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Cost Effective Node Deployment Strategy for Energy-Balanced and Delay-Efficient Data Collection in Wireless Sensor Networks

Messaoud DOUDOU, Djamel DJENOURI, Jose M. BARCELO-ORDINAS, Nadjib BADACHE

Décembre 2013

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Résumé: The real-world node deployment aspect is investigated, while considering cost minimization for resolving the energy hole around the sink, which represents a serious problem in typical sensor networks with uniform distribution. A novel strategy is proposed that is based on the use of two sinks and a few extra relay nodes close to the sinks' areas. The traffic is then alternatively sent to the sinks in every other cycle. As a second contribution, an efficient data collection mechanism has been developed to determine the optimal data rate that meets delay requirements of individual sensor reports and improves the network lifetime. The comparison of the proposed node deployment strategy with uniform, non-uniform geometric and linear increase node distributions demonstrates that the cost of the proposed solution is very close to that of the uniform distribution and much lower than all the others, while achieving a load balancing at the same order of the state-of-the-art solutions perspective.

Mots clés: Wireless Sensor Networks, Energy-Efficiency; Node Deployment, Data Collection.

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