Enhanced Compression Scheme for High Latency Networks to Improve Quality of Service of Real-Time Applications

Ling Sun Tan[1]
*Faculty of Computer Science &
Information Technology,
University Malaysia Sarawak,
94300 Kota Samarahan,
Sarawak, Malaysia*
swy41@yahoo.co.uk[1]

Sei Ping Lau[2]
*Faculty of Computer Science &
Information Technology,
University Malaysia Sarawak,
94300 Kota Samarahan,
Sarawak, Malaysia*
splau@fit.unimas.my[2]

Chong Eng Tan[3]
*Faculty of Computer Science &
Information Technology,
University Malaysia Sarawak,
94300 Kota Samarahan,
Sarawak, Malaysia*
cetan@fit.unimas.my[3]

ABSTRACT - High latency network is increasingly important in today's telecommunication world. It is widely used for real-time interactive multimedia applications such as video, music, data and graphic files exchange. One example of this network is the satellite communication technology. Unfortunately, the high latency satellite network provides limited network bandwidth and introduces high network latency issues. Network congestion and late packet delivery problems have posted serious threats to the network performance, especially when the bandwidth is shared among multiple concurrent users. These issues have created some negative impacts on the Quality-of-Service (QoS) of real-time applications and also user experiences. In this paper, a real-time compression scheme is proposed to improve the performance of high latency networks with limited bandwidth. The aim of this scheme is to reduce the network packet overhead by eliminating redundancies in the packet to achieve reduction in packet size and hence, increasing the effective bandwidth usage and allowing more packets to be transmitted over the link at any one time.

Keywords – High latency network, packet compression, bandwidth

I. INTRODUCTION

Undeniably, high latency networks especially satellite VSAT networks play a crucial role in bridging the digital divide in recent years. For most of the places, especially the rural areas, satellite technology is still one of the popular means to connect to the outside world. It is one of the easiest deployment technology and cost effective way to interconnect two networks, when other wired technologies are practically impossible and unsuitable due to geographical distance or accessibility. Such technology has been widely used for real-time interactive multimedia applications such as inter country long distance telephony services and military communication, television and radio broadcasting, teleconferencing, video conferencing, global positioning, weather forecasting and satellite internet services.

However, due to the advancement of multimedia technology and endless growth of users and multimedia applications, the network traffic is explosively increasing. A tremendous growth in large scale information transfer by remote computing can be witnessed and there has been profound increase in the amount of global information and information distribution on high latency network. Substantial bandwidth is needed to support network applications especially real-time interactive applications. Unfortunately, high latency network provides limited network bandwidth and high delay resulting in network congestion, reduced Quality of Service of real-time interactive multimedia applications and also late packet delivery issues. Therefore, apart from the need for efficient mechanisms for storage and transfer of enormous volume of data, these also lead to insatiable demands for ever-greater bandwidth in high latency network.

One of the well-known approaches to provide effective bandwidth usage and network traffic reduction is data compression. In order to control or to manage the operating cost of high latency networks, deploying compression is necessary to fully optimize the use of existing links. In bandwidth limited high latency networks, data compression helps to increase the amount of effective bandwidth available to an application by eliminating redundancies in the packet, resulting in significant reduction in packet size and packet required bandwidth, smaller amount of packet drops and packet retransmissions. This allows more packets to be transmitted over the communication link at any one time, hence avoiding network contention issues and long propagation delays, which in turns improving the interactive