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BAEV: Back-Bone Assisted Emergency alert in VANET's City Environments

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Abstract: Our goal is to achieve high packet delivery ratio and shorter end-to-end delay in VANET.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 paper, 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. We propose a technique to enhance our base work. In our enhancement, we propose the emergency alert.

I. Introduction:

VANET means 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 supposed that the first networks that will incorporate this technology are 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 measures are defined in vehicles by VANET, flowing communication within automobiles, edutainment and telemetric.The most favorable target is the more useful, efficient and safer roads will built through vehicular networks by informing to basic authorities and drivers in time in the future. Another target is to discover the advancement of vehicular ad hoc networking (VANET) wireless technologies. The purpose is to secure and to make possible commercial requests through range of communication systems and/or other networks (VANET) which goes short to medium. These technologies would support main concern for critical time secure communication and fulfill the QOS needs of other multimedia software or e-commerce mobile. Next goal to create high-presentation, extremely measurable and secured technologies of VANET shows an unusual challenge to the investigate community of wireless. Specific restrictions normally assumed in ad hoc networks are alleviated in VANET yet. Such as, VANET might assemble comparatively huge means of computational. Mostly interests to MANETS belong to the VANETS but the features are different. Vehicles are likely to move in structured way. The connection with wayside equipment can similarly be indicated absolutely accurately. In the end, mostly automobiles are limited in their motion range, such as being controlled to pursue a paved way.

VANET suggests unlimited advantage to companies of any size. Vehicles access of fast speed internet which will change the automobiles' on-board system from an effective widget to necessary productivity equipment, making nearly any internet technology accessible in the vehicle. Thus this network does pretend specific security concerns as one problem is no one can type an email during driving safely. This is not a potential limit of VANET as productivity equipment. It permits the time which has wasted for something in waiting called "dead time", has turned into the time which is used to achieve tasks called "live time".If a traveler downloads his email, he can transform jam traffic into a productive task and read on-board system and read it himself if traffic stuck. One can browse the internet when someone is waiting in vehicle for a relative or friend. If GPS system is integrated it can give us a benefit about traffic related to reports to support the fastest way to work. Finally, it would permit for free, like Skype or Google Talk services within workers, reducing telecommunications charges.

II. Literature survey

In [1] this paper, author discusses the advantages and disadvantages of topology-based and position-based routing protocols and explores the motivation behind their design and trace the evolution of these routing protocols. In [2] this paper author summarizes the characteristics of representative routing protocols that have either been used or designed specifically for VANETs and also indicated the type and subtypes whether they are topology-based or position-based and whether they are proactive/reactive, DTN or Non-DTN, overlay or not. In [3] paper, author analyze a position-based routing approach that makes use of the navigational systems of vehicles and compare this approach with non-position-based ad-hoc routing strategies (Dynamic Source Routing and Ad-Hoc On-Demand Distance Vector Routing).The position-based routing protocol GPSR[4] relies on the location service to acquire the position information of the destination. Basically, it uses two strategies, namely, greedy forwarding and perimeter routing, to send packets from source to destination. In greedy forwarding, a neighbor is chosen as the forwarding node if it has the shortest Euclidian distance to the destination among all neighbors. On the other hand, if no neighbor is witnessed closer to the destination than the sender itself, then perimeter routing is exercised. In GPCR[5], packets are forwarded by applying a restricted greedy forwarding procedure. During the selection of a forwarding node, a junction node termed as the coordinator node is preferred over a nonjunction node. Note that the coordinator node is not necessarily the closest node to the destination.

However, the recovery strategy in GPCR remains the same as GPSR. The A-STAR features the best use of city bus route information to identify anchor paths. The main idea behind such arrangement is that more packets can be delivered to their destinations successfully using paths having more connectivity. Geographic source routing uses a static street map and location information about each node. The sender computes a sequence of intersections using Dijkstra's shortest path algorithm to reach to the destination. The sequence of intersections is placed in the data packet header. The improved GyTAR[9] is an intersection- based geographical routing protocol that finds a sequence of intersections between source and destination considering parameters such as the remaining distance to the destination and the variation in vehicular traffic. The data forwarding between the intersections in GyTAR adopts either an improved greedy forwarding mechanism or a carry-and-forward mechanism, depending upon the availability of the forwarding node. In CAR[10], the source broadcasts request messages to probe the destination The request message caches the change of direction information and gathers the connectivity and hop count information en route. On receiving request message, the destination decides the routing path and replies to the source.

