

Localized Routing Mechanism in Improved QOS Vehicular Ad hoc Network

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ABSTRACT: The VANET has witnessed several endeavors toward the development of suitable routing solutions. Multi-hop information dissemination in VANETs is constrained by the high mobility of vehicles and the frequent disconnections. In this project, we propose a hop greedy routing scheme that yields a routing path with the minimum number of intermediate intersection nodes while taking connectivity into consideration. Moreover, we introduce back-bone nodes that play a key role in providing connectivity status around an intersection. Apart from this, by tracking the movement of source as well as destination, the back-bone nodes enable a packet to be forwarded in the changed direction.

KEYWORDS: VANET, GPS, Digital Map, void-guard back-bone nodes.

I. INTRODUCTION

Data is transmitted from one point to another through wireless links i.e. there is no need of wired link between the two nodes for transmission. They need to be in the transmission range. So, wireless links between the nodes works as a router to forwards the data on behalf of other nodes. One of the best techniques in wireless network is VANET (vehicular Ad-hoc network) and it is the technology which is used to move vehicles as joint in network to make a transportable network. Participating vehicles become a wireless connection or router through VANET and it allow the vehicles almost to connect 100 to 300 meters to each other and in order to create a wide range network, other vehicles are connected to each other so the mobile internet is made. It is the first networks that will incorporate the technology of fire and police mobiles to interact with one another for security reasons.

Brilliant way to use Vehicular Networking is defined in VANET or Intelligent Vehicular Ad-Hoc Networking. Multiple ad-hoc networking technologies integrated in VANET such as, ZigBee, IRA, WiMAX IEEE, and Wi-Fi IEEE for convenient, effective, exact, simple and plain communication within automobiles on active mobility. Useful procedures like communication of media within automobiles can be allowed as well process to follow the automotive automobiles are also favored. Security measurements are developed in vehicles by VANET and it has been increased in flowing of communication within automobiles, edutainment and telemetric.

Selection of wireless technologies are required to implement in VANET as DSRC (Dedicated Short Range Communication) which is include in Wi-Fi. Other entrant technologies of wireless are Satellite, WiMAX, and Cellular. Vehicular Ad-hoc Networks (VANET) can be considered as device of ITS (Intelligent Transportation Systems). ITS (Intelligent Transportation Systems) has conceived vehicular networks. IVC (Inter-Vehicle Communication) permits the automobile communicate to each other at the same time RVC (Roadside-to-Vehicle Communication) allows with the stations based wayside.

VANET is the emerging area of MANETs in which vehicles act as the mobile nodes within the network. The main purpose of VANET is to increase safety on road users and comfort of passengers. VANET is the wireless network communication takes place through wireless links mounted on each node (vehicle). Each node within VANET act as both, the participant and router node in network it communicates through other intermediate node that lies within their own transmission range. VANET are self organizing network. VANET routing focused more on single ad hoc routing method (e.g. most researchers focused on traditional ad hoc topology based routing, while some other focused on position based ad hoc routing method in VANET). The selection of routing method heavily depends on the nature of

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the network. Thus single ad hoc routing method is not sufficient enough in meeting all the different types of ad hoc networks. GPS measurements with a high-accurate digital map.

VANET are used for short-range, high speed communication among and between vehicles and roadside infrastructure units. Vehicular ad hoc networks (VANETs) are highly mobile wireless networks that are designed to support safety for vehicles, traffic monitoring, and other commercial applications. Within VANETs, vehicle mobility will cause the communication links broken between vehicles. Link failures require a direct response from the routing protocols, leading to a potentially increase in the routing overhead and degradation in network scalability.

