

Abstract:

Nonlinear phase distortion can severely degrade the performance of optical signals, both in terms of spectral characteristics and BER (Bit Error Rate) performance. This is especially serious for multicarrier optical signals. In this paper we study analytically the impact of nonlinear phase distortion on Coherent Optical Orthogonal Frequency Division Multiplexing (CO-OFDM) schemes with large number of subcarriers. The nonlinearly-distorted signal can be decomposed as the sum of useful and self-interference components. Conventional CO-OFDM implementations treat the self-interference as an undesirable noise term that leads to performance degradation. However, it is shown that this distortion component has information on the transmitted signals that can be employed to improve the performance. We show that the nonlinear phase distortion can lead to performance improvements relatively to the ideal linear case, contrary to what one could expect. We also present a sub-optimum receiver that is able to take advantage of this potential performance improvement.

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