

In this paper, we propose a new blind frequency synchronization scheme for multiuser orthogonal-frequency-division multiplexing (OFDM) uplink transmissions. The spatial multiplexing is supported in the considered model that allows the subcarriers to be simultaneously occupied by multiple users, while the orthogonal frequency division multiple access (OFDMA) can serve as a special case of our discussion. We propose to assign different null subcarriers to different users and design algorithm that can perform blind carrier frequency offset (CFO) estimation for each individual user with the aid of large number of receive antennas, which then removes the necessity of multidimensional searching. After estimating CFO for one user, the orthogonal complement space of the other users can be obtained which could be further utilized for multiuser interference cancelation. Hence, the multiuser OFDM uplink model reduces to an equivalent single user signal model, where the blind channel estimation with scalar ambiguity can be designed and the conventional single-user data detection can be performed. To make the proposed study complete, the closed-form performance analysis for mean square error (MSE) of the CFO estimation is derived, based on which the discussion about optimal null subcarrier assignment scheme is further provided. Finally, the Cramer-Rao bound (CRB) is derived, and the numerical results are provided to corroborate the proposed studies.