When all the vehicles move in a high speed can communicate to other vehicles more quickly and reliably. When an accident in a road can inform to other vehicles through alarm messages [1], to have a safe and fast transport system, any vehicle should know where a traffic problem such as a broken vehicle occurs. Road side unit (RSU) uses Cooperative positioning is to share the location information for public safety applications [2] and also vehicle estimates its location based on periodically broadcast beacon messages to RSUs deployed on either side of the road[3] in order to improvement in utilizing a range information, reducing range broadcasts by piggybacking [4]. Communication among vehicles is to compute a vehicle location, the integration of which with motion information and GPS location estimates a highly accurate vehicle localization and the inter vehicle communication also leads to the improvement of the robustness and accuracy of vehicle-location estimation[5]. GPS is one of the equipments which has been widely used for positioning service. Vehicle can use a GPS receiver to determine its position. But, all vehicles have not been equipped with GPS or they cannot receive GPS signals in some places such as inside of a tunnel. In these situations, the vehicle should use a GPS to find its location on transmission range had been suggested based on Optimized Disseminating Alarm Message (ODAM) [6].

II. LOCATION AWARE TECHNIQUES IN VANET

RF signal strength on the other hand is not suitable for fine-grained localization [7]. Fine-grained localization scheme should operate in a distributed fashion. This mode of operation power cost of localization evenly among the nodes in the network. Shadow fading channel model (LOS/OLOS model) [8] based on real measurements in highway and urban scenarios distinguishing between LOS and OLOS. Vehicles are not necessary equipped with GPS and even they cannot obtain availability of line of sight access to satellites, particularly when they enter tunnels. [9] To improve localization accuracy in order to support localization of GPS equipped or GPS unequipped vehicles. So, the number of vehicles discovering their localization will be increased. This prevents pile-up of cars when fogs, accident or any other obstacle and then contributes to the driver safety.

The vehicles movement information is (e.g., position, direction, speed, and digital mapping of roads) to predict a possible link-breakage. Vehicles are grouped according to their velocity vector, grouping ensures that vehicles, belonging to the same group, are more likely to establish stable single and multihop paths are moving together. Routes that involve only vehicles from the same group guarantee a high level of stable communication in VANETs [10]. [11] Car-to-Car message extensions needed to transmit GPS measurements between vehicles the integration of EGNOS/EDAS to enhanced localization accuracy.

Development of a vision sensor to detecting shock waves to detect accidents in highway traffic flow [12]. Vehicle tracking and detected in saturated traffic and providing arrival Information for drivers. Vehicle is equipped with a regular GPS. Handset with a preloaded map, which is already very common nowadays When the GPS can receive signals from satellites, it provides current location information and driving direction. It may lose satellite connection in some circumstances and when this happens, the vehicles are unable to obtain the location and direction etc. Localization schemes can be broadly classified into non- collaborative localization, in which a node evaluate its own location information, and collaborative localization, in which a node calculates its location through the help from other nodes/facilities. Non-collaborative localization are equipped with hardwares, such as camera and laser.

Collaborative localization has range- based approach and range-free approach. In range-based approach, distance between nodes needs to be measured by various techniques, such as signal attenuation measurement, time of arrival and time difference of arrival. Based on geometric relationship inferred from the measured distance and location of some

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nodes, the location of other nodes can be calculated. This method may suffer from large error propagation, so many techniques are introduced. For example, data fusion has been widely applied to aggregate the location information received from various sources to reduce error, such as kinematic sensors, dead-reckoning, and roadside infrastructures. By merging large amount of location information, the fusion-based methods can achieve higher positioning accuracy. When a frequent message exchange, introduces huge overheads, and sometimes requires the availability of additional resources.

Vehicles are equipped with GPS devices or cannot receive signals from the GPS satellites. The vehicles first find three neighbours within one-hop distance. If there is only one or two neighbours within one-hop, then distance information from neighbours within two-hop distance is used. They found when more than 40% of vehicles are equipped with GPS, most of the vehicles in the network will have at least three GPS-equipped neighbor used to compute their location. Here the problem is not to improve GPS coordinates, but to provide localization to those unable to use the GPS.

III. LOCALIZED ROUTING MECHANISM IN IMPROVED QOS VEHICULAR AD HOC NETWORK

A position-based connectivity aware back-bone-assisted hop greedy routing protocol for VANET's city environments. The proposed routing protocol finds a routing path consisting of the minimum of intermediate intersections. The protocol is designed considering certain features in a city map, such as road segments, intersections, etc. To maintain connectivity at the intersections and to detect void regions, rely on a group of nodes called back-bone nodes.

