

Impact of Fading Severity and Receive Antenna Correlation on TAS/MRC under Nakagami Fading

Juan P. Peña-Martin, Concepcion Tellez Labao, Juan M. RomeroJerez
Departamento de Tecnología Electrónica
Universidad de Málaga
29071 Málaga, Spain
Email: jppena@uma.es

Abstract:

Transmit antenna selection (TAS) is well-known to allow a reduced signal processing complexity while maintaining the diversity order of a MIMO system. Assuming Nakagami fading, we show in this work that antenna correlation in a maximal ratio combining (MRC) receiver, as well as severe fading, have a beneficial impact on ergodic capacity if TAS is used at the transmit end. This is in sharp contrast to MRC reception when a single transmit antenna is considered. We also derive novel closed-form expressions for the average symbol error rate (ASER) of TAS/MRC for different M-ary modulations, generalizing previous works by considering receive antenna correlation where the eigenvalues of the receive correlation matrix have an arbitrary multiplicity. Monte Carlo simulations are performed to validate the analysis. Our results show that, contrary to the behavior of ergodic capacity, antenna correlation and severe fading always have a detrimental impact on ASER for the average SNR values of interest, as in those cases the ASER is dominated by the diversity gain.

ACKNOWLEDGMENT

This work was supported in part by the Spanish Government-FEDER public Project No. TEC2013-42711-R and in part the by Universidad de Málaga, Campus de Excelencia Internacional Andalucía Tech.