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Preceding Knowledge Based an Efficient Hybrid Routing Framework for VANET

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Abstract: Vehicular Ad-hoc NETwork (VANET) is a wireless communication technology applied to transportation, its main objective is to improve road safety, logistics and information services. However, the efficiency and performance of VANET applications depends primarily on the way in which messages is transmitted between the vehicles, but the major challenge is to find a routing protocol adapted to a highly dynamic environment such as VANET. In this paper an attempt has been made to propose a hybrid routing framework in which communication takes place in both vehicle to vehicle and vehicle to base station paradigms. The proposed framework works on the basis of prior knowledge about routes and traffic information.

Keywords: Vehicular Ad-hoc Network (VANET), Cluster, Cluster Head (CH), vehicle to vehicle, proactive routing and reactive routing.

I. Introduction

The rapid development of wireless communication technologies, may be utilize in vehicles as VANET in order to improve intelligent transport systems by the great benefits that can be derived from this technology with the aim of improve the fluidity of traffic and enhance road safety, this type of network allows communication between vehicles or between vehicles and infrastructure by roadside access points [1]. Thus, a driver on the road could have a reliable and fast access to practical information with a wide range of applications, these applications are designed to enhance road safety, comfort, driving assistance and entertainment. VANET is a form of Mobile Ad-hoc Network (MANET), where nodes are represented by the vehicles, which are characterized by a high mobility, and this causes a highly dynamic topology that changes continuously and very rapidly [2]. Most traditional MANET routing protocols are unsuitable for VANET [3]. Thus, a protocol must necessarily support high mobility. Unlike the MANET nodes, the movement of vehicles is dependent on several parameters such as infrastructure, the laws of traffic and even other vehicles. So based on these road traffic information the wireless transmitter can define the most optimal path to take, to ensure that the packet reaching its destination in the most reliable way [4].

This paper is divided into five sections section I represents introduction about VANET how data transmission takes place in VANET. In section II discuss literature of various existing papers. Section III presents our proposed work and in section IV we discuss results and analysis at last in section V conclusion of per has been discussed.

II. Related Work

In 2011 Chowdhury et al.[5].compared performances of reactive routing protocols named Dynamic Source Routing (DSR), Ad hoc On Demand Distance Vector (AODV) and Ad hoc On Demand Multipath Distance Vector (AOMDV) in VANET using different Mobility Models provided in VanetMobiSim framework. In 2015 Nabil and Haqiq [6] proposed Location-Aided Routing (LAR) for inter-vehicle communications in a highway environment. They improved the stability of paths between sources and destinations. In 2016 Abuashour and Kadoch [7] proposed a Cluster-Based Life-Time Routing (CBLTR) protocol, which aims to increase the route stability and average throughput in two direction segment scenario. In 2016 Mehra et al. [8] proposed a Clustering approach based routing protocol for VANETs. The proposed algorithm was a distributed clustering algorithm together with OLSR Routing protocol In 2016 Mittal et al. [9] proposed a technique to increase the adaptability of the protocol with the changing topology .Since vehicle/node in VANET is fast moving entity, so the route amongst the nodes breaks frequently. In 2016 Houssaini et al. [10] presented an enhancement for the GPRS routing protocol identified as GPRS and Predict.

This improvement was defined by estimating the future position of all participating nodes. In 2017 Lo and Kuo [11] proposed TARCO to improve routing performance in urban vehicular environments. The improvement was achieved by using a cooperative information collection method that provides highly accurate information on road traffic and data network conditions.

III. Proposed Work

Proposed framework, divide the road into different regions called clusters. Each cluster have its own cluster head and this cluster head is selected on the basis of energy level of vehicles. The vehicle having higher energy then t is to be selected for cluster head rest vehicles are used for routing process to sends messages.

A cluster head provides connectivity between vehicles and deliver messages form one vehicle to another vehicle within cluster. In proposed framework clusters are formulated on the basis of vehicles common path towards destination.

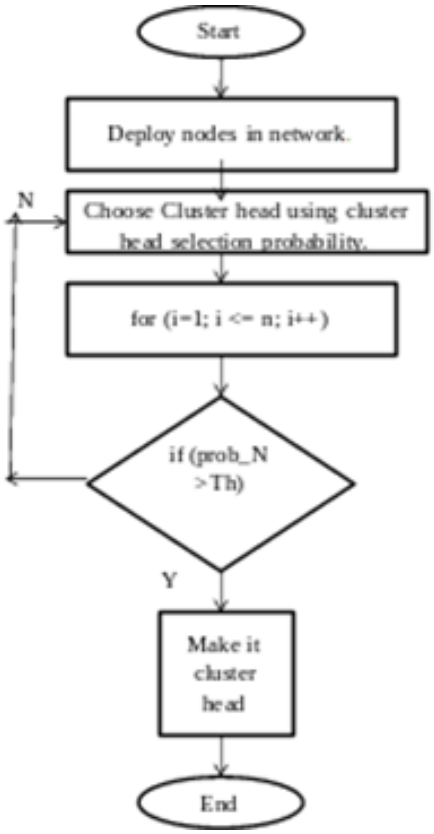

Fig 1 proposed framework

Fig 1 shows that how to select cluster head in VANET. Here we first deploy vehicles in network. Each vehicle has its own energy for data transmission. The vehicle having highest energy then some threshold value then that vehicle will be chooses for as cluster head. A threshold value is fixed in our case it is 5J.

