Prevention And Monitoring Of Traffic Congestion Using I-GPSR In VANET

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Abstract— Vehicular ad-network (VANETs) have a higher potential to improve road safety and increase passenger convenience in vehicles. To create scalable, efficient and safe frame work for managing the traffic autonomous vehicles at the intersections. Improved GPSR protocol will provide a increase in throughput and packet delivery ratio (PDR) due to the process of determining its nearest path to the destination. The delay has been sufficiently reduced to prevent the traffic in the network. Network congestion is prevented by the use of I-GPSR routing protocol. Improved GPSR Routing Protocol is used in order to provide high speed notification to the source node. We have simulated the scenario using the NS2 (Network Simulator). The performance metrics such as throughput, delay, packet delivery ratio are considered in our analysis.

Index Terms— GPSR, I-GPSR, NS2, VANET, PDR (Packet Delivery Ratio).

1.Introduction

A vehicular ad- hoc network (VANET) is a technology that uses moving all vehicles as nodes in a network to create a mobile network to provide communication among vehicles, nearby fixed road side units (RSUs) and a regional trusted authority (RTA). A VANET is considered as a variant and extended form of a mobile ad hoc network (MANET). At the present time cars are used daily by many peoples. VANET provides a wireless communication between vehicles with in a dedicated short range communication (DSRC).

The communications between vehicles allows to share different kinds of information in the network. For example, safety information for the purpose of accident prevention, post accident investigation or traffic jams. The intention behind distributing and sharing this information is to provide a safety message to warn drivers about expected hazards in order to decrease the number of accidents and save people's lives, or to provide passengers with pleasant journeys.

VANET allows every participating vehicle into a wireless router or node with approximately three hundred meters range to connect with each other. Unlike the nodes in MANETs, vehicles are equipped with an intelligent transportation system (ITS) which potentially have longer transmission ranges, extensive on-board storage capacities, and rechargeable source of energy. Mobile wireless devices and wireless networks become increasingly influential in recent years, the demand for the vehicle to vehicle (V2V) communication and the vehicle to roadside (V2R) communication growths continuously.

2.Classification of vanet UNIT:

2.1 INVEHICLE DOMAIN

In vehicle domain consists of an on-board unit (OBU) and one or more applications units (AU) inside a vehicle. Application unit produces a set of applications utilizing the communication capability of the OBU. An On-board unit is provided with a shorter range of wireless communication device which is dedicated for road safety, and potentially with other optional communication devices (for safety and non-safety communications). The distance between AU and OBU is logical so that they can also reside in a single physical unit.

2.2 AD-HOC DOMAIN

An ad hoc domain is merged combination of vehicles equipped with OBUs and road-side units (RSUs), forming the VANET. OBUs form a mobile ad hoc network which allows communications among nodes without the need for a centralized coordination instance. OBU can directly communicate with each other if wireless connectivity exists among them or multi-hop communications are used to forward data

2.3 INFRASTRUCTURE DOMAIN

The infrastructure consists of RSUs and wireless hotspots (HT) that the vehicles access for safety and non-safety applications. While RSUs for internet access are typically set up by road administrators or other public authorities, public or privately owned hot spots are usually set up in a less controlled environment.

2.4 APPLICATION UNIT

An Application Unit (AU) is an in-vehicle entity (embedded or pluggable) and runs applications that can utilize the OBU's communication capabilities. Examples of AUs are i) a dedicated device for safety applications like hazard-warning, or ii) a navigation system with communication capabilities. Multiple AUs can be plugged in with a single OBU simultaneously and share the OBUs processing and wireless resources.

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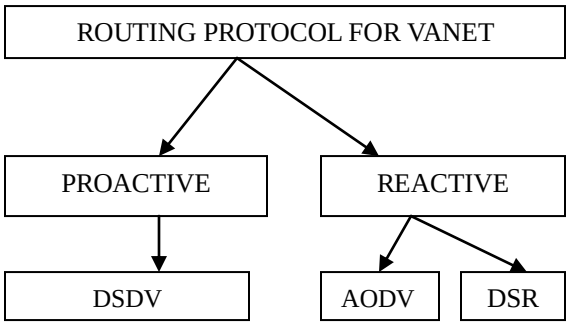
3 ROUTING PROTOCOLS FOR VANET

The Routing Protocol of the VANET is classified in to Table –Driven (or Proactive) and On-Demand (or Reactive) which is depicted in the Fig.4.1. The nodes maintain a set of table to every destination in the network due to periodical update of exchange messages. At all times the routes to all destinations are ready to use and as a consequence initial delays before sending data are small. Keeping routes to all destinations up-to-date, even if they are not used, is a disadvantage with regard to the usage of bandwidth and of network resources.

