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A SURVEY ON VEHICULAR ADHOC NETWORKS (VANETS)

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Abstract: - Vehicular ad-hoc networks (VANETs) offer a vast number of operations without any support from established infrastructure. VANET is a special class of MANET which implements communication between vehicles logically via vehicle to vehicle connection or vehicle to roadside communication. Vehicular Ad Hoc Networks (VANET) is a subclass of Mobile ad hoc networks which implements a distinguished arrange for Intelligent Transport System (ITS). Routing in Vehicular Ad hoc Networks is a challenging function due to the unique characteristics of the network such as high mobility of nodes, dynamically changeable topology and highly partitioned network. Survey on routing protocols based on different parameters of VANET is a mandatory issue in vehicle-to- vehicle (V2V) and infrastructure-to- vehicle (IVC) communication. Some of the promises of VANET are intelligent traffic system, early warning signals for vehicles that could minimize road mishaps and arrangement of better in-transit communication. Routing protocols for VANET falls in two sections as topology based routing & situation based routing protocols.

KEYWORDS: Vehicular ad hoc network, Routing, Intelligent Transportation System, ITS, Mobile Ad hoc Network

1. INTRODUCTION

Vehicular ad hoc network is a particular form of MANET which is a vehicle to vehicle & vehicle roadside wireless communication network. New machinery is used to implement more & more addresses to passengers including security applications. In VANET each vehicle acts as a router to change data between nodes in the network. It is arranged for vehicle-to-vehicle (V2V) and infrastructure-to-vehicle (IVC) communication. Vehicular Ad hoc Networks (VANETs) are special kind of Mobile Ad Hoc Networks (MANETs) that are formed between moving vehicles on an as-needed basis. Vehicular ad hoc network is a special form of MANET which is a vehicle to vehicle & vehicle roadside wireless communication network. In VANETs power utilization and storage space are not defined and the location of the nodes can be purposeful by using GPS. When we compare VANET with MANET then VANET comprises following features:

- Dynamic topology
- Mobility models

- Infinite energy supply
- Localization functionality

There are several VANET applications such as Vehicle collision warning, Surveillance distance warning, Driver Support, Coordinated driving, Cooperative journey control, Dissemination of road information, Internet access, Map location, Automated parking, Driverless vehicles. When a computing device could connect to the Internet via two various network technologies then it is automatically associated to the applicable network.

2. CHARACTERISTICS

VANET has some particular characteristics which make it various from MANET as well as requiring for designing VANET functions.

2.1 High dynamic topology:

The topology of VANET difference because of the movement of vehicles at high speed.

2.2 Frequent disconnected network:

From the highly dynamic topology results we monitor that frequent disconnection occur between two vehicles when they are swapping data.

2.3 Mobility modeling:

The mobility pattern of vehicles depends on traffic situation, roads design, the speed of vehicles, driver's driving conduct and so on.

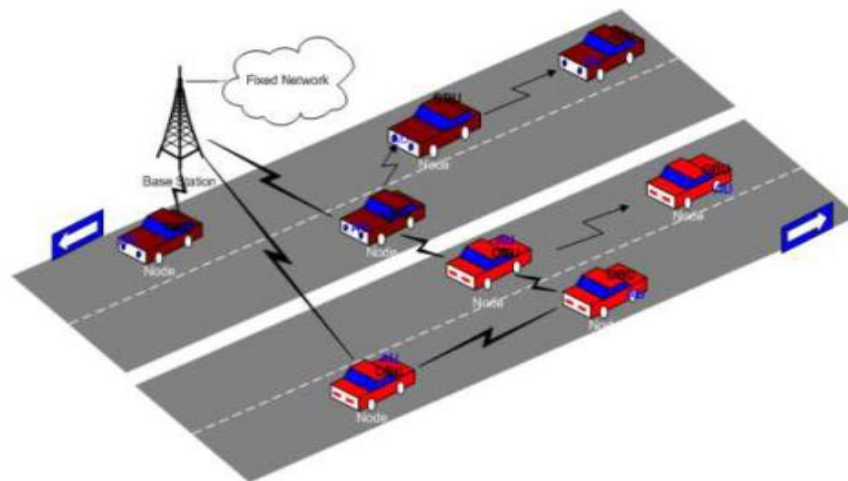


Fig 1 VANET SCENARIO

3. ROUTING PROTOCOLS

Routing is the procedure of electing best ways in a network along which we can send our message. It is the process of sending a message from source to its target the routing protocol of VANET can be restricted into two sections such as Topology based routing protocols & Position based routing protocols.

