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PROTOCOL MODELS IN EMERGENCY DATA TRANSMISSION SERVICES

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ABSTRACT:

Vehicular ad hoc networks are technology that helps in vehicle-to-vehicle communication. This allows for better mobility and coordination during emergencies, as well as more efficient data transmission services. There are many routing protocols discussed, but they often don't provide adequate throughput for emergency communications. In order to reduce the chance of accidents happening unexpectedly, we need intelligent routing models to be implemented into VANET networks. Various routing protocols have been reviewed to minimize traffic and end-to-end scalable communication. These include AODV, Improved AODV, ECDSA, Defensive Mechanism, MAV-AODV, Recursive Ant Colony algorithm SDGR and UMBP.

KEYWORD: VANET, Routing techniques, Emergency data transmissions.

INTRODUCTION :

VANETS are widely used for roadside communication. It serves as a medium to transfer emergency data transfers to desired destinations [1], [2], [3]. Therefore, VANET are considered as a promising innovation to help emergency-oriented services in transportation network framework that effectively empowers mobility of vehicles and collects continuous activity of the vehicular network [4]. The VANET communication message may send traffic information of a particular area, such as an accident alert or road anomaly. Those alerts are relayed to adjacent vehicles for broadcasting to the destination [5], [6]. The principle behind vehicular communications using a VANET is to handover the
communication functions between vehicles throughout the network to provide efficient and viable communication between drivers [7]. With a combination Network architecture, high mobility, and widespread deployment, VANET provides an effective method for exchanging information [8]. Routing protocols are developed to help in efficient communication between nodes in a VANET network. Unicast routing protocols are used to establish communication between two specific sources, but these can be ineffective when nodes move around. Inconventional Ad hoc networks, routing protocols such as reactive and proactive types were often used, but they had difficulty dealing with traffic avoidance and congestion. Fundamental requirements for this type of protocol should include minimizing delays and avoiding collisions, but that is very difficult to achieve in an underground network [9]. There is a need to choose an effective node to forward emergency data alerts to their destination. The most suitable and relevant forwarding nodes would bethose that govern the communication model in VANETs.
In some scenario, forwarding node can lead to rebroadcast problem [10], [11] which can result in duplicated forwarding messages, data collision, and data drop. Consequently, a reliable and guaranteed service should be considered when utilizing VANET frameworks. However, the mechanism provided is not effective for multimedia services. Notwithstanding this fact most of these traditional papers focus on directional communication only without taking into account multi-directionalcommunications in complex networks [12].
Congestion control strategy [13] will help to improvethe transmission ratio and avoid accidents by using an algorithm that is congestion aware. AODV and IMB protocols are used to enhance communication ina scalable way for use during emergency data transmissions (EDT).

ARCHITECTURE OF VANET :

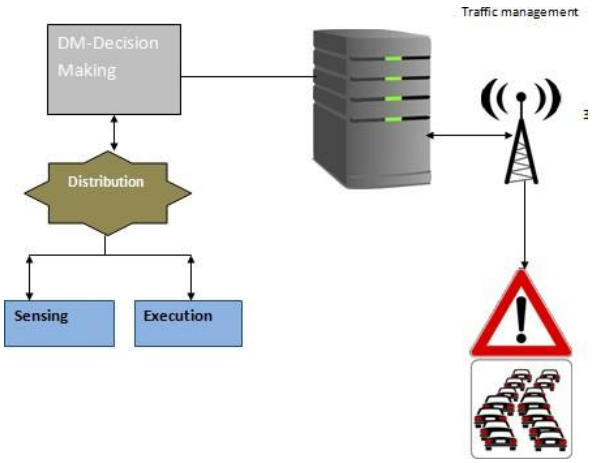

Figure 1: Architecture of VANET

LITERATURE SURVEY :

Distributed cooperative MAC wasdeveloped to improve bandwidth and diversity. It also minimized work load, but that system fails withhigh mobility. The quality of VANET degrades as mobility increases [14]. A broadcast protocol was proposed to minimize traffic collisions in VANET architecture that utilizes CDS-ConnectedDominating Set. Emergency messages tend to rotatein circulation until the threshold time expires [15].

