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Homogeneous 2-hop broadcast in 2D. (English) Zbl 1173.90448

Summary: In this paper, two variations of the minimum cost homogeneous range assignment problem for 2-hop broadcast from a given source are considered. A set \( S = \{ s_0, s_1, \ldots, s_n \} \) of radio stations are preplaced in \( \mathbb{R}^2 \), and a source station \( s_0 \) (say) is marked. In our first problem, the objective is to find a real number \( r \) such that 2-hop homogeneous broadcast from \( s_0 \) is possible with range \( r \), and the total power consumption of the entire network is minimum. In the second problem, a real number \( r \) is given and the objective is to identify the smallest subset of \( S \) for which range \( r \) can be assigned to accomplish the 2-hop broadcast from \( s_0 \), provided such an assignment is possible. The first problem is solved in \( O(n^2 \log n) \) time and \( O(n^2) \) space. For the second problem, a 2-factor approximation algorithm is proposed that runs in \( O(n^2) \) time and \( O(n) \) space.

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References: