Modified Congestion Re-routing scheme using centralized Road side Unit

Divya.R[1], Suganthi.V[3], Jayachitra.J[3]

[1]*UG Scholar, Department Of Information Technology*
IFET College Of Engineering, Villupuram
[2]*Associate Professor, Department Of Information Technology*
IFET College Of Engineering, Villupuram
[3]*Associate Professor, Department Of Information Technology*
IFET College Of Engineering, Villupuram

---***---

Abstract- *In order to face traffic congestion, there is need to eliminate traffic in an automated process. Centralized solutions to alleviate congestion, suffer from scalability and privacy problems such as the central server has to perform intensive computation with the vehicles in real-time and the drivers have to share their location of both origins and destinations of their trips with the server. This article proposes a centralized RSU (Road side unit) which offloads a large part of the rerouting computation at the vehicles, and thus, the re-routing process becomes practical in real-time. The RSU is a computing device located on the road side that provides connectivity support to passing vehicle. As RSU supports cooperative and distributed applications, it works together with vehicles to coordinate actions and process several types of information. Ns2 simulation is used to evaluate the performance of RSU backbone routing. Thus Simulation results that the proposed RSU technique provides detailed information for each vehicle with an individual information range of more than 50km from the current position with low delay and high accuracy.*

Key Words: RSU, Adaptive path rerouting, DSRC, IEEE 802.11P, VANET, SCRP

1. INTRODUCTION

Now a day, Congestion is a serious problem with high populations for big cities. Google maps traffic of internet based solutions are not adequate for instant response to fine grained traffic, highly dynamic and congestion control. Vehicles that are already in congested areas are advise against the use of certain roads, and the VANET-assisted communication helps nearby vehicles to re-route themselves around sudden traffic jams. It is not possible to achieve such impact via Internet-based solutions that, act on the order of tens of minutes; rather than milliseconds. To tackle all these problems, this article proposes a centralized RSU, a road side unit for congestion avoidance, which supports both VANET communication and cellular internet. As it uses a server, reachable over the Internet, to determine an accurate global view of the traffic. The RSU, a centralized server acts as a coordinator that collects location reports, distributes re-routing notifications to the vehicles and detects traffic congestion in the main traffic environment. However, the centralized RSU system offloads a large part of the re-routing computation and thus the re-routing process becomes practical in real-time. Unlike the other systems proposed in the field, the RSU does not require a global knowledge of the congestion levels on the map, but rather only the congestion levels of the roads that the vehicle might take. The vehicles situated in the same regions can exchange messages over VANETs. VANET allows vehicles to connect with RSU and they latter connected to the Internet, forming a fixed infrastructure that offers the capability of communicating with roaming vehicles each other. Also, there is a privacy enhancement protocol to be used to protect the users' privacy. RSUs have been used for different roles such as service proxies, location servers, traffic directories, security manager and data disseminators. When congestion are detected, the server sends the traffic map only to the vehicles that sent the latest updates. The experimental evaluation shows that the system is more reliable: In any case it performs better than a completely offline shortest-path calculation (e.g., Dijkstra), and its benefits increases as the level of congestion increases.

1.1 EXISTING SYSTEM

Several routing schemes are suggested to eliminate these issues. Nearly all of the schemes are based on blind decision based. Whenever the vehicle reaches the intersection area it will select the shortest path between source and destination, for example **GSR, GPSR, GYTAR, GPCR, and A-STAR** are previous approach algorithms. However these techniques are aimed to reduce the overall delay, they will cause the higher traffic of packets it leads to maximum delay. In empirical path loss models were developed in four different vehicle-to-vehicle environments, i.e., highway, rural, urban and suburban. In analysis of one-dimensional, an analytical model was proposed to investigate the connectivity of VANETs in the presence of Rayleigh, Rican and Weibull channels, from a queuing theoretic perspective. IN one-hop broadcasting, analytical models were developed for broadcast efficiency and reliability in 802.11p for Rayleigh fading channels. IN evaluation information propagation, the connectivity of information propagation was studied, focusing on packet loss rate, packet transmission distance and effective coverage range of road-side stations.

