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V2V Unicast Routing Scheme using Pheromone-Approach

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***Abstract*: Nowadays the world has been compacted in form of tablet, phones and other devices. Now the main challenge is to provide mobility and ease in every fields like cell phones etc. Currently a lot of work is going on VANET. Vehicular ad-hoc network is new world technology in which it maintains vehicle to vehicle data communication and vehicle to infrastructure data communication. Therefore, these two aspects of VANET can make any vehicle to contact to the world while moving. In vehicle-to-vehicle (V2V) communication, it can share the information regarding road conditions, accidents and circumstances related to the surroundings. Now this will give the all information to the vehicles that are at back of sender and this will prevent any hasty situations. And this will lead us to an intelligent system. The main challenge in VANET is to provide quality focused internet service during mobility. Because mobility causes delay in throughput and frequent packet loss. In VANETs, it is very difficult to establish a connection between two vehicles, so a good routing protocol is needed for vehicle-to-vehicle communication. In this paper, we have used a bionic V2V routing scheme which is also called as Pheromone-Based Vehicle-to-Vehicle (PBV2V) routing. It got inspired from the concept of Pheromones. Each vehicle periodically exchanges its pheromone information with neighboring cars and updates its pheromone table too. We have worked on this algorithm and results demonstrate that PBV2V gives a satisfactory performance.**

***Keywords*: V2V routing, Pheromone, Protocols, VANETs, throughput, Packet loss.**

1. Introduction

During the past few years, the research is going on mobile ad-hoc network (MANETs). However, MANET is different from VANET because here one node may contact with other node or more than one nodes without any predefined infrastructure. [1] Since there is no predefined topology for MANET so it has very complex protocols. VANET is special case of MANET we can say. VANET has some predefined mobility of vehicles (predictable), that is, motion only in two direction and the transmission mode is often broadcasted. Limited power is available here. In addition, most important thing is there are two communication mode one vehicle-to-vehicle and other vehicle to network infrastructure. The main need of VANET is to provide real time data. Since here, vehicles are highly mobile so it is very difficult to maintain V2V unicast connections. There are many protocols have been proposed for this connection for example AODV and DSDV. But it does not give the result up to the mark because of rapid movement of vehicles. Since using these different algorithms, results are not satisfactory so we move on to bionic concepts used in Ant Colony Optimization Algorithm. It simulates basically the behavior of Ants when they search for a path. Here pheromones are deposited iteratively and path is being chosen on the basis of pheromone density, so here suboptimal path can be found. In this paper we focus on V2V connections in VANETs and propose an PBV2V routing.

2. Literature survey

In paper [2], author has discussed about intelligent transportation system for smart city using VANET. He has discussed about how VANET can be used in smart traffic supervising using different communication modes and networks. It can be used in vehicle congestion control too.

In paper [3], the author discusses about VANET Geographic Routing Protocols on Real City Map. In this paper, the author uses and discusses about two protocols on the real city map, that is, Anchor based Street and Traffic Aware Routing (A-STAR) and Greedy Perimeter Stateless Routing (GPSR). He simulates VANETs on real map scenarios and it has given satisfactory results and can be deployed to real world problems. In paper [4], author discusses about traffic congestion control in VANETs. To detect traffic congestion in an area he integrates a fuzzy logic controller and implements on an Arduino Uno platform with the K-means clustering technique, which he implements on a PHP server.

3. Proposed method

In our model, we have assumed that all vehicles recognize their positions and can communicate to other vehicles too. We have also assumed that each vehicle regularly transmits its position to vehicles within its broadcasting area, so each vehicle knows neighbors' positions. We have got our pheromone-based algorithm here and it is inspired from Ant colony algorithm. We had a pheromone update mechanism in our model. The connection between two mobile nodes can be established by altering the RREQ-RREP method. The RREQ packet can be recursively forwarded to the destination. Then, the destination transmits an RREP packet to establish the route.

We had compared here our model and the already proposed models like AODV and DSDV and we had got some graphs.

