

Evaluation of Diversity and Adaptive Antenna Techniques on a Small-Cell LTE Base-Station Prototype

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Abstract:

Modern mobile communication increasingly tend to provide high speed transmission multimedia services, therefore the deployment of 4G cellular networks is expected to provide the high speed transmission multimedia services rely on heterogeneous radio access architectures, whereby cells of different coverage and capacity coexist in the same geographical areas. In this paper, we researched the real life problems which may influence the distributed antenna techniques in the uplink physical layer of LTE femtocell system, and aim to find a suitable technology, which consider the trade-off between the cost and quality of distributed antenna system, to improve the performance of LTE femtocell base station. We mainly investigate three types of LTE femtocell base stations: a) two distributed receive antennas and two-input LTE femtocell base station system b) two distributed receive antennas system with combined Hub Unit and four input LTE femtocell base station and c) four distributed receive antennas system and four-input LTE femtocell base station. By using the distributed antennas and FPGA combined Hub Unit, we make the two-input LTE femtocell base station's diversity performance match to the four input LTE femtocell base station. According to the software simulation results, the factors which may influence the Hub Unit combined techniques are analyzed in this paper. In addition, we introduced the WINNER 2 channel to evaluate the hardware performance in different propagation scenarios. Based on that, the real life propagation problems of the selected techniques are discussed in this paper.