

## **Taking into account variability in wireless communication devices performance**

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The quality of the radio link in a wireless communication is heavily dependent on what happens at both ends of the link, especially on the terminal side when the base station is in an elevated and free space location. In addition, these devices are often of highly varying performance and in widely variable kinds of environments, both regarding the local propagation context and the immediate (near field) medium. All this constitutes many sources of variability, which are not easily accounted for and which, in practice, are seldom considered.

In the paper “Statistical Modeling of the Radio-Electric Properties of Wireless Terminals in their Environment,” IEEE Antennas and Propagation Magazine, Vol. 54 , 6, 2012 by the author, a general methodology is proposed in order to combine the full description of antenna characteristics and a discrete multipath based channel model into a compact "effective gain" performance parameter, which is a stochastic quantity for which the parameters of the statistical distribution are related to high level descriptors, such as the propagation scenario, the type of devices and of near field environment, the use case etc. In the present work, we extend the methodology to multiple antennas devices, for which the variable factors can be summarized in i) non identical antenna behavior (power gain, radiation patterns) ; ii) correlation between signals resulting from a moderate multipath angular spread ; ii) antenna coupling resulting in signal correlations. Their specific and combined impacts are investigated for a set of variable multiple antenna systems, as regards the communication link quality with a generic (ideal) base station.