Cloud-based Mobile Video Streaming Techniques

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ABSTRACT
Now a day's watching video and playing online games through mobile devices are very trendy. Because of a huge interest of people in these devices they are available at affordable range in market. A various rich multimedia application is provided in this devices via a Mobile Cloud Computing (MCC) technique. In multimedia data the transmission of video and interactive video services such as video conferencing and online gaming is increasing in the very popular way. By a use of Cloud Services in smart phone they are overcome the better User Experience in Sharing Mobile Videos and online gaming. In mobile network video sharing is done through wireless link. Video streaming has attracted lots research and development in mobile media communication. Mobile streaming allows consumers to watch video anywhere and anytime, and is becoming a more and more popular way to consume video content. On-demand, dynamic and easily accessible videos are provided through various video streaming technologies in cloud environment. Video streaming in Clouds still has a challengeable research issues how the contents are well-distributed in Inter-Clouds. This paper is analyzed and compares various video streaming techniques and there issues in mobile devices that share in cloud.

Keywords: Mobile multimedia, wireless network, cloud computing, video streaming, video sharing.

1. INTRODUCTION
In mobile platforms video sharing and streaming is done in successful way. The cloud computing paradigm is used for fast and intelligent processing in near-real time data transmission such as audio, video, text and games [1].

According to survey among all the mobile data traffic across the world, the 66.5 percent will be only video related till 2017. This was only 51 percent in last survey. As mobile devices are limited by computation, memory, and energy, it may not serve as platforms for rich media, were it not for cloud applications and services. It is forecasted that cloud applications will account for 84 percent of the total mobile data traffic in 2017 [2]. Mobile cloud computing is bridging the widening gap between the mobile multimedia demand and the capability of various mobile devices. These devices are provided better storage, processing of video & audio fastly and smoothly only because of this technique [3].

Mobile media cloud computing is becoming an important computing paradigm to support mobile media services. In Mobile cloud computing is providing data and control between the cloud and mobile devices through wireless networks such as 3G and Wi-Fi (see fig 1). Wireless networks have limited bandwidth, probably longer latency, and intermittent connectivity [3, 4].

Mobile Visual Search Smart phones and Tablet PCs have evolved into powerful image and video processing devices, due to high resolution color cameras and application specific integrated circuits (ASIC) embedded units. With GPS assisted location based services and broadband wireless networks connection, mobile devices have shown great potentials in visual search and augmented reality applications, such as CD/Book cover search, location recognition, scene retrieval, product search, etc[5].

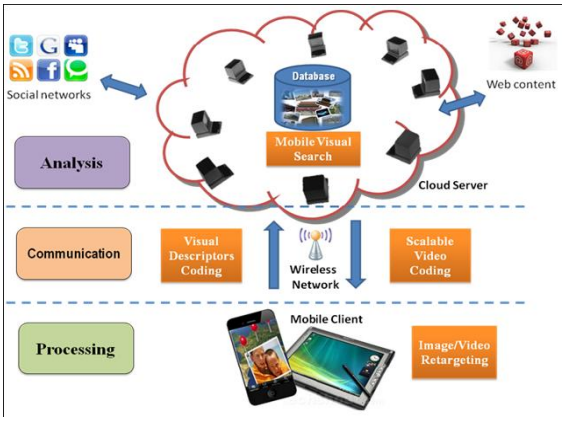

Fig.1 Mobile Media Communication, Processing, and Analysis

2. VIDEO STREAMING
In streaming technique clip of data file is sent to the end individual in a continuous flow. It is simply a strategy for shifting information such that it can be prepared as a stable and ongoing flow. Streaming movie is a series of "moving images" that are sent in compacted form over the Internet and shown by the audience as they appear [1, 6]. Streaming technique is significantly cheaper and more convenient for sharing mobile videos, storytelling, live event streaming, practice sharing, video chatting, watching TV anywhere, etc. [7]. The video services are offer the video content storage, and splitting and merging of the video for parallel processing. The parallel processing service is responsible for creating, starting, stopping instances, handling the queue and distributing the processing tasks [5, 6]. As a cloud provider i5Cloud is used for transferring video in different small parts and to merge it again without any loss of synchronization that is show in fig 2.

