Energy Efficient Transmission in Multi-User MIMO Relay Channels with Perfect and Imperfect Channel State Information

ABSTRACT

- We design novel transmission strategies to maximize the energy efficiency (EE) of the uplink multi-user MIMO relay channel. In this channel, K multi-antenna users communicate with a multi-antenna base station (BS) through a multi-antenna relay.
- To achieve the goal of EE maximization, we propose new iterative algorithms to jointly optimize the multi-user precoder and the relay precoder under transmit power constraints for two cases. In the first case, the perfect global channel state information (CSI) is available, while in the second case, the CSI between the relay and the BS is imperfect. To surmount the nonconvexity of our formulated EE optimization problems in both cases, we introduce the parameter subtractive function into the proposed algorithms.

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- Then the EE parameter in the parameter subtractive function is updated by the Dinkelbach's algorithm in the perfect CSI case, and by the bisection method in the imperfect CSI case. Moreover, in the perfect CSI case the relay precoder is optimized by the diagonalization operation and the multi-user precoder is optimized based on the weighted minimum mean square error method.
- Differently, in the imperfect CSI case we apply the sign-definiteness lemma to promote the semidefinite programming formulation of the EE optimization problem.

EXISTING SYSTEM

- A key assumption adopted is that the perfect channel state information (CSI) is available at each communication node. We note that this assumption does not always hold in practical scenarios where feedback and quantization errors may occur.

PROPOSED SYSTEM

- In this paper, we maximize the EE performance of the uplink in the multi-user MIMO relay channel for both perfect and imperfect CSI cases, which are of theoretical and practical significance.
- In the considered channel, K multi-antenna users transmit to a multi-antenna base station (BS) with the aid of a multi-antenna amplify-and-forward (AF) relay. In the perfect CSI case, we assume that the precise channel knowledge is available at eachcommunication node.

Hardware requirements

- Processor - Pentium-IV
- Speed - 1.1 Ghz
- RAM - 256MB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

SOFTWARE REQUIREMENTS

- Tool - Network Simulator-2
- Operating system - LINUX
- Front end - OTCL (Object Oriented Tool Command Language)

REFERENCES

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