

Optimal Resource Allocation in Time-Varying Systems

Summary: The fundamental challenge in cellular networks is the one of efficient use of network resources, such as frequency channels of the base stations (antennas). Due to fading and user mobility, the channel signal strength is time-varying, which makes an efficient channel allocation to users a difficult problem. Being efficient means to manage that users receive the complete data (e-mails, mp3s, videos, etc.) as quickly as possible. This problem can be modeled in the framework of stochastic dynamic programming, which usually requires long computational time and therefore it is not implementable. A particular Lagrangian relaxation method leads to a decomposition of the problem into single flows, which can typically be much faster to solve.. This solution leads to a set of priority rules that give a higher priority of transmission to some flows than to others, by opportunistically assigning more resources to users in currently better channel condition. The objective of this work will be to analyze the relaxed problem or its limit and test the performance of its solution by means of numerical experiments.

Keywords: Optimization, Stochastic dynamic programming, Markov chains, Matlab

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