1.2 DISADVANTAGES OF EXISTING SYSTEM

- Not always true in mobile vehicular environments
- Unable to provide complete evaluation
- Privacy information of the user may leaks
- Large number of manpower needed

2. PROPOSED FRAMEWORK

In this approach, our algorithm implements the power and delay effective spine nodes on intersection of roadsides and connects all the spine nodes with help of bridge nodes. These type of nodes helps to balance the higher no of nodes with effective delay and connectivity co efficient.To transfer the data Packets routes which having lesser no of weights are elected to transfer the packet. In additional we are applying the Adaptive path rerouting scheme on urban vehicular adhoc network to eliminate the traffic on road segments. When vehicle enters the roadside it should automatically transfer packet which contains the Destination, speed, ID of the current vehicle. Then the spine node will maintain the Real-time enhanced database of all vehicles currently travelling on road segments. This Spine Nodes will control the traffic signals based on the collected information from the vehicle. It will compute the traffic coefficient by the speed and destination of current vehicles then it will intelligently reroute some vehicles with the help of traffic signals. For simulation of this implementation we are using SUMO tool and getting parameter results we are using ns2 simulation tool.

2.1 OVERALL ARCHITECTURE

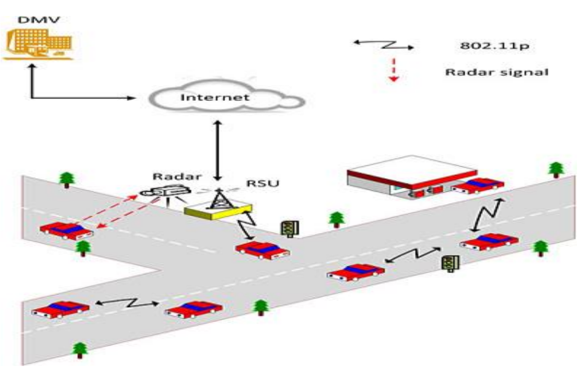

Fig 1: RSU on Congestion Avoidance

The RSU is placed on the main traffic environment, which is the computing device located on the road side that provides connectivity support to passing vehicles, and the radar is placed next to the RSU, has a transmitter that emits radio waves called radar signal in predetermined directions. When they come into contact with an object, they are usually reflected or scattered in many direction.They can be used to detect motor vehicles.802.11p is an approved amendment to the IEEE802.11 standard to add wireless access in vehicular environment. And then RSU later are connected to the internet, forming a fixed infrastructure, they provides connectivity solutions between internet and smart vehicles. The internet access through roadside infrastructure requires pervasive road side to achieve connectivity. This assistance help alert driver to slow vehicles ahead.

2.2 ADVANTAGES OF PROPOSED WORK

- It can provide complete evaluation
- Increasing the throughput
- Reduce the delay
- They are effective in avoiding accidents and traffic congestion.

3. DESIGN AND IMPLEMENTATION

There are three modules in this article, namely

- Message Types and Information Exchange
- Congestion Information Database
- Dynamic rerouting

3.1 MESSAGE TYPES AND INFORMATION EXCHANGE

For the communication among all cars, we assume standard signal range of the 802.11p protocol, which is 100 meters. In addition to the Basic Safety Messages (BSM) that are regularly sent to nearby vehicles, two types of messages are implemented in our system: congestion request and response. There are several fields within a BSM that are of interest to our application. First, the current speed of a vehicle is obviously crucial in the speed averaging process. Second, the position of the vehicle can be used to determine which road the vehicle is on.

3.2 CONGESTION INFORMATION DATABASE

Creating and Storing Congestion Information: In order to store and exchange congestion measurements, vehicles make use of congestion info structs. Each struct consists of the following fields: Creator ID: The unique ID of the vehicle that created this measurement. Edge ID: The unique ID of the road that this measurement belongs to. Average Speed: Average of the speed readings from all the cars on the same road with the car that crates this measurement. Timestamp: Time of the measurement's creation to ensure the freshness of measurements and prioritize most recent ones.

3.3 DYNAMIC REROUTING

Our dynamic route planning technique helps cars avoid congestion by choosing the route with the minimum trip time. This optimal route is calculated using the congestion information available to the car. There are two limitations in real-time trip time optimization: Calculating a global optimum is challenging due to the amount of congestion information required. Additionally, the global optimum may change frequently since congestion levels are often highly dynamic.Therefore, we designed a checkpoint-based approach and minimize trip times for each sub-trip after dividing a long trip into several sub-trips.

