

199. TO IMPROVE THE PERFORMANCE OF NETWORK LAYER IN DATA COMMUNICATION WITHOUT DELAYING TRANSMISSIONS

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A Packet losses in the network have a considerable performance impact on transport-layer throughput. For reliable data transfer, lost packets require retransmissions and thus cause very long delays. This tail of the packet delay distribution causes performance problems. There are several approaches to trading off networking resources up-front to reduce long delays for some packets (e.g., forward error correction, network coding). We propose packet pacing as an alternative that changes traffic characteristics favorably by adding intentional delay in packet transmissions. This intentional delay counters the principle of best effort but can reduce the burstiness of traffic and improve overall network operation – in particular in network with small packet buffers. As a result, pacing improves transport-layer performance, providing a tradeoff example where small amounts of additional delay can significantly increase connection bandwidth. We present a Queue Length Based Pacing (QLBP) algorithm that paces network traffic using a single queue and that can be implemented with small computational and memory overhead. We present a detailed analysis on delay bounds and the quantitative impact of QLBP pacing on network traffic. Through simulation, we show how the proposed pacing technique can improve connection throughput in small-buffer networks.

Key words— Network layer, traffic pacing, small-buffer net-work.

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