CHAPTER 6

CONCLUSIONS AND FUTURE WORK

The conclusion of the research work is consolidated here. The major advantages of the proposed work will help to choose the best network mode for the application. This chapter also highlights the scope for the future developments.

6.1 CONCLUSIONS

Performance of the WSN is analyzed for the Beacon enabled and Non-Beacon enabled by enabling and disabling the Acknowledgment. Performance of the network mainly depends on various parameters like Load, Throughput, End-to-End Delay and Utilization. When the numbers of nodes is increased in a network, above parameters are to be analyzed because these parameters depend on the size of the network and the acknowledgement. By comparing the Beacon enabled and Non-Beacon Enabled with acknowledgement enabled and disabled, Beacon enabled mode with acknowledgement is having minimum load because of which reliability is improved and also provided constant Throughput, minimum End-to-End delay and minimum Utilization compared with the non-beacon enabled mode. Finally, considering the overall performance of the network, Beacon Enabled mode is better than the non-beacon enabled mode, when the size of the network is increased.
Load Density Analysis of Mobile Coordinator in a Hexagonal Configuration

Proposed work has been analyzed and compared for all the possible mobility models Random Sink Mobility, controlled sink mobility model and predictable sink mobility. Simulation results show that controlled sink mobility model and predictable sink mobility has peak throughput in particular time only. But, Random sink mobility model has better throughput throughout the simulation time.

Load Density is analyzed using OPNET Modeler for the mobile coordinator in a Hexagonal configuration as described in chapter 3. This analysis gives the improvement compared with square configuration. The results obtained from the wide analysis of ZigBee mesh network shows variation when the routers are placed in Hexagonal configuration with a mobile coordinator. When the nodes are static and if each of the node is able to communicate with its neighboring node then there will be minimum delay for establishing the routes to the sink node and for association with the sink node. But if the sink is moving, then there can be association problems for the normal sensor nodes with the sink node. The major factors that decide the Network performance of Mobile coordinators are the node density and the traffic. Two key features required for this scenario are the ACK enable and understanding the range capability of ZigBee. Also the ACK enable was required for the end devices to recognize that the failure in the router has occurred. Thus the load metric for different number of nodes in Hexagonal configuration is obtained by enabling and disabling ACK. If a trajectory has to be chosen for other reasons, then the trajectory should give a considerable amount of time to each route that is the link route for a segment of the
network. The load of the network may be affected when the trajectory of the coordinator varies. In path constrained, outer periphery is having minimum load and mid cross is having maximum load.

Proposed simulation results shown that the process of choosing the actual sink's trajectory is far from trivial and the final decision will depend on the specific application requirements. For example, the outer periphery or the diagonal cross trajectories should be favored whenever the network lifetime, i.e. frequent battery replacement, is a concern. On the other hand, the mid-cross and the mid-periphery may be the trajectories of choice whenever a timely/frequent replacement of batteries is not an issue, but rather the average packet delay and/or the network's overall energy consumption need to be minimized.

Load Density Analysis of Beacon Enabled and Non-Beacon Enabled Wireless sensor Networks

Proposed work shows that superframe plays a critical role in analyzing network parameters in Beacon Enabled network. Superframe mainly depends on the Superframe Duration and Beacon Duration. Superframe Order and Beacon Order are used to calculate the Superframe Duration and Beacon Duration. Simulation parameters are analyzed for the various SO and BO. These results show that when the SO & BO are low, simulation parameters Throughput End-to-End delay, Power Consumption, Received Power and Utilization of the Channel are high and when the SO & BO are high, simulation parameters are low. Finally it is concluded that SO & BO values will be chosen based on the network requirement. If the application is required for minimum delay and high throughput, then SO
&BO equal to 1 is advisable. If the application considers only the battery life then SO & BO equal to 1 is advisable. By considering all the parameters, SO & BO equal to 6 is better.

Performance of the load of the network is evaluated in the non beacon enabled mode by increasing the nodes. Performance of the network is evaluated by the beacon enabled mode. Simulation results show that as number of nodes increases, the load also increases. In both beacon enabled and non beacon enabled modes, acknowledgment enabled scenarios have minimum load compared to the unacknowledgment scenarios. Compared with all scenarios, beacon enabled mode with acknowledgment have minimum load and because of which the reliability is improved.

Throughput, End-To-End Delay and Utilization Analysis of Beacon Enabled and Non-Beacon Enabled WSN

The simulation study analyses how the number of nodes impacts the reliability of data transmission and the end-to-end communication delay, based on the simulation model that was implemented in the OPNET Modeler. Simulation results show that as the number of nodes increases, the throughput and End-to-End delay also increases. In both beacon enabled and non beacon enabled modes, unacknowledgment enabled scenarios have maximum throughput compared to the acknowledgment scenarios. Comparing both Beacon enabled and non-beacon enabled modes, Beacon mode provides constant Throughput, minimum End-to-End delay and minimum Utilization.
6.2 SCOPE FOR FURTHER WORK

There are number of issues arising as a result of this study that can be further explored:

To analyze the energy consumption of the beacon and non-beacon enabled modes.

Proposed work can be applied for the network by considering the nodes as mobile in beacon enabled mode which is supported by any topology.

Proposed work can be applied to find the mobility of the nodes.

Proposed work can be applied for the cluster tree topology.