



Research Article



Optimal Linear Transmit Beam Forming Techniques for Multi-User MIMO

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ABSTRACT

Adaptive transmit beam forming is key to increased spectral and energy efficiency in next-generation wireless networks. In light of the difficulty to compute the optimal multiuser transmit beam forming there is a

plethora of heuristic schemes. Transmit beam forming is a versatile technique for signal transmission from an array of N antennas to one or multiple users. In wireless communications, the goal is to increase the signal power at the intended user and reduce interference to non-intended users. A high signal power is achieved by transmitting the same data signal from all antennas. Since transmit beam forming focuses the signal energy at certain places, less energy arrives to other places. This allows for so-called space-division multiple accesses (SDMA), where K spatially separated users are served simultaneously. One beam forming vector is assigned to each user and can be matched to its channel. Unfortunately, the finite number of transmit antennas only provides a limited amount of spatial directivity, which means that there are energy leakages between the users which act as interference. To design a beam forming vector that maximizes the signal power at the intended user, it is difficult to strike a perfect balance between maximizing the signal power and minimizing the interference leakage.

Keywords: SDMA, Transmit Beam formin, SNIR and Power minimization.

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