# Performance Bounds for Multipath-aided Indoor Navigation and Tracking (MINT)

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**Abstract:**

The MINT (multipath-aided indoor navigation and tracking) problem exploits the geometry of deterministic multipath components (MPCs) for robust indoor positioning in line-of-sight (LOS) and non-LOS situations. It assumes a known room layout and can thus easily make use of signals reflected by the walls, for instance.
In this paper, the Cramer-Rao lower bound of the positioning error is derived for this problem. This requires a novel channel model, where diffuse multipath is modeled as a colored Gaussian process that influences the effective SNR of deterministic MPCs. The adverse effect of path overlap is demonstrated and discussed. Computational results show the three-fold importance of a large signal bandwidth. The bandwidth reciprocal (i.e. the pulse duration) multiplies the error standard deviation-a fundamental result well-known from AWGN channels. But it also multiplies the effective power of the interfering diffuse multipath and gives rise to additional path overlap. A minimum bandwidth of 1~GHz seems appropriate and sufficient.