Quality of Service Based Routing Algorithm for Real Time Applications in MANETs Using Ant Colony and Fuzzy Logic

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Abstract : Routing is an important, challenging task in mobile ad hoc networks due to node mobility, lack of central control, unstable links, and limited resources. An ant colony has been found to be an attractive technique for routing in Mobile Ad Hoc Networks (MANETs). However, existing swarm intelligence based routing protocols find an optimal path by considering only one or two route selection metrics without considering correlations among such parameters making them unsuitable lonely for routing real time applications. Fuzzy logic combines multiple route selection parameters containing uncertain information or imprecise data in nature, but does not have multipath routing property naturally in order to provide load balancing. The objective of this paper is to design a routing algorithm using fuzzy logic and ant colony that can solve some of routing problems in mobile ad hoc networks, such as nodes energy consumption optimization to increase network lifetime, link failures rate reduction to increase packet delivery reliability and providing load balancing to optimize available bandwidth. In proposed algorithm, the path information will be given to fuzzy inference system by ants. Based on the available path information and considering the parameters required for quality of service (QoS), the fuzzy cost of each path is calculated and the optimal paths will be selected. NS2.35 simulation tools are used for simulation and the results are compared and evaluated with the newest QoS based algorithms in MANETs according to packet delivery ratio, end-to-end delay and routing overhead ratio criterions. The simulation results show significant improvement in the performance of these networks in terms of decreasing end-to-end delay, and routing overhead ratio, and also increasing packet delivery ratio.

Keywords : mobile ad hoc networks, routing, quality of service, ant colony, fuzzy logic