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Multipath Forwarding in VANET for Message Dissemination

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Abstract: The traditional routing techniques are geographic routing which has been proven to be more suitable for the highly mobile environments like VANETs; it's so because of the enhanced scalability and the feasibility. Vehicular ad hoc network have a key issue hindering implementation of the message dissemination standard in the wireless access in vehicular environments. Currently single path routing protocol for VANET is performed and, In this project we are going to propose a multipath routing protocol for VANET named Fast Restoration On demand Multipath Routing (FROMR). It focuses on rapidly building on alternate path if the original route is broken. In our study, and simulation conducted to evaluate the efficiency an efficacy of the proposed solution. Our results shows FROMR can provide the higher packet delivery ratio in multiple path routing protocol with comparable latency to other geographic routing schemes.

Keywords: FROMR, VANET, RREQ, RREP, RERR.

INTRODUCTION

A Vehicular Ad-Hoc Network, or VANET, is a known form of Mobile ad-hoc nodes, which offers communications among nearby vehicles and between vehicles and nearby fixed equipment. The main goal of VANET is to provide safety and comfort for passengers. With the coming producibility of minimum cost, short range radios along with the advances in wireless networking, it is offered that wireless ad hoc sensor networks will become commonly deployed. The message passing in this environment is more typical because constructing of VANET network is entirely deals with some critical operations which is based on the Intelligent transport services (ITS).In order to maintain secure transmit of message in vehicles we use multiple path for forwarding the packet .

PROPOSED SYSTEM

We propose a system called "Multipath routing based Fast Recovery Protocol "which concentrates on rapidly building alternate path when the original path is broken. FROMR Extends AODV which is a single path algorithm to find multiple paths. By this process we can send packet to destination without any delay by selecting alternate path when there is a breakage in the original path.

Fast Restoration On-demand Multipath Routing (FROMR). Different from previous researches which emphasize path disjointness, FROMR focuses on rapidly building an alternate path if the original route is broken. In order to reduce the amount of control messages as well as increase the path robustness, FROMR partitions the geographic region into squares of equal-size called grids.

Inside each grid, a vehicle which is expected to stay for the longest duration is selected as the grid leader. The only grid leaders are responsible for the route discovery.

Advantages of Proposed System

The system is very simple in design and easy to implement. The system requires low system resources and they will work in almost all configurations. The Following features in it are,

1. Robustness.
2. Easy to recover the path
3. Easy to retrieve entire packets
4. Quick response to path
5. Minimize manual process

Robustness is provided to message just to be deliver for the nodes and there is any problem we can easily recover the

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path according to the protocol and can receive the entire package and able to response quickly with minimal process.

PROSPOSED SYSTEM MODULES

In FROMR, we assume that vehicles are equipped with global position systems (GPS) and preloaded digital maps which provide location information and street-level road geometry. Each vehicle knows the existence and location of neighbors by hearing bacon messages that are periodically exchanged by vehicles.

We consider a VANET in an urban area which is modeled as a Manhattan grid. The key idea behind the scheme is to ensure fault-tolerant and fast restoration as path breakage happens by constructing multiple paths

There are four main parts of our protocol:

1. Discovery of Route,
2. Selection of Route,
3. Recovery of Route,
4. Selection of Grid leader.

These modules provide four main operation for processing the message dissemination in the vehicular adhoc networks. The main strategies for these modules to beacon the message to the destination using FROMR (Fast Restoration On demand Multipath Routing).

Each node provide preliminary RREQ, and RREP for transferring the message. If there is any problem in the node it immediately sends RERR message to the adjacent nodes and it finds alternative
path using Routed Information.

