Energy Efficiency of a Dual Hop Clustered Networks in a High Data Rate Applications

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Abstract: This study investigates the energy efficiency of applying hierarchical architecture on to channel constrained next generation wireless networks. Unlike that of LEACH which was designed for sensor networks, this study focuses in a high traffic data applications in which a balance is needed between the throughput, delay and energy consumption. The results are compared to that of a traditional single hop with no hierarchical formation. In order to quantify energy efficiency, Joules per bit otherwise known as ECR (energy consumption rating) metric was a chosen as it provides an insight on how much energy is transferred for one bit of information. It is found that reducing interference can increase the energy efficiency of the dual hop clustered network by 50% and that the network is more energy efficient than the standard single hop if the transmission power dominates the total consumed power by devices coupled with interference mitigating channel assignments schemes. Applying energy saving scheme can also improve the energy efficiency of the network by up to 80%.