How to build an open, real-time Smart Metering and Smart Grid Platform with Broadband Powerline
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Company and Business Modell

Smart Grid story, Market/regulation framework

Products, PPCs added value and USPs

PPCs BPL technology and software
The company

Technology developer and supplier for Broadband powerline based Smart metering/Smart grid solutions

A pioneer for Broadband Powerline installation and operation in Europe with 300,000 households passed

Biggest utilities in Germany are customers for Smart Metering

Projects in Europe and Middle East

March 2009: PPC featured as one of the worldwide “Smart Grid 50” companies by Cleantech Investor
UK based fund ($1.5 bn) Climate Change Capital invested 10 Mio. € in 2008/2009

Subsidiaries:
- Vype GmbH (100%) operates BPL network in Mannheim
- Speed Web (60%) reseller in Austria
Framework for the development of Smart Grid communications

Smart Grids are an integral part of strategies to fulfill the obligatory EU-Directive 2006/32/EC “Energy end-use efficiency and energy service”.

Smart grids will be developed

- based on obligatory Smart Metering structures
- and are a key infrastructure
- for future decentralized energy structures
- for improved energy efficiency and for interactive connection of customers into energy markets
- for sustainable cost reduction in utilities operations/assets
This proposal shall facilitate, inter alia the use of bi-directional electronic meters, which shall be rolled out to all consumers within 10 years after entry into force of the Directive, the active participation of final customers and distributed generators in system operation and the flow of real-time information between distribution and transmission system operators aimed at optimizing the use of all available generation, network and demand resources.

The regulatory framework in Europe is complemented by European technology platforms like “SmartGrids” (founded in 2006) or national grant programs like the 2007 founded German eEnergy “ICT based future energy system” program.
The new German law „Energiewirtschaftsgesetz“

The German Parliament changed the law regulating the Energy market 6th of June 2008:

- **By coming into effect** - energy suppliers are **obligated to bill the energy consumption monthly**, quarterly or half yearly upon consumer demand

- **1st January 2010** - all operators of meters **have to offer their clients meters showing the actual energy consumption of the client and the actual period of use** upon consumer demand

- **30th December 2010** - electricity suppliers are obligated to offer a **tariff stimulating their clients energy savings** or **adjusting the energy consumption** e.g. tariffs depending on varying demand or tariffs depending on the time of day (**real time pricing**)

- **Latest 2014** - according to political resolutions **all meters should be replaced by electronic meters**

Regulation and pricing in unbundled structures: **Standard load profils** for privat households will be **replaced by measured values**
Intelligent networks are key for future energy systems

Smart grid has a vital challenge:
“Existing energy distribution networks do not have communication-networks for Smart Grid solutions”

Broadband Powerline Communication
... use the electricity grids itself to offer a cheap and reliable communication-network with a sustainable bandwidth
... is the key technology for scalable Smart Metering
With BPL we are building for future needs

Manual meter reading
  • Monthly kWh reads

Automatic Reading (AMR)
  • Interval data
  • One-way or Two-way
  • Monthly kWh reads

Advanced Metering Infrastructure (AMI)
  • On-demand reads
  • Programmable load intervals
  • Demand Response
  • Bi-directional and net metering

Smart Metering
  • Efficiency
  • Area wide
  • Integrated communications
  • Real-time
  • Flexibility
  • Open interfaces
  • Plug-and-Play
  • Remotely upgradeable
  • User-friendly

Smart Grid
  • Demand Side-Management
  • Energy Management Services
  • Load Management
  • TCP/IP Standard
  • Internet of the Future
  • Electro mobility
  • SCADA
  • Decentralized Energy
  • Monitoring
  • Asset Management

Broadband Next Generation Network
  • Real-time
  • Bidirectional
  • Area-wide
  • User-friendly
  • Open interfaces
  • Based on standards
  • TCP/IP Standard
  • Ensures reliable systems
  • Based on meshed networks
  • 200 Mbps Standard
  • Automatic dynamic routing

grow with BPL
Smart Metering – the kick-off to future Smart Grids if ICT is ..

