Dynamic power budget distribution schemes that optimize connection lifetimes in MANETS

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Abstract:

We present new dynamic schemes that continuously redistribute a fixed power budget among a set of mobile wireless nodes participating in a multi-hop wireless connection. The schemes operate with the objective of maximizing the expected lifetime of the connection. First, we evaluate performance gains obtained by the proposed schemes and quantify their sensitivity to various system parameters, including connection size, node density, power budget size, and mean node velocities. Second, we compare the efficacy of our schemes in enhancing connection lifetime by comparing their performance against a scheme which distributes the connection power budget uniformly among nodes. Our simulations indicate that the proposed power budget distribution scheme yields a significant increase in connection lifetime. Third, we compare the proposed schemes against a scheme which distributes the connection power budget dynamically with the objective of minimizing end-to-end bit error rate (BER). In making this comparison we obtain quantifiable evidence of the inherent oppositions and tradeoffs between the objectives of BER minimization and lifetime maximization. Finally, we conduct a simulation-based analysis of control traffic incurred by the schemes in order to obtain a description of the relationships between control overhead and expected gains in connection lifetime, and an understanding of the influence of various system parameters (e.g. connection size, node density, and power budget size) on this relationship.

Keywords: Power distribution, connection lifetime, MANET

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