

DOKTORAND:

GRAD: Philosophiae doctor
FAKULTET: Det matematisk-naturvitenskapelige fakultet
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AVHANDLINGENS *Theoretical and Data-Driven Approaches for*
TITTEL: *Energy-Efficient Networks*

Mobile traffic is an essential part for today's society, fueling people with entertainment such as Netflix, Youtube and HBO. This leads to a near biannual doubling in traffic. The increased data usage comes with a cost, as ICT is becoming an ever-increasing source of pollution. It is therefore crucial to find methods that can curb the effect of the exponential growth.

New technological advancements both in communications (5G and IoT) and in power (Smart Grid), may provide the necessary solutions. This work investigates the intersection between these technologies and how they may provide energy-efficient solutions. It is based on data collected from large scale measurements done in an operators' network, and we show how differences in predictability in traffic and spectral-efficiency, can be leveraged on with different market models modelled with game theory. We refine established concepts for energy-efficiency such as offloading, so that it can be used as the coming technology evolve. Furthermore, we scrutinize the use of renewable energy source both in terms of battery and the energy source itself. We investigate the assumption about green energy for communication networks and show that significant changes are need for a green shift in power to occur.