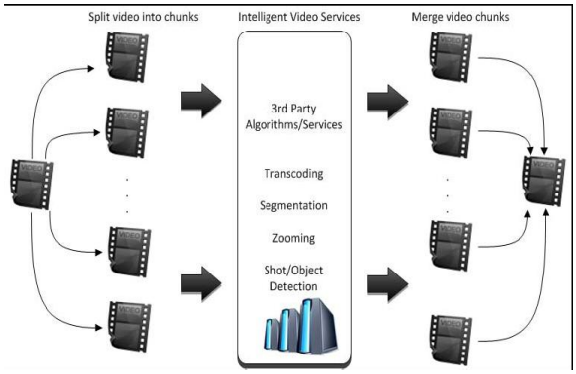

Fig.2 Video processing workflow

Mobile media cloud computing can be defined as a novel computing model whereby the media analysis, processing and storage are shifted from mobile devices to centralized computing platforms in the cloud. The communication between a mobile device and the cloud are normally based on wireless channels such as 3G, WLAN etc. Terminals on mobile devices can be thin native client or web browser [5, 6, and 7].

A. Streaming Principle

In this real-time video applications require media packets to arrive in a timely manner; excessively delayed packets are useless and are treated as lost. In streaming programs it is necessary for the information packets to reach their location in regular basis because the wait can cause the network blockage, and can result in the decrease in all those packets suffering from extreme wait [8]. This causes decrease in quality of information, the synchronization between customer and hosting server to be damaged and mistakes to distribute in the provided movie.

Two kinds of steaming techniques are available that is real-time and pre-recorded streaming. User Datagram Protocol (UDP) is used for streaming which delivers the multi-media flow as a sequence of small packets. The majority of transport protocols perform over TP stack, which is implemented on top of UDP/IP to provide an end-to-end network transport for video streaming [9].

B. Video Streaming Architecture

A cloud based source implements a streaming hosting a server which is responsible for retrieving, sending and adapting it clip flow. Depending on the application, it clip may be protected on-line for a real- time broadcasting or pre encoded and stored for broadcasting an on demand [10]. Where some Programs such as interactive movie, live broadcast, mobile movie streaming or interactive online games require real -time encoding and applications such as movie on-demand require pre-encoded movie. When the multicast session is initialized, the streaming hosting server retrieves the compressed movie and begins the loading with the adequate bit rate stream. A cloud based source implements a streaming hosting server which is responsible for retrieving, sending and adapting it clip flow [11]. Depending on the application, it clip may be protected on-line for a real-time broadcasting or pre-encoded and stored for broadcasting an on demand. Programs such as interactive movie, live broadcast, mobile movie streaming or interactive online games require real time encoding and applications such as movie on-demand require pre-encoded movie. Transferring of video properly in cloud environment for this purpose some technique is used. These techniques are increased transmission of on demand video and provide better user experience in cloud platform.

3. VIDEO STREAMING TECHNIQUES

Video Streaming or multimedia streaming in this a video is constantly received and continuously presented to an end-user. This video streaming mainly depends on encoding protocol and buffering mechanism. Video codec employ a range of encoded/decoded methods to fit videos signal into the allocated channel bandwidth [11]. These encoding methods can influence the generating quality of it. This system is more powerful for providing Video as a Service (VaaS) in popular Cellular phone. Video encoding is done through various storage formats. MP4 format has been widely used for this purpose. The main advantages of MP4 for being used extensively are RTP headers, packetization boundaries and transmission times. There are various streaming techniques for different mobiles, Smartphone describe below:

A. *BitTorrent-based video block device*

In BitTorrent networks video block device (VBD) is providing user-friendly viewing patterns. A VBD & NBD both module are used in BitTorrent technique. The NBD client module provides a network block device to the users. The VBD module communicates with neighbour peers and a seeders (i.e., contents server), which contain the block. If a block is already cached, the block is obtained by the local cache. The file sharing method is an alternative way to share videos on many servers. Frequently used blocks of videos are shared in a BitTorrent network. Unused blocks of videos are not cached until they are first used. Frequently used blocks of video images are shared in a BitTorrent network. Unused blocks of video images are not cached until they are first used [12].

