VANET based traffic awareness data delivery strategy

[1]Jigna Bhagora, [2]Krunal Panchal

[1] Student ,Computer engineering, L.J.I.E.T, Gujarat, India
[2] Assistant Professor, Computer engineering, L.J.I.E.T, Gujarat, India

ABSTRACT

Vehicular Ad Hoc Network (VANET) is an emerging class of wireless network that operates in a vehicular environment to provide communication between vehicles. VANET can be used by wide variety of applications to improve road safety, traffic efficiency and driving comfort. With the high dynamic nature of this network, communication linkage among vehicles in the environment suffers from link-breakage problem hence requires a reliable data delivery strategy to cope with this issue. In this work, we presents a data delivery strategy called Traffic-Aware Data Delivery (TADD). The idea is to use static nodes placed at each road junction to collect real-time traffic information to improve the situational awareness of the real road conditions. With these static nodes, traffic conditions of their surrounding roads can be obtained and a reliability score for each road can be determined. These scores is then used to select what it considers the most reliable path for data transmission to its destination.. TADD uses Dijkstra's least weight path algorithm to calculate what it considers the most reliable path with the road weights given by its nearest static node.

Keyword : *VANETs, Urban environment, connectivity routing , traffic aware routing ,road based routing*

1. Introduction

1.1 VANET

Vehicular Ad hoc Network (VANET) as a special class of Mobile Ad hoc Network (MANET) in which it adopt the idea to moving vehicles in order to create an extremely large scale mobile network. Two types of communication are used on a simply vehicular network, Vehicle-to-Vehicle (V2V) and Vehicle-to-Road-Side-Unit (V2R); both have to guarantee a successful transmission of the data packets. Since VANET needs critical road-safety information to be robustly and rapidly delivered to its road users, routing protocols have to be conceived to support the requirements.

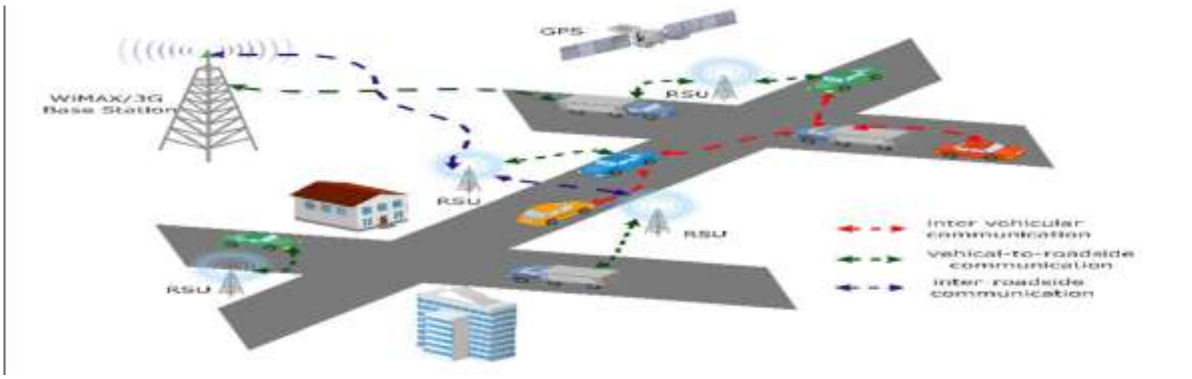

Fig -1: VANET

1.2 Basic Concepts of HTAR

Each node in the network is required to maintain a Neighbor Information Table using periodic hello message. As illustrated in Figure 1, this table contains information such as the position and velocity of neighboring nodes; Road ID is the unique identification of each road calculated via digital road map; At Junction defines whether the node is located at a junction; TTLJ/Channel Load is an adjustable field according to the value stored in the At Junction field. For instance, if At Junction is true, then Time to Leave Junction (TTLJ) is used in this field to indicate the remaining period of time for a node to leave a junction. On the contrary, if At Junction is false, Channel Load is used to represents the ratio of channel busy time. Timestamp is the receiving time of the record to determine the freshness of the record.

