ISSN:2231-0711

Arif Khan et al | IJCSET(www.ijcset.net) | 2020 | Volume 10, 11-13

SCRUTINY OF VANET SIMULATORS

Arif Khan[1] , Dr Nancy Arya[2]

Department of Computer Science and Engineering
World College of Technology and Management
Guugram,MDU, Haryana, India

Abstract: The Vehicular Adhoc network is the emerging research area which makes a phrase "Network on the wheel". VANET is a collection of communication vehicles to broadcast desired information Vehicular ad-hoc networks (VANETs) are considered to be the special application of infrastructure-less wireless Mobile ad-hoc network (MANET). In these networks, vehicles are used as nodes to form and deform the network as a replacement of more obvious mobile devices like laptops and PDAs. The absence of infrastructure in these nets represents the connectivity of nodes to directly join with each other or through other intermediate node(s), instead of requiring any fixed or dedicated equipment like router or access point. The movement of vehicles on road has certain considerable criteria in order to observe data dissemination through directed topological flow among distinct clusters. For same cluster, communication established within a single group of vehicles depends on the range of wireless coverage being used, commonly deals with physical aspects of the networks. When it comes to the internetworking, more generic - inter-cluster communication, where source vehicle in one group is unreachable to contact with destination vehicle in other group creates the communication discontinuity problems. To overcome these problems of termination and link breakage between out of range mediums, multi-hop technique from various routing protocols are employed for continuous communication manageability purposes. Hence, the concept of hopping with further extension of multi-hop evolved, where destinations achieved by mean of relaying on other intermediate node was coined specifically. The scope of this study is therefore associated with the understanding of available protocols with their effectiveness and underlying limitations followed by any definite proposed and/or implemented solution for respective environments.
Simulation of VANET is divided into two part
a. Traffic simulation: Generation of traffic movement, Defining the mobility model for vehicle and creating traffic movement.
b. Network simulation: Generating Inter communicating vehicle , Defining communication protocols. And both the simulation are connected in bi-directional coupling.

Keywords: VANET, SUMO, MANET, Network simulation, Traffic simulation

1. INTRODUCTION

Wireless communication technologies have now greatly impact our daily lives. From indoor wireless LANs to outdoor cellular mobile networks, wireless technologies have benefited billions of users around the globe. The era of vehicular *ad hoc* networks (VANETs) is now evolving, gaining attention and momentum. Researchers and developers have built VANET simulation software to allow the study and evaluation of various media access, routing, and emergency warning protocols. VANET simulation is fundamentally different from MANETs (mobile *ad hoc* networks) simulation because in VANETs, vehicular environment imposes new issues and requirements, such as constrained road topology, multi-path fading and roadside obstacles, traffic flow models, trip models, varying vehicular speed and mobility, traffic lights, traffic congestion, drivers' behavior, etc. Currently, there are VANET mobility generators, network simulators, and VANET simulators. This paper presents a comprehensive study and comparisons of the various publicly available VANET simulation software and their components. In particular, we contrast their software characteristics, graphical user interface (GUI), popularity, ease of use, input requirements, output visualization capability, accuracy of simulation, etc. Finally, while each of the studied simulators provides a good simulation environment for VANETs, refinements and further contributions are needed before they can be widely used by the research community.
Wireless Ad-hoc network is defined as a network which does not have a preexisting communication infrastructure. Network is created by some nodes which are available. In this type of network determination of which nodes to transfer data to which node is done dynamically, depending upon the connectivity of both devices. Ad-hoc network can use flooding data transfer. In Ad-hoc network all devices are treated equally all have same status. The main use of wireless ad-hoc network is done by Mobile Ad-hoc Network (MANET). In MANET different participating node moves randomly in the created wireless Ad-hoc network.
The objective of the present work is to compare the different VANET simulators and to show which simulator has better efficiency of working.

2. COMPARASION OF VANET SIMULATORS

VANET is very popular research field now days. So everyone is trying finding more accurate to develop VANET. Because of this urge people are continuously putting their efforts to study more and more things about VANET. But people are limiting their selves to particular part of VANET development. So exactly in the same way people are focusing on particular simulators. So the agenda is to study their research papers of various simulators and make common document and put a comparative analysis in a single document which helps people to know about all of the simulators at single place.

