

The challenges of integrating BPL into existing Telecom Business Models: Market visions from Brazilian research

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Abstract

This work presents a strategic assessment of Broadband Power Line (BPL) technology, showing evidences that BPL is a very real competitive access technology to telecom services. Firstly, the business environment of technological convergence is investigated to search for opportunities to deploy BPL. Additionally, BPL competitiveness is assessed against the main existing access technologies.

As a basis for telecom business environment diagnostic, we present the results of a research in Brazil's telecom market to understand how Service Providers are reacting to technological convergence [2][7]. The results were compared with a similar US research developed in 1991 by Joseph Pine, MIT [5]. The results indicated that many technological innovations do not reach the market due the lack of appropriated businesses models.

Furthermore, a technologic competitiveness assessment is performed using traditional techniques such as Porter's 5-forces [6]. BPL/PLC is assessed against the existing access technologies. Some strategic drivers were outlined in the entrance of BPL/PLC in the telecom sector. It provides important insights of how new technological assets, like BPL, can be competitive and integrated into telecom services.

Keywords

Telecommunications, Broadband, Power Line Communications, Technological Convergence, Business Strategies, Competitiveness

INTRODUCTION

Broadband over power line (BPL) is a technology that enables the distribution of broadband services over both the existing distribution electrical grid and internal electrical wiring. BPL can maximise the benefits by supporting, over the same infrastructure, power supply and its management applications and telecom broadband services. This paper has focused its BPL assessment over telecom services application, providing a conservative vision of the BPL technology potentiality. Other BPL/PLC applications like Real-time Energy Management, although relevant, will not be taken in consideration. For the propose of this work, Broadband over power line (BPL) and Power Line Communication (PLC) can be considered synonymous although some authors do not support this statement.

The technological innovations in the telecom networks have provided new types of access to telecommunications services. There are some contradictions between potential benefits discussed in the brand new technologies and the reality of the telecom service market [3] [4] [8]. The technology suppliers espouse flexibility, quality and low cost; however consumers have a different experience when they request a new service from a service provider [2].

Digital technologies are the base of telecommunications convergence. For last two decades, a silent revolution has increased the amount of digital content; almost all TV, cinema, music and video are produced in digital formats as COMPACT DISC and DVD. Magazines, newspapers and periodicals are produced in digital format before being printed. Most of the end users only just realize the value of convergent technologies when they are compelled to access this enormous amount of information. The perceived value of Telecommunications Convergence is in direct relation to the amount of content and usable bandwidth available to retrieve this data [8].

Several scientific researches have been focused in the technical aspects however services are sold based on an overall quality of service basis. All technological progress should be integrated with a clearly defined service provider strategy. This article tries to create a new battlefield, focusing on the integration of different technological platforms into telecoms traditional business models. New convergent technologies do not seem to fit into the old-fashioned telephony legacy business models [2]. Established Telcos and major equipment suppliers use vertical integration to protect their status quo and to reinforce the barriers to new entrants.

In practical terms, telecom services have been offered with little flexibility despite the technological potential available. Digital integration makes possible customized services however some companies still retain "a fabric mental model"[4] based on standardized services over a limited set of technologies, almost the same way it was in the POTS era.

The last mile barrier is very solid; with regulations creating strong walls between regions and technologies. An important challenge for the BPL community is to reduce the barriers to the "New Technologies Entrants", and compete with incumbent last mile emperors. Barriers in business models are real; some corporations are not prepared to integrate the new technologies in conjunction with established ones [2]. Alter-

native business models based on contents and bandwidth, partnerships and outsourcing should be investigated as acutely as it has been done with technological issues.

BPL/PLC has extended competition by increasing the coverage area for telecom services. Wider areas, including remote regions means more customers, with the potential of worldwide connectivity. However, this potential growth depends on the processes and IT architectures available. Basic competitiveness tools must be used in conjunction with the full range of technological assets. BPL as an isolated access technology is not an end in itself; it must be integrated with existing processes, technologies, OSS's and service platforms.

