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Data Dissemination using Multiple RSUs in Vehicular Networks

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Abstract

We propose a dissemination system using multiple roadside units (RSUs) on a two-way roadway. To enhance the performance of data services, data items are disseminated through a hybrid of infrastructure-to-vehicle (I2V) and vehicle-to-vehicle (V2V) communications. Unserved requests in RSU's coverage are transferred to the next RSU located in a vehicle's trajectory. In this way, channels are utilized efficiently by not retransmitting the unserved requests, and vehicle can receive the data service with less delays.

Keywords: data dissemination, multiple RSUs, hybrid of I2V and V2V communications.

1. Introduction

Efficient data dissemination is imperative to maximize the system performance on data service. It is one of important research topics enabling various applications to enhance vehicle safety, passenger comfortableness, and transportation efficiency [1]. Dedicated short range communication (DSRC) is a suite of protocols for the wireless communications in vehicular networks, and many companies (e.g., ARADA systems, Savari networks, to name but a few) develop more advanced DSRC devices. Moreover, the world vehicle population is expected to reach 1.34 billion by 2016 [2]. Given those speculations mentioned above, the number of the vehicles equipped with the devices will be increasing, and the number of data-service requests will grow together. Devices with cached data items transmit the requested data items via I2V or V2V communications. If there are many requests, the performance of data services will degrade significantly due to transmission collisions at receivers. Therefore, efficient data service is inevitable in the vehicular networks to avoid the unnecessary interferences.

2. System model

In our work, we assume that DSRC devices only transmit or receive one data item at a time and two service channels are used for I2V and V2V communications. Figure 1 illustrates our system. Two RSUs are installed on a two-way roadway and interconnected via wired backbone network, and all the vehicles are equipped with OBUs. Data are disseminated simultaneously via the hybrid of I2V and V2V communications in accordance with the scheduling of a RSU. The RSU transfers the unserved requests to the next RSU, which makes the vehicles not retransmit the requests. In this way, vehicles can receive the data service with less delays when the vehicles reach the next RSU's coverage.

3. Conclusions

We introduce our data dissemination system using collaborative I2V and V2V communications. Our contribution for the efficient data dissemination is to transfer the unserved requests to the next RSU based on RSU's scheduling. In this way, channels will be utilized efficiently and the performance on data services will improve in vehicular networks.

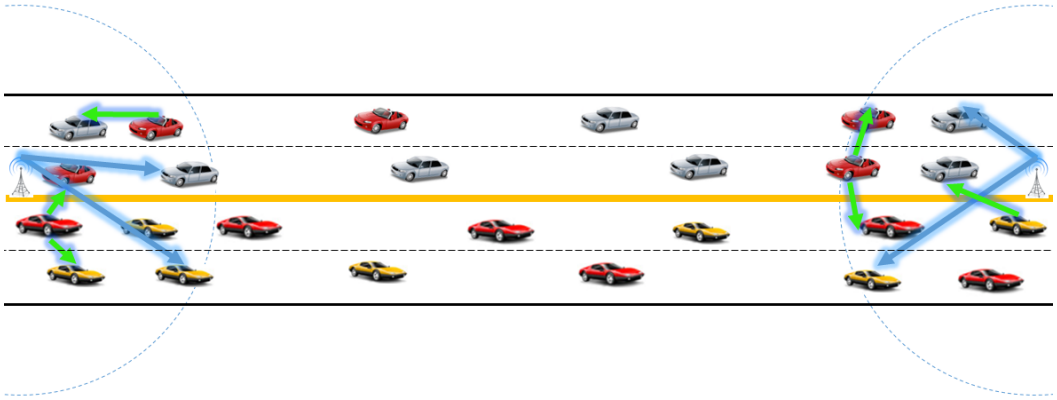

Figure 1 Data dissemination system

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