Metrics	TraNs	GrooveNet	NCTUns
Mobility generator	SUMO	GrooveNet	NCTUns
VANET built in application support	Road danger warning and dynamic reroute	Vehicle warning and adaptive rebroadcast	None
Ease of setup	Moderate	Moderate	Hard
Ease of use	Moderate	Moderate	Hard
Trip model	Random, manually defined	Djikstra, sightseeing	Manually defined
Intersection model	Junction based right of-way rules	Managed by traffic lights	Managed by four traffic lights
Road topology	Any	Any	Any

Comparison of VANET Simulators

Simulators	GloMosim	NS-2	NCTuns	QualNet
Signal to Noise Ratio Calculation	Cumulative	Difference in two Signals	Cumulative	Cumulative
Signal Reception	SNRT, BER	SNRT	Sender Transmitting power	SNRT, BER
Fading	Rayleigh, Ricean	No	Rayleigh, Ricean	Rayleigh, Ricean
Path Loss	Free Space, Two Ray	Free Space, Two Ray	Free Space, Two Ray, Free Space with shadowing	Free Space, Two Ray, ITM(Irregular Terrian Model)
Support for Multiple Wireless Technology	Yes	No	Yes	Yes
Antenna's Support	Bi-directional, Omni-directional	Bi-directional, Omni-directional	Directional, Bi-directional, Rotating	Bi-directional, Omni-directional, beam, Switched
Distributed Simulation	Yes	No	Yes	Yes
Time required fir Simulating 5000 Nodes (Sec)	6191	Fail	Fail	6191
Memory Required for Simulating 5000 Nodes (KB)	27.5	Fail	Fail	27.5
GUI	Yes	No	Yes	Yes

Results of Comparative Study of Various VANET Simulators

The above table shows a comparison of the various VANET simulators like TraNS, GrooveNet, and NCTUns with respect of several metrics. All VANET simulators support different mobility models and provide microscopic traffic simulation.Only TraNS and NCTUns support IEEE 802.11p technology and only TraNS and GrooveNet provides builtin VANET applications. In the terms of ease of setup, NCTUns is not preferred because it is very difficult to use. In the terms of ease of use, we preferred TraNS and GrooveNet because of very user friendly GUI. TraNS and GrooveNet were proposed to simulate vehicular ad hoc network on the other hand NCTUns was proposed for simulating the general network simulation purposes.

3. CONCLUSION

The popularity of VANET, forces researchers to develop more accurate and more idealistic tools.In this project we will study different type of VANET simulators available in the market so that it would be easier for developers as well as users to choose more appropriate simulators, to work with. The mobility generators studied include SUMO, MOVE, CityMob, FreeSim, STRAW, Netstream, and VanetMobiSim. SUMO, MOVE, STRAW, and VanetMobiSim all have good software features and traffic model support. However, only VanetMobiSim provides excellent trace support. CityMob is good in software features and traffic model support. FreeSim exhibits good software characteristics but is limited in other features. Among the network simulators studied, ns-2, GloMoSim, JiST/SWANS, and SNS all exhibit good software support.

However, both ns-2 and GloMoSim are poor in scalability while JiST/SWANS is harder to use than others. In fact, all network simulators do not specifically address VANET scenarios and requirements, such as the consideration of 802.11p, obstacles, vehicular traffic flow, etc. Finally, in terms of VANET simulators, we studied TraNS, GrooveNet, NCTUns, and MobiREAL. TraNS and MobiREAL both involve the coupling of a VANET mobility generator with a network simulator. GrooveNet and NCTUns, however, are self-contained simulators with GrooveNet capable of supporting hybrid simulations, i.e., communications between simulated vehicles and real vehicles.

A survey of recently published papers shows that GrooveNet and NCTUns are more frequently used for VANET simulations than others. Although these four VANET simulators are now publicly available, we realize that further refinement, extensions, and contributions are needed before they can be widely accepted and used for supporting VANET research.

REFERENCES

[1]. Francisco J. Martinez, Chai keong Toh, Juan-Carlos Cano, Carlos T. Calafate and Peitro Manzoni. "A survey and comparative study of simulators for vehicular ad hoc networks (VANETs)", John Wiley & Sons, 2009.

[2]. School of Information Science, Computer and Electrical Engineering Halmstad University, "A thesis report on VANET Simulations" by Aamir Hassan.

[3]. University Politehnica of Bucharest, Romania, Chapter on "VANET Applications." International Journal of Computer Applications (0975 – 8887) Volume 4– No.10, August 2010, on "Comparative Study of Simulation for Vehicular Ad-hoc Network" by Prof. Vaishali D. Khairnar Symbiosis Institute of Technology Lavale Pune - Maharashtra India and Dr. S. N. Pradhan Nirma Institute of Technology Gandinagar- Ahmedabad India.

[4]. International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 4, April 2014)