Routing Techniques of VANETs: A Review

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Abstract - The vehicular adhoc networks is the self configuring and decentralized type of network in which vehicle nodes join or leave the network when they want. Due to decentralized nature of VANET security, routing and quality of service are the three major issues which reduce performance of the network. In this paper, various routing technique has been reviewed and discussed in terms of description and outcome. The routing protocols are broadly classified into reactive, proactive and hybrid type of routing. It is been analyzed that reactive routing performs well in terms of various parameters.

I. INTRODUCTION

A vehicular ad hoc network is a technology that uses moving cars as a node in a network to create a mobile network. VANET turns each participating car into a wireless router or node, allowing cars approximately 100 to 300 meters from each other to connect and, thus, create a network with a wide range. As cars fall out of the signal range and drop out of the network, other cars can join in, connecting vehicles to one another so that a mobile Internet is created. It is near about the first systems that will integrate this technology are police and fire vehicles to communicate with each other for safety purposes. VANETs go under the category of wireless ad hoc network. In vehicular specially appointed network, the node might be a vehicle or the road side units. They can communicate with each other by allowing the wireless connection up to a particular range. Inter-Vehicular Communications (IVC) also known as vehicular specially appointed networks (VANETs) have turned out to be exceptionally popular in recent years. A Vehicular Ad hoc Network is a special type of Mobile Ad hoc Networks (MANETs is a kind of wireless unstructured networks and is self-arranging network of mobile routers connected by wireless links) which use vehicles as nodes. The principle difference is that mobile routers which build the network are vehicles like cars or trucks. Several different applications are rising with respect to vehicular communications. For instance, safety applications for safer driving, information services to inform drivers about the driving hazards and different business services in the vicinity of the vehicle can be taken. Government, operations, and the academic communities are working on enabling new applications for VANETs. A primary goal of VANETs is to increase road safety by the use of wireless communications [1].

A. Issues of VANETs

1) SECURITY CHALLENGES IN VANET

Security in VANET should be review as important as securing other networks in computing. There are a numbers of possible attacks in VANETs. The purpose of these attacks is to create problem for users to access the system or phishing some information [2].Due to the highly sensitive nature of information being broadcasted by the use of VANET all applications designed for vehicular network need to be protected from malicious manipulation. Imagine the possibility of a critical message been manipulated and the harm will cause if not detected. In adding together to that comfort and quality applications in VANET need to be protected to prevent loss of revenue. As per basic computer and network security definitions, attacks on a computer network can be classified in three main groups of threats associated with Authenticity, Confidentiality and Availability of the resource

2) QUALITY OF SERVICE (QOS)

Condition of certain quality of service levels in VANET is an important task. A network with minimum delay for data transport less retransmissions and high connectivity time can provide certain QOS guaranteed to the users. Promising this kind of QOS with different user applications and dynamic network environment is an interesting and challenging task in VANET design. Quality of Service hold up over VANET remains a challenge when current routing path become no longer available as a result improve in node velocity, node positioning, network topology or distance between vehicular nodes [3]. It may be a challenging issue both for network engineers and researchers to utilize the available bandwidth allocated for VANET to improve delivery of messages as well as to extend adaptive QOS routing protocols that will establish new routes quickly and efficiently.

3) EFFICIENT ROUTING

In order to timely and properly sending data packets from one node to another node an efficient routing algorithm is required. In VANET, efficient routing algorithm earnings a routing scheme with minimum delay, maximum system capacity and less computational complexity. Generally sense and uphold the optimal route to send data packets via intermediate nodes is the main motive of a routing algorithm. In VANETs due to the dynamic nature of mobile nodes, searching and saving routes is a complex task. In view of the fact that VANETs used special routing protocols originally

implemented for MANETs. The addresses and topology based routing protocols require a unique address for each participating node. This means that a mechanism is desired that can be used to assign unique addresses for vehicles, but these protocols do not guarantee to avoid duplicate allocation addresses in the network [4].

