That the frequency shift of subcarrier allocation starting point by r subcarriers results in the phase rotation of $e^{j2\pi \frac{n}{N} r}$ in IFDMA.

5. Simulation Results

5.1 CCDF of OFDM Signal Simulation Result

In this part, an evaluation of factors which could influence the PAPR reduction performance is performed using Matlab simulation. Using simulation results, it has been shown that $\alpha = 2.8$ is appropriate for sufficiently large N.

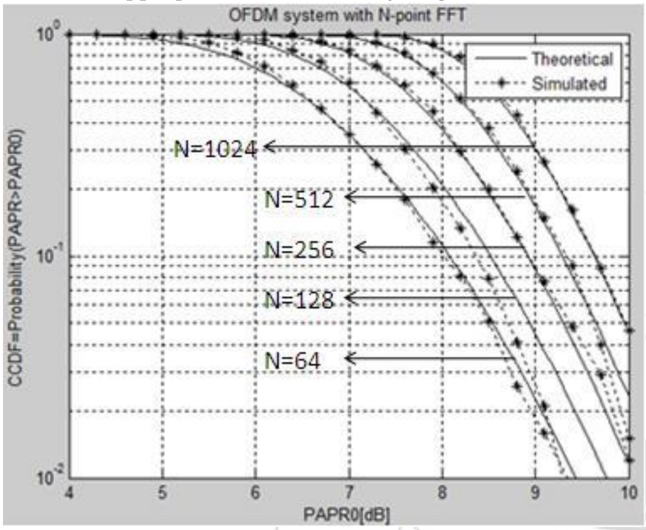

Figure 5.1: CCDFs of OFDM signals with N=64, 128, 256,512 and 1024

5.2 Partial Transmit Sequence Simulation Result

We realized from the above discussion that in PTS [3-6] approach, there are varying parameters that impact the PAPR reduction performance, these are:

1) The number of sub-blocks V, which influences the complexity strongly;

2) The number of possible phase value W, which impacts the complexity as well.

In our simulation, two parameters will be considered. They are sub-block sizes V and different sub-block partition proposals. The number of computations for Equation (5) in this suboptimal combination algorithm is V, which is much fewer than that required by the original PTS technique (i.e. $V \ll W^{V}$. Figure 5.2 shows the CCDF of PAPR for a 16 QAM/OFDM system using PTS technique as the number of subblock varies. It is seen that the PAPR performance Improves as the number of subblocks increases with V =1, 2,4, 8, and 16.

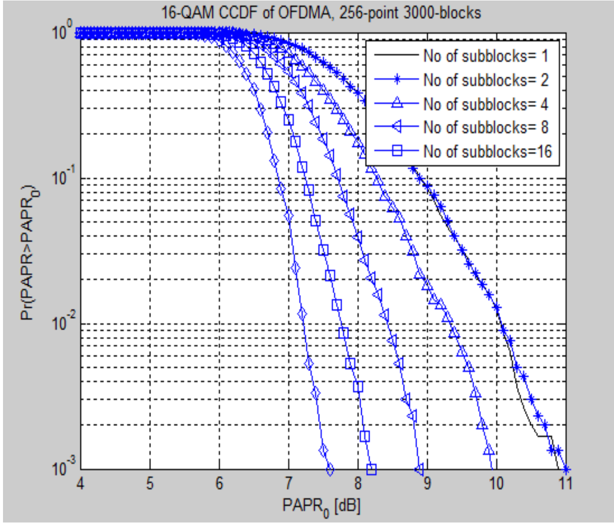

Figure 5.2: PAPR performance of a 16-QAM/OFDM system with PTS technique when the number of Sub- blocks Varies.

5.3 Clipping and Filtering Simulation Result

Figure 5.3(a) shows the CCDFs of crest factor (CF) for the clipped and filtered OFDM signals. Recall that the CCDF of CF can be considered as the distribution of PAPR since CF is the square root of PAPR [3]. It can be seen from this figure that the PAPR of the OFDM signal decreases significantly after clipping and increases a little after filtering. Note that the smaller the clipping ratio (CR) is, the greater the PAPR reduction effect is. Figure 5.3(b) shows the BER performance when clipping and filtering technique is used. Here, "C" and "C&F" denote the case with clipping only and the case with both clipping and filtering, respectively. It can be seen from this figure that the BER performance becomes worse as the CR decreases.

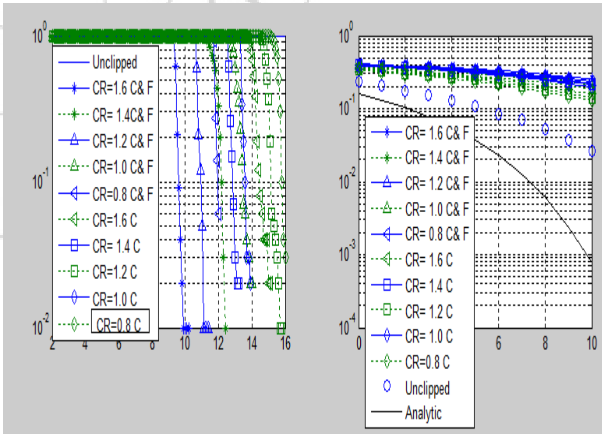

Figure 5.3: PAPR distribution and BER performance with clipping and filtering.

