



Infotainment and road safety service support in vehicular networking: From a communication perspective[☆]

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ABSTRACT

Vehicular ad hoc networking is an emerging technology for future on-the-road communications. Due to the virtue of vehicle-to-vehicle and vehicle-to-infrastructure communications, vehicular ad hoc networks (VANETs) are expected to enable a plethora of communication-based automotive applications including diverse in-vehicle infotainment applications and road safety services. Even though vehicles are organized mostly in an ad hoc manner in the network topology, directly applying the existing communication approaches designed for traditional mobile ad hoc networks to large-scale VANETs with fast-moving vehicles can be ineffective and inefficient. To achieve success in a vehicular environment, VANET-specific communication solutions are imperative. In this paper, we provide a comprehensive overview of various radio channel access protocols and resource management approaches, and discuss their suitability for infotainment and safety service support in VANETs. Further, we present recent research activities and related projects on vehicular communications. Potential challenges and open research issues are also discussed.

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1. Introduction

Vehicular transportation is one of the crucial means of transportation around the world. Regardless of its convenience, there are more than one million human casualties due to vehicle crashes worldwide every year [1]; therefore, road traffic safety remains a big concern in our daily life. Over the years, governments and automotive industries have been working together to improve road traffic safety through various intelligent transportation system (ITS) initiatives. For example, in October 2008, the United States Department of Transportation laid out an aggressive goal of reducing vehicle crashes by 90% by 2030 [2]. Similar efforts have also been made in Europe and Asia [3,4]. To realize the vision of accident-free transportation, automobile manufacturers have been striving to assemble vehicles with sophisticated hardware components (such as sensors and cameras) and software programs (such as image recognition) [5]. Various active and passive safety measures intended to reduce the number and severity of accidents are also implemented in today's vehicles (e.g., GM OnStar automatic crash response system [6]).

To further enhance transportation safety, communication-based safety applications empowered by vehicular ad hoc networking have recently attracted a lot of attention from industry and academia [7,8]. Via inter-vehicle communications, drivers can be informed of crucial traffic information such as treacherous road conditions and accident sites by

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