

CONTENTS

APPROVAL PAGE

SELF DECLARATION AGAINST PLAGIARISM

ABSTRACT	iv
ACKNOWLEDGMENTS	v
PREFACE	vi
CONTENTS	vii
LIST OF FIGURES	x
LIST OF TABLES	xii
LIST OF ABBREVIATION	xiii
ACHIEVEMENT	xiv
I INTRODUCTION	1
1.1 Background	1
1.2 Problem Identification and Objective	3
1.3 Scope of Work	3
1.4 Research Methodology	4
1.5 Stucture of Thesis	4
II BASIC CONCEPT	6
2.1 Channel Coding	7
2.1.1 Convolutional Codes	7
2.1.2 Low Density Parity Check (LDPC) Codes	8
2.1.3 Quasi Cyclic (QC)-LDPC <i>Codes</i>	8
2.2 Complex Binary Phase Shift Keying (C-BPSK)	9
2.3 Multicarrier Modulation: Orthogonal Frequency Division Multiplexing (OFDM)	10
2.3.1 Cyclic Prefix (CP)-OFDM	10

2.3.2	Frame Structure of NR Numerology	11
2.3.3	Matrix Circulant and Matrix Toeplitz	12
2.4	Channel Models for Fading Multipath Channels	13
2.4.1	Power Delay Profile (PDP)	13
2.4.2	Excess Delay	13
2.5	Capacity of Fading Channels	14
2.5.1	Outage Probability	15
2.5.2	Coding Rate	15
2.5.3	Signal-to-Noise Power Ratio (SNR)	15
2.6	Atmospheric Effects on Propagation	16
2.6.1	Temperature Effects	16
III SYSTEM MODEL AND THE PROPOSED FRAMEWORK 5G CHANNEL MODEL		18
3.1	System Model	18
3.2	The Proposed Framework	19
3.2.1	Environment Measurement	21
3.2.2	New York University Simulator	22
3.2.3	Representative PDP Calculation	24
3.2.4	Channel Capacity Calculation	26
3.2.5	Outage Performance Calculation	27
3.3	Outage Performance Validation of Channel Model	28
3.3.1	Frame Error Rate Calculation (FER)	28
3.3.2	Bit Error Rate Calculation (BER)	28
IV RESULTS AND PERFORMANCE EVALUATIONS		29
4.1	Power Delay Profile (PDP)	29
4.1.1	Modelling The Representative PDP	31
4.2	Outage Performance Analysis	34
4.3	Results Validation	36
4.3.1	FER Performances of Telkom University 5G Channel Model	36
4.3.2	BER Performances of Telkom University 5G Channel Model	38
V CONCLUSIONS AND FUTURE WORKS		40
5.1	CONCLUSIONS	40
5.2	FUTURE WORKS	40
REFERENCES		42

Appendices

A MISCELLANEOUS

1.1	Path Power of Representative PDP of 5G Telkom University with Temperature Effects
1.2	Path Power of Modelling The Representative PDP of 5G Telkom University with Temperature Effects