Plug-in Electric Vehicle (PEV) PLC based Communications

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PEV Communications Demand

*PEV has become a desired communications node*
PEV Side of Communications

• OEMs need to control the number of potential on-board communication interfaces.

• Optimization and streamlining of these interfaces will simplify choices of connecting to PEV for other parties as well.

• Wired link is required for PEV Communications for DC Off-board charging control and to ensure proper association with EVSE for Smart Energy support.

• Design of the SAE J1772™ Conductive Charging connector was targeting reduction of the coupler interface, elimination of the need for mechanical assist, and increasing reliability (fewer pins are better).
System configurations (a year ago)

**Scenario 1:** AC Charging – EVSE is “passing through” Smart Energy 2.0 (SE2) Communication over J1772 cordset L1/N directly from vehicle to HAN gateway and to utility.

**Scenario 2:** DC Charging with active EVSE--DC charge control messages and SE2 Communications (bridged in EVSE) over J1772 cordset L1/N or P/G wires.
Potential scenario Implementations

Scenario 1a – AC Charging with HPGP PLC HAN

Scenario 1b – AC Charging with 802.11 Wireless HAN

Scenario 1b – AC Charging with 802.15.4 to HAN

Scenario 2a – DC Charging

Scenario 2b – DC Charging

Potential scenario Implementations

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Road to a single PLC solution

- PLC “competitions” and preliminary tests were run by IEC/ISO and EPRI/SAE teams as well as internal studies by some OEMs.

- Major OEMs came together and agreed to come up with a common, single PLC Communications solution (for both AC and DC Charging) for as many markets as possible.

- HomePlug GreenPHY technology on the J1772™ Control Pilot wire has been accepted as a working assumption.
EVSE-PEV Link Architecture*

* Example, not all layers are not shown

- **DC Charging Application Layer**
- **Transport Layer**
  - Router
  - Network Layer
  - HAN* Link Layer
  - HPGP Link Layer
- **Vehicle CAN bus**
- **J1772™ Charging cable (Pilot/GND)**
- **Interaction Layer**
  - CAN Link Layer
- **“The Cloud”**
PEV PLC-based System Setup

Now HPGP on CP of J1772™ charging cord

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• **PEV-EVSE HPGP-over-CP link is being developed as the common standard for PEV DC Charging and Utility Communications.**

• **EVSE** has an important role to play completing PEV to HAN/Utility communications path redirecting and sending all relevant information bi-directionally as a bridge/gateway/router as required.

• This architecture offers much needed flexibility **today** providing HAN/PEV/Utility with necessary **connectivity options**.
Thank you!