

# TABLE OF CONTENTS

<b>APPROVAL</b>	<b>i</b>
<b>SELF DECLARATION AGAINST PLAGIARISM</b>	<b>ii</b>
<b>ABSTRACT</b>	<b>iii</b>
<b>PREFACE</b>	<b>iv</b>
<b>ACKNOWLEDGEMENTS</b>	<b>v</b>
<b>TABLE OF CONTENTS</b>	<b>vi</b>
<b>LIST OF FIGURES</b>	<b>viii</b>
<b>LIST OF TABLES</b>	<b>ix</b>
<b>LIST OF ABBREVIATIONS</b>	<b>x</b>
<b>1 INTRODUCTION</b>	<b>1</b>
1.1 Background . . . . .	1
1.2 Problems Definition . . . . .	2
1.3 Related Research . . . . .	3
1.4 Research Purposes . . . . .	4
1.5 Scope of Work . . . . .	4
1.6 Research Methodology . . . . .	5
1.7 Thesis Structure . . . . .	6
<b>2 REVIEW OF LITERATURE AND STUDIES</b>	<b>9</b>
2.1 Device-to-Device Communication . . . . .	9
2.1.1 D2D Communication Configuration . . . . .	10
2.1.2 D2D Communication Classification . . . . .	10
2.2 Geometric Programming . . . . .	12
2.3 Long Short Term Memory . . . . .	12
2.4 Fully Convolutional Network . . . . .	14
2.5 Performance Parameters . . . . .	15
2.5.1 Sum rate . . . . .	15
2.5.2 Power Consumption . . . . .	16
2.5.3 Energy Efficiency . . . . .	16
2.5.4 Computational Time . . . . .	16
2.5.5 Time Complexity . . . . .	17

<b>3</b>	<b>SYSTEM AND SIMULATION MODELLING</b>	<b>19</b>
3.1	Model System . . . . .	19
3.1.1	Device-to-Device Side . . . . .	20
3.1.2	Base Station Side . . . . .	21
3.2	Problem Formulation . . . . .	22
3.3	Simulation Scheme . . . . .	23
3.4	Convex Approximation Based Algorithm . . . . .	25
3.5	Dataset Generation . . . . .	26
3.6	Long Short Term Memory with Fully Convolutional Network . . . . .	28
3.6.1	LSTM-FCN Structure . . . . .	28
3.6.2	Training and Testing Process . . . . .	30
3.7	Simulation Settings . . . . .	31
<b>4</b>	<b>SIMULATION RESULT AND ANALYSIS</b>	<b>32</b>
4.1	First Scenario: Enhancement of CUE . . . . .	32
4.1.1	Sum rate . . . . .	32
4.1.2	Power Consumption . . . . .	33
4.1.3	Energy efficiency . . . . .	33
4.1.4	Computational Time . . . . .	34
4.1.5	Performance Comparison . . . . .	35
4.2	Second Scenario: Enhancement of D2D . . . . .	36
4.2.1	Sum rate . . . . .	36
4.2.2	Power Consumption . . . . .	37
4.2.3	Energy efficiency . . . . .	38
4.2.4	Computational Time . . . . .	38
4.2.5	Performance Comparison . . . . .	39
4.3	Time Complexity . . . . .	40
4.3.1	Time Complexity of Convex Approximation-Based Algorithm . . . . .	40
4.3.2	Time Complexity of LSTM Algorithm . . . . .	43
4.3.3	Time Complexity of FCN Algorithm . . . . .	44
4.3.4	Time Complexity of LSTM-FCN Algorithm . . . . .	45
<b>5</b>	<b>CONCLUSION AND FUTURE RESEARCH</b>	<b>47</b>
5.1	Conclusion . . . . .	47
5.2	Future Research . . . . .	48
	<b>Bibliography</b>	<b>49</b>