A Rate-Based Congestion Control Framework for Connectionless Packet-Switched Networks

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Certificate of Originality

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at UNSW or any other educational institution, except where due acknowledgment is made in the thesis. Any contribution made to the research by colleagues, with whom I have worked at UNSW or elsewhere, during my candidature, is fully acknowledged.

I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.

Warren Keith Toomey

Abstract

The control of congestion in connectionless packet-switched wide-area networks is a major problem, especially in such networks as the Internet, which is experiencing an exponential growth in users and network traffic. This thesis outlines a rate-based framework for congestion control in these networks, examines the requirements of the framework, and describes a number of control mechanisms which meet the framework's requirements.

The effectiveness of the framework in combatting congestion is demonstrated by a series of simulation experiments, which also compare the framework against traditional end-to-end congestion control mechanisms. Experimental results indicate that rate-based congestion control provides excellent congestion control. Moreover, a rate-based framework achieves much better congestion control in these networks than traditional control mechanisms.

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This thesis is set in Adobe Palatino, Computer Modern Typewriter and Computer Modern Math using LaTeX 2_ε and dvips version 5.58. Figures were drawn with xfig version 3.1.3, and converted to PostScript. Graphs were created with Gnuplot version 3.5 and converted through xfig to PostScript.

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