

Channel Estimation and Link Level Evaluation of Adaptive Beamspace MIMO Systems

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Abstract:

Beamspace MIMO (BS-MIMO) systems have been recently proposed as a means to address the two key weaknesses of conventional MIMO systems: the antenna size and the need for multiple RF chains. Based on Electronically Steerable Passive Array Radiators (ESPAR), the research effort on BS-MIMO focuses on the development of functional MIMO transmission schemes with efficient multiplexing and beamforming capabilities with the use of a single RF chain while maintaining extremely small antenna size. Previous studies have shown that for small-sized antenna arrays, BS-MIMO systems clearly outperform conventional systems in terms of system capacity. However, until now research is limited to the ESPAR antenna properties and theoretical results. This paper makes the first step to practical system design and focuses on BS-MIMO channel estimation. Basic estimators are applied in a BS-MIMO system with adaptive pattern reconfiguration. Finally the first, fundamental link level evaluation results are produced from simulation and system performance is compared vs. equivalent conventional MIMO.