Energy-Efficient and Spectrally-Efficient MIMO

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***Abstract*—While enabling energy efficiency and spectral efficiency, MIMO systems tends to be associated to an exponential increase of complexity and of signal processing, with the increase of the number of transmit and receive antennas. As described in this article, a reduction of complexity can be obtained with the use of the two proposed algorithms: Maximum Ratio Combining (MRC), and Equal Gain Combining (EGC). These algorithms are compared with the Zero Forcing (ZF). While ZF requires the computation of the pseudo-inverse of the channel matrix for each frequency component, such processing is not required for MRC/EGC, keeping the complexity requirements at low level, but generating a certain level of interference. In this article, we consider an iterative receiver that mitigates the interference associated to MRC/EGC, leading to a performance very close to that obtained with conventional pilots, but without the corresponding loss in the spectral efficiency. 5G Communications will support millimeter waves (mm-Wave), alongside with the conventional centimeter waves, which will enable much higher throughputs and facilitate the employment of hundreds or thousands of antenna elements, commonly referred to as Massive Multiple Input Multiple Output (MIMO) systems.**

Keywords—Energy Efficiency, MIMO Systems, post-processing, SC-FDE, mm-Wave, 5G.

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