- Automatic meter reading
- Remote interval reads
- Load control & balancing/shifting
- Power quality
- Flexible pricing/incentives
- Remote connect/disconnect
- Intelligent home
- Public lighting
- Process optimization
- Theft detection
- Outage detection
- Energy Storage
- Efficient maintenance
- Demand response
- Telco Services
- Utility of the future
- One IP-platform for all Smart Grid applications
- Plug-in Hybrids
- Decentralized power plants
- Decentralized power plants
Smart Metering/Smart Grid is not! a metering problem
– it is a challenge for communication networks

Transformation of today's communication networks in utilities
to an advanced solution based on guidelines for the Next
Generation Networks (NGN)

The key to success is convergence

- Network: one network for different services
- Services: same services on different infrastructures (wired/wireless)
- Gateways: one gateway for several functionalities and services
- Operations: one Operation center
Our guidelines for future proofed communications in Smart Grids

- Must be based on know standards for communications (TCP/IP, wireless M-Bus) and should be structured according to OSI Modell

- Logical and structural separation of communication structure and application (e.g. gateway for metering: MUC*)

- One IP-platform for all Smart Grid applications to reduce costs and improve scalability; on demand VPNs for applications

- Metering: Independent from measured medias, connect all kind of electronic meters to one gateway; intelligence in the system not in the meter

- IP-based communication from gateway to central IT-structure (WAN)

- Real time information for operations and customer displays

* Multi Utility Communications
PPC’s product for Smart metering/Smart Grids

PPC focused on BPL communication part and tools
- BPL equipment and System management Software (NMS)
- Metering Gateways according to new standards for Smart metering for multiple meter interfaces
- Project management and integration services
- “Energy data server” to collect metering datas/operate Smart Grids
"ICT-based energy system of the future" Flagship project of German Ministry BMWi

Volume €20m in 2008-2011 (€5.5m for PPC)

PPC’s responsibility
- Implementation (hardware/interfaces)
- utilization (public relation/guidelines)

 Utilities and partners:
- 1.5m meters (MVV/DREWAG)
- IBM network
- other eEnergy projects

Ministry Marketing:
- Multiple booth for eEnergy
- Video clip/Press/Materials
- Secondary R&D program

(Source: MVV Energie AG)
Smart Metering – modern systems

Energy data server

IP-network
WAN

BPL network

BPL gateway
BPL Gateway for Smart Metering/Smart Grid

- Gateway/MUC
- BPL Access (WAN)
- BPL indoor (LAN)
- Repeater LAN/WAN

200 MBit BPL based Smart Grid gateway execute 4 tasks

- Gateway/MUC
- BPL Access (WAN)
- BPL indoor (LAN)
- Repeater LAN/WAN
Business Case Smart Metering

- Net present value
  - Smart Metering Investm.
  - Increased efficiency metering/accounting/billing
  - Earnings new services
  - Cost reduction assets, operations and load management

  + leverage IP-structure for other applications of the utility
  + Improved customer care reduces costs of sales/lost customers
  + asset management
  + outage management
  + ….
Energy 2.0 will be the reality in future energy systems

- e.g.: Google crashes the smart-grid party

Source: http://www.google.org/powermeter/
Broadband enables advanced services and sustainable systems

⇒ **Real-time/online** data and remote access, added value based on demand response, new tariffs, remote actions, interaction with customer …

⇒ **Real-time information** and use of information to improve operation/energy trading (integration in load management and real-time balancing, asset optimization …)

⇒ **Flexible meshed network**
  (internal redundancy, dynamic auto-configuration, reliable system, reduced operation costs …)

⇒ **Open IP-communication platform** suitable to operate decentralized generation, energy management with real-time connected server, control system, ripple control..

⇒ Offers the **transfer of hardware functionalities to software**/centralized structures

⇒ **Broadband Powerline** offers TCP/IP platform based on existing structures and connections available everywhere
Reasonable investment/ICT costs for Smart metering

**Preferred solutions**: BPL and PLC

- **Broadband**
- **Narrowband**

### Cost Breakdown

- **Capital costs**
- **Third party telecom. costs**

### Solutions

- **DSL**
- **UMTS/HSDPA per house**
- **WiMax per house**
- **BPL**
- **GPRS**
- **Narrow band Powerline**

### Costs

- **€/month/meter**

**Notes**:

* Price for electronic meter + communication + installation (pay-back period 60 month)

** Unpredictable process cost due to the demand of a 100% coverage; individual contract with each landlord for constructions!
Learn from the development in the telecommunication sector

- IP-based structures
- Convergence of systems (mobile, fixed networks, gateways)
- Broadband, internet protocol based communications platform enables interactive solutions and makes any adaptation easier
- Less hardware and more software based solutions

One meshed IP-platform for all applications

- Otherwise utilities will end up with a variety of parallel/non-interoperable proprietary systems
- Start to “think in layers”

Choose communication systems with sustainable bandwidth for real-time applications and also for the Next Generation Smart Grid

Leverage of existing structures and availability everywhere supports solutions based on broadband powerline systems
Thank you for your attention

Next Generation Smart Grid
BPL based Smart Metering
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