A MODEL TO DIAGNOSTIC BUSINESS ENVIRONMENT CHANGES

A complete roadmap to strategic analysis should investigate market structure, environmental analysis, industry structure, ROI, financial analysis, industry value chain, market dynamics, etc. The environment analysis is one of the first steps to perform a good strategic planning.

The Dynamic Stability Model [1] was the theoretical reference model for the field research. This model was developed to understand how the changes of market demand and businesses processes influence strategy. The model helps to determine strategic drivers to maintain competitiveness [1].

Pine in 1991[5], developed a questionnaire to investigate the market "turbulence" (defined as demand uncertainties and lack of predictable patterns). Pine's research used the Dynamic Stability Model and used a formula to measure the perception of many US companies' executives about their business environment. Pine proves that is possible to determine the best strategy by measuring "turbulence" and discovering how companies had reacted. That questionnaire was given to 250 people from 164 US companies in 1991, part of them in the telecom segment.

Pine's conclusions showed that a turbulence variation of more than 10 points demonstrates that the market in study is passing through a strategic paradigm shift. In the US the telecom market in 1991 had an index of 18 against 26 in Brazil 2004. This is evidence that the telecom market is still experiencing a paradigm shift. Table 1 shows the results for the most significant demand and structural factors (10 of 16 factors investigated).

The fast changing rate of Technologies is the primary reason for the strong turbulence perceptions among Brazilian telecom professionals. The comparison between Brazil/2004 and US/1991 shows that this rate of technological change has grown from 3rd place to the number 1 turbulence factor.

Another important vision over the telecom convergence market appears in the other two parts of the questionnaire applied. These sections investigated product and organisational changes in the last 10 years. The objective was to know how companies are reacting to a turbulent environ-

ment. The results demonstrated that telecom companies are significantly reducing both the product life cycles and product development cycles. This is a natural consequence of the entry of new technologies and the customers' quickly changing needs. Pine denoted the new paradigm shift as "Mass Customisation". Following his ideas, with this strategy model, companies would be more competitive [1] [5]. The research in the Brazilian telecom market does not fully support this assessment, because just some of the "Mass Customisation" characteristics were corroborated; mainly product life cycle, new product development cycle and high rate of technological changes [2].

Table 1: Comparison between business environment factors in Brazil/2004 and US 1991 [2] [5]

Demand or structural factor	1994-2004 Brazil	1981-1991 US
Rate of technological change	49	27
Competitive intensity	48	38
Quickly changing needs/wants	44	27
High levels of pre and pos-sales services	35	18
Many substitutes	35	31
High saturation levels	34	9
High quality consciousness	33	9
Heterogeneous desires	33	21
High buyer power	28	24
Short, unpredictable product life cycles	27	19

Although Telcos are launching more services, they have the same basic structure of the older ones. Their strategies do not seem to be capable of coexisting with newer platforms that would enable the convergence of technologies. Most of the established corporations are running their businesses based on a few "cash cow" products and technologies and do not demonstrate a willingness to change.

The lack of a future focussed business model and strong internal resistance to change is a significant barrier to the growth of brand new technologies like BPL. Without the ability to reach the end customers of incumbent telecom companies, it will be very hard to get the scalability required to reduce costs and be competitive.

OSS/BSS EVALUATION TO TECHNOLOGICAL CONVERGENCE

The second part of the Brazilian research involves an IT support systems evaluation [2]. The author used Porter's value chain model to determine the activities of telecommunications services [6]. The research evaluates the importance and the performance of the existing support systems for convergent services. The results show that IT is also another strong barrier to the entry of new convergent technologies into the Telcos' business.

Table 2 shows 15 of the 24 activities investigated. It measured the performance and the importance. The grade varied from 0 to 100, on 20 of 20 points.

