A VEHICULAR COLLISION CONTROL FOR EMERGENCY WARNING MESSAGES IN VANET

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Abstract-*VANET is a challenging subclass of MANET which enables intelligent communication among vehicles and road side infrastructure (RSI).Vehicles are connected and communicate wirelessly in an intelligent transportation system (ITS). In wireless communication technologies supports both vehicle to vehicle and vehicle to infrastructure communication in VANET. Intelligent traffic system consists of warning messages to module composed to provide information to the driver to know current traffic conditions. The VCWC protocol provides congestion control, service differentiation, and a method for propagating emergency message warnings. A communication collision warning protocol can be achieved by taking either a passive approach or an active approach. First, in a protocol that uses the passive approach requires each vehicle to frequently broadcast its state information to other neighboring vehicles. Each vehicle then uses the collected state information from the surrounding vehicles to determine if it is in a dangerous situation. Second, the active approach only sends messages when an emergency event happens. For instance, an emergency warning message (EWM) would be sent if a vehicle slows suddenly. A vehicle becomes an abnormal vehicle (AV) when an event such as abrupt deceleration occurs. The surrounding vehicles should receive emergency messages as quickly as possible, so the driver has time to react. When an emergency event occurs surrounding vehicles can also become abnormal vehicles and generate their own emergency message warnings, as result of reacting to the initial emergency situation.*

***Key words*: RSI, ITS, Abnormal vehicle, VCWC, EWM**

1. INTRODUTION:

Vehicular Adhoc Networks (VANET) is implementing, collects and distributes safety information to reduce the number of accidents by warning drivers about the danger; so that we can send emergency warning messages (EWM) to all neighboring vehicles from source vehicles [1]. Such networks comprise of sensors and On Board Units (OBU) installed in the Road Side Units (RSU). In case of an unexpected event such as a traffic accident, or road works it is important for all vehicles in nearby to be inform of the hazard in order to take appropriate preventive measures. In addition, the information must continue in the area for a particular amount of time so that new vehicles entering the area are notified of the imminent danger. Vehicular communications are safety on the road, many lives were lost and much more harm has been incurred due to vehicle accidents. If any accidents appear in the road side, source vehicle sends warning messages to all neighboring vehicles nearby RSU. It has motivated for vehicular communication in cooperative collision warning which uses vehicle to vehicle communication. A vehicle can generate an emergency warning message which it distributes to neighboring vehicle through network. A major challenge in VANET application is the design of an efficient broadcast scheme which will facilitate the reliable dissemination of an early warning message to the approaching vehicles [2]. A straightforward solution is flooding it involves each vehicle rebroadcasting the message it receives it for the first time. Blind flooding is known to generate a large number of appear messages and unnecessary collisions.

In Vehicular Collision Warning Communication Protocol, a vehicle can develop into an abnormal vehicle (AV) due to its own mechanical failure or due to unexpected road work hazards. A vehicle can also become an AV by reacting to other AVs nearby. Once an abnormal vehicles resumes it regular movement, the vehicle is said no longer an abnormal vehicles and it return back to the regular state [11]. In general, the abnormal vehicle behavior can be detected using various sensors within the vehicle. A vehicle controller can certainly monitor the vehicle movement and activate the collision warning communication module when it arrive an abnormal state has been assumed. A vehicle that receives the Emergency Warning Messages (EWMs) can verify the applicability to the emergency event established on its relative motion to the abnormal vehicle, and give audio or visual warning advice to the driver. Each message used in VCWC protocol is designed for a group of receivers, and the group of intended receiver's changes fast due to high mobility of vehicles, which require the message communication using broadcast alternatively of unicast. To establish reliable delivery of emergency warnings over unreliable wireless channel, EWMs need to be frequently transmitted. Generally, to achieve network stability, congestion control has been used to modify the transmission rate based on the channel response. If a packet successful goes through, transportation rate is increased; while the rate is decreased if a packet gets lost.

The following assumptions have been made for each vehicle participating in the cooperative collision warning.

