Comparative Study of Routing Protocol using Emergency Vehicle in VANET

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Abstract: **Nowadays VANET is mostly active in intelligent Transport system (ITS) like communication and connecting moving vehicles'. In this ITS nodes to the connected VANETs. Network distributed organizing by self communication mobile network create by moving vehicles, that are characterized by very high mobility depends on speed of vehicles and degrees of freedom in movements. VANET are powerful research area, now research being focused not only on providing potential applications for such type of VANET network but also on providing services for emergency vehicles . we vision architecture of a mobile for vehicles like fire service vans, ambulance police patrols cars have to be given a high priority in this versioned. Network architecture as their requirement are critical during emergency situations. This work discussed solving traffic congestion application of VANET. We have simulated the work of mobility on network simulator tool (ns2) in which we have simulated the traffic roads with the help of AODV,DSR,DSDV protocols. AODV routing is used the best obtained for VANET, because it is used to find the correct destination.**

INDEX TERMS: VANET, Intelligent Transport system (ITS),AODV, DSR, DSDV, Network Simulation,emergency,NS2.

I. INTRODUCTION

VANET is a subgroup of MANET where the nodes refers to vehicles. The movement of vehicles are restricted by congestion is a major problem in metropolitan cities to avoid the traffic and attacks using the protocols in AODV,DSR,DSDV. The communication between the vehicles' and road side antenna(RSA). All the message are divided in different frequencies according to their priority and the position of the receivers vehicles which automatically tunes it self with different frequencies according to the speed of vehicles.

II.METHODOLOGY

This section explain about the topology used for the simulation, the tools required to built the road map and vehicle traffic .The idea of the routing protocols used and its traffic connection are also explained.

A. Topology

A road map is created in two lane roads and traffic junctions. The lanes are considered to be edges and junction are also called as nodes in the modeler. The roads, traffic regulations we can deploy fixed infrastructure in critical locations. It is fast and reliable and provides real time safety improve traffic safety and comfort of during minimize accident traffic intensity locating vehicles. VANET active safety of passengers and more reliable traffic After people are stuck for hoers in a traffic jam it happens due to accidents, natural calamity, improper driving or due to various other reasons. This information of the situation can be displayed through text messages on the dash board or even through an image of the affected are collected by vehicles in that area, so that passengers have a better understanding of the seriousness in problem. V2V system are based on dedicated between short range of communication(DSRC). This communication technology provide wireless link between the road side unit (RSU) and built in vehicle transceivers.

The main idea in this work to make an emergency vehicle reach its destination in the shortest time possible the emergency vehicle needs to reach its destination as soon as possible and the traffic signals in the path. There is a change of the traffic signal from red to green when it receives an alert message and reverts only the emergency vehicle crosses the junction the effective routing protocols implementation this work analyses the result obtained from a network consists of nodes that are moving at very high speed.

vehicles will move dynamic this can be modeled using MOVE, share xml file are generation and the visualization is achieved using SUMO[15].

1.MOVE

Move is implement in java and over the open-source micro-traffic simulator SUMO[3]. The output of move is a mobility trace file which contains information about the realistic vehicle movements then realized in NS-2 or Qualnet.

2.SUMO

The SUMO (Simulation of Urban Mobility) traffic simulation is used to provide a better way to effectively plan, operate and design intelligent transportation system[3]. This tool helps in finding the best rout, traffic ling management strategies and vehicular communication.

B. ROUTING PROTOCOLS

1.Proactive (table-driven) routing protocols:

In this protocols each node maintains up-to-date routing information at any time to any other node in the network. Which is based on these principles in DSDV.

Destination sequenced distance vector(DSDV)

The DSDV protocols is based on Distributed Bellman-ford algorithm[8] and implements the distance vector strategy its routing table a set of information for each destination containing[]:

- The destination address;
- The number hops (node) to reach it;
- The greatest sequence number received for that destination.

