UNIVERSITI TEKNOLOGI MARA

MULTIPLE ERROR CORRECTION (MEC) FOR LIFETIME OPTIMISATION IN WIRELESS SENSOR NETWORK

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ABSTRACT

Previous research had highlighted the methods to control energy consumption without taking other aspects into considerations such as error rates and latency that might significantly impact the network. The implementation of error correction schemes in Wireless Sensor Network (WSN) can help reduce the error rates and limit the number of flooded retransmissions in the network, which indirectly minimize energy consumption. However, the use of too high or too low error correcting capabilities and improper selection of error correcting codes can further degrade the lifetime of sensors and can promote an increase in latency during transmission between nodes. Thus, the problems of higher error rates in the WSN and the rise of high energy usage, as well as latency from the computation and decoding of error correction schemes, become the motivation of this study to design a new approach to optimise the lifetime of the WSN without compromising latency in the transmission and maintaining the error rates. This research aimed to propose an algorithm of multiple error correction that is adapted to the changes of SNR and congestion in the network to reduce higher usage of energy consumption when higher error correcting capabilities were not necessary. The algorithm corresponds to the classified SNR range that was estimated using Kalman Filter and the error correcting codes were carefully selected for every SNR classes to avoid excessive latency and unnecessary redundancy appended to the transmitted bits. From the result obtained, the energy consumption was seen to be significantly optimised alongside Bit Error Rates and latency in which the increment of 0.72 percent of remaining energy was observed with multi-coding MEC from single-coding BCH and increment of 0.68 percent of remaining energy observed with multi-coding MEC from single-coding RS.

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