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A Survey on Proficient Communication on Cooperative Scheduling In Vehicular Networks

M.Karthick[1], P.Srimiruthula[2]

P.G scholar, Dept of CSE, KSR College of Engineering, Tiruchengode, India[1]

Assistant professor, Dept of CSE, KSR College of Engineering, Tiruchengode, India[2]

Abstract: Vehicular adhoc networks (VANETs) is the current technology using in vehicles like cars and vans. Vehicles are considered as mobile nodes in a MANET to create a mobile network also the most important applications for VANET is the distribution of active safety messages to improve safety. In these network the Vehicle-to-vehicle (V2V) communications needs more secure transmission of data to the vehicles. The graph theory used to devise the problem of cooperative communications scheduling and reduce the complexity in the networks. The scheduling scheme to assign both vehicle-to-infrastructure (V2I) and V2V links for both single-hop and dual-hop communications.

Keywords: cooperative communications, vehicular networks, Vehicle-to-vehicle (V2V) communications.

I. INTRODUCTION

Vehicular communication is seen as a key technology for improving road safety and comfort through Intelligent Transportation Systems (ITS).The growing interest toward the possible applications of wireless technologies to a vehicular environment to develop technologies and protocols for data transmission between vehicles and between vehicles and road infrastructures. Vehicular Ad-hoc Networks (VANETs) represent a rapidly emerging, particularly challenging class of Mobile Ad Hoc Networks (MANETs). A MANET is a self forming network, which can function without the need of any centralized control. Each node in an ad hoc network acts as both a data terminal and a router. The nodes in the network then use the wireless medium to communicate with other nodes in their radio range. A VANET is effectively a subset of MANETs. The benefit of using ad hoc networks is it is possible to deploy these networks in areas where it isn't feasible to install the needed infrastructure. VANETs are distributed, self organizing communication networks built up from moving vehicles, and are thus characterized by very high speeds and limited degrees of freedom in nodes movement patterns.

There are usually two types of communication paradigms for vehicle services which is vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications (Fig.1). V2I communications enable vehicles to connect to the Internet via a roadside base station (BS). Intensive investigations and trials have been carried out to advance V2I technology with the aim of supporting in-vehicle applications such as real-time update of congestion, weather conditions, etc. Meanwhile, extensive research has been dedicated to short-range radio-based V2V communication technologies such as dedicated short-range communications (DSRC) to support active safety applications. Vehicle equipment (VE) close to the BS may enjoy a favorable channel quality resulting in high data rates. However, the others far away from the BS can only have much lower data rates due to poor radio links.

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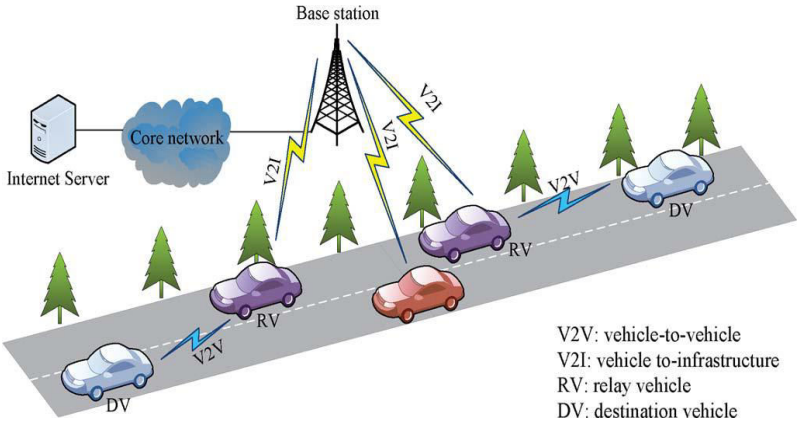

Figure.1 Illustration of 1-hop and 2-hop communications with the V2I and V2V links in a vehicular network.

II. LITERATURE SURVEY

A. Cross-Layer Cooperative Mac Protocol In Distributed Wireless Networks

Medium access control (MAC) protocol propose for distributed cooperative wireless networks is studied. Based on beneficial node assistance by addressing two fundamental issues of cooperative communications is focused namely when to cooperate and whom to cooperate with from a cross layer protocol design perspective. The overall protocol design taking account of protocol transparency a concept of neighbor region is explored whereby beneficial neighbor transmissions can be identified. A rate allocation in the cooperation region provides higher link utilization than in a non-cooperation region is shown. To increase network throughput, an optimal grouping strategy for efficient helper node selection is proposed, and devise a greedy algorithm for MAC protocol refinement. Analysis of a successful transmission probability with cooperative or direct transmission is presented. Simulation results show that the proposed approach can effectively exploit beneficial cooperation, thereby improving system performance.

