Survey Paper on Reactive (on-demand)-Topology Based Routing Protocol in VANET

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Abstract—VANET (Vehicular Ad-hoc Network) has become a remarkable and emerging area for research analysis and development. VANET is a subgroup of MANET (Mobile Ad-hoc Network). VANET and MANET both are wireless networks which are characterized as self-configured and autonomous ad-hoc networks. The main objective of VANET is to builds a robust network between mobile vehicles so that vehicles can talk each other for safety of human beings. Vehicular communication systems developed largely by the growing interest in intelligent transportation systems (ITS). Due to rapid topology changing and frequent disconnection makes it difficult to design an efficient routing protocol for routing data among vehicles, called V2V or vehicle to vehicle communication and vehicle to road side infrastructure, called V2I. In this Paper mainly focus on topology based routing protocol and analysis of reactive routing protocols based on their advantages and disadvantages for the routing mechanisms that exist in VANETs.

Keywords-Vehicular Ad hoc Network, Mobile Ad hoc Network (MANETs), Proactive, Reactive, Routing Protocol

I. INTRODUCTION

A VANET is a form of Vehicular Mobile ad-hoc Networks [6], to provide communication among nearby vehicles and between vehicles and nearby fixed equipment i.e. roadside equipment. Vehicular transformed into computers on the wheels of networks on the wheels. A Vehicular Ad-hoc Network (VANET) is a type of Mobile Ad-hoc Network (MANET)[8]. A mobile ad hoc network (MANET) is a continuously self-configuring, infrastructure-less network of mobile devices connected without wires. Ad hoc is Latin and means "for this purpose. [8] Roads are saturated; safety distance and reasonable speeds are hardly respected. H e roadside infrastructure is fixed, hence act as distribution points for the vehicles [4]. The two types of wireless communications exist in VANET. the major objective has been to improve the overall safety of vehicular traffic, promising traffic management solutions and on-board entertainment applications are also expected by the different bodies.[9] We have a number of ad hoc routing protocols [10, 11, 12] for MANETs but when we have to deal with a VANET then we require ad hoc routing protocols that must adapt continuously to the unreliable conditions and MANET protocol not feasible in vehicular ad hoc network because of analysis of traditional routing protocol for MANET DEMONSTRATED that their PERFORMANCE is poor in VANET. ROUTE INSTABILITY IS A MAIN PROBLEM IN VANET ENVIRONMENTS AND MORE PACKETS ARE DROPPED the overhead due to route repairs or failure notifications increases significantly, leading to low delivery ratios and high transmission delays. [13]

II. MOTIVATION

Motivations behind with a study of VANET topology based reactive routing protocols that target vehicle to vehicle communication. To increase safety and security we all know very well our country is the second largest population in the world. Thousands of peoples are killed worldwide due to road accidents yearly and many more are injured. Vehicular ad hoc networks (VANETs) are more and more popular today. Due to the advanced technologies, such as the Global Position System (GPS), power-saving embedded computer, and wireless communication system, people can enjoy many convenience services while they are driving in cars.

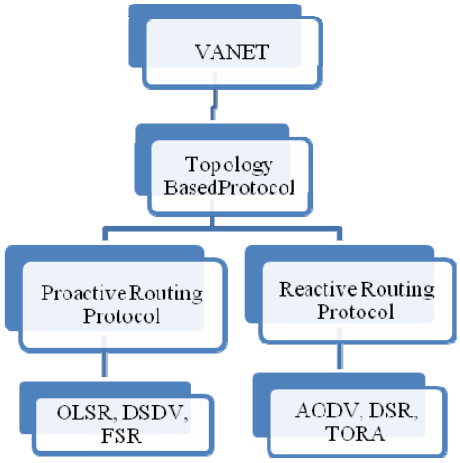

Figure 1. Vanet routing protocols

III. TOPOLOGY BASED ROUTING PROTOCOL

In topology-based routing protocols make use of routing tables for storing the link information as a basis of packet forwarding from source node to destination node. It utilizes the global information about the network topology and the information about the communication links for making routing decisions. It is using either proactive or reactive approaches for routing. Routing Protocols are standards and used for transfer the data in Networks. The topology-based routing protocols have limited performance when we are comparing with position based routing protocols [14]. Topology Based Routing schemes generally require additional node topology information during the routing decision process. Generally, topology based protocols do not measure well in the context of VANETs due to the overheads pertaining to the discovery of routes and maintenance of routes in the presence of moving vehicles. In VANET environment the mobility factor is high, which leads to the frequent network partitioning and route disconnection demanding re-computation of the topology information. [16] They are divided into Proactive and Reactive protocols.

