

## ABSTRACT

Wireless sensor network is an event based network and it is different from the existing conventional networks. The network may be flat network or cluster network. The flat network is not suitable for large number of nodes. All the sensor nodes have the same responsibility and role in flat based network. But, in cluster network, they have different responsibility and roles. If the network needs best communication even after increasing scalability, then the best choice is cluster based network. Cluster network gives the maximum life time for network than the flat network architecture. A huge number of routing protocols are used for the cluster network. Though the cluster network has more advantages, the flat network is the best choice wherever the easiest maintenance, administration and cost minimization for switches are needed. Based on the requirement, it has been decided whether to choose flat network or cluster network. Link and Node failures are major problems in Wireless Sensor Network (WSN) which disconnects and makes network partition.

Four protocols are proposed to address link failure in different aspects. First is Sectionary Junction Failure Recovery (SJFR) Algorithm. It will perform local route recovery to minimize data packet loss during link failures. The significant feature of this approach is that it does not depend on global positioning information and uses only Received Signal Strength (RSTH) and hop count. Second is Predicting and Recovering Link Failure Localization (PRLFL) Algorithm. Nodes are classified into three groups. Based on the location of the failure, the algorithm works.

Third is H2B2H Protocol for WSN to address the link failure between two cluster heads. When there is a link failure between two cluster heads, then the predecessor cluster head sends two control packets and tries to establish the communication link with the successor cluster head. If it gets acknowledgement for any one of two control packets and it will send the remaining data packets. If the predecessor cluster head doesn't get any acknowledgement, then the

predecessor cluster head establish the link with its base station and sends the remaining data packets to the base station. The base station will take the responsibility to forward the data packets. Fourth is Single cluster with Multi-hop Communication (SCMC) protocol. Once the single cluster head is identified, cluster transmission of data takes place dynamically from all the other nodes to the cluster head.

One algorithm is proposed for addressing node failure. That is Family based algorithm for recovering network from node failure in WSN. It consists of an innovative family based solution for node failure in WSN. In a family, there are  $n$  numbers of persons. If anyone is in sick, then another person/s of the same family will take over the responsibility until he/she recovered from illness. The same way this algorithm was developed. The simulations are carried out using Network Simulator - 2 along with the various link failure algorithms and node failure algorithm. The simulation results show a promising performance in detecting and recovering wireless sensor network from link and node failures in terms of the various QoS parameters such as throughput, packet delivery rate, network life time, packet dropping rate, end to end delay, energy consumption, and routing overheads etc.