AN IMPLEMENTATION OF PEAK TO AVERAGE POWER RATIO REDUCTION FOR MULTICARRIER SYSTEM (ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING)

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DEDICATION

Dedicate this work to my mother and my father dears

and my wife's dear…

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All praise for Allah S.W.T, blessings to Prophet Muhammad S.A.W along with his family and friends. Thanks to Allah because gave this permission to me prepared and accomplished this master thesis in the title "An Implementation of Peak to Average Power Ratio Reduction for Multicarrier System (Orthogonal Frequency Division Multiplexing)" in its time.

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ABSTRACT

Orthogonal frequency division multiplexing (OFDM) has been becoming more popular modulation technique in the high-speed wireless communication system. It is used especially in Large Term Evaluation technique (LTE) which depended from the fourth-generation (4G) of wireless communication system. OFDM proves high efficiency to transmit data rate as high as 100 Mbps, the capability to combat multipath fading channel and utilization the whole bandwidth. Although, OFDM technology has more advantages, the same time has some obstacles also.

The highest Peak to average power ratio (PAPR) considers the main restrict which cause non-linearity at receiving end. Coding, clipping and phase rotation among many PAPR reduction techniques are proposed to overcome this problem. In this project, we investigated the PAPR reduction performance with two PAPR reduction techniques selective mapping (SLM) and partial transmit sequence (PTS). These two PAPR reduction methods consider sub-parts of signal scrambling technique that depend on phase rotation technique in its operation.

The simulation results show SLM and PTS methods have improved the PAPR reduction performance with different parameters. Moreover, different kinds of SLM and PTS schemes are also plotted. Generally, PTS and SLM techniques are leading the PAPR reduction better performance. The results are verified using MATLAB software.

ABSTRAK

Frekuensi Ortogon Bahagian Pemultipleksan (OFDM) merupakan teknik modulasi yang semakin popular dalam sistem komunikasi pantas tanpa wayar terutamanya teknik *Large Term Evaluation* (LTE) yang berasaskan kepada sistem komunikasi tanpa wayar 4G. OFDM terbukti mempunyai keberkesanan yang tinggi untuk menghantar data dengan kadar sehingga 100 Mbps, keupayaan untuk melalui saluran pudar pelbagai arah dan penggunaan kesemua lebar jalur. Walaupun teknologi OFDM mempunyai banyak kelebihan, tetapi pada masa yang sama ia juga mempunyai banyak kekangan.

Nisbah Kuasa Puncak ke Kuasa Purata (PAPR) merupakan kekangan utama yang menyebabkan keadaan tak linear pada bahagian penerima. Pengkodan, keratan dan putaran fasa diantara kebanyakan teknik pengurangan PAPR diutarakan untuk mengatasi masalah tersebut. Dalam projek ini, prestasi pengurangan PAPR telah dikaji dengan dua teknik PAPR iaitu *selective mapping* (SLM) dan *Partial Transmit Sequence* (PTS). Kedua- dua teknik pengurangan PAPR ini boleh dikatakan pecahan dari teknik gegasan isyarat yang berdasarkan kepada teknik putaran fasa dalam operasinya.

Keputusan simulasi menunjukkan kaedah SLM dan PTS telah meningkatkan prestasi pengurangan PAPR pada parameter yang berlainan. Tambahan lagi, jenis – jenis skim SLM dan PTS yang berlainan juga dipaparkan pada graf. Umumnya, teknik SLM dan PTS menunjukkan pencapaian yang lebih baik untuk pengurangan PAPR. Keputusan dibuktikan menggunakan perisian MATLAB.

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LIST OF ABBREVIATION AND SYMBOLS

2G	Second Generation
3G	Third Generations
4G	Fourth Generation
IP	Internet Protocol
OFDM	Orthogonal Frequency Division Multiplexing
WLAN	Wireless Local Area Network
WMAN	Wireless Metropolitan Area Network
DVB-T	Digital Video Broadcasting — Terrestrial
PAPR	Peak-to-Average Power Ratio
SLM	Selective Mapping Technique
PTS	Partial Transmit Sequence Technique
U	Correlation Detectors Factor
DFT	Discrete Fourier Transforms
FFT	Fast Fourier Transforms
IFFT	Inverse Fast Fourier Transforms
DSP	Digital Signal Processing
CP	Cyclic Prefix
S/P	Serial to Parallel
P/S	Parallel to Serial

ADC	Analog to Digital Convertor
HPA	High Power Amplifier
SNR	Signal-to-Noise Ratio
R	Transmission Rate
Tmc	Time Multichannel
N	Number of sub-carrier
ISI	Inter-sample interference
MCM	Multi carrier modulation
di	Complex Modulation Symbols
CCDF	Complementary Cumulative Distribution Function
BER	Bit Error Rate
M	Statistical Independent Sequences (route number) in SLM technique
Pm	Rotation factor or weighting factor in SLM technique
16-QAM	4-Bits (Quadrature Amplitude Modulation)
V	Non-overlapping sub-block in PTS technique
bv	Weighting Factor in PTS Technique
W	Number of Phase Variation values in PTS Technique

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