- Such a vehicle is able to acquire its own geographical location, and resolve its relative location on the road (e.g., the road lane it is in). One possibility is that, the vehicle is furnished with a Global Position System (GPS) [5] or Differential Global Position System (DGPS) receiver to acquire its geographical position, and it may be armed with a digital map to determine which lane it is in.
- Such a vehicle is supplied with at least one wireless device for receiving, and the vehicular ad hoc networks are confident to vehicles equipped with wireless device for receiving. As suggested by DSRC, the transmission range of safety related vehicle-to-vehicle messages is pretended to be 300 meters, and channel struggle is resolved using IEEE 802.11 DCF based multi-access control.

2. RELATED WORK:

2.1. Sensor Network on the Roads:

Sensors in cars can provide information on both rapid and time-averaged speed of the car as well as its position. The location data can be collect either directly using onboard GPS capability, if this is available, or based on information received from neighboring vehicles which have GPS [5]. The sensors can also provide information on local traffic density and spontaneous front and back headways. These sensors can form a network on top of the VANET communication form. Broadly proposed applications that are describe to benefit from such vehicular sensor networks can be confidential into safety operations and traffic monitoring and management systems [9]. Maintaining end-to-end (E2E) network connectivity, packet routing, timely and predictable information dissemination, and high speed wireless communication in such highly vital networks are extremely challenging.

2.2 DSRC (dedicated short range communication):

DSRC (dedicated short range communication) is Current Trends in Vehicular Ad Hoc Networks. Traffic control is a major factor for effective use of the network. Currently traffic lights organize their abundance of traffic at junctions [3]. With DSRC traffic lights become flexible to the traffic and can provide concern to emergency vehicles as well as protection to pedestrians and cyclists. Moreover data about the location of the road can be assigning to cars to warn them of problems ahead such as ice or maintenance work on the road. This system will also be very effective in the case of accidents, automatically inform the nearest ambulance and other emergency vehicles.

2.3 A Inter Vehicle Communication (IVC) Networks:

A position of mobile ad hoc networks (MANETs), have no fixed framework and instead rely on the nodes themselves to support network performance [2]. However, due to mobility constraints, driver behavior, and high mobility, intervehicle communication networks viewing characteristics that are severely different from many generic MANETs. This paper obtains these differences through simulations and mathematical models and then analyses the impact of the differences on the IVC communication architecture including important security implications.

2.4 Graph Theoretic Model in Dynamic Wireless Multihop Networks:

A graph theoretic model, i.e. evolving graphs, as a formal absorption of dynamic wireless multihop networks [6]. We extended and grown a set of tools, i.e. route matrix, connectivity matrix and probabilistic connectivity matrix, to investigate the goods of dynamic multihop wireless networks. The equity of these matrices was investigated in relation to the properties of the corresponding dynamic multihop networks.

3. PROPOSED WORK:

3.1 Congestion control of EWMs:

It is common that more than one abnormal vehicle coexists in time. For example, if a car stops in the highway due to an automatic failure, it remains sending EWMs messages to nearing vehicles and will remain abnormal vehicle until it is resigned from the road. Also, due to the natural chain issue that is produced in emergency events. The coexisting abnormal vehicles might send messages at the same time, superior to packet collisions. The VCWC protocol has to transaction with multiple abnormal vehicles. Another phenomenon might increase the blockage in the network. This is known as redundant EWMs for Vehicle a suddenly stop; N3 breaks because of a delay. In this case, the EWM sent by N3 and the EWM sent by an absolutely warning about the same event. To ensure a reliable communication over uncertain wireless channel, EWMs must be frequently sent at a certain rate. However, if the retransmission rate is too high, there are more EWM messages travelling in the same time which point into a high congestion of the network.

3.2 Direction aware broadcast forwarding:

When a vehicle meets an emergency position, it needs to send a W-CWM to all cars behind within its detachment. Since the identification of those potential receivers may not be known deduced, classical unicast and multicast routing will not work. In this approach, the vehicle in an emergency position broadcasts a W-CWM first, and then its entire receiver selectively forward the message located on its direction-of-arrival. This mechanism provides that the W-CWM will be finally delivered to all the vehicles within the detachment. The following design targets have been identified for this CCA system:

- Minimize the number of vehicles elaborate in intra platoon chain crash.
- Prioritize data from safety-related ITS applications over low-priority.
- Limit vehicle collisions in the existence of radio channel errors.

