

Anticipatory Video Streaming for Mobile Users

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Mobile video streaming is a rising business but poses significant challenges for network and service operators. In mobile networks, time-variant wireless channels often violate the content's rate requirement, which leads to poor streaming quality and wasted channel capacity. This tutorial will cover new techniques for anticipatory adaptation, which drastically improve this situation. By proactively adapting load and resource allocation to a prediction of the wireless channel state, the network prevents service outages even before they occur. Drive tests and simulation consistently show impressive gains in video quality at no significant cost for the operators. After presenting powerful heuristics, we will survey optimal formulations based on linear programming, quadratically constrained programming, and Markov decision processes. Channel prediction will be covered from the perspective of applying support vector machines and Bayesian spatio-temporal inference to radio maps. We will conclude with a vision for context and user-centric adaptation that could play a key role for providing truly seamless services in 5G.

Speaker's Bio:

Dr Stefan Valentin received an M.A. in EE with excellence from the Technical University of Berlin, Germany in 2004 and an Dr. rer. nat. in CS with summa cum laude from the University of Paderborn, Germany in 2010. In the same year, he joined Bell Labs, Stuttgart as a Member of Technical Staff, where he worked on wireless resource allocation algorithms for 4G and 5G. Recently, he moved to Paris to lead the Context-Aware Optimization team at Huawei's new Math and Algorithms Lab. Dr Valentin's research interests are channel prediction, context-aware resource allocation, and anticipatory adaptation. His solutions for anticipatory video streaming are licensed by a leading mobile operator and deployed since 2014. Dr Valentin advises the German Federal Ministry of Education and Research and is a fellow of the Klaus Tschira Society. He received the Bell Labs Award for Exceptional Achievements in 2011, the Klaus Tschira Award for Comprehensible Science in 2011, and the Bell Labs Award of Excellence in 2013.