Chapter 1
Challenges in VANET

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ABSTRACT

The vehicular ad-hoc network (VANET) is a wide and rapidly developing field of vehicular communication technology study. A VANET is a network with no infrastructure. It is used to improve safety in terms of applications and convenience of use while driving. VANET is a vehicle-to-vehicle network that allows automobiles to share secure data while travelling on highways or roads. VANET applications are being developed for cities throughout the world. VANET delivers an identity recognition technology that has a significant impact on improving activity administrations and reducing traffic accidents. The main purpose of this technology is to create a safe and secure environment for vehicles. Many architectures, algorithms, and protocols have been developed and implemented in recent years to improve the performance of automobiles while travelling. The writers of this research study highlight recent issues such as developments, exploitation, safety, and security issues, as well as the most recent plans that have been run in various situations.

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INTRODUCTION

Vehicular Adhoc Networks (VANETs) are special type of MANETs (Mobile Adhoc Networks) in which the vehicles are nodes that act as a participating node and as well as a router. Since vehicles can send messages to other vehicles in the networks, there need not be any network infrastructure. But however, there may be roadside assistant networks that help vehicles in diagnostics, accident rescue, etc.

The main characteristics of VANETs are higher node mobility and Speed of the nodes (vehicles). The protocols that were used in VANETs in the earlier days are DSRC (Dedicated Short Range communication) which has so many problems like interference, etc. Now the current research in VANETs leads to the use of MANETs protocols for VANETs (Meneguette et al., 2015).

The Dynamic Source routing (DSR) and Adhoc on Demand Distance Vector (AODV) suits well for the VANETs as these protocols are suitable for multi hop wireless ad hoc networks, which is the prime requirement of VANETs. There are many literatures that covers the importance of VANETs, their deployments, their applications and metrics of other fast moving Adhoc networks as well. Some of these literatures are suggested and experimented as follows: (Anjum et al.,2020) designed a radio frequency-based sensor network for energy harvesting and hence the optimal energy is being used while transmitting and receiving. This paper uses a model that uses reward allocation when the states transition happens. This work is extended to handle optimal energy management for Internet of Vehicles as well.

(Kumar & Krishna, 2018) suggested a model that is solved using reinforcement learning which can optimize the power usage in internet of things and internet of vehicles. This paper identifies the power profile of various devices in the system and based on the power profile, the system is modeled using the semi-Markov decision process (SMDP) and solved using the reinforcement learning. DSRC protocol is standardized to work under the frequency range of 5.9GHz along with the WAVE 1609 standard as mentioned by (Maddio et al.,2013) in their work. Due to the size of vehicle density and speed of the vehicles, the DSRC performance analysis is highly complicated.

(Su & Zhang 2007) proposed a medium access control protocol that can send safety messages from cluster to cluster. They use content free and contention-based protocol within clusters and between cluster heads respectively. Each cluster heads can relay the safety message in real time to other cluster heads and the heads in turn send those messages to the cluster vehicles. The relay of these messages can be sent to both real time traffic and non-real time traffic as well.

(Zhang et al.,2019a) proposed a medium access Control protocol based on the DSRC protocol. This protocol is well suited for the purpose of basic safety messages which is been sent to nearby vehicles during a collision or any accidents. This