

**THE ANALYSIS OF QUALITY OF SERVICE (QOS) IN WIFI,
WIMAX AND LTE NETWORK**

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**THE ANALYSIS OF QUALITY OF SERVICE (QOS) IN WIFI,
WIMAX AND LTE NETWORK**

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APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Bachelor of Electronic Engineering with Honours.

Signature :

Supervisor Name : DR. JUWITA BINTI MOHD SULTAN

Date : 1ST JUNE 2018

DEDICATION

I would like to dedicate this thesis to my beloved parents Kudus Bin Abu Bakar and Habsah Binti Hassan for never stop giving off themselves in countless ways. Also, I would like to dedicate this thesis to my dearest brother and sister, Kamal Ikhwan and Elya Nabilla for their prayers and support throughout my years of studies.

ABSTRACT

WiFi, WiMAX and LTE network have their own Quality of Service (QoS) classes or levels. Quality of Service (QoS) is the measurement of overall performance of a services and each of these networks parameter performance can be measured and analysed. In this thesis, I focused on analysing and investigating the parameter performance of throughput, delay and data drop of WiFi and WiMAX network. Different scenarios have been conducted and simulation result in the OPNET Software is analyzed for each of the scenarios. The throughput, delay and data drop performances of both WiFi and WiMAX network is analysed in terms of number of users and distance of the users from the access point. The QoS in WiFi is evaluates from smaller number of users with smaller distance. Then, the number of users is increased as well as the distance. The parameter performances for both cases are then measured. Besides, I proposed end-to-end QoS mapping for hybrid wireless broadband network. The QoS in WiFi are mapped with QoS in WiMAX network by proposing the mapping table for both networks. Finally I deploy a hybrid network topology for WiFi and WiMAX network based on the proposed mapping table.

ABSTRAK

Rangkaian WiFi, WiMAX dan LTE mempunyai kelas atau tahap Kualiti Perkhidmatan (QoS) mereka yang tersendiri. Kualiti Perkhidmatan (QoS) adalah pengukuran prestasi keseluruhan perkhidmatan dan setiap prestasi parameter rangkaian dapat diukur dan dianalisis. Dalam tesis ini, saya menumpukan pada menganalisis dan menyelidik prestasi parameter penghantaran, kelewatan dan penurunan data rangkaian WiFi dan WiMAX. Senario yang berbeza telah dijalankan dan hasil penyelidikan dalam OPNET dianalisis untuk setiap senario. Prestasi penghantaran, kelewatan dan penurunan data rangkaian WiFi dan WiMAX dianalisis dari segi bilangan pengguna dan jarak pengguna dari pusat akses. Tahap Kualiti Perkhidmatan (QoS) rangkaian WiFi dinilai bermula daripada bilangan pengguna yang kecil dengan jarak yang kecil. Kemudian, bilangan pengguna dan jarak pengguna daripada pusat akses turut meningkat. Prestasi parameter untuk kedua-dua kes kemudian diukur. Di samping itu, QoS bagi setiap rangkaian turut disesuaikan. QoS dalam WiFi disesuaikan dengan QoS dalam rangkaian WiMAX berdasarkan jadual suaian yang telah dicadangkan. Akhirnya menggunakan topologi rangkaian hibrid untuk rangkaian WiFi dan WiMAX berdasarkan jadual suaian tersebut.

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LIST OF SYMBOLS AND ABBREVIATIONS

WiFi	:	Wireless Fidelity
WiMAX	:	Worldwide Interoperability for Microwave Access
LTE	:	Long-Term Evolution
QoS	:	Quality of Service
rtPS	:	Real-time Polling Service
BE	:	Best Effort
GBR	:	Guaranteed Bit Rate
Non-GBR	:	Non-Guaranteed Bit Rate
UGS	:	Unsolicited Grant Service
ertPS	:	extended real-time Polling Service
nrtPS	:	non-real-time Polling Service
WLAN	:	Wireless Local Area Network
4G	:	Fourth Generation
FCC	:	United States Federal Communication
LLC	:	Logical link control
MAC	:	Medium Access Control

OSI	:	Open System Interconnection
DSSS	:	Direct-Sequence Spread Spectrum
FHSS	:	Frequency-Hopping Spread Spectrum
IR	:	Infrared
PHY	:	Physical
OFDM	:	Orthogonal Frequency-Division Multiplexing
SISO	:	Single Input Single Output
MIMO	:	Multiple Input Multiple Output
WMAN	:	Wireless Metropolitan Area Network
TDD	:	Time Division Duplexing
FDD	:	Frequency Division Duplexing
PMP	:	Point to Multipoint
BS	:	Base station
SS	:	Subscriber Stations
CS	:	Convergence Sublayer
CPS	:	Common Part Sublayer
PS	:	Privacy Sublayer
AMPS	:	Advance Mobile Phone Service
FDMA	:	Frequency Division Multiple Access
CDMA	:	Code Division Multiple Access
TDMA	:	Time Multiple Division Access
IP	:	Internet Protocol
SLA	:	Service-Level Agreements

FTP	:	File Transfer Protocol
MPEG	:	Moving Picture Experts Group
EPS	:	Evolved Packet System
ARP	:	Allocation Retention Priority