A New active queue management based on the prediction of the packet arrival rate

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Abstract

In this paper,we predict the change in the packet arrival rate at the link through the analysis of the network congestion control mechanism. An appropriate expression for dropping probability is derived based on this prediction to stabilize the queue length to the desired value. Its analysis of the stability is also carried out, and the necessary and sufficient condition for the system to be stable is presented

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1 Introduction

With the growth of computer networks,excessive request for the limited network resources results in more and more serious congestion. Network congestion avoidance and control [1] gathers increasing attention in the past three decades. Transmission Control Protocol (TCP) and Active Queue Management (AQM) are the effective congestion control mechanisms at the end hosts and links,respectively.
In this paper,the prediction of packet arrival rate is derived from the analysis of the network congestion control mechanism. A new AQM algorithm named as Straightforward AQM ($SFAQM$) is proposed based on such a prediction.

2 Prediction of the change of packet arrival rate

Consider a system where there is a single congested router with a transmission capacity of C. Let N TCP flows(compliant with protocol of TCP Reno)traverse the router,labeled $i = 1, \ldots, N$$W_i(t)$, $V_i(t)$ and $R_i(t)$ denote the congestion window size,packets ending rate and Round Trip Time(RTT)of flow $TCP_i(i = 1, \ldots, N)$ at time $t > 0$, respectively.Let $\lambda(t)$ denote the packets arrival rate at the router at time $t > 0$, then

$$V_i(t) = W_i(t)/R_i(t), \tag{1}$$

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