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基于队列的模糊拥塞控制算法

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Abstract
Internet applications are developed rapidly. It is increasingly important for router itself to improve the ability to deal with networking congestion. Traditional Poisson model is unfit for Internet networks with burst flow. But self-similarity model suitable for Internet networks has not been used widely in practice because of its complex model and complicated calculation. By describing the practical buffer performance in routers, a new fuzzy congestion control model based on queues and a congestion control algorithm based on the model are presented. In the algorithm, all kinds of packets are firstly classified into queues according to their own priorities. Then the buffer state is divided into three phases, including normal, congestion avoidance, and congestion according to their buffer usage ratio. The three phases are crossover each other because of their fuzziness. Then by combining the whole congestion control, with the part congestion control, the fuzzy algorithm is carried out. Theoretical analysis and NS stimulation results show that the proposed algorithm has better networking performance in the fairness of all connections, compared with the traditional schemes, especially keeping from being affected by the connections with congestion. It really improves the routers' ability to deal with network congestion.

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摘要
传统的Poisson统计流量模型对于以突发性流量为基本特征的Internet网络不再适应,而采用更加接近Internet网络流量特征的自相似模型,会具有复杂的建模过程和繁杂的计算.为此,从数据缓冲区占用情况的实时状态出发,运用模糊理论对缓冲区占用率状态这一模糊性问题进行描述,建立起模糊拥塞控制模型,并实现了对拥塞的模糊控制.它对所有到达的数据流按照一定的优先级进行分类,并把全局性缓冲区和各队列的局部性缓冲区按照正常、拥塞避免和拥塞的规则划分为3个具有交叉过渡域的几个阶段,然后采用整体和局部相结合的拥塞控制方法,实现了队列调度过程中的模糊性处理.理论分析和NS实验仿真结果表明,该算法在保证各连接服务的公平性方面,特别是在保护和隔离非拥塞状态的连接上,取得了比传统方法更好的效果,从而更好地改进了路由器或者交换机的拥塞控制性能.

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