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Survey on Network and Device Aware QoS Approach for Mobile Streaming

Mohanakrishnan M. Azath[2]
[1*2]Department of Computer Science and Engineering, Met's School of Engineering, Mala, India
mohanp2248@gmail.com ,mailmeazath@gmail.com

www.ijcaonline.org

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Abstract**—**Cloud computing is an evolving technology designed to offer a variety of computing and storage services over the Internet. Cloud computing in multimedia is normally correlated with multimedia computing over grids, server-based computing, content delivery and peer to peer multimedia computing. Multimedia services offer a flexible, scalable, efficient data processing technique and it gives a solution for the user demands of best quality multimedia. Since the intelligent mobile phones, wireless networks and tablets have become more popular, network services for the users are no longer limited inside the home. Now public is in the use of mobile devices for watching the multimedia videos via streaming. Not all multimedia file formats are supported by all the mobile devices. Users always want to watch videos or files from everywhere at anytime, regardless of the changes in the network environments. To overcome the problem of limited available bandwidth for mobile streaming, surveyed the previous methods and introduced a network and device-aware QoS method that offers multimedia data which are appropriate for terminal unit. The wastage of bandwidth and terminal power could be avoided by choosing the appropriate transcoding format based on the bandwidth value. QoS method could endow with capable self adaptive multimedia streaming services based on the bandwidth environments.

Keywords**—** Cloud multimedia, Adaptive QoS, Network and device aware.

I. INTRODUCTION

Cloud computing is the use of computing resources that are delivered as a service over a network , typically the Internet [2]. The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing provides remote services with a user's data, software and computation. The basic technique of cloud computing is derived from distributed computing and grid computing. To provide rich media services, multimedia computing has emerged as a important technology to create, edit, process, and search media contents, such as video, images, graphics, audio, and so on. For multimediaapplications and services in mobile wireless networks and internet there are strong demands for cloud computing because of the significant amount of computation required for serving millions of Internet or mobile users at the same time. Now days as mobile devices have developed rapidly, users have been able to access network services anywhere and at anytime. Mainly with the development of 3G and 4G networks, multimedia services have become universal application services. Cloud multimedia services provide a flexible, scalable and efficient data processing method and offer a solution for the user demands of high quality and diversified multimedia. Multimedia applications and services over wireless networks is challenging due to constraints and heterogeneities such as limited bandwidth ,limited battery power different protocols and standards random time-varying fading effect, stringent QoS requirements. Sharing is an integral part of cloud service. The demand of easy sharing is the main reason the multimedia contents occupy a large portion of cloud storage space. Normally, multimedia sharing happens only when the person who shares the contents and the person who is shared with are both online and have a high-data-rate connection. Cloud computing is now turning this synchronous process into an asynchronous one and is making one-to-many sharing more efficient. Instantaneous music and video sharing can be achieved via streaming. Compared to the conventional streaming services operating through proprietary server farms of streaming service providers, cloud-based streaming can potentially achieve much a lower latency and provide much a higher bandwidth. Media is usually streamed from pre-recorded files but can also be circulated as part of a live broadcast feed. for a live broadcast, the video signal is converted into a compressed digital signal and transmitted from a Web server as multicast, sending a single file to many users at the same time. Streaming media is transmitted by a server application and received and displayed in real-time by a client application called a media player. A media player may be either an integral part of a browser, a plug-in, dedicated device or a separate program such as an iPod. Frequently, video files arrive with embedded players.

Technologies have improved considerably since the 1990s, when delivery was typically uneven. Yet the quality of streamed content is still dependent upon the user's connection speed. Streaming media is video or audio content sent in compressed form over the Internet and played instantly, rather than being saved to the hard drive. In the case of streaming media, a user no needs to wait to download a file to run it. Because the media is sent in a continuous stream of data it can play as it reaches. Users can pause or fast-forward, rewind just as they could with a downloaded file, unless the content is being streamed live. Here is some advantages of streaming media:

- Makes it possible for users to take advantage of interactive applications like video search and personalized playlists.
- Allows content deliverers to monitor what visitors are watching and how long they are watching it.
- Provides an efficient use of bandwidth because only the part of the file that's being transferred is the part that's being watched.
- Provides the content creator with more control over his intellectual property because the video file is not stored on the viewer's system Once the video data is played, it will be Discarded by the media player.