Broadcasting a protocol [16] to deal with mobility was proposed that receives packets parallel in order to avoid tediously partitioning the territory inside the transmission range. The protocol's duty is then appointed to a vehicle picked in during time segment. Besides finishing directional communication for complicated highway scenario, this method also displays great adjustment tocomplex street structures. The main motivation of this approach lies in decreasing communicate delay, which is a vital factor for time-based emergency message dissemination. Network aggregation technique wasproposed in order to improve the communicationefficiency of VANET's vehicle-to-vehicle communication model [17]. However, this provides multimedia sharing based on a content distribution framework. UMBP-urban multicast broadcast protocol [18] was applied the usage of multi hop protocol model however that fails with routing complexity and massive scale real time applications.To improve routing accuracy, AODV protocol has been included with ant colony primarily based optimization in conjunction with multi hop routing protocol.

AODV BASED APPROACH :

AODV protocol is a reactive routingprotocol that can both perform unicast and multi-castrouting. It sends data to the desired node whenever there's a requirement, using the RREQ message to disseminate this information to all neighboring nodes. Once the destination node receives the RREQmessage, it will respond with the RREP message, which lists all of its neighbours who are also interested in route updates for that particular destination. After verification of these messages has been completed, finally transmission of updated datatakes place.

Route Reliability

Improved AODV protocol model was proposed by taking into account the real time road environment in order to minimize packet loss. This approach utilizes back up route recovery schemewhich increases transmission ratio. The ECDSA (Elliptic Curve Digital Signature Algorithm) based message authentication was proposed in VANET[19]. It combines AODV and ECDSA to perform communication securely by considering routingefficiency, time delay, and security factors. This method performs effectively even when dealing with data injection attacks, Sybil attacks, and providing data integrity and confidentiality. Route information is temporarily stored while ECDSA generates digital signatures for each transmission so that an authenticated user can only access the data. In huge

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 technique for direction choice and message transmission. RREQ messages are forwarded through best selected route as a result it affords powerful transmission rate even in the presence of traffic a singular multicast routing protocol [22] deals forecast based totally multicasting which facilitates in decreasing deferral and improves transmission ratio. The broadcasting approach does no longer use an available resource, which makes the system ineffective. This improves system performance by using enforcing a prediction method and tree-primarily based multicasting protocol for tobe had sources.

ANT COLONY BASED APPROACH :

In the environment of ants, some animals may initially wander around randomly in order to find food. However, once they've found any sustenance they will return back home and leave a pheromone trail behind them. If other ants decide to follow this same path then it is more likely that they will discover food along the way - after all, if there are already ant trails present then the chances of finding something desirable are increased.

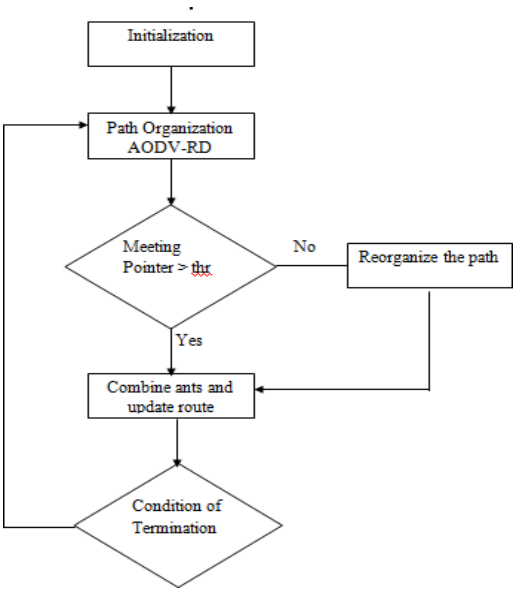

Figure 3: Ant Colony Based optimization Model

The outcome is that when one insect finds away 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 those ants following a solitary route. The possibility of an insectsettlement calculation is to copy this conduct with "recreated ants" walking around the issue to unravel.ACO (adaptive congestion optimization) is implemented by considering QOS (quality-of- service) and routing problems which utilizes optimal and energy efficient routing path to increase routing reliability and quality.

