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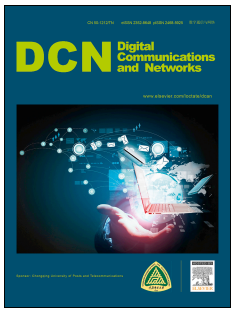

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A Routing Protocol for Urban Vehicular Ad Hoc Networks to Support Non-Safety Applications

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Abstract

Urban Vehicular Ad Hoc Network (UVANET) provides non-safety applications like media sharing, Internet service, file transfer, gaming, and so on. To provide better services to the users in UVANET, routing plays an important role. In this paper, a novel routing protocol is proposed for UVANET to support the non-safety applications. We have considered a non-safety application where the drivers and passengers of different parking lots can play multi-player games with each other. To play the games smoothly, the game data should reach the destination in a minimum time. Simulation results show that, when the density of the vehicles in the city area is high, then the proposed protocol fulfills the end-to-end delay tolerance of 100 ms. At last, an experimental work is performed to validate the proposed routing protocol by running a simple puzzle game in a UVANET prototype designed in an indoor laboratory environment and outdoor environment.

KEYWORDS:
UVANET, Non-Safety Applications, Routing, Gaming, Slow-Paced Games

1. Introduction

UVANET is an advanced wireless communication network to provide safety and non-safety applications to the passengers and drivers [1, 2, 3, 4, 5, 6, 7]. Safety applications mainly provide safety systems, traffic management, and maintenance. Non-safety or comfort applications provide media downloading and uploading, file transfer, mailing, gaming for back seat passengers, Internet access, location information, Region of Interest (ROI) information, and simple message transfer (reserving a seat in a coffee shop) [8]. In UVANET, a vehicle itself becomes a sender, receiver, and router. Vehicles transfer valuable information using vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) communication. UVANET uses Dedicated Short Range Communication (DSRC) standard for data communication, which is based on IEEE 802.11 technology. It is now advancing to Wireless Access in Vehicular Environment (WAVE) standard, which is based on IEEE 802.11p [9].

Routing in UVANET is a challenging task due to high speed of vehicles on the roads [10]. This leads to link disruption problem, where a vehicle is out of the communication range, and the link gets disconnected. Due to lower density of vehicles, routing also suffers from communication gap problem, where a vehicle is unable to forward the data to the next vehicle. If the density is high, that does not mean the vehicles are connected to each other. Therefore, the data should be transmitted in such a path where there is high density of vehicles and less link disruption problem between the vehicles.

Recent advancement in multimedia over UVANET

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