A Measurement Study on Video Acceleration Service

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***Abstract*—Recent advancement in multimedia and network has enabled the development of video accelerator for video sharing website where users can upload, view and share video clips (e.g. YouTube) to achieve better user experience. Several applications have already been developed. The paper examines these technical issues. The benefits of these techniques are discussed. Also the performances of these applications are evaluated by analyzing the network traffic.**

I. Introduction

Recent technical improvement has made the deployment of video accelerator possible, which can accelerate the speed of watching video from video sharing website. Because of limited network bandwidth, a peer may need a long time to buffer before watching a video. If the size of video being watched is large and network gets congested, buffering may stop before the entire video is buffered. Also if a video is so popular that it is watched several times on the same computer, the video will need to be buffered multiple times, which leads to resource wasting. Video accelerator is designed to attack these problems. Many techniques are used in video accelerator. For example, download session resuming and caching technology enable a user to enjoy a video many times on a local computer without downloading multiple times. Peer to Peer technology enables video downloading among peers which may greatly accelerate buffering speed and could partially solve the problem of network bottleneck [1]–[3]. Studying this kind of application offers us an entry to earn insight over the user information about today's video services, e.g., popularity of video files and user population, etc. Also by examining various techniques utilized by these services, we can infer how much improvement space is there for today's video service.

II. Performance of video accelerator

We study the techniques used in video accelerators by analyzing data sent and received by accelerators. Comparing study is conducted to study the downloading performance with and without video accelerators. Tudou.com [4] (a video sharing website in China) is chosen as our test website instead of YouTube [5] because currently no accelerator is designed specially for YouTube. We use an accelerator named PP Accelerator in our test. PP Accelerator [6] is widely used in China and is famous for its stability and popularity. In this section, we first briefly introduce some video accelerators. Then we present the performance of PP Accelerator in terms of payload saving and time saving.

This work was supported by NSF award 0643488, Vanderbilt Discovery grant, and a gift from Microsoft Research. Views and conclusions of this paper are those of authors, which should not be interpreted as representing the official policies, either expressed or implied, of the funding agencies.

Video Accelerator Accelerator	Downloads Resumeing	P2P	Save Video	Supported Websites
PP Accelerator	Yes	Yes	Yes	Most
Tudou Accelerator	Yes	Yes	Yes	A Few
SpeedBit	Yes	No	No	Most

TABLE I
Comparison of Video Accelerators

A. Some Video Accelerators

Payload saving and time saving are two major metrics to measure performance of a video accelerator. There are several kinds of video accelerators that can be found on Internet. The comparison of different video accelerators is summarized in Tab. I.

PP Accelerator: PP Accelerator and PPlive (the most popular peer to peer television software in China) are developed by the same company. PP Accelerator is based on P2P and uses UDP to transmit data between peers. It has the largest number of users and the most extensive coverage in Internet.

Tudou Accelerator [7]: Tudou Accelerator is developed by the Tudou video sharing website. It is based on P2P and uses TCP to share video data. It performs well when watching video from Tudou video sharing website. But it can only support video acceleration for a few video sharing websites and can hardly find peers when watching videos from other websites.

SpeedBit Video Accelerator [8]: SpeedBit doesn't support P2P technology. When watching an unpopular video from a website, in which case no peer can be found for sharing data with, its download speed is higher than other accelerators mentioned previously. Unfortunately it does not support user configuration of which directory the download video will be stored. Thus users can not get the video file after watching

Popularity	Video Links
Popular1	http://www.tudou.com/programs/view/96Y1dDhEgRk
Popular2	http://www.tudou.com/programs/view/6pReawB3sNg
Popular3	http://www.tudou.com/programs/view/wwruInmOyIs
Unpopular1	http://www.youtube.com/watch?v=QozzYxegaOc
Unpopular2	http://www.tudou.com/programs/view/cjUVO9UpnyU

TABLE II
VIDEO LINKS (COLLECTED FROM SEPTEMBER 18TH TO SEPTEMBER 19TH)

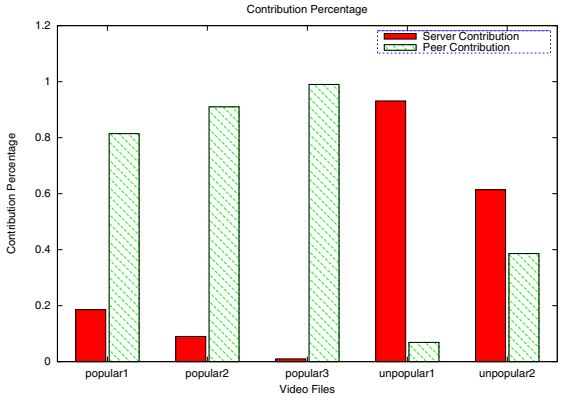

Fig. 1. Peer Contribution

it and need to buffer again when he or she wants to see the video for the second time.

B. Payload Saving

To measure payload saved when using PP Accelerator, we record the original data amount transmitted from the server without using accelerator. Then accelerator is run and data transmitted by the server and all other peers are recorded while watching the video. When accelerator is used, a peer can get data from its peers instead of the website server. We get samples for three popular and two unpopular videos of different lengths and these samples show that for a popular video, the accelerator may save up to 90% payload, which could significantly reduce the resource required for server bandwidth as well as computation capability. The video links for our tests are shown in Tab. II. The results are shown in Fig. 1

C. Time Saving

To measure the time saved by using accelerator, we record the data transmitting time with and without accelerator. We can see from Fig. 2 that for un-popular videos (only one user watches these videos), the buffering time is also reduced. In this case, download session resuming and caching help increase the buffering speed. While for popular videos, buffering time is shorter than that of un-popular videos. The reason is that a P2P system works better when there are more peers sharing data in the system.

III. CONCLUSION

This paper describe a new kind of application called video accelerator which can accelerate the downloading speed when

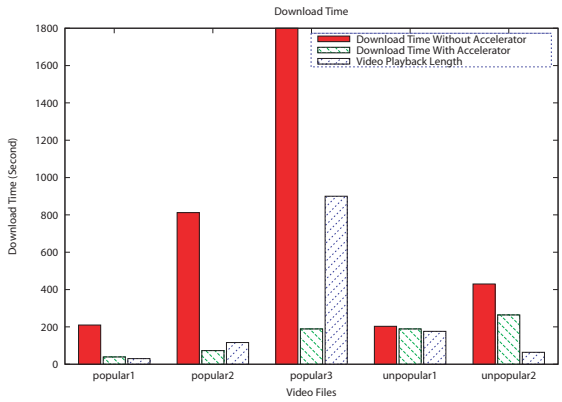

Fig. 2. Download Time

watching videos from websites. This paper also studies the technologies used in a video accelerator and analyzes their benefits and properties. Our experiments show that PP accelerator can significantly reduce server load and the time required to buffer videos. This paper only marks the beginning of our study. Through more trace collection and simulation, the relations between time saving, payload reducing, video length and popularity of a video can be clarified.

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