

## BORANG PENGESAHAN STATUS TESIS\*

JUDUL : OPTMIZATION OF DECENTRALIZE NETWORK FOR RESOURCE SHARING

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**OPTMIZATION OF DECENTRALIZE NETWORK FOR RESOURCE  
SHARING**

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This report is submitted in partial fulfilment of the requirements for the  
Bachelor of Computer Science (Computer Networking)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
2013

## DECLARATION

I hereby declare that this project report entitled  
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is written by me and is my own effort and that no part has been plagiarized  
without citations.

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## DEDICATION

This project is dedicated to my siblings, who have never let me down in anyway, especially my brother who pretty much raises me after my parents are gone. He never failed to give me financial and moral support, giving all the need during the time this research study is carried out and he taught me that even the largest task can be accomplished if it is done one step at a time. He knew that I was lost at the beginning of this research study. I could not find my direction and I almost give up. He asked me to be close to my supervisor and believe in her as he could not help me much in my field of study. He told me to keep on trying, though I have failed many times trying to figure out exactly how the study should be done. He makes me changed my mind and motivated me throughout the whole research study.

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Lastly, I would like to take this chance to thanks my friends for supporting me on completing my research study, and for their helps.

## ABSTRACT

This research study is about optimizing ad hoc network for resource sharing environment in Faculty of Information and Communication Technology (FICT) of Universiti Teknikal Malaysia Melaka (UTeM). The main purpose of the present study is to come out with a module that helps in optimizing an ad hoc network. Based on the module, ad hoc network environment will become more effective and efficient for resource sharing. The research study is carried out in two stages. The first stage is done in a simulation environment. The next stage is done in real life environment. Dependent and Independent variables that affect the resource sharing environment are identified and manipulated to obtain the data for this research study. Based on the result, conclusion is made and hypotheses for this research study are tested and proven. The end result of the research study come out with solution and equation that helps in providing an optimized ad hoc network model for resource sharing environment.

## ABSTRAK

Kajian penyelidikan ini adalah mengenai cara mengoptimumkan rangkaian ad hoc untuk persekitaran perkongsian sumber di Fakulti Teknologi Maklumat dan Komunikasi (FTMK) Universiti Teknikal Malaysia Melaka (UTeM). Tujuan utama kajian ini adalah untuk mengeluarkan modul yang membantu dalam mengoptimumkan rangkaian ad hoc. Berdasarkan modul, ad hoc persekitaran rangkaian akan menjadi lebih cekap dan berkesan untuk berkongsi sumber. Kajian penyelidikan dijalankan dalam dua peringkat. Peringkat pertama dilakukan dalam persekitaran simulasi. Peringkat seterusnya dilakukan dalam persekitaran kehidupan sebenar. Pembolehubah bersandar dan bebas yang memberi kesan kepada persekitaran perkongsian sumber telah dikenalpasti dan dimanipulasi untuk mendapatkan data bagi kajian penyelidikan ini. Berdasarkan keputusan, kesimpulan dibuat dan hipotesis bagi kajian penyelidikan ini diuji dan dibuktikan. Keputusan akhir kajian penyelidikan dikeluarkan dengan penyelesaian dan persamaan yang membantu dalam menyediakan dioptimumkan model rangkaian ad hoc untuk persekitaran perkongsian sumber.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

The so-called “information revolution” has made resource sharing around the world to adopt new philosophies and technologies to reduce the cost of information. Resource sharing in computer networking is resource that can be remotely access from another computer. Network resource sharing is the process of copying resource from one computer to another using a live network connection (Bradley Mitchell, 2013).

Resource sharing enables the users of the network to obtain information as if they were there at the location themselves and they are physically connected to the storage media that stores the information. Information transfer over network medium is very efficient when fetching information that is located in a computer that is distance away from the user. However, resource sharing over the network consumes a lot of network bandwidth. Sometimes, this bandwidth hunger service may tremendously affect the performance of the network. Well managed resource transfer over the network is needed to provide optimum performance solution for resource sharing.

## 1.2 Project Background

Faculty of Information and Communication Technology, FICT consists thousands of users that rely on network connectivity within its area. These users are the students and staffs of FICT. These users are provided with an infrastructure network for wireless connectivity. Wireless access points are placed within the area of the faculty to support these users and get them connected to the network.

