RATE ADAPTATION FOR AVOIDING CONGESTION IN THE USE

OF MULTIMEDIA OVER USER DATAGRAM PROTOCOL

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ABSTRACT

Multimedia applications have increased rapidly in the Internet today. However, multimedia communication suffers from bandwidth requirements problem. Therefore, it is important to optimize the network bandwidth utilization. Optimizing the network bandwidth utilization allows increasing the number of users who use multimedia applications that require guaranteed quality of service. The user experiences the performance during using the network service, which is the important factor to determine the users' satisfaction. With the limitation of the network bandwidth, multimedia traffic can cause congestion which degrades the performance experienced by the network users. Therefore, there is an essential need to reduce the occurrence of congestion situations in a network to optimize the utilization of network resources to provide the network users with suitable performance. For most of multimedia applications, UDP is used as transport protocol. Current UDP implementation helps in increasing the traffic as it does not have flow or congestion control mechanisms. Congestion can be avoided when the traffic arrival rate to a gateway maintained close to the outgoing link capacities and the gateways' queue lengths kept small to guarantee the availability of buffer capacity for successful buffering and consequent forwarding of temporary traffic upsurges which could otherwise cause buffer overflows and packet loss. Congestion management is the combined responsibility of network gateways and end-point hosts. Gateways are invested with the ability to delay or drop the packets inside the network. Gateways are responsible for congestion detection & notification delivery, queue's traffic arrival rate control, and queue length control. Traffic sources are responsible for the adjustment of their data transmission rates to enable the gateways to achieve their goals. Building a new responsive multimedia application and protocol, based on the UDP concept, can decrease the congestion occurrence and enhance the performance of the network, especially in the real-time environment.

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CHAPTER ONE

INTRODUCTION

This project is about improving the performance of the network that utilizes the User Datagram Protocol (UDP), as a transport layer protocol, to carry the multimedia traffic. It presents the adjustment that help in avoiding congestion problem caused by bursty multimedia traffic over the Internet where the bandwidth is limited. The goal of this chapter is to place the project in its context. This chapter provides an introduction to multimedia traffic and the protocols used to transfer such traffic in Sections 1.1 and 1.2, respectively. Section 1.3 discusses the multimedia transmission issues. The research problem is presented in Sections 1.4. Sections 1.5, 1.6, and 1.7 of this chapter, respectively, include the research questions, research scope, and objectives of the research presented in this project. The importance of the work done in this project is stated in Section 1.8 while the project organization is presented in Section 1.9 of this chapter.

1.1 MULTIMEDIA APPLICATIONS

As the number of multimedia applications increased rapidly in the Internet today, which require guaranteed quality of services (Aldo, Marco, David, Rene, & Gerardo, 2006), the need for optimizing the network has become an essential.

The variance of multimedia applications on the Internet has led to different types of multimedia traffic (Thomas et al., 2009). Multimedia applications such as video conferencing, IP telephony, and audio and video streaming are bursty in nature. This

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