

EZ-SEP: extended Z-SEP routing protocol with hierarchical clustering approach for wireless heterogeneous sensor network

ABSTRACT

Wireless sensor networks (WSN) are networks of thousands of nodes installed in a defined physical environment to sense and monitor its state condition. The viability of such a network is directly dependent and limited by the power of batteries supplying the nodes of these networks, which represents a disadvantage of such a network. To improve and extend the life of WSNs, scientists around the world regularly develop various routing protocols that minimize and optimize the energy consumption of sensor network nodes. This article, introduces a new heterogeneous-aware routing protocol well known as Extended Z-SEP Routing Protocol with Hierarchical Clustering Approach for Wireless Heterogeneous Sensor Network or EZ-SEP, where the connection of nodes to a base station (BS) is done via a hybrid method, i.e., a certain amount of nodes communicate with the base station directly, while the remaining ones form a cluster to transfer data. Parameters of the field are unknown, and the field is partitioned into zones depending on the node energy. We reviewed the Z-SEP protocol concerning the election of the cluster head (CH) and its communication with BS and presented a novel extended mechanism for the selection of the CH based on remaining residual energy. In addition, EZ-SEP is weighted up using various estimation schemes such as base station repositioning, altering the field density, and variable nodes energy for comparison with the previous parent algorithm. EZ-SEP was executed and compared to routing protocols such as Z-SEP, SEP, and LEACH. The proposed algorithm performed using the MATLAB R2016b simulator. Simulation results show that our proposed extended version performs better than Z-SEP in the stability period due to an increase in the number of active nodes by 48%, in efficiency of network by the high packet delivery coefficient by 16% and optimizes the average power consumption compared to by 34.

Keyword: Z-SEP; SEP; LEACH protocol; WSN; WMN; WMSN