Summary of Existing work:

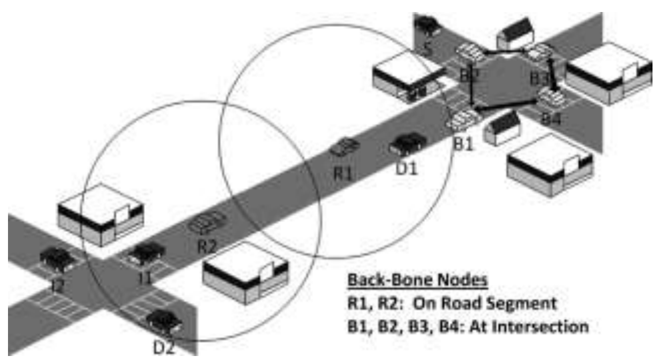
Originally, many routing protocols were solely designed for mobile ad hoc networks and later enhanced to suit the VANET scenarios. Number of Existing Routing protocols like GPSR work well in city environments. However, these protocols encounter different problems that motivate us to design a new robust scheme.

- Intersection Node Probing Problem
- Location Service Requirement Problem

Proposed system:

In this section, we present a position-based connectivity aware back-bone-assisted hop greedy routing protocol and emergency alert 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, we rely on a group of nodes called back-bone nodes.

The zone wise partitioning of a city road network is an important design frame- work for the efficient functioning of the destination discovery procedure. Back-bone nodes of this kind are of three types namely stable, primary, and secondary back bones.

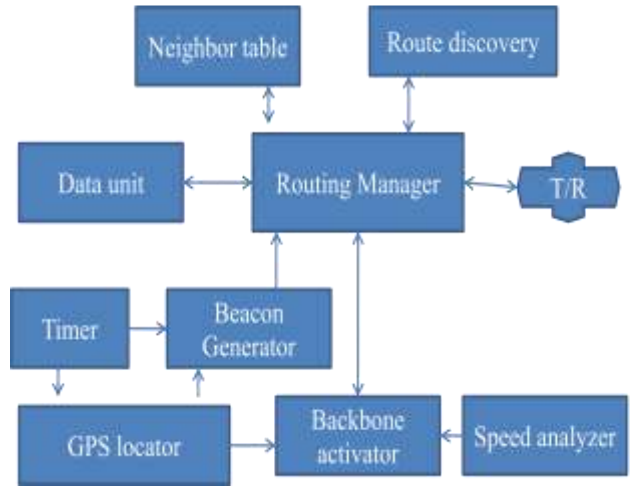


A stable back-bone node is selected from the stream of vehicles waiting at the intersection during red traffic signal. Among the waiting vehicles, the vehicle closest to the intersection declares itself as the stable back bone. However, primary and secondary back bones are selected from the fleet of vehicles crossing the intersection when the signal turns green. 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. Then, the primary backbone 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 backbone. This notification also informs vehicles at or around the intersection about the new primary back bone.

The hop greedy algorithm finds the best possible path in terms of both hop count and connectivity. The stable back-bone nodes take the responsibility of packet buffering. In the absence of a suitable forwarding node, the packet is stored in a stable back-bone node.

On availability of a forwarding node in the desired direction, packet is retrieved and forwarded. Before receiving the reply message, the source maychange its position. Some back-bone nodes must be aware of the direction of the source movement. When a forwarder chosen among the back-bone nodes learns about such changes, it forwards the reply message toward the new direction. Ultimately, the source is able to receive the reply message. Likewise, the destination may change its position before receiving the data packet, and its movements are tracked by the back-bone nodes. The destination may move substantially far from its original position. In such cases, the hop count will be elevated if the packet is forwarded using the updates received from the back-bone nodes. Thus, a fresh reply message is forwarded to the source if the destination changes its zone. On receiving this reply message, the source can compute a better path to the destination. This can marginalize the hop count, irrespective of the destination movement.

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.

