

A Study of Insufficient Cyclic Prefix by using Precoding for MIMO-OFDM Systems

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Abstract— In an orthogonal frequency division multiplexing (OFDM) system, the cyclic prefix (CP) is added to the beginning of each symbol to prevent inter symbol interference (ISI) and intercarrier interference (ICI). In practical OFDM system, the CP lengths are fixed. When the CP length is shorter than the channel impulse response (CIR) length, referred to as “insufficient CP”, significant signal distortion can occur at the receiver. This paper proposes the use of precoding technique at the transmitter to solve the ISI and ICI problems owing to insufficient CP. Pre-coding is first derived for single-input single-output (SISO) OFDM system, and then generalized for multiple input multiple output (MIMO) OFDM system. Simulation results on the bit error rate (BER) versus the signal-to-noise ratio (SNR) demonstrate that the proposed precoding technique is much more efficient the conventional OFDM with one-tap equalization when the CP is insufficient.

Keyword— MIMO-OFDM, precoding, cyclic prefix, channel dependent, insufficient length



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