

# A Survey on Routing Protocols in VANET with Efficient Multicasting AODV Route Discovery

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*Abstract-VANET is a Promising technology to improve the efficiency of inter vehicle Communications, for improving efficient road side Communication and safety between the vehicles, alerting vehicles by messages ,sharing between the vehicles, alerting vehicles by messages ,sharing the information and entertainments. Thus the vehicular Adhoc network (VANET) is a subclass of the mobile adhoc network (MANET) which is the emerging technology in intelligent transport system. The important factor for improving efficient communication is routing protocol in VANET. In this paper we will approach AODV protocol for better performance. The main aim of the paper is to propose a new protocol and algorithm for efficient message sharing by comparing the existing protocols and algorithm of VANET.*

**Keywords-** Routing Protocol, VANET, MANET, Intelligent Transport System

## I. INTRODUCTION

Routing Strategy can be affected by various network characteristics. There are some existing protocols in VANET can be categorized generally. Topological based routing makes use of forwarding packet by means of global path information and link information. Another type of routing named as Position based routing requires details about physical locations of the node. In general routing protocol determines the approach of two communication entities exchange information. It find outs the route and take the action for failure route. In this section to introduce unicast routing protocols in VANETs to transmit data from single source entity to a single destination entity with none duplication. Various routing protocols introduced in MANETs have been used for comparison purposes to set distinctive characteristics of VANETs.

## II. LITERATURE SURVEY

MaramBaniYounesat[1] proposed intelligent path recommendation protocol(ICOD) to determine suitable path towards every destination in grid based layout area.It can be ability to handling centralized based behavior issues. In

ICOD there are three types of variants can be involved such as congestion avoidance, economical and context free aware Congestion avoidance deals with less congestion path towards the destination. Economical variant deals with optimal economical path, fuel consumption and gas diffusion of each path. Context aware deals with road segment consideration for analyzing the efficient path. For using ICOD protocol and different variants in distributed manner to reduce centralized behavior problem and make the fastest communication between the vehicles. This work can be done by NS2 , it shownas a good performance & suggest the best path with decreases the delay of each vehicles. On Road Side Unit(RSU) path recommendation protocol can be used to find the best path which based on distributed manner. At each road intersection the RSU can be present.This can be ability to handle the problem of congestion.

Sheng-shin Wang,Yi-Shiun Lin at[2] introduced Passive Clustering(PC)mechanism for determining the stable and reliable cluster mechanism for determining the stable and reliable cluster structure on route discovery phase. PC is one of the efficient clustering mechanisms as compared with other traditional clustering mechanism. For constructing the metric such as node degree & expectedlink lifetime can be applied in each candidate nodes. These nodes self determinesits own priority & proposed multi metric election mechanisms based on metric selection .It is used to increases the ratio of route discovery and also selected nodes to create cluster structure. By using the cluster structure to improve the ratio of packet delivery and achieving higher throughput. To enhance the routing performance in VANETs by using reliable & stable cluster structure. By using route metrics, node degree expected link lifetime to design an efficient structure for reliable & stable routing.

James BernsenD.Manivannanat[3] based on reliable Inter-vehicular Routing(RIVER) protocol for VANETs. This protocol represents undirected graph in which surrounding street layout pointing vertices of a graph are in street curve. At every street edge can be assigned reliability rating by

using passive mechanism. By passing control messages to each node to identify neighbouring nodes & dependability information can be shared among all the nodes. Every edge can be communicated by means of known edge list. This known edge list consists of list of identified edges with their end point geolocations. The geolocations knowns list of anchor points related to every RIVER routing packet. For this list any two successive route anchor points denotes an edge within the street graph of sender nodes & has also related to edge weight in it.

Jung –Shian Li at[4] proposed an application layer forwarding protocol such as Intelligent Adjustment Forwarding (IAF) which enables segment-to-segment transmission policy to improve the performance of data delivery. This kind of protocol used to find a reliable end-to-end path in vehicular adhoc network and also to reduce frequently occurred transmission failures. Bundle Protocol (BP) is an experimental Delay Tolerant Network (DTN) protocol designed for unstable communication networks. By comparing the routing performance of BP protocol with that of IAF and an existing VANET approach BP protocol causes several web services to fail hence use the communication protocol transmission which utilizes an end-to-end transmission. Hence the application layer protocol designated as Intelligent Adjustment Forwarding (IAF) algorithm performing route discovery process in intelligent manner to determine a path towards destination.

Antonio-Fonseca, TeresVazoo at[5] based on position-based routing protocol to handle node position variation on VANETs. Pseudo-code position based routing protocol related on various perspectives. Geographic Source Routing (GSR) chooses destination path by using shortest path algorithm which includes GPS map information. The Anchor-based street Traffic Aware Routing (A-STAR) based on full path identification to forward data towards the destination. The Greedy Perimeter Co-ordinator Routing (GPCR) gives the solution for troubles occurred in junction. Greedy Perimeter Stateless Routing (GPSR) not able to calculate any link or path.

