Experimental Analysis of Dense Multipath Components in an Industrial Environment

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Abstract:

This work presents an analysis of Dense Multipath Components (DMC) in an industrial workshop for shipping container restoration. Radio channel sounding experiments with a vector network analyzer and virtual antenna arrays were carried out. Specular and dense multipath components were estimated from channel sounding data by means of an iterative maximum-likelihood algorithm (RiMAX). Two main parameters of DMC are studied: the distribution of radio channel power between specular and dense multipath, and the DMC reverberation time in the time-delay domain. The DMC power is found to account for 23 to 70\% of the total channel pow er. Statistically significant difference between DMC powers in line-of-sight and non-line-of-sight situations is discovered, and this difference can be largely attributed to the power of the line-of-sight multipath component. In agreement with the theory of room electromagnetics, the DMC reverberation time is found to be nearly constant and thus independent of transmitter/receiver location or link shadowing conditions. Overall, DMC in the industrial workshop appears to be more important, i.e., larger fraction of channel power and longer reverberation time, than in office environments: this is explained by the highly cluttered and metallic nature of the industrial environment.