

Vehicular Networks in a City-Scale: Internet Access and Internet of Things

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The University of Aveiro and Institute of Telecommunications developed a new wireless technology (WAVE/DSRC) for the communication between vehicles and between the vehicles and the Internet. This technology allows 10x the range of normal WiFi and reduces 100x the time required to start communication. With this technology we can turn any vehicle into a mobile hotspot to the Internet. The developed mobile router has several wireless interfaces, WiFi, WAVE and Cellular. Through a connection manager, the vehicles build a mesh network and are able to connect to the Internet through the best connection, being it a WiFi hotspot, another vehicle, or the cellular network if no other possibility is available (Figure 1). With this technology, the connection to the Internet can be performed through the WiFi and WAVE hotspots available in the city, being able to face the enormous traffic of passengers in the vehicles, and the large traffic volume of thousands of sensors in the city. This network of connected vehicles joins forces to offer wireless Internet access to citizens and city employees and share vital data to improve the efficiency and social value of municipal services.

Together with the University of Porto, we developed a vehicular network in Porto, the BusNet, to provide a low-cost and large range communication support all over the city. The BusNet is a city-scale vehicular platform comprised of 400 connected buses, 25 municipality vehicles and 50 road-side units connected via WAVE/DSRC wireless vehicular technology (Figure 2), which currently provides Internet WiFi access to passengers in the buses in the city of Porto (more than 100 thousand users in 4 months, and 10000 users per day), and is able to gather large amounts of data from the transports, people and the city environment. This work has a very high scientific level, since beyond the innovative technology, we have been building the network mechanisms required to build a moving network with optimal performance. This work has already resulted in more than 20 scientific international papers, and 20 PhD and MSc Theses.

This technology is being commercialized by a spin-off from UA/IT and UP, Veniam, which has been funded by International Venture Capitals to replicate the vehicular network in others cities in the world.

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FIGURE 1
Mesh Network between Vehicles.

FIGURE 2
Network of Vehicles.

