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Master Thesis -XR over 5G

Background

5G is a technology supporting a wide range of new and challenging services. XR (eXtended Reality) services such as AR and Cloud gaming are emerging HRLLC (High-Rate Low-Latency Communication) services currently being standardized. Having high requirements on throughput and being latency sensitive, XR is indeed a challenging service for the 5G network.

Quality of Experience (QoE) is a model of a user's experienced quality which for services such as XR is more adequate as a performance metric than throughput or latency. QoE is usually defined as function of both throughput and latency. Over a radio network such as 5G it is often not possible to sustain high QoE to all users. Furthermore, for a certain level of QoE it is far more costly for the radio network to serve users in bad positions than users in good positions. Therefore, there is a tradeoff between how many XR users that can be served and at which QoE level they can be served.

Rate-adaptation is one method for XR services to adapt to the varying nature of radio networks where that XR application adjusts the rate, usually the video rate, reactively based on the service provided by the network. Another method is to use Scalable Video Coding (SVC) where the video is split into two or more streams where packets from some streams can be lost without a large impact on the QoE. Since 5G is highly capable of providing differentiated QoS it could be expected that by providing the 5G network with information how provided throughput, latency, and packet loss to the SVC streams is translated to a QoE value will considerable increase the NR network ability to provide good QoE for all users.

Thesis Description

The aim of this thesis work is to further improve the performance of Ericsson's commercial product line, designing and evaluating algorithms for supporting XR with scalable video coding.

Evaluations of the proposed methods will be performed in Java-based radio network simulators and the results from those will inspire to further refine the proposed algorithms together with the advisor(s).

Qualifications

This project aims at Master of Science students in computer science, mathematics/statistics, or electrical engineering. Java and Matlab are our primary programming languages for simulation so a background in both of these is preferred.

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