The formula for energy level calculation is: V_Energy probability = Eri = Pi/ri

Eri = Pi/ri depends on the unknown mobile nodes r, i and consequently, is considered as a random variable. Let Eri be an estimate of the remaining battery life Eri = Pi/ri and ui = u(Ti) be the utility of battery power at node i.

IV. Results and Analysis

Tool used: Network Simulator NS-2: NS-2 stands for Network Simulator version 2. NS-2 is a discrete event simulator for networking research. This simulator works at packet level. NS2 is simply an event driven simulation tool that has proved useful in studying the dynamic nature of communication networks.

Performance metrics Used: To analyze proposed mechanism we use performance metrics like throughput and end to end delay.

- Average End to End Delay: Average End to End delay is the average time taken by a data packet to reach from source node to destination node.
- Throughput: Throughput is amount of messages delivered or received in perspective of total messages created in given time.

Table1: Simulation Parameters

Parameters	Values
No of Node	25, 50
Simulation Time	100 sec
Environment Size	1200x1200
Traffic Size	CBR (Constant Bit Rate)
Queue Length	50
Source Node	Node 0
Destination Node	Node 2
Mobility Model	Random Waypoint
Antenna Type	Omni Directional
Connection Type	TDP
Simulator	NS-2.35
Mobility Speed	100,200,300 m/s
Transmission Range (in meters)	200,250,300,350
Operating System	Ubuntu

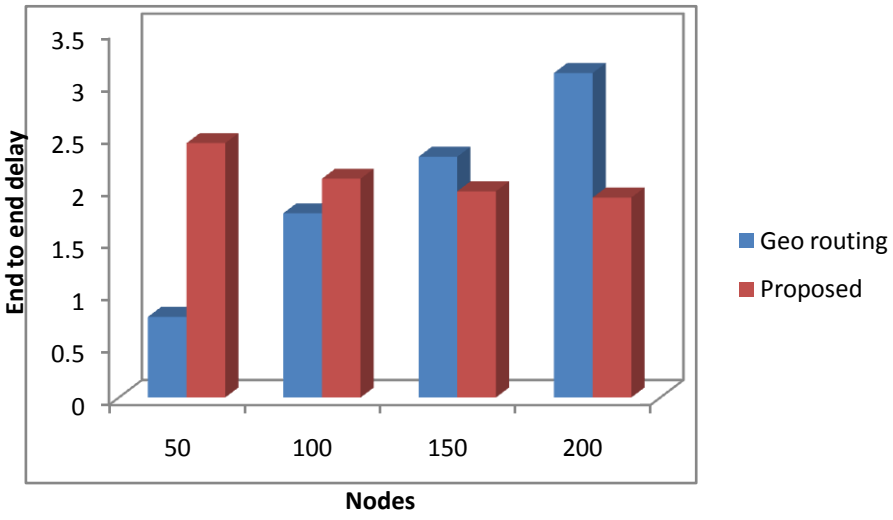

Fig. 2 End to end delay v/s Nodes

Fig. 2 shows end to end delay of existing geographical routing and proposed hybrid routing. To analyze effect of nodes these are varied from 50 to 200. Initially end to end delay is slightly higher in proposed work but when nodes are increase then delay decrease. In proposed work end to end delay is lower than existing routing.

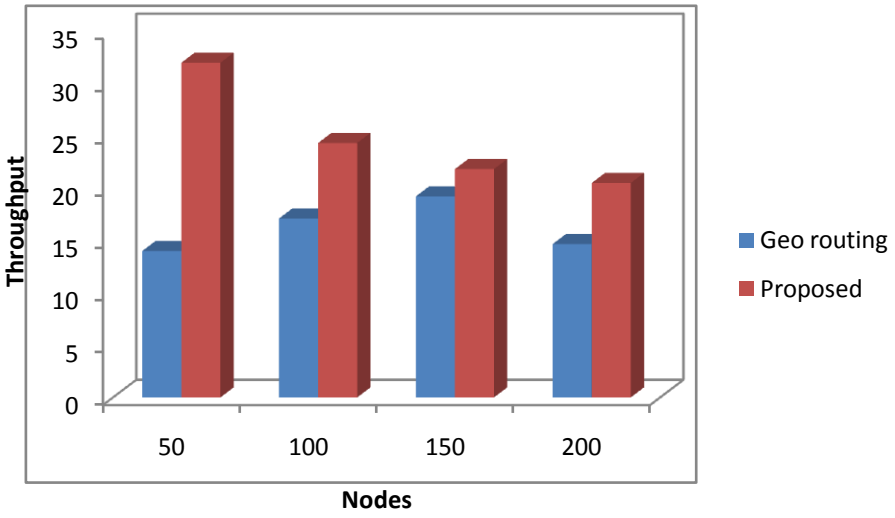

Fig. 3 End to end delay v/s Nodes

Fig.3 shows throughput of existing geographical routing and proposed hybrid routing. In proposed routing throughput is high as compare to existing geographical routing protocol.

V. Conclusion

VANETs are gaining popularity day by day in the research field for its ability to provide connectivity in challenging network environments such as in urban areas in which opportunistic meetings between cars and buses can be used to transfer messages from disconnected area of the network to connected area of network. To perform data transmission concept of proactive routing and reactive routing has been used but these routing protocols are not sufficient when vehicle mobility is high. To handle this kind of problem in this paper a hybrid routing framework has been presented. Results shows that proposed framework is Efficient and Hybrid perform best throughput and less end to end delay, it alsoperform well in case of increases distance among vehicles. In future the proposed framework may be enhance to get more efficient results, future researchers may also try to apply proposed concept in different application areas of VANET.

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