In proposed approach, assume that the system model has the following phases:

A. Network design

- Backbone

It's able to detect the vehicle, which enters into the critical intersection of roads.

- Vehicle communication

It has digital map and GPS system with wireless communication device

B. Data Transmission

- Route Discovery
- Void Guard info sharing

A. NETWORK DESIGN

- Backbone design

Considering the three types, namely, stable, primary, and secondary back bones. A stable back-bone node is selected from the stream of vehicles waiting at the intersection during red traffic signal. Among the waiting vehicles, the vehicle closest to the intersection declares itself as the stable back bone. The primary back bone is the one located at the intersection, whereas the secondary back bone is outside the intersection. Initially, a random node declares itself as the primary back bone. The primary back-bone node selects a secondary back-bone node comparing the average vehicle speed, the position, and the moving direction of all its neighbors. When the current primary back-bone node leaves the intersection region, it notifies the secondary back bone to become the new primary back bone. This notification also informs vehicles at or around the intersection about the new primary back bone.

- Vehicle Design

The vehicle has the GPS and Digital map. By using GPS it can know the current position and speed and direction of movement. By using digital map vehicle can identify the road intersection details

B. DATA TRANSMISSION

- Route discovery

If source has the data without route to destination then it need to find the route. The route searching process will be done based on the reactive routing mechanism. Our method is unique from other routing technique. The route will be established only with the backbone nodes. Route establishment will done based on the weight of backbone nodes. The stable back-bone nodes take the responsibility of packet buffering. In the absence of a suitable forwarding node, the

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packet is stored in a stable back-bone node. On availability of a forwarding node in the desired direction, packet is retrieved and forwarded.

- Void Guard Information Sharing

If any part of a road segment longer than the transmission range is devoid of nodes, it can be noticed by the nodes present at the periphery of the void region. Nodes closest to the void region from both directions declare themselves as back-bone nodes. These back-bone nodes are termed as “void-guard” back-bone nodes. The purpose of a “void-guard” back-bone node is to inform the presence of a void region to the neighboring back-bone nodes stationed at intersections.

C. ARCHITECTURE OF ROUTING PROCESS

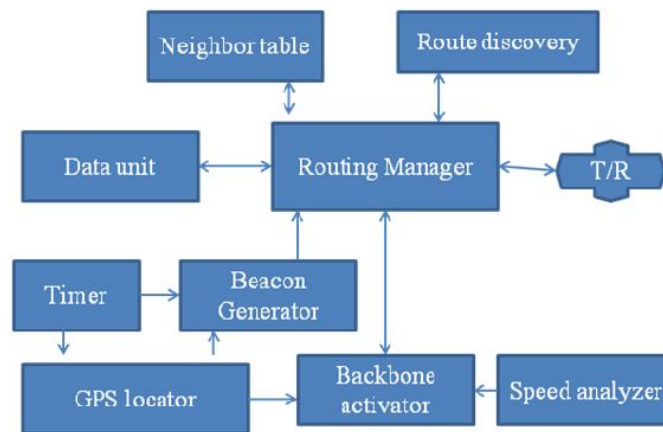


FIGURE 1.1 ARCHITECTURE OF ROUTING PROCESS

Figure 1.1 shows that each node equipped with the data unit, timer, and GPS locator, backbone activator and speed analyzer, route discovery unit, neighbor table, and beacon message generator.

The beacon message will be generated in periodic interval by using timer. The beacon message contains location of the vehicle and vehicle type. The backbone activator sets vehicle type based on movement of the vehicle (STB/PB/SB). Each node will share beacon message to all neighbors. The neighbor table is used to store the information of neighbor with location and neighbor type. The neighbor table will be refreshed in periodic interval to delete un-available vehicle. The use of data unit is to generate the data in source vehicle. The route discovery unit used to find a route by forwarding RREQ and RREP. The routing manager controls overall architecture. T/R is nothing but transmitter and receiver

IV. RESULTS AND DISCUSSION

We selected throughput and packet drop performance metrics for the evaluation of routing protocols. To check the performance of routing protocols in VANET to achieve high packet delivery ratio and shorter end-to-end delay in VANET.

