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COMPARATIVE ANALYSIS ON VANET ROUTING PROTOCOLS

N.Meenakshi[1] and K.E. Dharani[2]

[1]Assistant Professor, Hindustan Institute of Technology and Science, chennai, India
[2.]Assistant Professor, Hindustan Institute of Technology and Science, chennai, India

Abstract- *Today's intelligent transport system is possible by the technology of VANET. The VANET is also a mobile Ad hoc network which is the brain of the intelligent transport system technology. The protocols which are existing is not meeting the right traffic scenarios. So, it is necessary for the analysis of the various routing algorithm for the VANET. This paper analysis the pros and cons of the various VANET routing protocols.*

Keywords*: VANET, Ad hoc*

Introduction

The VANET is a special form of MANET that enables the vehicles to communicate with each other in the road side environment. It is self-organizing wireless communication network, where the nodes communicate themselves and share the information among themselves. The architecture of the VANET can be broadly classified in to V2V, V2I. V2V is the vehicle to vehicle architecture where the vehicle act as a server and the client as the data sharing is done among the vehicles in the network. so the data collection and the processing of data are done within the network. In the V2I technology (vehicle to Infrastructure) technology the specific infrastructure is a backbone for the data communication between the vehicles.

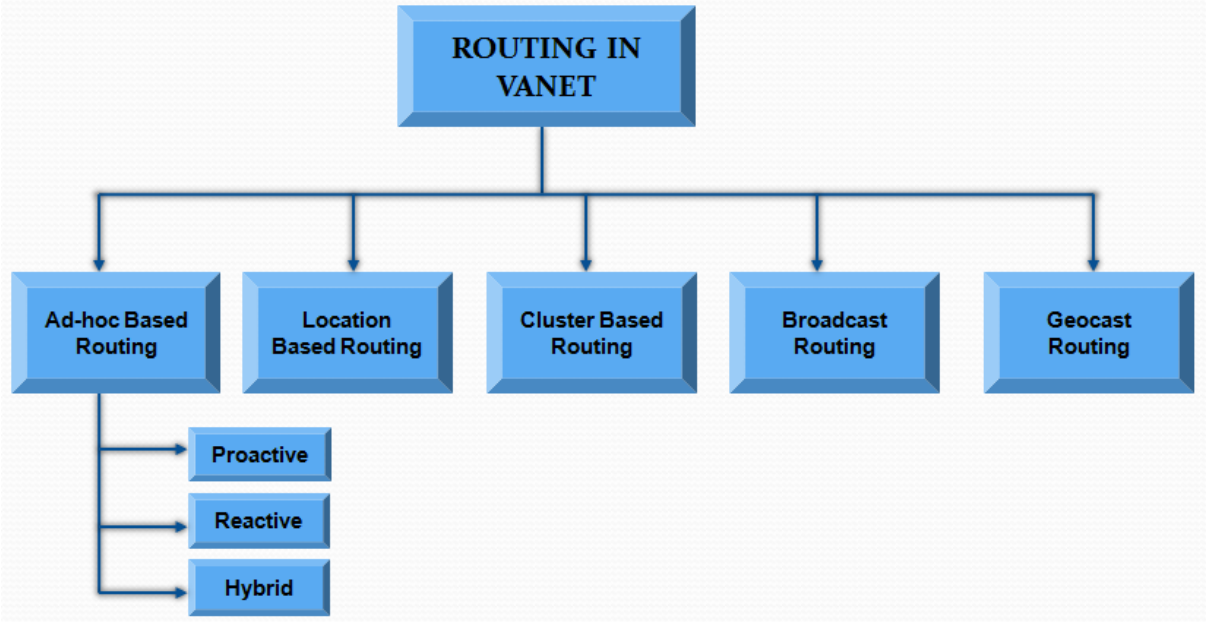

Fig 1: Types of Routing in VANET

Ad-hoc based routing:
Ad hoc routing protocol plays a vital role in the routing of packets between the computing devices in a mobile ad hoc network.In ad hoc network the topology of the network is non- consistent. The nodes are always to be active all the time to listen the broadcasting message of the other nodes. Every node learns about other nearby nodes and inform to the nearby nodes its position. These are now used in the vehicle to vehicle communication.

Table-Driven[Proactive routing] protocol
The proactive routing protocols are the extension of the wired routing protocol. The global topological information is recorded by every node. The data of the table is updated frequently to maintain the accurate network state information. Wireless routing protocol(WRP), destination sequenced distance vector routing protocol(DSDV), Source-tree adaptive routing protocol(STAR) and cluster- head gateway switch routing protocol(CGSR).

DSDV is a protocol where each node maintains a table that contains the shortest distance and the first node on the shortest path to every other node in the network. In the table-driven routing protocol, every node has the detail of detailed

information about the route to all the possible destination. The nodes exchange their table at the regular intervals to keep the network topological information up to date all the time. The table updates are of two types incremental updates and full dumps. The incremental update takes a single network data packet unit all the time and these are used when there is no change in the local topology. The Full dumps takes a multiple network data packet unit it is practiced when there is a meaningful change in the local topology or when an incremental update require more than a single network data packet unit. The table updates are done by the destination node with a new sequence number which is always greater than the previous one.