IT evaluation reinforced the hypotheses that business process and IT systems are not ready for telecommunications

convergence. The worst systems performance affects important tools that could be used to integrate BPL into telecom services (Partners, supplier and third part mgmt, Network Inventory and Billing). The overall evaluation identifies a poor IT model to allow for technological convergence.

Table 2: OSS/BSS evaluation results [2]

Value Chain Activity	Performance	Importance
Pricing and customer proposal	54	67
Customer Credit check	52	87
CRM	49	93
Customer SLA contracts preparation	49	80
Core network configuration	47	92
Access network and CPE activation	47	92
Service Orders management	45	100
Trouble ticket management	44	100
QoS and SLA management	42	86
Customer Contract management	40	87
Network Inventory	37	100
Customer solution and project design	36	73
Collecting management	35	93
Partners, supplier and third part mgmt	35	100
Billing	32	93
SLA and QoS automatic violation credit	29	79

The business environment analysis demonstrates that all telecom providers might redesign their business model, processes and IT support systems to use the full potential of convergent technologies; it means that brand new corporations can take advantage of this moment to start up their telecom services operations.

BPL COMPETITIVENESS IN THE ACCESS TECHNOLOGIES MARKET

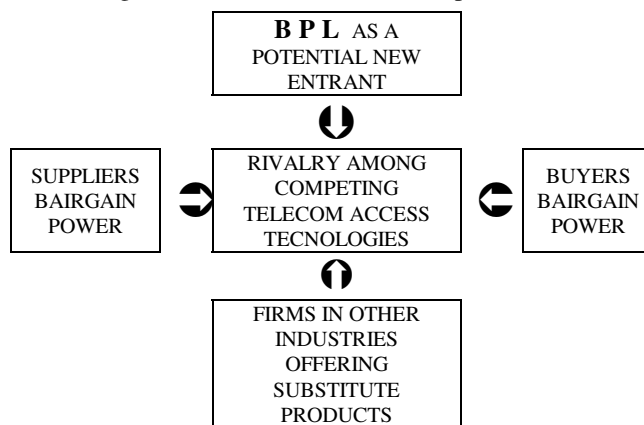
Porter' 5-forces model provides a good vision for BPL implementation strategies inside the access technologies market environment. The 5-Forces Analysis provides insights on the best ways to move on, and the best strategy to entry to a market segment [6]. (Fig. 1)

- Bargaining Power of Suppliers: The market is dominated by a few technology patterns. The powerful established suppliers can potentially reduce the strategic options to enable the entrance of new technologies. BPL proponents can expect to face strong barriers when trying to develop partnerships with incumbent Telcos.
- Bargaining Power of Customers: Many end customers do not differentiate one telecom service from another. They believe that services can be replaced by substitutes anytime. BPL in competition with a traditional telecom strategy may mean lower prices. While competition in like services is good for the consumer, competition in technologies may result in lower margins for suppliers, which is not a good business model.
- Barriers to New Entrants: This is one of the strongest barriers as economies of scale (minimum size requirements for profitable operations) are not easy to reach. The existing players control most of the distribution

channels. In addition legislation and stodgy government agencies often protect the Telco status quo.

- Threat of Substitutes: This factor can be used in favour of BPL. The research results demonstrated that Telcos are not ready to commercialize the full potential of telecom convergence. BPL can be competitive depending on the way companies define their strategies, even in the Telco homeland.
- The internal market determinants of rivalry shows a small number of big organisations using narrow range of access technologies (xDSL, HFC, Wireless, FTTH), competing over cost leadership strategy.

Figure 1: 5 Forces Model of Competition [6]



An initial conclusion indicates a hypercompetitive market to telecom access technologies with high barriers to the new ones. A good strategic plan should be able to reduce those forces against BPL entrance. Although hyper competition can discourage some investors at first sigh, in the other hand it opens new opportunities due its characteristic of constant disequilibrium through continuously creating, destroying, obsolescing or neutralizing opponents' competitive advantages.

For a better analysis, the study is driven to two separated assessments, addressed to each BPL technology family: Last-mile (BPL Access) and In-house Applications. These two analyses are necessary due the fact they have different market environments, structures and players.

