

## Massive MIMO with Nonlinear Amplification: Signal Characterization and Performance Evaluation

Abstract:

In this paper, we consider a  $T \times R$  massive MIMO system with up to  $R$  simultaneous links ( $T \gg R \gg 1$ ) and nonlinear amplifiers in each transmitter branch. The impact of a nonlinear amplification is analytically studied and accurate expressions for the spectral characterization of the transmitted signals, as well as the bit-error-rate (BER) are derived. The accuracy of our analysis is validated by simulations. It is also shown that the nonlinear distortion levels for detection purposes decrease with the ratio  $T/R$ , which means that the impact of the nonlinear distortion effects on the system's performance can be alleviated provided that  $T \gg R$ . Therefore, the combination of massive MIMO systems with nonlinear, highly efficient power amplifiers can be an interesting option for low-cost, broadband wireless systems.