

## ABSTRACT

In the first phase of the relay selection in wireless sensor network project, required hardware and software tests were performed to see the contribution of the relay to the network. After observation of the positive effect of using relays in distance and throughput, the selection of relay is now included in the project. The aim of our EE402 project is to prevent the communication interruption and mitigate fading in the channel by choosing the most suitable relay. Performance of several relay selection methods were analyzed in terms of important performance metrics. Our schemes are based on proactive selection approach, which selects relays continuously listening the communication in the network between source and destination. Four relay selection methods are highlighted: Random selection, Link Aware 1, Link Aware 2 and Network Aware. The methods aim to optimize different metrics including relay transmission success and simultaneous operation off many source-destination pairs. Coding and simulation of all phases are carried out via MATLAB. Different scenarios with parameters such as range, number of nodes, source-destination (S-D) distance and link probability are analyzed. The probability parameter applied here represents real-life environmental impacts such as fading. After studying the performance of the relay selection methods in terms of relay selection success, number of additional blocked nodes as well as relay positions, we implemented a wireless network with probabilistic links and investigated the benefits of relay selection in a real-network setting. In particular, we observed how much time the relay and non-relay networks spent to transmit packets successfully. We compare the performance of the relay network with a traditional wireless network that allows link-layer retransmissions. We show that while the retry can take place in a shorter time in the non-relay system, there are some situations where there is no need for retry in the relay system. The distance between Source and Destination plays an important role in the formation of link probability. The ratio of the range of nodes and the S-D distance reflects probability, and as the S-D Distance decreases, the probability of successful packet transfer increases. As the range of the nodes are increased, a decrease in the average transmission time was observed. The reason for this is that with the increase in the number of nodes, the range increase helps to find more potential relays. In the packet transfer section, 3 different options were applied and different results for time duration and relay were obtained. As a result, the importance of the relay in the network and how effective the relay selection was observed. In the project, it was observed that there was a positive effect on fading and interruption, an improvement in throughput and an increase in the number of transmitted packets.