A Survey on Greedy Routing Using Clustering Approach in VANET

Karupparaya yuvaraja.S, K.Aravindhan
PG Scholar, Assistant Professor
Department of CSE
SNS College of Engineering
Coimbatore-641107

Abstract – **Vehicular Ad hoc Network (VANET), an emerging technology, would allow vehicles on roads to form a self organized network without the aid of a permanent infrastructure. As a prerequisite to communication in VANETs, an efficient route between communicating nodes in the network must be established, and the routing must adapt to the rapidly changing topology of vehicles in motion. This is one of the goals of VANET routing protocols. In existing static infrastructure, transmitting the packets in a network with high vehicle density, but it is not applicable for dynamic infrastructure. So, the proposed system is mainly concentrate on reduce the density in both static and dynamic infrastructure. The proposed system is Hybrid Approach using cluster based routing to provide a routing algorithm which works on a hybrid scenario, i.e. it will have both static and dynamic infrastructure. The cluster based routing used in hybrid approach which will help the node for transmitting packets even in a network with low vehicle density. Moreover, cluster head backbone nodes play key role in providing connectivity status around intersections. The benefits of the proposed strategies are high packet delivery and shorter end to end delay.**

Index terms – **VANET, Cluster, Routing, Hybrid**

I INTRODUCTION

Vehicular Ad hoc Network (VANET) is a form of mobile ad-hoc network (MANET), in which vehicles communicate with each other and with nearby fixed roadside equipment. VANETs are a research field that is attracting growing attention. VANETs are highly-mobile wireless ad hoc networks designed for vehicular safety and other commercial applications. In a VANET, vehicles move non-randomly along roads and exchange information with other vehicles and roadside infrastructure within their radio range. A VANET provides both vehicle-to-infrastructure (V2I) communication and vehicle-to-vehicle (V2V) communication. V2I can provide real-time information on road traffic conditions, weather, and basic Internet service via communication with backbone networks. V2V can be used to provide information about traffic conditions and vehicle accidents based on wireless inter-vehicle communication. In V2V Communication environments, vehicles are wirelessly connected using multi-hop communication without access to any fixed infrastructure. A VANET has unique characteristics including the high and frequently changing velocities of vehicles. From the characteristics VANETs are influenced by frequent network topology changes according to the density of neighboring vehicles. A VANET should accommodate these frequent changes to vehicle mobility, vehicle density, and network topology. From these characteristics link breakages occur repeatedly and the packet loss rate increases.

Routing has been a challenge in VANETs because of the rapid movement of vehicles and frequent changes in the topology of VANETs. Greedy routing protocols are able to solve problems such as high mobility and low transmission delay because they maintain only the local information of neighbors instead of per-destination routing entries in VANET. When the network nodes move the established paths may break and the routing protocols must dynamically search for other feasible routes. Therefore maintaining connectivity is very difficult with a rapidly changing topology using the existing routing protocols of MANETs. The topology of a VANET can change rapidly. Such networks require a responsive routing algorithm that finds valid routes quickly as the topology changes and old routes break.

II RELATED WORKS

GREEDY PERIMETER STATELESS ROUTING PROTOCOL

Greedy perimeter stateless routing (GPSR) is the best known greedy routing protocol for VANETs. GPSR makes greedy forwarding decisions using only information about a router's immediate neighbors in the network topology. GPSR consists of two methods for forwarding packets: greedy forwarding and perimeter forwarding. GPSR exploits the correspondence between geographic position and

ISSN: 2278 – 1323

connectivity in a wireless network, by using the positions of nodes to make packet forwarding decisions. When a packet reaches a region where greedy forwarding is impossible, the algorithm recovers by routing around the perimeter of the region. GPSR uses greedy forwarding to forward packets to nodes that are always progressively closer to the destination.

This process repeats at each intermediate node until the intended destination of the packet is reached. It goes back to greedy forwarding as soon as it overcomes local maxima. Since GPSR only maintains location information of all of its 1-hop neighbors, it is nearly stateless and leads to better scalability in a per-router state than shortest-path ad hoc routing protocols. Another way of overcoming the local maxima is by the right hand rule with the face routing. However, GPSR may increase the possibility of getting a local maximum and link breakage because of the high mobility of vehicles and the road specifics in urban areas. GPSR also suffers from link breakage with some stale neighbor nodes in the greedy mode because of the high node mobility and rapidly-changing network topology. The local maximum and link breakage can be recovered in perimeter mode forwarding, but packet loss and delay time may occur because the number of hops increases in perimeter mode forwarding. These characteristics of greedy forwarding decrease VANET reliability.

