Volume 4, Issue 6, June 2014 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Adaptive and Efficient Video Sharing and Streaming in Cloud Environment

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Abstract- During the last two decades Internet streaming has experienced a dramatic growth and transformation from an early concept into a mainstream technology. As demand for videos is increased, video traffic over mobile networks have been increasing rapidly, so the wireless link capacity cannot keep up with the traffic demand. The gap between the traffic demand and the link capacity, along with time-varying link conditions, results in poor service quality of video streaming over mobile networks such as long buffering time and sporadic disruptions. The buffer time of the video over mobile devices which moves from place to place affects the smooth streaming and also sharing of video from one user to another user over social media. This paper shows the functioning of various methods and architecture which are used in cloud to provide effective solution for providing better service to the users. AMES is cloud architecture built specially to provide video service to the user. It provides an optimal solution, proposing with video cloud, which collects the video from video service providers and providing the reliable service to the user.

Key words- Adaptive Video Streaming, Mobile Networks, AMES, TFRC, Social Video Sharing

I. INTRODUCTION

Cloud computing era reigns with advancements in technology, that provides various services to the human's need and also it urges the more necessity for the emerging technology. It provides a platform for other advanced technologies like big data, mobile computing to inculcate its service and provide the QoS to the customers. All the services that are provided to the customer are done using could as their backbone, it gives vast amount of resources and infrastructure to consumer who acts as vendors to small scale business and cloud could provide services to fully fledged organization with less cost. Organizing the service and extending the service depending upon the growing needs of the customer could be achieved

The usage of data has grown to very large extent in recent years. The studies shows us that, amount of data generate over the last decade is three times lesser than the amount of data generated in last one year. In early days we cannot store large amount of data, that problem is solved by introducing the hardware where limitation are not considered but the situation turns out that, if the hardware resources are not utilized effectively, maintain the resources becomes very serious problem. The data that is being used among the computing world has faced drastic change. These data occupies large amount of data, need very heavy processing powers. All the needed resources such as storage space and processing power are provided by the cloud and can be extended depending upon the service. The problem doesn't rise until these data are transferred on the internet. The data created on the host, should be sent to the cloud for storage, the problem of data transfer with these high ended multimedia data starts. In this paper we are focus on the videos, video – data. The processing and transferring of video to the service provider and between hosts became an issue.

Over the past decade, increasingly more traffic is accounted by video streaming and downloading. In particular, video streaming services over mobile networks have become prevalent over the past few years. While the video streaming is not so challenging in wired networks, mobile networks have been suffering from video traffic transmissions over scarce bandwidth of wireless links. Despite network operators desperate efforts to enhance the wireless link bandwidth (e.g., 3G and LTE), soaring video traffic demands from mobile users are rapidly overwhelming the wireless link capacity.

The main issues faced during the study of video streaming and sharing achieved in mobile users under cloud environment are high traffic rate, long buffering time, and disruption due to limited bandwidth. The study shows the usage of video or any kind of multimedia has increased over the period of years, many issues had occurred and resolved through various techniques during the traditional change happened between emerging technologies.

Recently there have been many studies on how to improve the service quality of mobile video streaming on two aspects:

- Scalability: Mobile video streaming services should support a wide spectrum of mobile devices; they have different video resolutions, different computing powers, different wireless links (like 3G and LTE) and so on. Also, the available link capacity of a mobile device may vary over time and space depending on its signal strength, other user's traffic in the same cell, and link condition variation. Storing multiple versions (with different bit rates) of the same video content may incur high overhead in terms of storage and communication. To address this issue, the Scalable Video Coding (SVC) technique of the H.264 AVC video compression standard defines a base layer (BL) with multiple enhance layers (ELs). These sub streams can be encoded by exploiting three scalability features: (i) spatial scalability by layering image resolution (screen pixels), (ii) temporal scalability by layering the frame rate, and (iii) quality scalability by layering the image compression. By the SVC, a video can be decoded/played at the lowest quality if only the BL is delivered. However, the more ELs can be delivered, the better quality of the video stream is achieved.

