

Global stability conditions for rate control with arbitrary communication delays

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Abstract

We adopt the optimization framework for the rate allocation problem proposed by Kelly and characterize the stability conditions with arbitrary communication delays. We demonstrate the existence of a fundamental trade-off between users' price elasticity of demand and the responsiveness of resources through a choice of price function. We apply our results to a family of popular utility and resource price functions, and establish exponential stability. We study the effects of non-responsive traffic on system stability and show that the presence of non-responsive traffic enhances the stability of system.

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