Energy Harvesting Network With Wireless Distributed Computing

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Abstract

Bulky processing tasks are expected to burden the limited resources of energy harvesters by draining the stored energy, and thereby, reaching rapidly to energy causality constraint. In such scenario, energy harvesters flip into sleep mode, and thereby, the execution time of the next task will he delayed until the energy harvesters revert hack into active mode. To tackle this problem, this paper proposes a novel energy harvesting network (EHN) that deploys wireless distributed computing (WDC) network within the decision making process (DMP). The DMP is formulated as constrained partially observable Markov decision process in order to enable the energy harvesters to act under uncertainty. Furthermore, various challenges of WDC networks, e.g., nominating the collaborating nodes and task allocation, have been addressed herein. Unlike conventional research works on WDC networks, a system model is proposed for WDC network based on divisible load theory instead of graph theory. In addition, an adaptive task allocation algorithm is proposed to distribute the task efficiently among the collaborating nodes. Finally, the novel EHN system is analyzed and compared against the conventional research works on WDC, offloading computing, and local computing-EHN, where the proposed system is found to outperform in terms of energy and delay.

Keywords

Author Keywords: Divisible load theory (DLT); energy harvesting network (EHN); reinforcement learning; task allocation; wireless distributed computing (WDC)

KeyWords Plus: MAXIMIZATION

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