Wireless Routing Protocol

In wireless routing protocol each node in a network maintains a distance table, a routing table, a Link-cost table and a message retransmission list. For Example. If x is the source node and y be the destination, the routing table of the node X contains the distance of each destination node Y from node x via the neighbor N of X. It also contains the downstream neighbor of N through which this path is realized. The routing table of node x contains the distance of each destination node Y from node X, the predecessor and the successor of node X on this path. The detail of storing the predecessor and the successor in the table is beneficial in detecting loops and avoiding the problems. The Link-Cost table contains the cost of link to each neighbor of the node and the number of timeouts as a no error message was received from that neighbor. with the help of the message retransmission list the node can know which of its neighbor has not acknowledged its update message and has retransmitted the update message to its neighbor.Whenever there is a change in the link the node exchanges the routing table with their neighbors using update messages. The response list nodes are required to acknowledge the receipt of the update message. If there are no changes in the routing table till the last update, the node must send an idle hello message to ensure connectivity. The node will also update the routing table if the new path is better than the existing path. The pros of this algorithm are an it checks the consistency of all its neighbor for the change in the routing.

Global state routing Protocol

The Global state routing protocol (GSR) islike DSDV protocol. In this algorithm, each node maintains their Neighbor list, topology table, and a hopping table and thedistance of the node from the source to destination. Neighbor list of a node contains the list of its neighbors. The distance between the source and the destination is noted in the distance table.

Hierarchical state routing

The technique of hierarchical routing is based on the multilevel clustering and logical partitioning of the nodes. The area is dived in to number of clusters and the cluster-head is elected as in a cluster- based algorithm. In hierarchical routing, the cluster heads organize themselves in to clusters. The nodes of the clusters broadcast the link information to each other. The cluster head summarizes the information and send it to neighbor cluster head via the gateway[2].

Advantages of proactive routing protocol As the route form the source to destination node is available in the routing table, so the route discovery process is not required. The performance of the proactive routing is good compared with the reactive routing protocols. The latency is low in the proactive routing protocol.

Dis advantages of proactive Routing protocols

The required part of the available bandwidth is occupied by unused paths in the network.

On-Demand (Reactive routing) Protocol

The route in the reactive routing gets opened only if there is a necessary for the communication. The currently used routes are only maintained for communication to reduce the burden of the network. The several types of reactive routing protocols are

Reactive routing opens the route only when it is necessary for a node to communicate with each other. It maintains only the routes that are currently in use, as a result it reduces the burden in the network. Reactive routing consists of route discovery phase in which the query packets are flooded into the network for the path search and this phase completes when route is found. The several types of reactive routing protocols are AODV, PGB, DSR and TORA.

Ad Hoc on demand distance vector(AODV) is a protocol works on the demand basis when the nodes require within the network. Initially the source sends the route request message which is propagated through the neighbors of the node within the same network until it reaches the destination. A route reply message is unicasted back to the sender if the receiver to the sender's route is a valid one. This protocol has the capability of both the unicasting and broadcasting.

Preferred Group Broadcasting

PGB-Preferred Group Broadcasting PGB is a broadcasting mechanism which aims to reduce broadcast overhead associated with AODV's route discovery. Receivers can determine whether they are in the preferred group and which one in the group to received signal of the broadcast [4].

Position based Routing
This position-based routing protocols have the class of routing algorithm. The next hop of the node is decided by the property of the geographic position. The position-based routing is beneficial since the route for the nodes are not needed to be maintained.[6]

Greedy Perimeter Coordinator routing(GPCR)
The heuristic method is used to find the nodes located at the intersections and the nodes in the intersected place is designated as the coordinator. The routing decisions are taken care by the coordinator. The two approaches were used to take the coordinator determination. (1) Neighbor table approach and correlation coefficient approach. Neighbor table approach: The nodes periodically transmit the beacon signal which contains their position and the last know position of its neighbors. By considering these the node can judge its position and decide whether they are in the intersection point.(2) Correlation co-efficient Approach: Here the node uses its position information and the position information of its neighbor to find the correlation coefficient., p.

Area	Proactive Protocols	Reactive Protocols
Network organization	Hierarchical/Flat	Flat
Topology Dissemination	Periodical	On-Demand
Route Latency	Always available	Available when needed
Mobility Handling	Periodical updates	Route Maintenance
Commutation Overhead	High	Low

Table 1: Comparison of Proactive and reactive routing Protocols

The main disadvantage of the reactive routing protocol is that the delay will be high in finding the route due to that the excessive data flooding in the network leads to the network clogging.

Hybrid both(Proactive and Reactive routing)
These types of protocols combine the positiveness of the proactive and reactive routing. The routing is done initially with the proactive routes and then the demand is done through the reactive protocol.

Conclusion

In this section we have reviewed the existing routing protocols. The several types of proactive and reactive routing protocols are discussed with the pros and cons of theseprotocols. Even there are many existing protocols for the efficient routing in vehicle ad hoc network communication there is a still vacuum in delivering the datain right time. The efficient routing protocol which routes the data in shortest path is needed. The protocol is also required for the efficient routing table update in a fleeting time span.

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