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Enhance the Performance of Vehicular Node on MAC Layer in MANET

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ABSTRACT
Vehicular Ad Hoc Network (VANET) is a form of Mobile Ad Hoc Networks (MANET). VANETs provide us with the infrastructure for developing new systems to enhance drivers' and passengers' safety and comfort. VANETs are distributed self organizing networks formed between moving vehicles equipped with wireless communication devices. This type of networks is developed as part of the Intelligent Transportation Systems (ITS) to bring significant improvement to the transportation systems performance. One of the main goals of the ITS is to improve safety on the roads, and reduce traffic congestion, waiting times, and fuel consumptions. In this paper we present the new modified MAC layer protocol for the vehicular ad-hoc network and improve the results for the vehicular ad-hoc network.

Keywords: Vehicular Ad-hoc Network, Data Link Layer, V2V, DSRC, IEEE.

INTRODUCTION

An ad-hoc network is a collection of wireless mobile nodes in which mobile nodes can communicate without any predefine network topology or infrastructure. Furthermore, no centralized access point exists in the network [4, 5]. All nodes can communicate with each other via a direct shared radio wireless link. Nodes wish to communicate with other node exterior their communication range employs a multi hop strategy. VANET exhibits numerous special features such as high mobility, rapidly changing network topology, frequent partitioning etc. As a result of these unique characteristics, many solutions and protocols proposed for MANET might not be suitable or directly applicable to VANETs. Thus VANET needs for its unique solutions [7].

VANET comprises of vehicles, Road Side Units (RSUs) and Certificate Authorities (CAs) whose ultimate aim is to ensure traffic safety and secure transmission of information. These are equipped with sensing, processing and wireless communication modules [8]. Each vehicle or vehicular nodes has an On Board Units or OBUs installed in it which has computing and communication capabilities.

With rapid development of wireless technology, the Mobile Ad-hoc Network (MANET) has emerged as a new type of wireless network. The world today is living a combat, and the battle field lies on the roads, the estimated number of deaths is about 1.2 million people yearly worldwide [9]. MANETs are new type of networks which are expected to support a large spectrum of mobile distributed applications. A mobile ad-hoc network is a collection of mobile nodes or routers connected with an automatic system [11]. There nodes does not user any wired media as a link. MANET is type of wireless network so it uses the wireless links. The combination of this structure makes the random graph having vertices and links. Here node can freely moves anywhere in the network so it also change the location of node in

graph. This is a major cause by which the network can use without pre analysis.

The MAC layer is a sub-layer of the data link layer of the OSI reference protocol, and it is present in most communication networks; wire line as well as wireless [13]. The MAC protocol is responsible for determining who has the right to send on the channel for the moment. There exists many different MAC protocols and we have chosen to classify them here as being either contention based or conflict-free protocols. Conflict-free protocols ensure that a transmission is not interfered by any other transmissions, i.e., no overlap occurs in time, frequency, or space between transmitters and thus no collisions arise.

The rest of this paper is organized as follows in the first section we describe an introduction of about the Smart grid and their applications. In section II we discuss about the wireless sensor network. In section III we discuss about the vehicular ad-hoc network. In section IV we discuss about the experimental result analysis and the comparative study between existing method and proposed methods and their simulation study, finally in section V we conclude the about our paper which is based on the experimental result study.

II WIRELESS SENSOR NETWORKS

Most wireless sensor networks (WSNs) are composed of cheap battery-powered devices that are able to sense their environment and to communicate with each other in a wireless manner. Their low-cost and energetic autonomy has enabled environmental monitoring applications to emerge in the recent years. For instance, WSNs have been used for wildlife tracking and monitoring. In order to last for years with the current technology, it is crucial to save nodes energy in a WSN. As the radio module of a sensor node generally needs several times more energy than its processor, many researchers have focused on implementing energy-efficient communication protocols, where sensor nodes go to sleep mode periodically [5].

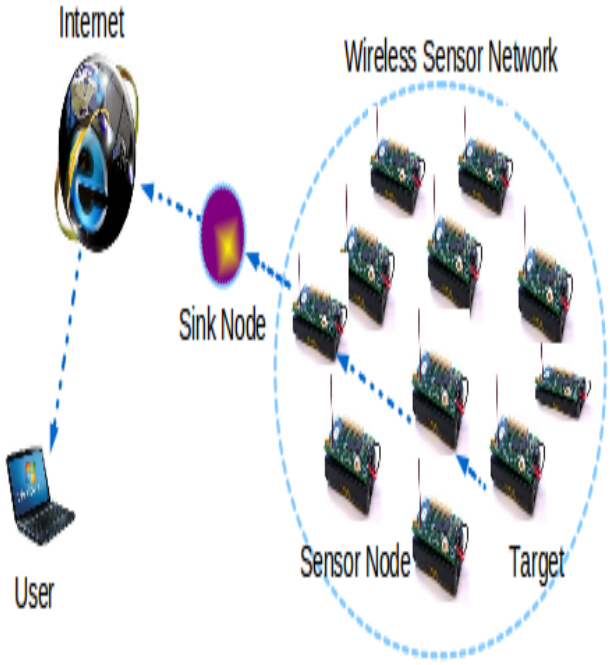

Figure 1: Wireless Sensor Networks.

In a typical monitoring application (such as in forest fire monitoring), a WSN is deployed over a large area. Sensor nodes sense the environment periodically and report their measurements to a sink.

