

TECHNICAL RESEARCH REPORT

Fair Bandwidth Allocation and Buffer Management in Hybrid Network Gateways

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Abstract

In this paper, we present an efficient and fair resource allocation scheme for scheduling and buffer management in a bottleneck hybrid satellite-terrestrial network gateway with per-flow TCP queues. Our first contribution is the use of Fair Queueing in conjunction with Probabilistic Fair Drop, a new buffer management policy to allocate bandwidth and buffer space in the gateway, to ensure that all TCP flows threading the gateway achieve high end-to-end throughput and fair service. Our second contribution is to introduce the concept of buffer dimensioning to alleviate the inherent bias of the TCP algorithm towards connections with large Round Trip Time. In support of each of these contributions, we report on extensive simulation results. Our scheme outperforms other resource allocation schemes reported in the literature and in particular, demonstrates significant improvements in fairness to long RTT connections in the hybrid network framework.

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