



VANET IN VEHICLE-TO-GRID

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VANET IN V2G: PREMISES AND OBJECTIVES

In a future where electrical vehicles will be a consistent part of the overall mobility system and where smartgrids will be used to better exploit energy resources, the *vehicle-to-grid paradigm* will play an important role



The *creation of a platform for the smart joint management of electrical and mobility resources* in a real-time dynamic manner will be compulsory

What does smart management concern?

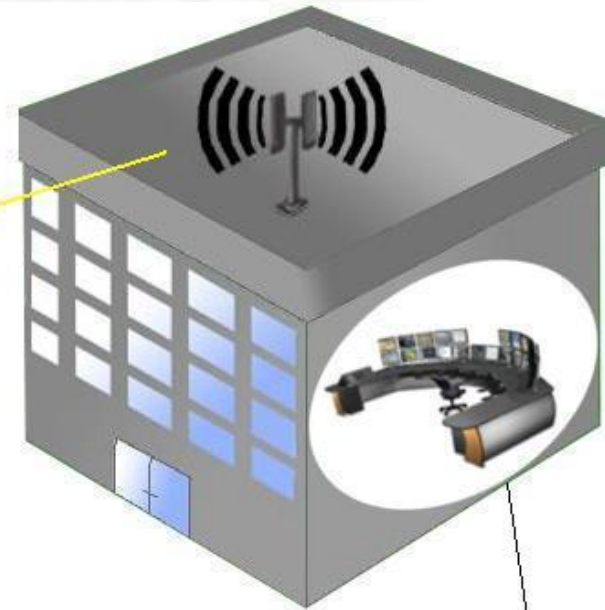
Any kind of vehicles

- Safety
- Traffic flow management
- Traffic advisors
- Consumption & Emissions
- Optimal routes

Electrical vehicles only

- Battery charge state
- Parking slots availability
- *Recharge stations availability*
- *Ranking and rates of electrical recharge stations*

VANET IN V2G: SCENARIO



- Vehicles will be equipped with:
- multi-technology module for wireless communications
 - human machine interface (use of smartphone will be possible)
 - sensing devices (e.g. battery charge state, travelling delays, pollution, position)
 - data processing unit (transmission energy harvesting, message generation and processing, local data processing)

Local recharge stations will have variable rates according to the need of vehicles in a certain area in relation to the smartgrid management

Vehicle, mobility network and electrical network information can be sent to the Central Management Station

The Central Management Station will acquire, process and send information on electrical and mobility networks state

VANET IN V2G: WIRELESS COMMUNICATION

A smart management of electrical and mobility resources needs a smart use of wireless technologies



HOW?

Use of various wireless communication standard technologies is possible:

- WiMax, Edge, UMTS and LTE for communications between vehicles and the Central Management Station
- Vanet (802.11p) and DSRC for communications among vehicles



However, a lack of coordination and standards for the use of these technologies in case of communication between vehicles and the Central Management Station needs to be faced

Moreover, encapsulation of messages and integration with cellular communications is needed

VANET IN V2G: GOALS

- At the Central Management Station
 - Handle the communications with the vehicles and recharge stations
 - Process the heterogeneous information received from heterogeneous sources
 - Find and provide optimal allocation of resources
- At the vehicles
 - Handle the multi-technology communications
 - Communication resource harvesting
 - Route optimization according to local information
 - Collect sensed data and send/present the relevant information
 - Interface to the user

VANET IN V2G: BENEFITS

Complementary to V2G for vehicles in plugged-in state



All vehicle will participate in V2G at any time making grids “even smarter”

Better traffic and electrical grids management



Economic and environmental sustainability

Big customer value