III VANET

An ad-hoc network is a collection of wireless mobile nodes in which mobile nodes can communicate without any predefine network topology or infrastructure. Furthermore, no centralized access point exists in the network [14, 15]. All nodes can communicate with each other via a direct shared radio wireless link. Nodes wish to communicate with other node exterior their communication range employs a multi hop strategy. VANET exhibits numerous special features such as high mobility, rapidly changing network topology, frequent partitioning etc. [16]. As a result of these unique characteristics, many solutions and protocols proposed for MANET might not be suitable or directly applicable to VANETs. Thus VANET needs for its unique solutions [17]. VANET comprises of vehicles, Road Side Units (RSUs) and Certificate

Authorities (CAs) whose ultimate aim is to ensure traffic safety and secure transmission of information. These are equipped with sensing, processing and wireless communication modules [18]. Each vehicle or vehicular nodes has an On Board Units or OBUs installed in it which has computing and communication capabilities [19]. It helps to fulfill basic security requirements of VANETs. As it has an in-built authentication mechanism which makes sure that the data received was transmitted by a valid node. RSUs and CAs together constitutes the Infrastructure components in VANETs [20]. Communications in VANET can be broadly classified into two types-

- **Vehicle to Vehicle Communication (V2V):** In case of V2V communication, vehicles communicate with other vehicles in the network in order to relay alert messages. Vehicles send, receive or exchange important traffic related information like road conditions, congestions, accidents etc.
- **Vehicle to Infrastructure Communication (V2I):** V2I type of communication takes place when a vehicle needs to inform RSU/CA of some event or in order to establish connection with outside networks like the Internet.

These communications enables the safety applications that helps to provide alerts and warnings about road accidents, collisions, traffic conditions like congestion, emergency braking, weather conditions etc.

IV EXPERIMENTAL RESULT ANALYSIS

In this section we presents the experimental result analysis and their comparative study with the existing approach and research paper, all the experimental results are simulated with the network simulator ns 2.34.

This chapter provides an overview of network simulation and different VANET simulators that can be used to simulate different VANET algorithms to analyze the performance of the network without the need of real systems. This not only saves cost but also provides opportunity to test new protocols and algorithms in a controlled environment which otherwise would have not been possible.

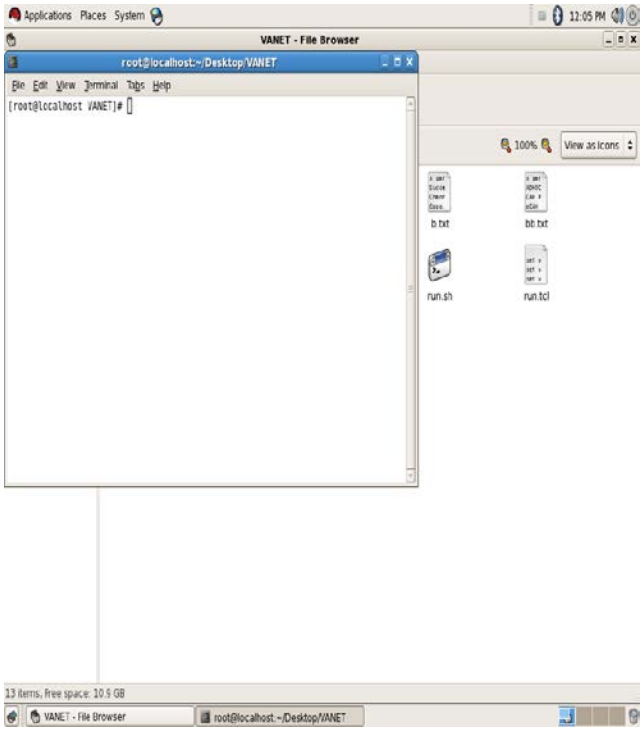

Figure 2: This figure shows that the terminal window for the command line input.

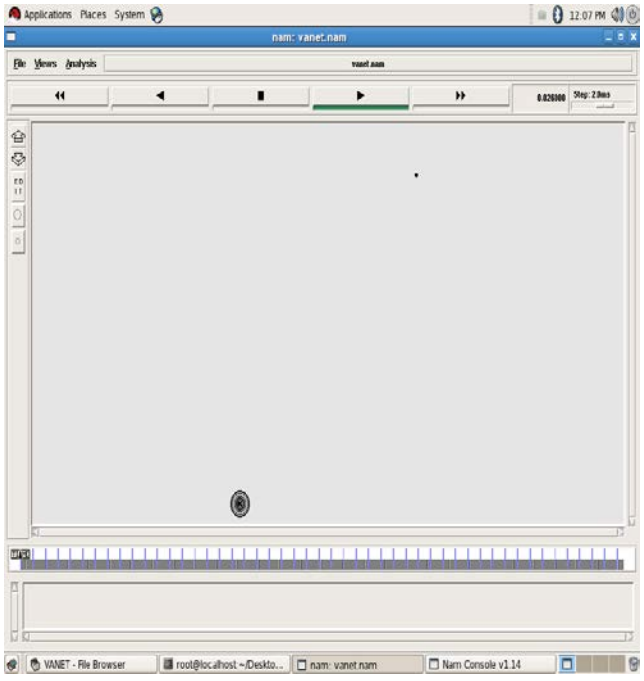

Figure 3: This figure shows that the experimental vehicle node movement in network.

V CONCLUSIONS

The time-based scheme is another approach to control the media access. In this approach, the time is divided into frames, which are divided into time slots. This approach is called Time Division Multiple Access (TDMA). The TDMA mechanism is a contention free method that relies on a slotted frame structure that allows high communication reliability, avoids the hidden terminal problem, and ensures, with high probability, the QoS of real-time applications. In this paper we improve the quality of services parameters for the vehicular ad-hoc network using dedicated short range communication protocol.

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