

A Comparative Analysis of Various Companding Techniques Used to Reduce PAPR in VLC Systems

Authors : Arushi Singh, Anjana Jain, Prakash Vyavahare

Abstract : Recently, Li-Fi(light-fidelity) has been launched based on VLC(visible light communication) technique, 100 times faster than WiFi. Now 5G mobile communication system is proposed to use VLC-OFDM as the transmission technique. The VLC system focused on visible rays, is considered for efficient spectrum use and easy intensity modulation through LEDs. The reason of high speed in VLC is LED, as they flicker incredibly fast(order of MHz). Another advantage of employing LED is-it acts as low pass filter results no out-of-band emission. The VLC system falls under the category of 'green technology' for utilizing LEDs. In present scenario, OFDM is used for high data-rates, interference immunity and high spectral efficiency. In spite of the advantages OFDM suffers from large PAPR, ICI among carriers and frequency offset errors. Since, the data transmission technique used in VLC system is OFDM, the system suffers the drawbacks of OFDM as well as VLC, the non-linearity due to non-linear characteristics of LED and PAPR of OFDM due to which the high power amplifier enters in non-linear region. The proposed paper focuses on reduction of PAPR in VLC-OFDM systems. Many techniques are applied to reduce PAPR such as-clipping-introduces distortion in the carrier; selective mapping technique-suffers wastage of bandwidth; partial transmit sequence-very complex due to exponentially increased number of sub-blocks. The paper discusses three companding techniques namely- μ -law, A-law and advance A-law companding technique. The analysis shows that the advance A-law companding techniques reduces the PAPR of the signal by adjusting the companding parameter within the range. VLC-OFDM systems are the future of the wireless communication but non-linearity in VLC-OFDM is a severe issue. The proposed paper discusses the techniques to reduce PAPR, one of the non-linearities of the system. The companding techniques mentioned in this paper provides better results without increasing the complexity of the system.

Keywords : non-linear companding techniques, peak to average power ratio (PAPR), visible light communication (VLC), VLC-OFDM

Conference Title : ICCE 2016 : International Conference on Communications Engineering

Conference Location : Amsterdam, Netherlands

Conference Dates : May 12-13, 2016