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Performance analysis of coordination strategies in two-tier Heterogeneous Networks (Conference Paper)

Boukhedimi, I. ✉, Kammoun, A. ✉, Alouini, M.-S. ✉

Computer, Electrical and Mathematical Sciences and Engineering (CEMSE) Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Makkah Province, Saudi Arabia

Abstract

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Large scale multi-tier Heterogeneous Networks (HetNets) are expected to ensure a consistent quality of service (QoS) in 5G systems. Such networks consist of a macro base station (BS) equipped with a large number of antennas and a dense overlay of small cells. The small cells could be deployed within the same coverage of the macro-cell BS, thereby causing high levels of inter-cell interference. In this regard, coordinated beamforming techniques are considered as a viable solution to counteract the arising interference. The goal of this work is to analyze the efficiency of coordinated beamforming techniques in mitigating both intra-cell and inter-cell interference. In particular, we consider the downlink of a Time-division duplexing (TDD) massive multiple-input-multiple-output (MIMO) tier-HetNet and analyze different beamforming schemes together with different degrees of coordination between the BSs. We exploit random matrix theory tools in order to provide, in explicit form, deterministic equivalents for the average achievable rates in the macro-cell and the micro-cells. We prove that our theoretical derivations allow us to draw some conclusions regarding the role played by coordination strategies in reducing the inter-cell interference. These findings are finally validated by a selection of some numerical results. © 2016 IEEE.

Author keywords

Coordinated Beamforming Heterogeneous Networks Massive MIMO systems Random Matrix Theory
Signal-to-Leakage Beamforming Zero-Forcing Beamforming

Indexed keywords

Engineering controlled terms: Beamforming Cells Communication channels (information theory) Matrix algebra
MIMO systems Quality of service Radio interference Random variables
Signal interference Signal processing Wireless telecommunication systems

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