Science and Information Conference 2013
October 7-9, 2013 | London, UK

Predicting mobile network bandwidth fluctuation to enhance video stream service quality

Implementation of location-based, dynamic transmission rate-limit control

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Abstract

Due to the very nature of modern day smartphones and tablets, users of such devices will often travel from an area with strong mobile signal to a weaker area. Travelling from a strong signal area (SSA) to a weak signal area (WSA) causes a significant drop in the mobile network bandwidth available to the device. This causes quality of service (QoS) problems for video streams over mobile networks. For a completely pause-less video stream, the average stream download rate must be consistently equal to, or greater than, the video bit-rate. A sudden bandwidth drop often causes the stream to rapidly become starved of buffered data, causing a pause in playback whilst the client attempts further buffering – posing a QoS problem. This paper proposes a solution that helps counter this mobility problem by attempting to foresee a user entering a WSA, and dynamically rate-limiting other nearby best-case users to increase available bandwidth to said user. Predictions are based on active user location information, and Mobile Network Coverage Map (MNCM) queries. Best-case user determination, and dynamic rate-limit algorithms are described in this paper. Through mathematical proofing with two unique test scenarios, the proposed solution is proven to significantly improve QoS of a video stream to a user entering a WSA.

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