Exploration on Various Protocol Models in Emergency Data Transmission Services

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Abstract- Vehicular ad hoc networks are emerging technology and helps in V2V (Vehicle to Vehicle) Communication with parameters like viable hub determination and delay, mobility etc.There are so many VANET routing protocols discussed but those do not provide adequate transmission speed for data transmission services in emergency situations. In some situations that leads to unexpected traffics and accidents. To minimize unexpected accidents, VANET network demands intelligent and effective routing models for intra vehicle communication. To minimize traffic and end to end scalable communication, various VANET Routing Protocols such as AODV, Improved AODV, ECDSA, Defensive Mechanism, MAV-AODV, Recursive Ant Colony, SDGR and UMBP have been reviewed.

Index Terms- VANET, Routing techniques, Emergency data transmissions.

I. INTRODUCTION

VANETS are widely applied in road side communication. It acts as a medium to hand over emergency data transfers to desired destination [1], [2], [3].Therefore, VANETs are considered as a promising innovation to help emergency oriented services in transportation network framework that effectively empowers mobility of vehicles to precisely gather continuous activity of a vehicular network and to avoid potential risks [4]. The VANET communication message may send to intimate road anomaly, accident alert, and traffic information of particular area and so on. Those alerts are hand-over and conveyed to all adjacent vehicles for to broadcast the messages to destination[5],[6].The principle behind VANET communication is to handover the vehicular communications everywhere in a network based on network head for to provide efficient and viable communication between vehicles[7]. VANET has combination network architecture with high mobility [8]. Routing protocols are developed to figure out energy efficient paths in VANET communication. Unicast routing protocols are used to establish a communication between single source and destination but that fails with node mobility. In conventional Adhoc network the routing protocols such as reactive type, proactive type, and geo cast type were used. The fundamentals process should face requirements like traffic avoidance, to minimize delayed communication. But those fail with constrained communication region [9].

To perform effective communication there is a need to select effective node to forward emergency data alert to destination .So there is a need to choose suitable and relevant forwarding node to govern data communication model in VANET. In some scenario forwarding node leads to rebroadcast problem [10], [11] which leads to duplicated forwarding messages, data collision, data drop etc., providing Trustworthy and guaranteed service should be considerable while considering VANET framework. But the mechanism provided in is not suitable for multimedia services. Be that as it may, most of this traditional papers just concentrates on directional communication however, they discards multi directional communication in complex network [12].

ARCHITECTURE OF VANET

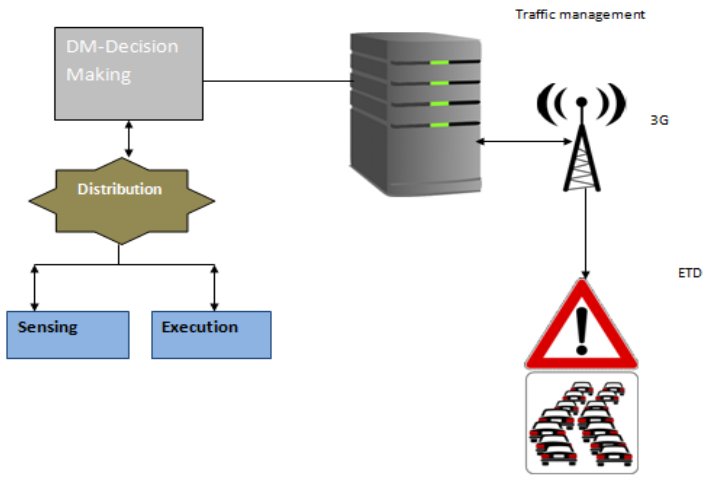

Figure 1: *VANET Architecture*

Congestion control strategy [13] effectively enhances and improves transmission ratio to avoid accidents by using congestion aware algorithm. AODV and IMB protocols are used to enhance the scalable communication for Emergency Data Transmission (EDT).

II. LITERATURE SURVEY

Distributed cooperative MAC was developed to enhance maximum gain and diversity. It also minimized work load. But that system fails with high mobility. The quality of VANET degrades with mobility [14] Broadcast protocol [15] and it was proposed to minimize traffic conjunctions in

VANET architecture that utilizes CDS-Connected Dominating Set. The emergency messages is tends to rotate in circulation motion until the threshold time expires.

