Delay Optimization in VANET Using Ant Colony Optimization and WI-MAX

Jaya Sehgal[1], Poonam Arora[2]

PG Student, Dept. of ECE, Baba Farid College of Engineering & Technology, Deon (Bathinda), India[1]

Assistant professor, Dept. of ECE, Baba Farid College of Engineering & Technology, Deon (Bathinda), India[2]

ABSTRACT: VANETS is the most popular network which is called Vehicular Ad Hoc Network. The researchers make a lot of work in this network. From the Literature review, VANETs works on the basis of real time system where the vehicles are moving nodes and travel with a very high speed on the roads in the urban areas. There are many security issues like authentication, tunnel attacks, intelligent system approach, collision detection, congestion avoidance, communication system approach etc. In this present work we are presenting an intelligent route identification approach in case of accident occurrence for V2V communication. The intelligent vehicles are been defined respective to distance, direction and speed analysis. If some accident over the network, the neighbour node information flow will be performed to perform the route analysis. In this work a bio inspired V2V communication approach is been suggested to identify the safe path over the network.

KEYWORDS: WIMAX, Ant Colony, VANET, MANET, REPLICATION, DSRC

I.INTRODUCTION

Vehicular ad-hoc network are wireless networks where all the vehicles from the nodes of the network. It is for the driver comfort and road safety, the inter-vehicle communication provide them. Vehicular ad-hoc network is subclass of mobile ad hoc networks which provides a distinguished approach for intelligent transport system. It is very necessary for all the vehicles. Vehicular ad hoc network is special form of MANET which is vehicle to vehicle roadside wireless communication network. It is autonomous and self-organizing wireless communication network, where all the nodes in VANET involve themselves as servers or client for exchanging and sharing information. In today era used Wi-Fi IEEE 802.11 based technology it is very commonly used for deploying VANETs. All the vehicles connected with the wireless network interface it can be use either 802.11b or 802.11g are the two standards for access media. These standards are general purpose standards and they do not fit properly the requirements of high dynamic network such as VANETs. In this scenario currently describe the DSRC (Dedicated short-range communication) has been proposed as the communication standard for VANET it is used in those platform where short medium range communication service that offered at very low latency and high data rate. IEEE 802.11 standard implies that vehicles communicate with in limited range while moving. These kinds of networks are very optimal configurations protocols in order to increase the effective data packet exchange, and reduce the transmission time and network usage [8].

II.RELATED WORK

Lalit Kumar and Dheerendra Singh (2013) In this paper we present a artificial bee colony (ABC) algorithm for NP-Hard problems. This algorithm is considered as one of the newest nature-inspired swarm-based optimization algorithms and has a promising performance. Shortest Common Supersequence is a classical problem in the field of string and it is classified as NP-Hard problem, such as Genetic algorithms, Majority Merge algorithm and Ant Colony Algorithm [1].

This approach obtains better results than the original artificial bee colony algorithm. Rakesh Kumar and Mayank Dav (2012) represent a paper based on the VANET vehicular ad-hoc networks are upcoming wireless network environment for intelligent transportation system. In the VANET applications build upon the data push communication model where information is disseminated to set of vehicles. There are so many types of VANET applications and their communication protocol needs a systematic literature survey. In this paper mainly define the VANET applications

based on the various broadcasting data dissemination protocols are surveyed separately and their fundamental characteristics are revealed. At the end of this paper comparison of all the protocols [2].

Amiour med tahar, Bilami azeddine represent a paper on VANET vehicular ad-hoc network where vehicles like car, bus, truck can assume as nodes of the network. Recently for driver comfort and road safety, the inter-vehicle communication became increasing a subject of much scientific research. On VANETs routing protocol have a great consequence where AODV is one of the most popular routing protocol dedicated to ad-hoc network it can use the flooding techniques for locating the destinations and possibly cause an overhead in the network. To overcome this problem used the multi point relay algorithm in the AODV protocol in order to reduce the number of messages broadcasted during the flooding techniques [3].

Rakesh Kumar, Mayank Dave represents a paper in (2011) on vehicular ad-hoc network is subclass of mobile ad-hoc network which provide a distinguished for intelligent transport system (ITS). According to the survey it is very necessary to use the ITS with the help of VANET routing protocol. In paper also discuss the advantage and disadvantages, applications of different routing protocols for vehicular ad-hoc networks. This paper also explores the motivation behind the designed and traces the evolution of this routing protocol. At last this paper also show the tabular comparison with various routing protocols for VANET [4].

