Cross-Layer Algorithms for Distortion-Fair Scalable Video Delivery over OFDMA Wireless Networks

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Abstract:

Optimizing video delivery to multiple users over OFDMA wireless systems is a challenging task, especially when the objective of maximizing the spectral efficiency has to be jointly considered with the objective of providing a fair video quality. In this paper a novel cross-layer optimization framework is proposed. It jointly addresses rate adaptation and resource allocation, aiming at maximizing the sum of the achievable rates while minimizing the distortion difference among multiple videos. After having discussed its feasibility, the optimization problem is vertically decomposed into two sub-problems, and a novel efficient Iterative Local Approximation (ILA) algorithm is proposed to evaluate the global solution. ILA algorithm requires a limited information exchange between the application and the MAC layers, which independently run algorithms that handle parameters and constraints characteristic of a single layer. The numerical evaluations show the fast convergence of the ILA algorithm and demonstrate the significant video quality improvement of the proposed strategy with respect to other optimization frameworks.