Samira Harabiaat[6] proposed multi-agent system approach to handle the stability problem occurred in route, less delivery ratio, large transmission delay and enhance the performance of VANETs. Routing information distribution can be done by routing management system for every node. The proposed agent technology suggested collecting context

information that can be used for optimized communication and to decreasing traffic network & select the optimal routes. Position based routing protocols provide various classes of routing algorithm. Topology based routing protocols perform packet forwarding with help of link information exists.

Yong Xiang at[7] introduces geographic stateless VANET routing combined digital map & location of the node to overcome (GEOSVR) the problem of local maximum and sparse connectivity. This algorithm also used to solve the unreliable wireless channel issues. Local maximum and sparse connectivity problem can be solved by optimal path forwarding algorithm and reduction of packet loss caused by unreliable wireless channel that can be solved by restricted forwarding algorithm. GEOSVR algorithm used to obtain high packet delivery ratio. Hence optimal forwarding path algorithm and restricted forwarding algorithm are two main routing algorithm used in GEOSVR.

### III. INTELLIGENT TRANSPORTATION SYSTEM (ITS)

Intelligent Transportation Systems are one of the emerging technology used in VANET for vehicle-to-vehicle and vehicle to infrastructure communication based on adhoc networks to be formed. Radio interface can be fixed on vehicles and Roadside unit (RSUs) for communication purposes. The location of receiver side can be predicted by means of Global Positioning System (GPS) provided by ITS. Backbone network can be communicated with RSUs by using some protocols. Some of the roadside units present at intersections only and remaining require road side units only at borders of the region. By using some communication protocols and global Positioning System (GPS) information can be exchanged in accurate manner among inter vehicles, vehicle to roadside and routing based communication.

### IV. STRUCTURE OF THE VEHICULAR NETWORK

Vehicular Network is one of the emerging technology which enables effective road side communication among the vehicles, road traffic alerting by messages, sharing information from vehicle to vehicle and provide infrastructure based safety information. Vehicular network can be formed by 3 ways.

Vehicle - to-Vehicle communication: This type of V2V VANET can be done without using any infrastructure mode.

Sensors fixed on vehicles collect valuable data and shared with other vehicles.

Vehicle to-Roadside( vehicle-to-Infrastructure)communication :This type of V2I communication uses cellular gateways and WLAN access points to connect to the internet with higher data rates.

Routing based Communication: Routing based communications can be configured by multi-hop unicast where a message is propagated in a multihop fashion until vehicle carrying desired data is reached.

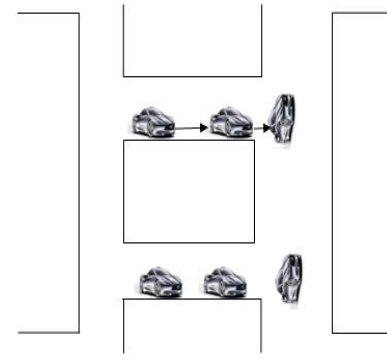


Fig.1 Unicasting

## V. FEATURES OF VANET

It is similar to MANET by means of self-organization ,low bandwidth shared radio transmission. However VANET has unique features over MANETS such as higher transmission power and high storage capacity ,higher computational capability and predictable mobility. Vehicles in VANETs can be operated by high capability of communication than MANETs. Node movement can be easily monitored and predicted by VANET based on current velocity and road path.

## VI. VANET ROUTING PROTOCOLS

Vehicular adhoc network provide effective communication for Vehicle to Vehicle and Vehicle to roadside to increase road safety mechanisms for drivers and also to provide comfortable environment. In general routing protocol specifies how routers communicate with each other, distributing information that enables them to select routes between any two nodes on a network. In VANET routing protocols are used for determining the route from source vehicles to destination vehicles using forwarding methods, route can be maintained between the vehicles and recovery mechanism of route if the network becomes failed. VANET routing protocols are classified into following types: unicast routing ,multicast routing ,geocast routing and broadcast routing. These type of protocols are used to increase the throughput and to reduce routing overhead packets. Unicast routing protocols are categorized into topology based and position based routing.

### A. UNICAST ROUTING PROTOCOL

The main goal of this protocol is used to transmit information from a single source to a single target location through wireless multi-hop transmission techniques and also include carry and forwarding techniques. The carry and forwarding mechanism provides delivery delay time cost is normally longer than wireless multi-hop transmission.

### *Topology based Routing Protocols*

This protocol is used to perform packet forwarding and routing operation by means of path information stored in routing tables .This protocol can be divided into two types such as proactive(table-driven) and reactive(on-demand) protocols.

#### *1. Proactive(table-driven) Protocols*

This type of table driven protocols mainly depends on shortest path algorithm. It uses routing table which contains the route information about all the vehicles. This routing table information can be distributed with their neighbor vehicles and all this vehicle(node) update their table whenever the network topology changes. Due to periodic broadcasting of message it increases network overhead and also control packets used in proactive protocols are constantly flood the messages among the nodes even when the path can be never used. The most generally used proactive protocols are OLSR,DSDV,FSR.

