ISSN 2278-3091
Volume 2, No.5, September - October 2013
International Journal of Advanced Trends in Computer Science and Engineering
Available Online at http://warse.org/pdfs/2013/ijatcse01252013.pdf

Design And Implementation Of Hybrid Routing Algorithm for VANET

[1]Ms. Pradnya Kamble , [2] Dr. Mrs. Manali Ksirsagar
[1]Affiliated to Nagpur University, India, Email:pradnya_kamble@rediffmail.com
[1]Affiliated to Nagpur University, India, Email:manali_kshirsagar@gmail.com

Abstract: This paper gives the close look of vanet and the new techniques by which the concert of vanet can be improved. In so doing , making the vanet more intellectual smart and vigorous. here the hybrid techniques are used to measure the various parameters of vanet.

Keywords*:* VANET, mobility model, cluster routing, hard delay constraint, UMB, RBVT-Protocol.

1. INTRODUCTION

Vehicular ad-hoc networks (VANETs) form when vehicles are equipped with devices capable of short-range wireless communication. Precise reproduction of VANETs is a demanding task, require both a vehicle mobility mould and a network simulator.

The feature of VANET mostly resembles the operation technology of MANET.It is the process of self-organizing self-management and low bandwidth plus shared radio transmission criterion remain same. But the key barrier in operation of VANET comes from the high speed and vague mobility [in contrast to MANET] of the mobile nodes (vehicles) along the paths. This recommended that the propose of well-organized routing protocol demands upgradation of MANET architecture to accommodate the fast mobility of the VANET nodes in an efficient manner. This defensible various research challenge to design appropriate routing protocol. It is as a result very important at **this** phase to repeat the key characteristics of VANET that may be accounted for the design of various routing protocols.

2. SPECIFIC CHARACTERISTICS OF VANET

High Dynamic topology: The speed and choice of path defines the dynamic topology of VANET. If the two vehicles running away from each other with a speed of 60 mph (25m/sec) and if the transmission choice is about 250m, then the connection between these two vehicles will last for only 5 seconds (250m/ 50ms-1). This defines its extremely vibrant topology.

Frequent disconnected Network: The above feature necessitates that in about every 5 seconds or so, the nodes needed another link with the close proximity vehicle to maintain continuous connectivity. But in case of such crash, mainly in case of low vehicle thickness zone, frequent disruption of network connectivity will transpire. Such troubles are at times addressed by road-side consumption of relay nodes.

Mobility Modeling and Prediction: The above features for connectivity therefore needed the knowledge of node positions and their movements which as such is very difficult to predict keeping in view the nature and pattern of movement of each vehicles. On the other hand, a mobility model and node prophecy based on study of predefined roadways model and vehicle speed is of paramount importance for effective network design.

Communication Environment: The mobility model highly vary from highways to that of city environment. The node forecast design and routing algorithm also therefore need to adapt for these change. freeway mobility model, which is essentially a basic model, is rather simple and easy to predict. But for city mobility representation, street configuration, variable nodule compactness, presence of building and trees that behave as obstacles to even small distance communication make the model application that very complex and difficult.

Hard Delay Constraints: The safety aspect (such as accidents, brake event) of VANET application justify on time delivery of message to significant nodes. It manifestly cannot concession with any tough data delay in this regard. Therefore high data rates are not as important an issue for VANET as overcoming the issues of hard delay constraints.

Interaction with onboard sensors: This sensors helps in providing node location and their movement nature that are used for effective communication link and routing purposes.

3. MOBILITY MODEL

The formulation of algorithm suitable to VANET, as recommended from dissimilar routing protocols, largely

depends on a genuine mobility replica and decision parameters of nodes to forward the packets to other nodes. For setting the balanced mobility model, the parameters such as street map, density of vehicle and speed, urban or geographic conditions including obstacles such as buildings and trees need to be properly accounted. Basic methodologies applied in the mobility model is explained below.

