# Chapter1

# INTRODUCTION

Today's Internet is moving toward providing quality capable service to increase traffic volume with multiple traffic types such as file transfer protocol (FTP), e-mail, Hypertext Transfer Protocol (HTTP), video, voice, etc. Each different traffic type requires its corresponding QoS. For example, interactive video requires low delay or jitter transmission, while FTP cares about packets loss. To achieve these goals, the Internet Engineer Task Force (IETF) recommended the deployment of active queue management in an Internet router. Today, several models of the Internet router with active queue management capable are commercially available.

Queue management is defined as the algorithms that manage the length of packet queues by dropping packets when necessary or appropriate. From the point of dropping packets, queue management can be classified into two categories. The first category is passive queue management (PQM) which does not employ preventive packet drop before the router buffer gets full or reach a specified value. The second category is active queue management (AQM) which employs preventive packet drop before the router buffer gets full. Passive queue management (for example, tail drop) is currently widely deployed in Internet routers. It has been found to introduce several problems (for example global synchronization) in the Internet.TCP global synchronization in computer networks can happen to TCP/IP flows during periods of congestion because each sender will reduce their transmission rate at the same time when packet loss occurs. Active queue management is expected to eliminate global synchronization and improve QoS of networks. The expected advantages of active queue management are increase in throughput and reduced delay. RED, an active queue management scheme, has been recommended by the Internet Engineering Task Force (IETF) as a default active queue management scheme for next generation networks. The original RED algorithm has a number of problems that led to the development of several variants of RED, which have improved the performance of RED.

## 1.1 Thesis Goal

The main goals of this thesis are:

1) Describe our approaches for performance evaluation for active queue management with OPNET.
2) Measure performance for our proposed AQM scheme with RED.

Today’s Internet only provides best effort service and traffic is processed as quickly as possible, but there is no guarantee for thetimely delivery of data. So, the ability to provide flow based quality of service (QoS) support has become very important for the design ofmodern switches and routers. With the development of the Internet network in recent years, a variety of novel Internet multimediaapplications, such as voice over IP (VoIP) and videoconferencing, have been developed, which usually have different quality of servicerequirements. Priority Queuing (PQ) and Modified Weighted Round Robin (MWRR)

Queuing have been proposed, because of their betterperformance for real-time applications traffic.

With increasing real-time application traffic, providing QoS for the network must be considered. So, QoS for reliable and secure communication between users and between different service classes is used. Classes of service on the Internet network should have different priorities because in application such as Email, FTP and HTTP the delay parameter is not important while in the real-time applications such as voice and videoconferencing, delay of several milliseconds would be effective to network performance.

To solve this problem, management queuing of traffic in router is used. Various mechanisms for implementing scheduling disciplines in the network router such as, First in First out (FIFO), Priority Queue (PQ), Custom Queue (CQ) and Weighted Fair Queuing (WFQ) have been introduced.

The motivation of this work is to explore the issues involved in congestion control routers as existing traffic manager mechanisms in high speed networks, and also implementing a higher performance traffic manager using Random Early Detection (RED) mechanism. We compare different congestion control mechanism in high speed gateways in terms of efficiency and throughput. After this analysis we have chosen the RED.

## 1.2 Thesis Organization

Chapter 1 (INTRODUCTION)

This chapter discusses introduction of the thesis and some information about different queuing mechanisms, QoS, RED algorithm and the main goals of this thesis.

Chapter 2 (QUEUING MECHANISM)

This chapter provides an overview aboutFirst-In First-Out (FIFO), Priority Queuing (PQ), Fair Queuing (FQ), Weighted Fair Queuing (WFQ), Custom Queuing (CQ), and Deficit Weighted Round Robin (DWRR) mechanisms.

Chapter 3 (QUALITY OF SERVICE)

This chapter discusses the QoS that introduces intelligent management techniques to avoid delay and packets loss for sensitive traffic in the event of network congestion. Then, the components and tools of QoS that used for congestion avoidance are discussed.

Chapter 4 (RANDOM EARLY DETECTION)

This chapter gives brief introduction for different techniques used for congestion avoidance such as Drop Tail (DT), Random Drop (RD), Early Random Drop (ERD), Random Early Detection (RED), and Weighted Random Early Detection (WRED).Then RED algorithm is discussed in detail .

## Chapter 5 (IMPLEMENTATION AND SIMULATION)

In This chapter, the effect of RED algorithm on different queuing mechanics performance isshown by simulation using “Opnet IT Guru” simulator. The performance is measured by delay and packet loss for each queuing mechanism.

## Chapter 6 (CONCLUSIONS and future)

This chapter summarizes the thesis, discusses its findings and contributions, points out, limitations of the current work, outlines directions for future research,and alsothe importance of RED on each queuing mechanism.However, still many extensions of this research deserve further consideration.