RSS-based Optimized DV-HOP Localization Scheme for Wireless Ad-hoc Networks

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Abstract— Connectivity-based range-free schemes offer cost effective solutions for localization in wireless ad-hoc networks. Despite the number of published works on them, there is still a lack of real-world evaluations of them so far. In this paper, we first present experimental analysis of typical rang-free DV-HOP localization scheme in a real world environment and point out generation of a large amount of error in small scale network environments. Further on the basis of this experimental analysis, we propose an optimized DV-HOP scheme by incorporating DV-HOP with Received Signal Strength (RSS) based ranging approach. In the proposed solution, connectivity information used in DV-HOP is artificially configured by setting a RSS threshold to minimize the localization error generated in the practical environment. Then, iterative location learning algorithm is applied which uses connectivity information and RSS-based distance between unknown node and its neighbors to get more precise location estimations. For RSS-based distance estimation, a thorough empirical analysis of the radio propagation model is presented. Experimental results show that our proposed scheme achieves improved localization accuracy with low cost and power consumption.