Performance Analysis of Mobile Ad Hoc Network Routing Protocols Using Self Organizing Map (SOM)

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ABSTRACT

The Mobile Ad hoc Networks (MANET) are wireless network which have no central bridge, no fixed routers and no centralized administration. All nodes may move randomly and are connecting dynamically to each other. Hence, each node acts as a destination as well as a router. The MANETs have dynamic network topology due to the mobility of the nodes. There are many protocols that have been developed to aid in routing in these types of networks and are generally classified as either proactive or reactive. Each of these protocols is designed with some certain mobility scenario in mind. To achieve effective routing in a given scenario, the right protocol must be chosen. Choosing the right protocol involves evaluating the performance metrics that defines the effectiveness of a routing protocol namely; Packet Delivery Ratio, Messaging Overhead and Mean End to End Delay. This often poses a challenge to application designers as there are no readily available standard platforms on which to test them for these performance metrics. Also comparing the performance of various protocols using the ordinary graphical methods poses a challenge due the high number of parameters under consideration. This research endeavored to configure a simulation platform on which various protocols could be evaluated under various mobility scenarios to determine their suitability and present results in Self Organizing Maps (SOM) which are better in viewing of high dimensional data for purposes of comparisons. An open source network simulator called GloMoSim was used to model the simulation platform and four MANET routing protocols were evaluated. These protocols are Wireless Routing Protocol (WRP) and Destination Sequenced Distance Vector (DSDV) which are proactive

and Ad hoc On demand Distance Vector (AODV) and Dynamic Source Routing (DSR) which are reactive. Our results demonstrated the usefulness of this modeled platform as it was able to establish the best protocol for different scenarios. Considering the overall performance, the AODV emerged as the best protocol because it had fairly good ratings in all the three performance metrics under consideration. The same modeled platform could be used to test other protocols in a similar manner.