A Survey on VANET'S

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Abstract— VANET is the sub category of MANET which has high mobility, self organized and dynamic in nature which is used to provide communication between vehicle to vehicle and vehicle to roadside. Routing is the backbone of VANETS. So it is necessary to study about the routing protocols so that problems shouldbe solved to increase the efficiency. This paper discussed the charaterstics application and routing protocols of VANET.

Keywords— Vehicular Ad-hoc Network(VANET), Mobile Ad-hoc networks(MANET).

I.   INTRODUCTION

Vehicular adhoc network is a special category of mobile adhoc-Network which is used to improve the road safety by providing information about Traffic- jams, Road-Blockage and efficient path which decrease the time traveler. VANET differs from MANET in terms of following characteristics that are high mobility, dynamic topology, self-organized architecture, distributed communication, path restrictions and variable topology size .

VANET provide the information between moving vehicles .In VANET, this entire act router to exchange the information. It is of two types vehicle to vehicle and vehicle to road side. Due to new technology it is the key research area of industry and academic.
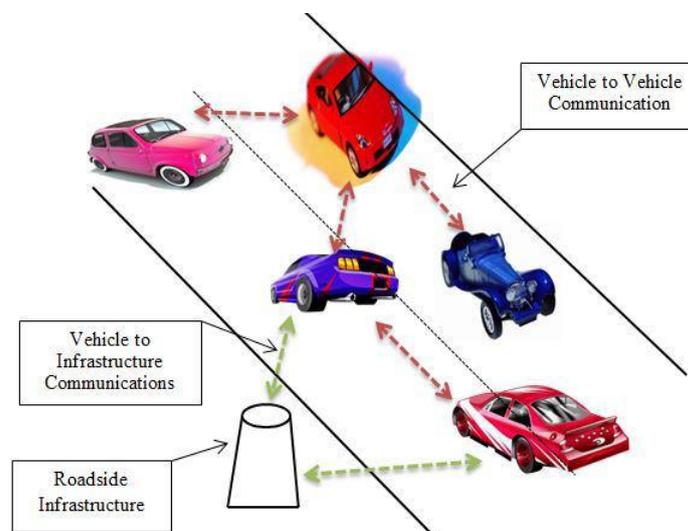

Fig1 VANET architecture [1]

II.   CHARACTERSTICS

A.   High dynamic topology

In VANET, speed of vehicle is very high so topology of network change rapidly due to changing the position of vehicles for example, suppose vehicles are moving at speed of 30 meter per second and range of radio wave between vehicles is 180 meter then link between vehicles will be 6 seconds.

B.   Frequent disconnection in network

While shearing the information topology of network change immediately then disconnection of network occurs very frequently.

C.   Communication environment

Communication area between vehicles is different in sparse network and dense network, as buildings, trees and other objects are not present in sparse network but these all behave as obstacles in dense network.

D. Interaction with on-board sensors

Sensors like GPS device can easily sense the current position and movement of vehicle. This information helps to make efficient decisions about routing and improve communication.

E. Mobility modeling

Mobility patterns of vehicles depend on how much traffic en, behavior of driver, structure of road and speed of vehicles.

III. ROUTING PROTOCOLS

Routing protocols area unit loosely classified as topology-based and position-based routing protocols. In topology-based routing mechanism, we tend to traumatize the network layout/architecture of the nodes specified packet forwarding is feasible exploitation the data that's accessible concerning the nodes and links among the network whereas, location of nodes ought to be best-known in position primarily based routing mechanism for packet forwarding[1].

A. Topology based routing Protocol

These protocols discover the route from supply to destinition and maintain it during a table before the sender starts sending knowledge. they're any divided into Proactive, Reactive and hybrid protocols.

1) *Proactive Routing Protocol:* It is table driven routing protocol that work periodically by exchanging the information of topology among all the nodes of the network. The proactive protocols don't have initial route discovery delay however consumes ton of bandwidth for periodic updates of topology. There area unit many routing protocols that represent this class.

2) *Fisheye state routing:* It's kind of like link state routing protocol . every node maintains a topology table supported the newest info received from neighborhood nodes. It uses completely different exchange amount for various entries in routing table to cut back the dimensions of management messages in giant networks. The disadvantage in FSR routing, is that the size of the routing table will increase with increase in network size. Route discovery might fail if the destination node lies out of scope of supply node. Attributable to high quality in VANET, route to remote destination subsided correct.

3) *Destination Sequenced Distance Vector Routing Protocol:* It supported the gap vector strategy exploitation shortest path algorithmic program, DSDV routing protocol implements one route from supply to destination that has been maintained within the routing table. A routing table is maintained for every node containing info of each accessible node within the network and total variety of hops required to succeed those nodes. The destination node initiates a sequence variety to each entry within the table. Every node maintains the route responsibility by broadcasting their routing table to the neighboring nodes. DSDV protocol doesn't enable cyclic routes, reduces management message overhead and excludes further traffic caused by frequent update. the entire size of routing table is reduced as DSDV keeps alone the most effective potential path to every node rather than multi methods. DSDV isn't able to management the networks congestion that decreases the routing potency.