Neighbor Information Table								
Node ID (i)	X-axis Position (x_i)	Y-axis Position (y_i)	X-axis Speed (v_{xi})	Y-axis Speed (v_{yi})	Road ID	At Junction	TTLJ/Channel Load	Timestamp

Fig-2 Neighbor Information Table

HTAR is a hybrid traffic-aware routing protocol design for urban environment. A reliability score called road weight for each road is calculated according to the real-time traffic density and network traffic load monitored by each Junc Tracker. Each source is required to select a road that has the lowest weight as its optimal routing path for data transmission. Based on the selected path, a relay node called next forwarder is chosen reactively until the packet reaches to the next junction or its destination.

2. Related work

Wanting Zhu1, Deyun Gao1, Chuan Heng Foh, Weicheng Zhao , Hongke Zhang proposed to work on collision avoidance mechanism using the RBEM/CBEM Handshake mechanism for emergency broadcasting process.

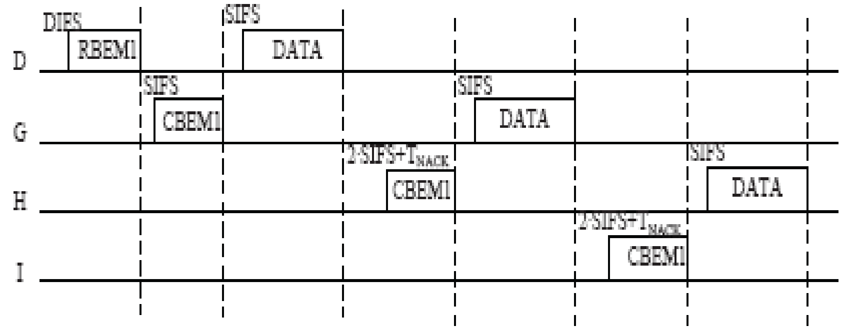

Fig-3 The road segment broadcasting process

Fig. 3 illustrates an example of the emergency message broadcasting process with the RBEM/CBEM handshake in the road segment case. Vehicles D, G, H and I are on a road segment ordered according to the message flow. The ordinary nodes that have received .RBEM or CBEM messages remain silent until the emergency messages are received or the waiting time expires. Moreover, if the ordinary nodes fail to receive the emergency messages after listening to the handshake behaviors, they can send NACKs to request the emergency message broadcast again.

2.1 Redundant Relay Node Adaption

Our proposed mechanism adds an additional RBEM/CBEM handshake to an existing routing protocol to enhance its broadcast reliability. Although we propose using the relay node selection which is already available in the routing protocol, we recognize that many routing protocols attempt to derive and use minimum set of relay nodes to avoid redundancy. However, in our application, any failure of transmission may cause the termination of message propagation and limit the cover age. With the ability of detecting failures through RBEM/CBEM and NACK, we further propose dynamic scaling of redundant relay nodes based on the RBEM/CBEM feedback. Precisely, we propose using an additive increase and multiplicative decrease (AIMD) adjustment.

Xin Ming Zhang, Member, Kai Heng Chen, Xu Lei Cao, and Dan Keun Sung, Fellow proposed method for delivering data packet , a street centric forwarding scheme was proven to be better than a node centric forwarding scheme.

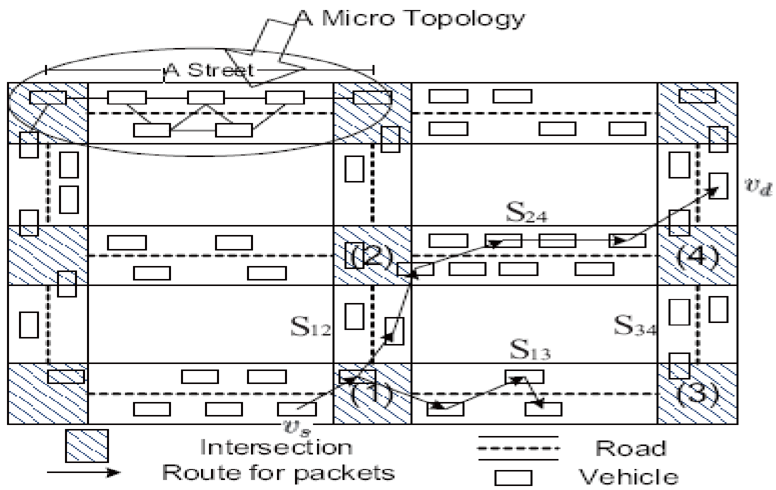

Fig-4 Example of micro topology

shown in Fig. 4. However, if vehicle *Vs* selects street *S*13 as the next street, the packets may encounter network partition, which seriously reduces the routing performance. The efficient routing decision for a path of streets from the source to the destination depends on the the routing-related characteristics of the streets. The characteristics of streets can be divided into two parts as follows:

Static attributes: They represent the unchangeable (static) characteristics of streets for a packet passing throughthe streets. For example, the static length of streets represents the geographic progress of the streets. It is defined as the difference between the distance from one side of the street to a destination and the distance from the other side of the street to the destination.

Dynamic attributes: They represent the changeable (dynamic) information of vehicles in the street, which actually determines the routing performance for a packet passing through the streets. The dynamic attributes of a street depend on the changeable information of vehicles in terms of vehicle density, connectivity, mobility of vehicles and the existing data traffics, which reflect the channel contention among vehicles.

Joanne Skiles ,Imad Mahgoub summarized simulation parameter in table. The simulation time for each protocol simulation was 600 seconds. Three simulations for each protocol were done, one with 200 vehicles (low density), another with 400 vehicles (medium density), and the last one with 600 vehicles (high density). This is to illustrate how traffic effects each protocol, and how the protocol is able to adapt.

Table-1 Simulation table

Parameters	Values
Number of Vehicles	200, 400, 600
Transmission Range	400m
Simulation Time	600s
Bitrate	18 mbps
MAC Protocol	IEEE 802.11p
Data Packet Size	512 bytes

Hiroki Hanawa and Hiroaki Higaki create forward protocol of data message by using representation, a multi hop data message transmission protocol with inter vehicle communication and store-carry-forward is designed. since protocol support wide area sparsely distributed VANET.

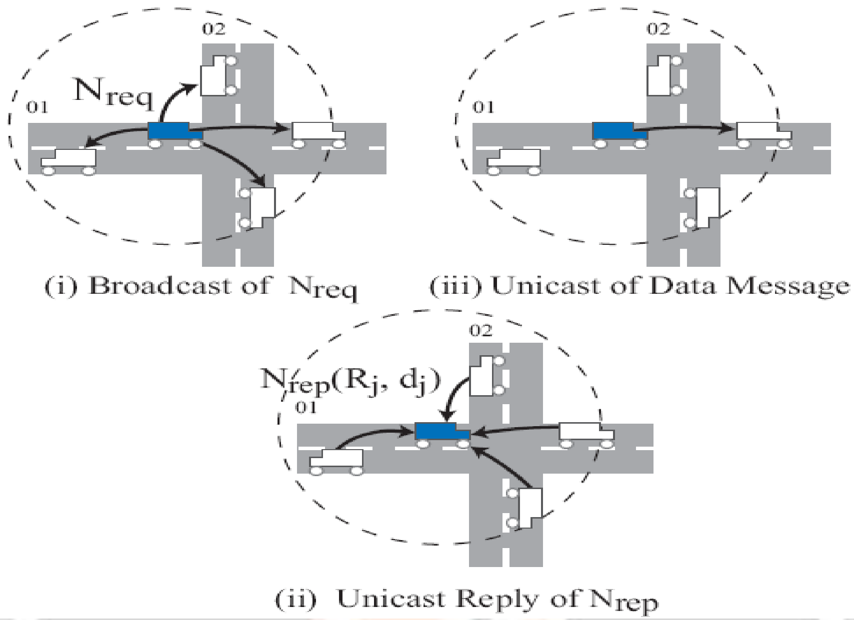

Fig-5 Forwarding Protocol of data message

3.Conclusion

In this dissertation focus on selection of roads and proposed a handshake mechanism to improve the reliability of emergency message broadcasting triggered by urgent event like accident ,road damage etc. in this system we try to solve link-breakage problem so there is requirement of new technique that provide a reliable data delivery improve some parameter like average end-to-end delay ,packet delivery ration ,throughput.

4. References

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