Uplink-Downlink LTE Multi Cell Capacity: A Performance Analysis in the Presence of ICI, Imperfect Channel Information and Reuse-1 Plan

Abstract

Long Term Evolution (LTE) technology is based on Orthogonal Frequency Division Multiple Access (OFDMA) technique in the downlink to support multiple users in the same cell at the same time. Such system is known to be susceptible to Inter Cell Interference (ICI) in the downlink. The uplink technology of choice, however, has been SC-FDMA due to low power consumption requirement by the mobile terminal. In order to deliver higher data rates anywhere in the cell in the downlink, especially at the cell edge; many algorithms have been proposed for interference mitigation and avoidance which impose additional complexity on the system and yields minimum capacity enhancements. MIMO techniques have proven to be more efficient than such algorithms. In this paper, a performance analysis of LTE cell capacity is conducted in the presence of several MIMO deployments, where multiple antennas at both the transmitter and the receiver are considered. A comprehensive simulation study of different multiple antenna configurations in the presence of uplink and downlink ICI and cell edge throughput is presented. We also provide insights into the MIMO deployment of choice based on users SINR.

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Index Terms

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Keywords

LTE MIMO MRC SM ICI Rayleigh fading.