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**DISSERTATION TITLE:** *A Methodology to Model the Execution of Communication Software for Accurate Simulation of Distributed Systems*

Network simulation has for several decades been a popular approach to evaluate the performance and correctness of computer networks. The simulators generally model delay, packet loss and throughput limitations of communication media, but neglect the impact of packet processing within devices. Traditionally, devices such as routers and switches are expected to route and forward packets efficiently to have neglectable impact on the performance of the network as a whole. However, with new and emerging mobile networks, the impact of packet processing can no longer be neglected due to the small size and strict resource constraints of the participating devices. An increasingly heterogeneous set of devices can participate in these networks, ranging from tiny sensors via wearable computers and handheld devices to more powerful tablet PCs and laptops.

This thesis proposes a methodology to create models of a wide range of modern devices that can be used in network simulators to account for the impact that communication software execution has on network performance. This methodology allows stakeholders such as network researchers, developers, and administrators to obtain more accurate simulation results using existing network simulators with minimal modifications. Our models are based on high-level abstractions that facilitate performance analysis, allowing the experimenter to easily understand the behaviour or the modelled system, and to predict the performance impact of system modifications.

We provide a proof-of-concept implementation using the popular network simulator Ns-3, and evaluate models extracted from the recent smartphone Google Nexus One. The evaluation demonstrates that the models can accurately reflect the behaviour of the device, and that the simulation overhead of our models is sufficiently low to facilitate scalable simulations. We are currently working towards making these models available in the public domain for the benefit of anyone interested.