# Live Video Streaming using Peer-to-Peer technologies

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## I. Introduction

Watching videos on websites, e.g. YouTube, is a popular activity of users today. Although the video quality and length of the videos are increased significantly over the last couple of years, offering a full video-on-demand service is still not viable. Different television broadcasters are already setting up streaming services to watch (live) television programs via their websites, but often the quality of the stream and the total number of viewers is limited.

An interesting technology that offers a cost efficient mechanism for distributing live video is the Peer-to-Peer (P2P) overlay network model. In a P2P network all peers are both suppliers and consumers, in contrast to traditional client-server networks where only servers supply and clients consume. Therefore, P2P services are potentially highly scalable and robust.

Different research projects, e.g. P2P-Next (http://www.p2p-next.org/), currently investigate the possibility of using P2P technologies for (live) video streaming via the Internet. In our research study we use an existing P2P video streaming application (i.e. Tribler [1]) and extend it with buffering and congestion control mechanisms. Via test runs on a dedicated large-scale network emulation environment the performance increase is measured.

## II. Tribler and the Virtual Wall

Tribler [1] is a P2P video streaming application, which uses a modified version of the popular BitTorrent protocol. Traditionally, BitTorrent uses a rarest-first policy to decide which parts of a file to download first. However, to enable video streaming (i.e. a sequential flow of data), Tribler modifies the protocol to make sure that packets that are played within a small time frame, have the highest download priority. We extend Tribler with a cooperative buffering and congestion control solution to increase the systems' performance.

The Virtual Wall, a network emulator for large-scale network topologies, is used to evaluate Tribler with our extensions and offers more realism than simulations.

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## III. Conclusions

In order to provide a full and high quality video-on-demand service, we extend existing P2P video streaming technologies and analyze the performance using a large network emulation test bed.

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## References

[1] J. A. Pouwelse et. al., *Tribler: A social-based peer-to-peer system*, Concurrency and Computation: Practice and Experience, Vol. 20, 2008, pp. 127 – 138