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RESEARCH ARTICLE

LIVE STREAMING WITH RECEIVER-BASED PEER-DIVISION MULTIPLEXING

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ABSTRACT

This paper presents a number of commercial peer-to-peer systems for live streaming have been introduced in recent years. The behavior of these popular systems has been extensively studied in several measurement papers. Due to the proprietary nature of these commercial systems, however, these studies have to rely on a "black-box" approach, where packet traces are collected from a single or a limited number of measurement points, to infer various properties of traffic on the control and data planes. Although such studies are useful to compare different systems from end-user's perspective, it is difficult to intuitively understand the observed properties without fully reverse-engineering the underlying systems. In this paper we describe the network architecture of Zattoo, one of the largest production live streaming providers in Europe at the time of writing, and present a large-scale measurement study of Zattoo using data collected by the provider. To highlight, we found that even when the Zattoo system was heavily loaded with as high as 20,000 concurrent users on a single overlay, the median channel join delay remained less than 2 to 5 seconds, and that, for a majority of users, the streamed signal lags over-the-air broadcast signal by no more than 3 seconds.

INTRODUCTION

There is an emerging market for IPTV. Numerous commercial systems now offer services over the Internet that are similar to traditional over- the-air, cable, or satellite TV. Live television, time- shifted programming, and content-on-demand are all presently available over the Internet. Increased broadband speed, growth of broadband subscription base, and improved video compression technologies have contributed to the emergence of these IPTV services. We draw a distinction between three uses of peer-to-peer (P2P) networks: delay-tolerant file download of archival material, delay sensitive progressive download (or streaming) of archival material, and real-time live streaming. In the first case, the completion of download is elastic, depending on available bandwidth in the P2P network. The application buffer receives data as it trickles in and informs the user upon the completion of download. The user can then start playing back the file for viewing in the case of a video file. Bit torrent and variants are examples of delay-tolerant file download systems. In the second case, video playback starts as soon as the application assesses it has sufficient data buffered that, given the estimated download rate and the playback rate, it will not deplete the buffer before the end of file. If this assessment is wrong, the application would have to either pause playback and re buffer or slow down playback. While users would like playback to start as soon as possible, the application has some degree of freedom in trading off playback start time against estimated network capacity.

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Problem Statement

- For many number of requests the server has no sufficient bandwidth so problem rises and there is no quality video distribution
- Buffering problem
- Due to more amount of time, video come's under delay state We can solve by these steps:

1. We have no idea about the overlay size of peer or server in each and every server or peer provide the single user a single channel.
2. Channel switching: after gets the peer failure before gets the peer failure extra requests allocate into another peer.

Existing System

In Existing system, peer-peer send the packets, where packet traces are collected from a single or a limited number of measurement points, to infer various properties of traffic on the control and data planes. Although such studies are useful to compare different systems from end-user's perspective, it is difficult to intuitively understand the observed properties without fully reverse-engineering the underlying systems.

Disadvantages

- Limited Access Only.
- No Secure because No Encode/Decode Operation of Sharing.
- No Live Streaming Accessing and Time Delay.

Proposed System

We proposed the intended for live streaming have been introduced a large number of measurement studies have been done on one or the other of these systems. Many research prototypes and improvements to existing P2P systems have also been proposed and evaluated. Our study is unique in that we are able to collect network core data from a large production system with over 3 million registered users with intimate knowledge of the underlying network architecture and protocol.

Advantages

- To minimize per-packet processing time of a stream.
- Added only a list of PEERs currently joined to the P2P network.
- More secure because Encode/Decode Operation used Validity Time for Peer Registration.