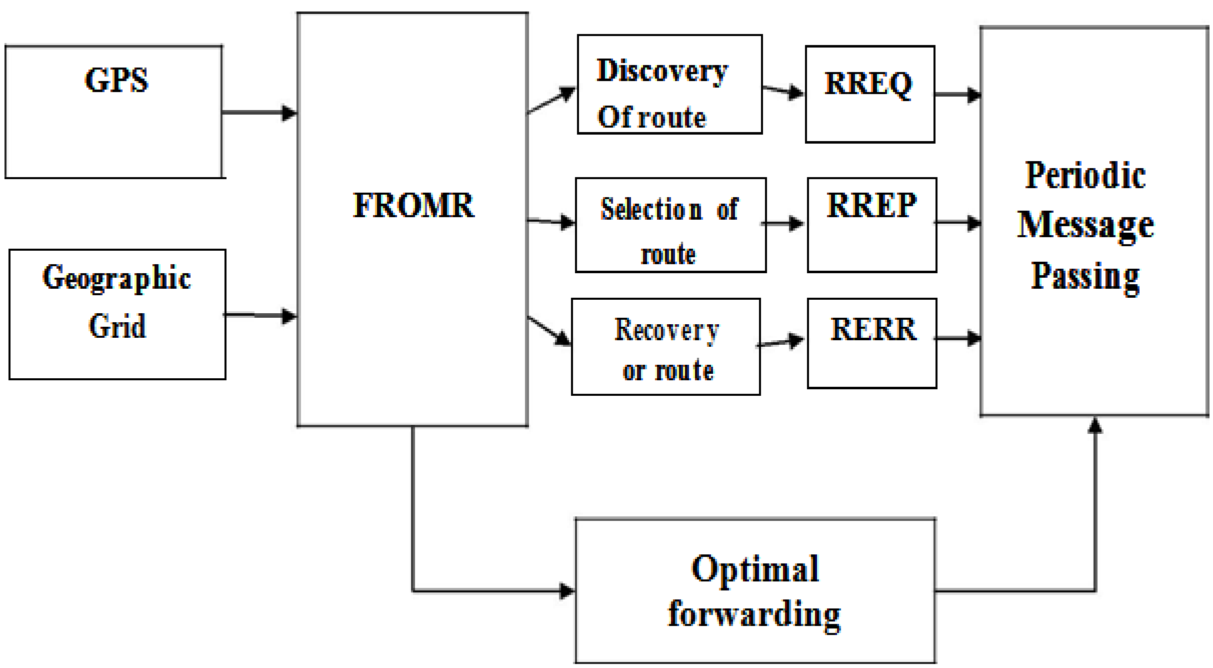

FIGURE: BLOCK DIAGRAM FOR PROPOSED WORK

PROSPOSED SYSTEM MODULES DESCRIPTION

I. Discovery of Route

Similar to AODV, FROMR can find routes on-demand using a route discovery procedure. The great difference lies in the number of routes found in each route discovery. The source initiates the procedure by sending route request message (RREQ). When a vehicle receives a new RREQ, it first creates or updates a route to the previous hop and rebroadcasts the RREQ to its neighboring nodes. Since the RREQ is transmitted by flooding, a vehicle may receive several copies of the RREQ. Unlike in AODV where duplicate copies of the RREQ are simply discarded, FORMR uses some of those copies to form multiple reverse paths. Assuming that a vehicle has received and rebroadcast the received RREQ, once it receives another copy of the same RREQ, it will record the last hop in the routing table to form an alternative reverse path but not forward the request again. Therefore, the number of control packet is reduced.

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When the destination vehicle receives RREQs from different pervious hops, it generates reply message (RREP) correspondingly to each request packet and sends it back to the source by uncasing. An intermediate vehicle which receives a RREP will increase a forward path in the routing table. If the RREP is new, the vehicle forwards it along each of the reverse paths or discards it otherwise.

Finally, the RREPs reach the source vehicle, and we will have multiple paths between the source-destination pair. The transmission routes are partially disjoint from each other, not completely link disjoint. Similar techniques as proposed can be used to provide loop-freedom.

II. SELECTION OF ROUTE

In the aforementioned route discovery procedure, a node may record multiple next hops in its routing table for a destination. These next hops information are sorted in the order of the RREPs arrival time. The next hop neighbour with higher rank in the sorted list is expected to have a better forward path (e.g. path of shorter length or of higher bandwidth) to the destination. Every vehicle on the route to the destination will pick the topmost next hop from the routing table to forward data packets.

III. RECOVERY OF ROUTE

When a vehicle finds the link to a next hop neighbor is broken. It firstly deletes all the corresponding links from the routing table. If the deletion causes a path breakage that means the missing next hop is the only downstream node for a path to the destination, it will send a route error message (RERR) back to the upstream node of the path. When receiving the error message, the vehicle removes the relative link from the routing table. Then it checks whether there is available alternative paths or not. If yes, the back-up path is applied and the RERR packet is discarded.

Otherwise, the vehicle reforwards the RERR along the reverse path. Under the worse situation, the error message travels all the way back to the source. The source will issue a new route discovery procedure if no alternate path is available.

