

Simple digital FIR equalizer design for improving the phosphor LED modulation bandwidth in visible light communication

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Received: 17 January 2013 / Accepted: 30 April 2013 / Published online: 8 May 2013
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Abstract We propose and demonstrate a simple digital post-equalization technique to improve the bandwidth-limitation of light-emitting-diode (LED) visible-light-communication (VLC) channel. The design of finite-impulse-response equalizer according to the channel response is presented to improve the bandwidth limitation of LED VLC channel. Here, no optical blue filter is used. The simulation and experimental results show ~ 10 times enhancement of the direct modulation speed of white-light LED VLC system. When compares with the previous demonstration using high-pass equalization circuit constructed by lumped capacitor and resistor, the proposed scheme shows an improvement in signal quality and transmission distance, and a 10 Mbit/s error-free free-space transmission over 1 m can be achieved under the bit error rate of $< 10^{-9}$.

Keywords Visible light communication (VLC) · FIR filter · Access network · LED

1 Introduction

Recently, light emitting diode (LED) lighting is gradually replacing the traditional incandescent or fluorescent lighting since LED is more power-efficient and becoming more

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