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Performance analysis of radio propagation models in VANET application

(2021) *ISCAIE 2021 - IEEE 11th Symposium on Computer Applications and Industrial Electronics*, art. no. 9431810, pp. 372-377. Cited 9 times.

DOI: 10.1109/ISCAIE51753.2021.9431810

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Abstract

Vehicular Ad-hoc Network (VANET) is developed for the communication between vehicle-to-vehicle and vehicle-to-roadside in purpose for safety, navigation and other roadside services. The radio propagation model (RPM) was used in VANET for the implementation of VANET in order to estimate the path loss in multiple operating environments such as modern road infrastructure. This research is concerned with the study about the performance of different RPM on VANET between Free Space propagation, Two Ray Ground propagation and Nakagami propagation. The purpose of this research work is to observe the packet loss, throughput and average end-to-end delay between vehicles by implementing different type of RPMs, which then has been compared to determine which RPM has a better performance. To obtain the performance analysis of RPM in VANET, several software such as Java OpenStreetMap (JOSM), Simulator of Urban Mobility (SUMO), Mobility Model Generator for VANET (MOVE) and Network Simulator Version 2 (NS2) has been used with Linux Ubuntu version 20.04 as the operating system. The data were collected at Jalan Besar Selayang Baru, 68100 Batu Caves, Selangor. With the target location of 2 km x 2 km size, detail analyzation of data from all three different propagation models were performed. Hence, the best performance of RPM in VANET has been identified. © 2021 IEEE.

Author Keywords

JOSM; MOVE; NS2; Radio Propagation Model (RPM); SUMO; Ubuntu 20.04; Vehicular Ad-hoc Network (VANET)

Index Keywords

Industrial electronics, Linux, Radio waves, Roadsides, Vehicle to roadside communications, Vehicle to vehicle communications, Vehicles, Wave propagation; Average end-to-end delays, Free space propagation, Network simulator version 2, Operating environment, Performance analysis, Radio propagation modeling, Radio propagation models, Road infrastructures; Vehicular ad hoc networks

Funding details

The authors would like to thank the Ministry of Higher Education and Universiti Teknologi MARA Shah Alam for the grant support in publishing this paper. The grant ID is 600-RMC/GPK 5/3 (248/2020).

References

- Al-Absi, M.A., Al-Absi, A.A., Lee, H.J.
V2V communication modeling for environmental channel throughput and radio propagation
(2017) *2017 International Conference on Information and Communication Technology Convergence (ICTC)*, pp. 507-512.
18-20 Oct. 2017
- Al-Absi, M., Absi, A., Kim, T., Lee, H.
An environmental channel throughput and radio propagation modeling for vehicle-to-vehicle communication
(2018) *International Journal of Distributed Sensor Networks*, 14, pp. 155014771877253.
04/01
- Dak, A., Yahya, S., Kassim, M.
A literature survey on security challenges in vanets
(2012) *International Journal of Computer Theory and Engineering*, pp. 1007-1010.
01/01
- Qureshi, M.A., Noor, M.R., Shamim, A., Band, S., Choo, K.-K.R.
A lightweight radio propagation model for vehicular communication in road tunnels

