

# Energy Balance Mechanisms and Lifetime Optimization of Wireless Networks

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**Abstract.** In this talk, we consider the problem of data propagation in wireless sensor networks and revisit the family of mixed strategy routing schemes. We will argue that maximizing the lifespan, balancing the energy among individual sensors and maximizing the message flow in the network are equivalent. We note that energy balance, although implying global optimality, is a local property that can be computed efficiently and in a distributed manner. We will then review some distributed, adaptative and on-line algorithms for balancing the energy among sensors.

By considering a simple model of the network and using a linear programming description of the message flow, we will show the strong result that an energy-balanced mixed strategy beats every other possible routing strategy in terms of lifespan maximization. We finalize by remarking that although the results discussed in this talk have a direct consequence in energy saving for wireless networks they do not limit themselves to this type of networks neither to energy as a resource. As a matter of fact, the results are much more general and can be used for any type of network and different type of resources.