
Scattered Pilots-Based Frequency Synchronization for Multiuser OFDM Systems With Large Number of Receive Antennas

Abstract:

Large-scale multi-input multi-output (MIMO) technique has drawn considerable research interest recently. However, multiuser transmissions in large-scale MIMO systems would face challenging estimation and compensation for multiple carrier frequency offsets (CFOs) that co-exist at the receiver. In this paper, we design a new frequency synchronization scheme in multiuser orthogonal frequency division multiplexing uplink with the aid of scattered pilot symbols. We specifically consider a base station with a large number of antennas and propose to assign a number of scattered pilot subcarriers to each user. With sufficient spatial dimensions offered by the large number of antennas, the designed scheme could estimate CFO for each user individually and eliminate the necessity of the multidimensional search. Moreover, after the CFO estimation, the receive beamforming matrix is further designed for inter-user interference cancelation, which yields an equivalent single user transmission model. The conventional single user channel estimation and data detection can then be performed. Finally, the numerical results are provided to verify the proposed studies.