



Lars K. Rasmussen, Elisabeth Uhlemann and Fredrik Brännström,

Concatenated systems and cross-layer design,

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Abstract

With high data rate wireless communications networks, new applications relying on high quality audio, video or control become viable. Examples of such applications are remote tele-medicine, collision avoidance systems, and audio/video entertainment at CD/DVD quality. These applications all demand high data rates, but have different quality-of-service (QoS) requirements in terms of reliability and latency. Currently, mobile communications networks have only limited provisions for QoS implementation and control. The conventional functionality separation in network design may be inhibiting effective implementation of guaranteed QoS. In this paper, we propose and review a system design paradigm based on concatenated system models and iterative signal processing. The novelty of the paradigm is to propagate methodologies of physical layer design across disciplinary boundaries within wireless network design in a bottom-up cross-layer approach. The paper is tutorial in nature, promoting the new view through presenting a series of examples of successful application of concatenated systems design from the physical and link layers.