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Uplink Scheduling in Wireless Networks with Successive Interference Cancellation

Abstract:

In this paper, we study the problem of uplink scheduling in wireless networks with successive interference cancellation (SIC). With SIC, concurrent transmissions, if properly scheduled, can be successfully decoded at a receiver. The scheduler decides: i. in which time-slot to schedule, and ii. in what order in a time-slot to decode each transmission in order to maximize the system utility and/or satisfy a system constraint. These two scheduling decisions effectively determine the rates allocated to concurrent transmissions, which in turn determine the throughput and fairness of the system. We consider several different scheduling problems in this context. The objective of the problems is to either maximize the throughput of the system or to obtain some kind of fairness among the users. We formulate and study each problem from the perspective of computational complexity. For each problem, we either propose a polynomial time algorithm, if any exists, or show that the problem is NP-hard.