Video communication over mobile broadband networks today is challenging due to limitations in bandwidth, different device requirements and difficulties in maintaining high quality, reliability and latency demands imposed by rich multimedia applications. As the amount of network users is rapidly increasing, bandwidth insufficiency will occur and then network multimedia services will be affected considerably. Differing from general services that have a high acceptance rate for packet loss, multimedia packets stress on the correctness, sequence order and real-time nature of packets. Whenever a multimedia video service is applied, the service quality declines deeply while trying to meet the demands of video transmission. As the Internet becomes the final archive for all of the personal stuffs like photos, emails, etc and it's mixed with the full streaming of content, bandwidth become the new hard drive. This will become the big and hard media hurdle. Here have problems of bandwidth throttling and the ability to have unlimited data is becoming a topic of heated discourse. Boundless data through high speed and mobile access is inevitability and it's also going to be an amazing media experience for the consumer. Getting the hardware manufacturers, content producers, and access providers to play nicely is where the challenge lies. This form of streaming is unavoidable, and once consumers experience it and understand it. The Internet speed is actually the bandwidth available to accept data from the Internet into the system. Measured in megabits per second (Mbps), it's the amount of data that can be transferred from the cloud to the connected devices in one second.

II. RELATED WORK

For multimedia videos, stability is of the greatest significance. No matter what the service is, users will be always expecting powerful, sound and stable functions. Users expect to watch videos smoothly and at a certain level of quality, no matter what changes occur in the network atmosphere. However, the existing video platforms often provide inconsistent playback, resulting from the variation of network on-line quality, especially with mobile devices, which have limited bandwidth and terminal unit hardware resources. Users often view live videos that freeze have broken sound, or even failure to operate. Therefore, how can execute smooth playback with limited bandwidth and the different hardware specifications of mobile streaming is an interesting challenge. In the previous service, the mobile device side exchanges information with the cloud environment, so as to find out an optimum multimedia video. Scholars have done several researches toward conventional platform or CDN to store different movie formats in a multimedia server, to opt the right video stream according to the current network situation or the hardware calculation capabilities. To resolve this problem, many researchers have attempted dynamic encoding to transfer media content, but still cannot give the best video quality [3]. By the use of multimedia content and applications the network traffic is increased.

Multimedia cloud computing is based on multimedia-aware cloud or media cloud and cloud-aware multimedia or cloud media Perspectives. Multimedia-aware cloud, defines how a cloud can provide QoS for multimedia services. Cloud media focuses on how multimedia can perform its content storage, processing, adaptation, rendering and so on. To attain a high QoS for multimedia services, have a media-edge cloud or MEC architecture, in which central processing unit or CPU, storage and graphics processing unit or GPU clusters are presented at the edge to provide distributed parallel processing and QoS adaptation for various types of devices [2].

The architecture is shown in Fig.1.

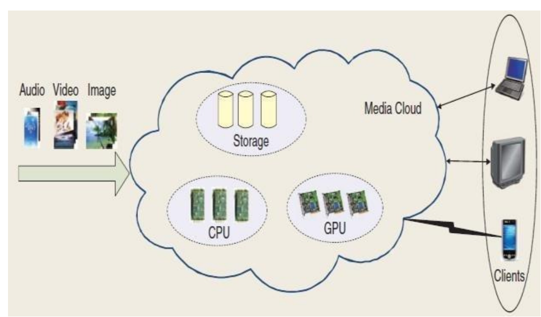

Fig.1: Multimedia Cloud Computing Architecture

Using a general-purpose cloud in the Internet to deal with multimedia services may suffer from unacceptable media QoS or QoE. Mobile devices have limitations in computing power, memory and battery life. Thus have even more prominent needs to use a cloud to address the tradeoffs between computation and communication. It is looked for that cloud computing could become a disruptive technology for mobile applications and services. In mobile media applications and services, because of the energy requirement for multimedia and the time-varying characteristics of the wireless channels, Quality of Service requirements in cloud computing for mobile multimedia applications and services become more stringent than those for the Internet cases.

A multimedia distribute applications through a cloud

Ferretti *et al.* [4] proposed cross layer architecture to offer mobility support to wireless devices executing multimedia applications which require boundless communications. This framework is based on the use of pairs of proxies, which allow the adaptive and concurrent use of different network interfaces during the communications. A cloud computing environment is using as the infrastructure to set up dynamically the proxies on the server-side, in accordance with the pay-as-you-go theory of cloud based services. Architecture provides always-connected services by exploiting all the networks available to the user, and by dynamically selecting their use on the basis of their costs and performance. Thus, architecture can provide its users with reliable communications even in presence of vertical and horizontal handoffs, and can optimize those communications, combining the probability of meeting application QoS requirements such as availability, responsiveness, continuity of the communication service. A client proxy needs to be installed on the mobile device, while a server proxy executes in the Internet on a fixed host with a public IP address. the architecture of the cross-layer part is confined into the client proxy which is the only component that depends on the mobile device operating system. a server-proxy is desired for each corresponding client, even if a given server-proxy may provide more than one client simultaneously. In addition, the server-proxy should be located close to the client so as to reduce the network latency and optimize the server's responsiveness. The disadvantage of cross layer architecture is the impact of dependability issues, such as security and fault tolerance, on their design.