- Adaptability: Traditional video streaming techniques designed by considering relatively stable traffic links between servers and users perform poorly in mobile environments [2]. Thus the fluctuating wireless link status should be properly dealt with to provide 'tolerable" video streaming services. To address this issue, we have to adjust the video bit rate adapting to the currently time-varying available link bandwidth of each mobile user. Such adaptive streaming techniques can effectively reduce packet losses and bandwidth waste.

  Scalable video coding and adaptive streaming techniques can be jointly combined to accomplish effectively the best possible quality of video streaming services. That is, we can dynamically adjust the number of SVC layers depending on the current link status.

The rest of this paper is organized as follows: Section 2 describes video sharing and streaming methods, Section 3 discusses effective solution proposed for video streaming and sharing over mobile users. In Section 4, gives the comparative evaluation study on performance of various methods to the proposed solution, followed by conclusions in Section 5.

II. VIDEO SHARING AND STREAMING METHODS

Video Share:- is an IP Multimedia System (IMS) enabled service for mobile networks that allows users engaged in a circuit switch voice call to add a unidirectional video streaming session over the packet network during the voice call. Any of the parties on the voice call can initiate a video streaming session. There can be multiple video streaming sessions during a voice call, and each of these streaming sessions can be initiated by any of the parties on the voice call. The video source can either be the camera on the phone or a pre-recorded video clip.

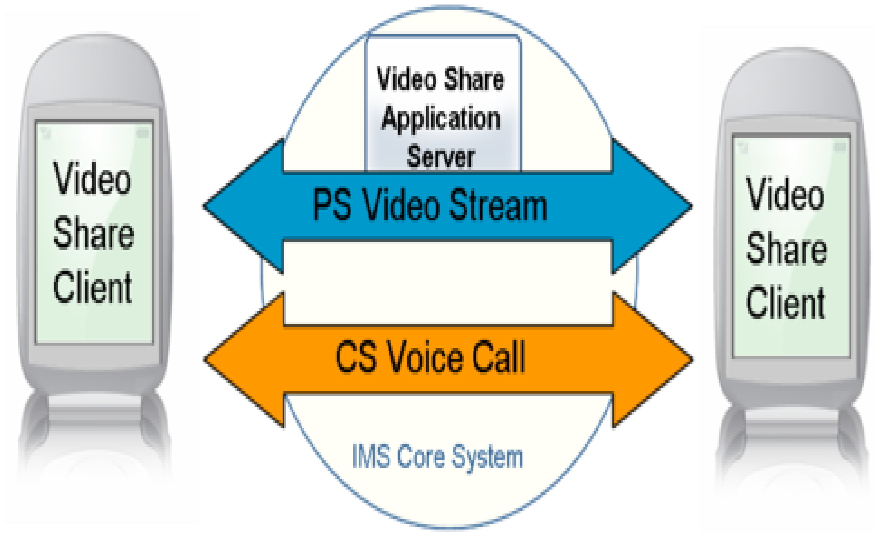

Fig1: video sharing and streaming

Video share is initiated from within a voice call. After a voice call is established, either party (calling or called) can start a Video Share (VS) session. The sending User is then able to stream one-way live or recorded video. The default behavior is that the receiving handset will automatically go to speakerphone mode when video is received, unless the headset is in place. The sender will be able to see what is being streamed on their handset, along with the receiving User. In this scenario, the sender can "narrate" over the CS audio connection while both parties view the video. Both users will have the ability initiate a video share session, and either the sender or recipient in a video share session can terminate the session at any time. As part of the VS invitation, the recipient can choose to reject the streamed video. It is intended that both sender and receiver will receive feedback when the other party terminates a session or the link drops due to lack of coverage.

The Video Share service is defined by the GSM Association (GSMA). It is often referred to as a Combinational Service, meaning that the service combines a circuit switch voice call with a packet switch multimedia session.