Jason J. Haas and Yih-Chun Hu represents a paper based on the performance measurements obtained from simulations of the (VANETs) vehicular ad-hoc networks. These simulations use as input traces of vehicle movements that have been generated by traffic simulators which is based on the traffic model theory. In this paper mainly work based on the actual large scale recordings of vehicle movements. To our knowledge, no one has published any work on actual large scale recording of vehicle movements. In order to enable analysis on this scale, we have developed a new VANET simulator which handle more vehicle than ns2 [5].

 Cristina Rico Garcia, Andreas Lehner represents a paper on efficient design and reliable broadcast MAC layers for wireless mobile ad-hoc networks (MANET) especially high user speeds are allowed is a current challenge. Despite the absence of infrastructure would permit channel allocation, awareness techniques allow a certain channel assignment. In this paper design the MAC layer protocol designed for broadcast MANETs called COMB cell based orientation- aware MANET Broadcast. In the technique of COMB allow the realization of collision free transmission, high speed is supported and no handshake is required. COMB is based on the localization aware cross layer dimensioned CDMA cell and it use the SOTDMA protocol as intra cell scheme [6].

Aswathy M and Tripti represent a paper in (2012) on vehicular ad-hoc network are special kind of mobile ad-hoc network (MANET). This paper defines the vehicles on road as nodes of network. With the help of VANET give us many applications as an intelligent transportation system. In the dynamic network architectures and node movement characteristics differentiates VANETs from other kind of ad-hoc networks. The dynamic change in topology shortens the effective time of routing. Routing in the VANET is quite complicated task. AODV (ad-hoc on demand distance vector) mostly used in the topology based routing protocol for VANET. During the process of route discovery process AODV broadcast route message (RREQ). It creates many unused routes between a source and destination node. This paper main aim to improving the performance of AODV by enhancing the existing protocol by creating stable clusters and performing routing by cluster head and gateway nodes [10].

 Patil V.P (2012) represent a paper on vehicular ad-hoc network is a type of mobile ad-hoc network where nodes are constrained to move along the road. In the VANET all the devices communicate with the help of radio devices with each other and along with the road side units called the base stations. Vehicular networks aims to make the driving experience safe, efficient and enjoyable. Vehicle traffic congestion is reflected as delays while travelling, it also have a number of negative effects and create a major problem in the society. There are so many technique has been given to deal with this problem. In this paper suggest more innovative approach to deal with this traffic congestion problem using the characteristics of vehicular ad-hoc networks (VANET). This system is developed and tested using the AODV protocol od ad-hoc mobile network to deal with the problem of vehicle traffic congestion in vehicular network. Traffic congestion can be measured on following patterns like packets broadcast, percentage of packet delivered and

percentage of traffic diverted and overhead to manage the problem of data traffic in the network. In the main simulation shows the domain of vehicle traffic congestion in VANET is demonstrated [11].

Reena Dadhich (2011) represents a paper in on VANETs vehicular ad-hoc networks have been recently attracting an increasing attention from both research and industry communities. VANET technology is distinguished from mobile ad hoc networks (MANET) and wireless sensor networks (WSN) by large scale deployed autonomous nodes with abundant exterior assisted information, high mobility with an organized with constrained pattern, change in frequency, topology leading to frequent network fragmentation with varying drivers behaviour factors. This paper also introduces the realistic vehicular mobility model and evaluates the performance of following routing protocols: AODV, DSR and TORA. It also introduce the different highway scenarios, characterized by the mobility, load and size of the network also be simulated. Result indicates that the reactive routing protocol performance which is suitable for VANET scenarios in term of packet delivery ratio, routing load and end to end delay [12]

