NEW BUSINESS OPPORTUNITIES WITH POWERLINE COMMUNICATION

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INTRODUCTION

Powerline uses the low- and medium voltage power-grid for voice and data communications. Systems are available providing attractive services at competitive costs, offering a promising business opportunity to utilities and partners. Various business models have been realised and first experiences from rollouts are available. The case study of the EEF is presented, highlighting the key success factors for Powerline Communication.

TECHNOLOGY AND SYSTEMS READY

Powerline is the first technology able to provide two-way broadband access networks. The bandwidth over the last mile is increased to around 4.5 Mbps, both upstream and downstream (Ascom Product Specification 2002). The 2nd generation will deliver 30-50 Mbps (theoretically up to 250 Mbps are possible but in practice 100 Mbps are realisable). Traditional broadband access like ADSL are able to provide only 6 Mpbs. Upstream channels remain even more limited with 128 kbps-384 kbps (ITU G.lite 992. ½).

Therefore Powerline increases connection capacity for the end-user and improves dramatically the quality of today's broadband services:

- peer-to-peer networking (mp3, ...)
- file-sharing over the Internet (FTP)
- distribution of big mails (pictures,...)
- interactive online services (gaming,...)
- streaming services (audio, video, webcam)
- indoor networking for PCs and printers
- shared Internet access
- VPN (Virtual Private Networks)
- teleworking
- telephony (single- and multi-line)
- small PBX (Private Branch Exchange)
- solutions for hotels and schools

Powerline turns every power socket into an interface to the network. Traditional network infrastructures such as dial-up, cable and ADSL limit the access to pure point-to-point communications from subscriber to provider.

Linecosts for Powerline access are below those of other broadband access technologies and will decrease further over the next 3 years. They are estimated to reach a level of $ 200 in 2006. Arthur D. Little (2002) reports that CapEx per ADSL User is 15% higher than Powerline.

Therefore Powerline is a powerful and attractive solution for the last-mile.

ATTRACTIVE MARKETS AND APPLICATIONS

While in industrialised countries the traditional fixnet infrastructure achieves a penetration over 100%, there is a huge lack of infrastructure in peripheral regions with a teledensity of sometimes below 10% (ITU 2002). Electricity infrastructure covers nearly 100% of the population in developed countries, but also 65% of the population in peripheral regions (IEA 2002).

So nearly every household can be connected with Powerline. It is suitable for developed and emerging markets, because it offers broadband internet access, as well as basic telephony services. In addition, Powerline is a solution for buildings that are not equipped with standard cabling infrastructure, like schools and hotels.

Figure 1 shows the huge potential in the context of broadband access.

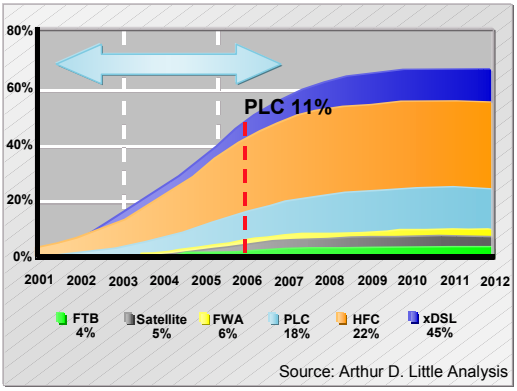

Figure 1: Residential BB Penetration by Technology for Europe

Deployment of Powerline bases on strong market drivers:

- liberalisation of the electricity market: utilities are forced to leverage their infrastructure and foster customer relationships.
- missing or monopolised last-mile: unbundling of the local-loop and infrastructure competition have failed (European Commission, DG Competition 2002).
- boom in broadband Internet access: broadband penetration will reach 80% in developed markets and 50% in emerging countries until 2020 (Fletcher, Mc Kinsey 2001).
- growing need for a networked home: multi-PC households and penetration of PCs per household is increasing rapidly (Dell'Oro 2002).
- pressure to close digital divide: 200 Mio households world-wide could afford telephony but are not connected because of lacking infrastructure. (ITU 1999).

