

Analysis of Trade-offs between Buffer and QoS Requirements in Wireless Networks

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Abstract

In this paper, we consider the scheduling problem where data packets from K input flows need to be delivered to K corresponding wireless receivers over a heterogeneous wireless channel. Our objective is to design a wireless scheduler that optimizes the buffer requirement at each wireless receiver while maintaining good throughput performance. This is a challenging problem due to the unique characteristics of the wireless channel.

We propose a novel idea of exploiting both the long-term and short-term error behavior of the wireless channel in the scheduler design. In addition to typical first-order Quality of Service (QoS) metrics such as throughput and delay, our performance analysis of the scheduler permits the evaluation of higher-order metrics, which are needed to evaluate the buffer requirement. We show that the proposed scheduler achieves high overall throughput as well as low buffer requirement when compared to other wireless schedulers that only make use of the instantaneous channel state in a heterogeneous channel.

Index Terms

Wireless Scheduling, QoS, Heterogenous Channel, Buffer Requirements.