#### *a) Optimized Link state Routing Protocol(OLSR)*

It is a link- state based routing protocol in which optimal route can be established and stored in every node of routing table. By means of multipoint relay OLSR improve the concept of transmission of control messages inorder to save bandwidth. OLSR works under the dynamic topology in which low latency is achieved during transmission. It process hop-by-hop routing logic.

#### *b) Destination Sequenced Distance Vector(DSDV)*

It maintains the route to all destinations before necessity of the path. The frequent updation of routing table causes loop free routing and lower latency to find the route. The entries of

routing table consists of next hop, destination node and cost metric. DSDV generates huge volume of control traffic with help of periodic updates which produces excessive amount of bandwidth.

**c) Fisheye State Routing (FSR)**

This kind of proactive link- state routing protocols maintain the complete topology map at every node. In this periodic exchange of topology table is done within local neighbors only. In FSR every node holds next hop routing table, neighbor list, topology table and distance table. By interchanging phases of routing table used to reduce the size of the routing update message.

**2. Reactive (On-Demand) Protocols**

It is also known as source initiated or on demand protocols. It determines the routes whenever the source only desires. It is mainly used to reducing the network overhead because it start establishes the route whenever the node want to communicate with any other node. This type of protocol have no periodic updates because of reduced route overhead problem. The different types of reactive routing protocols are DSR and AODV

**a) Ad Hoc On- Demand Distance Vector (AODV)**

It works upon distance vector routing protocol mechanism. This is based on On-Demand routing protocols whenever the node needs to send packet the route can be established and maintained until either the destination node became unreachable and if the route is no needed longer. AODV protocols process communication hop-by-hop in which routes are based on dynamic routing table entries. Every routing node maintains two counters (ie) broadcast ID and node sequence number. This type of protocols contains three control message in communication. Route request (RREQ) for requesting a route from source to target, Route Reply (RREP) for replying back to source node along with details of the route. Route error (RERR) packet messages for establishing connection between source to destination. This type of protocols used for large scale Ad Hoc networks. It provides loop- free and to avoid count-to-infinity problem.

Source IP address	Source Sequence Number	Destination IP address	Destination Sequence Number	Broadcast ID
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**AODV RREQ fields for route discovery**

**b) Dynamic Source Routing (DSR)**

It follows the principle of source routing in which path followed by the data packets were included in the packet header from source to destination node. It provide reliable packet delivery even if there is changes in topology. It provides two types of route discovery phase and route maintenance phase. Route discovery phase is used to determine routes On-Demand whenever a source node wanted to deliver a packet to target vehicle node. Route maintenance phase mainly responsible to currently progressed route can be maintained.

**B. MULTICAST AND GEOCAST ROUTING PROTOCOL**

It is one of the important operations in VANETS. Multicast and Geocast protocols in VANETS recently investigated to produce some results.

**a) Distributed Robust Geocast Multicast Routing Protocol**

This type of proposed protocol can be used for intervehicle communication. By using this protocol the packets are delivered to the vehicles which are located in specific geographic region. Vehicles located in specific region receive the packet otherwise the packet is dropped. In this region the vehicle should receive the geocast messages are called zone of forwarding (ZOF). Forwarding geocast messages to other vehicles in the Zone of relevance (ZOR) to increase the reliability whenever changes in topology.

**b) Multicast Protocol in Ad Hoc Networks Inter-Vehicle Geocast**

Multicast protocol called Inter Vehicle Geocast (IVG) protocol is used to intimate all the vehicles in a highway if there is any accident situation happens. In a multicast group the location, speed and direction of vehicles are temporarily defined. IVG protocol is used to broadcasting periodically to overcome the network fragmentation problem. It is also used to reduce the hops of delivering messages using deferring time to re broadcast.

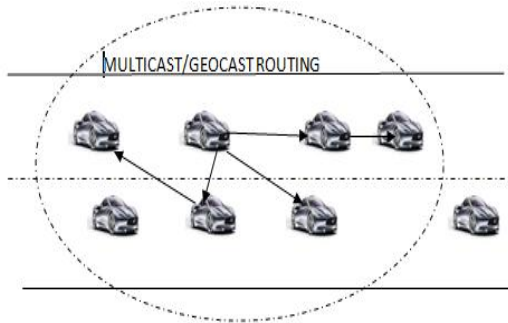


Fig.2 Multicast

***c)Spatio temporary Multicast and Geocast Routing protocol***

The spatio temporary Multicast protocol called as mobicast, that distributes a message to nodes in a delivery zone that evolves over time in some predictable manner. It has the ability to provide reliable and on time message delivery to mobile delivery zones on top of random network topology. Hence this protocol used to deliver the information to all node and particular region of space at particular time period.

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