A Skelton of Efficient Public Video Sharing and Adaptive Mobile Video Streaming in Cloud Computing

D. Sravani, B. Vijaya Bhaskar Reddy

***Abstract*- Based on demands of overloading of video traffic over mobile networks which are been sourcing for the wireless network capacity which can be keep up with respect to the existing demand. We are facing long buffering time and intermittent disruptions. With this perspective of mind we are developing a new concept through cloud computing technology; Here by we are proposing a new mobile video streaming framework named *dubbed AMES-Cloud,* This skelton consists two main parts. They are named as follows *AMoV (adaptive mobile video streaming) and ESoV (efficient public video sharing)*. Both framework parts build a private agent to provide video streaming services efficiently for every mobile user. For a given user, AMoV lets her private agent adaptively adjust her streaming flow with a scalable video coding technique based on the feedback of link quality. Likewise, ESoV monitors the social network interactions among mobile users, and also their private agents try to deploy video content in advance. Here we are going to implement a prototype of the AMES-Cloud framework to demonstrate its performance, which shows that the private agents in the clouds can effectively provide the adaptive streaming and perform video sharing based on the social network analysis?**

***Index Terms*- Computing, Mobile Cloud Computing, Adaptive video streaming, , scalable video coding, Public video sharing**

I. INTRODUCTION

The cloud computing refers to the images of clouds that are representing networks and the Internet in most drawings. Basically, cloud computing data and applications available through the Internet. By doing this, data and applications can be accessed from everywhere. Cloud computing is not a new technology or a new device; it is a new way of using existing technology and devices. It is hard to find a clear definition of cloud computing definition by all the elements that are commonly associated with cloud computing (services, software or infrastructure) delivered via Internet technologies in a pay-per-use,self-service way" .With cloud computing it becomes easier to access data with several devices. Especially for mobile devices this can be really useful since the only thing that is needed, is an Internet connection.

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Fig 1: Cloud computing diagram

This figure shows different devices like notebooks, desktops, Smartphone, tablets, connected to the Internet. Storing data and running applications will be done servers and databases that are in such a way that they can be used by devices that are connected to the Internet .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.

Adaptability: Traditional video streaming techniques designed by considering relatively stable traffic links between servers and users perform poorly in mobile environments. Thus the fluctuating wireless link 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. The adaptive video streaming technique depending on adaptivity is controlled by the client or server. 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. i.e., we can dynamically adjust the number of SVC layers depending on the proposals seeking to jointly utilize the video scalability and adaptability rely on the active control on the server side. That is, every mobile user needs to individually report the transmission status (e.g., packet loss, delay and signal quality) periodically to the server, which predicts the available bandwidth for each user. Thus the problem is that the server should take over the substantial processing overhead, as the number of users increases. Cloud computing techniques are poised to flexibly provide scalable resources to content/service providers and process offloading to mobile users. Thus, cloud data centers can easily provision for large-scale real-time video services as investigated in. Several studies on mobile cloud computing technologies have proposed to generate personalized intelligent agents for servicing mobile users, e.g., Cloudlet and Stratus. This is because, in the cloud, multiple agent instances (or threads) can be maintained dynamically and efficiently depending on the time-varying user demands. Recently public network services (PNSs) have been increasingly popular. There have bee proposals to improve the quality of content delivery using PNSs. In PNSs, users may share, comment or re-post videos among friends and members in the same group, which implies a user may watch a video that her friends have recommended. Users in SNSs can also follow famous and popular users based on their interests (e.g., an official facebook or twitter account that shares the newest pop music videos), which is likely to be watched by its followers. It can be done by a background job supported by the agent (of a member) in the cloud; once the user clicks to agent for each mobile user in cloud computing environments, which is used by its two main parts: (i) AMoV (adaptive mobile video streaming), and EPoV (efficient public video sharing). AMoV offers the best possible streaming experiences by adaptively controlling the streaming bit rate depending on the fluctuation of the link quality. AMoV adjusts the bit rate for each user leveraging the scalable video coding. The private agent of a user keeps track of the feedback information on the link status. Private agents of users are dynamically initiated and optimized in the cloud computing platform. Also the real-time SVC coding is done on the cloud computing side efficiently.