VANET architecture comprises of roadside units (RSUs) interconnected by the internet of things. VANETs have become more important in today's security context, and a defensive mechanism [23] is intended to present a cautious system for the VANET security with ant colony optimization. It eliminates malicious activities by using a naïve strategy and flexible transmission can be achieved in selectedeffective and energy efficient paths by ant colony optimization. Stable multicast tree-based ant colony optimization was proposed [22] in order to consider mobility and lifetime as important factors. It utilizes communication path selection by probabilistic approach, and bio ants. The MAV-AODV multipath direction utilizes conventional plans to increment the multicast structure lifetime and permit more efficiency with least transmission and administration overheads. It also verifies pheromone routes using a technique called "track intersection." Recursive ant colony [24] transmits ETD messages in a VANET by considering problems such as signal loss, mobility, and area. It partitions complex systems into smaller systems which facilitate an optimized way between vehicles or sending any data and messages between them. It makes the data transmitted between the vehicles more rapidly immediately.

Geographic Routing:

Geographic routing [25] is a method of connecting different areas with each other. The greedy routing protocol uses crossing points to find the most efficient routes, which can be found by considering mobility and distance from source todestination. Bio inspired routing [26] uses ASGR
(artificial spider web based geographic routing protocol) to recover information about available routes. SDGR proposes a novel SDN-based approachfor VANET that decouples route selection while datatransferring [27] so that more energy is saved. It utilizes forwarding algorithm to select a viable hop for data forwarding

In SDGR, a server updates the data of area details and speed of the vehicle by forwarding a state message to the node. This allows all gathered information from vehicular GPS and speed sensor tobe used in updating traffic states. When a source hubsends an urgent packet to a desired vehicle node, it checks whether the destination is available on that selected route or not before forwarding it onto another path. The path selection algorithm then broadcasts data packets out along any possible alternate routes until they reach their intended destinations.

MULTI-HOP BROADCAST PROTOCOL :

YUVANGUO developed a traffic accident routing model called UMBP. In an urban environment, traffic accidents cause EDT to be broadcasted. At first stage, EDT is communicated bi-directionally among nearby nodes. Then, at the second bounce of the message, only one hand-off hubwill be chosen in the message engendering heading and that hub's location must be situated in a crossingpoint territory.
To address the communication issues, UMBP createsa novel way to effectively communicate with each node at the first hop. This involves three stages:

1. Source node disseminates EDT directly to other nodes
2. Selection of viable nodes occurs to findthose who are able and willing to receive EDT
3. Viable nodes act as forwarding nodes by relaying information back and forth betweenboth source and destination nodes

Source node immediately forwards 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 communicates additionally comprise three ventures: 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 choosea 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 bundlebroadcasting of back notice zone, accordingly diminishing communicate repetition and end-to-end postpone.

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

COMPARATIVE ANALYSIS :

Different emergency messagedissemination methods are discussed in previous
sections, and a comparative study has been made inthis section (Table 1). It was observed that allmethods have lower communication overhead exceptDefensive mechanism and MAV-AODV, but theyalso provide different routing efficiencies. Table 1:
Comparative analysis of different emergency message dissemination methodologies.

CONCLUSION :

This survey is done to understand the performance of various emergency message dissemination methodologies in terms of metrics like Message communication overhead, security, routing efficiency and mobility. This literature survey helps us understand how each methodology in VANET performs.

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