4.SCREENSHOTS

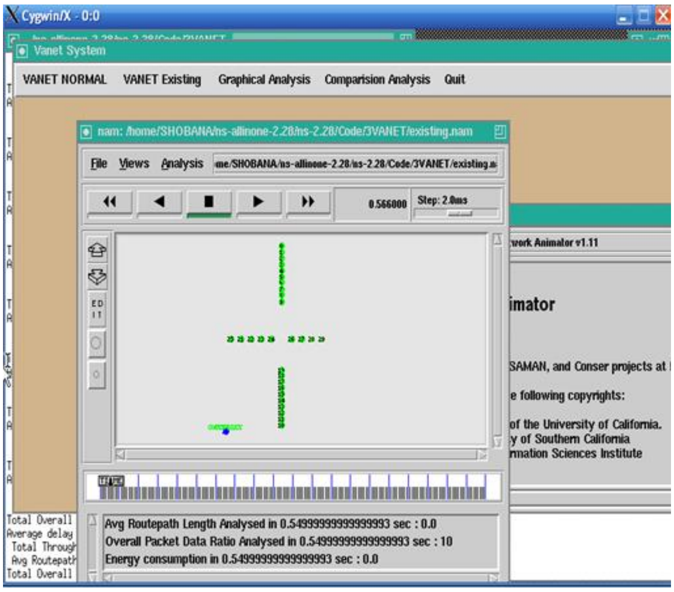

Fig 2 : Message types and information exchange

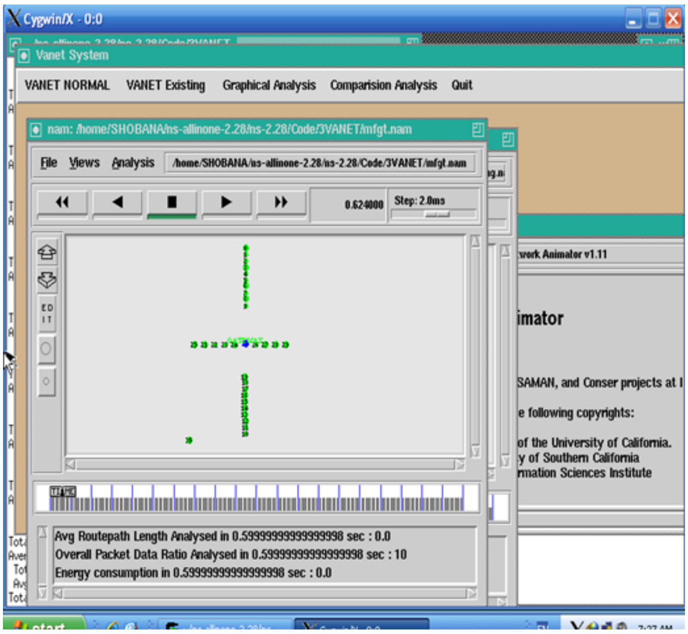

Fig 3: Congestion information database

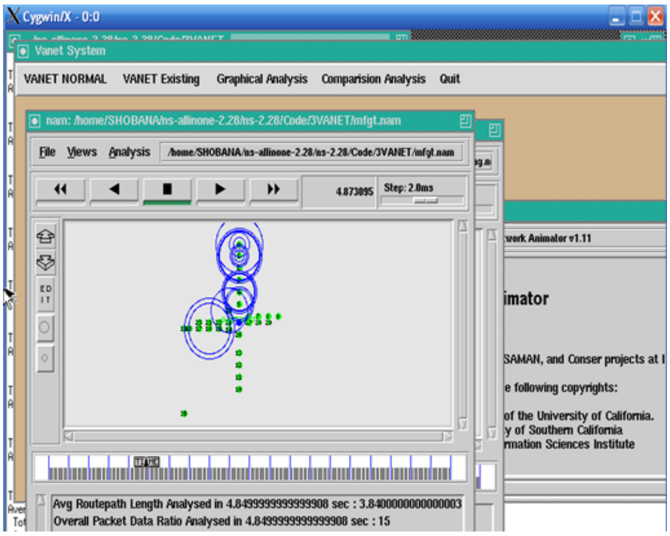

Fig 4: Dynamic rerouting

5.CONCLUSION

In this paper, we proposed a new analytical model for the performance analysis and clustering design in VANETs.Our model integrates SCRP protocol operations, Vehicle wireless channel conditions, and the moving pattern of the vehicles. We also derived closed-form expressions for average packet loss probability and throughput of a VANET cluster. Validated by extensive simulations, our model represents a new approach for the performance study of VANET.In particular we derived system measures that quantify the effects of cluster design criteria on VANET performance. Such measures can be used to determine the suitable cluster size, typical network Connectivity, and adequate data traffic control to achieve the desired system reliability and network throughput. The proposed model and analysis provided guidelines for the design and management of VANETs to maintain acceptable communication performance.