Cool streaming: Design, Theory, and Practice

There have been significant studies and numerous technical innovations for live video streaming, in which the recent The key novelties are 1) Peers gossip with one another for content availability information and Peers use a swarm-like technique, somewhat similar to the technique used in Bit Torrent, for content delivery. Make a distinction in this paper by referring this as a peer-to-peer (P2P) live video streaming system, in which there is no explicit overlay topology construction. This was referred to as a treeless approach or swarming in. The other approaches as overlay multicast, given the explicit construction of multicast tree. Cool streaming represented one of the earliest large-scale P2P video streaming experiments, which has been widel y referenced in the community as the benchmark that a P2P-based live streaming system has the potential to scale. Since its first release, while keeping the random partner selection, enhancing the system in nearly all aspects, specifically (Xie *et al.*, 2007).

InsightsintoPPLive: AMeasurement Study of large-scale P2P IPTV System

IPTV is expected to be the next disruptive IP communication technology, potentially reshaping our media and entertainment culture. However, provisioning the IPTV service brings forth significant new challenges. IPTV systems can be broadly classified into two categories: infrastructure-based and peer-to-peer based. In infrastructure-based systems, video servers and application-level multicast nodes are strategically placed in the Internet, and video is streamed from servers to clients via the multicast nodes.

PP Live is a free P2P-based IPTV application. According to the PP Live web site in January 2006, the PP Live network provides 200+ channels with 400000 daily users on average. The bit rates of video programs mainly range from 250 Kbps to 400Kbps with a few channels as high as 800 Kbps. The PP Live network (Hei *et al.*, 2006).

Background

Real – Time Live Streaming

Real-Time live streaming has the most stringent delay requirement. While progressive download may tolerate initial buffering of tens of seconds or even minutes, live streaming generally cannot tolerate more than a few seconds of buffering. Taking into account the delay introduced by signal ingest and encoding, and network transmission and propagation, the live streaming system can introduce only a few seconds of buffering time end-to-end and still be considered “live”.

Rendezvous Server

Rendezvous Server returns to the user a list of peers currently joined to the P2P network carrying the channel, together with a signed channel ticket. If the user is the first peer to join a channel, the list of peers it receives contains only the Encoding Server.

Search Phase

The New, joining PEER determines its set of potential neighbors. To obtain a list of potential neighbors, a joining peer sends out a SEARCH message to a random subset of the existing peers returned by the Rendezvous Server. The SEARCH message contains the sub-stream indices for which this joining peer is looking for peering relationships. The joining peer will be looking for peering relationships for all sub-streams and have all the bits in the bitmask turned on.

Join Phase

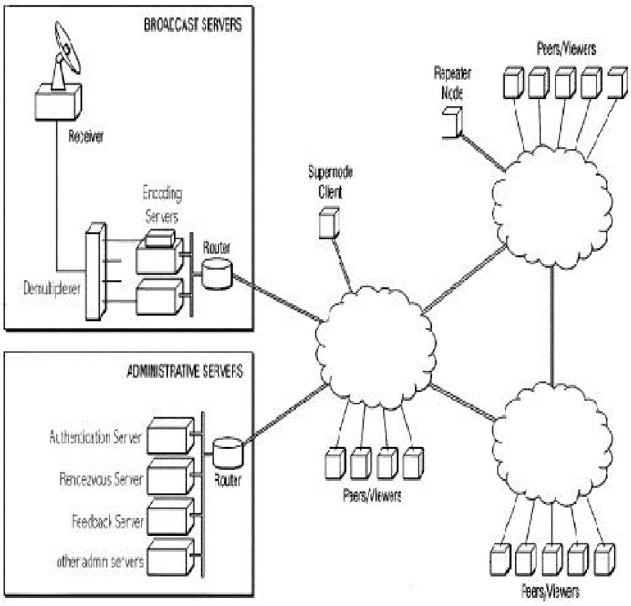
A New Cannot Join to a PEER List, the file details are encoded state if peer can join a PEER list the files are decoded state. Once the set of potential neighbors is established, the joining peer sends JOIN requests to each potential neighbor. The JOIN request lists the sub-streams for which the joining peer would like to construct virtual circuit with the potential neighbor. The joining peer gives highest preference to topologically close-by peers, even if these peers have less capacity or carry lower quality sub-streams. The list of peers returned by both the Rendezvous Server and potential neighbors all come attached with topological locations.

