Multicasting Scheme for Path Establishment in Vanet

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***Abstract*- The vehicular adhoc network is the decentralized type of network in which vehicles can move from one location to another. In the network two type of communication is possible which are vehicle to vehicle and vehicle to infrastructure. In the vehicle to vehicle type of path establishment is the major issue of the network. In this research work, multicasting routing technique is proposed for the path establishment from source to destination. The proposed technique is implemented in NS2 and simulation results shows improvement in network delay for path establishment.**

Index Terms- LAR, Broadcasting, Multicasting, VANET, Path establishment

INTRODUCTION

Within smart cites that consist of huge traffic, the mobility, quality, comfort as well as safety needs to be improved which can be done by utilizing Intelligent Transport Systems (ITS). For all the applications, in order to develop ITS, the most important part to be included is Vehicular Ad-Hoc Network (VANET) [1]. All across the globe, several researchers from industry as well as academia are attracted. In order to enhance the safety of vehicles on roads, the traffic efficiency as well as the level of comfort for commuters, VANETs are utilized. The vehicles are known as nodes within the VANETs and the edges within the network are considered to be the distance between these vehicles on roads. A wireless medium is used in order to accept and transfer the messages amongst vehicles. For connection and communication within the 100 to 500 meters of range, the vehicles that are participating are known as wireless nodes or routers which further generate a network. The vehicle will be dropped out of the network when it falls out of the signal range [2]. When any vehicle comes within the signal range of existing vehicles present in the network, it can possibly join the network. On Board Units (OBUs) are the advanced wireless communication devices through which these vehicles are furnished. There is no base station assigned towards such devices. Both V2V and V2I communications are possible for OBUs. A major application that supports vehicular ad-hoc networks is the Intelligent Transportation System (ITS). The development of dynamic routing protocol is one of the major challenges faced during the design of vehicular ad-hoc networks. The information from one node can be disseminated to another with the help of this protocol. Due to the highly dynamic and continuously changing topologies, there have been several changes made within the routing in VANET recently as comparison to other traditional approaches [3]. Within VANETs, few previously designed protocols for MANETs have been tested. The manner through which the delay related to passing information from one node to another can be minimized is the major challenge here. The real time applications for VANET scenario can be implemented by overcoming these challenges within MANET protocols. There is also a need to carefully examine other implications as well. The unpredicted and dynamic nature of vehicular network topology can be handled by routing protocol by examining the dynamic characteristics of VANETs. The identification and maintenance of optimal paths of communication within the required scenarios is the most difficult task to be performed within VANET routing [4].

RELATED WORK

Shaffy Singh, et.al (2017) presented the movement of vehicles is not dependent on the driver when they moves from one location to another within the network is known as the vehicular Ad hoc network. They implemented the root node selection technique in this paper in order to reduce chances of link failure. The selection of path done is done using the root node in case node wants to establish path to destination [8]. In this paper different optimal path algorithms was utilized by which path is established and traffic is controlled. They discussed the issues

related to the routing in this paper and two type of communication is possible. V2V communication is the first type and V2I communication is the second. They proposed the multicasting technique in which route request packets are flooded by the source node by which establishment of the path to destination can be possible. There is reduction in packet loss, delay and increase in network throughput due to the proposed method. They performed various experiments on the proposed method in order to analyze the performance of the network within the network.

Anurag Shrivastava, et.al (2018) presented the main focused on the road side unit (RSU) for which it is required to improve the efficiency of energy and its throughput. They proposed an improved multicast based energy efficient opportunistic data scheduling algorithm in this paper [9]. They provided the service of the multicasting at optimal data rate to the selected group of users. On the basis of obtained results, it is concluded that proposed method efficient energy and optimal throughput is provided by it. This proposed method also estimates the maximum throughput accurately and with low search complexity. The flexibility of the algorithm was tested in this paper by performing simulation on two different cases. First case is no new user is entertained until all the initial users get served and second, in every time slot there is entry of new users.

Xiu Zhang, et.al (2016) presented that within the wireless communications, higher attention has been paid towards the vehicular ad hoc networks (VANETs). For transmitting information within VANETs, the major issue being faced is routing. For constraining multicast routing issue, the quality of service (QoS) is provided through this paper. A NP-complete issue is found here and it is seen that in comparison to classical algorithms, the swarm intelligence algorithms are better [10]. For a continuous optimization issue, multicast routing is abstracted. Further, with MABC, this approach is linked to achieve better performances. Using three instances, the numerical simulation is implemented on a traffic environment. An optimal route is achieved as per the results achieved using MABC algorithm. Even though there is less frequent change in the network structure, the routing framework is possibly applied in real time.

