Research Paper

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A Study on Internet Message Transmission in a Vehicular Ad-hoc Network Using GPSR Routing

Engineering

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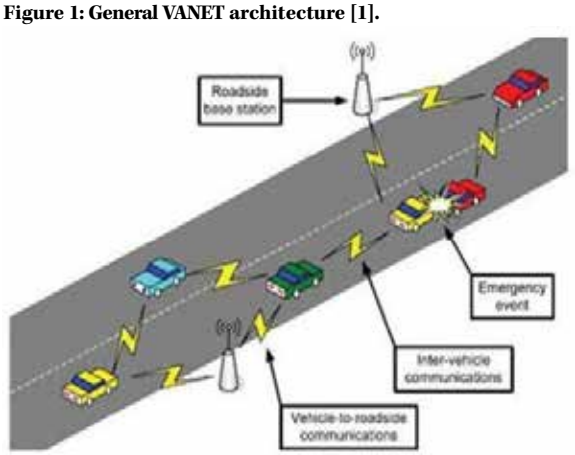
ABSTRACT

Vehicular ad-hoc network is a new technology for researchers, which has a many new applications in safety, infotainment and optimization. VANET main aim is secure communication between vehicles. In this paper we use VeMAC, A TDMA based MAC protocol supports efficient one-hope and multi-hope broadcast service on the control channel. For the packet forwarding we use novel routing schema. Packet routing schema based on multichannel VeMAC protocol.

INTRODUCTION

Now a days VANET is new emerging technology for researchers. Researchers are mostly like to research in this area. VANET is a one type of ad-hoc network equipped with a vehicle as a node. Biggest issue of ad-hoc network are stability, reliability and mobility. VANET consist of a set of stationary unit along with road known as road side unit (RSU). It is based on two kind of communication: (1) Vehicle to vehicle (V2V) (2) vehicle to RSU [2]. Safely Message transmission are more important while communication. So the Main objective of VANET is to achieve efficient communication between nodes. General architecture of VANET is shows in figure 1.

Figure 1: General VANET architecture [1].



Main aim of VANET architecture is – (1) To achieve multi hope in-vehicle internet access by using routing scheme of safety application (2) Satisfy QOS requirement. VANET equipped with the sensors and on board unit (OBU) installed in the car as well as RSU. So the communication between the vehicles are done by OBU. Through GPS data collected from the sensors and the data displayed to driver and sent to RSU. RSU distribute these data to another vehicles.

Road accident is a big issue in world wide. Safety of speed limit and road condition are implemented till now but still more work and safety required. Major aim of VANET is provide safety information by warning drivers about the danger before they actually face it. VANET are based on periodically broadcast safety message by vehicles and RSU. Any failure of safety message can effect of people.

The special characteristics of VANET is the highly dynamic network topology and diverse quality of service (QoS) requirements of potential applications, result in significant challenges in the design of an efficient medium access control protocol (MAC) protocol. Various MAC protocols have been proposed for VANETs based either on IEEE 802.11 or on channelization such as time division multiple access (TDMA), space division multiple access (SDMA) and code division multiple access (CDMA) [4]. The IEEE 802.11p is a recently proposed MAC standard for VANET. MAC protocol is such a useful for broadcast periodically safety message but the major problem with MAC protocol is it cannot solve hidden terminal problem. On other hand TDMA protocol like VeMAC, ad-hoc MAC can support reliable broadcast service without hidden terminal problem [4]. Time synchronization can be achieve by using GPS, so TDMA are good for VANET scenario. In this paper we use TDMA based MAC protocol for reliable communication.

Proposed Internet Message Transmission Using GPSR Routing

In these section, we introduce proposed strategy for the following features:

As we show in Figure 2, the major steps involved are how vehicle access the media using VeMAC protocol and how Path are selected and packets are forwarded to destination node using GPSR Routing. Also shows how Vehicle communicate with Gateway. The new strategy for internet communication in VANET. Up till now, MAC with GPSR are not use in VANET, we use GPSR for finding the reliable path and VeMAC for better channel availability.

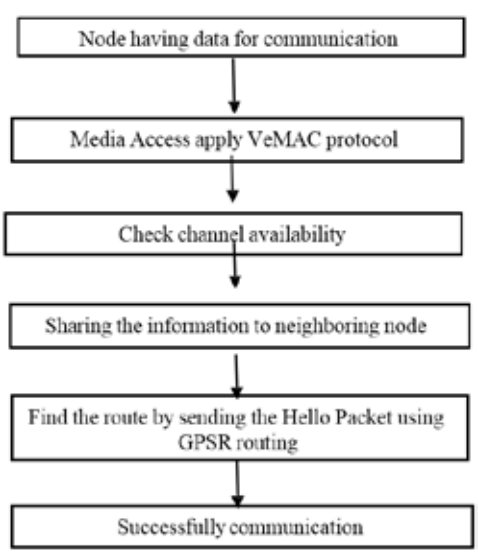


Figure 3: Steps of proposed work.

