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Distributed Audio Transcoding For Peer-to-Peer Systems

Mobile devices often connect to the network via wireless channels. In general, the downlink of the wireless channel (e.g., the cellular access network) is limited in throughput. The wireless channel may also suffer from transient fading or unexpected interferences, which results in throughput fluctuation. Thus, it is desirable to adjust the bitrate of the audio stream over time to adapt to channel conditions. In addition, it is desirable if one can adapt the audio signal to individual mobile users depending on the requirements of applications and hardware limitations of mobile devices (e.g., low-end built-in speaker). The change in the bitrate or the quality of the audio signal can be achieved by transcoding.

This invention describes a distributed transcoding algorithm for audio streaming to mobile users in P2P systems. The algorithm allows several fixed nodes to perform transcoding for a mobile device. After a mobile device connects to multiple fixed nodes as its parents, each parent generates a substream by transcoding the original audio. These substreams are transmitted and assembled at the mobile device as if they were a single stream. If the mobile device loses some of its parents, it can decode the incomplete signal and the user experiences graceful degradation instead of complete disruption.

Applications

- Distributed audio streaming systems, such as distributed media servers or peer-to-peer based systems.
- Reliable systems or systems consisting of reliable and unreliable components. For example, when a reliable component is present, some reliable entity may stream the base layer and eliminate its duplication transmission. Enhancement layers can then be transmitted by either reliable/unreliable entities. Since the base layer stream is independent of the number of parents, mobile receivers

can connect to a multicast group to receive the base layer stream, if available.

Advantages

- Distributed audio transcoding (format and/or coding conversion) algorithm that produces coded outputs that are gracefully degradable under packet loss or transcoding entity failure.
- Light-weight and robust transcoding algorithm suitable for peer-to-peer streaming systems.

Patents

- Published Application: 20120029911
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