Time-Frequency-Multiplex Preamble Design for Joint I/Q Imbalance, CFO and Channel Estimation in OFDM Systems

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Abstract— **In this paper, a novel time-frequency-multiplex preamble design is proposed to estimate the in-phase and quadrature-phase (I/Q) imbalance, carrier frequency offset (CFO) and channel impulse response parameters for the zero-IF receiver of orthogonal frequency-division multiplexing (OFDM) systems. First, the contiguous time-multiplex preamble is designed to estimate CFO. Then, the two CFO compensators of the positive and negative subcarriers are proposed to separate and estimate I/Q imbalance and channel parameters. Finally, the image signal cancellation via the estimated parameters is designed to enhance the receiver performance. The advantage of the proposed time-frequency-multiplex preamble design is low computational complexity and robust performance. Simulation results confirm that the proposed estimator can provide reliable performance over the severe I/Q imbalance, CFO, and multipath fading channel environment.**

Keywords*—*OFDM, CFO, I/Q imbalance, channel estimation, equalization.

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