

# PowerUp - Vehicle2Grid Technology for Fully Electric Vehicles

## Introductory Presentation

Presentation for the EGCI clustering event: Brussels, July 11-12, 2012



PowerUp is an FP7 research project co-financed by the EU

Project coordinator: BroadBit



# POWERUP CONSORTIUM

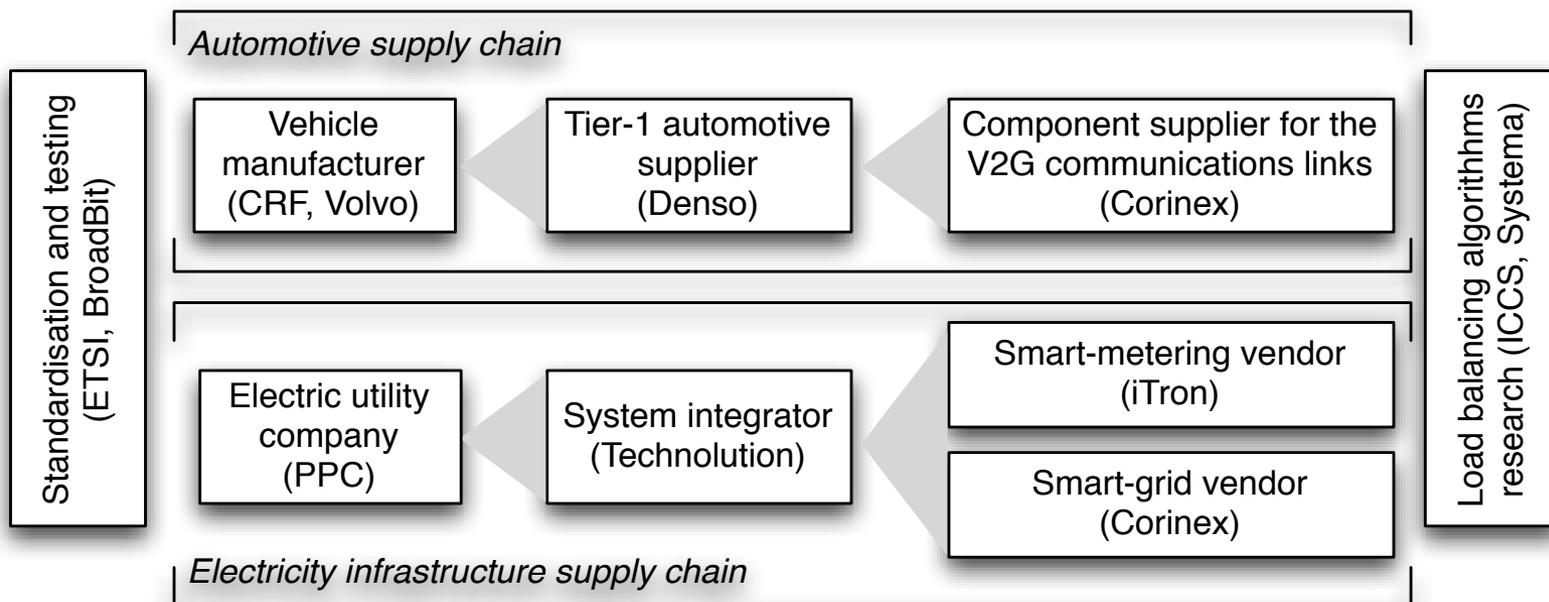
Participant organisation name	Role
BroadBit Slovakia	Coordinator
Centro Ricerche Fiat	Vehicle manufacturer
Corinex	PLC/smart-grid developer
DENSO AUTOMOTIVE Deutschland GmbH	Automotive supplier
ETSI	Standards Development Organisation
Institute of Communications and Computer Systems	Load balancing research, Quality mgmt.
Itron	Smart metering vendor
Systema	Load balancing research
Technolution	System integrator
Volvo Technology	Vehicle manufacturer
Public Power Corporation of Greece	Electric utility

