Joint Power-Rate-Slot Resource Allocation in Energy Harvesting-Powered Wireless Body Area Networks

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***Abstract*—Wireless body area network (WBAN) has become a promising network for continuous health monitoring of various diseases. The limited energy of sensors in WBAN cannot support the long term work with the high requirements of Quality of Service (QoS) for health applications. Energy harvesting (EH)-powered WBAN, which can provide uninterrupted work, has attracted more attention from both macadamia and industry. However, the time-varying and heterogeneous EH states of different sensors become an important factor when designing the resource allocation schemes in EH-powered WBAN. In this paper, we propose a novel two-phase resource allocation scheme, which optimizes the allocation of transmission power, source rate and slots to improve the QoS performance of EH-powered WBAN. In the first phase, we analysis the relationship between the QoS performance and the source rate for satisfying the Energy Neutral Operation (ENO), and then a joint Power-Rate Control Scheme (PRCS) is proposed to optimize the source rate and transmission power for ensuring the long-term QoS performance based on the statistical properties of EH. Moreover, we design a QoS Aware Slot Allocation Scheme (QASAS) to dynamically adjust the time slot allocation to cope with the time-varying EH states for obtaining better short-term QoS performance in the second phase. Finally, numerical simulation results demonstrate that the proposed joint Power-Rate-Slot resource allocation of EH-powered WBAN can exploit the time-varying EH to improve both long-term and short-term QoS performance, and .**

***Index Terms*—energy harvesting, resource allocation, wireless body area network (WBAN).**

I. Introduction

this is introduction

II. Related works

This is related works

III. System model

This is system model

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VII. Simulation results

In this section, the performance of the two proposed algorithms and the characteristics of the EH-DCCN are investigated in the performance of the average achievable system rate and the matching probability of EH-DPs. The matching probability of EH-DPs represents the ratio of the matched EH-DPs in N_D.

VIII. Conclusion

In this paper,

Appendix A
proof of **corollary ??**

According to the reusing rules of the ESM, the distance among EH-DPs reusing the same spectrum of one CU is enough far away from each other. Hence, the interference among EH-DPs can be approximately ignored. Based on this, the minimum reusing radius d_{EH} is approximately determined by the CU and the EH-DP reusing the same spectrum resource. Hence, according to the transmission rate requirement, the matched CU c_i and EH-DP d_j must satisfy the following constraints:

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