

A Review of different Routing Protocols for VANETs

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Abstract: *The vehicular ad-hoc network is the decentralized type of network. The vehicles can communicate with each other which is called vehicle to vehicle communication. The vehicle can also communicate the road side units which is called vehicle to road side communication. Due to decentralized nature of the network, routing is major issue of the network. In this work, various reactive, proactive and hybrid type of routing protocols are reviewed and discussed in terms of various parameters.*

Keywords: *Routing, Reactive, Proactive and Hybrid*

INTRODUCTION

One of the principle areas of research studies of communication among the vehicles and road-side units are the Vehicular Ad-hoc Networks (VANETS). In this network each one of the vehicles and elements of roadside infrastructure are connected with each other without requiring the hidden infrastructure, send and receive information and give warning about current traffic situation. Vehicular networks have some special conduct and characteristics which help them distinguish themselves from other different types of network. As compared to other different networks vehicular networks have unique and attractive features [1]. In the ad-hoc devices power issues is main constrained. However, in VANETs nodes/vehicles provide continuous power for computing and communicating within the devices. Operating vehicles can afford significant computing, communication and sensing capabilities. In the mobile ad-hoc network where it is hard to predict the vehicle mobility, vehicles have very predictable movements that are limited to roadways [2]. Roadways information is often available from positioning systems and map based technologies such as GPS. It describes the average speed, current speed and trajectory the future position of vehicle can also be found by them. The operating of vehicular networks is extremely dynamic and so are their configurations [3]. Vehicular network will be frequently partitioned and dynamic nature of traffic may result in large inter vehicle gaps in sparsely populated scenarios in several isolated clusters of nodes. In the vehicular network, the scenarios are varying from location to location [4]. The vehicles move and change their position constantly in the dynamic scenarios. Network topology changes frequently as the link between the nodes connect and disconnect very often. The network connected highly depends upon the two factors: the range of wireless links and the fraction of participant vehicles, where only a fraction of vehicle on the road could be equipped with wireless interfaces [5].

Since mobile ad hoc network is multi-hop in nature, it strictly relies on the cooperation between the nodes. So the guarantee of cooperation of nodes is required. A variety of attacks have been identified and detected in the network. Keeping in mind the end goal to provide a secure communication, one needs to confront the security challenges. Fundamentally, there are two types of attacks. A passive attack would not disturb the normal operation of mobile ad hoc network, while data have been exchanged from the network.

The attacker don't damage to the network specifically [6]. Be that as it may, they can get information for future harmful attacks. The types of passive attacks are eavesdropping and traffic analysis. In this attack, an attacker dependably tries to change or destroy the data or normal operation. Active attacks can be either internal or external. In external attack, the attacker concentrates on to cause congestion in the network. For this reason, they proliferates fake information or to disturb the nodes from giving services [7]. In internal attacks, the attacker needs to get the normal access to participate in the network activities. The active attacks are namely dropping, modification, fabrication, etc.

LITERATURE REVIEW

Rakesh Kumar and Mayank Dav (2012) represent [8], a paper based on the VANET vehicular ad-hoc networks in wireless network environment. This is done for the intelligent transportation system. The applications present in VANET are based upon the data push communication model. Here the information is disseminated to set the vehicles. This paper mainly defines the VANET applications based on the various broadcasting data dissemination protocols. They are surveyed separately and their fundamental characteristics are revealed. At the end of this paper comparison of all the protocols is done and the results are evaluated.

Amiour med tahar, Bilami azeddine (2007) represent [9], a paper on VANET vehicular ad-hoc network where vehicles like car, bus, truck can be assumed as the nodes of the network. The VANETs routing protocol have a great consequence as the AODV is one of the most popular routing protocol and is also dedicated to ad-hoc network. It can use the flooding techniques for locating the destinations and possibly cause an overhead in the network. This simulation shows the extended AODV using MPR reduces the load and performance better than the standard in case of AODVM using MPR reduces the load and perform better than the standard in case of traffic with low and high speeds.

Rakesh Kumar, Mayank Dave represents [10] a paper in (2011) on vehicular ad-hoc network is subclass of mobile ad-hoc network which provide a distinguished for intelligent transport system (ITS). According to the survey it is very necessary to use the ITS with the help of VANET routing protocol. In paper also discuss the advantage and disadvantages, applications of different routing protocols for vehicular ad-hoc networks. This paper also explores the motivation behind the designed and traces the evolution of this routing protocol. At last this paper also show the tabular comparison with various routing protocols for VANET.

Aswathy M and Tripti represent in the paper [11], in (2012) that the vehicular ad-hoc networks are special kind of mobile ad-hoc networks (MANETs). This paper defines the vehicles on road as nodes of network. With the help of VANET, there are many applications which are used as an intelligent transportation system. During the process of route discovery process, AODV broadcasts route request message (RREQ). It creates many unused routes between a source and destination node. The main aim of this paper is to improve the performance of AODV by enhancing the existing

protocol by creating stable clusters and performing routing by cluster head and gateway nodes.

