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Convolutional Neural Network Based Equalizer for Improving the Reliability Performance of OFDM with Subcarrier Power Modulation

Mohammed Hijazi, Jehad M. Hamamreh

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ABSTRACT

As the demand for higher data rates has rapidly been increasing day after day, researchers around the world have given serious attention and made significant efforts towards exploring new techniques that can improve the spectral efficiency of future wireless systems. Among these methods, the modulation technique named as orthogonal frequency division multiplexing with subcarrier power modulation (OFDM-SPM) is considered as a key potential candidate transmission method, which has the potential to effectively improve the per-user spectral efficiency of wireless networks. However, the reliability performance efficiency of OFDM-SPM is not that high, where it was found that the additional data stream conveyed by sub-carriers' power has higher bit error rate (BER) performance compared to the data stream conveyed by conventional modulation schemes. To improve the reliability performance of OFDM-SPM furthermore, in this paper, we propose the use of Convolutional Neural Networks (CNN) based equalizer for OFDM-SPM. Simulation results show that Convolutional Neural Networks (CNN) based equalizer can improve the reliability performance of OFDM-SPM by 5-10 dB compared to the conventional OFDM-SPM scheme that does not use CNN.

INDEX TERMS: CNN, DL, AI, ML, OFDM, OFDM-SPM, Rayleigh fading, SNR, STN, BER, Training Network.

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