There are two type of traffic generated in update:

- Incremental update:

Only the data that has changed since the updates is sent. Each node receiving these message transfer including the elements which have been modified.

- Complete update:

The totality of the routing table is sent to update node in the network which leads to changes in their routing tables.

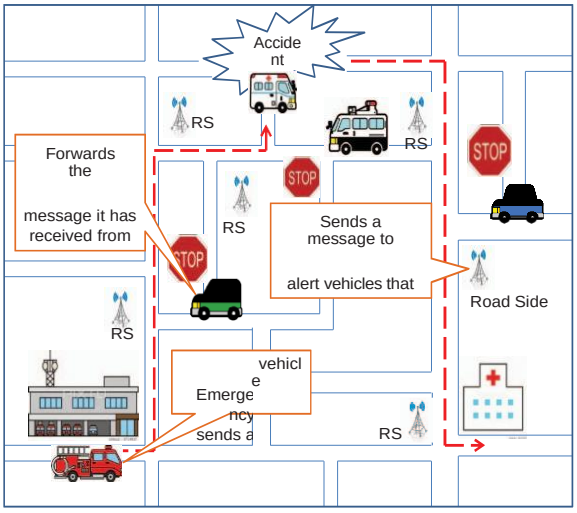

Fig1.Method of reserving routes for emergency vechicles.

2.Reactive (On-Demand) routing protocols routing

This protocols reactive protocols create a route only when it is desired the path is established path the protocols that are DSR, AODV.

Dynamic source routing (DSR)

The routes constructed are based on demand algorithm using source routing each node include its address in the header of the packet which carries the complete sequence list of nodes through which the packet should of transmit[18]. This routing protocol consists of two basic operations Route Discovery and Route Maintenance.

Ad-hoc On-demand Distance vector (AODV)

The AODV protocol[10] is enhancements to DSDV protocols and it is based on the principle of distance vector routing protocol combination of the two DSDV and DSR.[17]The road remains active between the source and the destination routing protocol is not involved, which minimizes the number of broad casts message by creating routes as needed un like DSDV.

C. Traffic Connection

We assume content bit rate traffic over UDP for simulations.

1. *UDP Traffic*

   The user datagram protocol is connection less service UDP is used here because unlike TCP where handshaking is necessary it takes some more time to establish a connection with other nodes Alert messages can be easily sent where reliable data transfer is not a priority[3].

2. *CBR Traffic*

CBR is chosen mainly because of constant bit rare traffic a fixed bandwidth link is needed for providing data traffic CBR service, a flow is carried out across the network in such a way that the end to end delay is less and the transfer of message is sender node[3].

A . Attack Model

The V2V and V2 I communication are carried out in open wireless channel, there are many attacks which threaten kinds of communication on the road. we have listed several possible attacks performed in VANETs[6].

1) Message replay attack: This attacks is basically happening when the attacker repeats or delays the valid message transmission maliciously to disturb the traffic.
2) *Sybil attack:* The attacker may use multiple identities at the same time. This attacks an attacker broadcast numerous messages with different identities to other vehicles.
3) *Masquerading :* In this attacks the attacker actively pretends to be another vehicle by using false identities attacks takes place when one user maker believe to be a different user to gain unauthorized access through legitimate access identification.
4) *Message tampering/ fabrication/Alteration:* or a specific part of the In this attack, the attacker may modify, delete and alter the content of the message to be sent.
5) *Collusion attack:* The collusion attack is the improper secret agreement in which two or more adversaries cooperatively defraud and act as legitimate Pus for benefit the updated group key after leaving from the Pus group.

A. Route Reservation for the Emergency vehicle:

A simulation window showing a part of vehicle movements for a case where RSU are not used shown in fig. The part in bold frames in the center show the route taken by the emergency vehicle. It can be seen that ordinary vehicles have received a message. Number of the alternative roads is limited, many instance of congestion occurred[5].