- In-house applications is defined as where both ends of the communications link are within the same building (LAN equivalent applications);
- Last-mile applications (also called Access BPL) typically include the distribution to the customer premises from Point-of-Presence (POP) of broadband service suppliers, using the AC power line network.

BPL/PLC LAST-MILE APPLICATIONS ASSESSMENT

The main Last-mils access technologies are: xDSL (Digital Subscriber Line technology family), Cable HFC (Hybrid Fiber-Coax) Networks and Wireless Broadband. The compe-

tition scenario has been changed by the entrance of BPL/PLC and FTTH (Fiber-To-The-Home) technologies. These new access technologies can be considered “new entrants” in the market. Based on this principle, BPL/PLC strategy movement should be thought of as reducing the barriers to reach potential customers.

The established technologies, especially xDSL, should be up-graded in both terminal equipment and customers’ access medium, to support the increasing bandwidth needs. The next paragraphs show a brief assessment of each BPL/PLC main competitor.

- xDSL – The broadband last-mile technology leader is the current ADSL (Asymmetric Digital Subscriber Line), with average bandwidth of 0.5 Mbps, it can now be delivered over a twisted pair network up to 6 km from the POP. The technological progress on the next-generation DSL will make possible speeds of over 2Mbps up to 5km from the POP. However, bandwidths beyond that will only be available over shorter distances, becoming necessary to run optic Fiber closer to the customers’ sites.
- Cable HFC networks - In broad terms, the Cable HFC networks have the capacity to deliver significantly higher bandwidth to the end user. Their main weakness is in relation to a relatively limited coverage area and subscribers base. To increase the number of customers, investment should be made to redesign existing networks to allow higher connection density and expand the coverage area.
- Wireless Broadband - Wireless broadband technologies have a good potential particularly in low-density areas. The key advantages that wireless access systems have are fast installation and the full mobility for the end customers. However, the capability of reaching mass-market solutions depends upon the availability of an appropriate and sufficient spectrum. Besides that there is the necessary investment on transport systems and Fiber Optics backbones.

These 3 access technologies were the broadband services precursors and had time to developed strong barriers to new entrants. The xDSL technologies, for instance, already have huge economies of scale, large customer base and coverage area. Because of this, they create a high bargaining power with their customers and suppliers, increasing the cost of switching technologies. Their market is well protected within the present bandwidth demand. But the increasing bandwidth needs can force the operators to redesign and deploy new networks and adequate last-mile solutions to satisfy the new bandwidth demand. These factors can promote market structure disequilibrium.

The market for broadband services has been growing fast; the cost of technology has fallen significantly, reducing the potential cost of the next generation of broadband networks. Although the up-grade of the terminal equipment in the ex-

isting networks is not a tough task, expanding the coverage area can bring some important infrastructure challenges.

While the technology costs have fallen, the cost of deploying new civil infrastructure has not. Every time that it is necessary to bring fibre closer to customers’ premises, replace the existing wires or deploy a new access medium, the infrastructures expenditures will be present. The civil works consist of opening trenches and laying ducts for the deployment the last-mile access. Depending on the situation; it can be very expensive, representing around 80% of the cost of a new access network. Hence, the access technology that requires less civil infrastructure investments to be deployed would be more competitive.

It is possible to establish some strategic drivers to BPL/PLC Last-mile implementation:

- Cost leadership strategy: It can be achieved through reducing own costs, reducing supplier and deployment costs. In sites where infrastructure expenditure is mandatory, the use of the existing power electric wire can be a competitive alternative. Market research should be developed with the objective of mapping the “golden” BPL sites e.g. historic and older areas, downtown and commercial “wire jammed” sites, etc. Assuming that new infrastructure deploying costs will drive the future competition in some regions, the key question to BPL users is: Where are the highest civil deployment costs to broadband improvement?
- Differentiation strategy: The companies should differentiate a product so that the marketplace perceives it to be superior. If the customers realize that BPL/PLC technology can provide high bandwidth with fewer impacts in their facilities, BPL/PLC can be perceived as clean and fast technology. The key questions are: Can a clean and fast technology be leveraged to create competitive advantage? Can the end-customer perceive value in it?
- Focus strategy: A possible start-up strategy is to concentrate on a particular narrow-scope market segment. As a new technology, a niche market is necessary to initiate the product life-cycle process. But it should be planned on a long, coordinated and permanent growth strategy to lead it into a mature product cycle phase. Remaining in a niche market will not build a solid demand flow for BPL/PLC equipments and services. The key questions are: Who can be the early BPL adopters? Who can demonstrate the potential added value that BPL brings?

BPL IN-HOUSE APPLICATIONS ASSESSMENT

The most commonly used inside wiring infrastructures are CAT-5 cables for LAN applications and twisted pair copper cables (telephony inside wiring) for xDSL services. Recently, wireless LAN applications have been a good alternative due its fast deployment and fewer impacts inside customers’ premises.

From the last 5 years, the SOHO and residential market has shown an increasing number of multi-PC usage. This cultural change implies in the growth of new LAN deployments. In fact, LAN applications have added the SOHO and residential market to the already established corporate market. There is a brand new market to be reached, much bigger and heterogeneous, where all competing types of inside networking have good growth opportunities. The market strategy should be based in attending directly to the customers' current needs. A new LAN user perceives value of an In-house application when:

- It supports all LAN applications as: Security Video, telephony and VoIP, Multimedia applications, Gaming systems, Internet appliances, printers, servers, client machines, etc.
- It has a fast deployment cycle with minimum costs for infrastructure, cabling and civil works.
- It flexible enough to support layout changes and adding new connections. There must enough connection points around the customers' premises, in quantity and location.

BPL/PLC has indeed more competitive advantages for new LAN deployments than the other players. Its potential market relies on a fast and low cost LAN implementation due the usage of the availability of and coverage of existing internal electrical cabling.

CONCLUSIONS

Broadband Power Line (BPL) technology is a real competitive access technology to telecom services. Besides the technical potential, BPL/PLC has real business potential for telecom players and investors. Technological convergence has increased the market "turbulence" demand for new telecom businesses models. In terms of an access medium alternative, it has been demonstrated that BPL/PLC can be a competitive technological choice for both Last mile and In-house applications.

The telecom service providers have a great challenge to adjust to the new and diverse coming technologies. Creation of business support tools, to use all technological potentialities, is an issue not easily solved even in the Telco world. There are many opportunities for BPL/PLC due to the fact that telecom providers have not always appeared to be ready for convergent technologies. Alternative business models based specifically on contents and bandwidth, partnerships and outsourcing should be investigated

BPL technology has many barriers but presents terrific opportunities. The most important barriers are related to the existing Telco Business Model. The opportunities are demonstrated by the need for less investment in infrastructure and civil works. The consumers' essential value perception is in direct relation to the content available, bandwidth, cost and flexibility. A utilities company that has structured a new business with a focus on an efficient way to transport con-

tent, a "Bit & Bytes Transport Co", and includes an innovative pricing model should be able to take advantage of the existing usage billing systems (the actual Achilles' Heel of all telecom providers).

ACKNOWLEDGMENT

We would like to acknowledge the "Human and Technological Factors of Competitiveness Research Group" of Production Engineering Department, Federal Fluminense University, Niteroi, RJ, Brazil, for the methodology that supported the Brazilian telecom industry research [7].

Special thanks to [ConvergencePro Forum](http://www.convergencepro.org/en) organization, sponsors and members for the web resources into the Brazilian field research (www.convergencepro.org/en).

Additionally, we would also like to thank to all team of specialists from [OSMB Consulting](http://www.osmb.ca) (www.osmb.ca), for there outstanding contributions in regards to knowledge of telecom access technologies concepts, features and applications.

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