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Alternate Path Selection Algorithm By Virtue Of Proactive Congestion Control Technique for VANETS

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ABSTRACT

A vehicular ad-hoc network (VANETs) is the technology which uses moving cars as nodes in a network to create a mobile network [6]. Vanets have received and are receiving a lot of attention due to the wide variety of services they can provide. Most of the research in vanets is based on congestion control. The main purpose of vanets is to furnish safety and comfort for passengers and to prevent them from accidents. The main aim or objective of this paper is to avoid and control congestion. Here we propose an alternate path selection algorithm as a solution to prevent congestion in VANETs. Alternate path selection method is a proactive congestion control approach. Congestion in the VANET environment occurs if the vehicles require space more than the available space. Congestion in vanets can be identified when the speed of the vehicle is less than the average speed. The avoidance of congestion in vanets is done by selecting an alternate path.

Keywords:- VANETs, Mobile Network, Congestion, Proactive, Alternate Path

I. INTRODUCTION

Vanets are vehicular ad hoc networks. Ad hoc network is defined as the network which does not rely on any of the pre-existing infrastructure such as routers in wired network or access points in wireless networks. Vanets are a type of wireless ad hoc networks [5]. Vanets facilitate the communication among the nearby vehicles and fixed equipment called road side units. Vehicular ad hoc networks are the important components of intelligent transportation system [ITS]. Vehicles in the network communicate with each other using inter vehicle communication [IVC],road side units [RSU] or base station using road side to vehicle communication [RVC].

The main goal or objective is they contribute to safer and more efficient roads in the future by providing timely information to drivers and concerned authorities. On board units [OBU] is the electronic device placed inside each vehicle which provides ad hoc network connectivity for the passengers. In 1999 the federal communication commission [FCC] has allocated a frequency spectrum for vehicle to vehicle and vehicle to roadside wireless communication. Then the commission established a dedicated short range communication service in the year 2003.It also uses the 5.850 - 5.925 GHz band. FCC allocated the DSRC spectrum to increase traveller safety, reduce pollution and the amount of fuel consumed and continue to advance the nation's economy. Figure 1 represents the vanet architecture. VANETS share some common characteristics with general mobile ad hoc networks (MANETS). They are characterized by the movement and self-organization of the nodes. Vanets are distinguished from Manets by their hybrid network architecture, node movement characteristics and new application scenarios.

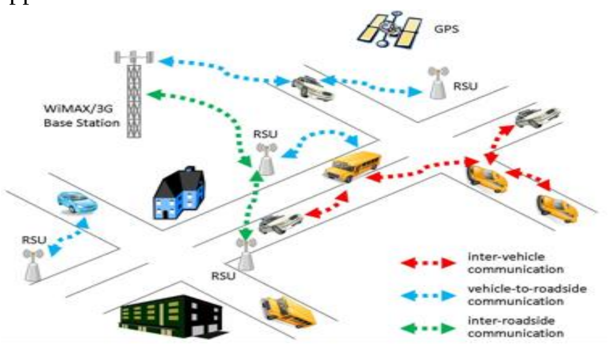

Fig 1: Vanet Architecture.

II. CONGESTION CONTROL APPROACHES

There have been several works addressing the congestion problem in VANETs. There are mainly three classes of congestion control approaches such as proactive congestion control, reactive congestion control and hybrid congestion control approaches fig 2. The first class is the reactive congestion control approach. This approach mainly uses the first order information about the channel state and performs some action to reduce the load on the channel. The main disadvantage or limitation of this approach is that it acts only when congestion occurs and is detected. Proactive congestion control approach has a built- in model about the environment and tries to estimate the traffic based on control periods. Using this method congestion can be prevented. The third class of congestion control approach is the hybrid congestion control. This approach is the combination of reactive and proactive congestion control approaches. In this paper we are focusing on the proactive congestion control approach. The alternate path selection method is a type of proactive congestion control approach.

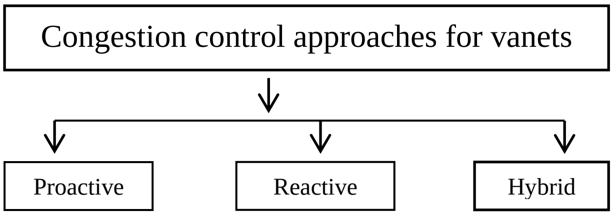

Fig 2: Classes of congestion control.

Step 1: Start

Step2: Initialize the source node and destination node.

Step 3: R_iS_i - road side unit at source R_iD_i-road side unit at destination.

Step 4: Find all the paths between source and destination.

Step 5: For each path find the [status of congestion]

- Avg time with no traffic.
- Avg time with less traffic.
- Avg time with congestion.

