ABSTRACT

Network performance is affected by the topology shaping the network. For VANET, the network topology is the mobility model of the vehicles in the network. There are many navigation applications which are installed in gadgets such as Google Maps, Waze, and Sygic and those that built in vehicles' computer system. The surfacing of those navigation applications causes many people to use navigation applications to find the shortest route to their desired destination at the lowest travel time. Moreover, the usage of these navigational services is keep on increasing. Navigation applications use vehicular load balancing scheme to decide the route that has the lowest travel time. Due to the facts above we can assume that the future vehicular mobility model will be similar to the vehicular mobility model that uses load balancing scheme.

This research will discuss the effect of mobility model that uses load balancing scheme to network performance in VANET environment. Three topology-based routing protocol that are AODV, DSDV, and ZRP, will be used. Furthermore, performance comparison of each routing protocol the designed mobility models will be explained. Simulation system modelling is divided into two subsystems that are mobility subsystem and network subsystem. We use VanetMobiSim 2.0 to model the mobility models and Network Simulator 2 to model the network subsystem. Mobility models are built so that real traffic condition can be simulated. We also model a mobility model which does not use a load balancing scheme for a comparison and to illustrate the current traffic condition. Network performance metrics are calculated using the resulting trace files generated by Network Simulator 2. The analyzed performance metrics are throughput, packet delivery ratio, and end-to-end delay.

We can conclude that the network performances using topology-based routing protocols on the mobility model that uses load balancing scheme tend to decrease relatively to the network which does not use load balancing scheme. The most suitable routing protocol for the mobility models designed is DSDV with 51,8% packet delivery ratio, and 9,3 ms end-to-end delay on the mobility model that uses load balancing scheme and 31% packet delivery ratio and 19,2 ms end-to-end delay on the mobility model without load balancing scheme.

***Keywords**: VANET, mobility model, vehicular traffic load balancing, NS2, VanetMobiSim, AODV, DSDV, ZRP*