Table1.SIMULATION PARAMETER

Item	condition
Scenario map size	700X700
Simulation time	1800 seconds
Number of emergency vehicle	1
Number of RSUs	4
Number of ordinary vehicle	50,100,150,200,250,300,250,400 450,and 500
Starting point of the emergency vehicle	Fire department
Action of the emergency vehicle	Travels from the starting point to the destination .
Message transmission interval	10 seconds
Wireless communication system	IEEE 802.11p
Mobility models of ordinary vehicle	Random way point
Radio propagation model	Two-ray ground or ITU-RP.1411
Number of simulations	10

B. Requirements:

Versatility: The warning system is versatility enough to support different potential application E.g., warn vehicle about an approaching or standing emergency vehicle but also support controlled switching of traffic lights[2].

Timing: A driver can move her vehicle aside in time or traffic light can initiate a green phase after stopping the currents light switching cycle.

Relevance: Warning should only be displayed to drivers or acted upon it relevant e.g., when driving towards the same intersection as the emergency vehicle but not when moving away from it

C. SECURITY

Warning message have to be authenticated and integrity protected so that only authorized emergency vehicle can generate then otherwise other vehicle could illegitimately send emergency vehicle warning message to gain a driving advantage.

D.COMMUNICATION:

In term of communication do not distinguish between vehicle and infrastructure nodes, but crate them equally[2]. The emergency vehicle now disseminates warning message periodically with updated information . two type of messages are used to reduce bandwidth requirements receives verify the signature before forwarding or processing the message and can ignore emergency warning messages from sending which lack the required emergency vehicle property.

Local Relevance Decision:

The current route of RN, and the driving direction can be derived from the ordering of the waypoint or node ides in relevance we are three classes for warning message.

- Forwarding only RN and EV are moving in opposite directions or have divergent routes
- Information only: RN and EV have divergent routes but d< r,i-e, d is a distance r is root RN is the range of EV and the siren is audible.

E .*Emergency vehicle warning–plug-in;*

Other vehicle and road users run the emergency vehicle warning –plug-in it also provides a map view with the current location to simulate a vehicle information system an emergency vehicle is close by a relevance decision component handles the received warning message , information only and active warning (forwarding only)[2].

A. VANET ARCHITECTURES AND CHALLENGES

VANET ARCHITECTURES

As VANET have standards similar to those of MANET in the sense that the set of stations communicating through wireless channels with stand –alone configuration without any fixed backbone support. The architecture of vehicular ad hoc network includes a various hardware and software components such as On Board Units. That are fixed in vehicles to transmit and receive message through wireless network .we find other device in roads Infrastructure communication are called RSU(Road Side Unit).these devices provide drivers and passengers with the latest information about any disturbances on roads[1].

B.VANET challenges

VANET related research challenges in infrastructures, communication , security application, and services[1]. These challenges are:

- Highly dynamic topology
- Mobility modeling
- Signal attenuation
- Hard delay constraints.

B. *Emergency vehicles signaling using VANET*

In case of approaching emergency vehicle like an ambulance or fire engine, there could be loss of life due to the delay in the arrival of the vehicle at the destination .The time taken for the ambulance real its destination will be minimal when compared to the time taken for it arrive in a normal scenario. This can be made an everyday situation with the use of VANET

III. SIMULATION AND DISUCSSION

A. *Simulation environment:*

The open source tool NS2 (network simulator) [] is used to simulate the wireless data transmission . The FRSMOR is implemented in NS2, the programming language used is c ++ and TCL/OTCL. Two –ray ground reflection model are used the propagation model . The number of vehicular node consider in this simulation between 200 and 450 in a 3000 X 3000m area. Node are travelling at an average velocity between) and 60 km/h[1].

Simulation Result: Heading routing protocols can be analyzed And compared on the basis of following performance metric.

Packet Delivery ration: The ratio of the total packets delivered to the destinations. It is associated with the Qos and bandwidth utilization in the network .

Normalized routing load: It is defined as the total number or routing packet to under the protocols routing overhead.

