



## Study of Manhattan Mobility Model and DSR, OLSR and ZRP Routing Protocols of VANET

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**Abstract**— Vehicular ad-hoc network is a special class of wireless ad-hoc network that provide the communication among vehicles that are moving on road. There are large numbers of accident are increasing on the road so that VANET play a vital role to prevent the accident by sharing the information among vehicles. VANET is the major component of the ITS (Intelligent Transportation System) that provide the application to improve the road safety and travel comfort routing protocol is working as a head of (or as backbone) of the VANET because all the information sharing is done by the Routing protocol. In this paper, we are describing the three VANET Routing Protocol that are: DSR as reactive, OLSR as proactive and ZRP as hybrid routing protocol and the Manhattan Grid Mobility Model. This mobility model is used for generating the scenario among the same purpose but the internal mechanism and the performance of these protocols is different. This mobility model is used for generating the street scenario.

**Keywords**— VANET, MANET, OLSR, DSR, ZRP, ITS.

### I. INTRODUCTION

Vehicular Ad-hoc network provide many improvements in terms of accident avoidance, better utilization of roads, traffic management and resources such as time and fuel, and new opportunities for entertainment applications. It provide the two types of communication: First is the vehicle to vehicle communication and the Second is the Vehicles to Roadside unit communication. In which vehicles send and receive the data from Road Side Unit (RSU) that is fixed along the side of road. VANET stands for vehicular ad hoc network. In the VANET vehicles are taken as nodes that are connected to each other in the form of a wireless network called “vehicular ad hoc network”. For transferring the between vehicles the CBR and TCP are the traffic agent is used. Vehicular ad hoc network is the major part of the intelligent transport system. VANET have two types of communication 1) Vehicle to Vehicle (V2V) 2) Vehicle to Infrastructure (V2I) that is road side unit. Vehicle to Vehicle communication uses multi-hop or multi cast technique and it use two type of broadcasting first is naive broadcasting in which vehicle send broadcast message periodically and at regular interval upon receipt of the message, the vehicle ignores e the message if it has come from a vehicle behind. If the message comes from a vehicle in front, the receiving vehicles send it own broadcast message to vehicle behind it. Limitation of this broadcasting is that large numbers of broadcast message are generated. So message collision risk. Second, Intelligent broadcasting remove this message collision risk. By taking an example we can easily understand, if a car spot a dangerous road situation such as black ice, it transmit the information to car behind it, that might be heading in the direction of danger. Routing protocols are used to provide the communication by routing the data among vehicles. In the VANET vehicles (nodes) itself taken as routers. Firstly systems that will integrate this technology are police and fire vehicles to communicate with each other. The roadway system effect the life of every person .so for saving the accident and for traffic management the vanet is important in the Intelligent Transportation System(ITS).

VANET is a subgroup of the MANET (Mobile ad hoc network). Being a subgroup of MANET VANET has some characteristics like MANET. Nodes of both the network are moveable so that both are mobile network , both does not have any infrastructure and both use the nodes as a network router for routing the data among nodes or for providing communication among vehicles by forwarding the data packet. But there are some characteristics which differentiate VANET from MANET. 1) VANET, topology is very dynamically changed as compare to MANET because vehicles speeds are high so they change the location very frequently.2) MANET nodes can be moved randomly but the VANET nodes can move on a desired fashion such as roads and highway. 3)



Figure 1 Vehicular Ad-hoc Network

MANET use the GPS (Global Positioning System) to determine the position of node but the VANET use the AGPS (Assisted Global Positioning System) or DGPS (Differential Global Positioning System). In MANET, low storage space, low battery and processing power but these are not in VANET.

## II. ROUTING PROTOCOL

### Dynamic Source Routing (DSR)

#### Reactive protocol:-

It is also called the on demand routing protocol it means route is established when the sender want to sent data packet from source to destination. It does not have any predefined route.

#### Multi-hop routing:-

It is the multi-hop routing protocol it means if one node (sender) is connected with five nodes then it will send the request to all the connected nodes it is one hop and if it will not get the destination these all nodes transmit the message to another nodes .or n multi-hop wireless networks, communication between two end nodes is carried out through a number of intermediate nodes whose function is to relay information from one point to another. So we can say that it is multi-hop protocol.

#### Source demanding routing protocol:-

DSR is the source demanding routing protocol it means source node send the route request message to destination and destination node reply the message. In this algorithm packet carries the complete path from the source node to the destination node.

#### Has two phases

- 1 Route discovery phase
- 2 Route maintenance phase

In the route discovery phase it will discover the route from source to destination and the route maintenance phase maintain all the routes from source to destination. If any route is breakdown then no need to rediscovery of the route.

### Optimized Link State Routing Protocol(OLSR)

OLSR stands for optimized link state routing protocol. It is Developed by INRIA (France).

#### Proactive protocol:-

The proactive protocol is also known as table driven routing protocol. These protocols discover the path, in advance, for all source-pair destinations periodically exchange routing information to maintain paths. If any change occur in the path table is updated regularly. Being a table-driven protocol, OLSR operation mainly consists of updating and maintaining information in a variety of tables. The data in these tables is based on received control traffic, and control traffic is generated based on information retrieved from these tables. The route calculation itself is also driven by the tables.

#### OLSR defines three basic types of control messages:

**HELLO** - HELLO messages are transmitted to all neighbours. These messages are used for neighbour sensing and MPR calculation.

