

On the energy efficiency in multi-user multi-relay coded network

Nan Qi, Ming Xiao, Theodoros A. Tsiftsis, Phuong L. Cao, Mikael Skoglund, Lixin Li

- School of Engineering

Abstract

In this paper, the energy efficiency (EE) of a cooperative diversity system with maximum diversity network coding (MDNC) is studied. In the considered system, channel state information (CSI) is only available at the receivers for all the channels. We formulate the problem of maximizing the EE under the constraint on the outage probability. The problem is NP-hard due to the non-convexity of the outage probability function and the nonlinear fractional structure of the introduced EE. To solve the optimization problem efficiently, first, the outage probability function is tightly approximated as a log-convex form in the high signal-to-noise ratio (SNR) region. Further, based on the fractional programming, we transform the introduced EE into a subtractive-form, which is proved to be a convex form. The tradeoff between outage probability and EE is given. The results show that our power allocation (PA) policy can substantially increase the EE. We show that EE can be increased if more relays forward the messages. Additionally, we also investigate the effect of the relay locations on the EE and demonstrate that the increase in the transmission distance in the first hop causes the loss of the EE. The loss can be reduced by our PA policy.

Original language	English
Title of host publication	2016 23rd International Conference on Telecommunications, ICT 2016
Publisher	<u>Institute of Electrical and Electronics Engineers Inc.</u>
ISBN (Electronic)	9781509019908
State	Published - Jun 27 2016
Event	23rd International Conference on Telecommunications, ICT 2016 - Thessaloniki, Greece

Qi, N., Xiao, M., Tsiftsis, T. A., Cao, P. L., Skoglund, M., & Li, L. (2016). On the energy efficiency in multi-user multi-relay coded network. In *2016 23rd International Conference on Telecommunications, ICT 2016*. [7500378] Institute of Electrical and Electronics Engineers Inc.. DOI: 10.1109/ICT.2016.7500378