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Mengistu Abera Mulatu

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# Energy Cooperation in Communication of Energy Harvesting Tags

Mengistu Abera Mulatu

*Department of Electrical and Electronic Engineering, University of Swaziland, Kwaluseni, Swaziland*

**Abstract**

Energy harvesting wireless devices are recently emerging as a viable infrastructure for internet of things (IoT) applications. In this paper, an energy cooperative transmission strategy is proposed for a network energy harvesting tags, that is adapted to the available energy resource and identification request. We develop an optimal transmission policy to maximize the long-term average throughput performance via a Markov decision process (MDP) formulation. Numerical results are provided to show the performance of the energy cooperative transmission policy under various scenarios.

**Index Terms**

Energy transfer, energy harvesting tags, Markov decision process, transmission strategy

## I. Introduction

Cooperative communication and energy harvesting have been recognized as practical solutions to overcome the battery and communication reliability problems in wireless devices. Energy harvesting tags (EHTs) are recently proposed as tiny devices that can be attached to common place objects [1], [2]. They are getting a variety of applications, including tracking and monitoring, locating or identifying lost objects and disaster victims, collecting information and in health care. EHTs can be placed at fixed locations, such as forests and buildings, or can be attached to moving items such as animals, vehicles, and items on transaction. They harvest energy from the environment. Environmental energy harvesting is becoming the best option to mitigate energy supply challenges in wireless devices. An efficient design of micro-scale energy harvesting using energy transducers and a system design perspective are studied in detain in [3], [4]. Reference [5] has developed a number of algorithms to detect and track maximum power point of energy



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