3.1. ROUTING IN VANET

In VANET, the routing protocols are classified into five Categories which are as

- Topology based,
- Position based
- Broadcast.
- Cluster based,
- Geo cast based

3.1.1 Topology based routing protocols:

For packet promote in topology based routing protocol, links information that exist in the network is used to perform packet forwarding from authority to target.

1. Proactive routing protocols Proactive routing protocols: In this type of routing all the required information for routing is managed in background heedless of communication requests.
2. Active routing protocols it is also known as on demand routing protocol. It only opens the routes when it is required for a node to connect with each other.

3.1.2 Position based routing:

This category of routing consists of a class of routing algorithms. In this protocol the nodes uses the global locating information in order to select the next promoting hops. The packet is sent to the neighbor hop which is closest to terminal.

- (I). **FSR** - Fisheye state routing
- (II). **DSDV** – Destination Sequenced Distance-Vector Routing [9]
- (III). **OLSR** - Optimized Link State Routing Protocol [10]

3.1.3 Broadcast routing:

Broadcast routing is primarily used for security applications such as for distribution weather, traffic, and emergency, road conditions among vehicles & delivering advertisements & announcements. It is better to use in VANET in case of a limited number of nodes. Various broadcast routing protocols are DV-CAST, UMB etc.

1. Traffic based broadcast Routing Protocols:

In traffic based broadcast routing algorithm, a source node broadcasts a packet to its entire neighbor's and each of those neighbor's, in turn, re-broadcast the packet absolutely one time.

2. Distance and Hop based Routing Protocols:

In distance and hop based style, messages are broadcast by considering the neighboring lengths and hop count from the addressing node.

3.1.4 Cluster based routing:

Cluster based routing is approved in case of clusters. In this case the entire geographical area is split into squares. If the vehicle gets a reply from the cluster-head vehicle, the new vehicle would become a representative of the cluster. If not, the new vehicle becomes the cluster head.

- Cluster-Based Directional Routing Protocol
- **TIBCRPH**: Traffic Infrastructure Based Cluster Routing Protocol with Handoff.
- **LORA-CBF** - Location Routing Algorithm with Cluster Based Flooding.
- **COIN** - Clustering for Open IVC Network.

3.1.5 Geo Cast Routing:

It is essentially a location based multicast routing. Its main target is to deliver the packets within a stated geographical region (**Zone of relevance - ZOR**). Geo cast routing is basically a locate based multicast routing.

- **IVG** : Inter-Vehicle Geocast [52]
- **DG-CASTOR** : Direction-based GeoCast Routing Protocol for query dissemination in VANET [53]
- **DRG**: Distributed Robust Geocast.

3.1.6 Infrastructure based protocols:

The subsequent protocols are framework based because they rely on established infrastructure for their routing.

SADV: Is a static node assisted flexible data circulation protocol for vehicular networks.

Roadside-Aided Routing (RAR): Is a framework for efficient routing in vehicular hybrid networks rather than a concrete routing protocol.

4. CONCLUSION

We have investigated the pros and cons of particular routing protocols for inter-vehicle connection in VANET. Routing is a necessary component in vehicle-to-vehicle (V2V) and infrastructure-to-vehicle (I2V) communication. By studying particular routing protocol in VANET we have seen that further work calculation is required to verify performance of a routing protocol with other routing protocols based on different traffic scenarios. Routing is an important component in vehicle-to-vehicle (V2V) and infrastructure-to-vehicle (I2V) communication. This paper considers various routing protocols of VANET. We analyzed a large number of routing protocols that are applicable in the literature and classified them concisely in the form of a taxonomy based on key attributes. The survey it is clear that position based, geocast and cluster based protocols are more dependable for most of the applications in VANET. From the survey it is clear that location based, geocast and cluster based protocols are more stable for most of the applications in VANET.

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