



EMS and PHEV Integration
Juice Technologies, LLC

Contact:

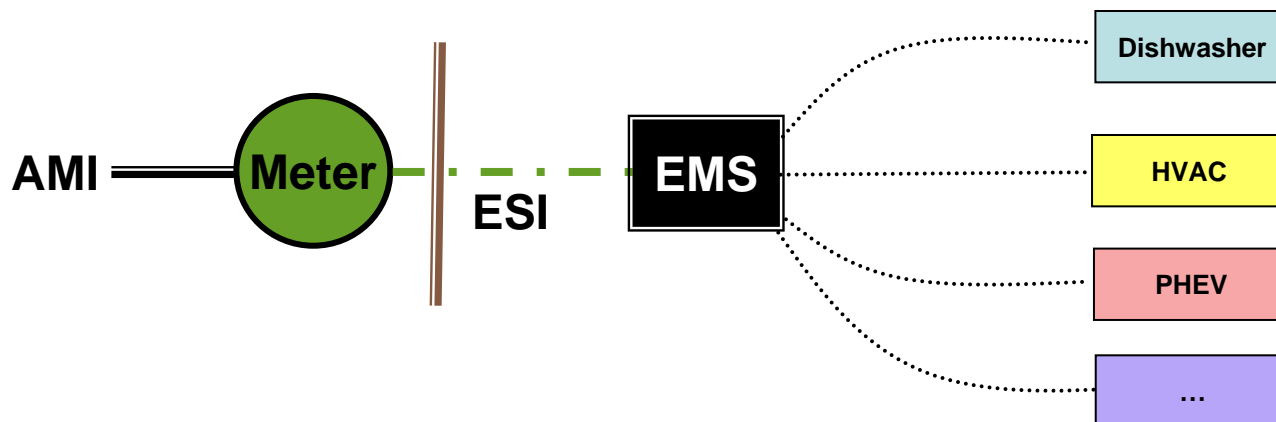
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- Energy Management System
Configuration and Definition Overview
 - Technologies, Integration
- Proof of Concept Demonstration Overview
 - Using Homeplug 1.0
- PHEV and EV Smart Charging
Configuration and Definition Overview
 - “Plug Smart Pal” Concept

- Homeplug 1.0
 - TCP/IP, Ethernet, IP Addressable
- ESI Communication Protocol
 - The EMS's interface with the Meter
 - Zigbee Smart Energy Profile (conformance to SEP 1.x)
 - GridNet Han Device SDK (conformance to OpenHAN standard)
- Grid Net Smart Energy Services Interface (SESI)
 - Running on the Meter Simulator
- HAN Device Physical Transport Layer
 - Technology Agnostic

- The EMS communicates with the Utility (could be an AMI Smart Meter) via a secure Energy Service Interface
 - Zigbee Smart Energy Profile 1.x Compliant
- The Plug Smart Home (the EMS) allows the consumer an interactive window into the operation of the HAN
- Allows for easy-to-use energy management strategy configurations
 - Consumer can “program” lighting schemes, appliance usage times, electric vehicle charging times, etc.
- Gathers and reports energy usage statistics and data in an easy-to-understand fashion
- Controls all HAN devices
- **KEY IDEA:** The EMS adapts with the ever-changing HAN technology, not the utility meter





