Editorial Note

Multimedia delivery over P2P has become a significant research topic over the last decade. Motivated by the ever-increasing need for higher video quality as well as the need for global video access, P2P has become a popular and often used technology for video streaming. P2P techniques not only offer advantages such as robustness, self-organization, and scalability, but they also allow content providers to offer streaming services to a multitude of users with fewer resources. Thus P2P-based video streaming has been an active topic not only in the academic community, but also from a commercial point of view. P2P streaming applications, such as PPLive and UUSee, deliver thousands of video channels to millions of users daily. Moreover, new operating systems and mobile smart phones are starting to ship with support for P2P mechanisms for multimedia delivery, which is the case, for example, with the latest Android operating system.

With this supplemental issue of recently submitted TOMCCAP articles related to P2P streaming, we want to accommodate this development. This issue is comprised of six articles which present new approaches for important problems in P2P streaming systems as well as new insights and perspectives in this area.

Selected Articles

Today users are accessing streaming overlays more and more from their mobile devices and smart phones. In the article “Building an Efficient Transcoding Overlay for P2P Streaming to Heterogeneous Devices” by Dongyu Liu, Fei Li, Bo Shen, and Songqing Chen, the authors present a solution to offload the processors of mobile devices. To achieve this goal, they use peer-assisted video transcoding from more powerful peers in the streaming network.

The evolution of P2P streaming systems with higher video quality means that more strain is put on the networks. In the article “ISP-Friendly P2P Live Streaming: A Roadmap to Realization” by Zhijie Shen and Roger Zimmermann, the authors present new mechanisms to perform traffic localization of P2P streaming traffic. What makes this work distinct from previous efforts on this subject is that much of the cross-ISP traffic is reduced while having only a minimal impact on the video quality.

The streaming quality is indeed very important in any streaming application. In “Quality of Data Delivery in Peer-to-Peer Video Streaming” by Xiaosong Lou and Kai Hwang, the authors present new models for assessing the quality of delivery of P2P streaming systems. With the proposed model, the authors derive a lower bound on the probability of having no jitter in video delivery, thereby improving the quality in the whole system.

Practical P2P streaming applications have always been fascinating and they motivate researches to analyze them to gain more insights on their performance. In “Diagnosing Network-Wide P2P Live Streaming Inefficiencies” by Chuan Wu, Baochun Li, and Shuqiao Zhao, the authors analyze the inefficiencies of live streaming systems based on 2 years of traces of the popular UUSee streaming system. The authors provide major insights on how to address these inefficiencies to build better streaming applications.

P2P techniques for multimedia streaming are not restricted to live steaming; they also apply to video-on-demand (VoD). In “Auction-Based P2P VoD Streaming: Incentives and Optimal Scheduling” by Chuan Wu, Zongpeng Li and Xuanjia Qiu, and Francis C.M. Lau, the authors touch on the topic of incentives in P2P video-on-demand and devise an approach based on auctions to push users to contribute more resources to the system.

Also in the area of P2P video-on-demand, the article “Providing Hierarchical Lookup Service for P2P-VoD Systems” by Tieying Zhang, Xueqi Cheng, Jianming Lv, Zhenhua Li, and Weisong Shi, considers the problem of fast seeking. They propose a hierarchical lookup scheme that takes the playback position of the peers into account. Thereby the seeking peers are able to find provider peers quickly, improving the user experience.

We hope that this collection of articles will provide our readership with a broad spectrum of different views and research activities on this interesting, current, and still evolving area.

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