A 550 Mbit/s real-time visible light communication system based on phosphorescent white light LED for practical high-speed low-complexity application

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Abstract: In this paper, we first experimentally demonstrate a 550 Mbit/s real-time visible light communication (VLC) system based on nonreturn-to-zero on-off keying (NRZ-OOK) modulation of a commercial phosphorescent white light LED. The 3-dB modulation bandwidth of such devices is only a few megahertz. We proposed an analog pre-emphasis circuit based on NPN transistors and an active post-equalization circuit based on an amplifier to enhance the 3-dB bandwidth of VLC link. Utilizing our proposed pre-emphasis and post-equalization circuits, the 3-dB bandwidth of VLC link could be extended from 3 to 233 MHz with blue-filter, to the best of our knowledge, which is the highest ever achieved in VLC systems reported. The achieved data rate was 550 Mbit/s at the distance of 60 cm and the resultant bit-error-ratio (BER) was $2.6 \times 10^{-9}$. When the VLC link operated at 160 cm, the data rate was 480 Mbit/s with $2.3 \times 10^{-7}$ of BER. Our proposed VLC system is a good solution for high-speed low-complexity application.

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OCIS codes: (060.4510) Optical communications; (060.2605) Free-space optical communication.

References and links