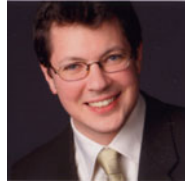


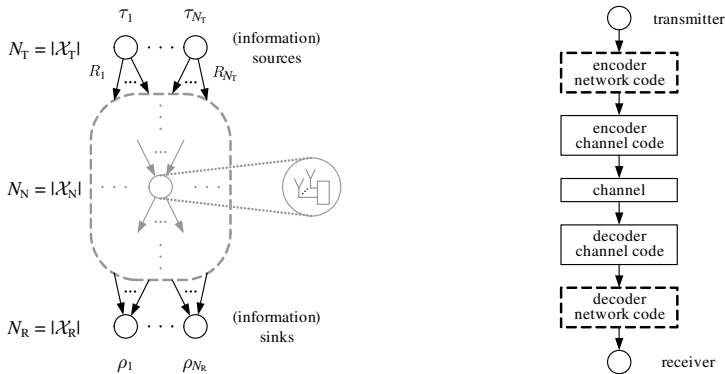
# Physical Layer Network Coding for Improved Energy Efficiency

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In 2000, the concept of network coding was introduced by Ahlswede et al. and it led to paradigm changes on several layers. On the physical layer, it changed the way how interference is handled. Interference is now rather exploited than avoided or canceled. On the network and transport layer, it changed the way how packets are forwarded. Instead of separate packets, combinations of packets flow through the network. The concept of network coding was successfully applied to several research scenarios ranging from ad-hoc and sensor networks to peer-to-peer file sharing.



First, we will review the basic concept of network coding by two basic example scenarios: the butterfly and the two-way relaying network. Then, the two classes of network coding over finite fields (linear network coding, deterministic and random network coding) and physical layer network coding (also known as wireless network coding) are discussed. Finally, we apply the idea to a multiple antenna interference network scenario and show how the energy efficiency of the overall network can be significantly improved. The presentation is concluded by pointing out open questions as well as an overview over relevant references.