Reed Solomon error correct code algorithm:

- For a peer many number of requests are generated here
- some of the attackers enter the peer
- recover the corrupted peers bits.

The Zattoo system rebroadcasts live TV, captured from satellites, onto the Internet. The system carries each TV channel on a separate peer-to-peer delivery network and is not limited in the number of TV channels it can carry.

Architecture



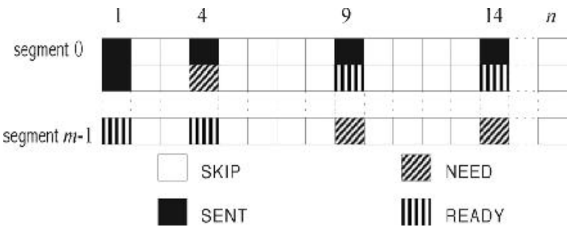
Although a peer can freely switch from one TV channel to another, thereby departing and joining different peer-to-peer networks, it can only join one peer-to-peer network at any one time. We henceforth limit our description of the Zattoo delivery network as it pertains to carrying one TV channel. Fig. 1 shows a typical setup of a single TV channel carried on the Zattoo network.

Peer-Division Multiplexing

To minimize per-packet processing time of a stream, the Zattoo protocol sets up a virtual circuit with multiple fan outs at each peer. When a peer joins a TV channel, it establishes peer-division multiplexing (PDM) scheme among a set of neighboring peers by building a virtual circuit to each of the neighboring peers. Baring departure or performance degradation of a neighbor peer, the virtual circuits are maintained until the joining peer switches to another TV channel. With the virtual circuits set up, each packet is forwarded without further per-packet handshaking between peers.

Tream Management

Forwarding destination. The output pointer of a destination indicates the destination's current forwarding horizon on the IOB.



of possible forwarding destinations listed, we have three types of output pointers: player pointer, file pointer, and peer pointer. One would typically have at most one player pointer and one file pointer, but potentially multiple concurrent peer pointers, referencing an IOB. The Zattoo player application does not currently support recording. Since we maintain the IOB as a circular buffer, if the incoming packet rate is higher than the forwarding rate of a particular destination, the input pointer will overrun the output pointer of that destination. We could move the output pointer to match the input pointer so that we consistently forward the oldest packet in the IOB to the destination. Doing so, however, requires checking the input pointer against all output pointers on every packet arrival implemented the IOB as a double buffer.

Adaptive PDM

While we rely on packet retransmission to recover from transient congestions, we have two channel capacity adjustment peer also computes a loss rate over the packets. If the loss rate is above a threshold, the peer considers the neighbor slow and attempts to reconfigure its PDM. In reconfiguring its PDM, a peer attempts to shift half of the sub streams currently forwarded by the slow neighbor to other.

Global Bandwidth Subsidy System

Each peer on the Zattoo network is assumed to serve a user through a media player, which means that each peer must receive, and can potentially forward, all sub streams of the TV channel the user is watching. The limited redistribution capacity of peers on the Zattoo network means that a typical client can contribute only a fraction of the sub streams that make up a channel. This shortage of bandwidth leads to a global bandwidth deficit in the peer-to-peer network.

Conclusion

We have presented a receiver-based, peer-division multiplexing engine to deliver live streaming content on a peer-to-peer network. The same engine can be used to transparently build a hybrid P2P/CDN delivery network by adding Repeater nodes to the network. By analyzing a large amount of usage data.

Future Enhancement

We have shown that error-correcting code and packet retransmission can help improve network stability by isolating packet losses and preventing transient congestion from resulting in PDM reconfigurations. We have further shown that the PDM and adaptive PDM schemes presented have small enough overhead to make our system competitive to digital satellite.

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