Step 6: for each path found. Move from Source Node to Destination:

Check (if (speed of node <average speed))
If (Congestion=true)
Then find expected delay caused because of Congestion
If (Congestion > Threshold Value)
Then find the alternate path and select this path as the new path.

Step 7: Move to the destination node

Step 8: END

Fig 3: Alternate path selection Algorithm

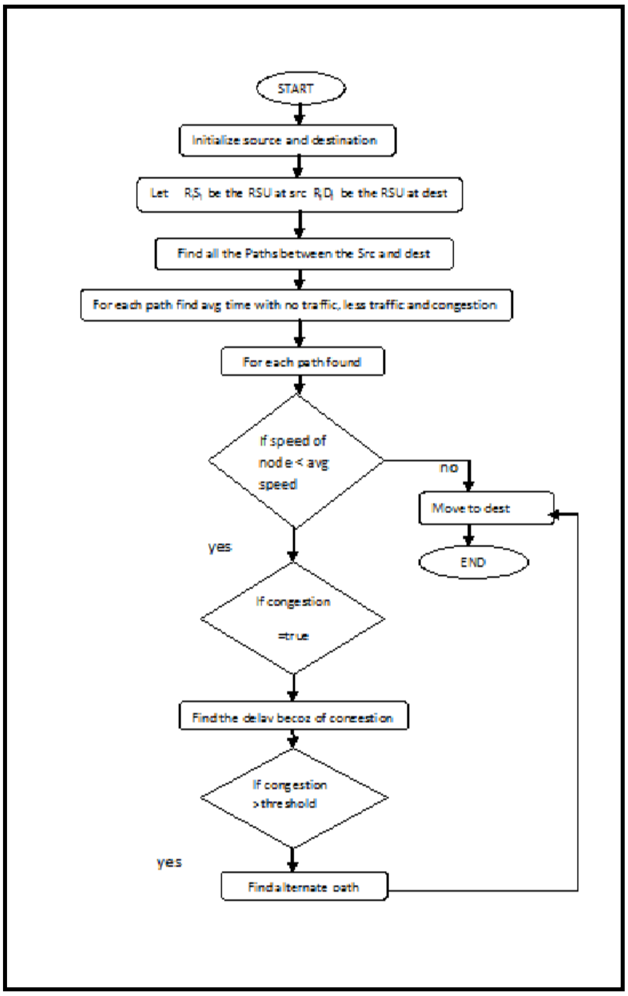

Fig 4: Flow Chart

III. PROPOSED WORK

In the proposed system we mainly focus on when the alternative path has to be selected to avoid congestion. Before a vehicle enters the way for its destination, information about the destination is given to the on board unit, which in return is given to the RSU (Road side unit). Information about the destination received by RSU is given to the base station every minute. Assumption of the density is made in the base station and if the density is more than 70% then base station has to search for the alternate path. Alternative path given by the base station is then sent to the road side unit, which is then passed to the on board unit which could be viewed by the person. Suppose if the density is more than 70% and the base station sends the information to the RSU and then to the on board unit [OBU] saying there is no congestion in the path [traffic] then the vehicles can remain in the same state. Figure 3 and 4 represent the alternate path selection algorithm and flow chart respectively.

IV. SIMULATION ENVIRONMENT

The simulation experiments are performed using NS2 basically used for the simulation of networking scenarios.NS2 is an open-source event-driven simulator designed specifically for research in computer communication networks. Since its inception in 1989, NS2 has continuously gained tremendous interest from industry, academia, and government. Having been under constant investigation and enhancement for years, NS2 now contains modules for numerous network components such as routing, transport layer protocol, application, etc. To investigate network performance, researchers can simply use an easy-to-use scripting language to configure a network, and observe results generated by NS2. Undoubtedly, NS2 has become the most widely used open source network simulator [7].

V. SIMULATION DESCRIPTION

This paper is implemented using the network simulator NS2.The details regarding NS2 is defined in the previous section. The implementation details are as follows. Here the nodes behave like vehicles. Initially 40 nodes have been created. To establish a communication link each node sends hello messages to its neighbours. After the completion of sending hello messages the source node sends data packets to its receivers. If the queue size exceeds the maximum limit the packets will be dropped. During the packet transfer if congestion occurs then an alternative path is selected. The snapshot for each condition is shown in the below section.

VI. SIMULATION RESULTS

In this section we represent the snapshots of the results obtained. There are mainly seven snapshots which represent creation of node, sending hello messages, sending and receiving packets, packet drop, congested node and finally finding the alternate path.