Algorithm:

At initial, $Nd_{type} \leftarrow NN$ (all the nodes are normal node at initial time), $Nb_{table} = \{\}$, we are assuming that each node has GPS and digital map. Node current pos Px=Py=-1, Old position Ox=Oy=-1. Road_id Rid, intersection is denoted as J, and each node has own node id ***Nid,*** each node denotes own information as "$self$"

1) Set Timer $T_h = 0 + rand(time)$
2) If Timer $T_h \leq T_c$ // timer expired with current time
   a. If $Ox = Px \& Oy = Py$
      i. Set node ==>***STB*** //set node as stable backbone
      ii. Foreach $n \in Nb_{table}$ //each member of neighbor table
         1. If $n.Nd_{type} = STB \& Rid = n.Rid$//already stable found
            a. Set node ==> NN //reset as normal node
            b. Break;
   b. Elseif $(Px, Py) infrontofJ$ //not crossed intersection
      i. Set node ==>***PB***//set node as Primary backbone
      ii. Foreach $n \in Nb_{table}$ //each member of neighbor table
         1. If $n.Nd_{type} = PB \& Rid = n.Rid$//already PB found
            a. Set node ==> NN //reset as normal node
            b. Break;
   c. Elseif $(Px, Py) NexttoJ$ // crossed intersection
      i. Set node ==>***SB***//set node as Secondary backbone
      ii. Foreach $n \in Nb_{table}$ //each member of neighbor table
         1. If $n.Nd_{type} = SB \& Rid = n.Rid$//already SB found
            a. Set node ==> NN //reset as normal node
            b. Break;
   d. Send the hello with BB info
3) If pktrecv (*pkt*)
   a. Pkt is ***Hello***
      i. If $S_{hello} \in Nb_{table}$ //source of hello information already found
         1. Update $S.Px, S.Py, S.Nd_{type}$ and $T_x = T_c + Interval$ //update position and node type and expire time
      ii. Else
         1. Create new entry $S_{hello} \cup Nb_{table}$ //node id, update position and node type and expire time
   b. Pkt is Req
      i. If $Nd_{type} \neq BB$ // node is not backbone
         1. If $Pkt.dst \neq Nid$ //node is not destination so it ignores the packet
            a. Ignore pkt
         2. Else if $Pkt.hop = Greedy\_hop$ //new path is shorter than old so send reply
            a. Send Reply
         3. Else
            a. Ignore // if path is longer then ignore
      ii. Elseif$Nd_{type} = STB$

1. Set $D_{fw} = 0$ // no initial delay for Stable backbone

iii. Elseif$Nd_{type} = PB$

1. Set $D_{fw} = D_p$ // PB has to send pkt after small delay but it less than SB delay

iv. Elseif$Nd_{type} = SB$

1. Set $D_{fw} = D_s$ // SB has to send pkt after small delay

v. If $Los(self, Pkt.Frw)$ // pkt forwarder is in line of Sight to me

1. Set $D_{fw} = D_{fw} + rand(D_l) + D_{dis}$ //add small rand delay for direct node

vi. Else

1. Set $D_{fw} = D_{fw} + D_l + rand(D_{nl})$ //add small rand delay for non-LoS node this delay is greater than LoS delay

vii. Forward Pkt after $D_{fw} + Tc$

c. Pkt is Rep

i. If $Pkt.hop < Old_{rep}$ // best path accept

1. $Old_{rep} = Pkt.hop$
2. If $(Self = Pkt.dst)$
   a. Send data
3. Else
   a. Forwad

ii. Else

1. ignore

IV. Requirements:

Hardware:

Single PC, 20 Gb Hard disc space, 1Gb RAM

Software:

Linux OS (Ubuntu 10.04), NS2.34

Result:

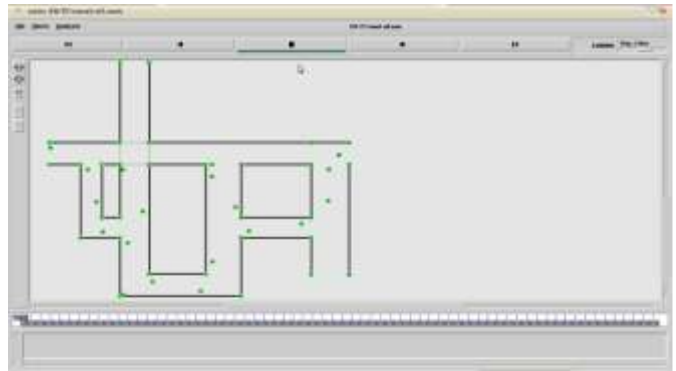


Fig.1 Road map creation

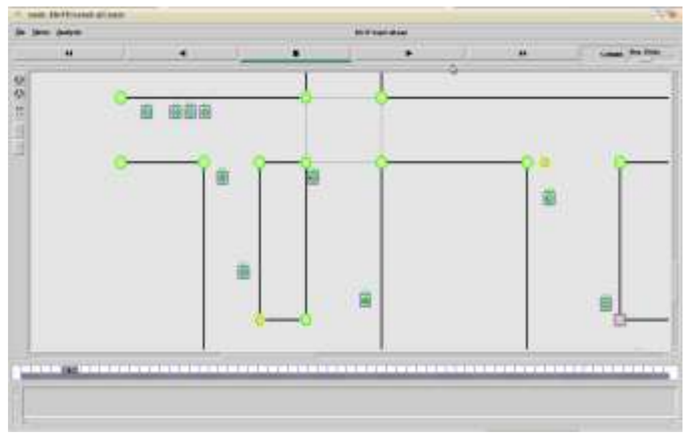


Fig.2 Node movement

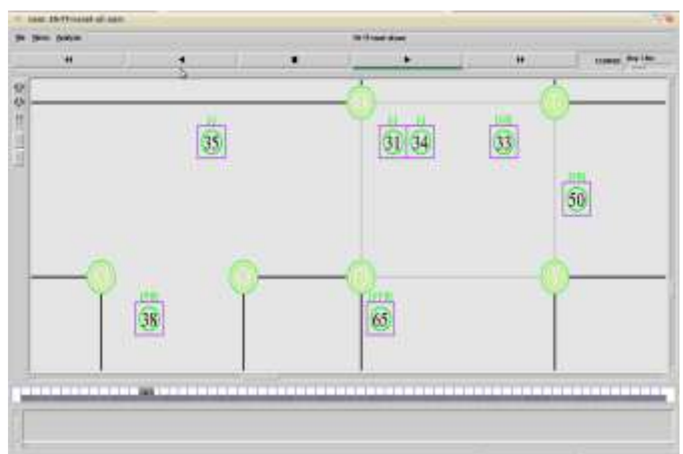


Fig.3 Backbone creation testing

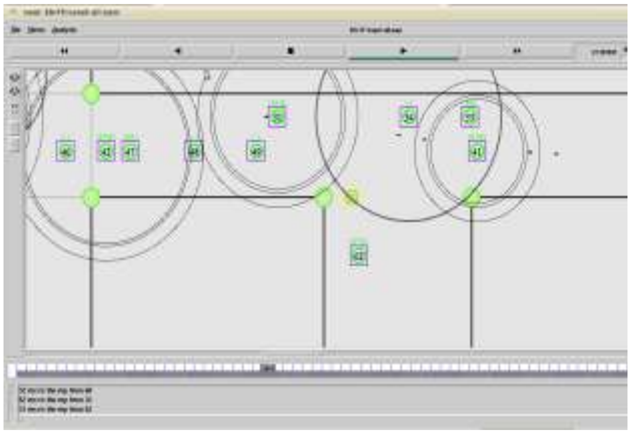


Fig.4 Data sharing

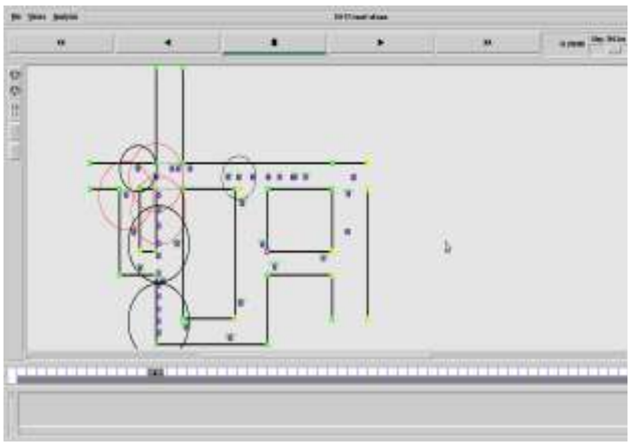


Fig.5 Emergency Alert

Fig 1 shows the road map creation with 22 dummy nodes and 70 moving vehicles. Fig 2 shows the movement of vehicles. Fig 3 shows the backbone nodes. Source sends the request for destination to all the neighboringnodes. All neighboring nodes forwards the requests. Stable backbone node stores the information of all other nodes. When the reply is received from destination the data sharing is done between source and destination shown in fig 4.To avoid the collision Emergency alert is given at the intersection based on speed and position of the vehicle. Fig 5 shows the emergency alert indicated with red circle. Backbone node broadcast the emergency alert at the intersection.