B. Routing Protocols for VANETs

The routing protocols are those which establish secure and efficient path from source to destination. These routing protocols are broadly classified into:-

1) Proactive Routing Protocol

These routing protocols constantly retain the updated state of the network topology by creating a routing table and having the routing information before it is needed. Therefore they are also called as Table Driven protocols. All the nodes present in the network creates & maintains routing information to every other node in the network which is kept in the routing tables and is updated periodically as the network topology changes. These protocols manage various tables and are not suitable for a larger network because the memory required maintaining node entries for each and every node in the routing table of every node will raise an issue regarding cost, overhead and consumption of more bandwidth [5].

2) Reactive Routing Protocol

These protocols are also known as source-initiated on-demand routing protocols, these are demand driven reactive protocols. Therefore they do not follow the procedure creating and updating routing tables with routing information recurring at uniform intervals.. As they are on demand routing protocols, so they start route discovery only when they are asked. In order to send a packet to another node in the network using this protocol, then this protocol initiates a route discovery process for finding the suitable route to the destination and establishing the connection in order to transmit and receive the packet. In this process the RREQ packet is broadcasted throughout the network which adds a significant amount of control traffic to the network due to query flooding.

3) Hybrid Routing Protocol

These types of protocols make use of the strengths of both the previously discussed protocols by combining them together to obtain better results. In the initial stage routing is done with some dedicated prospected routes and then serves the demand from additionally activated nodes through reactive flooding. The basic idea is that every node has a pre-defined zone centred at itself in terms of number of hops and for the nodes which lie within the zone, the protocol used to maintain routing information in the network is intense. The nodes which lie outside its zone, it does not maintain routing information in a permanent base. Instead, reactive routing strategy is adopted when inter- zone connections are required.

II. LITERATURE REVIEW

Young-Bae Ko and Nitin H. Vaidya (2000) In this paper author proposed that a mobile ad hoc network is the one which consists of wireless hosts that may move often. Improvement of hosts results in a change in routes requiring some mechanism for determining new routes. Several routing protocols have already been suggested for ad hoc networks. In this paper author suggest an approach to develop location information (for occurrence obtained using the global positioning system) to improve performance of routing protocols for ad hoc networks. The proposed technique leads to significant reduction in the number of routing messages. Two algorithms are extended to determine the request zone, and also suggest potential optimizations to our algorithms [6]. **Cristina Rico Garcia, Andreas Lehner (2006)** ,In this paper author proposed that an efficient design and reliable broadcast MAC layers for wireless mobile ad-hoc networks (MANET) especially high user speeds are allowed is a current challenge. In spite of the absence of infrastructure would permit channel allocation, awareness techniques allow a certain channel assignment. In this paper plot the MAC layer protocol designed for broadcast MANETs called COMB cell based orientation- aware MANET Broadcast. The proposed techniques leads to COMB allow the realization of collision free transmission, high speed is supported and no handshake is required. COMB is based on the contain alert to cross layer dimensioned CDMA cell and it uses the SOTDMA protocol as intra cell scheme [7]. **Yoshitaka Ohtaki (2006)** In this paper author proposed that scalable ant based routing algorithm that keeps the overhead low while keeping paths short. In the algorithm using the multistep time to live scheme is an effective message migration scheme and efficient scheme foe updating the probability of packet forwarding. The proposed techniques leads to establish shorter paths then the conventional ant based algorithm with the same signalling overhead [8]. **Jonathan Ledy, Herve Boeglen (2009)** In this paper author suggests that a v-aodv a version of aodv (ad-hoc on demand distance vector) especially created for vehicular ad-hoc networks (VANETs). In the V-AODV is designed for complex cross layered metric based on delay from node to node and bit error rate coming from the physical layer. This paper implemented on the ns2 simulator taking in account a realistic environment tool called communication ray tracer. The proposed technique leads to the routing metric based on delay and BER the first parameter is more relevant in terms of QoS [9]. **Josiane Nzouonta, Neeraj Rajgure** (2009) In this paper author proposed that classes of routing protocols which are used in VANET. It is also called the road based using vehicular traffic routing. In this paper uses the scenario which is based on the road paths consisting of successions of road intersections that have with high probability network connectivity among them. Geographical forwarding is used to move packets between intersection on the path and reducing