Figure 2 shows the expected strong growth of broadband access worldwide.

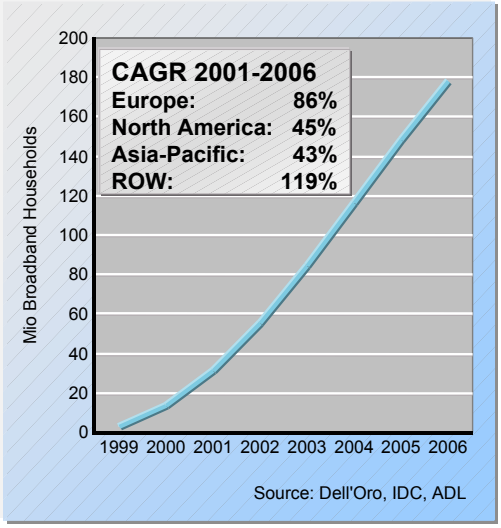

Figure 2:Broadband Growth Worldwide

Powerline offers to utilities a unique business opportunity to:

- leverage existing infrastructure (low-voltage grid, medium-voltage links, copper connections, fibre backbones).
- leverage existing customer basis and customer relationships.
- leverage existing local service organisation.

POWERFUL BUSINESS MODELS

Utilities usually do not have much experience in providing broadband internet or telephony services. Thus key for success is partnership and co-operation. Depending on the interests and capabilities of the partners involved - power utilities and service providers - different models for partnership form the successful fit.

The power utility can choose a business model that licences the use of the infrastructure to service providers. This is the easiest solution for the utility, because the service provider takes care of all service and operations aspects and owns the end-user. This is often chosen by utilities, that do not have experiences in telecom and internet business. Examples are EEF (Switzerland), EDF (France), EMS (Russia), Elite (Honduras), others.

At the other extreme of possible business concepts, the power utility enters the market as a service provider with a direct market offering. This scenario is possible, if the utility has operator competencies, e.g. it owns an ISP company. Examples are Endesa (Spain), ENEL (Italy), EnBW (Germany), SP Telecom (Singapore), TIWAG (Austria), others.

Business models for telephony services do not substantially differ from the ones for broadband access.

Figure 3 shows the tremendous lack of telephony worldwide, offering a large potential for Powerline.

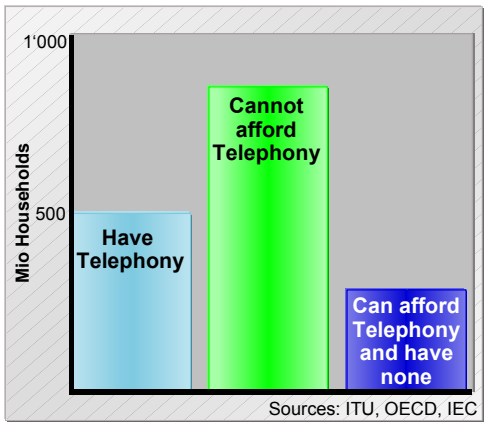

Figure 3: Teledensity Worldwide

SUCCESSFUL DEPLOYMENT

In order to successfully deploy Powerline a few key requirements need to be ensured:

- stable and reliable technology
- compliance with regulatory requirements.
- defined and prepared business concept

Today, several manufacturers have proven through extensive field trials and pilots that products are stable and reliable. Also, various suppliers are able to comply with the relevant regulatory requirements (FCC Part 15, IEC/CISPR22, EN-55022, CE Certification, others).

The business set-up is fully under control of the utility and its partners. It typically includes:

- target market specification
- service portfolio definition
- network architecture
- operations concept
- business plan
- marketing and sales plan
- rollout plan

Usually a phased rollout is performed in order to test and ensure operations and services offered to the market, before starting large-scale deployment of Powerline.

Thereby feasibility, business case and operations concept are analysed during an evaluation phase. As a result, the market is prepared for a pilot project. The pilot represents a market test and is therefore a verification of the business and operations concept. During this pilot the mass deployment is prepared in terms of infrastructure and the operations support systems (OSS). The more efficient and rapid Powerline is deployed the bigger success.