B. Scalable video coding

The cloud server behaves like a SVC extractor, enabling a very large number of clients to receive live video streams at the same time by dynamically arranging available resources based on the streaming quality requested by clients. 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. The subset bit stream can represent a lower spatial resolution (smaller screen), lower temporal resolution (lower frame rate), or lower quality video signal [12, 13].

C. P2P Live Video Streaming

Cloud-based P2P Live Video Streaming Platform (Cloud PP) that uses public cloud servers to construct an efficient and scalable video delivery platform with Scalable Video Coding (SVC) technology. The cloud server behaves like a SVC extractor, enabling a very large number of clients to receive live video streams at the same time by dynamically arranging available resources based on the streaming quality requested by clients[13].

D. Progressive Download

The mobile customers have the choice to gradually get a compressed data clip partitioned in the appropriate codec's for the product to play by using HTTP or HTTPS. As the data file starts to gradually download, play-back is started enabling an almost immediate watching of the material. In the qualifications, the press gamer is constantly on the download the rest of the material. By comparison, without modern download the user would have to wait for the whole data file to obtain to the product before watching would start. During the play-back process, audiences are able to seek back and

forth through the whole press data file. If the audience looks for forward to a point in the schedule that has not yet downloadable, the press gamer stop play-back until the data comes [14].

E. HTTP Live Streaming

HTTP structured multimedia streaming communications protocol carried out by Apple company is known as Hyper text transport protocol (HTTP) Live Streaming (HLS). IOS, IPod and Iphone etc., product are an adaptive streaming multimedia distribution standard protocol that produced by Apple. It is an exemplified and segmented in MPEG family transport channels and M3U8 - MP3 Playlist File (UTF-8) to offer live and on- demand multimedia data by utilizing H.264 multimedia codec. On the behalf of most suitable channel or stream like bandwidth, platform and CPU limits selected by device instantly, it downloads available bits for buffering to play multimedia file [15].

4. INHERENT ISSUES IN SHARING VIDEO

A. In mobile cloud computing energy efficiency is one of the greatest challenges. In smart phones limited battery life has been the biggest complaint. Two main factors contribute to the energy problem. One is relatively limited capacity of batteries. The other is the high demand for energy-hungry applications such as video streaming and online gaming [2]. To minimize energy efficiency problem especially in multimedia applications, offloading technique is used by author yi xu and shiwen mao.

B. The poor user experience (UX) is one of the issue in mobile video sharing it can be associated with the high development cost. The popularity of mobile video sharing in mobile user is not comparable with traditional TV or desktop video productions. To solve this problem author Dejan Kovachev, Yiwei Cao and Ralf Klamma used standard libraries which augment the raw video streams to comprised video services in mobile devices. It is a CPU-intensive task [14].Several problems affect the user experience for mobile video, such as processing of videos, such as focusing or zooming on certain regions in the video, changes in connection speeds, browsing/navigating video on a mobile device, personalization of video streams explain in fig 3.

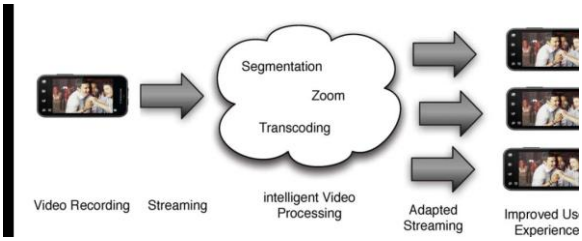

Fig.3. Improving user experience for mobile video by intelligent and fast Video processing cloud services [14].

