Distributed Power Control for Multi-hop Energy Harvesting Links with Retransmission

ABSTRACT

In this work, we consider an energy harvesting (EH) node that periodically takes a measurement and conveys it to a destination over multiple EH relays operating in the decodeand forward fashion, using the automatic repeat request (ARQ) protocol. Packets that are not delivered to the destination before the next measurement is taken are dropped. We seek to design an online retransmission-index based power control policy (RIP) for each node which minimizes the packet drop probability (PDP). To this end, we first derive an expression for the PDP in terms of the RIPs at the nodes. Next, when the energy cost for decoding a packet is negligible, we obtain closed form expressions for the optimal RIPs. We also extend the results to the case where the peak transmit power is constrained. When the energy cost of decoding is non-negligible, we present a geometric programming based iterative algorithm to obtain near-optimal RIPs. In both the scenarios, in order to obtain insight on the impact of channel coherence time, we design the RIPs for both slow and fast fading channels. Through Monte Carlo simulations, we show that the proposed policies significantly outperform state-of-theart solutions.

EXISTING SYSTEM

- We presented a method to systematically design PDP-optimal SoC-independent policies for retransmission-based point-topoint EH links, where both the transmitter and receiver are EHNs.
- Due to the coupling among the policies of different nodes, policies that are optimal for point-topoint EH links could be highly suboptimal for multi-hop EH links.
- Finally, when the energy required for receiving and decoding a packet is non-negligible, the problem becomes a mixed-integer nonlinear program.

PROPOSED SYSTEM

- In proposed system, PDP of ARQ-based multi-hop EH links equipped with finite sized batteries for both slow and fast fading channels.
- The gap between the lower bound and the PDP of our system decays exponentially fast with the battery size at each node.
- Furthermore, when there is a peak transmit power constraint at the transmitter, we provide a provably convergent algorithm to determine the optimal transmit power control policy.

SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS

- Processor - Intel core i3
- RAM - 2B
- Hard Disk - 20 GB

SOFTWARE REQUIREMENTS

- Operating System : LINUX
- Tool : Network Simulator-2
- Front End : OTCL (Object Oriented Tool Command Language)

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