

different ways to create the road map – the map can be manually created by the user, generated automatically, or imported from existing real world maps such as publicly available TIGER (Topologically Integrated Geographic Encoding and Referencing) database from U.S. Census Bureau [11]. The Vehicle Movement Editor allows the user to specify the trips of vehicles and the route that each vehicle will take for one particular trip. This currently support three different methods to define the vehicle movements –the vehicle movement patterns can be manually created by the user, generated automatically, or specified based on a bus time table to simulate the movements of public transportation. The information users input in the Map Editor and the Vehicle Movement Editor is then fed into SUMO to generate a mobility trace which can be immediately used by a simulation tool such as ns-2 or Qualnet to simulate realistic vehicle movements. To reduce such an overhead, MOVE also provides an interface to automatically generate simulation scripts on the fly based on the parameters that the user inputs into MOVE.

In addition, MOVE provides a GUI that allows the user to quickly generate realistic simulation scenarios without the hassle of writing simulation scripts as well as learning about the internal details of the simulator.

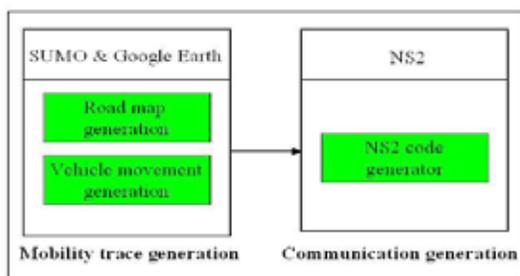


Figure- 2. The architecture of MOVE

STRAW (STreet Random Waypoint) [12]

It provides accurate simulation results by using a vehicular mobility model on real US cities, based on the operation of real vehicular traffic. STRAW's current implementation is written for the JIST/SWANS discrete-event simulator, and its mobility traces cannot be directly used by other network simulators, such as ns-2. STRAW is part of the C3 (Car-to-Car Cooperation) project [13]. A more realistic mobility model with the appropriate level of detail for vehicular networks is critical for accurate network simulation. The STRAW mobility model constrains node movement to streets defined by map data for real US cities and limits their mobility according to vehicular congestion and simplified traffic control mechanisms.

FreeSim[14]

It is a fully customizable macroscopic and microscopic free-flow

traffic simulator that allows for multiple freeway systems to be easily represented and loaded into the simulator as a graph data structure with edge weights determined by the current speeds. Traffic and graph algorithms can be created and executed for the entire network or for individual vehicles or nodes, and the traffic data used by the simulator can be user generated or be converted from real-time data gathered by a transportation organization. Vehicles in FreeSim can communicate with the system monitoring the traffic on the freeways, which makes FreeSim ideal for Intelligent Transportation System (ITS) simulation. FreeSim is licensed under the GNU General Public License, and the source code is available freely for download.

City Mob

CityMob[15] is a mobility pattern generator especially designed to investigate different mobility models in VANETs, and their impact on inter-vehicle communication performance. CityMob creates urban mobility scenarios and simulates damaged cars using the network to send information to other vehicles, trying to prevent accidents or traffic jams. CityMob v.2 CityMob is a ns-2 compatible mobility model generator proposed for use in VANETs.

Citymob implements three different mobility models: (a) Simple Model (SM), (b) Manhattan Model (MM), and(c) realistic Downtown Model (DM). In DM model, streets are arranged in a Manhattan style grid, with a uniform block size across the simulation area. All streets are two-way, with lanes in both directions. Car movements are constrained by these lanes. Vehicles will move with a random speed, within an user-defined range of values. DMmodel also simulates semaphores at random positions (not only at crossings), and with different delays. DM adds traffic density in a way similar to a real town, where traffic is not uniformly distributed. Hence, there will be zones with a higher vehicle density. These zones are usually in the downtown, and vehicles must move more slowly than those in the outskirts. CityMob DM also has the following capabilities: (a) multiple lanes in both directions for every street, (b) vehicle queues due to traffic jams, and (c) the possibility of having more than a downtown.

Conclusion

The increasing popularity and attention inVANETs has prompted researchers to develop accurate and realistic simulation tools. In this paper, we make a survey ofseveral publicly available mobility generators, network simulators, and VANET simulators. The mobility generators studied include SUMO, MOVE, CityMob, FreeSim, STRAW, and VanetMobiSim. SUMO, MOVE, STRAW, and Vanet- MobiSim all have good software features and traffic model support. However, onlyVanetMobiSim 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.

REFERENCE

[1] Hadi Arbabi, Michele C. Weigle, "HIGHWAY MOBILITY AND VEHICULAR AD-HOC NETWORKS IN NS-3", Proceedings of the Winter Simulation Conference, IEEE, 2010. [2] L. Wischhof, A. Ebner, and H. Rohling, "Information dissemination in self-organizing intervehicle networks," IEEE Transactions on Intelligent Transportation Systems, vol. 6, no. 1, pp. 90-101, March 2005. [3] M. Bechler, W.J. Franz, and L. Wolf, "Mobile internet access in fleetnet," in Verteilten Systemen KiVS 2003, February 2003. [4] C.-K. Toh, Ad Hoc Mobile Wireless Networks: Protocols and Systems. Prentice Hall, 2001. [5]Haeerri J, Fiore M, Fethi F, Bonnet C. VanetMobiSim: generating realistic mobility patterns for VANETs. Institut Eurécom and Politecnico Di Torino, 2006. Available at: <http://vanet.eurecom.fr/> [6] CANU Research Group. Canu-MobiSim (Mobility Simulation Environment). Institute of Parallel and Distributed Systems (IPVS). University of Stuttgart, 2001. Available at: <http://canu.informatik.uni-stuttgart.de/mobisim/index.html>. [7] Fall K, Varadhan K. ns notes and documents. The VINT Project, UC Berkeley, LBL, USC/ISI, and Xerox PARC, February 2000. Available at: <http://www.isi.edu/nsnam/ns/nsdocumentation.html> [8] Martin J. GloMoSim. Global mobile information systems simulation library. UCLA Parallel Computing Laboratory, 2001. Available at: <http://pcl.cs.ucla.edu/projects/gloimosim/> [9] Scalable Network Technologies. Qualnet. Scalable Network Technologies, Inc., 2006. Available at: <http://www.scalablenetworks.com/products/download.php>. [10]. Haeerri J, Fiore M, Fethi F, Bonnet C. VanetMobiSim: generating realistic mobility patterns for VANETs. Institut Eurécom and Politecnico Di Torino, 2006. [11] TIGER (Topologically Integrated Geographic Encoding and Referencing). <http://www.census.gov/geo/www/tiger/>. [12] STRAW - STreet RAndom Waypoint - vehicular mobility model for network simulations (e.g., car networks), 2008. Available at: <http://www.aqualab.cs.northwestern.edu/projects/STRAW/index.php>. [13] Car-to-car cooperation for vehicular ad-hoc networks. An Aqualab Project, 2002. Available at: <http://www.aqualab.cs.northwestern.edu/projects/C3.html>. [14] FreeSim, 2008. Available at: <http://www.freewaysimulator.com/> [15]Martinez FJ, Cano JC, Calafate CT, Manzoni P. Citymob: a mobility model pattern generator for VANETs. In IEEE Vehicular Networks and Applications Workshop (Vehi-Mobi, held with ICC), Beijing, China, May 2008.