IV. SELECTION OF GRID LEADER

In VANETs, data paths follow roads. Thus, the same road segment may be shared by many data paths and broadcasts. The experiments in the city scenarios proposed by Naumov et al. [6] show that from 70% to 95% of the network traffic is dedicated to broadcasting of RREQs. Also, half of the RREQs are dropped by nodes due to collisions and the level of redundancy during RREQ broadcasts is extremely high.

To deal with this, FROMR partitions the geographic region into squares of equal-size called grids, as shown in Fig. 1. The idea of dividing the network area into smaller grids is not new. It also appears in other works but for different purpose.

The size of a grid is referring to the transmission range of vehicles. Inside each grid, one of the vehicles is selected as the grid leader. Only the leaders are responsible for broadcasting of control messages and data forwarding. Therefore, both the amount and the level of redundancy of RREQ can be reduced.

When a vehicle newly comes into a grid, it will send a message to nodes "who is the leader". If no response is received within a predetermined time interval from any connected nodes, it will set itself as the leader of the grid. Otherwise the vehicle regards itself as a normal vehicle.

When a grid leader discovers itself is going to leave the current grid. Since the leader has knowledge of neighbours' location, it selects the vehicle which is closest to the centre of the grid as the next leader. Pass the leadership to that node by sending a message.

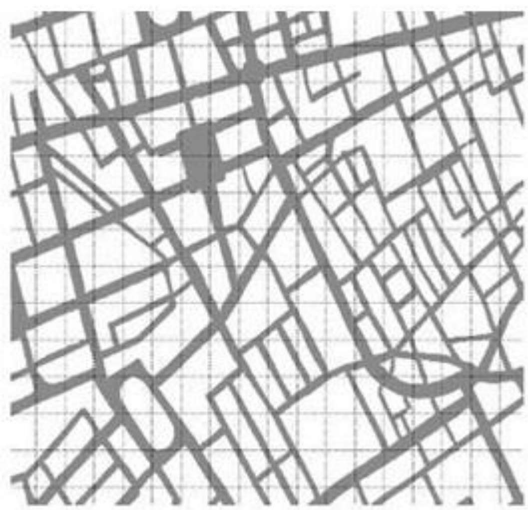

FIGURE: A GEOGRAPHIC REGION IS DIVIDED INTO GRIDS.

PROPOSED WORK DESCRIPTION

From previous description, we can see that FROMR can build multiple intersected paths. The main advantage of FROMR over AOMDV which guarantees disjointness of alternate paths is that faster path restoration is possible. An example is shown in Fig. 2 where S is the source and D is the destination. Two solid-line paths S-A-B-E-H-I-D and S-C-F- G-H-J-D are link disjoint. If the link (H, I) is broken, H can replace I by J to form an alternate path to D. However, if

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the link (B,E) is broken, no alternate path can be found until the RERR generated by B reaches S. Consider the dotted-line paths constructed by FROMR, an alternate path can be found by A under the same situation.

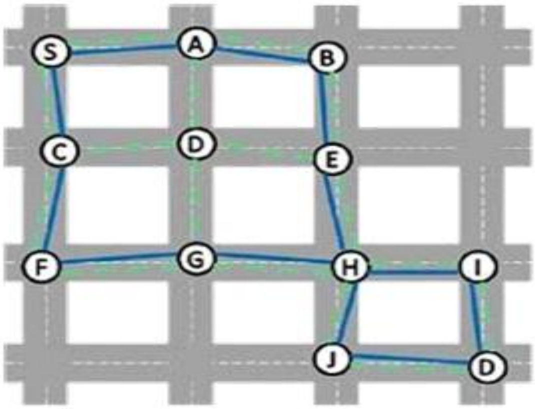

FIGURE: EXAMPLE OF MULTIPLE PATHS FROM S TO D

SYSTEM ANALYSIS

For any project to be successful there is a need for an effective feasibility study. The main aim of the feasibility study is not to solve the problem but to determine if the problem is worth solving. There are many feasibility studies to be conducted. But the three main feasibility tests to be performed are:

- Operational Feasibility
- Technical Feasibility
- Economical Feasibility

CONCLUSION

FROMR can provide faster restoration because there is more intersection between multiple paths. In order to avoid harsh collision caused by query flooding, we restrict only grid leader can transmit packets. By this method we can able to restore the packet its efficient is increased. We can able to avoid the packet loss and the packet delivery ratio will be high and then the local maximum and sparse connectivity problem will be removed. Due to fast restoration there is robustness in the routing process if the original path is destroyed there will be an alternate path in the routing process. It will provide high reliability and also scalable robust routing in it.

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