

Experimental Investigation of a Directional Outdoor-to-In-Car MIMO Propagation Channel

Author(s) - Institution(s):

Fredrik, Harrysson, Ericsson
Jonas, Medbo, Ericsson
Fredrik, Tufvesson, Lund

Corresponding author email: : fredrik.harrysson@ericsson.com

Corresponding WG group:

TWGV
WG1

Abstract:

The demand for wireless channel models including realistic user environments is increasing. This motivates work on more detailed models that are reasonably simple and tractable but with adequate statistical performance. In this paper, we present an investigation of the spatial outdoor-to-in-car radio channel at 2.6 GHz. Specifically, we investigate the performance of a multiple antenna smartphone mock-up in the hand of a user. We evaluate and utilize a composite channel approach to combine measured antenna radiation patterns with an estimated spectral representation of the multipath channel outside and inside the car in two different scenarios. The performance of the method is investigated and comparisons with direct channel measurements are performed. Statistical and directional properties of the outdoor-to-in-car channel are presented and analyzed. It is found that the composite method, despite nearfield problems when estimating plane-wave channel parameters in a very narrow environment, constitutes a tool that provides reasonably viable statistical results. In addition, we have found that the introduction of the car in the propagation environment increases scattering and eigenvalue dispersion while it decreases pairwise antenna signal correlation. These statistical properties are found to slightly increase the possible diversity and the spatial multiplexing gains of multiple antenna terminals when located inside cars. This positive effect, however, is small compared to the negative effect of car penetration loss.