

Manchester University



Broadband Powerline Trial Reinforces Manchester University as a Leader in the Smart Grid Space

The University of Manchester, a centre of excellence for smart energy and high voltage research joined forces with Electricity North West, Schneider Electric and Power Plus Communications (PPC) to install a medium voltage demonstration link on the 6kV network on the university campus, using Broadband Powerline (BPL) communications.

The link was set up in such a way as to replicate the kind of challenges that a dense, urban environment presents for Smart Grid installations in the UK, such as noise and physical barriers. The University has its own grid comprising 25 secondary substations (United Utilities provide a 33kV system to the university campus) and specialises in studies in high voltage power transmission.

The objective was to use BPL to harvest a range of energy data in real-time, to study consumption in kilowatt hours, carbon emissions, and other parameters according to the University’s needs. Because the system is IP-based the data can be easily shared with different software systems and portals, and also encrypted at all stages for security.

The whole installation was completed in half a day and is now documented (also with video recordings: see YouTube channel PowerPlusCom) as a textbook example of how to install BPL on medium voltage grids in the UK. “Initially we



Every stage of the installation was documented and recorded also with images and [video](#)

thought this would be a very complex project, but it turned out to be very straightforward and easy to install.” said Kevin Fullerton, EHV Delivery & Protection Engineer at Electricity North West.

The scope of the project was to install a MV link on the 6kV network between two substations. The BPL was combined with a GPRS/fibre backbone. In one substation PPC’s BPL12CC medium voltage coupler was installed in a pre-fitted enclosure. Electricity North West connected the coupler with the 6kV cable, which connects the two substations.

PPC provided the technology, the project plan and support for the installation of the couplers (BPL12CC) and Rugged Modems. PPC also monitored the MV link for three months via a G3 mobile phone router which provided an internet connection to the network management system (NMS) hosted in Mannheim, Germany.

“The opportunities that this project presents are excellent and consolidate the University’s lead in the Smart Grid space.” said Ian Cotton, Professor of High Voltage Technology, University of Manchester.

Project Summary	
Customer	Manchester University
Goals	Campus installation (replicating a dense urban environment)
Solution	2 links, 2 couplers on a MV - 6 kV network
Product	BPL Capacitive Couplers and Rugged Modems
Results	Real-time data delivery to G3 mobile phone and internet portal Installation just in half a day

Technical Details



Capacitive Coupler BPL 12CC

Capacitive Couplers

Capacitive couplers connect power grids with MV200 BPL modems and thus enable broadband data transfer on the phase of a power cable. To enable this the coupler is installed between the phase and earth of a MV cable or overhead line.

The excellent transmission characteristics and compact design of PPC's couplers are the result of years of development and practical experience in a vast number of installations.

PPC's capacitive medium voltage couplers are available in 2 versions: BPL12CC for 12kV networks and BPL24CC for 24kV networks. Their small dimensions enable installation in modern compact switchgears and substations.

The form and functions of PPC couplers have been optimised for:

- Installations with limited space
- Support of all cable and switchgear types
- Overhead lines and low-impedance lines
- Indoor and outdoor installations
- Coupling on different cables or overhead lines via common bus bar



Rugged BPL Modem

BPL Rugged Modems for Medium Voltage

PPC's Rugged BPL modems enable broadband data transmission on low and medium voltage power grids according to IEEE1901 FFT OFDM Access standard profile.

They are especially designed for the operation within the power grid and station environment (overvoltage category IV).

Ethernet (RJ45) and BNC interfaces enable connection with backbone, medium voltage couplers and/or other devices such as RTUs or measurement equipment.

PPC Network Management System (NMS)

The NMS enables fast, easy monitoring and administration of BPL systems and their components. It provides all necessary information and configuration options for set-up, extension and operation, featuring:

- Multi-level user and rights management
- Automatic integration of all BPL devices
- Central configuration via client server structure
- Platform independent with web-based user interfaces
- Visualisation of network topology and link quality
- SNMPv3 encrypted communication and SSL-encryption with HTTPS