Smart Charging Key Ideas

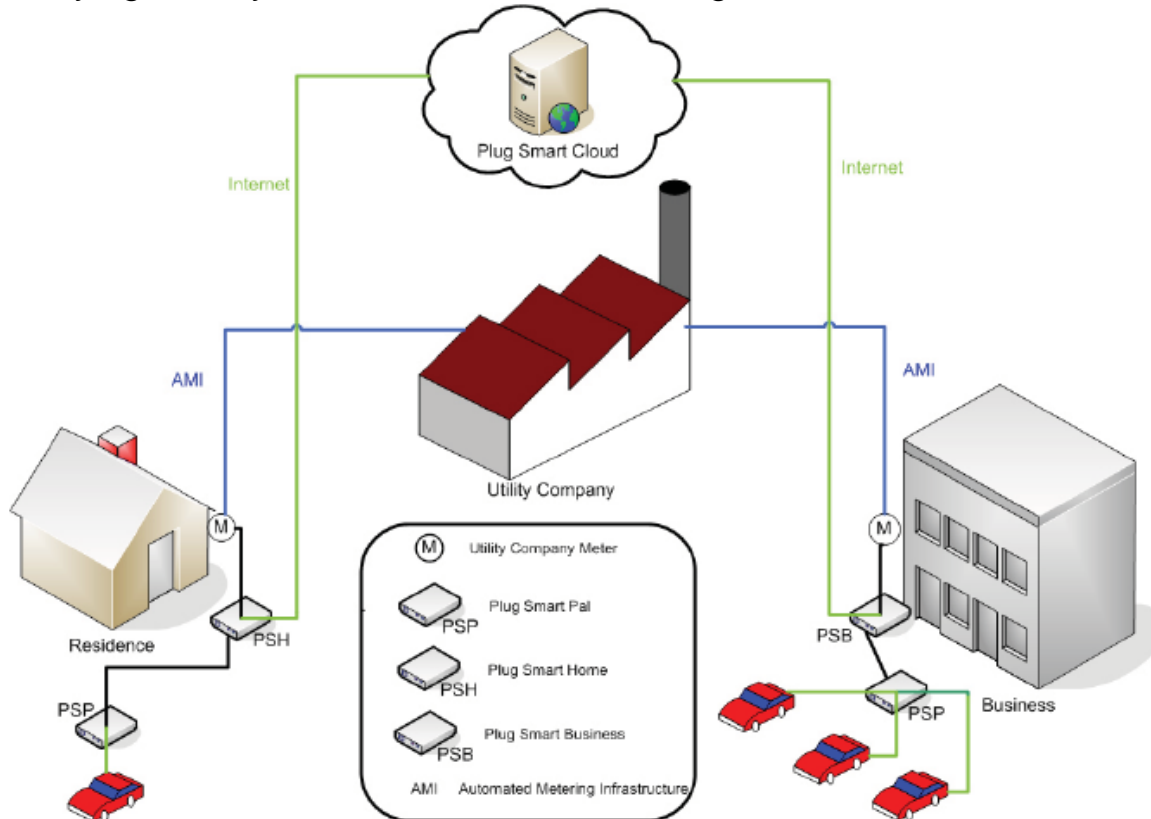
- Allow the physical charging device to travel with the EV or PHEV, without forcing the automotive manufacturers to integrate a meter and secure communication technologies (i.e. Homeplug 1.0) into their vehicles.
- Provide an infrastructure that enables the electric vehicle owner to be charged for the electricity that he or she uses for the PHEV/EV anywhere in the country.
- Collect charging data, display the data, and give an EV or PHEV owner the information through an EMS (such as the Plug Smart Home) or web portal provided through the infrastructure to view MPG, electricity usage, and carbon footprint.



“Plug Smart Pal” Concept

▪ **Configuration Option 1:** (Shown below) includes the Smart Charging device and the EMS integrated into one total solution, where the EMS ties into the utility company through an AMI.

▪ **Configuration Option 2:** includes the Smart Charging device as tying directly into the AMI, circumventing the EMS



Features of the Charging Device

- Easily thrown into the trunk of the PHEV when not being used
- Size of a laptop computer power supply (“a bump in the cord”)
- Homeplug 1.0, (intended to be SEP 1.x compliant)
- Revenue Grade Meter
- Optional GPS and Web Server (for collecting and displaying energy usage statistics)
- Affordable for the Consumer
- 110V/220V Charging
- Intelligently Controlled (able to be programmed by the consumer to intelligently follow and act on utility pricing)



The Center for Automotive Research (CAR) at The Ohio State University (OSU) has launched “**SMART@CAR**” a new comprehensive research and development program focused on Plug-in Hybrid Electric Vehicles (PHEVs), Electric Vehicles (EVs) and intelligent charging. R&D efforts on electric and hybrid electric vehicles are not new. This work has been underway at OSU and other places across the nation for a number of years. What is new about the SMART@CAR Program is the multi-discipline systems approach to issues involved with the development, manufacturing, deployment, and application of electric and plug-in electric vehicles. SMART@CAR is a research and development collaboration of the entities and stakeholders that will be most affected and are best suited to address the challenges.

A number of key drivers contribute to the time sensitivity of this program:

- Rapidly increasing fuel prices.**
- Environmental considerations, including emissions/greenhouse gasses.**
- Technology advancements in PHEVs, EVs, and batteries.**
- Technology advancement in batteries.**
- Growing constraints on the transmission grid**
- Increasing needs for load and capacity management options**



Thank You!

- **Questions or Comments?**