

Abstract

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Exploring BER performance of a SC-LPPM based LOS-VLC system with distinctive lighting

This paper introduces an optimization parametric study for a sub-carrier pulse position modulation (SC-LPPM) based line of sight-visible light communication (LOS-VLC) indoor system. The optimization process targets achieving optimum possible communication and illumination performance. The obtained results show that, to satisfy enough illumination level (≥ 300 Lux) the operating bit rate should be ≥ 3 Mbps. Increasing the subcarrier modulation factor (SCMF) in the range 0 to 40% at 3 Mbps provides a remarkable BER (up to 10^{-6}) and a reasonable illumination performance (~ 400 Lux) with an acceptable increase in the total required system lighting power. Increasing the modulation level (L) enhances the BER performance at the cost of the illumination performance especially at low bit rate regions. The choice of $L = 8$, SCMF increases by 40% and a bit rate ≥ 3 Mbps provides a BER of 2.254×10^{-6} and an illumination level of 420 Lux through the room and 4.54×10^{-5} , ~ 140 Lux respectively, when moving towards the room corners. The work is extended to study the effects of: 1) different modulation levels and SCMF, 2) distance between transmitter and receiver, and 3) transmitter semi-radiation angle and SCMF on system performance and power requirements.