International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Review On A Reliability-based Routing Protocol for Vehicular Ad-Hoc Network

Monika Mangave[1], P.P.Belagali[2]

[1]P.G Student, Department of Electronics and Telecommunication Engineering, Shivaji University, Dr.J.J.M.C.O.E Jaysingpur, Kolhapur, India

[2]Associate Professor, Department of Electronics Engineering, Shivaji University, Dr.J.J.M.C.O.E Jaysingpur, Kolhapur, India

Abstract: ***Vehicular ad hoc networks (VANETs) are a special form of wireless networks which is made by vehicles communicating among themselves on roads. The conventional routing protocols proposed for mobile ad hoc networks (MANETs) are not suitable they work poorly in VANETs. As communication links break more frequently in VANETs than in MANETs, the routing reliability of such highly dynamic networks needs to be paid special attention. A very little research has focused on the routing reliability of VANETs on highways. In this paper, we use the evolving graph theory to model the VANET communication graph on a highway. The extended evolving graph helps us to capture the evolving characteristics of the vehicular network topology and determines the reliable routes preemptively. This paper is to propose an evolving graph-based reliable routing scheme for VANETs to facilitate quality-of-service (QoS) support in the routing process. A new algorithm is developed to find the most reliable route in the VANET evolving graph from the source to the destination***

Keywords: Evolving graph(EG), quality of service (QoS), routing Reliability, most reliable journey (MRJ) ,mobile ad hoc networks (MANETs) ,vehicular ad hoc network (VANET).

1. Introduction

Every day, a lot of people die, and many more are injured in traffic accidents around the world. The desire to provide road safety information among vehicles to prevent accidents and improve road safety. The main goal of VANETs is to avoid such accidents and provides road safety information. So there is need of communication to realize traffic condition monitoring, dynamic route scheduling, emergency-message dissemination and, most importantly, safe driving. Vehicular Ad hoc NETworks (VANETs), an emerging technology, would allow vehicles to form a self-organized network without the aid of a permanent infrastructure. Vehicular ad hoc networks (VANETs) are a promising technology to enable the communications among vehicles on one hand and between vehicles and road side units on the other hand. VANETs are highly mobile, thus the network topology is ever-changing. The conventional routing protocols proposed for mobile ad hoc networks (MANETs) work poorly in VANETs. As communication links break more frequently in VANETs than in MANETs, the routing reliability of such highly dynamic networks needs to be paid special attention.

VANETs tend to operate without an infrastructure; The ad hoc network connectivity is equipped with wireless communication that is provided by each and every vehicle. Each vehicle in the network can send, receive, and relay messages to other vehicles in the network. This way, vehicles can exchange real-time information, and drivers can be informed about road traffic conditions and other travel-related information. VANETs have attractive& unique feature than MANET such as normally higher transmission power, higher computational capability, The special behavior and characteristics of VANETs raise important technical challenges that should be considered to deploy these networks effectively. Within this ever-changing network, messages must be passed from vehicle to vehicle in order to reach their intended destination. So This is the to propose an evolving graph-based reliable routing scheme for VANETs to facilitate quality-of-service (QoS) support in the routing process. Here a new algorithm is developed to find the most reliable route in the VANET evolving graph from the source to the destination.

2. Literature Review

[1] S. Jiang, D. He, and J. Rao, *"A prediction-based link availability estimation for mobile ad hoc networks,"* in Proc. IEEE INFOCOM, 2001, pp. 1745–1752Y & V. Thilagavathe and K. Duraiswamy, *"Prediction based reliability estimation in MANETs with Weibull nodes*," Eur. J. Sci. Res., vol. 64, no. 2, pp. 325–329, Nov. 2011

The specialty of this proposed system is a scheme that uses the information on vehicle headings to predict a possible link breakage prior to its occurrence. Vehicles are grouped according to their velocity vectors. When a vehicle shifts to a different group and a route involving the vehicle is about to break, the proposed scheme searches for a more stable route that includes other vehicles from the same group.

[2] K. T. Feng, C. H. Hsu, and T. E. Lu, "Velocity-assisted predictive mobility and location-aware routing protocols for mobile ad hoc networks," IEEE Trans. Veh. Technol., vol. 57, no. 1, pp. 448–464, Jan. 2008

A velocity-aided routing protocol is proposed that determines its packet-forwarding scheme based on the relative velocity between the forwarding node and the destination node. The region for packet forwarding is determined by predicting the future trajectory of the destination node based on its location information and velocity.

[3] V. Namboodiri and L. Gao, "Prediction-based routing for vehicular ad-hoc networks," IEEE Trans. Veh. Technol., vol. 56, no. 4, pp. 2332–2345, Jul. 2007.

This paper introduces a prediction-based routing (PBR) protocol for VANETs. It is specifically designed for the mobile gateway scenario and takes advantage of the predictable mobility pattern of vehicles on highways. PBR predicts route lifetimes and preemptively creates new routes before the existing routes fail. The link lifetime is predicted based on the range of communication, vehicles' location, and corresponding velocities.