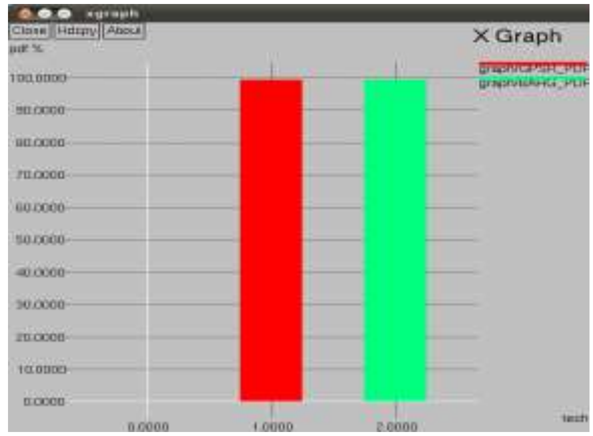


Fig.6 Packet delivery fraction

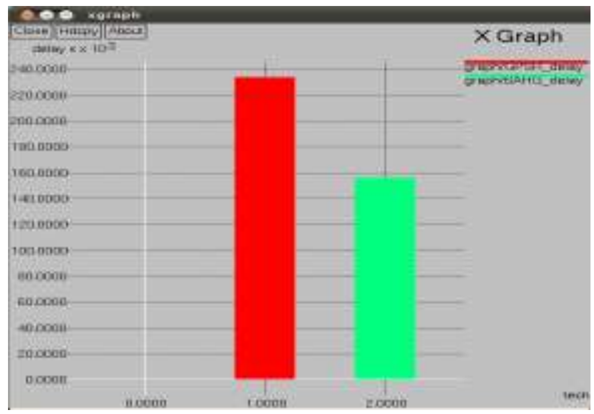


Fig.7 End to end delay

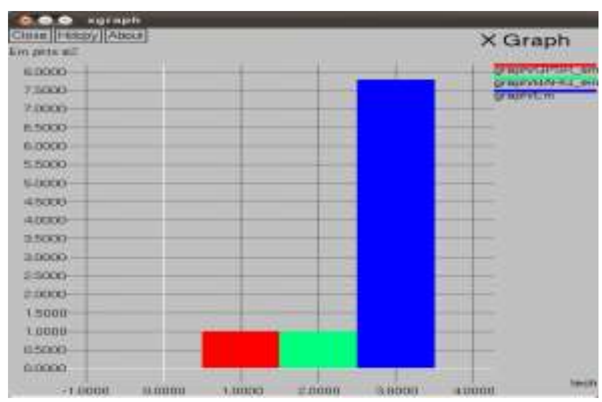


Fig.8 Emergency Alert

Fig 6 shows the packet delivery ratio varied with existing system GPSR.packet delivery ratio is increased. One common factor responsible for this drop is the dependence on intersection node for packet forwarding. An increase in the src–dst distance reduces the chance of finding an intersection node. Backbone Assisted Emergency alert in Vanet city environments(BAEV) does not suffer from the so-called intersection node probing problem as it avoids forwarding through intersections. The outcome is expected as BAEV makes minimal use of intersections. However, the update mechanism of the BAEV protocol with the help of back-bone nodes enables the source to be connected with the destination through a reliable path. Therefore, the packet delivery ratio of BAEV is maintained high. Fig 7 shows the end to end delay varied with existing system. End to end delay is decreased compared with existing one. This paper proposes emergency alert it is shown in Fig 8.Emergency alert avoids the collisions in vehicles.

V. Conclusion:

We have achieved our goal by our enhanced BAHG.This paper introduces Emergency alert forvanet.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 paper, we proposed 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. We proposed a technique to enhance our base work. In our enhancement, proposed work successfully made the emergency alert.

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