Upon identify an emergency event, a W-CWM is broadcast by the distinguish vehicle. The message contains an origin_vehicle_id (of the event detecting vehicle) and an event_id (unique within the detecting vehicle), which are used for separately identifying the emergency event. An msg_seq_noise also added so that the tuple {origin_ vehicle_id, msg_seq_no} can separately analyze a message across the group of vehicle. A message type field identifies the combine ITS application, which is CCA in this particular case. Naive broadcast (NB) forwarding provides as a baseline packet-routing device for the target CCA application. After detecting an emergency event, the identify vehicle starts sending W-CWM messages at regular intervals. Executing the naive broadcast logic will ensure that all vehicles within the detachment will eventually receive a warning message and will slow to avoid collisions with vehicles ahead.

The warning message reproduction for an event will stop only when the message appear at the last car of the detachment, where there is no more receiver vehicle behind it. Intelligent broadcast with constant acknowledgment the primary limitation of naive broadcast is its excessive message forwarding, which expand message collisions for 802.11 MAC. High MAC collisions decrease the message-delivery rate, and also increment the delivery inactivity, because successful delivery after message drops will have to rely on the repeated retransmissions from the event identify vehicle. To avoid these, we propose an implicit acknowledgment-based message formation and transmission strategy, intelligent broadcast with definite acknowledgment (I-BIA), that can improve the system accomplishment by reducing the number of messages that are infuse within a platoon for a given vehicle emergency event.

3.3 Joint V2V/V2R Communication Protocol:

In Joint V2V/V2R (R2V) communication protocol, a vehicle (for example V1) has a mechanical failure or detects road hazards, it produce an emergency warning message which includes all the related information and manage one copy in its buffer for possible retransmission. In V2R (R2V) communication, the source vehicle will repeatedly send the warning message to a roadside unit before it receives the message with the same event ID from roadside unit.

Working of warning message in V2V and V2R communication modes:

(i)The warning message has been collected by the transceiver working in V2R (R2V) Communication method.

- If the receiving vehicle is the source vehicle (checking the source vehicle ID in the warning message), it stop retransmitting the warning message to the roadside unit in order to decrease upward in networks.
- If the receiving vehicle is not the source vehicle and is in front of the source vehicle, it avoids the warning message.
- If the receiving vehicle is following the source vehicle, but has received warning messages with the same event id from other vehicles in V2V communication, it rejects the warning message.
- If the receiving vehicle following the source vehicle and warning messages with the same event id have not yet been collected, it gives out appropriate to avoid collision.

(ii) The warning message is acknowledged by the transceiver working in V2V communication method.

- If the receiving vehicle is in front of the broadcasting vehicle, it will not rebroadcast the warning message with the same event id. Again, this is to decrease broadcast messages in networks.
- If the receiving vehicle is follow the communication vehicle and this message was received before, it will ignore it.
- If the receiving vehicle is after the transmission vehicle and receives this warning message for the first time, it will carry out appropriate to avoid collision.
- At the same time it checks either a warning message with the same event id has also been accepted from its roadside unit. If not, it will regularly transmit this warning message to the roadside unit continuously it receives a warning message with the same event id from the roadside unit.

4. SIMULATION AND RESULT:

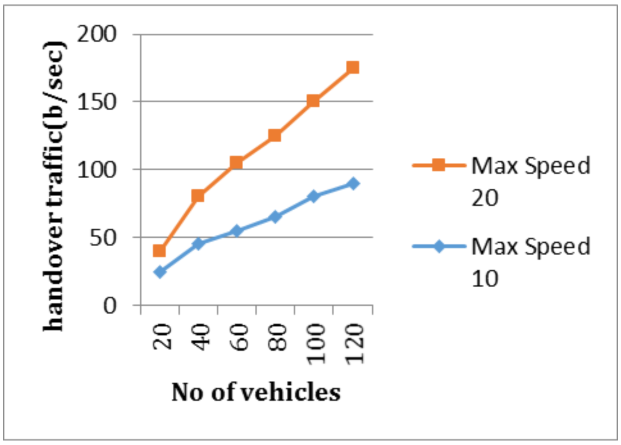

Figure 1: Hand over traffic

The above figure 1 depicts the handover traffic comparison. As the vehicle speed increased in the max speed. When the handover traffic is decreased the vehicle speed in the existing system.