(2016) *PLoS. One*, 11.
03/22

- Dessai, S.F., Sutar, D.
Radio propagation model with obstacle effect and efficient bandwidth utilization for v2v vanet application services
(2019) *2019 International Conference on Intelligent Computing and Control Systems (ICCS)*, pp. 602-606.
15-17 May 2019
- Young, W.
(2021) *Measurements and Models for the Wireless Channel in a Ground-Based Urban Setting in Two Public Safety Frequency Bands*,
01/12
- Wang, Y., Hu, J., Zhang, Y., Xu, C.
Reliability evaluation of IEEE 802.11p-based vehicle-to-vehicle communication in an urban expressway
(2015) *Tsinghua Science and Technology*, 20 (4), pp. 417-428.
- Jiang, D., Delgrossi, L.
(2008) *IEEE 802.11p: Towards An International Standard for Wireless Access in Vehicular Environments*, pp. 2036-2040.
- Rehman, S., Khan, M.A., Zia, T., Zheng, L.
Vehicular ad-hoc networks (VANETs)-an overview and challenges
(2013) *Journal of Wireless Networking and Communications*, 3, pp. 29-38.
01/01
- Luo, G.
Cooperative vehicular content distribution in edge computing assisted 5G-VANET
(2018) *China Communications*, 15 (7), pp. 1-17.
- Wang, M., Shan, H., Cai, L.X., Lu, N., Shen, X., Bai, F.
Throughput capacity of VANETs by exploiting mobility diversity
(2012) *2012 IEEE International Conference on Communications (ICC)*, pp. 4980-4984.
10-15 June 2012
- Boucetta, C., Baala, O., Ali, K.A., Caminada, A.
Performance of topology-based data routing with regard to radio connectivity in VANET
(2019) *2019 15th International Wireless Communications & Mobile Computing Conference (IWCMC)*, pp. 609-614.
24-28 June 2019
- Hadzialic, M., Behlilovic, N., Sarajlic, A.
An analytical approach to error evaluation in gamma shadowed Nakagami-m fading channel for different path loss models
(2006) *Proceedings Elmar 2006*, pp. 273-277.
7-10 June 2006
- Chandra, R.
Performance evaluation of radio propagation model for vehicular ad hoc networks using VANETMobiSim and NS-2
(2012) *International Journal of Distributed and Parallel Systems*, 3, pp. 145-155.
07/31
- Eenennaam, M.
(2009) *A Survey of Propagation Models Used in Vehicular Ad Hoc Network (VANET) Research*,
01/01

- Martinez, F.J., Toh, C., Cano, J., Calafate, C.T., Manzoni, P.
Realistic radio propagation models (rpms) for vanet simulations
(2009) *2009 IEEE Wireless Communications and Networking Conference*, pp. 1-6.
5-8 April 2009
- Singh, P.K.
Influences of tworayground and nakagami propagation model for the performance of adhoc routing protocol in vanet
(2012) *International Journal of Computer Applications*, 45 (22), pp. 1-6.
- Brahmia, H., Tolba, C.
Nakagami fading impact on the performances of vanet routing protocols in a realistic urban
(2020) *International Journal of Advanced Networking and Applications*, 11, pp. 4330-4335.
01/01
- Chan, H.
(1998) *A Dynamic Reservation Protocol for Integrating Cbr/vbr/abr Traffic over IEEE 802.14 Hfc Networks*, 5.
10/15
- Khelifa, S., Maaza, Z.M.
An Energy Multi-path AODV routing protocol in ad hoc mobile networks
(2010) *2010 5th International Symposium on I/V Communications and Mobile Network*, pp. 1-4.
30 Sept.-2 Oct. 2010
- Ledy, J., Boeglen, H., Hilt, B., Abouaissa, A., Vauzelle, R.
An enhanced aodv protocol for vanets with realistic radio propagation model validation
(2009) *2009 9th International Conference on Intelligent Transport Systems Telecommunications, (ITST)*, pp. 398-402.
20-22 Oct. 2009
- Jhaji, H., Datla, R., Wang, N.
Design and implementation of an efficient multipath aodv routing algorithm for manets
(2019) *2019 IEEE 9th Annual Computing and Communication Workshop and Conference (CCWC)*, pp. 0527-0531.
7-9 Jan. 2019

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Publisher: Institute of Electrical and Electronics Engineers Inc.

Conference name: 11th IEEE Symposium on Computer Applications and Industrial Electronics, ISCAIE 2021

Conference date: 3 April 2021 through 4 April 2021

Conference code: 169143

ISBN: 9781665403382

Language of Original Document: English

Abbreviated Source Title: ISCAIE - IEEE Symp. Comput. Appl. Ind. Electron.

2-s2.0-85107676122

Document Type: Conference Paper

Publication Stage: Final

Source: Scopus

