

Evolving mmWave massive MIMO towards an all-digital paradigm

Abstract: Over the last decade, there has been substantial progress in development of low-cost hardware targeting commercial applications for the vast available spectrum in the millimeter wave (mmWave) band. The tiny wavelengths in these bands enable the realization of antenna arrays with a very large number of elements within compact form factors. While most prior work has focused on RF beamforming, in which such arrays can form beams towards one direction at a time, recent advances in RFIC design demonstrate that all-digital massive MIMO systems, supporting spatial reuse across a large number of simultaneous users, are on the cusp of feasibility. The realization of such all-digital systems requires overcoming or sidestepping significant hardware bottlenecks, including RF nonlinearities, phase noise, and the low precision of the analog-to-digital converters (ADCs) available at multiGHz sampling rates. In this talk, we discuss recent progress in hardware/signal processing co-design for alleviating such bottlenecks by taking advantage of the increase in the number of antenna elements.