GREEDY PERIMETER CORDINATOR ROUTING PROTOCOL

Greedy perimeter coordinator routing (GPCR) is both a position-based routing protocol using standard greedy forwarding and a repair strategy that does not require a graph planarization algorithm. It was proposed to improve the reliability of GPSR in VANET. The main idea of GPCR is to take advantage of the fact that streets and junctions form a natural planar graph, without using any global or external information such as a static street map. GPCR consists of two parts: a restricted greedy forwarding procedure and a repair strategy and junctions. Therefore it does not need a graph planarization algorithm. In the restricted greedy forwarding of GPCR, junctions are the only places where actual routing decisions are made. Therefore, packets should always be forwarded to a node on a junction rather than being forwarded across a junction. A coordinator broadcasts its role along with its position information. If the forwarding node is located on a street and not on a junction the packet is forwarded along the street towards the next junction. Once a packet reaches a coordinator a decision has to be made about the street that the packet should follow. This is done in a greedy fashion: the neighboring node with the largest progress towards the destination is chosen.

The repair strategy of GPCR consists of two parts: The first on each junction it has to be decided which street the packet should follow the second between junctions a special form of greedy forwarding is used to forward the packet towards the next junction. Given that no external map is available, the key challenges are to identify nodes that are on a junction and to avoid missing junctions while greedy forwarding is used. Therefore, the basic behavior of GPCR is similar to GPSR, but it selects a relay node after considering information about the road structure. GPCR makes routing decisions on the basis of streets and junctions instead of individual nodes and their connectivity. However, GPCR forwards data packets based on the node density of adjacent roads and the connectivity to the destination. Thus, if the density of nodes is low or there is no connectivity to the destination, then the delay time increases and the local maximum problem go unresolved.

GEOGRAPHIC SOURCE ROUTING

Geographic source routing (GSR) is the first protocol to use a map of the streets, and is mainly proposed for urban environments to avoid the problem of GPSR. GSR tries to overcome the disadvantages of position-based routing approaches designed for MANETs when applied to VANETs in urban scenarios. Using a static street map and location information about each node, GSR computes a route to a destination by forwarding messages along streets. In GSR, a source node computes the shortest path to an intended destination using Dijkstra's algorithm based on the distance metric. The computed path consists of a sequence of junction IDs known as anchor points (AP), along which packets should be forwarded to reach the destination. These anchors, obtained from street maps, reflect the underlying road topology and usually represent the road intersections where decisions are made. The list of junctions is then inserted into the header of each data packet sent by the source. The packets are forwarded over the selected path from one AP to the next AP using the greedy forwarding scheme. Moreover, it is important to note that the authors make use of a reactive location service to retrieve the current position of a desired destination. Concretely, the source node floods the network to query the location of a specific distant node, which wastes bandwidth. The studies conducted to compare GSR

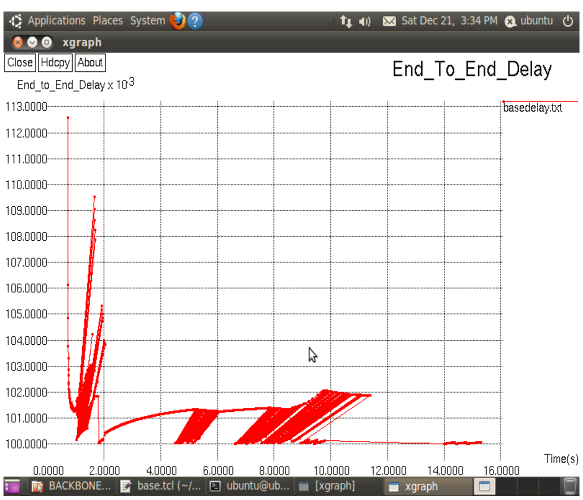
ISSN: 2278 – 1323

with topology-based protocols show the advantage of this map-based approach in realistic vehicular environments. However, it should be noted that the insertion of the entire path in the packet's header cannot be preferred if there is a long route between the source and the destination, since it causes additional packet overhead. Furthermore, assuming the connectivity of the shortest path is not realistic since it does not consider situations where there is no sufficient number of vehicles on the road between two involved junctions to ensure road connectivity. That is, the packets are directly discarded if they face a local maximum situation along one road segment that prevents them from progressing towards the next AP, even though an alternative longer path may exist.