3. VEMAC PROTOCOL

VeMAC primaries

Main aim of MAC protocol is to attribute the access the shared medium. It restrict the node within the transmission range of each other from transmitting at the same time.

In VeMAC protocol two channel use by all node to access the channel. Two channel are used: control channel (CCH) and service channel (SCH). Node has two transceiver. Transceiver one always tuned on CCH and transceiver 2 switching according to SCH. In this protocol, each node must acquire exactly one time slot in a frame on channel C0. Once a node acquires a time slot, it keeps accessing the same slot in all subsequent frames on channel C0 unless a transmission collision is detected.

Header	Ans	Acs	Header Priority Application

Figure 2: Format of each packet transmitted on Channel [5].

Each packet4 transmitted on channel c0 is divided into four main fields: header, announcement of services (AnS), acceptance of services (AcS), and high-priority short

Applications, as shown in Figure 2. Each node must transmit a packet during its time slot even if the node has no data to include in the high-priority short applications field. The reason is that information in the header, AnS and AcS fields, is necessary for other nodes to decide which time slots they can access on the control channel and service channels.

For a certain node x, the following sets are defined:

N(x): The set of IDs of the one-hop neighbors of node x on channel C0, from which node x has received packets on channel C0 in the previous S0 slots;

Tm(x): The set of time slots that node x must not use on channel Cm in the next Sm time slots.

Accessing time Slot on CCH

For time slot assignment on control channel C0. The header of each packet should include the information of previously used time slot in the particular channel.

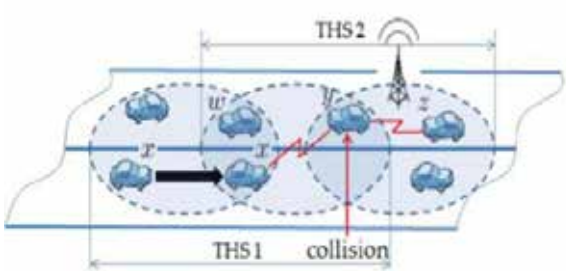


Figure 4: collision cause by node position [5].

In figure 4, Packet by the node y should include set N(y) and the time slot used by each node z ϵ N(y). So the N(y) should decrease the overhead while accessing CCH to the neighbor node as compared to including the MAC address of each one- hope neighbor in the header of transmitted packets.

Suppose, node x needs to acquire time slot. It starts listening the CCH C0 on the time slot S0. At the end of the time slot Node x determines the time slot used by each node on the channel C0. So node x used only that time slot which cannot used by previous transmission. N(x) are updated by node x at the end of each time slot [5].

3.2 Accessing slot on SCH

Once a provider x send announcement for the service, no actions occur unless the destination accept the service. Based on information channel by the provider x on CCH C0, the destination node decide whether the service is used by previous communication or not. Any other node than the destination accept the service and including in the Acs field. After acceptance, update the time slot by Tm.

On the same time provider x receives the acceptance of service, it tunes transceiver 2 to CCH and starts offering service for the next time slot.

4. GPSR Routing Schema

GPSR is a stateless, flooding routing protocol. In our GPSR strategy consider vehicle speed, vehicle density and moving direction. Here we consider vehicle equipped with GPS, sensor and some intelligent computer devise which is installed in vehicle [8]. In this routing we consider two strategy (1) Neighboring table update scheme (2) Next hop selection scheme.

Neighboring table update scheme

In this approach, Hello packet is periodically broadcast to one-hop neighbor. Store-and-forward strategy is used. Packet format of hello packet is given in figure 5.

PF	ID	X0	Y0	Vx	Vy	VD	þ

Figure 5: Hello Packet Format [9].

Using these packet the vehicle roughly estimate the neighboring nodes information. PF value with 0 and 1. If PF value is 0 then packet lost due to some problem and if PF value is 1 then packet successfully transmitted. ID identify the vehicle's current position. X0 and Y0 is the XY-coordinate of vehicle. VD shows the direction of vehicle. þ is to store the information of neighboring vehicle. So Hello packet periodically change the vehicles information. Each vehicle update their table in timely manner.

Next-hop Selection Scheme.

In GPSR, the source node or intermediate node forward the data packet to the neighboring nodes. In these scheme: node send data packet to one-hop neighbor and consider XY coordinate information, vehicle speed and vehicle direction. The condition for next hop selection is (1) The source node are in the direction of destination node (2) The speed between source node and neighboring node is not more than 10 m/s.

Receiving node set the priority depending on the conditions are satisfy or not. If yes then PF value set 1 and if no than 0.

CONCLUSION

VANET is basically provide driver safety to passing the messages while communication. So this paper present, a new strategy for successfully communication together with GPSR routing schema based on VeMAC protocol in order to provide internet connectivity for the vehicles by using one-hop

Communication in VANET. For media access VeMAC protocol is used, this protocol provide better channel access than another MAC protocol. Nodes access the time slot on the control channel and service channel in distributed way, which are avoid hidden terminal problem. For packet routing GPSR strategy is used. This strategy estimate the future position of neighboring vehicles so the information of neighboring vehicle could be more precious and the path can find easily.

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