CASE STUDY

Presentation of EEF

The Entreprises Electriques Fribourgeoises (EEF) is a private electric utility located in Western Switzerland. The transmission grid has a 60 kV voltage level and it supplies the distribution system (18 kV) with twenty-five 60 kV/18 kV sub-stations. 700 km of optical fibre are installed. More than 2000 MV/LV sub-stations are in operation.

Pilot Test

In June 2000 the EEF began installing a pilot network using ASCOM equipment. The pilot network, which was the first of its kind in Switzerland, was set up in collaboration with other Swiss electric utilities (AEW, BKW, CKW, EKZ, FMV, SIG, SI Lausanne, SI Martigny, RDP-CREE and Sunrise) and the EPFL (Swiss Federal Institute of Technology, Lausanne). It was one of the initial 16 pilot networks with ASCOM technology (other pilots was: TIWAG, RWE, ENEL, EDF, ENDESA, France Telecom, Evicom, Viken, NESA, EDP, CEGECOM, Lina.net, EVN, Singapore Power and iAdvantage). The pilot network comprised a residential area made up of apartment blocks and detached houses, an industrial estate and also a demonstration zone.

This pilot permitted verification that the technology was functioning and also the ease in implementing the network. Various services were implemented: Internet access, IP telephony, video surveillance as well as energy services such as remote meter reading and tracking, monitoring and regulation of heat pumps. In addition to setting up the different services, electromagnetic interference measures were performed together with EPFL in order to detect emissions in connection with use of the PLC system and also any possible interference. No third-party interference has been detected to date. The different measures taken were incorporated in a model as part of a research project by EPFL.

One of the advantages of this pilot test was to gauge the satisfaction of customers using the services offered, i.e. mainly Internet access. The information collected was very valuable to compile the commercial offer.

MARKET STUDY

After successfully verifying the PLC technology, we carried out a market study among our customers in spring 2001. The objectives of this study were to measure:

- the level of satisfaction with current Internet access technologies;
- the interest in having Internet access via the power socket;
- the services to be offered via PLC;
- the money subscribers are prepared to spend for this new technology (i.e. modem price and monthly flat rate).

504 interviews were conducted by phone with a representative sample of private customers and 200 phone interviews were conducted with a representative sample of SMEs with staff levels in a range of 3 to 50.

PLC was very well received by respondents, who were even enthusiastic. This technology has a very interesting potential for about one home out of seven. The fact that this new technology is provided by the power distribution network was very well received by the population. More than 90% of the customers interviewed and already having Internet access responded favourably to the idea that Internet access could be offered via the power socket by the power distribution utility.

PLC provides Internet access in all rooms of the house. This advantage is the main argument distinguishing it from other technologies (namely ADSL and CATV), i.e. no additional cabling is required. We then saw that the two arguments in favour of PLC are the speed and the monthly flat rate, which are two elements that are no different from broadband Internet access.

PLC is very well received by respondents within SMEs. They were just as enthusiastic as the general public. Above all the speed of information transfer in the case of PLC is appealing to respondents. The monthly flat rate and accessibility in all rooms are also considered to be convincing arguments. As was the case for the general public, we noted that the fact that this new technology is provided by the power distribution utility was very well accepted by the parties interviewed, the vast majority of whom are favourable to it.

BUSINESS PLAN

We have chosen to offer Internet services to specific sectors, SMEs and schools on the basis of a “last mile” operator business model. This model permits ensuring a relatively high income level for the power distributor, while taking advantage of the competences of a telecom operator renowned for the quality of its services. The proposed business model stipulates that it is the distributor’s responsibility to invest, construct, operate and maintain the network and also to acquire and invoice customers.

From a technical aspect, the business plan is based on the use of the optical backbone constructed on the HV network to deliver Internet to HV/MV sub-stations of the network. From these HV/MV sub-stations the signal is then fed to

MV/LV cabins using optical fibres, if available, or using SDSL technology on copper pairs leased from the usual telecom operator. This second method enables the Internet service to be transmitted to a MV/LV cabin located between 3 and 5 km from a source sub-station and is essential to ensure speedy and cost-effective deployment of the service in an area where optical fibre is not available. The SDSL service is managed entirely by our company.