Project duration: July 1, 2011 - June 30, 2013



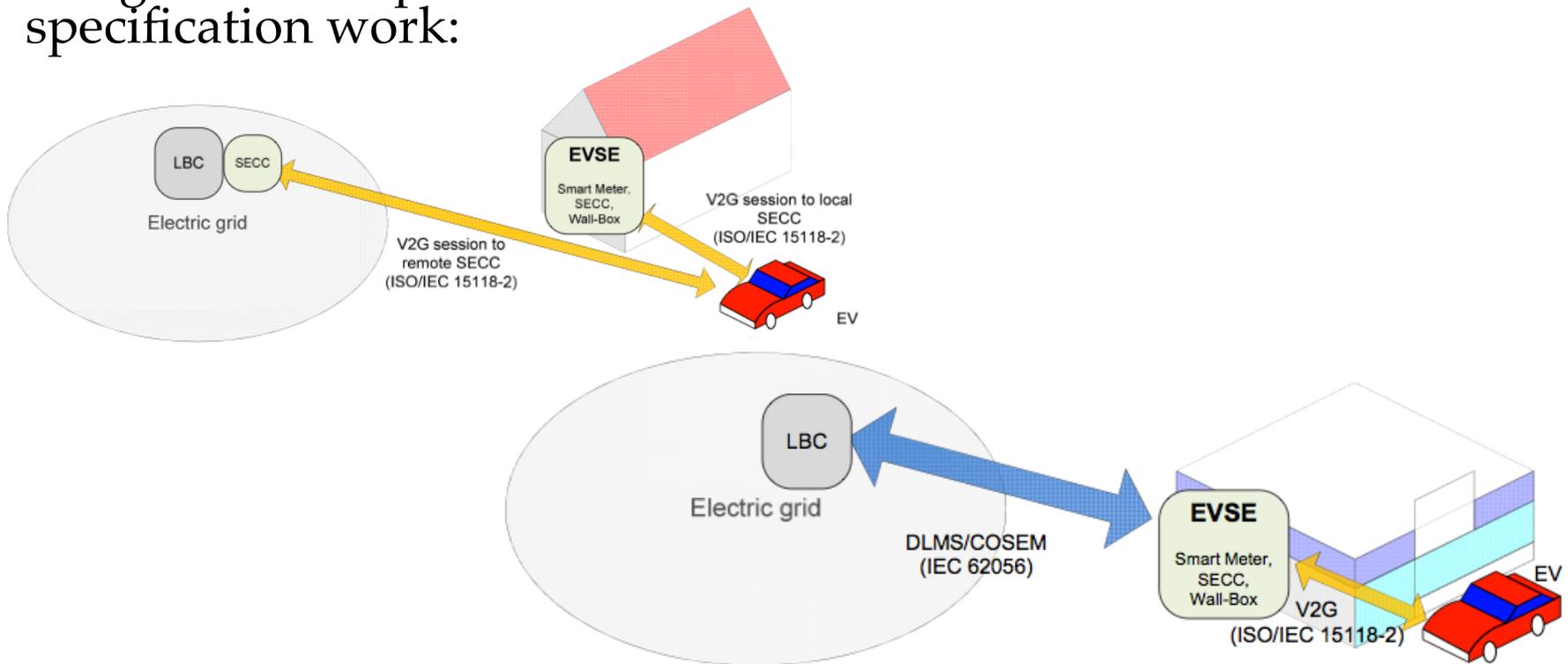
# POWERUP CONSORTIUM

PowerUp consortium represents the full supplier value chain in both automotive and electricity grid domains:



