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ISSN: 0976-3031

International Journal of Recent Scientific Research
Vol. 6, Issue, 3, pp.3213-3215, March, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

DESIGN OF VEHICULAR ADHOC NETWORK USING DSDV PROTOCOLS

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ARTICLE INFO

Article History:

Received 14th, February, 2015
Received in revised form 23th, February, 2015
Accepted 13th, March, 2015
Published online 28th, March, 2015

Key words:

Vehicular ad-hoc networks (VANET), security, authentication, privacy, non-repudiation, confidentiality

ABSTRACT

Vehicular Ad-hoc Network (VANET) is a new network technology where the cars are used as mobile nodes to form a communication network. In VANET, routing protocols have a significant role in terms of the performance because they determine the way of sending and receiving packets between mobile nodes. In this paper, we examine and analyze the performance of Ad-hoc On-Demand (AODV), Dynamic Source Routing (DSR) and Destination-Sequenced Distance Vector (DSDV) routing protocols over Constant Bit Rate (CBR) traffic data type using different speeds and number of nodes. The performance measurements; Packet Delivery Ratio, Average End to End Delay and Average Throughput are examined with respect to speed and number of nodes. The objective of this study is to find the best routing protocol which can be further used for enhancing security. Based on our validated results, AODV performs the best among all three evaluated protocols.

INTRODUCTION

VANETs are new type of networks which are expected to support a large spectrum of mobile distributed applications that performed in vehicles. One of the most considerable services in VANET on the roads is that it can give drivers safety in driving. VANET can transmit useful information about road and traffic conditions as well as other noticeable information for people who drive in the range of the typical road. For example, if a car encounters a dangerous situation, then it can communicate with other cars and warn those cars which have not arrived at that place yet using Vehicle to Vehicle (V2V) communication.

This information may also be sent to or from fixed roadside base units using vehicle to roadside communication (V2R). But VANET does not have any specific protocol at all and all Adhoc protocols are usable in VANETs. Unfortunately, most of Adhoc protocols do not propose special security mechanisms due to the nature of Adhoc which is focused on reducing the consumption of energy and resource. However, it is critical for VANET to meet robust security policy to ensure users about issues that can make them worry. To guard against misuse activities, the overall organization for VANET security architecture must be carefully designed especially when it is a worldwide implemented VANET.

Clearly, VANET is applicable for the commonwealth more than Adhoc and maybe we can call VANET the Adhoc network that has been organized for all type of people. Therefore, VANETs have several benefits that cause it to be one of the most attractive types of mobile technology.

