009

3rd International Conference on e-Democracy
September 23rd -25th September
Athens, Greece
http://www.e-democracy2009.gr/index.php/home.html