

# Routing Protocols in Vanet A Brief Review

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**Abstract** - Vehicular Adhoc Networks, or VANETs, are the decentralized and self-configuring type of network, in which, vehicle nodes can join or leave the network as and when they want. In this network, vehicle to vehicle and vehicle to infrastructure type of communication is possible. The VANET is a sub form of Mobile Ad-Hoc Network or MANET. The primary purpose of VANETs is to improve public protection and save lives. As of now, various routing protocols have been designed by researchers after considering the primary challenges involved in VANETs. This paper provides a brief survey of routing protocols for VANETs.

**Key Words:** VANET, Characteristics, and Routing protocols.

## 1. INTRODUCTION

In order to review the ad-hoc networks that are a communication technology for vehicle-specific applications in intelligent transportation systems (ITS), numerous researches are projected recently. There are various applications of ITSs which are associated with vehicle transportation. They encompass numerous parts such as computers, communications, sensors, and management techniques and management techniques. The functioning of transportation systems is enhanced by the operation of these parts all at once. The protection and potency of the bottom transportation networks are increased with the assistance of real-time data gathered from these Systems [1]. The warnings associated with environmental hazards, and traffic and road Conditions may be delivered by the vehicles with the assistance of VANETs. The information associated with an issue like road closure, accident, and tie up etc., is transferred by the vehicles to alternative vehicles so the motive force will avoid such routes and prevent additional troubles. The vehicles will distribute the data or warnings to all alternative vehicles through communication. Thus, data propagation is extremely vital in VANET environment. Routing plays a spirited role in data propagation the main objective of routing protocols is to acquire minimum communication time when the amounts of used network resources are minimal. In this paper, we have discussed the characteristics of VANET, various existing routing protocols.

## 2. CHARACTERISTICS

**2.1 Massive network:** a large amount of vehicles is high within the large-scale network that is understood as VANETs [2]. The registration of every type of vehicle

within the network is feasible even within the presence of a huge Number of nodes.

**2.2 Traffic monitoring:** it's attainable to alter the laws of traffic and therefore the speed limits, quality of vehicles, on the premise of the configuration of roads. The mobility of vehicles, chiefly affected because of the behavior and therefore the interaction amongst the drivers [3]. It's terribly troublesome to simulate the traffic due to that it's wide employed in numerous applications.

**2.3 Resources:** within the VANETs sizable amount of resources are accessed by the vehicles as compared to MANETs that's gift among the mobile devices. A large number of batteries, antennas and process power is needed because of which it's not necessary to possess resource conservation mechanisms among these networks.

**2.4 Extremely dynamic topology:** The dynamic topology of VANETs is outlined as the availability of selections of the multiple ways in conjunction with the high speed of the vehicles.

**2.5 Frequent disconnected networks:** The dynamic topology is outlined by the high speed of the vehicles and conjointly necessitates the frequent needs of the wayside unit's lack of which ends frequent disconnections.

**2.6 Modeling quality and prediction:** it's terribly troublesome to predict the vehicle position and their movements. In VANETs, this feature of quality modeling and prediction relies on the roadmap models that are predefined. For the efficient network style, the speed of the vehicles is incredibly necessary.

**2.7 Communication Environment:** numerous totally different options are a gift within the mobility model on the premise of road design, highways, or city Environments, thus solely having a quality model isn't enough [4]. Hence, it is necessary to require care, communication in these things.

**2.8 Exhausting delay constraints:** The delivery of messages on time throughout emergency is a major downside. Therefore, handling such things is more critical rather than looking at the high information rates.

**2.9 Interaction with a board sensor:** Sensors are the mode of communications as they'll scan information associated with the Speed of the vehicle, direction and may communicate to the Information Centre. Therefore, for the link formation and in routing protocols sensors have been used.

### 3. CATEGORIES OF ROUTING PROTOCOL

Routing protocols are broadly classified into Position based routing Topology based routing, Geo cast routing, broadcast routing and Cluster based routing

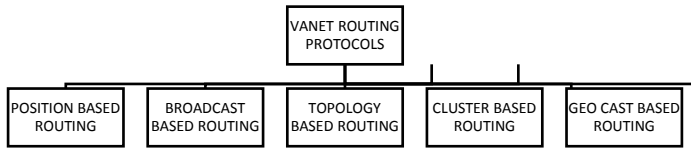


Fig -1: Classification of Vanet Routing Protocols

#### 3.1 Position based Routing

Position primarily based routing protocol has been utilized in the vicinity functions as it determines the exact location of the source node, neighbor node, and the destination node. All the statistics about the nodes such as role is maintained by the use of GPS and it has additionally decided the specific coordinates of the nodes

in all directions, which lead to route discovery mechanism [5]. When a packet is transferred through the source node, it obtained all the facts about the region coordinates (x, y) of the destination. In this routing protocol, it is no longer indispensable to update the routing table, establish or keep the route. Location tracking has been utilized by way of this protocol in order to operate all its recreation and some form of forwarding strategy for the implementation of forwarding the packets with the aid of the supply node.