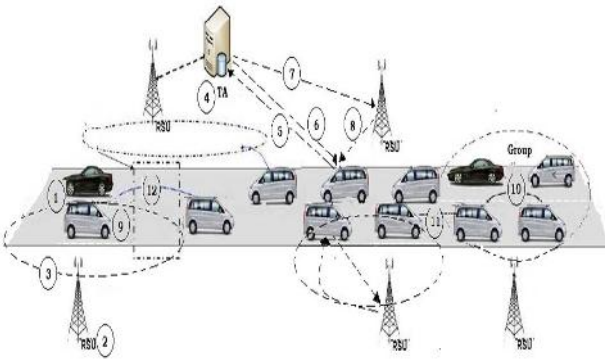

Fig 1 shows the communication in vanet network

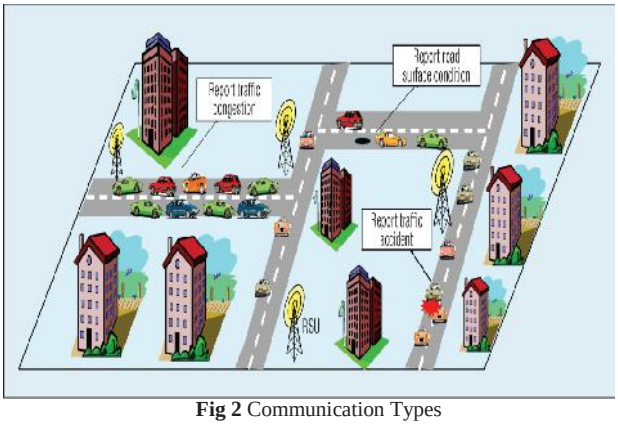

Fig 2 Communication Types

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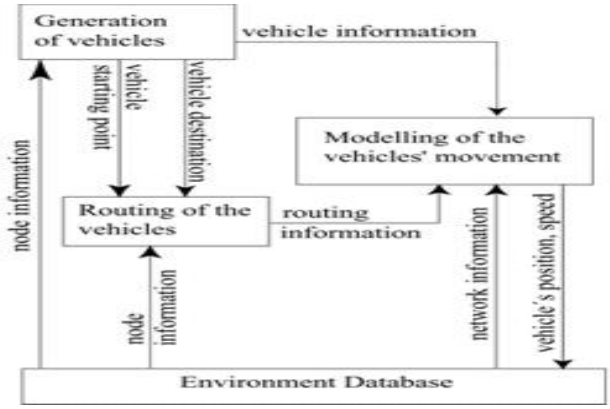
Related Work

Monika *et al*. used NS2 simulator to compare among three routing protocols; DSDV and AODV over VANET. IEEE 802.11p is the standard protocol that is applied on their network. The comparison aims to analyze the performance of the throughput and the packet loss rate. They conclude that AODV has the highest throughput and the best performance. Also, they state that the network performs better with existence of Road Side Unit (RSU). However, a RSU is an expensive unit. The performance of AODV and DSDV was analyzed based on variation values of speed and node density. Based on the analysis, AODV and DSDV perform very well and provide a high Packet Delivery Ratio whenever the low speed and low node density were used. Moreover, DSDV showed better performance than AODV. A comparison of AODV and DSDV routing protocols was presented. The Packet Delivery Ratio and Average End to End Delay were evaluated. The paper concluded that AODV provided a high Packet Delivery Ratio. Moreover, AODV can be considered as the best routing protocol for carrying the packet over VANET with high security. A heterogeneous network model based on the IMS that integrates the Worldwide Interoperability for Microwave Access (Wimax), Universal Mobile Telecommunications System (UMTS) and Wireless Local Area Network (WLAN) technologies is proposed and provides it provides guaranteed QoS for the Wimax network which incorporates the idea of network performance and packet formation .The effects of different packet size with the implementation of AODV routing protocols in homogeneous and heterogeneous MANET focuses the key technology for the transmission of packets throughout the network from one to all nodes in broadcast way using MIMO technology. Also many researches shows survey of simple uplink scheduling algorithms for Wimax & carried out a simulation study of BE scheduling service on the uplink. The simulation is carried out using the NS2 simulator with the NIST implementation ver2.6 of Wimax module.

Proposed System

VANET has been an active field of research and development for years but it is fair to say that, with the recent dramatic improvements in communication and computing technologies, it is only in the last decade that this field has really gained a lot of momentum. In fact, VANET research has attracted a lot of attention from researchers working in various fields including electronics, networking, security, software engineering, automotive, transportation, and so on.



Figs 3 Block dig of vanet

Recent results covering VANET-related issues include areas such as routing, Quality Service (QoS), broadcasting, security attacks and threats, capacity, collision and interference, the effects of transmission power on protocol performance and power control algorithms, congestion control, and service discovery. It is beyond the scope of this work to review each of these topics. Instead, we present, discuss, and review recent research results that have been achieved in the most active VANET areas which include routing, broadcasting, QoS, and securit these specific areas also stems from the fact that they are the ones with the most active interest from the VANET research community as evidenced by the number of recent publications we found during our literature review on VANET.