By considering mobility as an important factor, a broadcast [16] protocol was proposed that receives a packet parallel in way to deal with tediously partition the territory inside the transmission range to get the uttermost conceivable fragment. The protocol's duty is then appointed to a vehicle picked in during time segment. Besides finishing directional communication for complicated highway scenario, the convention likewise displays great adjustment to complex street structures. The main motivation of this method lies in lessening communicate delay, which is a vital factor for time-based emergency message dissemination

Network aggregation technique was proposed [17] to improve the communication efficiency of VANET's vehicle to vehicle communication model. But that provides multimedia sharing based on content distribution framework. UMBP-urban multicast broadcast protocol [18] was implemented using multi hop protocol model but that fails with routing complexity and large scale real time applications. To improve routing accuracy,-AODV protocol has been included with ant colony based optimization along with multi hop routing protocol.

AODV based approach

AODV protocol is a reactive type routing protocol that is able to perform uni-cast as well as multi cast routing. It forwards data to desired node when there is a requirement. RREQ (route request message is disseminated to all neighborhood node of each node until the destination arrived. Desired destination node responses RREQ by forwarding RREP to source that can be termed as route reply message. After the verification of RREQ and RREP data is transmitted to destination. The operation of AODV protocol model is illustrated below in fig 2.

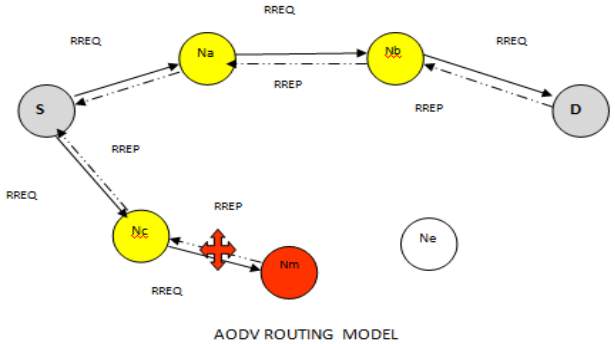

Figure 2: *AODV Routing Model*

Route Reliability

Improved AODV protocol model [3] was proposed by considering real time road environment to minimize packet loss it utilizes back up route recovery scheme. Unlike other approaches [4, 5, 6, 7] it increases transmission ratio by implementing two hop routing for desired communication and thus it increases transmission ratio.

ECDSA (Elliptic Curve Digital Signature Algorithm) based message authentication was proposed in VANET [19]. It combines AODV and ECDSA to perform secured communication by considering the factors such as routing efficiency, time delay and security. It performs effectively even when considering attacks such as data injection attack, Sybil attack and provides data integrity and confidentiality. Route information's are temporarily stored and ECDSA generates digital signatures for each transmission so an authenticated user can only access the data. In large scale data transmissions the performance of AODV degrades with the area size and with the vehicle counts. Improved AODV protocol [20, 21] proposes gray correlation method for path selection and message transmission. RREQ messages are forwarded through only selected path hence it provides effective transmission rate even in the presence of traffic A novel multicast routing protocol [22] deals forecast based multicasting which helps in decreasing deferral and improves transmission ratio. Broadcasting method does not use an available resource which makes the system ineffective, this improves system performance by implementing prediction technique and tree based multicasting protocol for available resources.

Ant colony based approach

In the characteristic world, ants are one of a few animal categories at first meander arbitrarily, and after discovering nourishment come back to their province while setting down pheromone series. In the event that different ants find such a way, they are likely not to continue going aimlessly, but rather to take after the trail, returning and fortifying the chance that included in the end discover sustenance.

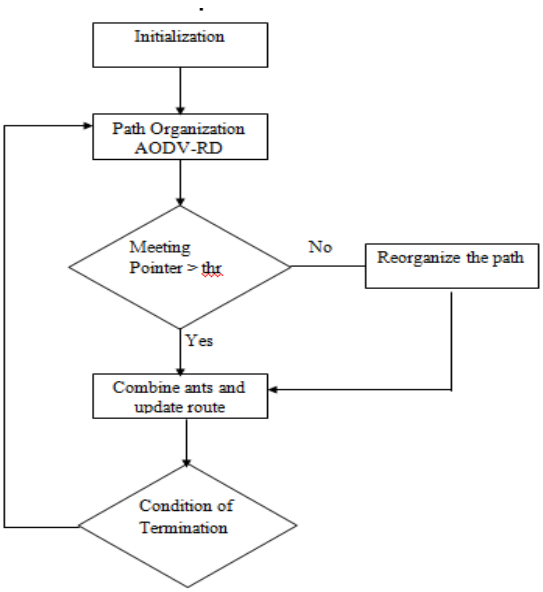

Figure 3: *Ant Colony Based optimization Model*

The general outcome is that when one insect finds a better way from the state to a nourishment source, different ants will probably take after that way, and positive input in the end prompts every one of the ants following a solitary way. The possibility of the insect settlement calculation is to copy this conduct with "recreated ants" strolling around the issue to unravel. ACO is implemented by considering QOS and routing problems which utilizes optimal and energy efficient routing path to increase routing reliability and quality.

