Efficient CAC Algorithms Based on the Tail Distribution of Aggregate Traffic

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To guarantee the quality of services of today's communication networks together with efficient resource utilization requires well designed traffic management algorithms. Such algorithm is the call admission control (CAC), which makes decision about the acceptance of newcomer flows to a communication link. The operation of CAC algorithms often based on only very limited knowledge on the traffic for two main reasons: Firstly, the acceptance decision requires information on the newcomer flow in advance which is especially difficult e.g. in the case of interactive services. Secondly, even when the real characteristics of a source theoretically was available, in would be too complex (computationally expensive and time consuming) to determine or to utilize either. Characterizing the traffic is getting worse in the case of the sum of many traffic sources (or getting simpler?). This paper deals with performance measures for aggregate stream traffic which can be used for admission control. We consider traffic as fluids flowing into the link as pipes, and we assume that the emission rates of sources can be described by stationary rate processes. The widely-accepted and well-understood rate envelope (bufferless) multiplexing scheme is adopted for the traffic aggregation. This approach can provide low delay and delay jitter while the analysis of loss performance remains tractable.

In the paper, after introducing the tail distribution of aggregate traffic, making use of the well known Chernoff bounding method, we present techniques to estimate (upperbound) it, and use it in designing good performance measures for CAC. From the previous results we derive several simpler (thus less accurate) estimations. After the comparison of these techniques, their advantageous properties are also performed and conclusions are drawn in connection with their usefulness.