Throughput: It is the sum of data rate to all the nodes in the network during a period .(bits per second).

Delay: Delay or latency is the time taken by the date packets to trans verse from the source to the destination.

Figure2. Protocols Delay

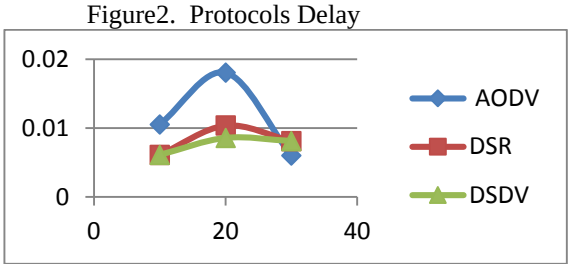

TABLE 2.PROTOCOL COMPARSION.

VANET	No of node creation								
Protocol	AODV(km/h)			DSR(km/h)			DSDV(km/h)		
No of nodes	10	20	30	10	20	30	10	20	30
No of pkts send	655	91	574	657	571	1019	657	563	1019
No of pkts recv	647	91	480	451	566	810	451	434	810
Pkt delivery ratio	98.7786	100	83.6237	68.6454	99.1243	79.4897	68.6454	77.087	79.4897
Control overhead	118	20	261	131	165	428	131	283	428
Normalized routing overhead	0.18238	0.21978	0.54375	0.290466	0.291519	0.528395	0.290466	0.652074	0.528395
Delay	0.0105476	0.0180504	0.00599829	0.0061219	0.0103757	0.00812215	0.0061219	0.00857247	0.00812215
Throughput	27734.1	42062.2	20986.2	19317.9	24729.8	35398.5	19317.9	18975	35398.5
Jitter	0.153195	0.0996099	0.183179	0.219202	0.1724	0.120288	0.219202	0.224806	0.120288
No of pkts Dropped	8	0	97	206	5	209	206	129	209

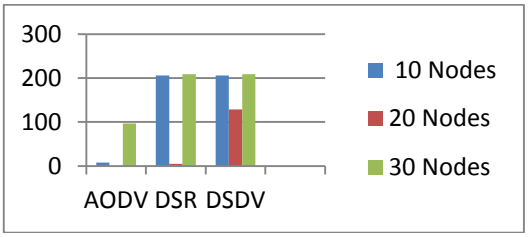

Figure2. Dropped Packed

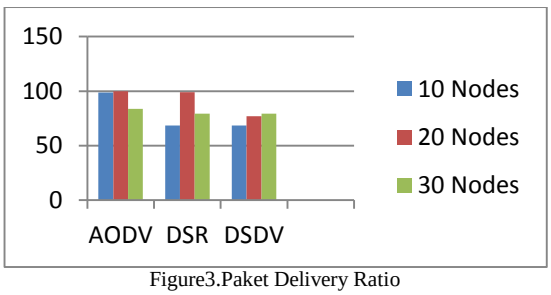

Figure3.Paket Delivery Ratio

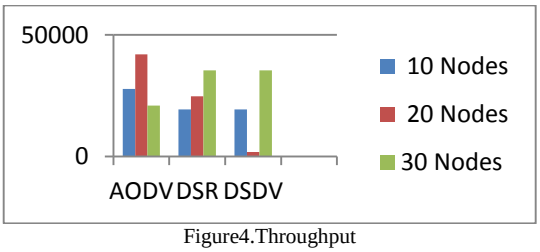

Figure4.Throughput

IV.CONCLSION

In this paper on Routing protocol using emergency vehicle comparsion of reactive and proactive routing protocol in number of nodes created. This work on discussed solving traffic congestion application of VANET. This network are organizing by self communication of speed of vehicle and degrees of freedom in the movements. This architecture of mobile for vehicle like fire service vans, ambulance ,police patrols care in high priority in this work. VANET simulated the traffic roads with the help of AODV, DSDV, DSR protocols. The AODV routing is used best obtained for the VANET, because it is used to find the correct destination.

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