ANCHOR-BASED STREET AND TRAFFIC AWARE ROUTING

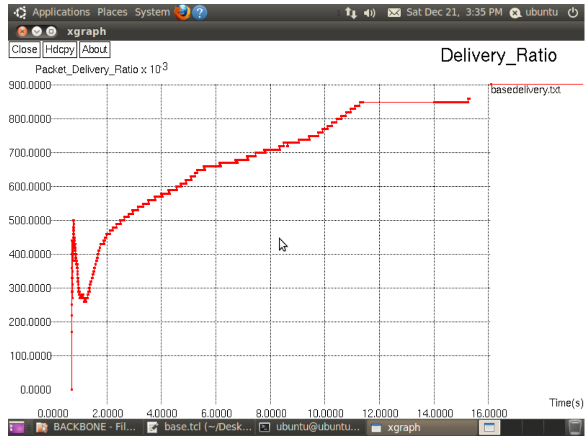
Anchor-based street and traffic aware routing (A-STAR) is designed for V2V. A-STAR also aims to improve the problem where the perimeter mode of GPSR utilizes next-neighbor hops along a street instead of selecting the farthest neighbor along a street for the next hop. It utilizes city bus routes to identify an anchor path with high connectivity for packet delivery in city environment. The anchors in the A-STAR are both geographic forwarding points to route packets and junctions that a packet must pass through to reach its destination. The A-STAR involves inserting a sequence of anchors into a packet, through which the packet must travel on its route to the destination.

III COMPARISION CHART



END TO END DELAY

Chart shows the delay elapsed between packet generation at the source and at the destination.



PACKET DELIVERY RATIO

Chart shows the ratio of the total number of packets received at the destination to the total number of packets generated by the source.

IV CONCLUSION

Many crucial problems are explored such as unreliable location service, intersection node probing problem, etc., experienced by VANET routing protocols. Then, hop greedy routing protocol is proposed that aims to reduce the end-to-end delay by yielding a routing path that includes the minimum number of intermediate intersections. The zone wise partitioning of a city road network is an important design framework for the efficient functioning of the destination discovery procedure. The hop greedy algorithm finds the best possible path in terms of both hop count and connectivity. To address connectivity issues such as void regions and unavailability of forwarders, the concept of back-bone node is introduced. The proposed techniques improve the efficiency of packet delivery ratio and reduce end to end delay.

REFERENCES

1. Bernsern.J and Manivannan.D, "Unicast routing protocols for vehicular ad hoc networks: A critical comparison and classification," Pervasive Mob. Comput., vol. 5, no. 1, pp. 1–18, Feb. 2009.
2. Johnson D.B, Maltz D.A, and Broch.J, "DSR: The dynamic source routing protocol for multi-hop wireless ad hoc networks," in Ad Hoc Networking, C. E. Perkins, Ed. Reading, MA: Addison-Wesley, 2001, ch. 5.
3. Karp.B and Kung H.T, "GPSR: Greedy perimeter stateless routing for wireless

ISSN: 2278 – 1323

networks," in Proc. ACM MOBICOM, 2000, pp. 243–254.

4. Liu.G, Lee B.S, Seet B.C, Foh C.H, Wong.K.J, and Lee.K.K, "A routing strategy for metropolis vehicular communications," in Proc. ICOIN, LNCS, Aug. 2004, pp. 134–143.
5. Lochert.C, Hartenstein.H, Tian.J, Fubler.H, D. Hermann, and M. Mauve, "A routing strategy for vehicular ad hoc networks in city environments," in Proc. IEEE Intell. Veh. Symp., 2003, pp. 156–161.
6. Lochert.C, Mauve.M, Fubler.H, and Hartenstein.H, "Geographic routing in city scenarios," ACM SIGMOBILE Mobile Comput. Commun. Rev., vol. 9, no. 1, pp. 69–72, Jan. 2005.
7. Menouar.H, Lenardi.M, and Filali.F, "Improving proactive routing in VANETs with the MOPR movement prediction framework," in *Proc. ITST*, 2007, pp. 1–6.
8. Ni.S.Y, Tseng.Y.C, Chen.Y.S, and J. P. Sheu, "The broadcast storm problem in a mobile ad hoc network," in *Proc. ACM/IEEE MOBICOM*, 1999, pp. 151–162.
9. Naumov.V and Gross T.R, "Connectivity-aware routing (CAR) in vehicular ad hoc networks," in Proc. IEEE INFOCOMM, 2007, pp. 1919–1927.
10. Perkins C.E and Royer E.M, "Ad-hoc on-demand distance vector routing," in Proc. 2nd IEEE Workshop Mob. Comput. Syst. Appl., 1999, pp. 90–100.

ISSN: 2278 – 1323