GSM Association has split the Video Share service definition into 2 distinct phases. The first phase (also called Phase 1) involves sharing a simple peer-to-peer, one-way video stream in conjunction with, but not synchronized to a circuit switch voice call. The second phase (also called Phase 2) introduces the Video Share Application Server in the solution and supports more complex features and capabilities, such as point-to-multipoint video share calls, video streaming to a web portal, and integration of video share with instant messaging.

III. ADAPTIVE AND EFFICIENT VIDEO STREAMING AND SHARING IN CLOUD

The figure 2 shows the architecture of the adaptive and efficient way of enhancing the video streaming and sharing of video to the mobile users. The architecture was constructed based on the video service provided in cloud called as AMES The architecture contains

A. Video service provider (VSP): the originated place of actual video data. It used the traditional video service provider. VSP can handle multiple request at the same time, while coming to the QoS with the mobile users , the VSP does not provide service up to the mark.

B. Video cloud (VC): the cloud step up has been established with many components working together , virtually to get the original video data from the VSP and provide the reliable service to the mobile user and it also provides availability of video and makes the sharing of those videos among the users much easier.

C. Video base (VB): Video base consists of the video data that are provided as the service to the mobile users in cloud.

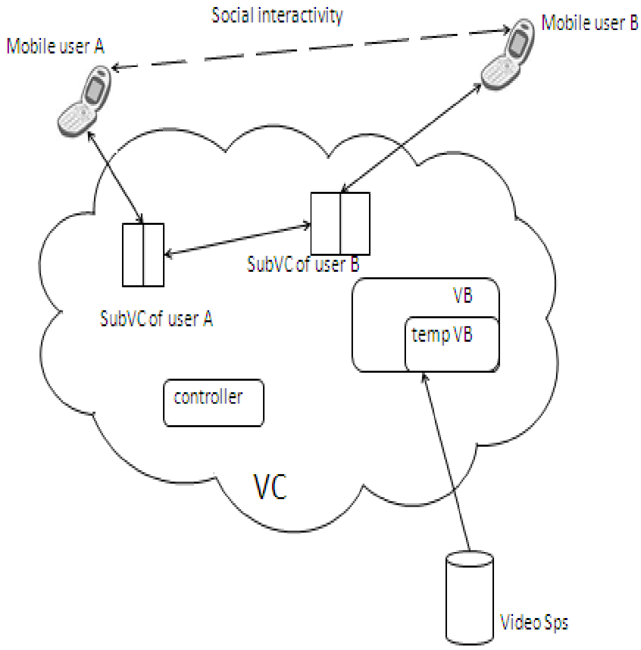

Fig2: VC architecture

***D.* Temp video base(TVB):** it contains the most recently accessed video data and it also contains most frequently accessed video data.

***E.* Vagent:** it is an agent created for every mobile user who requests for the video service to the video cloud.

***F.* Mobile users:** the users who are mobile and providing the availability of the service to their location is difficult.

The video cloud provides services under two main methodologies adaptive mobile video streaming and efficient mobile video sharing. The video streaming and video sharing plays the vital role in providing the reliable service to the customers. The rate in which frames of the videos are streams determines the quality and availability of the video service. Video data are most commonly shared among the users in the network. Mobile users are most commonly found to use social networking sites more offenly [6,7]. The mobile device and mobile computing provides them space to be connected on the social network. Multimedia data such as images and videos are shared among the friend and users of the social media. The request of the video and sharing of video are two main actions requested from customer. Video cloud provides platform to provide these two services in better way.

