ABSTRACT

Wireless networks are increasingly becoming popular and have enabled communication between mobile devices using standard network protocols. In ad hoc networks, nodes communicate directly with each other without any special access point equipment. Because of its infrastructure less feature, ad hoc wireless networks can be used when the mobile devices are on the move even in places where access points are not feasible. In an ad hoc network connectivity is achieved in the form of a multihop graph between the nodes. The QoS of the network depends on the terminal position, coverage pattern and transmission power and interference level. Unlike wired networks the topology may change continuously and hence the QoS parameters also change dynamically. As the topology is dynamic, planning the configuration of MANET is challenging and difficult. The network should be capable to reconfigure itself based on the dynamic nature of the terminals and based on application it is running along with the protocols used.

AODV has been found to be highly efficient in medium sized networks with moderate mobility. Though, the network characteristics make it more susceptible to attack and lower the performance. This research investigates performance of AODV routing and proposes improvements. The work is classified into the following areas:
The Effect of route life time under different node mobility speeds and evaluates the performance of the network for random traffic.

- Propose a fuzzy inference system to vary AODV routing protocol parameters dynamically.
- Propose a hybrid routing scheme using clustering techniques to improve the throughput of the network.
- Propose a novel reputation based system to improve the performance of the network under selfish nodes.

The OPNET simulation tool is used to evaluate performance. The investigations showed that the AODV routing protocol performed best when the active route timeout is 2.5 to 3 sec. A fuzzy inference system to dynamically vary the parameters of AODV, thus, improving the performance of the network is proposed. Simulations are run using Fuzzy AODV, Proposed Fuzzy Clustered AODV and Proposed Fuzzy Clustered AODV with selfish nodes. On evaluation of the proposed AODV Clustering approach shows marked improvement for packet delivery ratio and end-to-end delay but performance deteriorates in the presence of selfish nodes. The issue is addressed by incorporating a reputation metric in the routing protocol.
The proposed method combines trust and link quality for computation of reputation of nodes. A novel reputation computation mechanism was proposed and implemented. Simulations were carried out for 200 seconds and compared with Fuzzy AODV and Fuzzy Clustered AODV. The proposed Reputation Routing Based on Nearest Neighbor (RRNN-AODV) improves the network performance considerably in the presence of selfish nodes.