



CONTENTS

Title Page	ii
Approval Page	iii
Statement Page	iv
Dedication Page	v
Motto Page	vi
FOREWORD	vii
CONTENTS	viii
LIST OF TABLES	xi
LIST OF FIGURES	xii
ABSTRACT	xv
INTISARI	xvi
CHAPTER I INTRODUCTION	1
1.1 Background	1
1.2 Research Problem	2
1.3 Research Constraints	2
1.4 Research Objective	3
1.5 Research Benefit	3
1.6 Research Methodology	3
1.7 Thesis Organization	4
CHAPTER II LITERATURE REVIEW	5
CHAPTER III THEORITICAL BASIS	8
3.1 Internet of Things	8
3.2 Smart Environment	10



3.3	Kaa Platform	10
3.4	Quality of Service	11
3.4.1	Throughput	11
3.4.2	Delay	11
3.4.3	Packet Loss	12
3.5	Network Topology	12
3.6	Wireshark	14
3.7	Hardwares	15
3.7.1	Raspberry Pi	15
3.7.2	DHT11 Temperature Sensor	16
CHAPTER IV ANALYSIS AND SYSTEM DESIGN		17
4.1	System Description	17
4.2	System Requirements Analysis	17
4.2.1	Hardware Specifications	18
4.2.2	Software Specifications	19
4.3	Research Steps	20
4.4	Flowchart	21
4.4.1	Client Application Flowchart	21
4.4.2	Kaa-Server Process Flowchart	22
4.5	Test Scenario	23
CHAPTER V IMPLEMENTATION		28
5.1	Network Topology	28
5.2	Network Interface Configuration	28
5.2.1	Network Configuration for Kaa-Server	28
5.2.2	Network Configuration for Client	28
5.3	Code Implementation	29
5.3.1	Sensor Data Reading	30
5.3.2	Upload Data to Kaa Server	31
5.4	Testing Stages	32
5.4.1	Testing Condition	33
5.4.2	System Testing	33



CHAPTER VI EXPERIMENT AND DISCUSSION	36
6.1 Experiment Results and Discussion	36
6.1.1 Experiment Results of Scenario 1	36
6.1.2 Experiment Results of Scenario 2	40
6.1.3 Experiment Results of Scenario 3	44
6.1.4 Experiment Results of Scenario 4	51
6.2 Data Comparison	65
6.2.1 Average Throughput Comparison	65
6.2.2 Average Delay Time Comparison	66
6.3 Network Testing by using IPERF	67
6.3.1 IPERF Testing for Scenario 1	68
6.3.2 IPERF Testing for Scenario 2	68
CHAPTER VII CONCLUSION AND FUTURE WORKS	69
7.1 Conclusions	69
7.2 Future Works	70
REFERENCES	71