Indoor propagation: comparisons between simulations and measurements

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submitted to URSI commission F1 (Propagation Modeling and Measurement)

This paper presents comparisons between indoor propagation channel wide band measurements and two simulations algorithms based on ray−optic approximation.

Measurements were made at 2.4 GHz (with a 400 MHz bandwidth) in the fourth floor of a modern building, both with and without line of sight propagation (Fig 1).

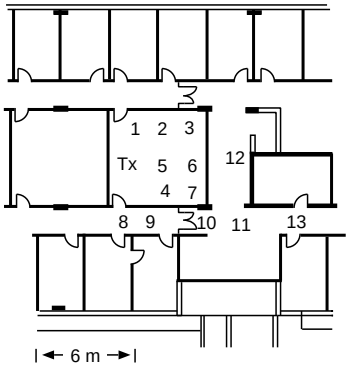

Fig 1 1...13: receivers
Tx: Transmitter

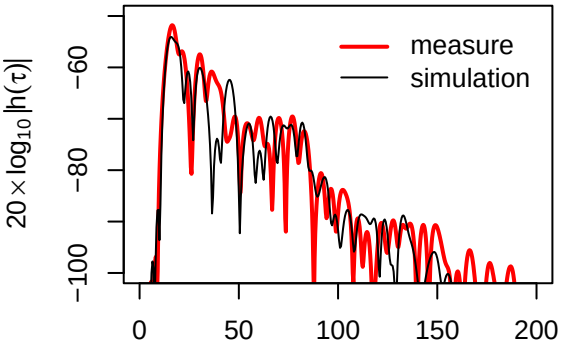

Fig 2

The measurements device was built around a vector network analyser. The sampled frequency response is Fourier transformed to give the impulse response.

Simulations are obtained by the image method and by the shooting ray method and compared with measurements. To get simulations presenting an acceptable agreement with measurements, several features have to be considered which are the matter of this paper:

1. Scene description accuracy;
2. The simulations give impulse response as a set of Dirac impulses and must be properly filtered;
3. due attention is paid to variation with frequency of the rays parameters (amplitude and phase). This point generally neglected in previous studies, globally increases agreement with experimental data. A frequency sweep is made in simulations to account this last point.

Agreement between simulated and measured impulse responses at point 4 of the scene is illustrated in Fig 2.

More results will be presented in the final paper, comparing impulse responses and derived parameters such as the rms delay spread, mean excess delay and local mean power.