# POWERUP ARCHITECTURE (ALREADY PUBLISHED)

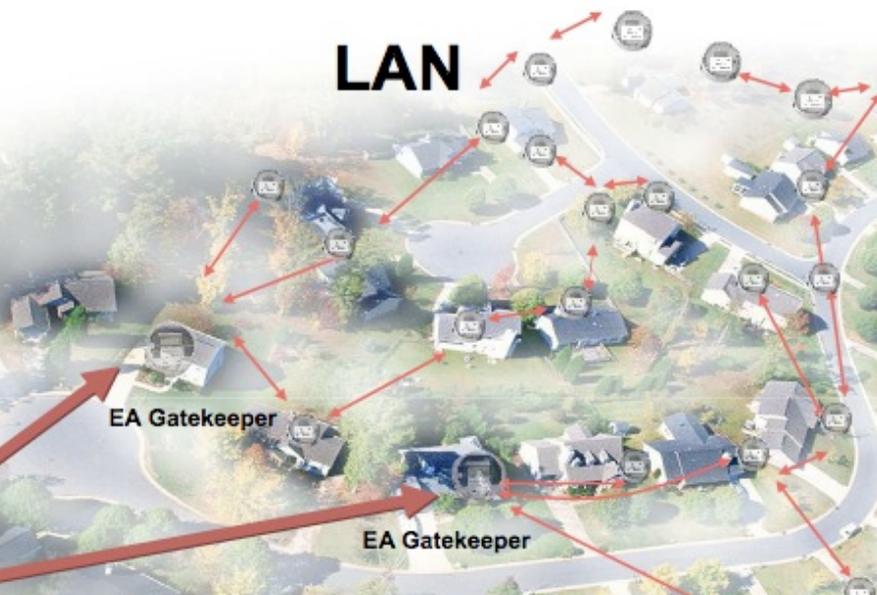
The interaction between local EV control (i.e. EVSE) and the load-balancing entity in the grid (i.e. LBC) is a major issue for a V2G system design. PowerUp considers two V2G architecture variants for its specification work:



The implementation and field trial focuses on the second variant.

# CONCEPT OF V2G INTEGRATION INTO SMART-GRID NETWORKS

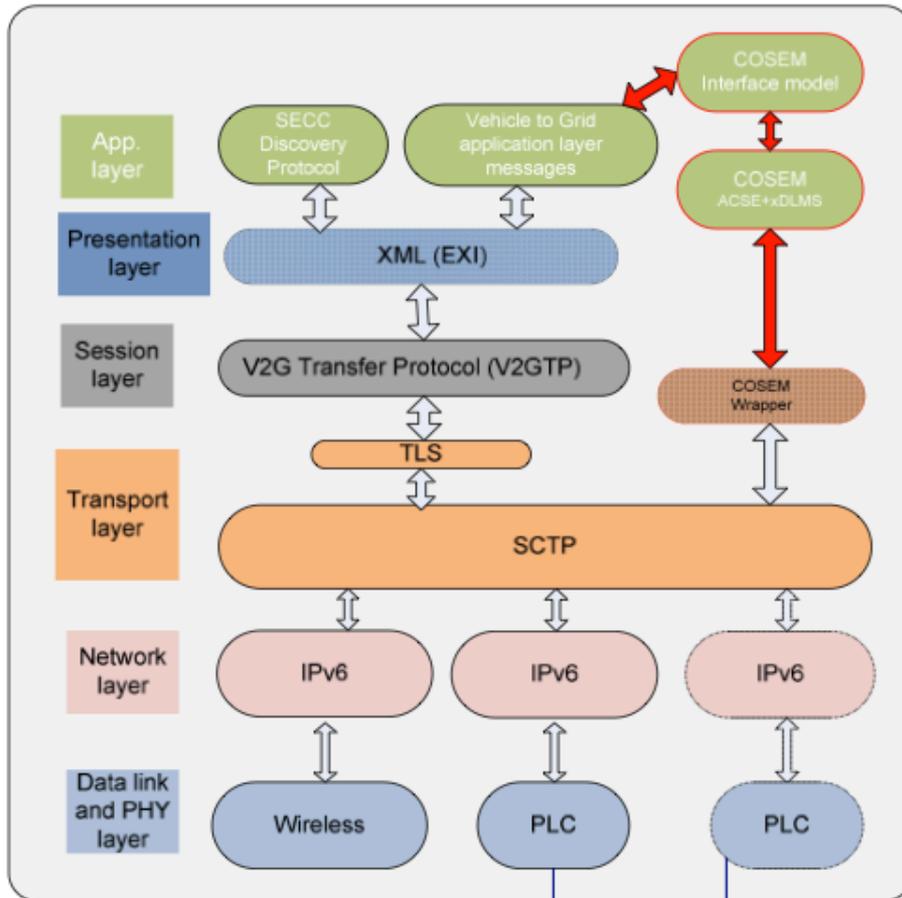
Smart electric meters for automated meter-reading are the primary entry point into a smart-grid network. As a result of the EU directive on deploying smart electric meters throughout the EU by 2020, the integration of grid-side V2G adapter into smart electric meters solves the infrastructure-side deployment issue for the V2G interface. PowerUp will develop such V2G-ready meters.