C. While sharing video in cloud Map Reduce based process is also used for transform images and videos into cartoons or transcoding media content into various video formats for different devices and different Internet connections. In this video file is split in multiple parts, processed in parallel and merged in the proper order.

D. In 3G/4G mobile networks when receiving video streaming traffic, users often suffer from long buffering time and intermittent disruptions due to the limited bandwidth and link condition fluctuation caused by multi-path fading and user mobility. Thus, it is crucial to improve the service quality of mobile video streaming while using the networking and computing resources efficiently [15].

5. RESULTS & ANALYSIS

Multimedia streaming is limited by the various features such as network channel, 3G-324M channel bandwidth, Multi coded stream, Transcoding, Packet loss, Bandwidth supervision and endpoint features. In VES, technique streaming is done very efficiently. In Bit torrent algorithm video is send in blocks by use of VBD & NBD techniques. This is a user friendly technique to send stream video. Video block device (VBD) technique, instead of legacy BitTorrent protocol, can be an appropriate choice to fit video streaming situation in Cloud computing environments. This method is potentially useful in environments where large distributed on-demand videos are driven by a cloud service platform. Cloud-based P2P Live Video Streaming Platform (Cloud PP) that uses public cloud servers to construct an efficient and scalable video delivery platform.

By Progressive download the user would have to wait for the whole data file to obtain to the product before watching would start. SVC is a one of the common technique to share on line video in internet. SVC standardizes the encoding of a high-quality video bit stream that also contains one or more subset bit streams. The subset bit stream can represent a lower spatial resolution, lower frame rate, or lower quality video signal.These all steaming techniques are some advantages and disadvantages to share efficient video on demand, on line for smart phone user. This video streaming technique attention, in the following areas:

A. *Browser Plug-in*
Need either Adobe Flash Player or HTML 5 supported Browser for playing streamed video file.

B. *Buffering and Playback*
The low quality video is uploaded by the client it will not be enhanced so High band width users affected by low quality service.

C. Copy right Security
At the time of buffering the videos are cached by hacking tools. So copy right is become an issue.

D. Telepresence

Tele-Presence is an evolutionary breakthrough technology that is designed to allow interaction and collaboration with a near "in person" meeting experience. The systems are designed around HD video and high fidelity to deliver a real-time, life-size, face-to-face experience.

Cloud based Encoding API which provides lots of Encoding techniques which are solution for the cloud based environments. Video streaming techniques for streaming the video over the internet or cloud based network for iPhone, Android, Window phone and Smartphone. HTTP Live streaming is one of the best solution for video streaming provided by Apple Company. As mobile devices proliferate, media consumption is frequently performed on these devices. Due to the high demands of video traffics over mobile networks, the wireless link capacity fails to keep up the proper speed with the user demand. There exists a gap between the demand and the link capacity which results in poor service quality of the video streaming over mobile networks which includes disruptions and long buffering time. Recent advances have shown that mobile media communication, processing and analytics will be built upon cloud services.

6. CONCLUSION

The video streaming architecture that develop streaming servers which are responsible for downloading, uploading and adapting the video stream content in 3G or others networks. Cloud Computing is applied to calculate adjustable video encoding streaming based on mobile device hardware characteristics, decoding characteristics. Hence, the research and development is of Upmost important in boosting the competitiveness of traditional media techniques in cloud computing. The combination of mobile computing and cloud computing is fulfill the basic needs of today's smart phone very easily and amazingly. But still this combined environment is under process for better utilization of various resources. In smart phone transmission of multimedia data such as audio, video and text are transfer rapidly. For better scope in future researcher are work progressively in this area but still mobile video streaming needs to address challenging issues inherent mobile devices and mobile network.