**TC** - Topology Control messages are the link state signalling done by OLSR. This messaging is optimized in several ways using MPRs.

**MID** - Multiple Interface Declaration messages are transmitted by nodes running OLSR on more than one interface. These messages list all IP addresses used by a node.

Utilizes a technique to reduce message flooding

#### MultiPoint Relaying (MPR) :

Reduce the number of duplicate retransmissions while forwarding a broadcast packet. Restricts the set of nodes retransmitting a packet from all nodes(regular flooding) to a subset of all nodes.

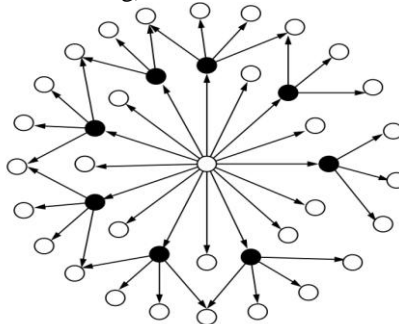


Figure 2 MPR

### Zone Routing Protocol (ZRP):

ZRP stands for the Zone Routing Protocol. It is invented by Zygmunt Haas of Cornell University.

#### Hybrid routing protocol:-

ZRP combines proactive and reactive approaches. It have property of both protocols reactive and proactive.

**ZRP Concept:**

It is based on the concept of zone which is defined as a set of nodes. In this protocol the network is divided into different zone. The zone radius is always fixed. It finds loop free routes to the destination.

**This routing protocol is divided into two part:**

**Intrazone routing protocol:**

If the source and destination node are in the same zone then it is known as Intrazone routing. This strategy is similar to the proactive protocol or we can also say that Proactively maintain routes to all nodes within the source node's own zone.

**Interzone routing protocol:**

If the source and destination node are in the different zone then it is known as Interzone routing. This strategy is similar to the reactive protocol or Use an on-demand protocol (similar to DSR or AODV) to determine routes to outside zone.

ZRP routing protocol is shown in figure 3

**III. MOBILITY MODEL**

The mobility Models are the key criteria that influence the performance characteristics of the mobile Ad-hoc networks. It is designed to mimic the movement pattern of mobile nodes, and how their location, velocity and acceleration change over time. Since mobility patterns may play a significant role in determining the protocol performance, it is necessary to choose the proper underlying mobility model[15].

The most important issue to take into account while creating a simulation environment in VANETs is to correctly model how vehicles move. One key component of VANET simulations is the mobility pattern of vehicles, also called the mobility model. Mobility models are used to determine the location of nodes in the topology at any given instant, which strongly affects network connectivity and throughput.

Manhattan model was introduced to emulate the movement pattern of mobile node on street defined by maps. It can be useful in modeling movement in an urban area where a pervasive computing service between portable device is provided. The map is composed of a no of horizontal and vertical street. Each street has two lanes for each direction (north and south direction for vertical street, east and west for horizontal street). The mobile node is allowed to move along the grid of horizontal and vertical street on the map. At an intersection of a horizontal and a vertical street, the mobile node can turn left right or go straight. this choice is probabilistic the probability of moving on the same street is 0.5 the probability of turning left is 0.25 and the probability of turning right is 0.25.

However it differs from the freeway model in giving a node some freedom to change its direction. the Manhattan mobility model is also expected to have high spatial dependence and high temporal dependence.

There are various mobility model. The mobility model guide driver of the vehicle in taking the right path.

Also provide the safety and comfort one such mobility model use. Grid road topology. this mobility model was merely proposed in urban area where the street are in an organised manner.

Manhattan Mobility Model shown in figure 4

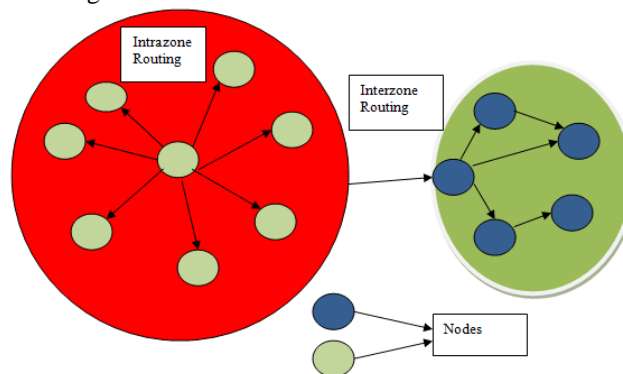


Figure 3 ZRP Routing Protocol

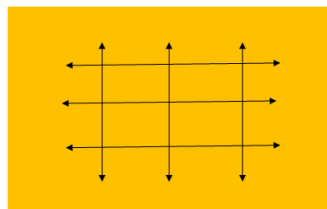


Figure 4(Manhattan Mobility Model)

**IV. CONCLUSIONS**

In this paper we have presented basically a theory of routing protocols and the mobility model for VANET. Routing protocol is one of the most part for VANET. It work as a backbone of the vehicular ad-hoc network. The Mobility models Represent the movement of node and how their location, velocity and acceleration change over time. mobility models are used to create a realistic simulation environment we have discussed the difference between FANET and other ad hoc network.

## V. FUTURE SCOPE

In this paper , we have studied some routing protocol for vehicular ad-hoc network .As future work we want to compare all these mobility model using one mobility model and choose which one is best for VANET

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