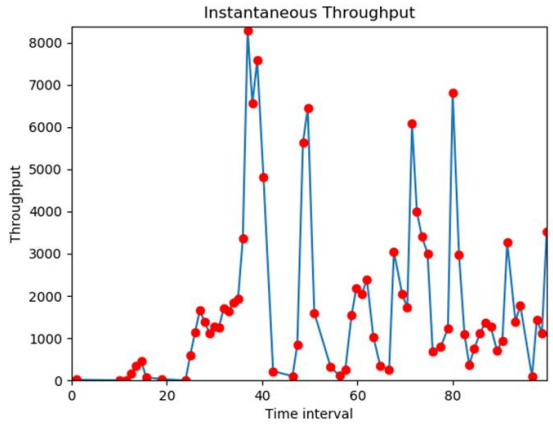

Fig. 1. Throughput of DSDV routing protocol

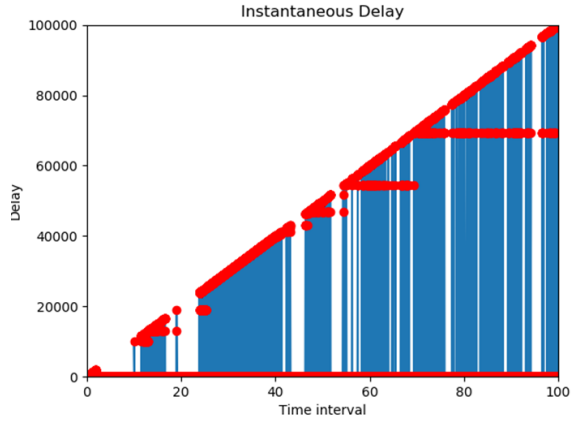

Fig. 2. Time interval vs. Delay

In fig. 1, delay for DSDV has been shown, as we notice here that throughput for DSDV is not in the strictly format with time.

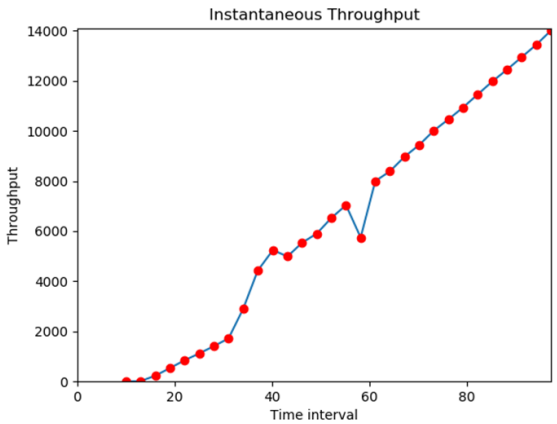

Fig. 3. Throughput of AODV routing protocol

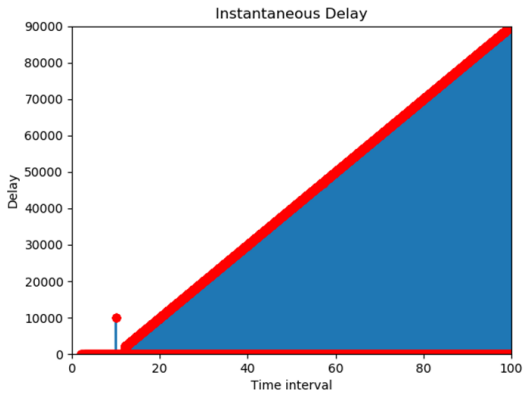

Fig. 4. Delay of AODV routing protocol

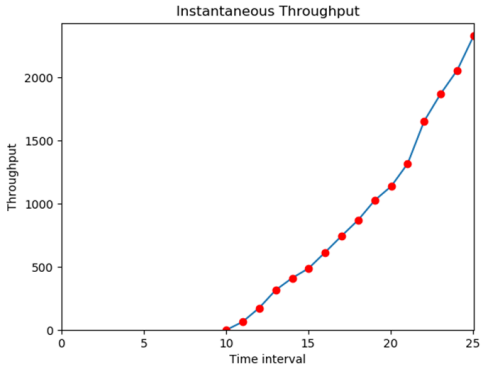

Fig. 5. Throughput of PBV2V routing protocol

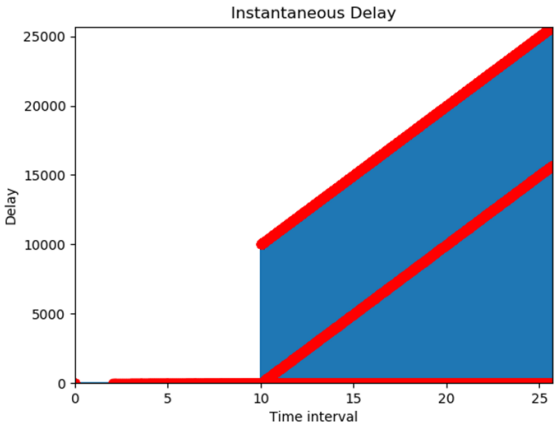

Fig. 6. Delay of PBV2V protocol

Figure 1 and 2 shows the delay and throughput of DSDV routing protocol which cannot be used in real time. Figure 3 and 4 shoes the delay and throughput of AODV routing protocol which gives best throughput but delay starts at beginning only, that indicates the connection is unstable which can't be held for longer period. In figure 5 shows the throughput of PBV2V routing protocol which is as good as a\AODV and in figure 6 the delay of PBV2V which starts delay after some time which means stable. We can achieve connection for longer period of time which can't be in AODV or DSDV.

4. Conclusion

Several studies of VANETs expresses how to connect mobile nodes. The proposed method PBV2V applies the pheromone density diffusion bionic concept. Since each node exchanges its information and updates its table periodically, the vehicle can find the destination without transmitting new packets over the network. This minimizes the network overheads and the search time. The simulation results show that the PBV2V scheme performs well in terms of success rate.

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