B. Reactive Protocols

These area unit known as conjointly known as On-demand-Protocols as a result of once sender needed to send the message, then first of all route are discovered from supply to destination by flooding. Any node existing on the route towards the destination on receipt of the request message, sends back a route response message to the source node exploitation unicast communication[1]. they're appropriate for networks having often dynamic Topology however typically flooding messages produce overhead and delay. its sorts area unit mentioned below:

1) *AODV:* Ad-hoc On Demand Protocol(AODV) is that the reactive kind of protocol is that supply initially sends the hi messages to detect neighbors, discover the routes and fill forward to its destination. AODV uses sequence numbers to make sure the freshness of routes. Every active node sporadically broadcasts a hi message to any or all its neighbors. Since the hi messages area unit sporadically sent, once a node fails to receive many hi messages from a neighbor, it detects a link failure. Each node of the network maintains a routing table that stores routing info.

2) *DSR:* Destinition sequence vector routing protocol(DSR) provides route discovery and route maintenance method. throughout the invention mechanism, once the supply node needs to look a non-existing route, a route request message is send by it to any or all its neighbors. All nodes in- between that receive the request message broadcast it once more except to the destination or if there's an instantaneous route from the forwarding node towards the destination node. when that the supply node receives back route reply message which route is stored within the routing table of the supply node for future use. If any failure in route happens, the supply is educated by causing a route error message back to the supply node. during this protocol routing, every info packet consists of a listing of nodes that exist within the path in order that supply node deletes the nodes on the route that have unsuccessful from its cache and stores another flourishing route to it destination and exchanges it with an accurate route. If no such route exists, DSR once more starts a brand new route discovery method.

3) *TORA*: Temporarily ordered routing protocol (TORA) is distributed, loop- free, multipath Routing Protocol that produce a directed graph within the style of tree. It offer route to each node within the topology. during this protocol, supply node represented as root node send knowledge packets to its lower nodes and knowledge solely send to the forwarding node. When node broadcasts packets to its destination node, its neighbors send back a route reply message if its packets run from higher levels to lower level to the destination, otherwise it only rejects the data[1]. It conjointly reducing management message broadcast. However routing overhead/traffic is caused throughout route maintenance among network nodes as a result of high dynamic VANETs.

C. Hybrid Network

It is the mixture of Proactive and Reactive Routing Protocol enforced so as to cut back the drawbacks of proactive i.e. to cut back the management overhead and reactive i.e. to beat the matter of initial route discovery delay. Its sorts area unit mentioned below:

1) *Zone routing protocol :* Zone is that the assortment of nodes that area unit in zone radius. Zone radius outline the dimensions of network. In ZRP, a proactive routing protocol (IARP) is used in intra-zone communication associated an inner-zone reactive routing protocol (IERP) is used in intra-zone communication [].If supply and destination area unit within the same zone then supply directly send the data to the destination otherwise IERP initiate route discovery. It aims to seek out loop free routes and to find destination rote learning from supply it use broadcasting to flood packets.

2) *HARP:* In this protocol, network is divide into non-overlapping zones within which stable route is established from sender to receiver. to boost delay, It applies the route discovery between zones to limit flooding in network, that helps to limit flooding.

D. Position primarily based routing Protocol:

It sends the Packet from supply to destinition exploitation packet location rather than utilizing the network address. during this protocol, each node decicide its position and their neighbor node with the assistance of geographic position System(GPS). . Once the supply node sends its knowledge packet, it saves location of the destination in the header of the packet that aids in sending the data packet to the destination node with no need of route discovery, route maintenance or any awareness of topology[1]. These are categorised as below:

1) *Greedy Perimeter Stateless Routing (GPSR):* Every node broadcast beacon messages having id and position to neighbours within specific time limit.if any node does not receive beacon message, then GPSR router assume the failure or out of range of node and delete node from table. . It takes greedy forwarding decisions using information about immediate neighbors in the network. For any node if greedy forwarding is impossible then it uses perimeter of the region strategy to find the next forwarding hop[4].

2) *Delay Tolerant Network (DTN) Routing Protocol*: DTN protocol overcome the problem of networks having rapid disconnectivity during communication, huge scalability, high delays, limited bandwidth, power constraints. . DTN create a moving node that find routes towards neighbour nodes in the network which are in the transmission range. In DTN protocol, we are not sure about disconnectivity, so the data packets are cached for specific time limit with intermediate nodes. To form a routing protocol for DTN network having such characteristics is an important issue.

IV.   APPLICATION

A. Traffic Jams

Another example is avoiding from traffic jams. If a road is jammed by an accident a traffic jam warning can be sent to other vehicles to change their path to avoid that road. Another application of VANET is that the rescue vehicles such as ambulances or police vehicles can instantly receive the exact position of the accident which can help them to reach the scene of the emergency faster.

B. GPS Navigation Systems

Nowadays lots of GPS navigation systems are used in the cars that provide information about roads and streets. But the problem is that this information is not real-time. By using the VANET we can feed new and real-time information to the navigation systems and update them.

C. Entertainment Applications

Another application of VANET is in-vehicle entertainments such as radio and television and video games. Multiplayer games can be played in this network while the players are peoples who are in the vehicles. Internet access for passengers, communication with other vehicles, multimedia entertainments and cooperative games are just a few potential entertainment services that VANET may provide.

D. Safety Applications

These applications use the wireless communication between vehicles or between vehicles and infrastructure, in order to improve road safety and avoid accidents; the intention being to save people\'s lives and provide a clean environment.

V.   CONCLUSION

VANET (Vehicular Ad-hoc Network) is a new technology which has taken enormous attention in the recent years. Routing is the most important component of communication in VANET. To design an efficient routing protocol is very difficult. In this paper we have discussed the characterstics , routing protocols and applications of Vanets and analysed the unique challanges amog routing protocols which are to be improved in further researches.

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