Sabri Allani, et.al (2016) presented the wireless communications technologies and low cost embedded sensors have been widely utilized in the VANET network due to which there is improvement in the road safety and transportation efficiency [11]. In this paper, analysis of literature was shown and the effective approaches were highlighted that was not able to fulfill the essential requirements due to which they are no more utilized. They proposed a new infrastructure-less Geocast protocol in this paper that eliminates all the previous limitations. Vehicles present in the Zone of Relevance only received message from this proposed method with a minimum overhead cost. On the basis of experiments, it is concluded that proposed method has minimum overhead cost while provide the high delivery ratio as well as a high Geocast precision. It is also demonstrates that as compared to other methods proposed method provide effective and efficient performance.

Jeongcheol Lee, et.al (2016) presented with the advent in the technology, one-to-many group communications has been provided by the Vehicular Ad Hoc Networks utilized for business and entertainment applications such as video conferences and file sharing. For VANETs they proposed a delay-sensitive and cost efficient multicast protocol in this paper. The shortest path connection and the farthest destination Selection strategy were utilized by the proposed method in order to construct a multicast tree [12]. This method is based on the vehicle information like map information and location information and upcoming intersections. As per simulation results, it is demonstrated that better performance is shown by the proposed protocol using FSSC as compared to SPT and MST protocols. End-to-end delay, the transmission number, and the delay variation are the parameters for comparison.

3.1. Problem Formulation

Following are the various research gaps which can overcome in this work :-

1. The technique which is proposed in the base paper is based on the broadcasting for the path establishment. In the technique of broadcasting, the source node send route request packets in the network and nodes which adjacent to destination will respond back with route reply packets. The source select best path on the basis of hop count

and sequence number. Due to use of broadcasting approach some nodes receive request packets which are not able to establish path to destination.

2. In the broadcasting approach every node receives route request packets due to which delay and bandwidth consumption of the network is quite high. The technique is required which establish path in least amount of time from source to destination

3.3. Research Methodology

In order to enhance the performance of protocol, the lifetime of a route is to be increased for which the stability of route present in between source and destination is improved here. The nodes that participate within the route request and travel in the similar direction of movement are selected here. This is done due to the fact that the nodes that move in opposite directions generate the route that can break easily in comparison to the nodes moving in similar direction. Thus, the selection of direction of movement is an important factor to be considered.

RESULT AND DISCUSSION

The vehicular ad hoc network is the network in which vehicle nodes move from one location to another. The simulation of the proposed model is one which specified nodes in the specified area.

The simulation of the proposed model is performed in NS2 by considering various parameters specified in table 1

Number of Nodes	41
Anteena type	Omi-directional
Queue type	Priority queue
Standard	802.11
Packet size	1000
Queue size	50

Table 1: Simulation Parameters

CONCLUSION

VANET is one of the most challenging areas. Within the vehicular system, safety and security are ensured with the help of this network. As mentioned, it provides both Vehicle-to-vehicle and Vehicle-to-Infrastructure communications. Within both of these networks, the information is generated and distributed through vehicular communication. It is very difficult to design the routing protocols in VANETs due to the highly dynamic topology they include. There are several routing protocols introduced within this network. These routing protocols are broadly classified on the basis of their properties and tasks. Amongst these classification, the topology based routing protocols are introduced in which the packet forwarding is performed with the help of including information related to links. The protocols included under this category are further classified as being proactive and reactive. The maintenance of routing information in the background irrespective of the communication requests being generated is defined as proactive routing. Further, the routing in which the route is open only when communication is required amongst the vehicles is known as reactive type of routing in VANET. A class routing algorithm is available within the position based routing. In order to choose the next forwarding hops, the geographical positioning information is utilized here. The transmission of packets to the destination in least possible time is the major aim of Position Based Greedy V2V protocols which are also known as min delay routing protocols. On the basis of the fact that the city street forms a natural planner graph, the Greedy Perimeter Coordinator Routing (GPCR) is developed and there is no need to external static streets map here.In this work, it is conclude that path establishment is the major issue of vehicle adhoc network due to high mobility and dynamic nature of the network. In this research work, multicasting technique is proposed for the path establishment from source to destination. The proposed technique is based on zonal routing which is divided into expected and predicted zones. The simulation results shows that proposed technique performs well in terms of packetloss and throughput

FUTURE WORK

Following are the various future prospective of this research work:-

1. The proposed algorithm can be further improved with the other path establishment algorithms of vehicular ad hoc networks

2. The proposed algorithm can be further improved to increase security of the network

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