Simulation Performance Evaluation of an Energy Efficient Routing Protocol for Mobile Ad Hoc Networks

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Abstract

Energy conservation is one of the most important issues in ad hoc networks, where computers used are usually supplied with limited autonomous resources. Recent studies show that the energy consumed for routing data-packets in wireless ad hoc networks can be significantly reduced compared with the current min-hop max-power routing protocols. But designing a power efficient routing protocol is one of the most challenging issues. In this work, we have conducted a detailed simulation to evaluate the performance of our energy efficient routing protocol [2] derived from DSR, in this simulation we have compared our protocol with the standard DSR considered as benchmark.

1. General description

In our previous work [2], we have defined new metrics to resolve the trade-off between the batteries freshness [4] and the total required power [3] for selecting routes and defining their optimality. We have also defined a new technique which allows to take advantage of all available routes, and to disperse the routing task over several nodes. Using these metrics and this technique, we have modified DSR protocol, to improve it and build a new power-aware and efficient protocol. Our protocol performance has been evaluated by simulation using GloMoSim. We have defined two kinds of comparison metrics, the first one represents the consumed energy where the second one represents the battery life time. The former includes three metrics: i) the communication energy that is composed of, ii) the transmission energy and iii) the reception energy, whereas the latter includes two metrics: i) the average battery life time, and ii) the battery life time difference, this last one is not related to the consumed energy at all. An efficient protocol must booth increase the average battery life time, and decrease the battery life time difference to ensure that all nodes stay alive *together* as long as possible.

2. Results and conclusions

The metrics of comparison were measured in different situations of mobility, network load, and battery capacity. The results of our simulation show an important improvement compared with the DSR benchmark regarding all the proposed metrics, especial for the high load situations. Our protocol reduces the energy consumption, specifically the transmission energy, thereby it increases the average battery life time. Moreover, it enormously reduces the battery life time difference. The detailed results and analyzes are available in [1].

References

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