A. SVC for QoS-enabled streaming

Kim *et al*. [5] introduced the seamless streaming of multimedia content that ensures Quality of Service over heterogeneous networks has been a desire for many multimedia services, in which the multimedia contents should be adapted to usage environments such as network, terminal capabilities, user preferences and characteristics. Scalability in video coding is a good feature to meet the requirement of heterogeneous networks. The consumption and access of multimedia content over heterogeneous networks by using diverse terminals in a seamless and transparent way, which is mentioned to be Universal multimedia access or UMA, has being recognized as an essential application in convergent atmosphere. In UMA, video adaptation that is performed according to usage environments such as network characteristics, user preferences, terminal capabilities is required to maximize consumer experience and ensure Quality of Service. presently, the Joint Video Team of the ISO/IEC Moving Picture Experts Group and the ITU-T Video Coding Experts Group is standardizing a new scalable video coding standardization, called as SVC, which will be an extension to H.264/MPEG-4 AVC. Transcoding is a better technology used to reformat video content so that it can be viewed on any of the increasing number of diverse devices in the market. A dynamic adaptation method of Scalable Video Coding using MPEG-21 Digital Item Adaptation or DIA that can provide an optimally adapted video stream over heterogeneous networks. This technique provides scalability at a bit-stream level simultaneously with similar coding efficiency as H.264/MPEG-4 AVC [6]. There are some issues to be necessarily considered in video adaptation. initially, complexity of adaptation process should be as low as possible to react immediately to time varying network conditions. Second, video bit-stream has to be transmitted and stored with a variety of spatio-temporal resolution and bit-rate, which provides flexibility in the video adaptation. The video adaptation must be performed in an interoperable way to be deployed across heterogeneous service environment.

B. Media cloud

Tan *et al.* [7] described media cloud that provides a cost-effective and powerful solution for the coming tide of the media consumption. The combination of cloud computing and media processing is called media cloud. The emergence of media cloud not only has great impact on the related research and technologies such as the architecture of the cloud computing platform, storing, media processing, delivery, and sharing, but also has profound impact on the commercial model, industry strategy, even the society. The Media cloud architecture consisting of five components

- Cloud administrative services.
- Ingest services which accept media input from a wide range of sources.
- Streaming services.
- Video services which manage and deliver videos across media channels to various clients.
- Storage subsystems for the content cacheand Storage, movement and asset management.

To reduce delay and jitter of media streaming, hence providing better Quality of Service of multimedia services, MEC architecture is introduced. In that architecture, a MEC is a cloudlet which locates at the edge of the cloud. Within an MEC, it uses P2P technology for distributed media data storage and computation. It's composed of storage, GPU clusters and CPU, the MEC stores, transmits and processes media data at the edge, thus achieving a shorter delay. It is not unique that proxy is used to seamlessly integrate media cloud with the outside world, hence gives a solution for some of the heterogeneity problems. The challenges of the media cloud are seamless integrating existing systems to the media cloud, making the media cloud highly scalable to adapt to new services and applications, exerting the power of media cloud, making the media cloud profitable and finding innovative and suitable applications for media cloud.

III. COMPARISON ON QOS APPROACHES

SECTION	APPROAC USED	SCALABILITY	SELF ADAPTIVE SERVICE	QOS	LIMITATIONS
Dynamic and interoperable dynamic SVC	UMA and MPEG-21 DIA	Good	Yes	Medium	Need lowest complexity of adaptation process to react to time varying network conditionsVideo bit-stream has to be transmittedand stored witha variety of spatio-temporal resolution and bit-rate.
Seamless Support	Cross layer architecture	Poor	No	Medium	Have dependability issues.
Media cloud	P2P based MEC architecture	Good	No	Medium	P2P networks are more susceptible to securityHigh bandwidth usage required.

IV. CONCLUSION

In this paper surveyed the challenges in multimedia streaming And Proposed the Network and Device Aware QoS technique which is capable of offering self-adaptive multimedia streaming services for varying bandwidth situation. In which suitable file format is selected based on the bandwidth and device parameters. Hence efficiently utilizing the power and bandwidth.

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