Measurement-based Analysis of Quality Factors for Ultra-Wideband Communication in an Indoor Environment

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Abstract:

In our work, we present an estimate of the reverberation time known from the theory of Room Electromagnetics for Ultra-Wideband (UWB) indoor communication, based on channel sounding measurements ranging from 3.1 GHz-10.6 GHz. We also investigate the influence of metallic equipment in a room when estimating the reverberation time, where it was found that this could lead to significant errors for the higher frequencies in the UWB band. In addition, an estimate of indoor quality factors is presented, where a quasi-linear relation was found between frequency and quality factor. The techniques in this work can be used as guidelines for the prediction of quality factors based on mechanical models depending on room properties, which in turn be used to predict the average power level in a room, allowing for an easy characterization of the indoor radio channel.