A Data Dissemination Platform for Vehicular Networks

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***Abstract*— This paper presents a video demonstration of a platform for data dissemination for vehicular Networks developed by France Telecom R&D. The aim of this platform is to disseminate infotainment information (e.g. advertisement applications, etc.) in a predefined zone. This platform is based on an optimized dissemination protocol called ROD [1] (Road Oriented Dissemination).**

Keywords-component; Vehicular networks; Cooperation; Data dissemination; Multi-hop communication

I. INTRODUCTION

Today, vehicle is the third living place and a major position for communication and content consumption. In fact, According to the European Automobile Manufacturers' Association (ACEA) statistics, the European fleet is increasing by almost 15 million vehicles every year, and the road traffic annual growth is about 1.9%. In 2008, the daily driving time of the 200 million European fleet's vehicles is almost 14 billion minutes. All these statistics make research community allocating more and more interest to improve the driving conditions. To do that, one of the possible solutions is the deployment of vehicular networks. A vehicular network is based on the principle of connecting vehicle to other vehicles and to existing infrastructure. Within this context, several projects and consortium have been launched, the most known are the Car2Car consortium [3], CVIS Project [4], CALM Project [5] and Pre-Drive [6], etc.

The communication technology to be used in cooperative vehicular networks is considered one of the primary concerns in the majority of these projects. The manner in which pertinent information is disseminated throughout the vehicular environment is also an important aspect of cooperative vehicular networks. However, dissemination is usually confronted with two major problems: (i) on one hand, in case of dense traffic, bandwidth proves to be insufficient and it is difficult to limit the packet losses, (ii) on the other hand, if the traffic density is low, temporary disconnection in vehicular network are unavoidable.

Our aim is to introduce a new platform based on an efficient data dissemination approach in cooperative vehicular networks.

The rest of this paper is structured as follows. Section II describes the functioning of the platform and Section III gives practical information about the proceeding of the demo.

II. DEMO DESCRIPTION

A. *Experimental platform setup*

To setup our platform, we used seven vehicles numbered from 1 to 7. Each vehicle is equipped with a mini Dell laptop running Linux operating system (Redhat) and equipped with an Atheros PCMCIA IEEE 802.11b/g Orinoco card with external antenna (Blink Technology Omnidirectional Antennas), and Holux GPSlim236 Bluetooth-based. We used a modified version of Multi-band Atheros Driver for WiFi, also known as MADWIFI [7] which gives the ability to monitor the entire transmitted and received packets that reach the network card. Figure 1 shows one of the seven cars of our experimental platform.

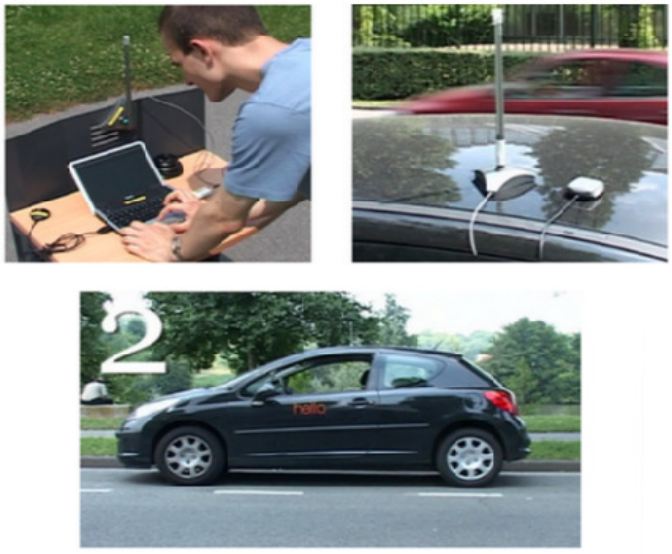

Figure 1. Experimental platform.