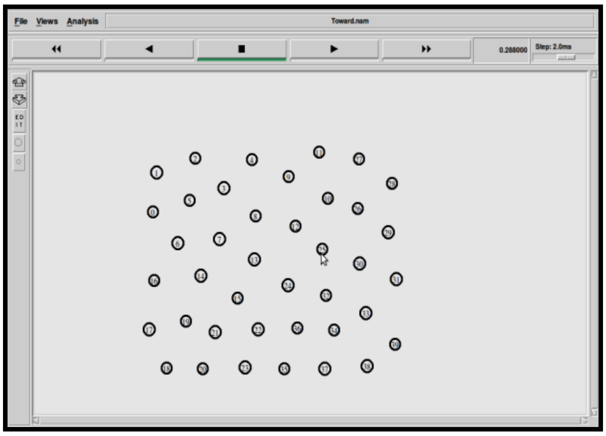

Fig 5: Creation of the nodes

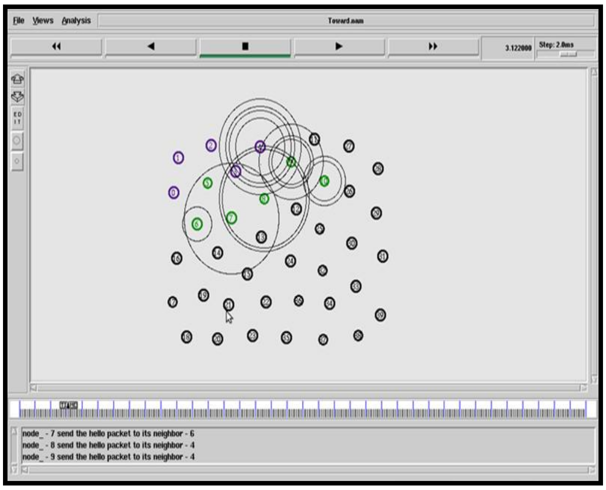

Fig 6: Node sending hello packets to its neighbours

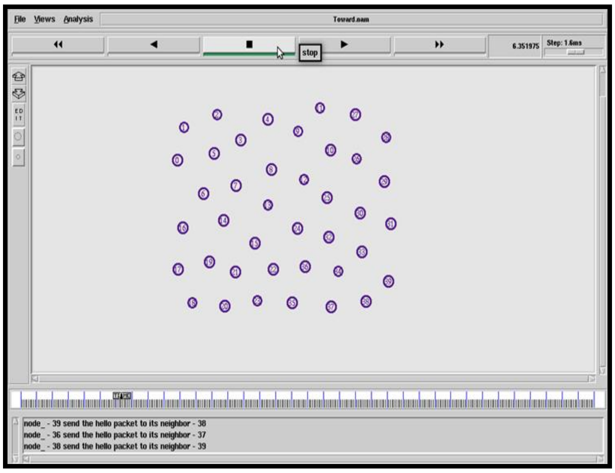

Fig 7: Node completes sending hello messages

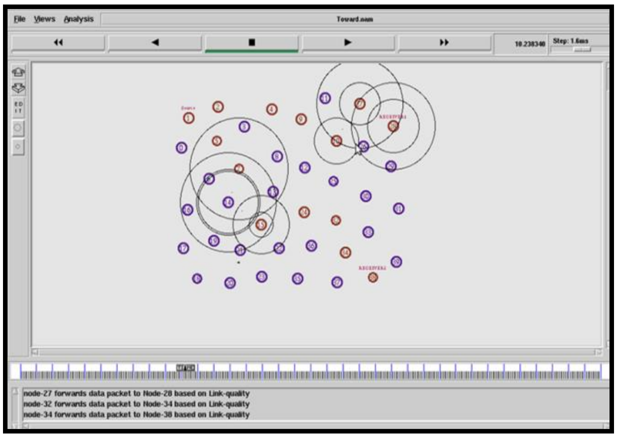

Fig 8: The source node sends the data packets to its receivers

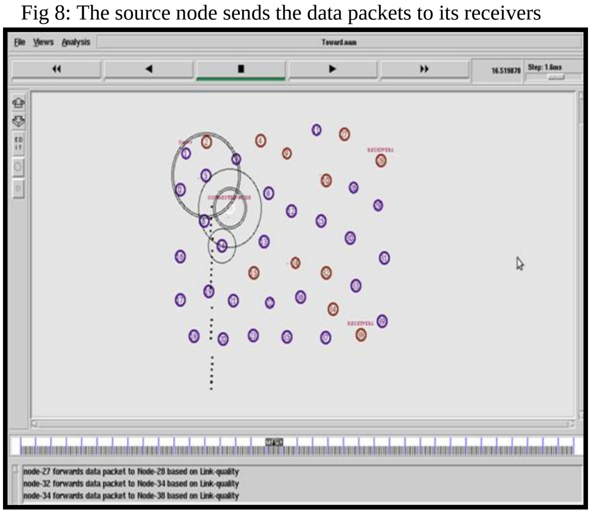

Fig 9:Representation of packet drop

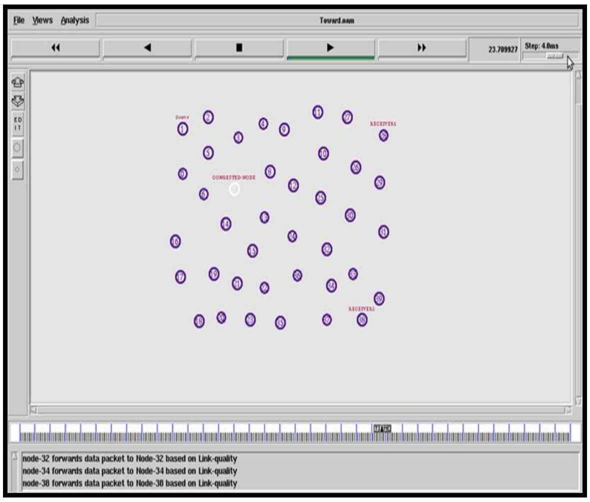

Fig 10 :Represents the congested node

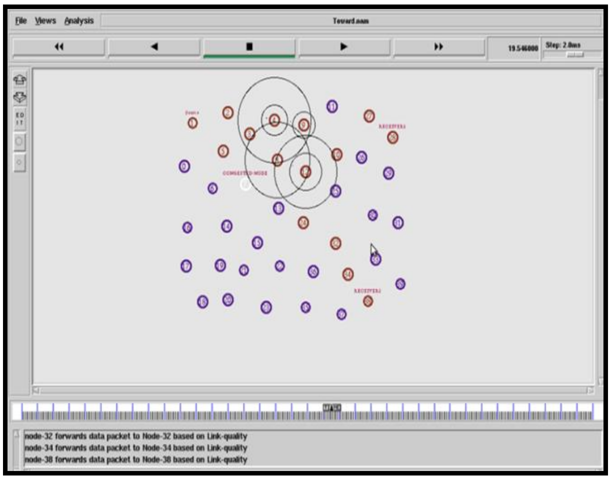

Fig 11:Alternate path would be selected due to congestion

VII. CONCLUSION

The controlling of the vehicular traffic in road scenarios is the crucial problem. The main goal of VANETs is achieved by providing safety and comfort for passengers. Here we mainly discussed how the alternate path will be selected by the vehicles when congestion occurs. The proposed system reduces the congestion of vehicles thereby improving the effective travelling time. Hence, it can be concluded that the alternate path selection based on the density value holds a good potential for improving the traffic conditions.

VIII. FUTURE WORK

In this paper we had implemented the VANET scenario using the network simulator NS2.There are few limitations of NS2 such as it does not have good GUI support, you will have to analyse through trace file and filter the required data using AWK scripts and there is no good support for debugging in NS-2.Due to