Scalability: Video Streaming service must be compatible with multiple mobile devices having variousvideo resolutions, computing powers, wireless links and soon. Capturing multiple bit rates of same video may increase the burden on servers in terms of storage and sharing. To resolve this issue, the Scalable Video Coding (SVC) technique has been introduced. **Scalable Video Coding** (**SVC**) . AVC video compression standard. SVC standardizes the encoding of a high-quality video bit stream that also contains one or more subset bit streams. A subset video bit stream is derived by dropping packets from the larger video to reduce the bandwidth required for the subset bit stream. A subset bit stream can represent a lower spatial resolution, or a lower temporal resolution, or lower quality video signal (each separately or incombination) compared to the bit stream it is derived from. The following modalities are possible:

- Temporal (frame rate) scalability: The motion compensation dependencies are structured so that complete pictures (i.e. their associated packets) can be dropped from the bit stream.
- Spatial (picture size) scalability: Video is coded at multiple spatial resolutions. The data and decoded samples of lower resolutions can be used to predict data or samples of higher resolutions in order to reduce the bit rate to code the higher resolutions.
- SNR/Quality/Fidelity scalability: Video is coded at a single spatial resolution but at different qualities. The data and decoded samples of lower qualities can be used to predict data or samples of higher qualities in order to reduce the bit rate to code the higher qualities.
- Combined scalability: A combination of the 3 scalability modalities described above

II. RELATED WORK

A. Adaptive video Streaming Techniques

In the adaptive streaming, the video traffic rate is adjusted on the fly so that a user can experience the maximum possible video quality based on his or her link's time-varying bandwidth capacity [11]. There are mainly two types of adaptive streaming techniques, depending on whether the adaptivity is controlled by the client or the server. The Microsoft's Smooth Streaming is a live adaptive streaming service which can switch among different bit rate segments encoded with configurable bit rates and video resolutions at servers, while clients dynamically request videos based on local monitoring of link quality. Adobe and Apple also developed client-side HTTP adaptive live streaming solutions.

B. Mobile Cloud Computing Techniques

The cloud computing has been well positioned to provide video streaming services, especially in the wired Internet because of its scalability and capability[12]. For example, the quality-assured bandwidth auto-scaling for VoD streaming based on the cloud computing is proposed , and the CALMS framework is a cloud-assisted live media streaming service for globally distributed users. However, extending the cloud computing-based services to mobile environments requires more factors to consider: wireless link dynamics, user mobility, the limited capability of mobile devices [14] [15]. More recently, new designs for users on top of mobile cloud computing environments are proposed, which virtualize private agents that are in charge of satisfying the requirements (e.g.QoS) of individual users such as Cloudlets [16] and Stratus [17]. The Video usage and images plays a vital role in communication. The usage of traditional networking and service providers lacks to provide the quality centered and reliable service to the mobile users concerning with the media data. The problems that leads to the poor services from the service providers would be low bandwidth which affects the efficient transfer of video to the user, the disruption of video streaming also occurs due to the low bandwidth. 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. Our survey shows the functioning of various methods and architecture which used 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. The study has came up with a optimal solution, proposing with video cloud, which collects the video from video service providers and providing the reliable service to the user[1].The network providers youtube provide video downloads but it provides some delays due to network dynamicsso this technique is used to remove jitters and provide video on demand[3].

cloud centered streaming solutions for different mobile which shows my realistic work relevant to streaming methods with RTMP protocols family and solutions for iPhone, Android, Smart mobile phones, Window and BalackBerry phones etc[8].

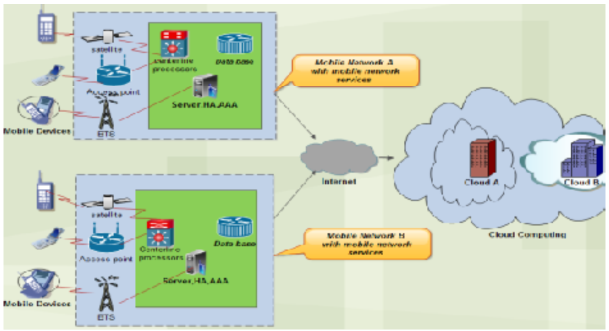


Fig 2: Mobile Cloud Computing Architecture

III. OVERALL ARCHITECTURE

Overall Working Video Cloud is a cloud storage in cloud environment and VC have a database called VB (Video Base).The user in our system the user are registered the request is passed to the server program in VC. All users can communicate with the server via a social network , called SubVC (Sub Video Cloud). After a user is registered into the system, he login to the home page and can avail all the facilities of social networking. When another user accepts his request, he can view all the updates. The videos are streamed using H264 protocol and hence, adaptive video streaming is enabled. Once a user decides to view a video, the system checks whether the video is available in the subVC.If it is available, the video is loaded from the subVC using adaptive video controller.