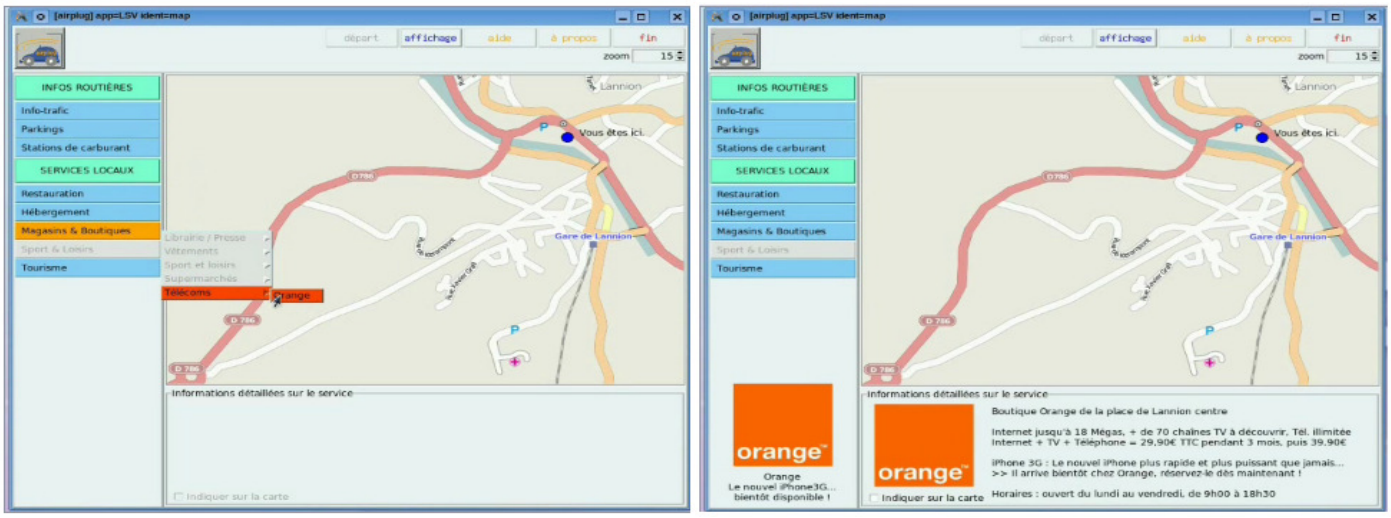

Figure 2. Platform interface.

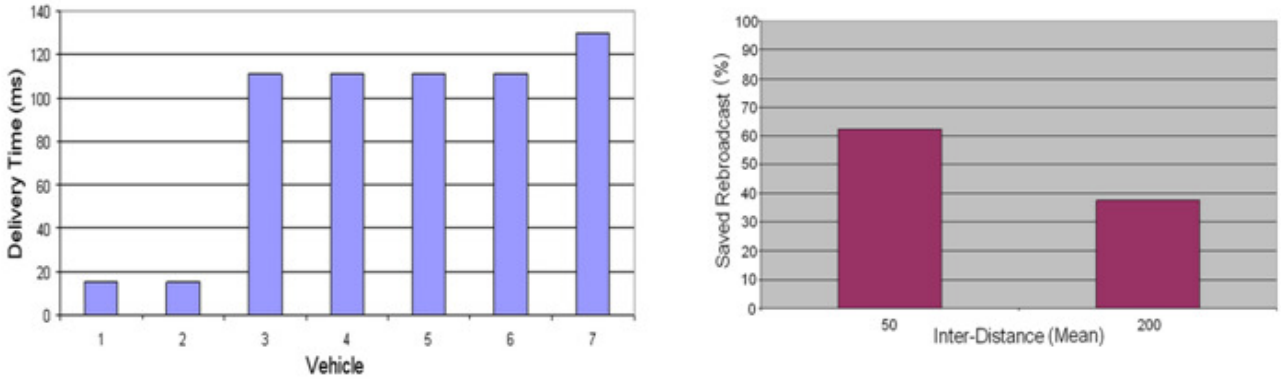

Figure 3. On-road tests' results.

B. *Basic idea*

One of the lacks of many dissemination protocols is the use of a discovering module to identify neighboring nodes and to know their coordinates in order to choose the best relay vehicle in charge of data propagation. In this platform we implemented a new data dissemination protocol for vehicular networks in both highways and urban environment. This protocol called ROD (Road Oriented Dissemination) is introduced in [1] and prior simulation studies have shown excellent performances of this protocol. Therefore, the GPS position of the vehicles, the outgoing and the ingoing intersections' positions are encoded in the same header to distinguish the dissemination direction. Then, timing is used to select, in a distributed way, the best re-transmitter vehicle. The function of ROD is described briefly in Figure 4.

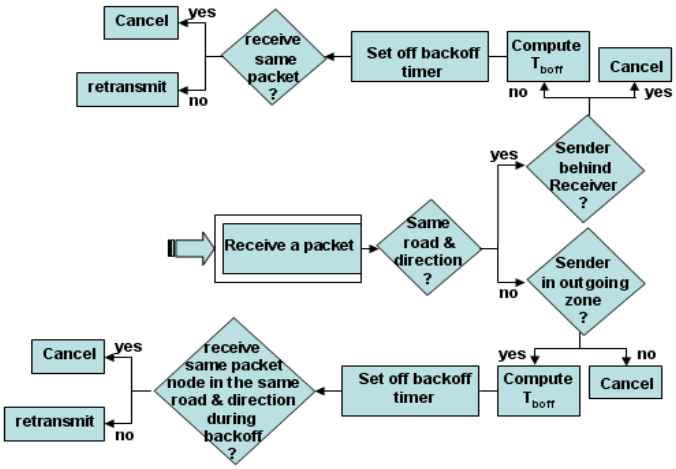

Figure 4. Dissemination process

C. Platform interface

The platform is doted with a TCL interface (see Figure 2) permitting to have access to two classes of services: (i) Drive assisting services (info-traffic, parking availabilities and fuel prices in the neighborhood) and (ii) other services (restaurants, hotels and sales promotions).

If new information is received via the dissemination protocol, the corresponding icon flickers as shown in Figure 2. Then if one of the passengers is interested with the service, he can click on the icon and the information will be displayed at the bottom of the interface.

D. Proceedings of the demo

As it is impossible to reproduce the on-road deployment of the platform (space, material and time constraints), the demo presents the platform through a video that describes the on-road deployment of this platform in Compiegne (France) in June 2009. The video describes the progress of the on-road tests and shows some results especially in terms of delays saved packets retransmission (Figure 3).

III. PRACTICAL INFORMATION

A. Equipement to be used for the demo

The demo needs a laptop computer and a video projector. Then, the space needed is only a small table.

B. Setup time required

The setup time required for the demo is about eight minutes.

C. Extra information

More information about the demo could be found in [2].

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