

Carrier Aggregation for LTE-Advanced Mobile Communication Systems

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Abstract. In order to achieve up to 1 Gb/s peak data rate in future IMT-Advanced mobile systems, carrier aggregation technology is introduced by the 3GPP to support very-high-data-rate transmissions over wide frequency bandwidths (e.g., up to 100 MHz) in its new LTE-Advanced standards. This article first gives a brief review of continuous and non-continuous CA techniques, followed by two data aggregation schemes in physical and medium access control layers. Some technical challenges for implementing CA technique in LTE-Advanced systems, with the requirements of backward compatibility to LTE systems, are highlighted and discussed. Possible technical solutions for the asymmetric CA problem, control signaling design, handover control, and guard band setting are reviewed. Simulation results show Doppler frequency shift has only limited impact on data transmission performance over wide frequency bands in a high-speed mobile environment when the component carriers are time synchronized. The frequency aliasing will generate much more interference between adjacent component carriers and therefore greatly degrades the bit error rate performance of downlink data transmissions.

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