III. ANT COLONY OPTIMIZATION AND WIMAX

Ant communication is accomplished primarily through chemical called pheromones. Ants communicate to one another by laying down pheromones along with their tail. Other ants receive the presence of pheromone and tend to follow path where the pheromones concentration is higher. Pheromone trail starts to evaporate, then reducing its attractive strength. The more time the pheromones have to evaporate. Ant follows that path which are shorter and the pheromone density remain high as it lay on the path as fast as it can evaporate [3].
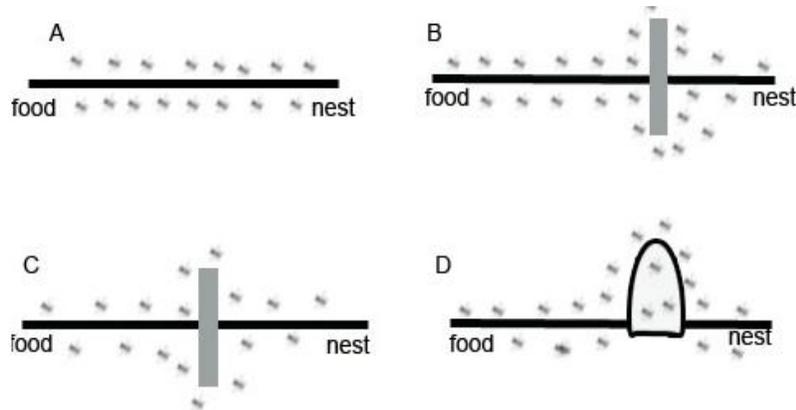

Fig1: Ant Behavior

In the figure A ants in the pheromone trail between nest and food; on other side in figure B an obstacle interrupts the tail; as it is same side C ants finds two paths to go around the obstacle; as compared to other sides in D figure new pheromone trail is formed along the shorter path. Pheromone evaporation has also advantage of avoiding the convergence to locally optimal solution. It there was no evaporation at all, the path chosen by the first ants would tend to be excessively attractive to the following ones. Ant find a good path from food to destination and other ant follow that path and positive feedback eventually leaves all the ants followings a single path. ACO is basically the optimization approach that is speed up the algorithmic process. In the wireless network the ACO is basically used to optimize the communication process. This approach is used in the nodes to find the optimize path over the network. Ant places the pheromones on the located path so all other nodes can follow these pheromones to communicate on this optimized path.

Wi-Max is a wireless system that is designed for metropolitan area. There for, in the wi-max support non-LOS channel, pedestrian mobility and high data rate. The core technique of wi-max is based on the IEEE802.16 family standard. Wi-max combined with wi-fi technique, which is most popular local area wireless scheme. Wi-max offered a metropolitan wide coverage. With the help of local hotspot receives the Wi-max signal convert into the Wi-Fi protocol because it is

compatible with most the existing wireless devices. Wi-max interoperability for microwave access is currently one of the hottest technologies in wireless. The institute of electrical and electronics which sets networking standards such as Ethernet 802.3 and wi-fi 802.11 has published standards. WiMAX is based on RF technology called orthogonal frequency division multiplexing which is very effective means of transferring data when carries of width of 5MHz or greater can be used. Below 5MHz carrier width, current CDMA based 3G systems are compatible to OFDM in terms of performance. Wi-Max is standard-based wireless technology that provides high throughput broadband connection over long distance, hotspots and high speed connectivity for business customers [7].

IV. NEW PROPOSED TECHNIQUE

In this proposed work we have defined the network with a new intelligent algorithm to perform the vehicle to vehicle communication. Each vehicle can pass the information to other regarding the path, speed etc. This information also includes the accident status also. In this proposed work, as a vehicle get some collisions it will inform to the follower vehicles about its status so that they can perform the decision regarding the route change at earlier stage. Each vehicle can pass the information to other regarding the path, speed etc. This information also includes the accident status also. In this proposed work, as a vehicle get some collisions it will inform to the follower vehicles about its status so that they can perform the decision regarding the route change at earlier stage.