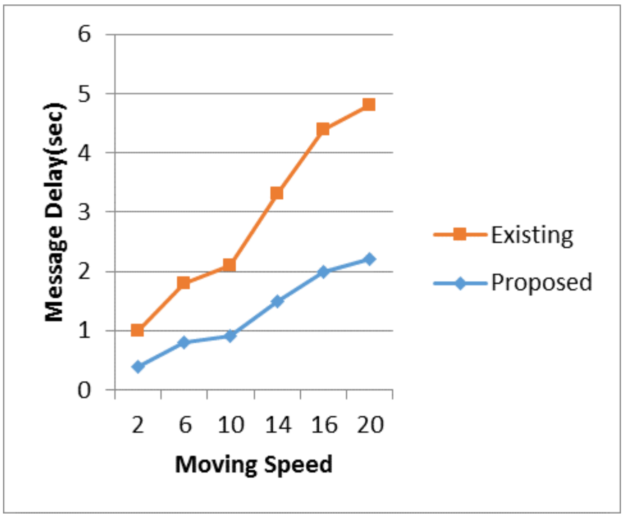

Figure 2: Message Delay

Message delay= $\frac{interarrival\ of\ packet\ time}{total\ data\ packet\ delivery\ time}$

The above figure 2 depicts the message delay comparison. As the number of nodes increases the delay is decreased in the proposed system. When the delay is decreased automatically the performance is efficiently compared to the existing system.

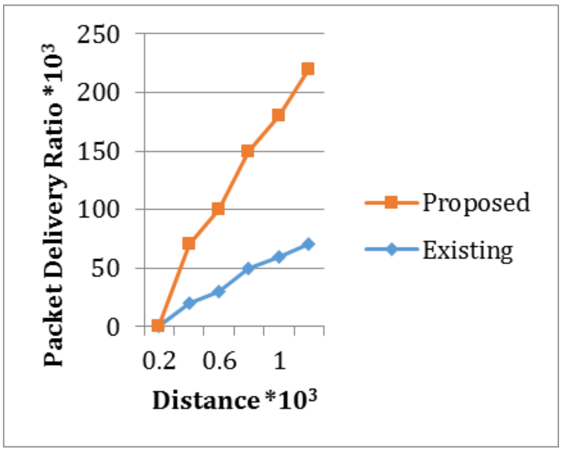

Figure 3: Packet Delivery Ratio

The ratio of the packets that are delivered to a destination compared to the number of packets that have been sent out by the sender.

PDR= $\frac{number\ of\ packets\ received}{number\ of\ packets\ sent}$*100

The figure 3 depicts the packet delivery ratio of the system existing .As compared with the number of nodes in x-axis and PDR in y-axis it is proved that ratio has been increased.

5. CONCLUSION:

Information dissemination in VANETs is currently of great interest due to its promised potential to assist drivers in reducing road accidents, by providing timely information about impending dangerous situations and hence increasing the available time to the vehicle driver to respond. In particularly , the constraints on vehicle action, varying driver behaviour, and high mobility source rapid topology changes, regular fragmentation of the network, a small effective network diameter, and limited service from network redundancy. A key application in a vehicle network is accident prevention and road safety. In this scenario, the communication types will focus on message multicast/broadcast from a given source to recipients mainly located in the origin's neighbourhood or direction. Vehicles will broadcast data that is possibly valuable for multiple surrounding vehicles. This means that the vehicles to be reached, using normally unidirectional communication, depend on their geographical location and their interest to the reported event.

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