

Analytical Model for Underwater Wireless Sensor Network Energy Consumption Reduction

ABSTRACT

In an Underwater Wireless Sensor Network (UWSN), extreme energy loss is carried out by the early expiration of sensor nodes and causes a reduction in efficiency in the submerged acoustic sensor system. Systems based on clustering strategies, instead of each node sending information by itself, utilize cluster heads to collect information inside the clusters for forwarding collective information to sink. This can effectively minimize the total energy loss during transmission. The environment of UWSN is 3D architecture-based and follows a complex hierarchical clustering strategy involving its most effecting unique parameters such as propagation delay and limited transmission bandwidth. Round base clustering strategy works in rounds, where each round comprises three fundamental stages: cluster head selection, grouping or node association, and data aggregation followed by forwarding data to the sink. In UWSN, the energy consumed during the formation of clusters has been considered casually or completely evaded in the previous works. In this paper, the cluster head setup period has been considered the main contributor to extra energy utilizer. A numerical channel model is proposed to compute extra energy. It is performed by using a UWSN broad model. The results have shown that extra maximum energy consumption is approximately 12.9 percent of the system total energy consumed in information transmissions.