IV. REACTIVE ROUTING PROTOCOL

It is also called On Demand routing because it establish a route to destination whenever a node has something to send thus reducing burden on network. Reactive routing have route discovery phase where network is flooded in search of destination. [17] Proactive approaches maintain the topology information about all the nodes irrespective of the fact that whether they are presently participating in the communication or not. [16] whereas, reactive protocols determine the routing information for a destination on-demand, only when it is needed for current communication. Reactive routing can be classified into either as source routing or hop-by-hop routing. In source routing complete route information from source to destination is included in data packets, whereas in hop-by-hop routing only the next hop address and the destination address are provided. Hop-by-hop routing is better in terms of overall packet delivery ratio and end-to-end delay than source routing and hence it is adopted by most of the routing protocols. [16] Examples of proactive protocols-DSDV, OLSR and reactive protocols AODV, DSR, TORA.

Merits

- Its consume less resource due to absence of large routing table
- Require less routing overhead.

Demerits

- Route finding –high latency time.
- Network clogging-excessive flooding can lead.

A. Ad hoc on Demand Distance Vector (AODV)

AODV is a reactive routing protocol, which supports both unicast and multicast routing. It uses a destination sequence number, which makes it different from other on-demand routing protocols. It reduces memory requirements and the route redundancy. AODV responds to the link failure in the network. In Ad Hoc on Demand Distance Vector (AODV) (Perkins, 1999) routing, upon receipt of a broadcast query (RREQ), nodes record the address of the node sending the query in their routing table. This procedure of recording its previous hop is called backward learning. [9]

Merits

- It reduces excessive memory requirement and route redundancy.
- An up to date path the destination.
- Apply for large scale ad hoc network

Demerits

- Its require more time for setup connection and initial communication to establish route
- Inconsistency in route.
- It consumes extra bandwidth because of periodic Beaconing.

B. Dynamic Source Routing (DSR)

The dynamic source routing is also reactive type protocol. It utilizes source routing & maintains active routes. It has two phases route discovery & route maintenance. It Uses source routing instead of depending on intermediate node routing table. So routing overhead is always dependent on the path length. The limitation of this protocol is that the route maintenance process does not locally repair a broken link. The performance of the protocol briskly decreases with increasing mobility

Merits

- Periodical update is not requiring.
- Beacon less.
- To obtain route between source nodes to destination node, it has small overload on the network. It uses caching which reduce load on the network for future route discovery.

Demerits

- If there are too many nodes in the network the route information within the header will lead to byte overhead.
- Unnecessary flooding burden the network.
- In high mobility pattern it performs worse.
- Unable to repair broken links locally.

C. Temporally Ordered Routing Protocol (TORA)

Temporally Ordered Routing Protocol [18] is based on the link reversal algorithm that creates a direct acyclic graph towards the destination where source node acts as a root of the tree. In TORA packet is broadcasted by sending node, by receiving the packet neighbor nodes rebroadcast the packet based on the DAG if it is the sending node's downward link. [2]. TORA is a distributed routing protocol. TORA uses multi-hop routes during routing mechanism. This protocol reduces the communication overhead to adapt with frequent network changes and does not include implementation of shortest path algorithm and therefore, routing doesn't represent a distance. [7]

Merits

- It creates direct acyclic graph when necessary.
- Reduce network overhead because all intermediate nodes don't need to rebroadcast the message.
- Perform well in dense network.

Demerits

- It is not used because DSR & AODV perform well than TORA.
- It is not scalable.

V. CONCLUSION

In this paper we are presents survey on different topology based reactive routing protocols and discuss about Vehicular ad hoc network is a special form of MANET which is a vehicle to vehicle and vehicle to roadside wireless communication network and we have investigated the merits and demerits of different reactive routing protocols for inter-vehicle communication in VANET. By studying different on demand routing protocol in VANET we have seen that further performance evaluation is required to verify performance of a routing protocol with other routing protocols based on various traffic scenarios. The most common MANET routing protocol that has been applied to VANET is the Ad hoc On-demand Distance Vector (AODV).

TABLE 1 . OVERVIEW OF ROUTING PROTOCOLO

Types of Protocol	**Topology Based**
Forwarding Technique	Wireless multi hop Forwarding
Strategy of Recovery	Multi hop Forwarding
Digital Map Requirement	No
Virtual Infrastructure Requirement	No
Realistic Traffic	Yes
Scenario	Urban

TABLE 2.REACTIVE ROUTING PROTOCOL

Protocols	**Routing Structure**	**Frequency of Updates**
AODV	Freeway	Unicast and Multicast

Figure. 2 Ad Hoc Network

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