

Innovative applications within Broadband and Smart Sphere

Abstract

- **High potentials of the PLC industry, reinforced through the standardisation field**
- **Smart Grid applications being realized through PLC in a dedicated way**
- **Intelligent Building and Smart Home networking getting to mature mass markets**

Breakthrough of the PLC industry

The PLC industry has often been declared dead, after going through alternating stages of hype and abandonment at the turn of the millennium. Once PLC was seen as a high potential infrastructure for realising broadband local loop in competition with traditional cable and DSL technologies. In mature markets this scenario has not fulfilled, due to long developments needed by the technology itself to be mature, to the inadequacy of the strategies by some pioneering actors (e.g. RWE Powerline in 2001) and to a manifold hesitant regulation framework.

Today however PLC is not at all doomed to disappear; a new upsurge of activities can be noticed worldwide. Firstly the technology is clearly meeting the requirements of operators. Some manufacturers will provide up to 400 Mbps by 2010, current generation products allow 200 Mbps as theoretical throughput, obtaining stability and quality of service in the deployments. Furthermore equipment costs have been reducing steadily enabling promising business plans.

PLC standardization in the near future

PLC standardisation is also making steady progress with the possibility to get a true final PLC interoperability standard within the next 2 years.

In December 2008 in a vote proceeding (achieving well above 75% of the votes) the working group IEEE (Institute of Electrical and Electronics Engineers) accepted the baseline proposals of a standard comprising the specifications of Homeplug and Panasonic. The proposal defines a single media access controller (MAC) and a PHY protocol for the wired home and is to include the G.hn layer to be defined by the ITU in addition to provide a high interoperability between the PLC devices. This vote will accelerate the development of an IEEE1901 standard for PLC technology; a version of this draft standard is expected early 2009.

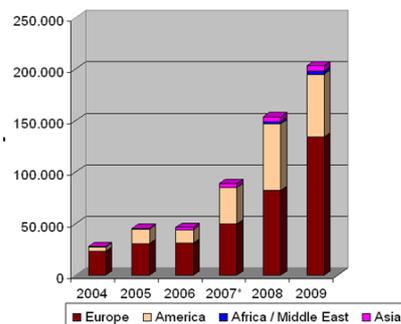
Great involvement and interest in the G.hn standard have allowed the ITU-T bodies to

access successful consent end of 2008 as well. The baseline recommendation was accepted and is foreseeable integrated into the IEEE P1901 standard through a full interoperability around a single PHY/MAC by September 2009.

PLC within the broadband local loop

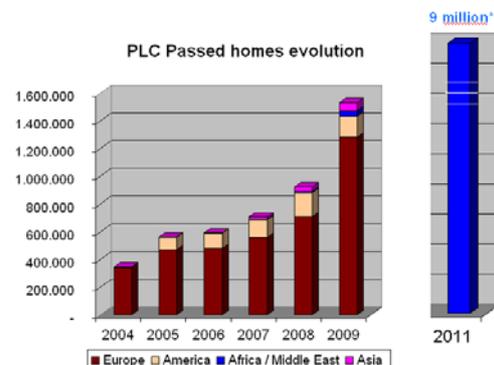
In parallel to the significant efforts related to standardization, a growing number of PLC projects are up surging around the world, as a platform for providing broadband services. Today bmp TC has counted more than 200 thousands PLC subscribers on a world basis.

PLC users evolution per continent



Source: bmp TC PLC Atlas 2009.

The worldwide passed homes have constantly increased (1, 5 millions in 2009), showing a growing interest for the PLC technology.



Source: bmp TC PLC Atlas 2009.

Following trends have been noticed in the course of the last years. First of all, the heart of the PLC projects remains in Europe, which shows the pioneering projects still in commercialisation but limited to small scale projects. Today still some new projects are being launched targeting white zones such as the one of SERC in France. The United States as well show PLC activities related to broadband local loop, in rural municipalities, as seen with the partnership of IBEC (International Broadband Electric Communications) and IBM. IBEC is becoming one of the main actors of this segment by offering broadband connections in rural areas thanks to PLC. Indeed IBM has announced that it has signed a \$9.6 million deal with IBEC to install equipment and provide PLC based service to almost 350000 homes in Alabama, Indiana, Maryland, Pennsylvania, Texas, Virginia, and Wisconsin.

