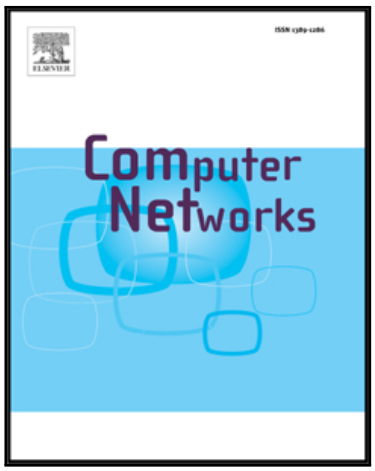


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# Queue Management for Two-User Cognitive Radio with Delay-Constrained Primary User

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**Abstract**

In this paper, two novel Queue Management Policies (QMP) are proposed for Quality of Service (QoS) enhancement of a two-user Cognitive Radio Network (CRN) comprising a Primary User (PU) and Secondary User (SU), the latter having non-causal information on PU's messages (or packets). Specifically, we aim to maximize the throughput of the SU while satisfying the delay criterion of the Primary User (PU). The first proposed QMP is a hybrid interweave/overlay scheme where all the SU's resources are devoted to the transmission of PU's packets. The second proposed QMP adaptively uses all or some of the SU's resources towards the transmission of the PU's packet, this decision being based on the packet's delay experienced in the PU queue. For this adaptive QMP, a novel multi-regime Markov fluid queue model is proposed via which closed-form expressions are derived and validated for the exact delay distribution for Poisson PU traffic and exponentially distributed packet lengths. Using this analytical tool, we optimally tune the parameters of the adaptive QMP and we show through numerical examples that it consistently outperforms the hybrid interweave/overlay model as well as two other conventional schemes in terms of

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