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Performance Comparison of ATM Policing Mechanisms with Telecommunications Traffic

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Abstract

Asynchronous transfer mode (ATM) is considered a leading technology for transporting multimedia (including voice, video, and data) over wide area networks. One of the most challenging problems to solve prior to the deployment of ATM networks is traffic management and congestion control. ATM can employ traffic policing or usage parameter control (UPC) to monitor and enforce connection's traffic descriptor. When an arriving cell violates its connection's contract, a network policer either discards the 'non-conforming' cell or marks it as a low priority class cell. This prevents heavily loaded connections from compromising the performance of other connections, and significantly improves the network's ability to predict and guarantee each connection's quality of service.

This paper focuses on evaluating and comparing the performance of several traffic policing mechanisms including leaky bucket (LB), jumping window (JW), triggering jumping window (TJW). The proposed mechanism, 'variable rate token (VRT)' has also been compared by varying the token size and token rate correlation with particular telecommunications traffic.

Keywords: Asynchronous transfer mode (ATM,) traffic policing, usage parameter control (UPC), leaky bucket (LB), jumping window (JW), triggering jumping window (TJW), variable rate token (VRT), network policer, non-conforming cell.

Introduction

In broadband-ISDN, the term 'traffic control' and 'congestion control' describe different aspects of asynchronous transfer mode (ATM) operations. Congestion is defined as "a condition that exists at the ATM layer in the network elements (NEs) such as switches, transmission links, or cross connection where the network is not able to meet a stated and negotiated performance objective". In contrast, traffic control defines a set of actions taken by the network to avoid congestion; traffic control takes measures to adapt to unpredictable fluctuations in traffic flows and the other problems within the network.

According to Black (1995), to meet the objective of traffic control and congestion control, the ATM network must:

- Perform a set of actions called connection admission control (CAC) during a call setup to determine if a user connection will be accepted or rejected. These actions may include acquiring routes for the connection.
- Establish controls to monitor and regulate traffic at the user network interface (UNI); these actions are called usage parameter control (UPC) or traffic policing.
- Accept user input to establish priorities for different types of traffic, through the use of the cell loss priority (CLP) bit.

This paper focuses on the UPC or traffic policing in order to control cell stream during an entire active phase of the call, and restricts a