The intelligent bio inspired algorithm is suggested in this work to identify the new route.The intelligent bio inspired algorithm is suggested in this work to identify the new route. The simulation of the proposed technique is done in NS2. The delay is reduced in the new technique as compared to the previous technique. In figure 2, comparison delay graph is shown between the new and previous technique. The green line shows the delay in previous technique and red line technique shows the delay in new technique.
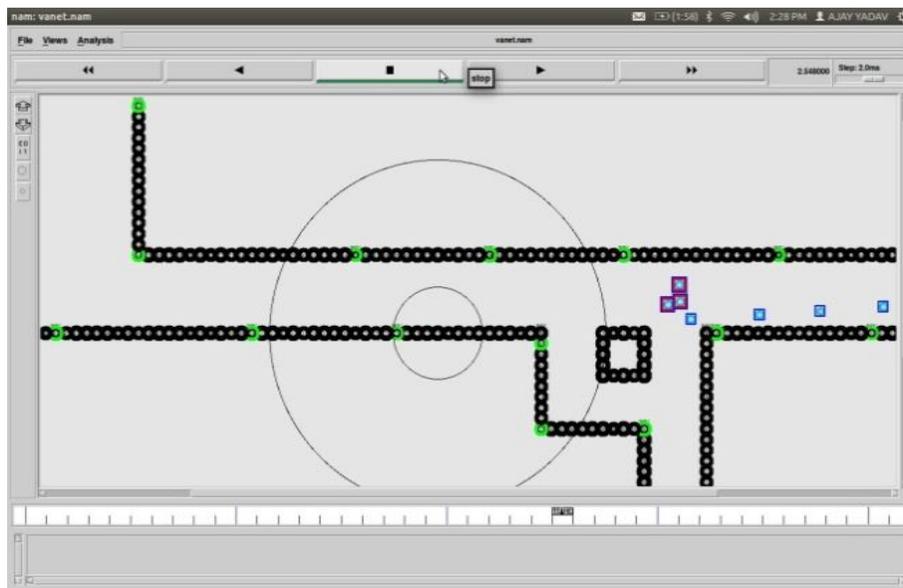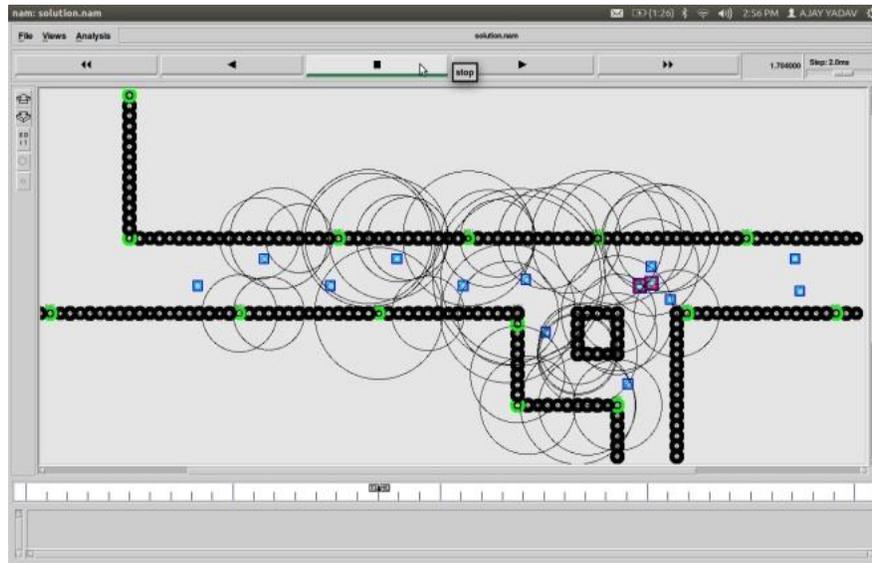

Case 2: To decrease the delay between the vehicles use the case. In this case again define the road along will the RSU(road side unit).
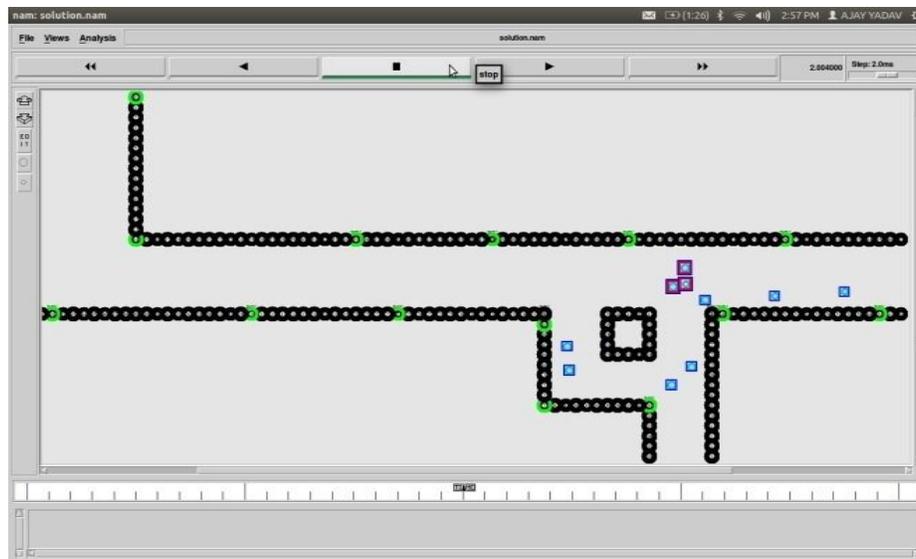
Whole traffic passes on the road without any jamming in the network.

