

Bandwidth sharing networks in overload
by
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Bandwidth sharing networks are a class of stochastic processing networks, which are proposed to develop qualitative insights into the flow level performance of communication networks.

Although a well designed communication network should not operate in overload, or even near overload, temporary surges in traffic can cause overload for extended periods of time. Motivated by this, we consider a multiclass bandwidth sharing network operating under a weighted alpha-fair scheduling discipline. We assume that at least one of the traffic links is overloaded. We are interested in the growth rates of the number of users.

Building on recent work by Gromoll & Williams, we obtain an equation for this growth rate, which is a multidimensional fixed point equation. Uniqueness of solutions to this fixed point equation is shown by identifying an associated convex programming problem.

We illustrate our result, which is valid for any network topology, by considering linear networks and star networks as special cases. In addition, we consider an extension of our analysis to bandwidth sharing networks with impatience.

Joint work with Sem Borst (Bell-Labs & TUE) and Regina Egorova (CWI & TUE).