7. REFERENCES

[1] Dejan Kovachev, Yiwei Cao and Ralf Klamma, "Cloud Services for Improved User Experience in Sharing Mobile Videos", IEEE Seventh International Symposium on Service-Oriented System Engineering, 978-0-7695-4944-6, DOI 10.1109/SOSE.2013.95, Pg no. 298-303, 2012.

[2] Yi xu, shiwen mao, "A survey of mobile cloud computing for Rich media applications", 1536-1284, IEEE, wireless communications, Pg no. 46-53, June 2013.

[3] Sarbojit banerjee, roheet bhatnagar ,"Adaptive and Efficient Video Streaming and Sharing for Mobile Users Using Cloud Assistance", Proceedings of SARC-IRF International Conference, ISBN: 978-93-84209-03-2, Pg no. 47-50, 2014.

[4] Niroshinie Fernando, Seng W. Loke, Wenny Rahayu, "Mobile cloud computing: A survey", doi: 10.1016.05.023, Pg 84-106, 2012.Wen Gao, Ling-Yu Duan, Junsong Yuan, Yonggang Wen, "Mobile Media Communication, Processing, and Analysis: a review of recent advances", 978-1-4673-5762-3, IEEE, Pg no. 869-872, 2013.

[5] Atul Gonsai, Rushi Raval, "Mobile Cloud Computing: A Tool for Future", International Journal of Computer Science & Engineering Technology (IJCSET), ISSN: 2229-3347, Vol. 4 No. 07 Pg No.1084-1094, 2013.

[6] R. Lakshman naik & S. S. V. N. Sarma, "A Framework For Mobile Cloud Computing ", International Journal Of Computer Networking, Wireless And Mobile Communications (IJCNWMC), ISSN 2250-1568, Vol. 3, Issue 1, Pg no. 1-12, 2013.

[7] Chin-Feng Lai, Honggang Wang, Han-Chieh Chao, and Guofang Nan, "A Network and Device Aware QoS Approach for Cloud-Based Mobile Streaming", 1520-9210, IEEE transactions on multimedia, VOL. 15, NO. 4, pg no 747-757, June 2013.

[8] George Lawton, "Cloud Streaming Brings Video to Mobile Devices", Published by the IEEE Computer Society, 0018-9162/12,Pg no. 14-16, 2012.

[9] V.venugopal, mrs Rr.revathi, "User adaptive mobile video streaming and user behavior oriented video pre-Fetching in cloud", vol 3, special issue 3, ISSN (Online): 2319 – 8753, IEEE international conference on innovations in engineering and technology (ICIET'14), pg 2151-2158, 2014.

[10] D.Kesavaraja, Dr.A. Shenbagavalli, "Cloud Video as a Service [vaas] with Storage, Streaming, Security and Quality of service Approaches and Directions", International Conference on Circuits, Power and Computing Technologies [ICCPCT-2013], 978-1-4673-4922-2113, IEEE, Pg no. 1093-1098,2013.

[11] Yong-Ju Lee, Jin-Hwan Jeong, Hag-Young Kim, "Video Block Device for User-friendly Viewing Patterns in IaaS Clouds", 978-1-4577-0231-0, IEEE International Conference On Consumer Electronics (ICCE), pg 455-456,2012.

[12] Hong-Yi Chang, Ya-Yueh Shih, Yuan-Wei Lin, "Cloud: A Novel Cloud-based P2P Live Video Streaming Platform with SVC technology", NSC-IOl-2218-E-415-00l, Pg no. 64-68,2013.

[13] Mohammad Reza Zakerinasab, Mea Wang," a Cloud-Assisted Energy-Efficient Video Streaming System for Smartphone's", 978-1-4799-0590-4/13, IEEE, 2013.

[14] Xiaofei Wang, Min Chen, T. Yang, "AMES-Cloud: A Framework of Adaptive Mobile Video Streaming and Efficient Social Video Sharing in the Clouds", IEEE transactions on cloud computing, vol: 15 no: 4, Pg no. 1-21, 2013.