

# A SURVEY ON CHANNEL ESTIMATION IN MULTICARRIER MODULATION SCHEMES

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**ABSTRACT**—The principle of MCM (multicarrier Modulation) is to transmit the data by dividing the stream into several bitstreams, where each stream has much lower bit rate, and sub-streams are used to modulate several carriers. Where FBMC and OFDM systems are multicarrier modulation schemes. Compared to the OFDM system FBMC gives better spectral efficiency. A framework, discussion, and performance evaluation of FBMC and its comparison with OFDM is investigated based on the performance of the simulation. This paper presents a survey of the channel estimation in multicarrier modulation schemes like OFDM, FBMC-OQAM.

**KEYWORDS**- Multipath carrier, FBMC-OQAM, OFDM, Channel estimation.

## I. INTRODUCTION

OFDM (Orthogonal Frequency Division Multiplexing) is the dominant technique of the present wireless transmission and is intended to remain relevant even in the next generation. OFDM requires the usage of a cyclic prefix which is its main shortcoming. Main disadvantage of OFDM is, having no spectral localization of the subcarriers which results in issues of spectral leaking and interference with the unsynchronized signal. To overcome OFDM limitations and meet 5G requirements, FBMC seems to be a good technique.

OFDM has gained much attention based on popular multicarrier modulation methods, which have been adopted in many wireless standards and face many challenges in complex networks. OFDM has another limitation of unaffordable out-of-band leakage which makes it hard to coexist with other communication systems.

Multicarrier is proposed for channel sensing, co-existence of primary and secondary users and to avoid interference among them a good separation or filtering is needed for different subcarriers such as

FBMC and the aim of Filter Bank Multicarrier (FBMC) is to overcome the drawbacks of OFDM and to have better spectral properties and usage of the available channel capacity and can offer higher data rates within given radio spectrum bandwidth.

## II. LITERATURE SURVEY

### 1. Channel Estimation in OFDM Systems:

The channel estimation in the OFDM is based on time-domain channel statistics use of multi-amplitude signaling schemes in a wireless system and which requires the tracking of fading radio channels by the usage of differential phase-shift keying (DPSK). A limited no of bits per symbol results in a 3dB loss in SNR. LS (Least square) estimation is complex when compared to MMSE and prior knowledge of channel covariance and noise variance is assumed by MMSE. LS estimation is simple for higher and lower SNR and the modifications of LS and MMSE (minimum mean-square error) estimators are compromised between complexity and performance.

16-QAM system with the symbol error rate is presents to utilize the simulation results which are depends on the estimator complexity in SNR up to 4dB is gained over LS estimator and the SNR gain is less compared to the modified MMSE.

This paper mainly emphasized four aspects

- Traditional channel estimation based on the CFR (channel frequency response)
- PM (Parametric model) based channel estimation
- Iterative channel estimation
- Channel estimation in MIMO-OFDM systems.

#### Advantages of the system are:

- Efficient usage of channel.
- Prior knowledge of channel co-variance and noise variance.

#### Disadvantages are:

- Error estimation is complicated.
- Loss of spectral efficiency due to CP.

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