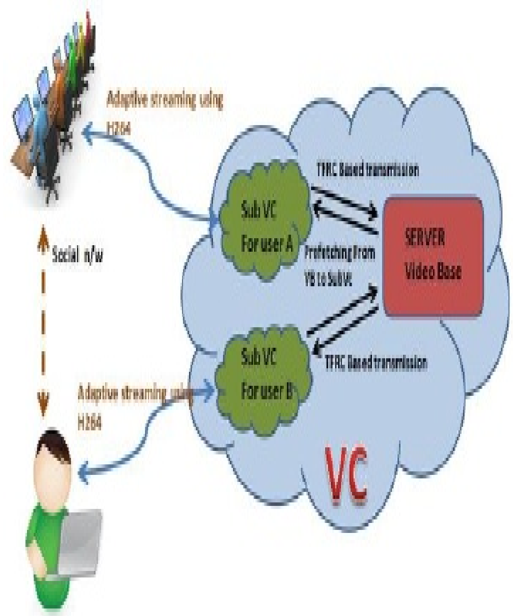


Fig 3: Overall video cloud architecture

If the video is not available in the subVC, the system checks the server. Finally the video is transferred from the server to the sub VC using TFRC protocol. The video is adaptively streamed and is made available to the user. As the network traffic and the probability of congestion is high, for the transfer from the cloud server to the respective users subVC, the use of TFRC protocol is highly efficient and reduce the packet loss rate. Further optimization is obtained by prefetching the videos to the Sub VC, based on the past experiences of a particular users action. The system architecture is based on adaptive video streaming in Cloud contains mainly 3 parts which are:

1.Video Cloud, 2. Sub Video Cloud , 3.Users

A. ***Video Cloud:*** The cloud server is to main act of the video cloud. The uploaded videos from all users can store here. And it has all the advantages of a Cloud both in terms of data storage and processing. Video cloud (VC) all the advantages of cloud Server. By using cloud mechanism it is more secure than any other server in internet. To store the videos in VC here use a Video Base. The video base is the cloud store and can store all videos, the user upload.

B. ***Sub VC- Sub Video Cloud***

Sub VC has a Sub VB (Sub Video Base) for area/group of user. They can share videos by uploading them to the Cloud and can also download videos shared by friends.

D. ***Users***

User(s) who use this system. They can share videos by uploading them to the Cloud and can also download videos shared by friends.

E. ***Adaptive Video Streaming***

As shown in Fig. 3.2, traditional video streams, especially the ones with fixed bit rates finds it difficult to adapt to the fluctuation of the link quality. If the sustainable link bandwidth is found to lot, there is a possibility that the video streaming be terminated frequently due to the packet loss. SVC has two types of layers: a Base Layer (BL) and some Enhancement Layers (ELs). According to SVC, BL is guaranteed to be delivered. Whenever the link can afford more ELs can be obtained. This will automatically result in a better video quality. The main advantage of using SVC encoding techniques is that the server does not have to worry about the client side or the link quality. Even in the case when some packets are lost, the client is still able to decode the video and display it. But this may still not be bandwidth-efficient. This is due to the presence of unnecessary packet loss. So it is critical to control the SVC-based video streaming at the server side. This control is made possible with the rate adaptation method in order to Efficiently utilize the band width .

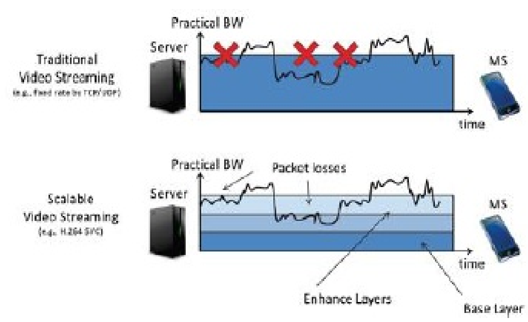


Fig 4: Scalable Video Streaming

F. *TFRC Protocol Implementation*

TFRC is used in any Internet environment where the main type of data flow is “unicast”. The congestion that occurs in such environment is controlled using this mechanism[10]. TFRC was designed in such a way that itis almost fair when there is a competition for bandwidth along with TCP flows. However this is the main point of interest and TFRC does not specify a complete protocol. However, when one compare TFRC and TCP, it can be seen that TFRC has much lower variation of throughput over time when compared with TCP. This is the factor that makes TFRC more suitable for applications like telephony or streaming media in which, a relatively smooth sending rate is of critical importance. There is however a major disadvantage of having smoother throughput than TCP. This is that, even if TFRC is found to compete fairly for bandwidth, it responds rather slower than TCP to the changes that a represent in bandwidth is available. TFRC is a technically a receiver-based mechanism. The calculation of the congestion control information in the data is done at the receiver and not at the sender. Such a mechanism is well-suited for applications where the sender is a very large server handling many connections simultaneously, and the receiver has comparatively more memory and high processing speed available for computation.