6. FUTURE WORK

In our future work, we are going to extend our cluster model to adaptive data rates and multiple clusters, and incorporate inter-cluster routing, channel allocation, and interference management. As future work, we intend to customize the GA for this particular application, proposing new operators or multi-objective fitness functions and do a qualitative comparison with other techniques used to solve this problem. We also want to test different scenarios, where the number *k* of RSUs allowed can be minimized. Another interesting aspect to be studied is the parallelism of the solution, which can considerably increase the algorithm performance. In additional, we want to apply the GA to bigger scenarios, such as S˜ao Paulo. However, this last experiment depends on generating traces of real traffic.

REFERENCES

[1] G. Karagiannis et al., "Vehicular networking: A survey and tutorial on requirements, architectures, challenges, standards and solutions," IEEE Commune. Surveys Tuts., vol. 13, no. 4, pp. 584–616, 2011.
[2] Amendment 6: Wireless Access in Vehicular Environment (Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications), IEEE STD 802.11p TM-2010, Jun. 17, 2010.
[3] H. Su and X. Zhang, "Clustering-based multichannel MAC protocols for QoS provisionings over vehicular ad hoc networks," IEEE Trans. Veh. Technol., vol. 56, no. 6, pp. 3309–3323, Nov. 2007.
[4] R. Liu, H. Liu, D. Kwak, Y. Xiang, C. Borcea, B. Nath, and L. Iftode. Themis: A participatory navigation system for balanced traffic routing. In Proceedings of the IEEE Vehicular Networking Conference (VNC), pages 159–166, 2014.
[5] J. Meyerowitz and R. Roy Choudhury. Hiding stars with fireworks: location privacy through camouflage. In Proceedings of the 15th annual international conference on Mobile computing and networking, pages 345–356. ACM, 2009.
[6] O. Kayis and T. Acarman, "Clustering formation for inter-vehicle communication," in Proc. IEEE Intell. Transp. Syst. Conf., Seattle, WA, USA, Sep. 2007, pp. 636–641.
[7] M. Raya and J. P. Hubaux. Securing vehicular ad hoc networks. Journal of Computer Security, 15(1):39–68, 2007.
[8] D. Schrank. Urban Mobility Report (2004). DIANE Publishing, 2008.
[9] Wireless LAN Working Group. Wireless access in vehicular environments. IEEE Standards, July 2010.
[10] L. Wischoff, A. Ebner, H. Rohling, M. Lott, and R. Halfmann. Sotis - a self-organizing traffic information system. In VTC, 2003.
[11] J.B Kenney. Dedicated short-range communications (dsrc) standards in theUnited States. Proceedings of the IEEE, 99(7):1162–1182, 2011.
[12] Z. Liang and Y. Wakahara. Real-time urban traffic amount prediction models for dynamic route guidance systems. EURASIP Journal onWireless Communications and Networking, 2014(85):1–13, 2014.
[13] Z. Wang, L. Liu, M. Zhou, and N. Ansari, "A position based clustering technique for ad hoc intervehicle communication," IEEE Trans. Syst., Man Cybern.—Part C: Appl. Rev., vol. 38, no. 2, pp. 201–208, Mar. 2008.
[14] S. Lim. Congestion-aware traffic routing for large-scale mobile agent systems. PhD thesis, Massachusetts Institute of Technology, 2012.
[15] M. Milojevic and V. Rakocevic. Distributed vehicular traffic congestion detection algorithm for urban environments. In IEEE VNC, 2013.
[16] N. Loulloudes, G. Pallis, and M.D. Dikaiakos. V-radar: A vehicular traffic query protocol for urban environments. In Vehicular Traffic Management for Smart Cities (VTM), 2012 First International Workshop on, pages 1–6. IEEE, 2012.
[17] V. Verroios, K. Kollias, P. K. Chrysanthis, and A. Delis. Adaptive navigation of vehicles in congested road networks. In ICPS, 2008.