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On the construction of $k$-connected $m$-dominating sets in wireless networks. (English)


Summary: Connected dominating sets (CDS) that serve as a virtual backbone are now widely used to facilitate routing in wireless networks. A $k$-connected $m$-dominating set (kmCDS) is necessary for fault tolerance and routing flexibility. In order to construct a kmCDS with the minimum size, some approximation algorithms have been proposed in literature. However, the proposed algorithms either only consider some special cases where $k = 1, 2$ or $k \leq m$, or not easy to implement, or cannot provide performance ratio. In this paper, we propose a centralized heuristic algorithm, CSAA, which is easy to implement, and two distributed algorithms, DDA and DPA, which are deterministic and probabilistic methods respectively, to construct a kmCDS for general $k$ and $m$. Theoretical analysis and simulation results indicate that our algorithms are efficient and effective.

MSC:

90C27 Combinatorial optimization
90C35 Programming involving graphs or networks

Keywords: wireless networks; connected dominating sets; $k$-connected $m$-dominating sets; performance ratio; distributed algorithms; approximation algorithms

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References:


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