3.1 RWP (Random Way Point):

This is one among the simplest and oldest model used. In this a random destination point and a uniform speed is attributed to each node. Once destination point reached, another random destination point is provided. RWP is lengthily worn in ad hoc network simulation (example: NS-2) but the model as such is far from a realistic one.

To modify this existing model of RWP (Nadeem has stated), parameters such as road span, average speed, no of lanes are built-in to progress its consistency.

Towards extra up degree of model, Saha and Johnson included factual path map based on TIGER (Topologically Integrated Geographic Encoding and Referencing) US road map by US Census Bureau. Alongside they use a speed 5 mph above and below the prescribed speed limits and define the movement based on shortest path algorithm.

3.2 STRAW (STreet RAndom Waypoint):

In an effort to make the above model more sensible, it uses a car-following model with US road information to simulate the realistic travel situation that includes, traffic gearshift, traffic cloggings, car communications etc in an urban environment. The authors compared their simulation result using both AODV and DSR under varying traffic conditions (in Chicago, and Boston), significantly different results were found out when compared with the performances of STRAW and RWP.

In the latest technique of more reasonable mobility replica structure, vehicles are monitored by recording their one dimensional position and lane on the highways on every discrete time steps of 0.5 sec. combining the compelling map outs from these, a realistic mobility circumstances is developed.

In Seattle, Washington J. etcheva et al. developed such a movement scenario by recording the movement sketchs of buses from Public shipping system. on the other hand, this model has restrictions as buses only put in a small fraction of all vehicles on the road.

Naumov et a. in their mobility model incorporated trace date obtained from MMTS (Multi-agent Microscopic Traffic Simulator) which is capable of simulating public and private traffic over a real road map in Switzerland with a high degree of realism.

4. ROUTING TECHNIQUES

4.1 Ad Hoc Routing*:* As mentioned earlier, the operational philosophy of VANET and MANET match in most aspects except the high speed mobility and high nature of changeableness of their progress. This suggests the applicability of most MANET routing protocols in VANET.

Some of the well known ad hoc routing protocols such as AODV (Ad Hoc on demand distance vector) and DSR (Dynamic source routing) are therefore can be applied to VANET as well. However, the simulation of these algorithms in VANET brought out frequent communication break which is mainly attributed to high dynamic nature of its nodes.

The **Figure 1** Shows the working of AODV node s in the field of interest.

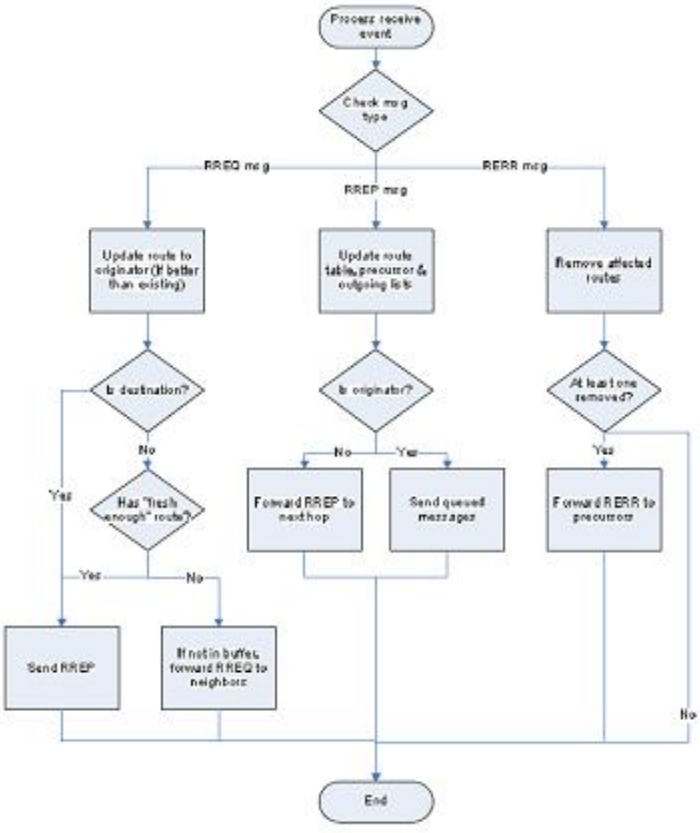


Figure 1: Flowchart showing the action of AODV node.

4.2 Position based Routing: The technique employs the awareness of vehicle about the position of other vehicle to develop routing strategy. One of the best position based routing is GPSR (Greedy Perimeter Stateless Routing) which works in the principle of combining greed forwarding and face street, (b) vehicle queues due to traffic jams, and (c) the possibility of having more than a down-town.

4.3 Cluster-based routing: In cluster based routing, several clusters of nodes are formed. All cluster is symbolized by a cluster head. Inter-communication among different clusters is carried through cluster heads whereas intra-communication within each cluster is made through direct link. F**igure 2** shows the example of cluster based routing.

This cluster algorithm, in general, is more appropriate for MANET. In VANET, owing to its high speed, and random variation of mobility, the connection of bond in the cluster often breaks. Certain modification in the algorithm (COIN - Clustering for Open IVC Network put forth by Blum et al., LORA-CBF – Location based Routing Algorithm using Cluster based Flooding) such as amalgamation of a dynamic movement system, expected decisions of driver under certain situation, enhancing the lenience limit of inter-vehicle distances are included that on are observed to provide more stable structure at the cost of little additional overhead

.

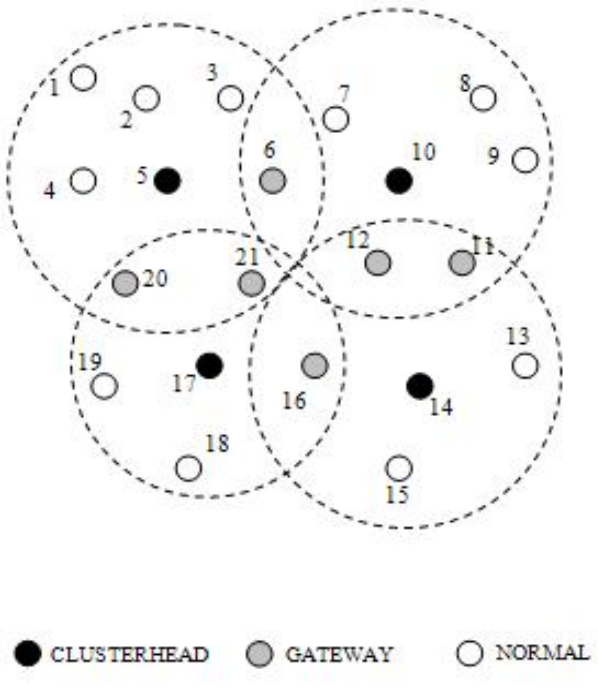


Figure 2: Cluster based routing, showing dark circle nodes as clusterheads and other blank circle nodes as normal nodes

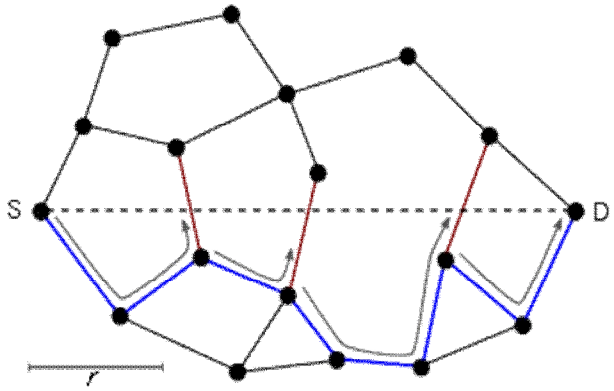


Figure 3: Geographic Routing (Position Based Routing): The node is moving from position S to position D.