Whole traffic reaches to destination stage.

V. RESULT AND DISCUSSION

NS2 is used as a simulation platform. NS is a discrete event simulator, where the advance of time depends on the timing of events which are maintained by scheduler. NS simulator is based on two languages: C++, and a OTcl (an object oriented tool command language) interpreter used to execute users command scripts.
 1).   Simulation analysis: Sensor node distributed in 800X800 areas.

Table 1.Simulation Parameter

No. Item	No. Item Description parameter	No. Item Description value
1	Simulation Area	800X800
2	Data rate	0.05 packet per second
3	Channel Type	Channel/wireless channel
4	Antennae model	Antenna/omniantenna
5	Simulation time	15 sec
6	Interface queue Type	Queue/Drop tail/ priqueue
7	Link layer type	LL
8	Transmission Power	802.11
9	Routing Protocol	AODV
10	Traffic Source	CBR
11	Type of MAC	MAC 802.11
12	Packet size	1000 bytes

2).   Simulation Result:
The Results of the simulation are shown in the figure 2, figure 3 ,figure 4and figure 5which shows the reduce in delay and the total emissions also show a high decrease because of less fuel consumption and the fewer accelerations and brakes that vehicles need to apply. The emissions also decrease and power increase.

2.1)Delay Comparison Graph: In this we show the comparison between the old delay graph and new delay graph. In this green line show old graph and red line show new graph.
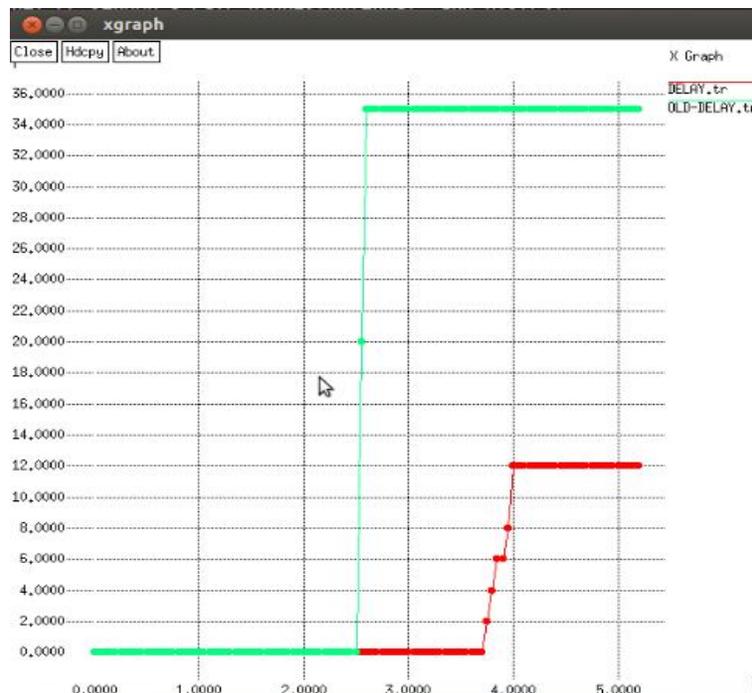

Fig. 2 Delay comparison graph

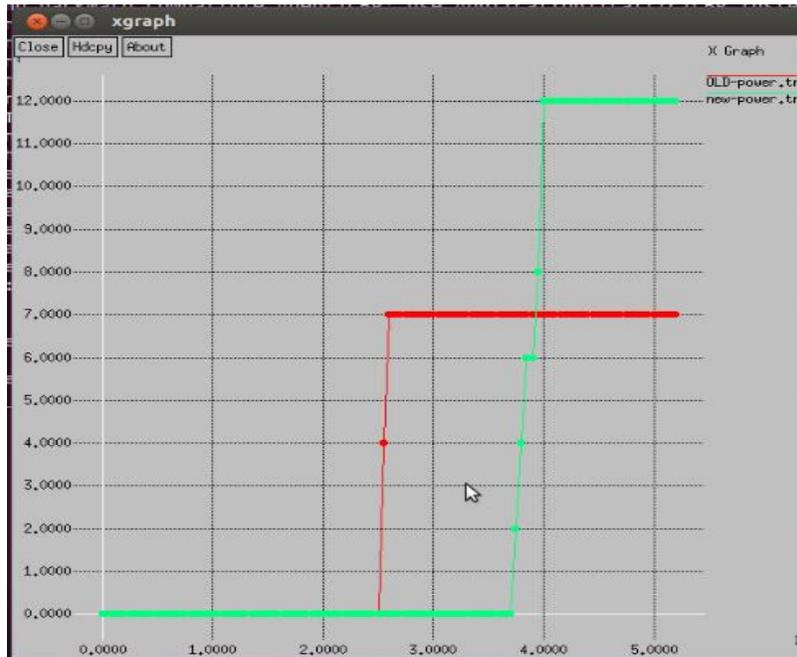2.2)Power comparison graph: In this green line show new power graph and red show old power graph.