The students and staffs of FICT share their resources' over the current infrastructure network. The staff, the lecturer for instance, shares the latest notes of his or her subject to the students on the local server in the faculty. The students have to download these notes themselves. The students are also required to upload their assignments to the local server. Sometimes, the tasks given to these students require collaboration among themselves. Therefore, resources of one's student must be shared over the network in order to complete those tasks. Thus, *File transfer protocol*, FTP is one of the important services for local usage in FICT.

The network performance of the wireless infrastructure network in FICT are varies depending on the time of the day. During peak hour (time when students having break before their next class), demand on network usage is extremely high. In fact, bandwidth provided to them is limited. Therefore, some of them may not get the access to the current infrastructure network.

The present study takes the networking environment of FICT to a whole new level. The present study is carried out to help in improving the current wireless infrastructure network in FICT. The present study improves the resource sharing service among users in FICT. The method chosen is the key to carry out the whole process of the present study. The experiment conducted help in simulating the environments of the network. The variables of experiment are manipulated to get the outcomes of the experimental processes. These outcomes are evaluated to help in improving the performance of the network.

### 1.3 Research Problem

Normally, the infrastructure network provides connectivity to the users. However, there are times when the infrastructure network failed to serves these users. Those times are times when infrastructure network is temporarily down and the coverage area of the infrastructure network is out of reach. Therefore, backup connection and alternative network is essential to overcome these issues respectively. Decentralized network, is a type of network that does not require infrastructure. It connects a group of users in an area creating a networking environment. It may help in providing continuity plan for the current infrastructure network when the current network is down. Decentralized network provide coverage regardless to the surface of the geographical area. The resource sharing activities in the local network will get affected when the infrastructure network failed. Decentralized network can helps in maintaining the resource sharing service of the network. It may also aid in providing better performance of resource sharing by load balancing resource sharing over the network. This will also boost the *Quality of Service*, QoS of resource sharing.

### 1.4 Research Question

The present study constructs research questions from the problem above as followed:

#### 1.4.1 Resource unavailable when the current infrastructure network is down

1. What is the alternative network?
2. How does decentralized network work?
3. What are variables of decentralized network?

#### 1.4.2 Performance of decentralized network for resource sharing in FICT is poor

1. What cause the performance to degrade?
2. How does the performance affect the network?

#### 1.4.3 No framework as bench mark for availability of resource sharing

1. What is the optimum number of connected users?
2. What is the acceptable performance?

## **1.5 Objective**

1. To investigate the variables that affects the availability of resources in decentralized network.
2. To analyze an optimal solution for decentralized network for resource sharing in FICT.
3. To evaluate optimized decentralized network for resource sharing.

## **1.6 Project Significant**

The present study improvises the networking environment in FICT. An approach that will help in the current network to support more number of connected users. It provides alternative and backup connection to the current network. The present study discovers the variables that affect the performance measure of decentralized network. Therefore, parameter changes unveil the outcomes of decentralized network. The present study produce framework for setting up decentralized network solution.

## 1.7 Research in Map

Table 1.1 simply describe all about the research done:

**Table 1.1: Simplified Research Description**

RESEARCH PROBLEM	RESEARCH QUESTION	OBJECTIVE	DELIVERABLE
Resource unavailable when the current infra net is down	<ol style="list-style-type: none"> <li>1. What is the alternative network?</li> <li>2. How does <i>decentralized network</i> work?</li> <li>3. What are variables of decentralized network?</li> </ol>	<ol style="list-style-type: none"> <li>1. To investigate the variables that affects the availability of resources in decentralized network</li> </ol>	<ul style="list-style-type: none"> <li>• Literature Review</li> </ul>
Performance of decentralized network for resource sharing in FICT is poor	<ol style="list-style-type: none"> <li>1. What cause the performance to degrade?</li> <li>2. How does the performance affect the network?</li> </ol>	<ol style="list-style-type: none"> <li>1. To analyze an optimal solution for decentralized network for resource sharing in FICT.</li> </ol>	<ul style="list-style-type: none"> <li>• Analysis &amp; Design</li> </ul>
No framework as bench mark for availability of resource sharing	<ol style="list-style-type: none"> <li>1. What is the optimum number of connected users?</li> <li>2. What is the acceptable performance?</li> </ol>	<ol style="list-style-type: none"> <li>1. To design a framework for optimized decentralized network for resource sharing.</li> </ol>	<ul style="list-style-type: none"> <li>• Implementation</li> </ul>

## 1.8 Conclusion

In this chapter, the introduction states network activities in FICT. The project background gives the main idea of the present study. The research questions clarify the problems. The problem statements and objectives of the present study are clearly defined. Literature review of the present study will be further discussed in the next chapter.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Based on the present study background in chapter one, in this literature review of the present study, the AODV network will be elaborated in details as it is the proposed solution to the current networking system in FICT. External sources will be used as the reference materials for the present study. Reference materials are taken from academic papers. Most informations referred focuses on the objective of present study. This chapter will be use as guidelines for the next phase, analysis and design.