In Europe, some PLC projects having been initiated as early as 2001 are still ongoing:

- **Germany.** The PLC provider PPC provides PLC since June 2001, in Mannheim, and now covers nearly all the city. It claims 5000 customers connected out of 85.000 Homes passed at the end 08.
- **Switzerland.** The largest regional utility, Groupe E delivers energy to 170.000 households in Fribourg and Neuchâtel. Since 2007, in the region of Fribourg and emphasize Groupe E is competing with DSL and cable operators and provides PLC services to end-users as a full service provider. It claimed 4.500 users end 2007, over than 50.000 households and 1.500 new PLC users each year.
- **Austria.** Linz 'project with Strom AG (partner: Main.Net and Power Plus Communications) positioning as full service provider connect more than 5.500 users witching 73.00 households passed at end 2007,
- **France.** SERC is a small utility deploying Fiber on the medium voltage and PLC in the local loop in white zones. The first aim is to provide broadband internet access to a region encompassing 5 000 homes.

Some of the world largest commercial projects are to be found in Europe:

- **Russia.** One of the most significant PLC project worldwide is Electro Com's project, having established a hybrid Fiber to the Building and PLC inbuilding platform. It offered its broadband services to 110.000 clients out of a million homes passed. Expansion in major 2nd tier cities in progress.
- **Sipperec:** Mecelec was given a concession to build out a PLC infrastructure. It has announced to connect 1,5 million households within 5 years but suddenly stopped activities in 03/ 07, mentioning a strong FTTH competition and a change of its strategy.

In developing markets, PLC has been identified as being a viable alternative for quite a number of alternative players within broadband. South Africa is well known for having dynamic actors in this field. In Africa today some 15 projects are underway, with some of them having secured the financing and preparing mass deployment of the PLC infrastructure.

Asia is also in the move. In China, developments in Beijing and Hong Kong are using hybrid technologies which are inbuilding PLC and FTTB as the backhaul. In India, various utilities are implementing first projects to test the technology for a future large scale deployment. Maple Leaf India is working with the Indian Institute of Technology on a trial roll out in 10 villages to offer broadband internet access and VoIP. They intend to test technology and equipments to enable a wide use of it at the national scale. The state of Assam is also working on a future deployment of a trial project in Sualkuchi. They plan to test PLC for last mile connectivity. Latin America has taken up the PLC opportunities. For more details do take reference on the bmp TC PLC Atlas 2009 (www.bmp-tc.com/.....)

The PLC internet provided in all these projects is being utilized to deliver different business to business (B2B), business to citizen (B2C) and e-Governance services, including triple play.

New market segments with high promise

"Smart Grid" is being taken up by energy utilities increasingly. Smart Grid is indeed opening numerous innovative opportunities in order to efficiently increase the performance of the energy distribution. (Broadband) PLC technology has been chosen by numerous utilities as its performance and characteristics are enticing and future proof.

Traditional (low data rate PLC, GPRS, zigbee...) only approaches have shown their limits in the long term and in the multiplicity of innovative applications. PLC allows to overcome many of these limitations and is being used by a quickly growing number of actors within Smart Grid. Thus it enables advanced metering infrastructure (AMI) for applications for improved intelligent network , especially the response to demand and demand-side management to achieve more efficient use of energy resources; to detect outages, tampering and theft, for the balancing of lines and finally to the integration of intelligent appliances and devices. The first business cases established by bmp TC show that though investments might not be more appealing, the cost of installation and

infrastructure exploitation enables quicker return on investments.

First projects using PLC dedicated for Smart Grid have been appearing recently. In **Senegal**, for example, the National Electricity Company (Senelec) is implementing PLC on their entire medium voltage for Smart Grid applications and is looking for a short term return on investment in this respect.

In **Ghana**, BPL Global is currently deploying a pilot project. Dedicated to Smart Grid applications, these solutions enable the VRA- the National Electricity Company of Ghana- to manage and oversee its electrical network effectively, quickly locating the fault with sensors and smart meters. VRA will also manage demand through these smart meters, which transmit in real time information on consumption of its customers. In Asia, Thailand is hosting one of the most ambitious projects, with a plan to serve over 50 million inhabitants with PLC as well. In April 2007, Provincial Electricity Authority (PEA) was announcing to pass 15 million meters in the coming years.

The obvious advantages of PLC compared to other technologies for Smart Grid have even led European utilities to define broadband IP on their networks and to choose the PLC technology for the control and monitoring of their energy distribution activities.