*Illustration of automated electricity meters forming a meshed smart-grid network, providing infrastructure connectivity of the V2G interface*

# POWERUP SPECIFICATIONS (ALREADY PUBLISHED)

The ISO/IEC 15118-2 (V2G) draft standard and the IEC 62056 (DLMS/COSEM) standards are taken as specifications baseline.



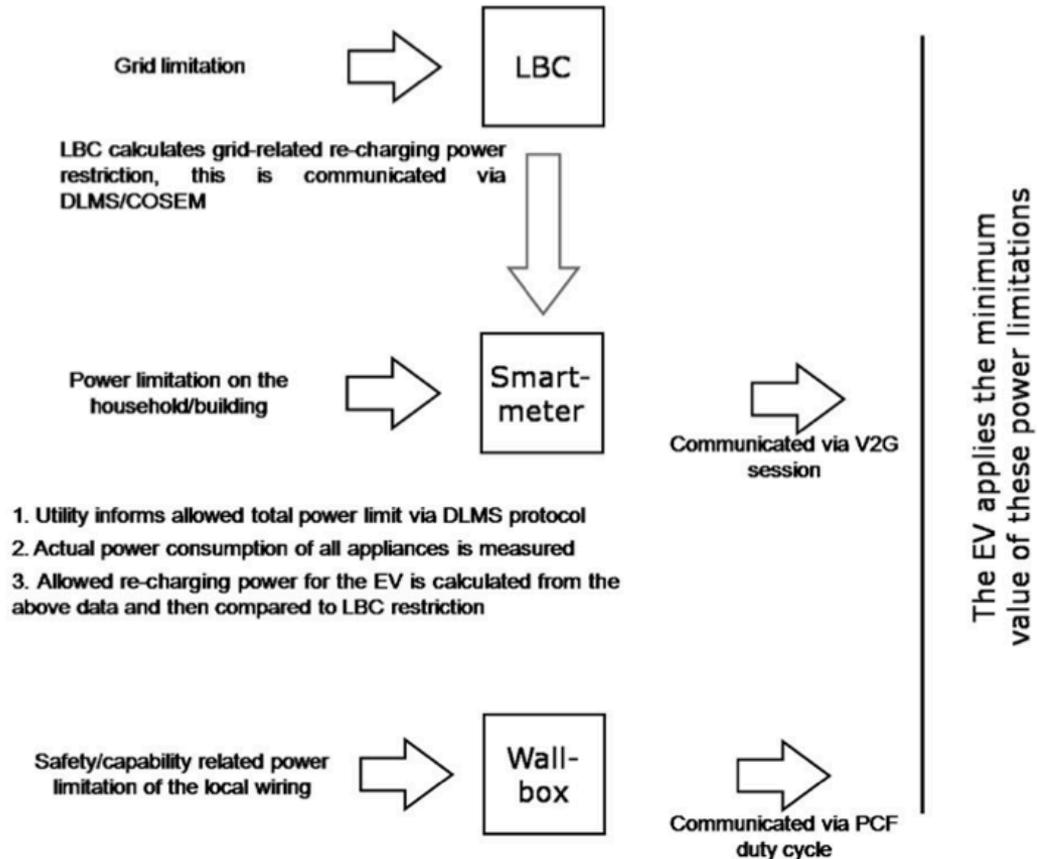
The PLC interfaces on the COSEM and V2G sides may be same or different technologies