#### **2.2 Fact And Finding**

The present study did in-depth research on the objectives by using tools. In the context of present study, journal, thesis, research and case study which is closely related to the main title, is refered as the main source. The present study found a number of problems exist. A study will be carried out to tackle the problem. In order to obtain an extensive literature review, the current work of decentralize network is studied.

Keyword : MANET, AODV, OLSR.

## 2.2.1 Coverage

Network coverage is the geographical area, in which a wireless network provide offers service for users (Raymond Mulligan, 2010).

Types of wireless network coverage :

### 2.2.1.1 Wide Area Network

Wireless Wide Area Networks are the networks provided to user in a large geographical area (John Kelsey, 1997). This type of network is provided by mobile cellular carriers. In Malaysia, some of the mobile cellular service providers are Maxis, Celcom and DiGi. Data service is added to cellular voice services, creating voice-plus-data networks. The geographical area of this network is determined by carriers and their business strategy, and Quality of Service (QoS), is also being controlled by them.

WANs is used when *reach* the most important aspect of your solution. *Reach* is essential to provide wireless solutions to the public at large.

In the context of present study, the term *reach* is referred to the furthest distance of wireless signal can be extend. It is a capability of wireless signal to cover the amount of geographical area. The further the distance is *reached*, The higher the *reach* of the wireless network. Thus, the greater amount of geographical area coverage.

### Wireless WAN technology

CDMA2000 is a family of 3G mobile technology standards, which use CDMA channel access, to send voice, data, and signaling data between mobile phones and cell sites. The name CDMA2000 actually denotes a family of standards that represent the successive, evolutionary stages of the underlying technology. The range of CDMA 2000 technology is represented as *cell* (Vieri Vanghi, 2004). The dependency of the coverage area of one cell on the frequency of a CDMA2000 network will be explained in **Table 2.1**.

**Table 2.1:** CDMA2000 frequency dependency

Frequency	Cell radius	Cell area	Relative Cell Count
450 MHz	48.9 Km	7521 Km <sup>2</sup>	1
950 Mhz	26.9 Km	2269 Km <sup>2</sup>	3.3
1800 Mhz	14.0 Km	618 Km <sup>2</sup>	12.2
2100 Mhz	12.0 Km	449 Km <sup>2</sup>	16.2

### 2.2.1.2 Wireless Local Area Network

Wireless LAN networks are set to provide wireless connectivity within a finite coverage area. University is one of typical coverage areas and it has a predetermined users; students and staffs.

WLANS is used when high data-transfer rate is the most important aspect of your solution, and *reach* is restricted.

#### Wireless LAN technology

802.11 is the standard for wireless LANs (IEEE Computer Society,1999). In fact, it is a family of technologies such as 802.11a, 802.11b, 802.11g and the latest 802.11n, differing in speed and attributes like approximate range for outdoor and indoor. The characteristic of 802.11 will be explained in **Table 2.2**

**Table 2.2** : 802.11 network standards

802.11 protocol	Fequency	Bandwidth	Data rate per stream	MIMO	Approximate Range	
					Indoor	Outdoor
<b>A</b>	5 GHz	20 MHz	54 Mbit/s	1	35 m	120 m
<b>B</b>	2.4 GHz	20 MHz	11 Mbit/s	1	35 m	140 m
<b>G</b>	2.4 GHz	20 MHz	54 Mbit/s	1	38 m	140 m
<b>N</b>	2.4 GHz	20 MHz	72.2 Mbit/s	4	70 m	250 m
		40 MHz	150 Mbit/s		70 m	250 m

### 2.2.1.3 Personal Area Networks

These are networks that provide wireless connectivity over distances depending on class and bluetooth is a common wireless PAN technology. For example, a class 2 bluetooth may provide wireless connectivity up to 11m. This range allows a computer to be connected wirelessly to a nearby printer.

#### Wireless PAN technology

Bluetooth technology operates in the unlicensed industrial, scientific and medical (ISM) band at 2.4 to 2.485 GHz, using a spread spectrum, frequency hopping, full-duplex signal at a nominal rate of 1600 hops/sec. Range of bluetooth technology is varies depending on class. This characteristic will be explained in **Table 2.3** and **Table 2.4**.