Customer services are made up of an offer addressed to individuals comprising an e-mail address, 6 GB of data, for a monthly flat rate and at a speed of 384 kbit/s. The offer for SMEs is based on additional services adapted to the needs of a SME and including a transfer speed of 768 kbit/s and an unlimited data volume.

In order to increase the attractiveness of the basic services we have supplemented them by offering two additional services relating to the security of Internet access. The first is a network firewall, which offers protection from third-party data piracy. The second service offers content filters, which restricts Internet access to sites depicting violence, racism and pornography.

UTILISATION OF PLC NETWORK

Development of a commercial offer requires adapted processes as well as the deployment of new skills within a company such as a power distributor.

From a commercial aspect, this refers initially to sales staff, whose job is to canvass customers who can be connected technically or who request a connection. From a technical aspect, it is necessary to call on telecom engineers to deploy and manage the network and also to supply the services. The technical staff of the distribution network contributes to the installation and commissioning of the PLC equipment in the MV/LV cabins. Electricians are required to install equipment at the entry point of the LV switchboards in apartment blocks and detached houses. Customer service also needs to be provided; it should comprise technicians capable of providing customer service for any installation problems and technical support in case of break-down. Lastly, it is essential to establish an invoicing system that can be integrated in the company's accounting procedures in order to reduce administrative costs to a minimum.

In order to permit all parties to carry out their work as per technical and economical performance criteria, it is essential to have dedicated processes to operate a PLC network and an information system, which can document the installed equipment and operations carried out for customers in the acquisition, activation and support stages in case of break-down. For this purpose EEF has an Intranet system developed specifically for the PLC, which facilitates support for the processes used: sales and marketing, planning, installation, operation, customer support and documentation. Once the signal is available in his/her building, the customer receives a modem, operating instructions and a CD comprising an installation kit for Windows, Macintosh and Linux operating systems.

The website "http://www.eefpowernet.ch/" (see Figure 4) is the preferred communication channel with customers. Customers can indicate their interests, consult our offers, search for technical assistance, see if the service is available in their street; existing customers can have access to personal information (data download volume for the ongoing month) or subscribe to additional services such as the firewall or content filtering.

Figure 4: EEF Homepage

OPERATING RESTRICTIONS FOR POWER DISTRIBUTION

Operation of a PLC network presents new aspects in the running of a distribution network. The equipment is actually installed on the LV network and this must be taken into account when work is scheduled on this network in order to minimise downtimes for the Internet service. To do so EEF has an efficient documentation system, which enables PLC equipment to be stacked on the computerised LV electrical diagrams. This particular documentation tool is also used to determine customers who can be connected to the system depending on the physical distance of signal propagation (approximately 300m) without repeater. From a marketing aspect, this particular tool also facilitates identification of customers who can be connected, thus enabling direct marketing operations.

CONCLUSION

Preparation of a business plan is an essential stage, which allows to identify and weaknesses. One of the results of this is to define the necessary competences, especially in the area of telecommunications. The fact that a network has been in operation for more than one year now helps to confirm the proposed hypothesis, which aims to reach a break-even point in less than 5 years. Competition,

especially ADSL, is a stimulating factor, which helps create a market for high-volume permanent access. Access via every power socket, without the need for additional cabling, and the offer of value-added services are the decisive differentiating factors in relation to competitors.

Over time the choice of going into partnership with a telecom supplier has enabled rapid development of a commercial offer without requiring significant investments to acquire know-how in the field, thus avoiding major investments in hardware. In addition, the partnership with a telecom operator represents an additional sales argument towards customers.

Finally, careful planning enables identification of the most attractive zones to ensure a speedy return on investment. This planning must be backed up by an efficient information system that can ensure the traceability of each process at all stages of implementation in order to guarantee first-rate customer care.

By way of conclusion, we actively encourage power distributors to seize this new opportunity to create additional revenue with existing customers.