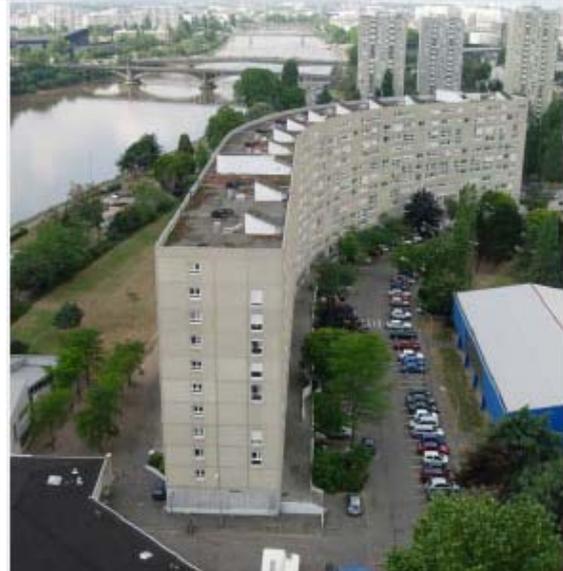
Implementation have been identified by bmp TC in Germany, France, Austria, quite some utilities in Western and Eastern Europe are currently preparing first projects in this field.

Smart Home Sphere enabled

The versatility of PLC entails other applications which emerge alongside the development of broadband: Smart Building and Smart Home. The PLC technology has become an attractive technology for inbuilding solutions.

Quite a number of projects in France, in Russia show how PLC meets demands as well of distributing broadband triple play offers as of implementing innovative applications such as technical management of the building, access control, monitoring... Indeed, the usage of the energy network within the buildings enable to combine the PLC "inbuilding backbone" with whichever local loop technologies, so as to immediately and efficiently connect a whole building with limited initial investments.

In Russia, Electro Com has been massively deployed Fibre to the Building (FTTB) and PLC as the inbuilding distribution platform, covering one million households today. PLC has dramatically proven its viability in this project, enabling a number of applications as well as broadband triple play.



But also in France many projects have been initiated where PLC has been utilised within high rise buildings: **Effineo** and **Edelia- subsidiary of EDF-** provide internet and telephony VoIP via PLC in social high rise buildings of Nantes (Malakoff) and Dunkerque with DS2 equipments. They connect (1.400 households in Malakoff, 800 in Dunkerque) with 40Mbps required bandwidth all of the building and unlimited telephony VoIP. **BPL Global** provides PLC services over their "Masterbox" solutions in 33 social apartment buildings of Poitiers, France. The project connects 2 500 households on broadband internet access and offers also others services such as video services, security services... Due to the pervasiveness of PLC within a building, new eHome services are being implemented for confort, monitoring and security. PLC represents a truly plug&play platform in these domains and is appealing for quite a number of operators.



bmp TC has worked out a dedicated report in the world (the bmp TC worldwide PLC Atlas 2009) and has identified the projects on a worldwide basis. The bmp TC Powerline Atlas 2009 provides a concrete view on each project, mainly through personal interview and enabling to understand the trends within the worldwide PLC market.

Previous Market Reviews are available on the website below.

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About bmp Telecommunications Consultants:

bmp TC is a strategic consultancy in the field of telecommunications with a focus on central issues related to business models based on broadband platforms such as DSL, Wireless, fibre or Powerline Communications. The longstanding experience & a wide-ranging industry view enables to create and launch new services for the market and support the implementation and introduction

Selected recent references (complete references upon request)

Operators/ISPs

- ⇒ British Telecom
- ⇒ Cegetel
- ⇒ Electro-com, Russia
- ⇒ France Telecom
- ⇒ GTS Central Europe
- ⇒ Smart Telecom

Utilities

- ⇒ Copel Brasil
- ⇒ Compagnie Ivoirienne Energie
- ⇒ Electricity Authority of Cyprus
- ⇒ Electricité de France
- ⇒ ESB Ireland
- ⇒ RWE

Integrators, venues

- ⇒ Cegelec
- ⇒ EDEV-CPL
- ⇒ Sogetrel
- ⇒ Cngi
- ⇒ Tank & Rast

Investors

- ⇒ Baring Vostok Capital Partners
- ⇒ Bearing Point
- ⇒ Durlacher
- ⇒ Morgan Stanley

Public authorities

- ⇒ African Telecom. Union
- ⇒ Département Meurthe & Moselle
- ⇒ DCMNR-Irish Government
- ⇒ Luxembourg City
- ⇒ Région Alsace/Alsace Connexia

Suppliers

- ⇒ Hewlett Packard
- ⇒ Itochu
- ⇒ Legrand
- ⇒ Mitsubishi
- ⇒ Schneider Electric
- ⇒ Siemens