

Novel Universal Windowing Multicarrier Waveform for 5G Systems

Fifth Generation (5G) systems aim to improve flexibility, coexistence and diverse service in several aspects to achieve the emerging applications requirements. Windowing and filtering of the traditional multicarrier waveforms are now considered common sense when designing more flexible waveforms. This paper proposed a Universal Windowing Multi-Carrier (UWMC) waveform design platform that is flexible, providing more easily coexists with different pulse shapes, and reduces the Out of Band Emissions (OOBE), which is generated by the traditional multicarrier methods that used in the previous generations of the mobile technology. The novel proposed approach is different from other approaches that have been proposed, and it is based on applying a novel modulation approach for the Quadrature-Amplitude Modulation (64-QAM) which is considered very popular in mobile technology. This new approach is done by employing flexible pulse shaping windowing, by assigning windows to various bands. This leads to decreased side-lobes, which are going to reduce OOBE and boost the spectral efficiency by assigning them to edge subscribers only. The new subband windowing (UWMC) will also maintain comprehensively the non-orthogonality by a variety of windowing and make sure to keep window time the same for all subbands. In addition, this paper shows that the new approach made the Bit Error Rate (BER) equal to the conventional Windowed-Orthogonal Frequency Division Multiplexing (W-OFDM). This platform achieved great improvement for some other Key Performance Indicators (KPI), such as the Peak to Average Power Ratio (PAPR) compared with the conventional (W-OFDM) and the conventional Universal Filtered Multicarrier (UFMC) approaches. In particular, the proposed windowing scheme outperforms previous designs in terms of the Power Spectral Density (PSD) by 58% and the (BER) by 1.5 dB and reduces the Complementary Cumulative Distribution Function Cubic Metric (CCDF-CM) by 24%.