Parameter Evaluation of Outdoor SIMO Radio Channels for GSM applications

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Abstract:

In this work, the time-delay and direction of arrival parameters for an outdoor SIMO (Single-Input Multiple-Output) radio channel are obtained from a high-resolution estimation algorithm and advanced 3D ray-tracing. The SIMO radio channel was measured on the Lille1 campus under Non-Line-of-Sight (NLOS) conditions with a virtual 6 x 6 uniform rectangular array at the receiver and single antenna at the transmitter. A matching pair of dual-polarized patch antennas with 1.3 GHz central frequency and 22 MHz bandwidth was used for both Rx and Tx to measure the co- and cross-pola r channels. The geometrical parameters were evaluated over a 22 MHz and 200 kHz bandwidth corresponding to the total and single channel bandwidths available for the GSM standard, respectively. For the sake of comparison, the geometrical parameters of the studied scenario were also evaluated thanks to a ray-tracing software. For both studied bandwidths, the estimated data are shown to be in good agreement with the ray-traced data that contribute the most in energy to the investigated NLOS radio channel. The results show the potential of joint TOA-DOA estimation not only for GSM applications but also for the 3rd and upcoming 4th Generation of mobile broadband wireless systems.