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DATE OF DISPUTATION:	05 juni 2014
DISSERTATION TITLE:	*Resource Adaptation Methods for Improving Multimedia Streaming Throughput to Mobile Nodes in Heterogeneous Wireless Environments*

Svetlana Boudko is a senior research scientist at Norsk Regnesentral (Norwegian Computing Center). Her research interests include distributed computing, algorithms, video transmission, and wireless communication.

The thesis formulates effective strategies for delivery of streaming content for mobile users in resource-limited networks. In the work, we take into account 1) the presence of a large number of mobile devices operating simultaneously inside an area with overlapping coverage of several mobile networks; and 2) the ability of the mobile devices to exploit several network technologies and to be connected to different access points simultaneously. We aim to improve the performance of the whole system by jointly considering users' requirements and network limitations and by identifying and implementing adaptation mechanisms for different parts of the delivery path. Taking into account the complexity of the whole system, the thesis aims to design mechanisms operating in a decentralized manner with partial knowledge of the system.

For this purpose, the system is clearly separated into two distinct parts: the backbone part of the network and the wireless part. We study resource adaptation mechanisms for both of these parts that include 1) overlay routing for the backbone and 2) multi-access approaches for heterogeneous wireless network. For overlay routing in the backbone, we consider multipath streaming techniques. For the wireless part, we improve the utilization of resources by intelligently redistributing mobile devices among the available wireless connections. To evaluate the adaptation mechanisms for both of these parts, we build mathematical models for the overlay network and for the heterogeneous wireless network. For the overlay network, we develop and evaluate a distributed rate-allocation algorithm for delivery of video in a Video-on-Demand system built upon multipath delivery. The operation of the algorithm is based on information collected by overlay nodes.

For the heterogeneous wireless network, we consider the network selection to use for multiuser environments with possible multicast configurations. It allows the network to perform load balancing and increase the networks' throughput. The novelty of the solutions is that the network selection is done in a decentralized manner with only limited information available to decision makers.

The solutions are evaluated through multiple simulations. We show that these provide a substantial improvement in performance compared to earlier proposed solutions from the literature.