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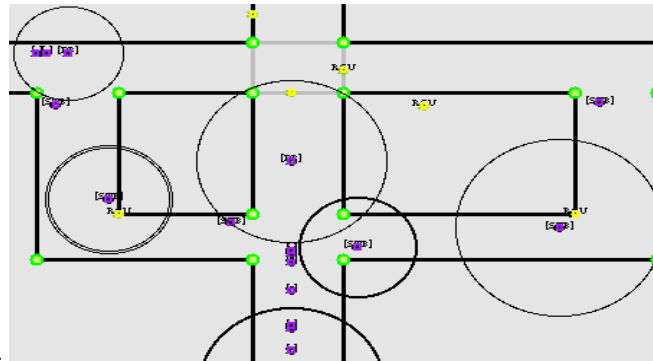


Fig. 2 Vehicle communication

Figure. 2 shows that the initially all vehicles moves in the direction to reach the destination. Here Vehicle communicates with each other for updating of speed, position and direction its stores in routing table. The source node finds a shortest path to reach destination node through route discovery process (i.e. sending a request to intermediate nodes) by obtaining information from routing table.

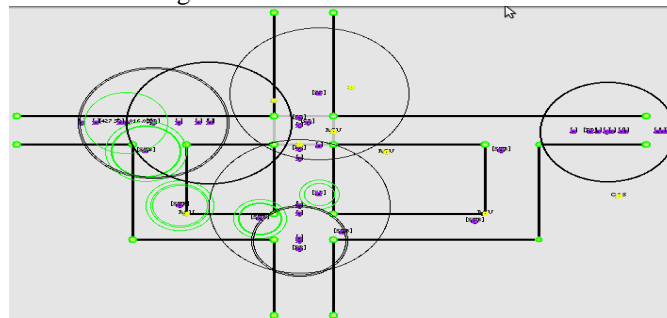


Fig. 3 Route discovery

Figure.3 shows that after finding shortest route to destination the source node forwards the packet or information by choosing stable back-bone nodes (long term node present in network) used for communication.

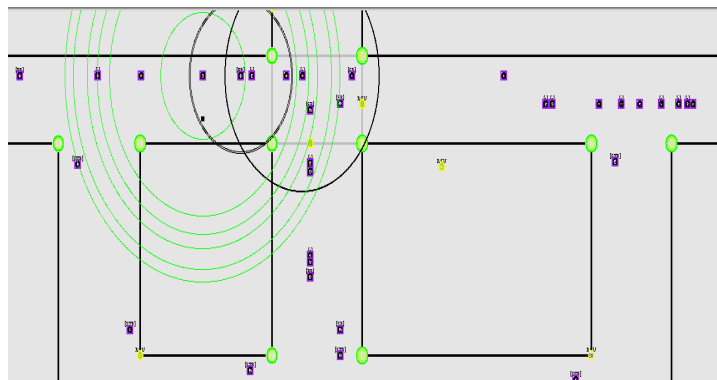


Fig. 4 Intersection Process

Figure. 4 shows that the packet delivery is the number of data packets delivered from source to destination in vehicles.

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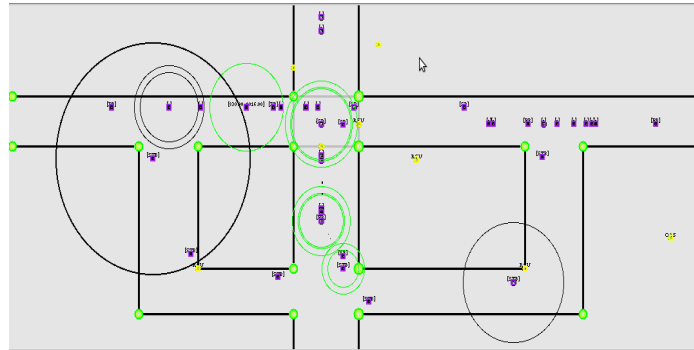


Fig. 4 Void-Guard information sharing

Figure.4 shows that the void-guard back-bone node is to inform the presence of a void region to the neighboring back-bone nodes stationed at intersections and finally find another shortest path to reach destination.

