**Lateral Position Dependence of MIMO Capacity in a Hallway at 2.4 GHz**

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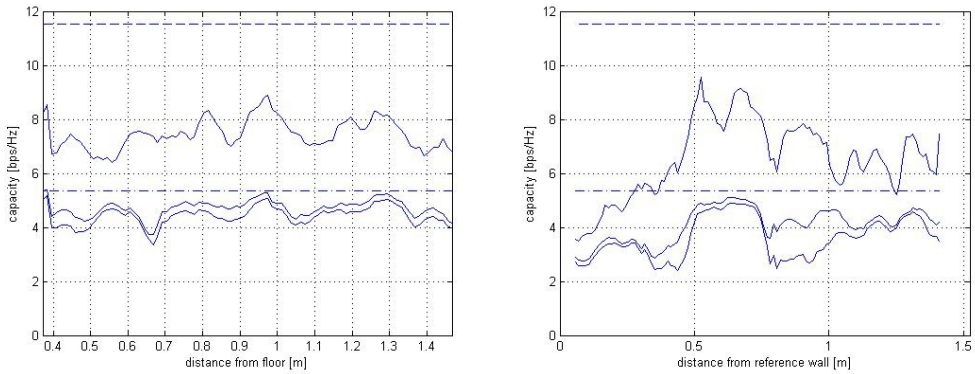
We report on measurements of the capacity of a 2.4 GHz vertically-polarized 3 x 4 MIMO system in which both ends of the wireless link are located in a hallway. This scenario is of interest due to the increasing mobility of wireless devices, and because hallways have previously been reported to create difficulties for MIMO propagation. Here we focus on the variation in capacity as a function of position as one side of the wireless link is moved laterally (i.e., vertically and horizontally) in the hallway. We find not only significant degradation in MIMO capacity due to rank collapse, but also identify considerable variability due to changes in the signal strength. The capacity along a vertical cut is found to be relatively constant about 7.5 +/- 1 bps/Hz for a reference signal-to-noise ratio (SNR) of 10 dB at a range of 12 m, which is significantly less than the ideal maximum of 11.5 bps/Hz. The capacity along a horizontal cut is found to be about 6.7 +/- 3 bps/Hz under the same conditions, dominated by a large-scale signal strength variation which can be attributed to identifiable propagation mechanisms. We also consider the performance relative to simpler rank-1 (diversity/beamforming) schemes, with and without channel state information.




*Left Panel:* Capacity in the vertical cut. Top solid: Measured 3 × 4 MIMO, Middle solid: Measured best rank-1 channel, Bottom solid: Measured conventional beamformer; Top dash: Ideal 3 × 4 MIMO, Bottom dash: Ideal rank-1 channel.
*Right Panel:* Capacity in the horizontal cut. Curves have same meaning as in left panel.