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Stochastically Bounded Burstiness for Communication Networks

David Starobinski and Moshe Sidi

Department of Electrical Engineering
Technion - Israel Institute of Technology
Haifa 32000, Israel

Abstract

In this work, we develop a network calculus for processes with burstiness that is stochastically bounded by *general* decreasing functions. This calculus enables us to prove the stability of feed-forward networks and obtain statistical upper bounds on interesting performance measures such as delay, at each buffer in the network. Our approach is based on a generalization of the "exponentially bounded burstiness" (EBB) network calculus where only exponentially decaying bounding functions were considered. We show that our generalized calculus find remedies for some of the major deficiencies of the EBB model: (i) it is useful for a larger class of input processes, including important processes exhibiting subexponentially bounded burstiness such as fractional Brownian motion (ii) it provides much better bounds for common models of real-time traffic, like Markov modulated processes and other multiple time-scale processes. We expect that this new calculus will be of particular interest in the implementation of services providing statistical guarantees.