



Review paper on Analysis and Design of Proactive Active Queue Management Techniques with MATLAB Simulator on Various Performance Metrics

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ABSTRACT: Network congestion can seriously degrade the quality of services delivered to end users. Though a congestion control mechanism is conventionally implemented in end to-end systems to keep the core network flexible and simple, researchers are seeking other possibilities to effectively control congestion. The rapid development in hardware technology means that intermediate nodes, such as routers, gateways and switches are now powerful enough to handle extra tasks such as congestion control. Active Queue Management (AQM) controls congestion by handling incoming packets based on the status of the queue in an intermediate node. Random Early Detection (RED) is regarded as the first practical AQM scheme and has been recommended by IETF for deployment on the Internet. It can reduce end-to-end delay and prevent consecutive packet drops which usually results in oscillation in link utilization and TCP (Transport Control Protocol) global synchronization. Most AQM methods utilize Explicit Congestion Notification (ECN) to further improve the performance of control. In addition, Self Configuring Random (Adaptive) Early Detection (ARED), one emerging variants of RED. They all perform well in terms of queuing delay, packet drop rate and link utilization. These three performance indices are also known as network-centric (or router-based) metrics. However, a user is more interested in the end-to-end behavior of a network service such as end-to-end delay and packet loss ratio.



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1. INTRODUCTION

In Internet routers, active queue management (AQM) is the intelligent drop of network packets inside a buffer associated with a network interface controller (NIC), when that buffer becomes full or gets close to becoming full, often with the larger goal of reducing network congestion. This task is performed by the network scheduler, which for this purpose uses various algorithms such as random early detection (RED), Explicit Congestion Notification (ECN), or controlled delay (CoDel). RFC 7567 recommends active queue management as a best practice. An Internet router

typically maintains a set of queues, one per interface, that hold packets scheduled to go out on that interface. Historically, such queues use a *drop-tail* discipline: a packet is put onto the queue if the queue is shorter than its maximum size (measured in packets or in bytes), and dropped otherwise.

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