Performance of Hybrid Beamforming for mmWave Massive MIMO Systems in Dense Urban Scenarios

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Abstract:

It is expected that fifth generation (5G) systems will bring a great increase of the system data rate, which motivates the key role of massive MIMO cellular solutions operating in mmWave bands. However, the huge cost and complexity of fully digital schemes applied to massive MIMO systems has boosted the interest on hybrid beamforming solutions with unclear performance when it comes to their use in a cellular system. This paper assesses with simulations the behavior of a hybrid beamforming scheme in a cellular system, comparing its performance with an increasing number of radiofrequency chains against the fully digital option. Results show that hybrid beamforming can reach the performance of a fully digital precoder when working under line of sight conditions and with a sufficient number of parallel radiofrequency chains. On the other hand, hybrid schemes are shown to be more sensitive to interference and higher performance degradation is observed in non line of sight conditions. However, they still offer huge potential as compared with current 4G technologies.