CHAPTER 6
RESULTS AND DISCUSSIONS

The prior chapters have discussed the techniques to conserve significant amount of energy in WSN. The motive of this research is to accomplish a common goal of energy efficiency, using different forms of methodologies. Hence, the adoption of different methodologies and a common goal of energy efficiency in WSN are achieved. This chapter explains the outcome accomplishment of the last three chapters pertaining to optimizing energy using probabilistic technique, globular topology and dynamic reconfiguration.

6.1 JOINT ANALYSIS OF ALGORITHM PROCESSING TIME

Algorithm processing time highlights the amount of compatibility and efficiency in execution for real-time environment of sensors. Figure 6.1 shows that proposed ENLPL model is found with highly reduced algorithm processing with increasing simulation round owing to implementation of probability theory. A closer look into the performance of globular topology and dynamic reconfiguration shows almost similar performance till 1100th simulation rounds. After 1100th simulation rounds, model for dynamic reconfiguration shows more algorithm processing time. Dynamic reconfiguration includes agents to process the information, which results in slight increase in algorithm processing time.
The outcome presented in Figure 6.1 shows that ENLPL is highly appropriate for sensors which require processing of critical information. Various applications in WSN pertaining to habitat and environmental monitoring require sensors to process the data faster owing to the massiveness of the data. So that processed data could be easily compatible with load balancing algorithms in reality. Hence, the model of ENLPL is highly recommended for usage in such application scenario.

6.2 JOINT ANALYSIS OF DATA AGGREGATION TIME

Assessing data aggregation time gives a better idea of sensor network efficiency with respect to realistic scenario of application. Reduced data aggregation time will only mean capability of the sensor to transmit the data to sink faster. The outcome shown in Figure 6.2 highlights that curve corresponding to dynamic reconfiguration has highly minimized
data aggregation time and is better in contrast to data aggregation time for ENLPL and globular topology. ENLPL could have better algorithm processing time but it performs optimization in multiple level which calls for increasing time to actually transmit the data from one aggregator node to sink. Owing to simpler search technique and mobile sinks, globular topology could deliver the data faster compared to ENLPL. However, Globular topology uses search-based optimization in two levels and doesn’t support dynamic reconfiguration. This results in globular topology not to excel better data aggregation time in contrast to dynamic reconfiguration.

![Combined Analysis of Data Aggregation Time](image)

**Figure 6.2: Joint Outcome of Data Aggregation Time**

Various times critical applications in sensor network for example healthcare, nuclear plant monitoring, chemical plants, etc requires aggregated data to reach the sink early. Hence, the model of dynamic reconfiguration is always suggested for this reason.
6.3 JOINT ANALYSIS OF PACKET DELIVERY RATIO

Packet delivery ratio is the most appropriate performance parameter to understand the effect of load balancing technique developed in proposed work. The outcome exhibited in Figure 6.3 clearly shows that Globular topology exhibits superior performance in comparison to dynamic reconfiguration and ENLPL. The prime reason behind this is globular topology introduces a completely novel method to search the destination node using dual-steps of search mechanism. Although, it consumes little processing time in initial search levels, but the more the process runs, the topology posses more heuristic data of routing. Dynamic routing and ENLPL have better time-based performance but owing to much optimization and agent usage, the packet delivery ratio is not as better as globular.

![Combined Analysis of Packet Delivery Ratio](image)

Figure 6.3: Joint Outcome of Packet Delivery Ratio
Various applications example multimedia streaming and other real-time streaming application which requires faster dissemination of data and higher information of data to be relayed on the destination end can seek the usage of globular topology. It could also be used for data mining applications in WSN, where massive amount of extracted knowledge is required to be disseminated.

6.4 JOINT ANALYSIS OF ENERGY CONSUMPTION

Energy consumption or rather residual energy defines how long the sensors can prolong its normal operation of data aggregation. Figure 6.4 shows the joint outcomes of energy consumption where it can be seen that ENLPL performs better energy consumption with increasing simulation rounds. Also, performance of globular and dynamic reconfiguration is somewhat equivalent in nature with respect to consumed energy.

![Combined Analysis of Energy Consumption](image)

*Figure 6.4: Joint Outcome of Energy Consumption*
ENLPL has the extensive optimization using 1st order radio model, where priority is given to selection process of cluster leader using various local and global attributes apart from residual energy as in case of LEACH. Applications which are used for large scale networks are usually unattended for longer duration of time e.g. military application, defense application, environmental monitoring, forest fire monitoring etc. Sustaining in such environment is quite challenging and calls for sensors with highest retention of network lifetime. Hence, ENLPL is suitable for conforming to energy standards required in such scenario.

**SUMMARY**

This chapter presents the combined outcomes of the proposed system with special emphasis on three significant models that is optimizing energy using probabilistic technique, globular topology and dynamic reconfiguration. The outcome shows the comparative performance analysis of the proposed system with conventional LEACH protocol. The chapter also explains about the comparative analysis among the models to showcase the best scenario of usage in sensor-based applications.