VANET architecture comprises of roadside units (RSUs) connected to other by IOT. VANETs security properties have gotten more consideration in current scenario. Defensive mechanism [23] intends to present a cautious system for the VANET security with ant colony optimization. It eliminates malicious activities by Naïve strategy and flexible transmission can be achieved in selected effective and energy efficient path by ant colony optimization. By considering the drawbacks of other works, stable multicast tree based ant colony optimization was proposed [22].It considers mobility and lifetime as an important factor. It utilizes communication path selection by probabilistic approach and bio ants. The MAV-AODV multicast direction utilizes conventional plans to increment the multicast structure lifetime and to permit more efficiency with least transmission and administration overheads. It utilizes to verify pheromone and route path. Recursive ant colony [24] transmits ETD messages in a VANET by considering problems such as signal loss, mobility and area. It partitions complex system into littler systems which facilitate an optimized way between vehicles or sending any data and messages between them. It makes the data to be transmitted between the vehicles more rapidly immediately.

Geographic Routing

Geographic routing [25] developed with greedy routing protocol which provides crossing point based routing that is able to find efficient routes. The crossing points are selected by considering mobility and distance from source to destination. Bio inspired routing mechanism [26] utilizes ASGR (Artificial spider web based geographic routing protocol) to recover the information's of available routing paths. SDGR (SDN-based geographic routing protocol) proposes a novel SDN based routing for VANET which decouples the routing while data transferring [27]. It accumulates data of vehicles and manipulates energy efficient path. It utilizes forwarding algorithm to select a viable hop for data forwarding.

In SDGR, node updates the data of area details and speed of the vehicle by forwarding a state message to server and those are all gathered by vehicular GPS and speed sensor. Based on that, traffic state is updates in all vehicles. when a source hub sends a packet to desired vehicle node, router checks whether the destination available or not from the selected route otherwise it forwards the state message to source then path forwarding algorithm selects alternate viable path and broadcasts the data packets to destination

Multi-hop broadcast protocol

By considering the drawbacks of all other routing model [28] Yuanguo et al developed UMBP .A traffic accident in a street in an urban environment triggers the initiation EDT. At first stage EDT is broadcasted to nearby nodes bi-directionally At second bounce, the message is directionally communicated and just a single handing-off hub is chosen in the message engendering heading, aside from that the sending hub situates in a crossing point territory .To address the issues, UMBP builds up a novel way to deal with accomplish effective bi-directional way to communicate at the first hop, which comprises of the following three stages:

1. Source node directly disseminates EDT
2. Selection of viable node
3. Viable node acts as a forwarding node

Source node immediately forwards/broadcasts EDT messages as soon as detecting emergency alerts by MAC (medium Access Control) layer. Whenever a forwarding channel finds to be idle, source node disseminates emergency messages to desired vehicle. In UMBP, multi-directional communicate additionally comprises three ventures as those in bi-directional communicate, and the source hub embraces similar operations to convey a crisis message specifically. From that point, the applicant sending hub choice process is led toward every path at the same time. It implements time

based strategy to choose Rebroadcast EDT via viable nodes and its holding up time is conversely corresponding to Extra Coverage Area. A hub with the biggest area has the briefest holding up time, so it will turn into a rebroadcast hub in the opposition with other hubs, and different hubs will stop to give up packets rebroadcasting when they get a copied parcel from the rebroadcast hub, consequently less hubs are chosen as rebroadcast hubs to be in charge of bundle broadcasting of the back notice zone, accordingly diminishing communicate repetition and end-to-end postpone.

III. COMPARATIVE ANALYSIS

Different emergency message dissemination methodologies are discussed in previous sections and a comparative study in made in this section as furnished in Table1. It is observed that all methods give less communication overhead except Defensive mechanism and MAV-AODV methods; and more routing efficiency except ECDSA and SDGR.

Table 1: Comparative analysis of different emergency message dissemination methodologies

Methodology	Overhead	Security	Routing efficiency	Mobility
Improved AODV	Less	Less	More	Not considered
ECDSA	Less	more	Less	considered
Improved AODV + Gray correlation	Less	more	More	considered
Defensive mechanism	More	more	More	considered
MAV-AODV	More	less	More	considered
Recursive ant colony	Less	more	More	Not considered
SDGR	Less	more	less	considered
UMBP	Less	more	more	considered

IV. CONCLUSION

This survey is done on various emergency message dissemination methodologies in terms of performance metrics like Message communication overhead, Security, Routing Efficiency and Mobility. This literature survey helps to understand the performance of each method in VANET.

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