

ABSTRACT

Mobile Ad hoc Network (MANET) is a network consisting of a collection of nodes which can communicate with each other without help from a network infrastructure. There has been a growing interest in mobile ad hoc networks motivated by the advances in wireless technology and the range of potential applications that might be realized with such technology. Due to the lack of an infrastructure and their dynamic nature, networks demand a new set of networking protocols to harness the full benefits of the versatile communication systems. Routing is one of the key issues in MANETs because of highly dynamic and distributed nature of nodes. Especially energy efficient routing is most important because all the nodes are battery powered. Failure of one node may affect the entire network. If a node runs out of energy the probability of network partitioning will be increased. Since every mobile node has limited power supply, energy depletion has become one of the main threats to the lifetime of the ad hoc network. So routing in ad hoc network should be in such a way that it will use the remaining battery power in an efficient way to increase the life time of the network.

In Mobile Ad hoc Networks, mobile nodes collect the route information through overhearing and store this information in route caches through Dynamic Source Routing (DSR) protocol. When the route cache freshness is absent, it leads to the stale route information resulting in pollution

caches. If the node overhears the packet to another node, node's energy consumption occurs unnecessarily. Overhearing means a node picks up packets that are destined for other nodes. Wireless nodes will consume power unnecessarily due to overhearing transmissions of their neighboring nodes. Wireless nodes consume power unnecessarily due to overhearing the transmissions of their neighbors. This is often the case in a typical broadcast environment. For example, as the IEEE 802.11 wireless protocol defines, receivers remain on and monitor the common channel all the time. Thus the mobile nodes receive all packets that hit their receiver antenna. Such scheme results in significant power consumption, because only a small number of the received packets are destined to the receiver or needed to be forwarded by the receiver. DSR gathers the route information through overhearing. Overhearing improves the routing efficiency in DSR by eavesdropping other communications to gather route information but it spends a significant amount of energy.

In the first phase of the research work, the Demand Based Energy Efficient (DBEE) algorithm is developed which reduces the effect of overhearing. The mobility of the nodes results in stale routes, due to the lack of route cache updation. For that, a cross layer framework is implemented along with the DBEE to improve route cache performance in DSR. By using the cache timeout policy stale routes are prevented from being used. The cache timeout of individual links are found by Receiving Signal Strength Indicator (RSSI) information.

In the second phase of the research work, the Source Initiated Energy Efficient (SIEE) algorithm is proposed while improving the energy efficiency. Due to the lack of route cache update, the stale route entry and overhearing is originated among the network. For that, three mechanisms are developed to improve route cache performance in DSR. The three mechanisms like maximum error detection for link and route errors, clock based expiration of routes to determine the route expires and unconstructive caches to improve the performance of cache freshness in ad hoc networks.

In the third phase, the Efficient Source Routing Scheme (ESRS) algorithm is developed which provides energy consumption model for all overhearing techniques like no overhearing, incomplete overhearing and absolute overhearing to make the correct balance between the energy consumption and overhearing in MANETs.

By simulation results, the proposed scheme ESRS achieves 28% energy consumption and more packet delivery ratio while attaining less delay and overhead with the existing schemes like Random Cast, Source Initiated Energy Efficient (SIEE), Demand Based Energy Efficient with Cross Layer Approach (DBEE-CLA) and 802.11 Power Saving Mode (PSM).