5.4 DFT Spreading Simulation Result

Figure 5.4 shows a comparison of PAPR performances when the DFT-spreading technique is applied to the IFDMA, LFDMA, and OFDMA. Here, QPSK, 16-QAM, and 64-QAM are used for an SC-FDMA system with N=256, M=64 and S=4. It can be seen from Figure 5.4 that the PAPR performance of the DFT-spreading technique varies

Depending on the subcarrier allocation method. In the case of 16-QAM [2-6], the values of PAPRs with IFDMA, LFDMA, and LFDMA for CCDF of 1% are 3.5dB, 8.3dB, and 10.8dB, respectively. It implies that the PAPRs of IFDMA and LFDMA are lower by 7.3dB and 3.2dB, respectively, than that of OFDMA with no DFT spreading.

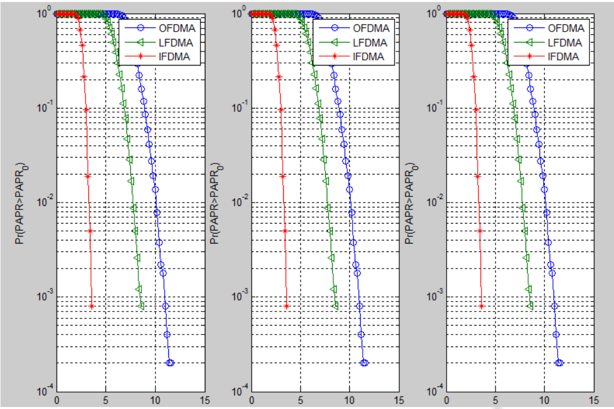

Figure 5.4: PAPR performances of DFT-spreading technique for IFDMA, LFDMA, and OFDMA.

5.5 DFT-Spreading Technique with Pulse shaping Simulation Result

Now, let us see how the PAPR performance of DFT spreading technique is affected by the number of subcarriers, M, that are allocated to each user. Figure 5.5 shows that the PAPR performance of DFT-spreading technique for LFDMA with a roll-off factor of $\alpha = 0.4$ is degraded as M increases [4-9], for example, M=4 to 128. Here, 64-QAM is used for the SCFDMA system with 256-point FFT (N=256) in Fig.5.5.

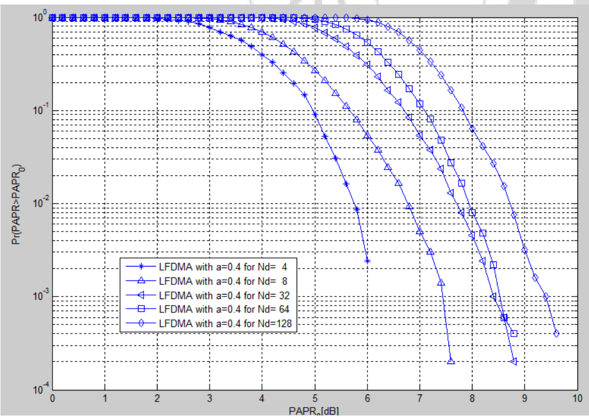

Figure 5.5: PAPR performance of DFT-spreading technique when M varies.

6. Conclusion

In This paper we analyzed the performance of DFT spread OFDM method for reducing the PAPR in OFDM. The simulation results shows IFDMA method is best among the OFDMA, LFDMA and IFDMA. But the disadvantage of IFDMA scheme is that we are losing user diversity and investigates one of the bottleneck problems that exist in OFDM wireless communication system. High Peak-Average Power Ratio (PAPR of OFDM signal), and discusses how to reduce it by different effective system. High Peak-Average Power Ratio (PAPR of OFDM signal), and discusses how to reduce it by different effective algorithms. We are mainly focusing on the signal scrambling technology, and discuss it by observing the MATLAB simulation results. In the signal scrambling technology, we study the method of selected mapping and partial transmit sequence. A series of detailed simulations were conducted for comparison and results were obtained of the two schemes for PAPR reduction in a complex system. These methods have disadvantages, although they are used in optimizing the statistical characteristics of PAPR in MIMO-OFDM system. For the inherent defect of traditional PTS algorithm, complex computing, a very effective iterative method is introduced to determine sub-optimal weighting factor for each sub-block instead of conducting an ergodic searching so as to reduce the calculation complexity significantly. This sub-optimal algorithm gives a better approach to the real conditions in engineering practice by providing a compromise between the PAPR reduction performance and computational complexity.

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