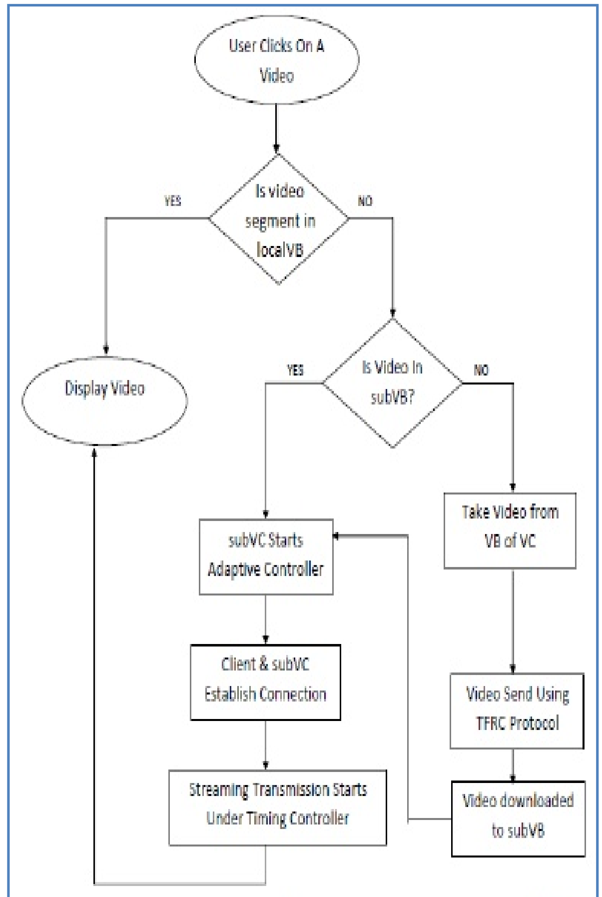
G. Protocol Mechanism

For making its congestion control mechanism practical, TFRC relies on a throughput equation which calculates the sending rate as a function of the parameters by receiver. A loss event is defined as one or more lost packets from a window of data. Generally speaking, TFRC's congestion control protocol works as follows:

(i) The loss event rate is measured by the receiver and this information is send back to the sender.
(ii) The sender measure the round-trip time (RTT) using this feedback information.
(iii) Using the calculated values of loss event rate and RTT throughput is calculated which gives an acceptable transmit rate.
(iv) The sender uses this calculated transmit rate and adjusts its own transmit rate accordingly.

IV.TCP THROUGHPUT EQUATION

It should be noted that any realistic equation giving TCP sending rate as a function of parameters from receiver such as loss event rate and RTT is suitable for use in TFRC.. The throughput equation is given in equation 3.1



$$X = \frac{s}{R*sqrt\left(2*b*\frac{p}{3}\right)+t_{RTO}*\left(3*sqrt\left(3*b*\frac{p}{8}\right)*p*(1+32*p^2)\right)}$$

Fig: 5: Flow Chart

V.PERFORMANCE EVALUATION

The performance of the system is prominent when a congestion occurs in a network. When the network faces a congestion, the TFRC protocol adapts itself by varying the chunk size, and thus avoiding packet loss. As an evaluation measure, the variation of chunk size is measured and plotted as shown in figure 3.5

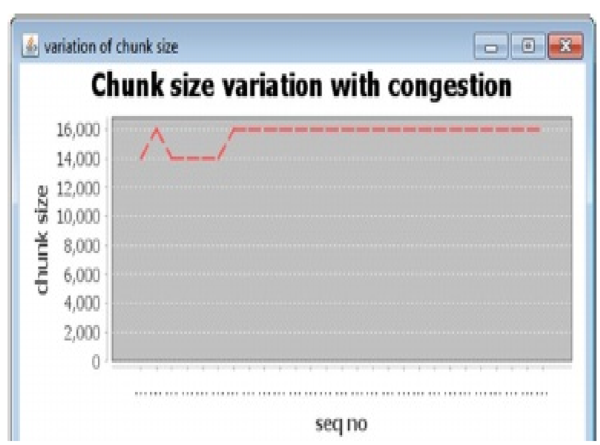


Fig 6: Chunk Size Variation withCongestionV

VI.CONCLUSION

Mobile Cloud Computing, as a development and extension of Cloud Computing and Mobile computing, is the most emerging and well accepted technology with fast growth. The combination of cloud computing, wireless communication infrastructure, which efficiently stores videos in the clouds (VC), and cloud computing to construct private agent (subVC) for each mobile user to try to offer "non-terminating" video streaming adapting to the fluctuation of link quality based on the Scalable Video Coding technique. Also AMES-Cloud can further seek to provide "non-buffering" experience of video streaming by background implementation and shows that the cloud computing technique brings significant improvement on the adaptivity of the mobile streaming We ignored the cost of encoding workload in the cloud while implementing the prototype. As one important future work, we will carry out large-scale implementation and with serious consideration on energy and price cost. In the future, TFRC protocol is using perfect video efficient, perfecting, and security issues in the AMES-Cloud.

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