4.4 Geographic routing: (also called **georouting** or **position-based routing**) is a routing principle that relies on geographic position information. It is mainly proposed for wireless networks and based on the idea that the source sends a message to the geographic location of the destination instead of using the network address. The above **Figure 3**. describes the geographic routing example.

4.5 UMB(urban multihop broadcast *):* In UMB protocol, each node while spreading the message, allocate just the farthest away node to forward the message (rebroadcast). At the crossings signals squares , repeaters are installed to forward the parcel to all road segments. This method has a elevated triumph ration and also can prevail over intervention, packet collisions etc. to a great extent.

4.6 Broadcast-based Routing: This is most frequently used routing protocol in VANET especially to communicate the safety linked messages. Easiest of broadcast technique is carried by flooding in which each node rebroadcast the message to other nodes. This decides the opening of message to all besieged destinations but has a advanced operating cost. Moreover, it works well with lesser number of nodes in the network.

5. RELATED WORK

Chen, T. Mehani, O. Boreli, R. [1] Proposes that trust establishment in VANET is a particularly challenging task due to the lack of infra-structure, openness of wireless links and the usually highly dynamic network topology. To overcome these difficulties, we propose a trusted routing framework that provides message authentication, node-to-node trust and routability verification, without online assistance of Certificate Authorities (CA).

Nzouonta, J. Rajgure, N. Guiling Wang Borcea, C. [2] paper presents a class of routing protocols called road-based using vehicular traffic (RBVT) routing, which outperforms existing routing protocols in city-based vehicular ad hoc networks (VANETs). RBVT protocols leverage real-time vehicular traffic information to create road-based paths consisting of successions of road intersections that have, with high probability, network connectivity among them.

Cabrera, V. Ros, F.J. Ruiz, P.M. [3] emphasizes that vehicular communications have been one of the hottest research topics for the last few years. Many routing protocols have been proposed for such kind of networks. Most of them try to exploit the information which may be available at the vehicle by the time that a routing decision must be made. In addition, some solutions are designed taking into account the particular, highly partitioned, network connectivity in vehicular settings. To do so, they embrace the store-carry-forward paradigm of delay-tolerant networks.

Jing Zuo; Yuhao Wang, Yuan Liu, Yan Zhang [4] puts work on environmental factors taking effects on the communication performance of routing protocols. However, in high-density urban areas, one of the important factors is vehicle-node density. This paper proposes the vehicle- node density parameter to improve the performance of AODV routing protocol and OLSR routing protocol under two typical mobile models in VANET.

Jang, Hung-Chin Huang, Hsiang-Te [5] highlights that packets transmission over VANET is intermittent due to rapid change of network topology. This comes from both high mobility of mobile nodes and limitation of roads. Intermittent transmission causes inefficient packet delivery. Those routing protocols applicable to MANET might not be suitable for VANET. In this paper, we propose a Moving Direction Based Greedy (MDBG) routing algorithm for VANET that is used to enhance routing decision in packet delivery.

As per Yuyi Luo Wei Zhang Yangqing Hu, [6] with the development of vehicles and mobile Ad Hoc network technology, the Vehicle Ad hoc Network (VANET) has become an emerging field of study. It is a challenging problem for

routing protocol for VANET based on the former results, called CBR (Cluster Based Routing). searching and maintaining an effective route for transporting some data information. In this paper the authors designed a new

6. SIMULATORS FOR VANET

Vanet simulators: Trans, NCTU, Mobilereal, Groovenet
Network simulator : ns2, sns, GlomoSim, boson sim simulator
Mobility Generators : Sumo, move, Citymobile(ns2), freesim, vanetmobisim, straw , netstream

