

TABLE OF CONTENTS

APPROVAL PAGE	ii
SELF DECLARATION AGAINST PLAGIARISM	iii
ABSTRACT	iv
PREFACE.....	ii
ACKNOWLEDGEMENTS.....	vii
TABLE OF CONTENTS.....	viii
LIST OF FIGURES	xii
LIST OF TABLES	xvi
CHAPTER I INTRODUCTION.....	1
1.1. Background	1
1.2. Problem Identification.....	2
1.3. The Aims of Research	2
1.4. Hypothesis	3
1.5. Research Methods	4
1.6. Scope of The Problem	5
CHAPTER II THEORETICAL BACKGROUND.....	6
2.1. 5G Technology	6
2.1.1 5G Usage Scenarios	7
2.1.2 5G Non-Standalone.....	7

2.2.	Infrastructure Sharing.....	10
2.1.1	Passive Infrastructure Sharing.....	12
2.1.2	Active Infrastructure Sharing.....	12
2.1.3	Business/Ownership.....	14
2.3.	The Concept of Frequency Reuse.....	16
2.4.	Pathloss Exponent	17
2.5.	Coordinated MultiPoint (CoMP).....	18
2.5.1	CoMP Types	19
2.5.1	CoMP Architectures.....	22
2.6.	Techno-Economy Concept.....	24
2.7.	Capital Expenditure (CAPEX).....	24
2.7.1	Expansion Generated by New Products.....	25
2.7.2	Project Mandated by Law	25
2.7.3	Equipment Replacement	25
2.7.4	Expansion to Meet Growth in Existing Products.....	25
2.8.	<i>Operating Expenditure (OPEX)</i>	25
2.9.	Sensitivity Analysis	26
2.10.	Internal Rate of Return (IRR).....	27
2.11.	Net Present Value (NPV)	28
2.12.	Payback Period.....	29
CHAPTER III SYSTEM DESIGN AND MODELS.....		31
3.1.	System Design.....	31
3.2.	Collecting the Data.....	33
3.3.	Location of Research.....	34

3.4.	5G NR Technical Requirements.....	35
3.5.	Capacity Planning Approach.....	36
3.6.	Coverage Planning Approach.....	40
3.7.	Determination of Number of gNodeB.....	45
3.8.	Network Planning Simulation.....	46
3.9.	5G NR Simulation Indicator.....	46
3.10.	Sharing Scenario.....	47
3.10.1	Frequency Sharing Scenario.....	48
3.10.2	Regulation of Frequency Sharing Scenario.....	49
3.11.	Coordinated MultiPoin (CoMP) Scenario.....	51
3.12.	Economic Aspect Analysis.....	51
3.12.1	BHP (User Rights Fee) Shared Frequency.....	51
3.12.2	Sensitivity Analysis.....	52
3.13.	Regulatory Analysis.....	53
CHAPTER IV RESULTS AND ANALYSIS.....		54
4.1.	Mobile Network Operators (MNO).....	54
4.2.	Capacity Analysis.....	54
4.2.1	5G User Projection.....	54
4.2.2	Calculation of Single User Throughput.....	58
4.2.3	Network Throughput Calculation.....	60
4.2.4	Calculation of Cell Average Throughput.....	60
4.2.5	Calculation of Total gNodeB.....	61
4.2.6	Calculation of Data Rate.....	62
4.3.	Capacity Analysis Based On User Growth.....	63

4.4.	Coverage Analysis.....	65
4.5.	Atoll Simulation	68
4.5.1	Banjarmasin City.....	68
4.5.2	Banjarbaru City	73
4.6.	Economic Analysis.....	78
4.6.1	CAPEX.....	78
4.6.1.1	Banjarmasin City.....	79
4.6.1.2	Banjarbaru City	80
4.6.2	OPEX	81
4.6.3	Revenue.....	81
4.6.3.1	Banjarmasin City.....	82
4.6.3.2	Banjarbaru City	84
4.6.4	Economic Feasibility Analysis.....	87
4.6.4.1	NPV (Net Present Value) Analysis	87
4.6.4.2	IRR (Internal Rate of Return) Analysis	91
4.6.4.3	PP (Payback Period)Analysis.....	96
4.6.5	Sensitivity Analysis.....	98
4.6.5.1	Spider Diagram Sensitivity Analysis	98
4.7.	Economic Feasibility Analysis Include Coordinated Multi-Point (CoMP)	99
4.8.	Regulatory Analysis	102
4.8.1	Law Number 36 of 1999	103
4.8.2	Omnibus Law Number 11 of 2022.....	104
4.8.3	Government Regulation (PP) Number 46 of 2021.....	105

4.8.4	Regulation of the Minister of Communication and Information Technology Number 7 of 2021	111
4.8.5	Business Scheme Regulations.....	114
CHAPTER V CONCLUSION		115
5.1.	Conclusion.....	115
5.2.	Recommendation.....	117
5.2.	Future Work	118
BIBLIOGRAPHY		119