#### 3.2 Broadcast based routing

The broadcast routing protocol is also acknowledged as flooding-based routing protocol that has been utilized in VANET for sharing data among automobiles such as when an accident or a tournament occurs, then it transmits the records to all nodes [6]. An essential function is performed with the aid of the broadcast routing protocol in emergency situations when the messages must deliver shortly and in an environment-friendly manner in nearly all safety applications. The broadcast routing protocol has a principal drawback such as the hidden node hassle and the excessive possibility of collision in the messages. With the help of broadcasting protocols, messages have been transferred to vehicles within the communication vary and it also switches the messages to all the automobiles in the network. Subparts of broadcasting protocols are BROADCAST and DV-CAST.

#### 3.3 Topology based routing protocol

In order to send data packets from source to destination, it is indispensable to have links information on topology based on the routing protocol. With the assist of hyperlink information, packet forwarding is performed within the network. Topology-based routing protocols are divided into two categories such as proactive and reactive routing.

Proactive routing is also known as the table-driven method and reactive routing protocol are known as the on-demand method.

#### 3.4 Proactive routing

The proactive routing is described as the protocol in which a routing table is maintained via every node which includes the statistics about every other node in the network whether statistics is currently in it or not. Proactive routing is also acknowledged for the routing information, such as renovation of next forwarding hop irrespective of

Communication requests [7]. There is no route discovery in the proactive routing protocol due to the fact that the destination route is stored in the background which is viewed as its advantage. The drawback of this protocol is that it presents low latency for real time application. Proactive routing protocols have quite number types such as FSR, DSDV, OLSR, CGSR, WRP, and TBRPF.

#### 3.5 Reactive routing

The proactive routing is described as the protocol in which a routing table is maintained via every node which includes the statistics about every other node in the network whether statistics is currently in it or not. Proactive routing is also acknowledged for the routing information, such as the renovation of the next forwarding hop irrespective of communication requests [7]. There is no route discovery in the proactive routing protocol due to the fact that the destination route is stored in the background which is viewed as its advantage. The drawback of this protocol is that it presents low latency for real-time application. Proactive routing protocols have quite number types such as FSR, DSDV, OLSR, CGSR, WRP, and TBRPF

#### 3.6 Cluster based Routing

A cluster between nodes or vehicles can be set up with the help of cluster-based routing protocol. The cluster is defined as the group of nodes in which a unique cluster-head is existing within each cluster. This cluster is responsible for intra and inter-cluster communication [9]. A direct hyperlink is set up between the nodes in order to communicate inside the cluster and specified cluster-heads are accountable for the inter-cluster communication. Within the cluster, a cluster-head declares the packet to all the nodes in the cluster-based routing which improves the scalability for a large network of nodes. In the VANET, community lengthens and overhead expands for the high mobility feature. The variety of Clusters based totally routing protocols are HCB, CBRDP, CBLR, and CBR.

#### 3.7 Geo Cast Routing Protocols

It is essentially a region, primarily based multicast routing. Its objective is to deliver the packet from the source node to all different nodes within a unique geographical area (Zone of Relevance, ZOR). In Geo cast routing automobiles,

outdoor the ZOR are not alerted to avoid a useless hasty reaction. Geo cast is considered as a multicast provider within a specific geographic region. It commonly defines a

Forwarding region where it directs the flooding of the packets in order to minimize message overhead and network congestion caused by the aid of genuinely flooding packets everywhere. In the vacation spot zone, unicast routing can be used to a head the packet. One pitfall of Geo cast is network partitioning and additionally adverse neighbors which may avert the appropriate forwarding of messages.

#### 4. CONCLUSION

In this paper, we have presented a comprehensive survey of various most significant VANETs protocols, which are designed for vehicle to vehicle or vehicle to infrastructure communication. Due to the decentralized nature of the network, routing can reduce the performance of the network. In order to enhance the performance of the network, we use various routing protocols in VANETs. Hence, we have reviewed and presented various routing protocols used in VANETs and come to the conclusion that the VANET is the solution for efficient and much safer future intelligent transportation system.

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