Fig.1.Classification of Routing protocol



3.1 DSDV

DSDV (Destination-Sequence Distance Vector) has one routing table, each entry in the table contains: destination address, number of hops toward destination, next hop address. Routing table contains all the destinations that one node can communicate. When a source A communicates with a destination B, it looks up routing table for the entry which contains destination address as B. Next hop C was taken from that entry. A then sends its packets to C and asks C to forward to B. C and other nodes.

3.2 DSR

DSR (Dynamic Source Routing) is a kind of routing protocol which is used to manage a MANET without providing periodic table-update messages like table-driven routing protocols. Dynamic Source routing is particularly designed for use in multi-hop wireless ad-hoc networks. Ad-hoc protocol allows the network to be an independent and self-dependent for the prevention of security threads in the network scenario

3.2 AODV

Ad-hoc on demand distance vector routing (AODV) is the combination of DSDV and DSR. In AODV, each node maintains one routing table. Routing in AODV consists of two phases: Route Discovery and Route Maintenance. When a node wants to communicate with a destination, it looks up in the routing table. If the destination is found, node transmits data in the same way as in DSDV

4 GPSR ROUTING PROTOCOL

GPSR which is named as Greedy Perimeter Stateless Routing. This routing protocol is applicable for VANET network, which is encoded on geographical position of the area.GPSR routing protocol is a one in which each node periodically broadcasts its own location information to the neighboring node after the information is being received. A node make a packet forwarding decision based on the location itself and neighboring node and the destination node. The forwarding of packets is based on the shortest path to the destination

4.1 LIMITATIONS OF GPSR PROTOCOL

GPSR routing protocol in which transmission of message is done by packet method and the nodes are moving by the process of quick sending and quick receiving but its processing is very low. As the number of nodes increases in the network a large queue of data to be processed is formed. As the increase in the number of data packets will leads to congestion and causes increase in transmission delay with the decrease in the packet delivery ratio.

4.2 IMPROVED GPSR (I-GPSR)

I-GPSR is improved GPSR based on the speed and orientation of vehicle. Its working is similar as GPSR routing protocol but difference is that it sends the messages to that vehicle which has high speed and going to that direction in which the receiver is going to destination. I-GPSR is used in order to provide the immediate information to source node regarding the traffic congestion.

5 PROPOSED METHOD

The system consists of different road scenarios with mobility of vehicles, service provider and trust authority. When a vehicle enters into a network it should be registered with the trust authority. Only registered vehicle can communicate with each other and get the updated information. Each registered vehicle contains an individual name provide by the trust authority. The vehicle can communicate with other vehicles and the service provider by using the Improved GPSR routing protocol. When there is accident in network it is informed to source node through the nearest path with high speed. The information is send to all vehicles by using vehicle to vehicle communication (V2V) and vehicle to infrastructure communication (V2I). It Avoids unwanted time by waiting in the network.

6 RESULT AND DISCUSSIONS

Table 1: Simulation Table

PARAMETER	DESCRIPTION
Simulation Area	2000*800m
Number of nodes	36
Channel	Wireless
Channel Type	Two way ground
Protocol	DSR,I-GPSR
Application	Constant Bit Rate
MAC Protocol	802.11

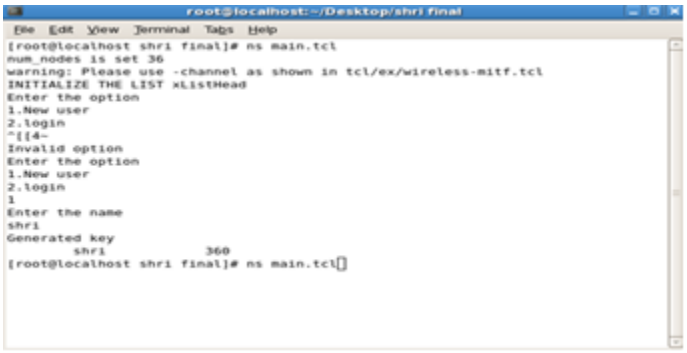


FIG.1.1 TERMINAL WINDOW

The Fig. 1.1 shows the code to run in the terminal window. If no error exists, it executes the code. The option asks for Enter the option whether it is a new user or Existing User. If it is a new user, then select 1 and enter the user name and the system generates the key for that particular user