The proposed enhancements to the above-mentioned protocols - which are identified as a result of PowerUp research - will be contributed to the IEC TC69 and IEC TC13.

# POWERUP SPECIFICATIONS (ALREADY PUBLISHED)

Main new contributions to the V2G interface:

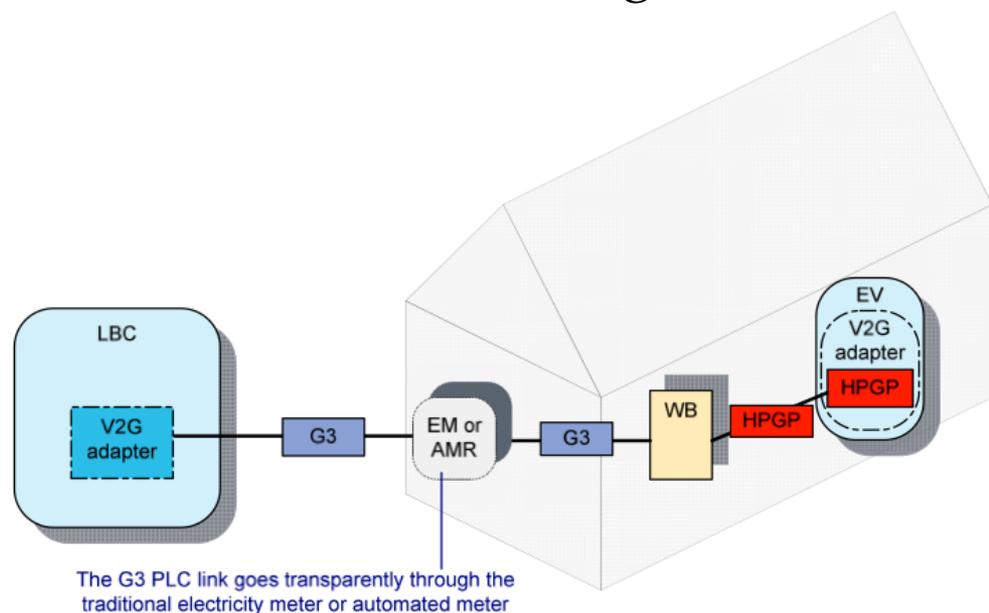
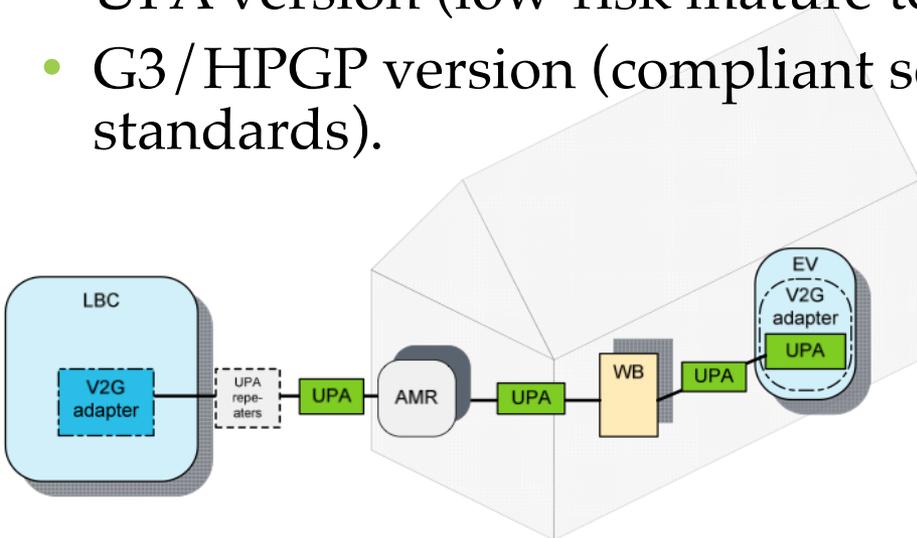
- Proposal to use SCTP instead of TCP transport layer. This allows the handling of link redundancy, and the use of 5.9 GHz wireless networks.
- EV-specific extensions of the DLMS object model.
- Elaboration of a 3-tiered concept of recharging power control (see below)
- Extensions of the V2G protocol; description of transactions for power delivery rescheduling, optional parameters supporting fair load-balancing