Vanet : mobisim /sumo/ move/ straw/ citymob					
Software					
Open source	✓	✓	✓	✓	✓
Console	×	✓	✓	—	✓
GUI	✓	✓	✓	✓	✓
Available examples	✓	✓	✓	-	×
Maps					
Real	✓	✓	✓	✓	×
User defined	✓	✓	✓	—	×
Random	✓	✓	✓	×	✓
Mobility					
Random waypoint	✓	✓	✓	×	✓
STRAW	×	✓	✓	✓	×
Downtown	×	×	×	×	✓
Traffic models					
Lane changing	✓	✓	✓	✓	✓
Overtaking criteria	✓	—	—	—	×
Large road networks	—	✓	✓	✓	✓
Collisionfreemovement	—	✓	✓	—	✓
Traces					
ns-2 trace support	✓	×	✓	×	✓
GloMoSim support	✓	×	✓	×	×
XML-based trace support	✓	×	×	×	×

Table 1 : A Comparison Of The Studied Mobility Generators.

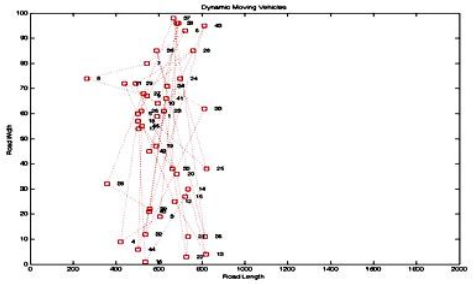
The above table1 gives the comparisons of various factors under the mobility generators of VANET

7. PROPOSED WORK

- The parameters in VANET are studied and found from the various papers
- parameters in various algorithms are merged together
- some new parameters can also be added in the existing
- Repeat the above steps and continue until we get considerable enhancement in processing speed in routing prediction
- Same algorithm can be implemented on a single algorithm to get comparable results.

- Try to guess the parameters (like node mobility) of similarity between given algorithm and existing algorithms

Screen Shot 1



8. CONCLUSION

This work has given VANET to enter into several newer applications which can be broadly categorized as safe transportation application and multimedia services. The facilities offered in intelligent transport applications are, online navigation, adjustable traffic monitoring, traffic stream control, traffic jamming analysis based on travel mobility information. These services helps in getting immediate accident information, vigilant at dead crossing, location of close to motel and gas stations etc. Besides the analysis of traffic overcrowding and mobility data could help develop optimum traffic signal system for efficient traffic flow. These applications mostly use televisive or geocast based routing schemes.

9. REFERENCES

[1] Chen, T. Mehani, O. Boreli, R.," Trusted routing for VANET", 2009 9th International Conference on Intelligent TransportSystemsTelecommunications,(ITST),Oct.2009,pp647-652

[2] Nzouonta, J. Rajgure, N. Guiling Wang Borcea, C. , "VANET Routing on City Roads Using Real-Time Vehicular Traffic Information", IEEE Transactions on Vehicular Technology, Sept. 2009, Vol. 58 , pp 3609

[3] Cabrera, V. Ros, F.J. Ruiz, P.M., "Simulation-Based Study of Common Issues in VANET Routing Protocols ", IEEE 69th Vehicular Technology Conference, 2009. VTC Spring 2009, pp 1-5

[4] Jing Zuo; Yuhao Wang; Yuan Liu; Yan Zhang, "Performance Evaluation of Routing Protocol in VANET with Vehicle-Node Density ", 2010 6th International Conference on Wireless Communications Networking and Mobile Computing (WiCOM), Sept. 2010, pp 1 - 4

[5] Jang, Hung-Chin Huang, Hsiang-Te, "Moving Direction Based Greedy routing algorithm for VANET", 2010 International Computer Symposium (ICS), Dec. 2010, pp 535

[6] Yuyi Luo Wei Zhang Yangqing Hu, "A New Cluster Based Routing Protocol for VANET", Second International Conference on Networks Security Wireless Communications and Trusted Computing (NSWCTC), 2010, Vol. 1, pp 176-180