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A Study of Adaptive Rate Algorithm in ATM Network Flow Control

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Abstract

In this paper we present a flow control algorithm designed to improve the performance of ATM network and to gain higher throughput by guaranteeing negotiated cell loss ratio (CLR) for all cell streams passing through the usage parameter control (UPC). In particular, the cases in which a Tahoe, Reno, New Reno, and SACK schemes are applicable in peak-cell-rate (PCR) are discussed. The proposed algorithm improves the performance by adjusting the growth and the declination of window size, rather than using advertised window per se, by means of incoming traffic rate, number of cell drop, current window size and cell delay time. Several simulations are performed to study how different kinds of flow control algorithm behave when congestion existed and compared to our proposed algorithm. By varying advertised windows size in each algorithm, we can obtain the impressive results that support our algorithm.

Keywords: *Flow control algorithm, cell loss ratio (CLR), usage parameter control (UPC) Tahoe, Reno, New Reno, SACK, sliding window.*

Introduction

The Asynchronous Transfer Mode (ATM) can provide a variety of services using a unified interface and architecture. In ATM networks, information is segmented into fixed-sized blocked called cells and the necessary number of cells is transmitted for the amount of information in the network. Therefore, the traffic control methods (Allman, *et al.* 1999) used in other existing transfer modes is not applicable to ATM networks.

The principle of ATM traffic flow control should be simple. At connection setup, the user specifies both Quality of Service (QoS) requirements and, using a source traffic descriptor (Shioda and Saito 1997), the anticipated traffic characteristic of the connection. Network resources for the connection are assigned on the basis of the source traffic descriptor values and the QoS requirements. If there are not enough network resources, the connection is rejected. If the characteristics do not conform with the source traffic descriptor specified at the connection set up by monitoring the cell stream from the connection. If the characteristics do not conform, a penalty is imposed on the connection, e.g. some cells from the connection may be discarded.

To simplify traffic flow control specification base on best QoS requirements and monitoring by the network, the traffic descriptors are required to be observable and easily checked through some algorithm mechanisms. In this sense, the specification of, and the resources allocation based on, the best traffic pattern have recently become a key issue for ATM traffic control.

There are many previous studies consideration in flow control algorithms (Pakdeepinit and Jittawiriyanukoon 2002); the behavior of each flow control schemes (Rathgeb 1001) with varying advertised windows sizes is not mentioned as well. In this paper, we proposed an algorithm that improves the performance of ATM network by adjusting the growth and declination of flow control