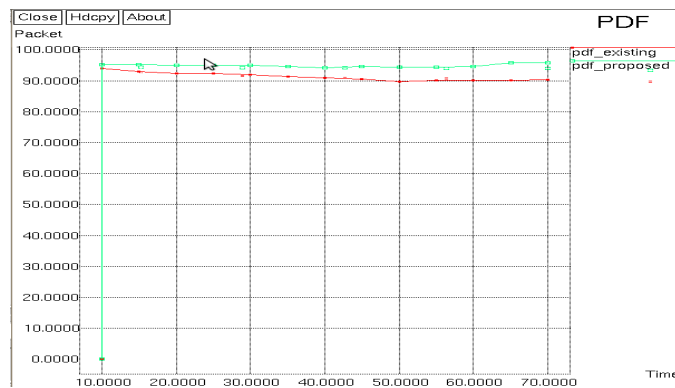


Fig. 5 Packet Delivery function

Figure.4 shows that the packet delivery function is the number of data packets delivered from source to destination in vehicles.

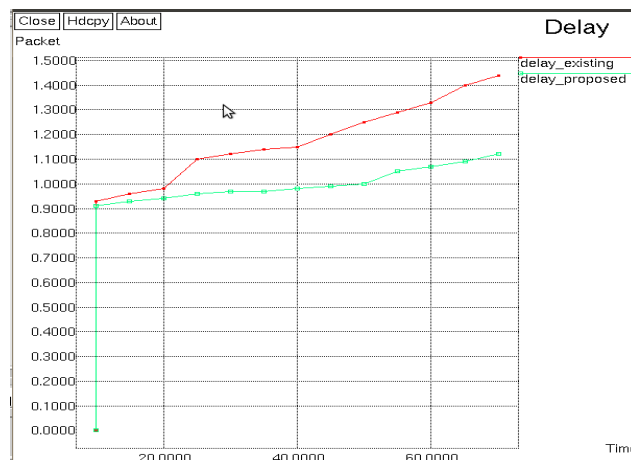


Fig. 5 Delay

Figure. 5 shows that the Delay is to reduce for sending beacon messages from one vehicle to another vehicle.

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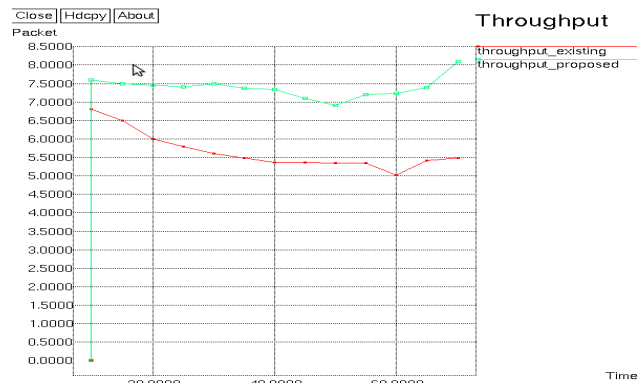


Fig. 5 Throughput

Figure. 5 shows that the throughput is increased at the rate of successful message delivery over a communication channel.

V. CONCLUSION AND FUTURE WORKS

A location-based ad-hoc routing protocol, which combines features of reactive routing. We have shown, through both analysis and simulations that a significant reduction in the delay, high packet delivery function and increased in throughput. The efficient routing mechanism achieves in Vehicles through periodically sharing of beacon messages for updating position, speed and direction in functioning of destination route discovery procedure and hop greedy algorithm finds the best possible path in terms of both hop count and connectivity.

In future we will implement the history maintenance to check the behavior of the node so further we can improve the reliability in security on route.

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