PROPOSED METHODOLOGY

In a Vehicular Ad-hoc Network (VANET), the amount of interference from neighboring nodes to a communication link is governed by the vehicle density dynamics in vicinity and transmission probabilities of terminals. It is obvious that vehicles are distributed non-homogeneously along a road segment due to traffic controls and speed limits at different portions of the road. The common assumption of homogeneous node distribution in the network in most of the previous work in mobile ad-hoc networks thus appears to be inappropriate in VANETs. In light of the inadequacy, we present in this paper an original methodology to study the performance of VANETs with practical vehicle distribution in urban environment. Specifically, we introduce the stochastic traffic model to characterize the general vehicular traffic flow as well as the randomness of individual vehicles, from which we can acquire the mean dynamics and the probability distribution of vehicular density. As illustrative examples, we demonstrate how the density knowledge from the stochastic traffic model can be utilized to derive the throughput and progress performance of three routing strategies in different channel access protocols. We confirm the accuracy of the analytical results through extensive simulations. Our results demonstrate the applicability of the proposed methodology on modeling protocol performance, and shed insight into the performance analysis of other transmission protocols and network configurations in vehicular networks. Furthermore, we illustrate that the optimal transmission probability for optimized network performance can be obtained as a function of the location space from our results. Such information can be computed by road-side nodes and then broadcasted to road users for optimized multi-hop packet transmission in the communication network.

RESULT ANALYSIS

The Packet Delivery Ratio, Average End to End Delay, and Average Throughput for each of AODV, DSR, and DSDV routing protocols have been measured. Different speeds over time in the range from 1m/s to 40 m/s under CBR traffic connections is used to evaluate the performance of these three routing protocols. We have used different number of nodes and varying speed as a performance parameter. The speed ranges from 1 m/s to 40 m/s and number of node ranges from 5 to 40 to examine the performance of the protocols. Based on the node speed and number of nodes we received different results for our measured parameters; Packet Delivery Ratio, Average End to End Delay, and Average Throughput.

Packet delivered ratio is the ratio of data packet successfully received to the total number of data packets transmitted. Results with CBR data traffics for fixed and mobile nodes are simulated with various node mobility speed and numbers of nodes.

Table1 Network Simulation Parameter

Sr.	Parameter	Description
1	Protocols	AODV, DSDV, DSR
2	Number of nodes	5, 10, 20, 30, 40
3	Simulation time	200sec
4	Channel	Wireless
5	Traffic type	CBR
6	Transmission range	250m
7	Interference range	250m
8	Simulation area	1000 x 1000 m2
9	Speed limit	1, 2, 5, 10, 20, 30 m/s
10	Packet size	512 bytes
11	Data rate	1Mbps
12	Packet interval	0.25sec
13	Propagation modal	Two ray ground
14	MAC protocol	802.11
15	Queue type	Drop Tail/ Pri Queue
16	Maximum packet in queue	50
17	Antenna type	Omni-directional

Fig 2shows the calculated result for DSDV

Parameter	Result Obtained
Throughput of network	1.256Mbps
Maximum delay	10usec
Packet Delivery ratio	25%
Packet loss ratio	75%

CONCLUSION

AODV, DSR and DSDV routing protocols using CBR traffic connections. We considered the speed and the number of nodes as the controlled parameters in our experiments to determine the best routing protocol. As per the simulation, for considering packet delivered ration first AODV is superior then DSDV and AODV proves to be consistent for various speed and different number of nodes. Secondly considering Average throughput, with AODV better throughput is measured with node mobility. By considering fixed nodes the throughput decreases as the nodes reach 40.We recommend AODV for secured communication in VANET's based on the simulation results. A trade off must is to be considered between all the constrain parameters. With Addition of security it can achieve better performance for the mentioned parameters

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How to cite this article:

Aditi.M.Khekale *et al*. Design of Vehicular Adhoc Network Using Dsdv Protocols. *International Journal of Recent Scientific Research Vol. 6, Issue, 3, pp.3213-3215, March, 2015*

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