Docket #: S11-079

Streaming Video to Mobile Clients Using Peer-to-Peer Systems

A system for enabling streaming video to a mobile client includes a plurality of fixed node peers linked to the mobile client via one or more networks as well as a video source linked to fixed node peers and configured to provide streaming video data representing a video presentation to each of the fixed node peers. A decoder assembly associated with each of the fixed node peers is configured to decode the streaming video data and to transcode a portion of the decoded streaming video data for transmission to the mobile client. A video substream manager and interleaver on the mobile client is provided for receiving the transcoded output of the decoder assemblies of the fixed node peers and reconstructing the video presentation on a screen of the mobile client.

Applications

- Video streaming to mobile users when a large population of fixed-line users (e.g., personal computers or set-top boxes) watch a live program.
- Fault-tolerant systems, including typical media servers. Servers in a data center, or distributed over physically different regions, can form a peer-to-peer network, serving mobile clients. Mobile clients can connect to multiple servers close to them simultaneously.
- Video-on-demand service. In this case, a peer (or server) possessing the video contents becomes a video source.

Advantages

- For mobile streaming, transcoding is necessary not only to reduce the video bitrate, but also to change the video encoding. Each mobile phone usually has its own transcoding requirements in terms of video encoding scheme, frame

rates, spatial resolution, and the bitrate. This poses a large burden of video processing on the video server or CDNs. Mobile P2P streaming is a good solution because it harnesses the users' excess computing power in addition to their uplink bandwidth.
- Due to the hardware requirements, there is a limit on the number of concurrent multicast sessions allowed at Internet routers. In case of IP-TV, the scalability is not an issue because the number of IP-TV channels is usually a few hundred, and is under the control of the content provider (and ISP). However, the number of user-generated contents can be huge. P2P streaming can overcome such limited scalability. P2P will be especially useful when each session has a small number of viewers, yet the number of concurrent sessions is high, compared to IP multicast.
- P2P streaming has a potential beyond live streaming, such as extit{time-shifted streaming}. Time-shifted streaming is achieved by storing the past portion of the live stream in the P2P system, usually at each peer. IP multicast only supports live streaming because storing contents at Internet routers is very costly, even considered impossible. Time-shifted streaming for mobile clients can also be supported if the P2P network is enhanced to support time-shifted streaming.

Patents

- Published Application: 20120054818
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