P2P-based Mobile Social Media Delivery Methodology for Beaming Broadcast Service

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Abstract. When using any of the technologies described up until now, the mobile users receive a live video streaming but do not broadcast anything. In this paper, we propose a new method with which mobile user is both capable of sending and receiving social video. It is called MobileCast. MobileCast allows users to broadcast their own video in real-time, seeing live video and broadcast this video for other mobiles at the same time based on peer-to-peer network. With MobileCast, the idea is to use some of the idle sending capacity at the end mobile users. When mobile user captures and sends video in real-time, the device becomes a broadcaster then it can send this video for other mobile devices which again would forward the stream to other mobiles, and so on.

Keywords: peer–to–peer, broadcast, live video streaming, file sharing

1 Introduction

In recent years, peer-to-peer (P2P) live streaming is becoming an increasingly popular technology. Live video streaming is a technology that allows an audio and video source broadcast live to be viewed in real time by viewers who are connected. This live video can be followed from a web page or mobile phone. Uses generate a video stream that is transmitted live to streaming server using encoding software, broadcast software. Broadcasting video direct to any listener who is connected anywhere in the world. Streaming is a method for intelligent broadcasting of data on the mobile phone. Live video streaming allows users to broadcast their live contents [1]-[3]. The audio stream is compressed using an audio codec such as Mp3 or AAC. The video stream is compressed using a video codec such as H264 or VP8. Encoded audio and video streams are assembled in a container bitstream such as Mp4 or FLV. The bitstream is delivered from a streaming server to a streaming client using a transport protocol, such as MMS or RTP. The streaming client may interact with the streaming server using a control protocol, such as MMS or RTSP.

With traditional video live streaming technologies, the quality of the video degrades as more viewers tune in [4][5]. Big viewers need a lot of bandwidth to support them. In contrast, with MobileCast, the quality and reliability of the broadcast actually
improves every time a new viewer connects, since every new viewer becomes a miniature broadcaster and amplifies the stream. With MobileCast, anyone can create a resilient video stream that would be instantly accessible by thousands of people around the world.

2 Related Research

AfreecaTV is a video streaming service, based on P2P technology, in South Korea. As shown in Figure 1, the site mainly retransmits TV channels, but also allows users to upload their own videos and shows. The functions for broadcasting, watching, channel lists and chatting etc. are provided. Users are required to install ‘Afreeca players’ with the way of grid delivery. Broadcaster delivers a live broadcast to viewers, after that they can select their favorite channel. A channel can accept from 50 to 500 viewers at the same time. Broadcasting programs can be various from TV shows, sport events, game matches etc.

As shown in Figure 2, Ustream is the leading video technology platform for live business communications, Ustream bring live broadcasting technology mainstream. Ustream was originally created to connect military service members to family and friends across the world. Since then, the company has established itself as a socially-fueled video platform for broadcasters of any size to easily reach an infinite audience and share experiences in real-time.

As shown in Figure 3, U stream SNS in conjunction with real-time chatting can be broadcasted. Like Afreeca TV based on a national service, U stream is broadcasted in conjunction with SNS (Facebook, Twitter, etc.).
3 System Design

3.1 System Overview

MobileCast is a live video streaming sharing system that cooperates transparently by using idle bandwidth on a user's mobile to deliver live video or on-demand broadcasts. MobileCast is P2P file sharing system such as BitTorrent, but has the advantage of providing a robust live or on-demand streaming solution. The original high bit-rate stream is split up into smaller bit-rate streams that are shared through user’s mobiles, by incorporating a plug-in that reconstructs the smaller streams back to the original high bit-rate stream. MobileCast constructs several smaller data streams a lower bit-rate from an original higher bit-rate stream. As an example, assume the live stream is a 400 Kbit/s signal and the MobileCast solution constructs multiple data streams at a size of 100 Kbit/s. Now, an end user receiving any four of the different data streams at 100 Kbit/s may use these four data streams to construct the original live stream back to 400 Kbit/s, and thus the movie can be played in real-time at the end mobile user.

MobileCast based on the principles of the BitTorrent protocol. Each viewer becomes a miniature broadcaster and amplifies the source broadcast across the mobile network as shown in Figure 4. Each mobile user, while downloading a live video stream, is simultaneously also uploading that stream to other users, thus contributing to the overall available bandwidth. The video quality of the channels usually depends on how many users are watching, the video quality is better if there are more users.

![Fig. 4. MobileCast System Using BitTorrent Protocol](image)

For example, if a mobile user wants to see a live video, he contacts a tracker server for that channel in order to obtain addresses of peers who distribute that channel; it then contacts these peers to receive the feed. The tracker records the user's address, so that it can be given to other users who want to view the same channel.

3.2 System Detail

Servers can provide broadcasting services rather than broadcasting to relay information and act as a bridge between the sender and the receiver using a Hybrid P2P. In
addition, a structured P2P manner complements the drawbacks of unstructured P2P system by using a peer to concentrate on all Peers (Nodes) and unstructured P2P network to maintain and manage the information are used together. The mobile P2P streaming architecture is depicted in Figure 5. Due to the utilization of standardized protocols and interfaces to communicate with Android specific components, the architecture can be ported to other systems as well.

Fig.5. Basic Architecture of the Mobile P2P Streaming Platform

The key entity of the P2P streaming platform is the P2P overlay component, which provides the signaling part related to the P2P streaming overlay. The P2P overlay component is complemented by the multiplexer, which deals with the actual video stream. The multiplexer supports the RTP/RTCP [6]. It can be configured by the P2P overlay component to forward packets to a number of peers and to the local Android Media Framework that displays the stream on the GUI. As RTP/RTCP is utilized for the transmission of the stream as well as for local playback, the Android Media Framework copes with packet loss by skipping missing packets and sorts wrongly ordered packets automatically, which greatly simplifies custom development. Testing a streaming prototype is simplified by two features: First, a possibility is provided to stream locally stored video files using a stripped down and adapted ffserver library, which is encapsulated using the Java Native Interface (JNI) framework. Additionally, a means to initiate join operations to the P2P overlay is provided using Near Field Communication (NFC): the devices are held back-to-back to exchange the necessary information for bootstrapping a new peer.

4 Conclusion

In this paper, we proposed MobileCast application which is implemented as an Android application with P2P system using BitTorrent protocol to receive and broadcast live video streaming at the same time. Video is captured from the mobile device, is broadcasted and transmitted to other devices using the P2P approach manner of service and depending on the support can significantly reduce the cost of the server using the rental cost and speed of the service. By using N to N configuration, it ensures the good quality of the video transmission by peer broadcasting services.
Acknowledgements. This research was financially supported by research program, ICT and Future Planning, Korea Evaluation Institute of Industrial Technology, Korea, 2013.

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