Medium Voltage Broad Band Powerline (MV BPL)

The increasing amount of integrated distributed energy resources drive requirements on more and different protection, automation and monitoring in the distribution grid. In addition the rollout of Smart Meters and development of demand response solutions are all drivers for a complete and general communication infrastructure covering the medium and low voltage grid area from primary substations to end user.

The conditions for the communication viewed from economy, technology and regulatory perspectives vary largely depending on the location and local conditions for the grid owner. As an example, in the condensed urban areas with mainly underground cable the conditional are different than in the rural areas.

The offered communications systems can be categorized as fiber (or wired) communication, wireless e.g. GPRS and Broadband Powerline for the medium voltage cable network (MVBPL). In order to allow for an optimized solution under the varying conditions a mix of these communication systems are required.

Starting with the AMI roll out in the Spanish grid of Iberdrola the MVBPL has found a natural place as communication system for the urban areas. In a typical case there are 10% to 15% of the transformer stations already equipped with a form of communication connection with the control centers the MVBPL can extend this to cover almost all transformer station by using the existing medium voltage cable as communication medium between the transformer stations.

Starting with the pilot installation in Castellon the first deployment with 100,000 meters (175,000 inhabitants) and 600 secondary substations using MVBPL in 200 transformer stations in 2010 and 2011, where the products and system concept have been validated the MVBPL solutions is now expanding to areas in the entire footprint of Iberdrola grid and today there are more than 3000 MVBPL modems installed in the grid.

The first requirements on the MVBPL communication system were to support the AMI with data transmission mainly from the meter data concentrators to the back end control center. However, the MVBPL communication system offer a general communication link with the grid infrastructure and toady the communication system is also used increasingly for monitoring of the network asserts and operation including maneuvering the circuit breakers. This is no problem since the MVBPL can also support any modern TCP/IP based protocol like e.g. IEC 60870-5-104 and IEC 61850.
The MVBPL is working integrated with fiber and wireless solutions to forma a uniform and seamless communication system for the entire distribution grid. The mix of communication solutions in the installation in Spain is approximately 45% MVBPL, 50% wireless and 5% wire bound. It is clear that the MVBPL fulfill an important part of the total communication system and that it fulfills this well.

Starting with the support for AMI the MVBPL is now also increasingly used and tested for further applications in distribution automation and monitoring. The INTEGRIS (http://fp7integris.eu/) project has conducted test of various applications over a communication system consisting of MVBPL as well as Ethernet over fiber and wireless wire bound communication systems. In this project a particular focus is put on the latency and throughput performance of the different types of communication systems and it concluded that MVBPL can support a large part of the distribution automation and monitoring applications used in connection with grid operation

The MVBPL is playing an increasingly important role in supporting the electrical utility with a fully owned and managed communication system that integrate with the existing communication solutions. It has shown that it support not only the AMI but also further application that are required in the electrical grid with the increase of distributed generation and focus on power quality today. The MVBPL is further developed and supported by Ormazabal to increase the envelope of applications and the work in aligned with the definitions and requirements set in the IEC61850 standard.

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