



Project Proposal

Hybrid Analog-Digital Beamforming for Wideband Signal Model

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Massive MIMO systems are considered as one the leading enabler of 5G wireless communication. In this technology, the transmitter and receiver are equipped with very large number of antennas. This can potentially allow for higher data rates and better spectral efficiency.

One of the main challenges is massive MIMO system is the hardware complexity. When considering hundreds of antennas, dedicated RF chain per antenna like in traditional MIMO systems is no longer possible. Hence, it is desirable to reduce the number of RF chains is the system while still benefiting from the large number of antennas.

To this aim, a hybrid analog-digital architecture is suggested, where some of the processing, traditionally performed in the digital domain, are shifted to the analog domain. This technique is call hybrid analog-digital beamforming

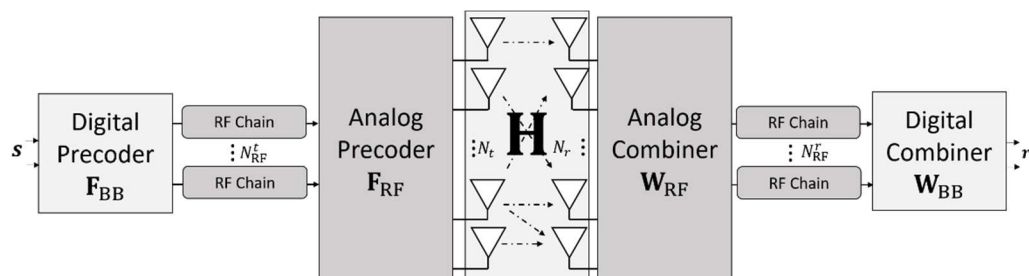
Therefore, an efficient design method for the hybrid beamformer is required.

Most of the previous works on this field considered a narrowband signal model. However, a wideband signal model is a more accurate assumption in most cases, especially if the system operates in mmWave technology.

The goal of the project is to generalize a previously suggested framework [1] for hybrid beamformers design to the wideband signal case: to incorporate the wideband signal model in the existing framework and make all the necessary adjustments to the theorems and algorithms.

The project will include research next to matlab implementation

Required background: Introduction to Digital Signal Processing (044198), Computational Methods for Optimization (046197) (or a similar course)



[1] S. S. Ioushua and Y. C. Eldar, "Hybrid Analog-Digital Beamforming for Massive MIMO Systems".