The video service provider (VSP) contains the raw video data; the videos available in VSP can be used to service the customer's request. But VSP does not have sufficient resource to provide QoS and better video sharing among mobile devices and users. The Video cloud(VC) contain video base (VB) which collect the requested videos from the VSP and keeps the copy of the video , so as the request for the videos can be services. The Temporary video base (TempVB) stores the link of the videos that are accessed more recently and frequently, the links provides faster access to the videos on the VB. The controller plays the important role of managing the working and coordination of all the components on the video cloud and mobile users [2,7,10]. For every mobile user who comes for the service in cloud, one agent is created ―Vagent. This video agent is responsible for processing the user's request and delivery the servers' response to the user. The requested videos link will be saved in vagent for retransmission and for services if the same videos are requested again by the client. The Vagent can communicate among them for providing adaptive streaming of services. The video source or link available to one Vagent can be accessed and used by another Vagent. The mobile user can also communicate among them. The social interaction are carried out, the sharing of videos are also tracked and carried out through the Vagent of each user. Hence tracking of the video source availability and provides video to the requested user becomes easier. The video sharing in social media becomes efficient for video streaming.

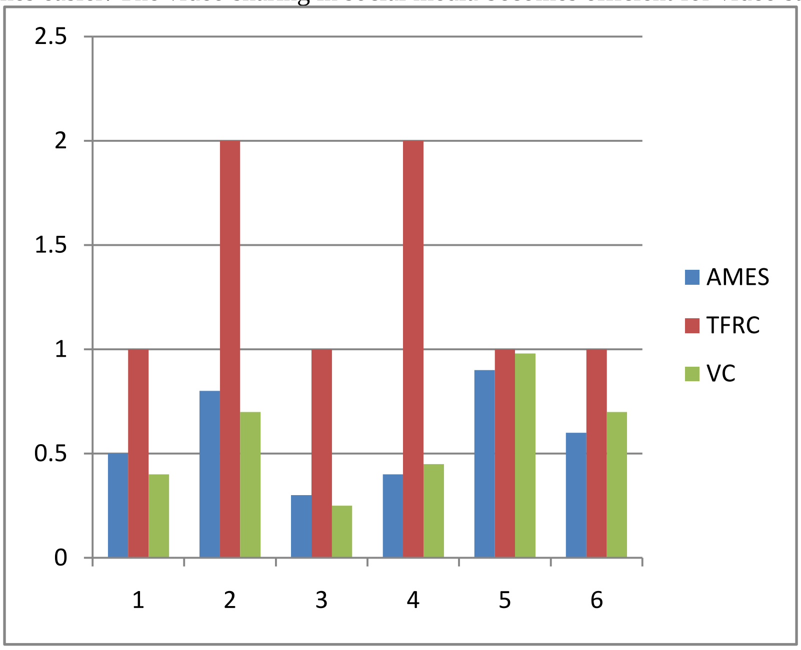

Fig 3: Comparison of Performance

The performance of video cloud is better than the previously used techniques. We consider the comparison of AMES Cloud and TFRC to our proposed method Video Cloud. The working of the AMES and VC are more equal and most of the extra loaded components which are found in AMES are reduced [5]. Vagents carry out most of the preprocessing of the video streaming sharing in media. Vagents also prefetch the requested video by the user from TempVB or VB for providing better services. TRFC does not provide any dedicated method to improved the service to the user, it tells how the transfer medium could be monitored and bandwidth level could be negotiated so as the data transfer can be achieved very efficiently [3,13] . The over comparison of the services provided based on bandwidth and buffer time is considered. Figure 3 show the graph of VC provides better result than AMES. the disruption due to low and varying bandwidth , the buffer time at the client side usually takes long time due to delay in perfecting of video from service provider, VC provides Vagent to minimize it comparatively.

IV. CONCLUSION

The cloud environment default provides adaptable and optimal infrastructure to any cloud user. The video service provider is added as one of the resource in video cloud. The cloud base and Vagents plays vital role in keep track of videos and updating the link so as to provide undisrupted service to the customer. It also provides better video sharing in social media, where the transmissions of videos are highly carried out. This paper gives the overview of the social video streaming and sharing used by various techniques and video cloud provides adaptive measure for video streaming using Vagent and also it provides video sharing among mobile users.

V. ACKNOWLEDGEMENT

There are some skilled personality's roles involved in this paper to achieve the goal. I show my honest thanks and appreciation to them who helped me lot. I would like to thank my R&D team members Prasad College of Engineering, Andhra Pradesh, India.

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