[4] H. Menouar, M. Lenardi, and F. Filali, "A movement prediction-based routing protocol for vehicle-to-vehicle communications," in Proc. 1st Int. V2V Commun. Workshop, San Diego, CA, USA, 2005, pp. 1–7.

A movement prediction-based routing (MOPR) algorithm is proposed in this paper that predicts the future position of a vehicle and searches for a stable route. If several potential routes between the source vehicle and the destination vehicle exist, MOPR chooses the route that is the most stable when considering the movement conditions of the intermediate nodes with respect to the source and destination nodes.

[5] J. Monteiro, "The use of evolving graph combinatorial model in routing protocols for dynamic networks," in Proc. XV Concurso Latinoamericano de Tesis de Maestrìa, 2008, pp. 1–17.

The author used evolving graph model to design and evaluate least cost routing protocols for MANETs with known connectivity patterns. The NS2 network simulator is used to first implement an evolving graph-based routing protocol, and then, it is used to provide a benchmark when comparing four major ad hoc routing protocols. The author showed that an evolving graph-based routing protocol is well suited for networks with known connectivity patterns and that the model, as a whole, may be a powerful tool for the development of routing protocols.

[6] G. Pallis, D. Katsaros, M. D. Dikaiakos, N. Loulloudes, and L. Tassiulas, "On the structure and evolution of vehicular networks," in Proc. 17th IEEE/ACM Annu. Meeting Int. Symp. MASCOTS, 2009, pp. 1–10.

The objective of the paper focuses on providing a thorough study of the topological characteristics and statistical features of a VANET communication graph.it tells about: VANET graphs evaluation over time and space, spatial distribution of these nodes, critical link duration statistics in a VANET when the vehicles move in urban areas, robustness of VANET. The obtained results could have a wide range of implications for the development of high performance, reliable, scalable, secure, and privacy-preserving vehicular technologies.

3. Methodology

3.1 Vanet-Oriented Evolving Graph (VOEG) Model

We proposed VoEG to model and formalize the VANET communication graph. So We associate a model considering the time & link reliability value at that time. In the VoEG model, the communication link between two vehicles is not available if its reliability value is equal to zero & the communication link between two vehicles is available if its reliability value is not equal to zero. Thus the VoEG model is used to find out whether the communication link between two vehicles is possible or not. where Link reliability is defined as the probability that a direct communication link between two vehicles will stay continuously available over a specified time period. The objective is to find the most reliable journey (MRJ) instead of using the conventional approaches of finding the foremost, shortest, or fastest journey. The MRJ has the highest journey reliability value among all possible journeys from the source to the destination.

3.2 Evolving Graph Reliable Ad Hoc On-Demand Distance Vector Routing (Eg-Raodv) Protocol

We extend the well-known ad hoc on-demand distance vector (AODV) routing protocol with evolving graph theory to propose reliable routing protocol EG-RAODV. But first A new routing algorithm to find the MRJ is needed. Then, this algorithm will be applied to design the route discovery process for our proposed EG-RAODV routing protocol.

A. **Prediction Algorithm** :
This algorithm is used to predict the location of vehicles at time t. We propose the VoEG model to address the evolving properties of the VANET communication graph and consider the reliability of communications links among vehicles

B. **EG-Dijkstra Algorithm** :
The normal Dijkstra algorithm cannot be directly applied in this context. We modify it and propose the evolving graph Dijkstra's algorithm (EG-Dijkstra) to find the MRJ based on the journey reliability definitions. EG-Dijkstra algorithm maintains an array called the reliable graph (RG) that contains all vehicles and their corresponding MRJ values.

C. Route Discovery Process in EG-RAODV:
It is assumed that the source vehicle has information on the current status of VoEG. When the source vehicle has data to send at time t, it calculates the reliability value for each link in the current VoEG. At this stage, the source vehicle knows the most reliable valid journey to the destination. It will create a routing request message (RREQ) and assign the hops of the MRJ as extensions to this RREQ. Note that this extension field in the RREQ is not used in the traditional ad hoc routing protocols and was left for future use.

In EG-RAODV, by utilizing the extension information in the RREQ, intermediate nodes are able to forward the routing request to the next hop without broadcasting. At each vehicle along the route, when an RREQ is received, the information about from which vehicle it heard is recorded. Then, the RREQ will be forwarded to the next hop based on the

extension's information. Intermediate vehicles are not allowed to send a routing reply message (RREP) to the source vehicle, even if they have a valid route to the destination. Since the time domain is incorporated in the routing process and the mobility of nodes is highly dynamic, the reliability values at intermediate vehicles might be outdated. An RREP will be sent back to the source vehicle to start data transfer.