# POWERUP PROTOTYPING

The prototyping work will consider the end-to-end V2G system. Two physical interface variants will be made, using different PLC technologies:

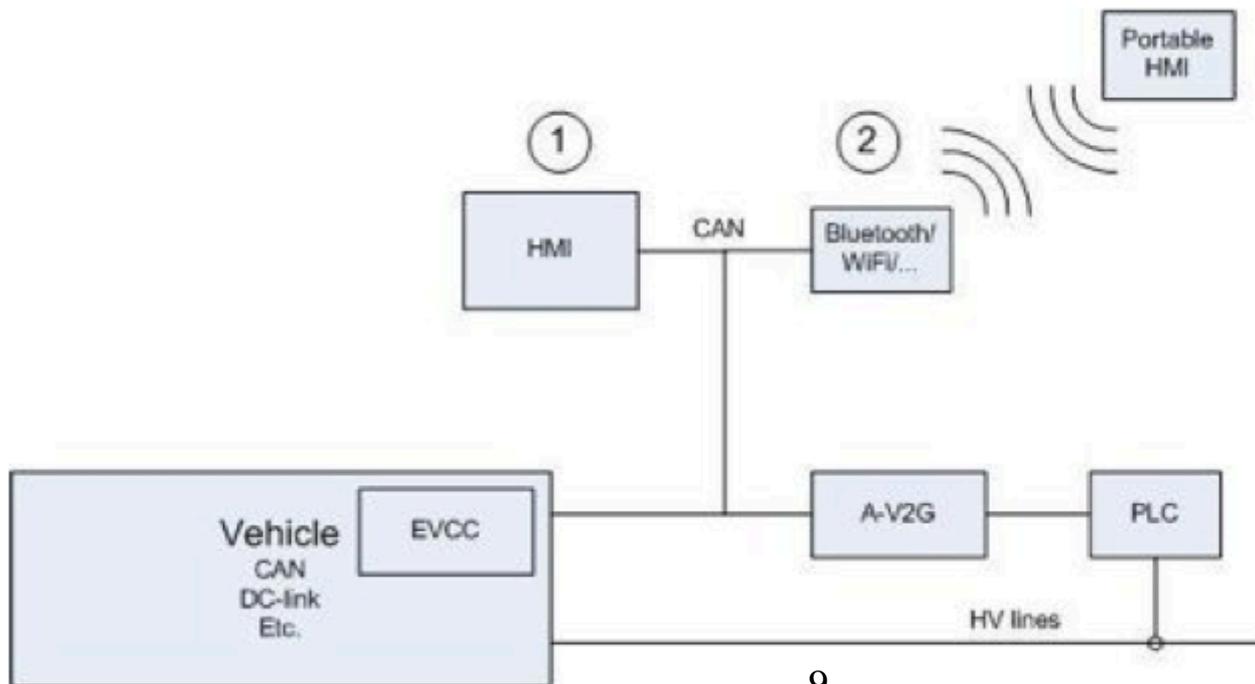
- UPA version (low-risk mature technology)
- G3/HPGP version (compliant solution to smart-metering and V2G standards).