the path sensitivity to individual node movements. In the network with high concentration optimize the forwarding using a give out receiver –based election of next hops based on the multi criterion prioritization function that takes non uniform propagation into account. In proportion to this paper considered and implemented reactive protocols RBVT-P and compare them with protocol representative of mobile ad-hoc networks and VANETs. The proposed technique leads to urban setting show up to a 40% increase compared with some existing protocols. In terms of average delay, RBVT-P performs best with a much as an 85% decrease compared with the other protocols [10]. **Mohammad A. Mikki (2009)** In this paper author proposed that an Energy Efficient Location Aided Routing (EELAR) Protocol for MANETs that is based on the Location Aided Routing (LAR). EELAR makes major reduction in the energy consumption of the mobile nodes batteries by limiting the area of discovering a new route to a smaller zone. Thus, control packets overhead are significantly reduced. The base station reserves locations of the mobile nodes in a position table. To show the efficiency of the proposed protocol they present simulations using NS. The proposed technique leads to show that EELAR protocol makes an development in control packet overhead and delivery ratio compared to AODV, LAR, and DSR protocols [11]. **Shetali Zeadally, Ray Hunt (2010)** In this paper author proposed that recent advances in hardware, software and communication technologies are enabling the design and implementation of a whole range of different type of networks that are being deployed in various environment. VANET is the immediately prior region of research where define the consistency and improvement because it has tremendous potential to improve vehicle and road safety, traffic efficiency and convenience as well as comfort to both drivers and passengers. A lot of research on VANET has determined on specific area together with routing, broadcasting, quality of service (QoS) and security. The proposed technique leads to enable the deployment and widespread adoption of scalable, reliable, robust and secure VANET architecture, protocols, technologies and services [12].

Author Name	Year	Description	Outcomes
Manju Dhiman and Mrs MamathaJadhav	2015	The author proposed that AOMDV (ad hoc on-demand multipath distance vector).	The proposed technique leads to support the Quality of Service (QOS).
K. Aravindhan , G. Kavitha , Dr.C. Suresh Gnana Dhas	2014	The author proposed that Position Based Routing Protocol (PBR) .	The proposed technique leads to reduced packet loss.
Sangheethaa Sukumaran , Lakshmi Ramachandran, Surya Rani Sunny	2013	The author proposed an intersection based routing protocol ” RLFF”(Red Light First Forwarding) that consider traffic lights.	The proposed technique leads to better performance in urban environment as compared to GPSR
Jamal Toutouth, Jose Garcia-Nieto	2012	The author proposed that Meta heuristic algorithms to find automatically optimized OLSR.	The proposed technique leads to give a result in Better Quality of Service (QOS)
Shetali Zeadally, Ray Hunt	2010	The author proposed that VANET has focused on specific area like routing, broadcasting, quality of service(QoS) and security.	The proposed technique leads to Scalable, reliable, robust.
Jonathan Ledy, Herve Boeglen	2009	The author proposed that V-AODV for complex cross layered metric based on delay from node to node and bit error rate coming from the physical layer.	The proposed technique leads to delay and BER that is more relevant in terms of QoS.
Josiane Nzouonta, Neeraj Rajgure	2009	The author proposed that RBVT-P protocol is used .	The proposed technique leads to decreased average delay is 85%.
Mohammad A. Mikki	2009	The author proposed that an Energy Efficient Location Aided Routing (EELAR) Protocol for MANETs that is based on the Location Aided Routing (LAR) is used.	The proposed technique leads to improvement in control packet overhead and delivery ratio.
Cristina Rico Garcia, Andreas Lehner	2006	The author proposed that MAC layer protocol is used for broadcast MANETs called COMB cell based orientation- aware MANET Broadcast.	The proposed technique leads to sport high speed and no handshake is required.
Yoshitaka Ohtaki	2006	The author proposed that ant based routing algorithm which provide more scalability.	The proposed technique leads to Algorithm for shorter paths.

Table 1: Comparison of routing Techniques

III. CONCLUSION

In this paper, it is been concluded that due to decentralized nature of vehicular adhoc networks routing, quality of service and security are the three major issues which reduce network performance. In this paper, various technique of routing protocols has been reviewed and it is been analyzed that reactive routing protocols perform well which can be improved in future.

IV. REFERENCES

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