

## ABSTRACT

*5G NR network planning involves types of usage scenarios and applications which includes 3 use cases, those are enhanced mobile broadband (eMBB), ultra-reliable and low latency communications (URLLC), and massive machine type communications (mMTC). The use of Multicarrier Scenarios such as Orthogonal Frequency Division Multiplexing (OFDM) and Filter Bank Multicarrier (FBMC) is an essential factor for the realization of these use cases. The OFDM system has weaknesses such as the high value of Peak to Average Power Ratio (PAPR) and reduced bandwidth efficiency due to the addition of Cyclic Prefix (CP). These weaknesses can be overcome by the FBMC modulation scheme with Offset-Quadrature Amplitude Modulation (O-QAM) as a more efficient CP substitute for its implementation in 5G New Radio. In this research, it is done by an analysis on the manufacture of a simple scheme of the FBMC system and making a comparison with the usage of Cyclic Prefix (CP) based on OFDM. The first step of this research is to present an overview of the modulation scheme used. Furthermore, it compares the performance of OQAM-FBMC and CP-OFDM by analyzing several Bit Error Rate (BER) simulation results against the SNR value, when both systems use the same simulation parameters. Based on the test results of the value of each BER, both are not too far apart. However, it can be seen that the OQAM FBMC system managed to reach a BER close to 0 when the BER value was  $2 \times 10^{-5}$  at SNR 16. Meanwhile, the CP-OFDM system only managed to reach a BER close to 0 when the BER value was  $3 \times 10^{-5}$  at SNR 18. These results indicate that OQAM FBMC system is superior to CP-OFDM based on the comparison of the BER values.*

**Keywords :** *Multicarrier, Modulation, CP-OFDM, OQAM-FBMC, BER.*