Ain Shams University
Faculty of Engineering
Electronics and Communications Department

Advanced MIMO Techniques for Long Term Evolution

A Thesis
Submitted in partial fulfillment of the requirements of a Master of Science degree in Electrical Engineering

Submitted by:

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Cairo, 2016

Advanced MIMO Techniques for Long Term Evolution

Dedication

To my parents, my close friends, and my future wife.

Ain Shams University
Faculty of Engineering
Electronics and Communications Department

Examiners' Committee

Name: Amr Tarek Ahmed Abdel-Razik Khashaba
Thesis: Advanced MIMO Techniques for Long Term Evolution
Degree: Masters of Science in Electrical Engineering

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Statement

This thesis is submitted as a partial fulfillment of Master of Science in Electrical Engineering, Faculty of Engineering, Ain Shams University. The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Signature

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Date:

Acknowledgment

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Abstract

Faculty of Engineering – Ain Shams University
Electronics and Communication Engineering Department

Thesis title: **Advanced MIMO Techniques for Long Term Evolution**
Researcher Name: **Amr Tarek Ahmed Abdel-Razik Khashaba**
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Abstract

In modern wireless networks, the throughput achieved by the edge users is a key performance indicator of the network. Enhancing the edge user throughput can be achieved through mitigating intercell interference. Long term evolution (LTE) introduces a new technique for interference mitigation through coordination between BSs denoted as coordinated multipoint (CoMP) transmission reception systems. CoMP promises an enhanced edge user downlink throughput, especially in TDD systems. Radio frequency (RF) calibration is necessary for proper CoMP operation. In this thesis, the RF calibration problem in CoMP systems is discussed and analyzed and new techniques are proposed.

We study the performance of different CoMP schemes and different precoders under RF mismatch calibration errors. Numerical results are provided which show the best precoder and the best CoMP mode candidates given different SNR and calibration error levels.

In addition, a new iterative MMSE-based calibration scheme is introduced and simulation results are provided showing superior performance compared to traditional algorithms. Moreover, a new mobility-aware calibration point selection algorithm is proposed for different types of calibration in CoMP systems. Full