The prototyping work will also cover the Wall-Box (WB) unit and the V2G-ready smart-meter.

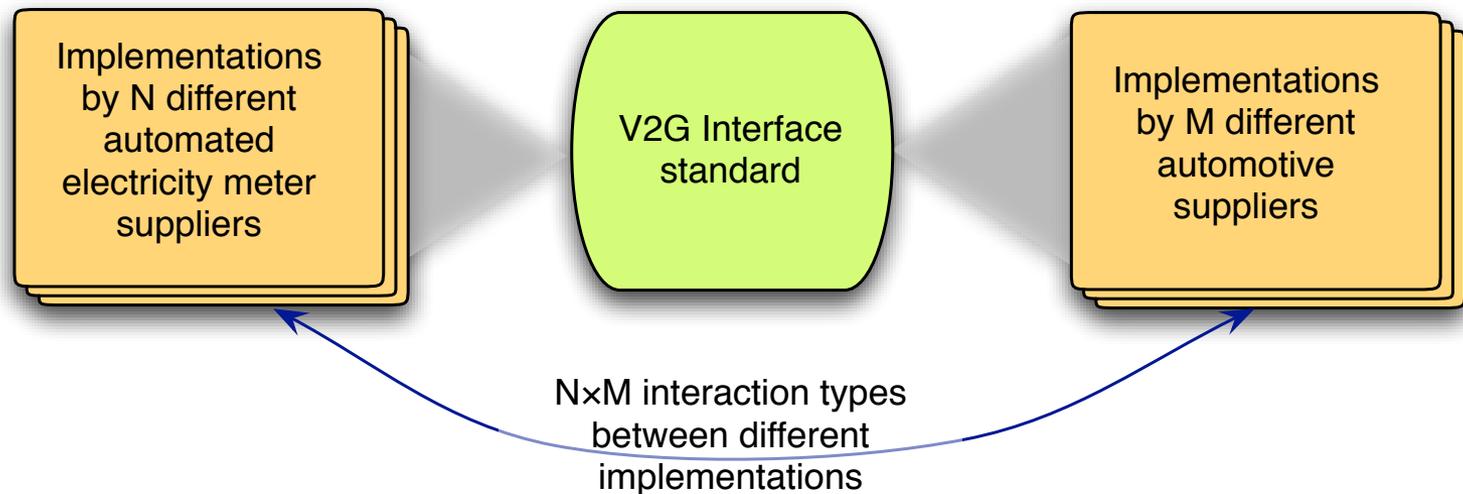
# POWERUP PROTOTYPING

The automotive V2G adapter prototypes will be integrated with the battery control unit and the user HMI. The project will consider both built-in HMI and nomadic device based HMI. The automotive integration will be done on Fiat and Volvo electric vehicles.



# CONFORMANCE TESTING SUPPORT

Multi-vendor compatibility is crucial for the success of V2G technology, so that the recharging of any fully electric vehicle brand could be controlled by any electric network in the EU.



The project will develop the conformance test specifications for the V2G interface, including both test descriptions and TTCN-3 test suite code.

# EXPECTED POWERUP RESULTS

PowerUp aims to provide the automotive and electric utility communities with the following:

- **Specification of the V2G interface;** a self-contained 'consensus' specification of the V2G protocol stack, and EV-specific smart-metering extensions. PowerUp consortium members shall contribute the project specification results for standardisation.
- **Automotive V2G adapters** for EV integration and **V2G ready electricity meter prototypes.** These components may be used by EV related follow-up field trials.
- **End-to-end demonstration of the V2G system;** this may also serve as a model for follow-up field trials
- **V2G interoperability testing capability;** relevant for compatibility of follow-up multivendor products

# FURTHER INFORMATION

**Project coordinator contact:**

Andras Kovacs / BroadBit  
andras.kovacs@broadbit.com

**Project web-site:**

<http://www.power-up.org>