these limitations we can implement the same scenario using the road traffic simulation package i.e. SUMO. "**S**imulation of Urban Mobility" is an open source, highly portable, microscopic and continuous road traffic simulation package designed to handle large road networks.

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REFERENCES

[1] Yue Liu, Jun Bi, Ju Yang- “Research on Vehicular Ad Hoc Networks”- 2009 IEEE.

[2] MohamadYusof Bin Darus, Kamarulnizam Abu Bakar- “Congestion Control Framework for Disseminating Safety Messages in Vehicular Ad-Hoc Networks (VANETs)”- International Journal of Digital Content Technology and its Applications. Volume 5, Number 2, February 2011.

[3] M. Y. Darus and K. A. Bakar, "A Review of Congestion Control Algorithm for Event-Driven Safety Messages in Vehicular Networks," channels, vol. 10, p. 13.

[4] “Ad hoc networks” http://en.m.wikipedia.org/wiki/Wireless_ad_hoc_network.

[5] “Vehicular ad hoc network” http://en.wikipedia.org/wiki/Vehicular_ad-hoc_network

[6] “Network Simulator – NS2” http:// www.isi.edu/nsnam/ns/

[7] Haresh M. Rathod and B.V. Buddhadev “Comparative Study of Congestion Control Techniques for Wireless Sensor Network” International Conference On Current Trends In Technology, Nuicone – 2011

[8] “NS2” http:// en.wikipedia.org/wiki/Ns_ (simulator).

[9] Ghassan M. T. Abdalla, Mosa Ali AbuRgheff and Sidi Mohammed Senouci “Current Trends in Vehicular Ad Hoc Networks” Ubiquitous Computing and Communication Journal-2011