D. Working flow Chart

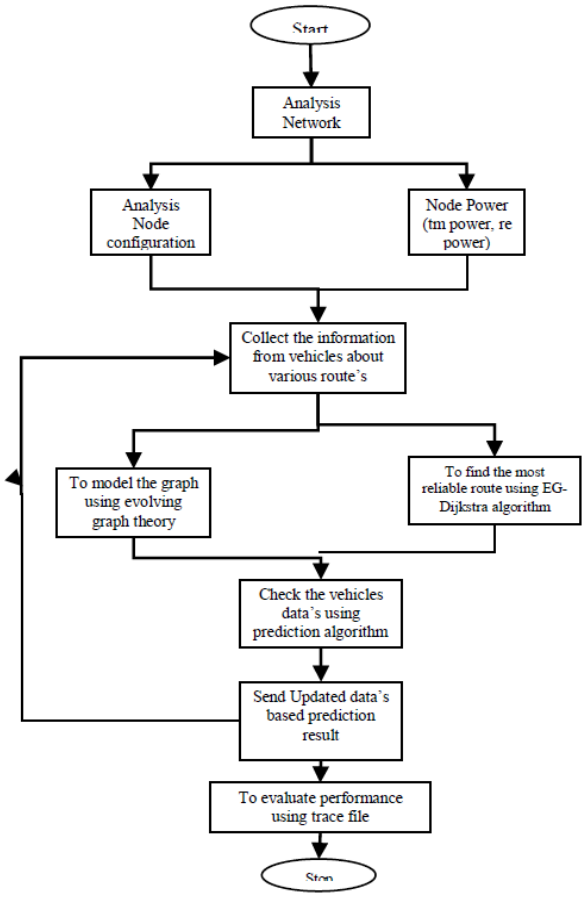

Figure 1.Working Flow Diagram

4. Conclusion

To fulfil VANETs' requirements, we extend the current evolving graph model. The extended version of the evolving graph model, called VoEG, is evolving based on the predicted dynamic patterns of vehicular traffic. These patterns are predicted based on the underlying road network and vehicular information. In addition, VoEG considers the reliability of communication links among vehicles. In the following, we briefly introduce the basis of the evolving graph theory and then extend the current evolving graph model to propose the VoEG model.

A new algorithm called bidirectional search algorithm has been used to find the most reliable routing in the VANET from the source to the destination. Instead of searching the reliable lane route in one direction bidirectional search algorithm searches the most sophisticated route from both the directions (i.e.) from source to destination and destination to source.

5. Acknowledgment

I would like to express my sincere gratitude towards my guide Prof. Mrs. P. P. Belagali for her motivation and useful suggestions which truly helped me in improving the quality of this paper. I take this opportunity to express my thanks to my teacher, family and friends for their encouragement and support.

References

[1] M. Nekovee, "Sensor networks on the road: The promises and challenges of vehicular ad hoc networks and vehicular grids," presented at theWorkshop Ubiquitous Comput. e-Res., Edinburgh, U.K., 2005.
[2] H. Moustafa and Y. Zhang, Vehicular Networks Techniques,Standards and Applications. New York, NY, USA: Taylor & Francis,2009, pp. 7–11.
[3] G. M. T. Abdalla, M. A. Abu-Rgheff, and S. M. Senouci, "Current trends in vehicular ad hoc networks," in Proc. IEEE Global Inf. Infrastruct. Symp., Marrakech, Morocco, 2007, pp. 1–9.
[4] J. J. Blum, A. Eskandarian, and L. J. Hoffman, "Challenges of inter vehicle ad hoc networks," IEEE Trans. Intell. Transp. Syst., vol. 5, no. 4,pp. 347–351, Dec. 2004.
[5] G. Mao and B. D. O. Anderson, "Graph theoretic models and tools for the analysis of dynamic wireless multihop networks," in Proc. IEEE Wireless Commun. Netw. Conf., 2009
[6] J. Monteiro, A. Goldman, and A. Ferreira, "Performance evaluation of dynamic networks using an evolving graph combinatorial model," in Proc. IEEE Int. Conf. WiMob Comput., Netw. Commun., 2006, pp. 173–180.
[7] A. Ferreira, "Building a reference combinatorial model for MANETs," IEEE Netw. Mag., vol. 18, no. 5, pp. 24–29, Sep./Oct. 2004.

Author Profile

Miss. Managve Monika R. Received B.E degree in electronics and telecommunication Engineering from J.J.M.C.O.E. Jaysingpur, Kolhapur, India in 2012. She is student of M.E Electronics and Telecommunication at Dr. J.J. Magdum College of Engineering, Jaysingpur, Kolhapur, India.

Prof. Mrs. P. P. Belagali received M.E degree in Electronics Engineering and pursuing Ph. D. Degree. Prof. Bellagali is currently working as a Associate Professor at Dr. J. J. Magdum College of Engineering, Jaysingpur, Kolhapur, India. She has published papers in many major journals and conferences.