Demerits

More cooperation techniques including coded cooperation need to be exploited and evaluated.

B. Efficient And Reliable Broadcast In Inter-Vehicle Communications Networks: A Cross Layer Approach

Broadcast messages is an successful way to broadcast safety-oriented information for cooperative driving in inter-vehicle communications (IVC). Though, it is lacking with fundamental challenges such as message redundancy, link unreliability, hidden terminal, and broadcast storm which greatly degrade the network performance The cross layer approach to design an efficient and reliable broadcast protocol for urgent situation message distribution in inter-vehicle communication systems. A novel composite relaying metric for relay selection, by jointly considering environmental locations, moving velocities of vehicles and physical layer channel conditions. Depend on the relaying metric, a distributed relay selection scheme is proposed to assure a unique relay is selected to reliably forward the emergency message in the desired propagation direction. We further apply IEEE 802.11e EDCA MAC to guarantee QoS provisioning to safety related services. In addition, an analytical model is developed to study the performance of the proposed CLBP in terms of relay selection delay and emergency message access delay.

Demerits

Reliable broadcasting with user cooperation in both urban and rural environments, incorporating various mobility models and road traffic conditions is needed.

C. VC-MAC: A Cooperative MAC Protocol in Vehicular Networks

The rapid growth and evolution under the increasing demand of vehicular traffic management and ubiquitous network connectivity in vehicular networks. In exacting, the amount of data to be downloaded from

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the access point deployed gateways is severely increasing. It is contaminated by high mobility, user connectivity, and irregularity of the wireless channel, it is challenging to satisfy the need for massive data transmission in vehicular networks The vehicular cooperative media access control (VC-MAC) is used which utilizes the concept of cooperative communication tailored for vehicular networks, particularly for gateway downloading scenarios. VC-MAC leverages the broadcast nature of the wireless medium to maximize the system throughput. Spatial diversity and user diversity are exploited by concurrent cooperative relaying to overcome the unreliability of the wireless channel in vehicular networks.

Demerits

Complex in its design.

D. Cooperative Diversity for Intervehicular Communication: Performance Analysis and Optimization

The cooperative diversity for inter vehicular communication based on the Rayleigh fading channel model in which communication takes place from base station antenna level and vehicle antenna level. Due to vehicle moving the channel ml provides a realistic description of an intervehicular channel where two or more independent Nakagami fading processes are assumed to be generated by independent groups of scatterers around the two mobile terminals. The performance of amplify-and-forward relaying for an intervehicular cooperative scheme assisted by either a roadside access point or another vehicle is investigated that acts as a relay.

A. Relay channel

a. Facilitation
b. Cooperation
c. observation

B. Fading channel

Our diversity analysis reveals that the cooperative scheme is able to extract the full distributed spatial diversity. We additional devise a power-allocation problem for the considered scheme to optimize the power allocated to the broadcasting and relaying phases. The Performance gains up to 3 dB are got through optimum power allocation, depending on the relay location.

Demerits

The current results are mainly limited to the Rayleigh fading channel model, which is commonly used to characterize the cellular radio systems.

III. CONCLUSION

By using graph theory the scheduling problem in the dual-hop communications for vehicular networks has been identified .Due to the channel variation and mobility of VE(vehicle equipment), the dual-hop network topology is time-varying, which can be modeled as a spanning tree based on the V2I and V2V links. The extensive literature reviewed in this paper, has indicated that capable to achieve better fairness among VE and can noticeably enhance the date rate of the VE with poor channel conditions also the cooperative communications are able of improving the throughput which makes the system low complexity.

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BIOGRAPHY

M.Karthick is presently doing his Final M.E degree under the department of CSE, K.S.R. College of Engineering, Tiruchengode, Tamilnadu, India. He received the B.Tech degree in Information Technology from Anna University, Chennai in 2012 respectively. His project area of interests includes vehicular ad hoc networks. He is the member of IEEE.

P.Srimiruthula received the B.E degree in Computer Science and Engineering from Anna University, Chennai, India in 2008 and M.E degree in Computer Science and Engineering from Anna University of Technology, Coimbatore, India in 2011 respectively.
She is currently an Assistant Professor with K.S.R. College of Engineering, Tiruchengode, Tamilnadu, India. Her research interests include Image processing and vehicular ad hoc networks. She is a member of ISTE.