Abstract:
We discuss the scenario where remote nomadic users (or a single user) communicate to a destination via a set of intermediate agents. The agents are ignorant of the codebook used due to the nomadic regime and are connected to the destination via reliable links of finite capacity. We focus here on independent Gaussian channels to all agents, who are equipped with a single antenna while the transmitter or transmitters may possess multiple antennas.

First we review the results associated with a single transmit antenna, invoking decentralized quantization, which yield the ultimate achievable rate, in the nomadic regime.

For a multiantenna transmitter, upper and lower bounds on the achievable rate with Gaussian signaling are developed, and it is demonstrated that the full multiplexing gain of the system can potentially be maintained, even when the transmitter is denied the knowledge of the channel state information (corresponding fading coefficients). We also examine the asymptotic setting with the number of agents and transmit antennas (or users) taken to infinity, yet maintaining a fixed ratio. Here we demonstrate the incompetence of the simple compression when compared to a Wyner-Ziv based approach.

Finally, we confine attention to the basic single antenna scheme with two agents and consider the impact of a finite capacity feedback link from the final destination to the agents, allowing for a single round of conferencing. Network coding is optimal here in the sense of facilitating the full exploitation of the conferencing phase on the feedback link (from the destination to the agents). The impact of this conferencing protocol on the ultimate performance is quantified, and implications of layered coding in this scenario are also considered.

The talk is based on joint works with Amichai Sanderovich, Yossef Steinberg, and Michael Peleg.