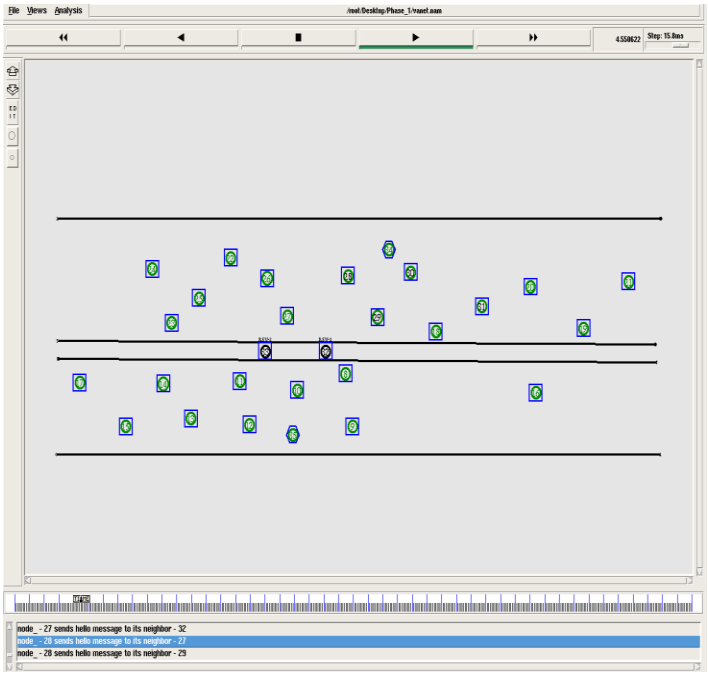
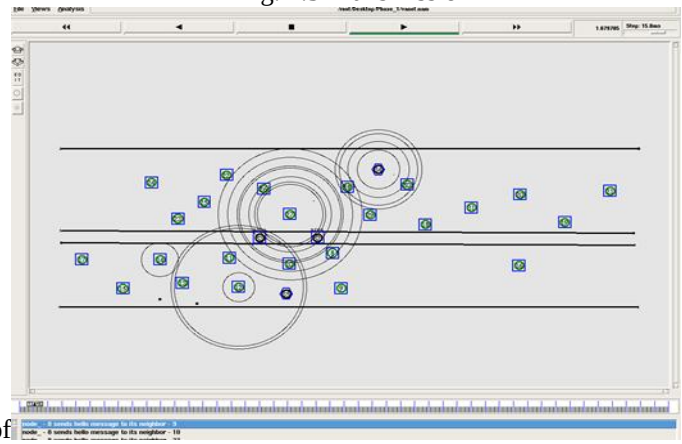


Fig. 1.2 Initial Scenario

The Initial Scenario is placed with the number of thirty-six nodes in which two of them are fixed for constant monitoring of the network. The node number thirty- two and thirty-three fixed nodes. These two nodes are named as Road Side Unit (RSU1) and Road Side Unit 2(RSU). The center flow of two nodes is named as fixed nodes.