Patil V.P (2012) represents [12] a paper on vehicular ad-hoc network. This paper suggests more innovative approach to deal with this traffic congestion problem. This is done by using the characteristics of Vehicular Ad-hoc Networks (VANET) as a solution. This system is developed and tested using the AODV protocol on ad-hoc mobile network to deal with the problem of vehicle traffic congestion in vehicular network. Traffic congestion can be measured on the patterns such as packets broadcast, percentage of packet delivered and percentage of traffic diverted and overhead to manage the problem of data traffic in the network. The main simulation shows the domain of vehicle traffic congestion in which VANET is demonstrated.

Weiwei Dong (2016) presented [13], that Vehicular ad hoc network (VANET) is experiencing the frequent link breakage and low packet delivery rate, which challenges routing protocols. To address this issue, a Geographic Opportunistic Routing protocol based on Link state and forwarding quality inside nodes (LF-GOR) is proposed. LF-GOR improves the transmission reliability and reduces the delay. The simulation results also demonstrate that in a highly dynamic network, the packet delivery rate of LF-GOR is

12% higher, the throughput is 1.8kbps higher and the end-to-end delay is 0.029s lower than that of GyTAR.

Daxin Tian, (2015) proposed [14], that epidemic routing has emerged as a promising candidate for giving message dissemination technique in vehicular ad hoc networks. In this paper, a novel model is presented to evaluate the capacity of epidemic routing in vehicular networks with considering the traffic signal control as a significant factor in urban territory. The review reveals that epidemic routing can behave differently in different traffic signal control situations where messages can be forwarded by vehicles going through the intersections from different directions. The simulation results prove the accuracy of the model.

Nikita Mangla (2015) proposed [15], that Vehicular Ad hoc Networks (VANETs) allow vehicles to frame a self-organized network without the requirement for a permanent infrastructure. The paper also outlined the principle problems which must be solved for this class of routing protocols and even presented the solution for the particular problem. The paper will also propose an algorithm for position based routing at Road Intersection in VANETs. The protocols are also compared with respect to the next proposed routing protocols and accordingly aim at implementing the following characteristics that are obstacle awareness, street awareness, no bottleneck and no full path selection.

Author's name	Year	Description	Outcome
Rakesh Kumar and Mayank Dav	2012	This paper mainly defines the VANET applications based on the various broadcasting data dissemination protocols.	At the end of this paper comparison of all the protocols is done and the results are evaluated.
Amiour med tahar, Bilami azeddine	2007	The VANETs routing protocol have a great consequence as the AODV is one of the most popular routing protocol and is also dedicated to ad-hoc network.	This simulation shows the extended AODV using MPR reduces the load and performance better than the standard in case of AODVM using MPR reduces the load and perform better than the standard in case of traffic with low and high speeds.
Rakesh Kumar, Mayank Dave	2011	According to the survey it is very necessary to use the ITS with the help of VANET routing protocol.	At last this paper also show the tabular comparison with various routing protocols for VANET.
Aswathy M and Tripti	2012	This paper defines the vehicles on road as nodes of network. With the help of VANET, there are many applications which are used as an intelligent transportation system.	The main aim of this paper is to improve the performance of AODV by enhancing the existing protocol by creating stable clusters and performing routing by cluster head and gateway nodes.
Patil V.P	2012	This paper suggests more innovative approach to deal with this traffic congestion problem.	The main simulation shows the domain of vehicle traffic congestion in which VANET is demonstrated.
Weiwei Dong, Changle Li and Zhifang Miao	2016	A Geographic Opportunistic Routing protocol based on Link state and forwarding quality inside nodes (LF-GOR) is proposed.	The simulation results also demonstrate that the packet delivery rate of LF-GOR is 12% higher, the throughput is 1.8kbps higher and the end-to-end delay is 0.029s lower than that of GyTAR.
Daxin Tian, Yue Yang, Haiying Xia, and Guohui Zhang	2015	In this paper, a novel model is presented to evaluate the capacity of epidemic routing in vehicular networks with considering the traffic signal control as a significant factor in urban territory.	The simulation results prove the accuracy of the model.
Nikita Mangla, Shambhawi Srivastava, Shweta Jha	2015	The paper also outlined the principle problems which must be solved for this class of routing protocols and even presented the solution for the particular problem.	The protocols are also compared with respect to the next proposed routing protocols and accordingly aim at implementing the following characteristics that are obstacle awareness, street awareness, no bottleneck and no full path selection.

CONCLUSION

In this work, it is been concluded that vehicular ad-hoc network is the decentralized type of network due to which issue of routing get raised in the network. In this work, various routing protocols like proactive, reactive and hybrid are discussed. It is been analyzed that reactive routing protocol is the most efficient routing protocol for vehicular ad-hoc networks.

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