Fig. 3 Power comparison graph

2.3)Emission comparison graph: In this we show red line show old emission graph and green line show new emission graph.
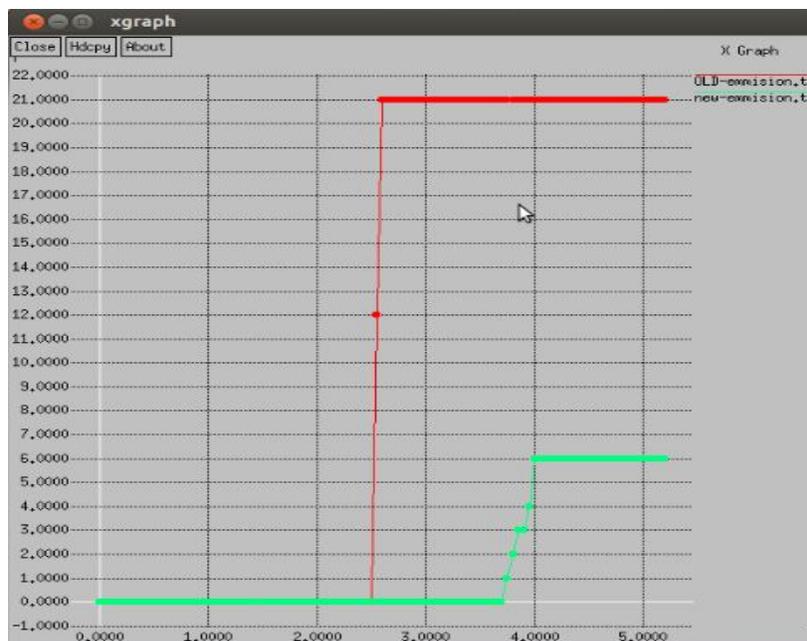

Fig .4 Emission comparison graph

2.4)Fuel comparison graph: In this red line show old fuel graph and green line show new graph .
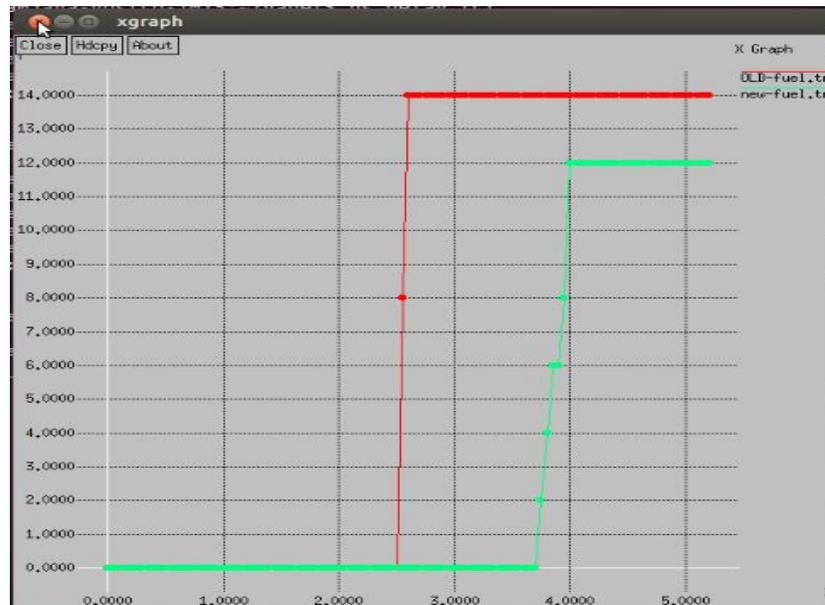

Fig 5.Fuel comparison graph

VI.CONCLUSION

In this paper we conclude that the ant colony optimization is efficient approach for VANET. The accident information should be flooded in the city roads as soon as possible .The accident information is exchanged between the road side sensors using WIMAX .The simulation results shows that proposed technique is more efficient than the previous techniques.

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