Fig. 1.3 Transmission



of HELLO messages

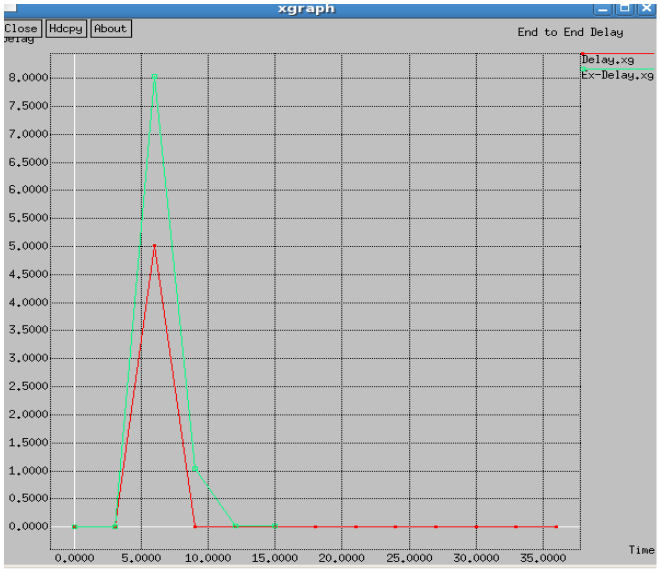


Fig. 1.4 Packet Delay

The delay is the important parameter in VANET and the time taken by the source to reach the destination should be very low. The Fig.6.6 shows the comparison of delay with AODV and I-GPSR routing protocols. The service provider shares information to all vehicles and other service provider in the road network. Based on the comparison between nodes shows that delay is one of important parameter in order to transmit the packet from source node to destination node at certain duration of time. The Improved GPSR Routing protocol transmit higher packets to destination node in small duration of time by reducing the factor of the delay in the network transmission.

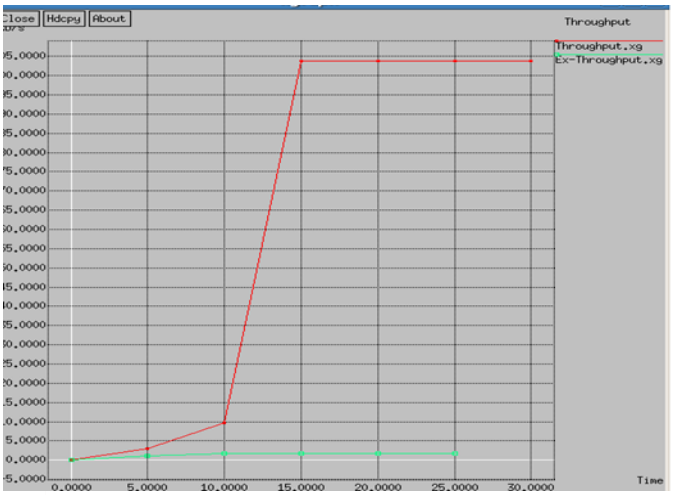
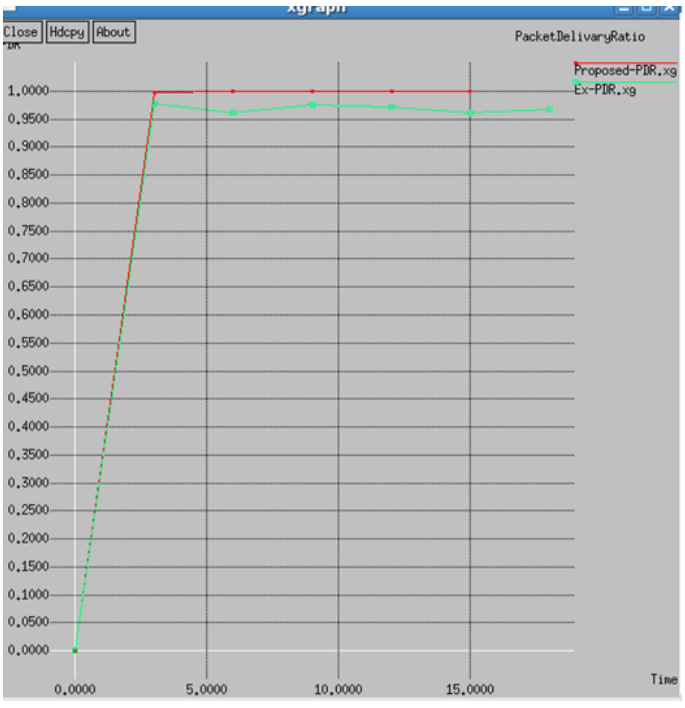


Fig. 1.5 Throughput

Throughput Performance helps the network to decide whether the protocol can be used to transmit the successful amount of information to its destination. Improved GPSR Routing protocol provides a significant increase in transmission of message to its end user. Based on the comparison around thirty packets has reached its destination node during the same interval of time as it used for GPSR Routing Protocol



Packet Delivery Ratio is one of the important feature of the network which helps to calculate the number of packets which is transmitted from the source to particular destination in given time duration of simulation time.

7 CONCLUSION

The proposed scheme preserves the privacy of each vehicle which takes part in the network. RSU is used as a mediator for authentication of both the requesting vehicle and the RSU. Improved GPSR Routing helps to limit the traffic congestion by the process of transmitting the packet from the source node to destination in a faster manner. A Scenario of Authentication avoids congestion in the network. The Improved GPSR routing protocol helps to find the shortest path to reach the destination. In future, the system can also use dual authentication method for the information sharing among vehicles.

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