Challenges, Design and Analysis of a Large-scale P2P-VoD System

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With the prevalence of P2P internet application, P2P-based video on demand becomes a new hot topic among the network researchers. Comparing with P2P live streaming, P2P-VoD has less equivalent in peers' sharing content, peers might watch different parts of the video. Therefore, it is tougher to allay the server load and retain the streaming performance. Due to the trending of P2P-VoD, developing and improving the P2P-VoD is demanded.

Based on the article, P2P-VoD's primary idea is that, every peer provides some small storage(normally 1GB) into the system instead of using only the playback buffer as in P2P streaming system. This added storage helps to form new replication strategy, content discovery technology and peer scheduling mechanism. Thus, P2P-VoD system can satisfy diverse users' demands. As a result, P2P-VoD is a dynamic replication system with modern distributed scheduling method.

There are few important points in this paper. The major components of the system include source servers to provide original content, trackers to help peer connection, bootstrap servers to find appropriate tracker, log servers to log in and transit servers to assist NAT peers. The segment size also includes three levels, they are chunk(2MB), piece(16KB) and sub-piece(1KB). Same as P2P system, P2P-VoD depends on tracker, DHT and gossiping method to discover content. Additionally, P2P-VoD selects pieces based three principles: sequential, rarest first and anchor-based. This paper examines the user satisfaction accurately, system and specific component's performance to measure and improve the system. The measurement is based on a real P2P-VoD system called PPlive. Accordingly, the building block, measurement results and corresponding methods strongly influence further study on the P2P-VoD system.

There are some obvious weaknesses in this paper. Since the paper only talks about the designs used in PPlive so that readers cannot get an diverse view of P2P-VoD. Secondly, the paper does not provide a optimal transmission algorithm for P2P-VoD. Besides, the users in PPLive have no control of their contribution level, the software itself update its chunk bitmap to tracker consistently. Furthermore, NAT and firewall have a negative effect on PPLive system, PPLive had to trot the upload and request rate to cut down losses.

I suggest to use the concepts and performance metrics in this paper to investigate different design choices. Studying P2P-VoD with scalable video coding[1] could be one of the choice. SVC is more flexible and more efficient than advanced video coding. Deploying SVC in P2P-Vod reduces the startup delay and enhance the playback quality.

[1] Y. Ding et al., Peer-to-peer video-on-demand with scalable video coding, Comput. Commun. (2010), doi:10.1016/ j.comcom.2010.04.025