

# **Report:P2P Streaming**

## **Peer Selection Strategy**

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## **Introduction**

Internet media content delivery has grown significantly in these two decades. In these five years, the concept of self-media represented mainly by various types of webcast platforms is very popular. P2P media streaming came into being due to their impact on network traffic and usage. P2P stands for peer to peer. It takes full advantage of the customer's upstream bandwidth. It occupies the downlink while occupying the upstream bandwidth, providing resources for other users, and accelerating and expanding the network. The current download software is using P2P to achieve download acceleration and expand the user base. In actual implementation, only a part of people are connected to the server, and other users connect to the users of these connection servers and communicate with each other at the same time. This way, the pressure on the server and bandwidth is relieved. The focus of this report is how to select the peer to connect to the server, and would also introduce the basic concepts and techniques in P2P media streaming first.

## **Basic Concepts and Techniques in P2P Media Streaming**

Content Distributed Networks (CDNs) is one architecture for internet media content. In CDNs, a provider sets up a set of distributed machines at various locations in the Internet and uses them to provide content for customers.[1] The main disadvantage of CDNs compared with P2P media streaming is its inability to use the upload bandwidth of the client side. P2P media streams are designed to take advantage of the client's upload bandwidth. Therefore, it may greatly reduce the server-side traffic load.[2]

There are two main architectures of P2P media steaming.[2] The first are tree based push systems. Compared with CDNs, it not only has a two layers client- server structure, but also has many such layers allowing each client to be a potential server to other clients. The second are mesh based pull systems. Mesh based pull systems would guide peers to pull their desired media chunks from other peers by requiring peers to share information about their media repositories.

## **Peer Selection Strategy**

The specific technology of P2P media steaming such as peer selection strategy is developing fast. Such as CoolStreaming[3], the old version of CoolStreaming has a namely random peer selection. However, in its new version, peers monitor the status of ongoing sub-stream transmissions. Then,

each time the other peer detects that a parent's streaming rate is insufficient, it goes to another parent selected from its local partner list. [2]

Zimu Liu and his team gave a strategy to distilling peers who are suitable to connect to servers.[4] They named the desirable peers superior peers. It is best to keep the peers in a live session with stability for a long period of time and contributing a higher percentage of their upload capacities. Zimu Liu conduct a statistical analysis on more than 130 GB runtime traces in a real-world live streaming system, UUSee[5] in China. They gave three results[4]: Firstly, The peers that enjoy better streaming quality which is inferred from the average or initial buffering level usually watch longer time. Secondly, in the evening, the peers usually stay longer than other times. Thirdly, the peers in the popular channels always stay longer time. They concluded that the predicted peer longevity is based on the above three factors and is independent with upload bandwidth by check correlations. The predicted peer longevity means how long the peer stays in the system (such as webcast platforms). As peer longevity and upload bandwidth are two factors to determine whether select a peer to connect to server and pull stream to other peers, Zimu Liu defined the Superiority Index to distilling superior peers.

$$SuperiorityIndex = PredictedPeerLongevity \times EstimatedAverageUploadBandwidth$$

The peers with high superiority indexes are superior peers.

Some measurable metrics are use to find the predicted peer longevity and Estimated Average Upload Bandwidth. Initial buffer level, peer population, and joining time are dependent variables in these estimates. The new peer selection algorithm would use the statistic results in each system's environment. The system would awards higher bandwidth to the peers with higher superiority index. Zimu Liu's implements' results have confirmed that this peer selection algorithm can improve the stream quality.[2]

## Problems in Peer Selection Strategies

There are lots other strategies of peer selection strategy such as Service Differentiated Peer Selection[6], Random Useful Peer Selection[7]. They usually work well in their own case and short in robustness. For different P2P streaming architectures, different strategies would perform well. The results of most strategies are quite random and far from optimum solutions. Uniform protocols are imperious demands for these strategies.

## **Conclusion and Future**

P2P media streaming has obvious advantages compared to content distributed networks, but it is based on the two layers of CDNs. It would be combined with the Internet of Things and Fog computing to optimize its performance and expand its range of applications. Peer selection strategies are necessary composite in P2P media streaming. A bad peer selection strategies could make P2P media streaming have higher delay compared to content distributed networks. However, as the techniques of 5G toward maturity, many problems might be easy to solve. Then the establishment of standard become more important.

# Bibliography

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## Reflection

In research report assignment, I choose Peer-to-peer (P2P) streaming as my research topic. I did this research individually. I concentrated on the peer selection strategy in my research. I am interested in P2P streaming because some webcasting platforms became really popular in China last year. I want to go through more technique details behind them. In the research, some knowledges from COMP90007 class about streams help me a lot to understand some ideas. Some hard maths about stochastic modelings and statistic modeling are used in many papers, I cost some time on them and luckily, my statistic background from my bachelor helps my a lot.

For network analysis assignment, I did this assignment individually. In this assignment we should repeat same steps for different web addresses, so I learnt some bash scripts to do them quickly. I cannot iperf some web addresses, so I choose different addresses. As I do iperf finally, I should redo all previous steps.