Asymmetrical Clipping Optical Filter Bank Multi-Carrier Modulation Scheme

Asmaa Ibrahim (✉ Asmaa.ibrahim@upc.edu)

Universitat Politècnica de Catalunya: Universitat Politecnica de Catalunya <https://orcid.org/0000-0002-0191-108X>

Josep Prat

Universitat Politècnica de Catalunya: Universitat Politecnica de Catalunya

Tawfik Ismail

Cairo University

Research Article

Keywords: 5G networks, Optical Wireless, Filter bank multi-carrier, Asymmetrical Clipped Optical, Orthogonal Frequency Division Multiplexing

Posted Date: February 26th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-248482/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at Optical and Quantum Electronics on April 22nd, 2021. See the published version at <https://doi.org/10.1007/s11082-021-02867-2>.

Abstract

Filter bank multi-carrier (FBMC) is considered a promising alternative to the Orthogonal Frequency Division Multiplexing (OFDM) scheme. It improves spectral efficiency by eliminating the need for cyclic prefix while attenuating interference due to the robustness of the out-of-band emission. In this work, we present a framework, and the performance evaluation of FBMC is a multi-carrier modulation scheme for the direct detection of optical communications. As the proposed model has higher spectral efficiency than the classical ACO-OFDM, as removing the guard interval enhances the spectral efficiency. Furthermore, the perfect rectangular pulse shaping and eliminating the out of band emission of the filter bank enhances the ACO-FBMC the BER performance of the ACO-OFDM. We propose a transceiver model for Asymmetrical Clipped Optical FBMC (ACO-FBMC) based on Fast Fourier Transform (FFT) operations, analyze inter-frame interference, and offer an iterative receptive method to eliminate it. Finally, we compared the bit error rate (BER) performance of the ACO-FBMC using different overlapping factors with the ACO-OFDM.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the latest manuscript can be downloaded and [accessed as a PDF](#).

Figures

a. FBMC with 2 overlapping factor

b. FBMC with 4 overlapping factor

Figure 1

OQAM-FBMC frames with 2 and 4 overlap factors

Figure 2

OQAM-FBMC subcarriers

Figure 3

OQAM-FBMC Transmitter

Figure 4

Odd Indexed ACO frames

Figure 5

Even Indexed ACO frames

Figure 6

ACO-FBMC frames

Figure 7

OQAM-FBMC Receiver

Figure 8

The receiver procedure ow chart

Figure 9

Average transmitted and received signals

Figure 10

BER of ACO-FBMC Hermit and PHYDYAS Iter

Figure 11

BER of ACO-FBMC with 8 overlapping factor and ACOOFDM

Figure 12

BER of ACO-FBMC with 2,4,8 overlapping factor