

## BORANG PENGESAHAN STATUS TESIS

JUDUL: WIRELESS MOBILE COVERAGE ANALYSIS AT UNIVERSITI

PENDIDIKAN SULTAN IDRIS

SESI PENGAJIAN: 2004 – 2008

Saya NUR SYUHADA BINTI MOHAMAD

mengaku membenarkan tesis (PSM/Sarjana/Doktor Falsafah) ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. \*\* Sila tandakan (/)

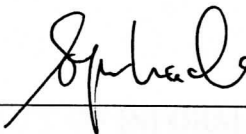
\_\_\_\_\_ SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

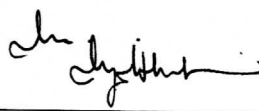
\_\_\_\_\_ TERHAD

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

/ \_\_\_\_\_ TIDAK TERHAD

  
\_\_\_\_\_

Alamat tetap: **LOT 745, KG. KAYU TINGGI,  
BUNUT SUSU,  
17020 PASIR MAS, KELANTAN**

  
\_\_\_\_\_

**NUR AZMAN ABU**

Tarikh: **17 APRIL 2008**

Tarikh: **17 APRIL 2008**

**WIRELESS MOBILE COVERAGE ANALYSIS AT UNIVERSITI PENDIDIKAN  
SULTAN IDRIS**

**NUR SYUHADA BINTI MOHAMAD**

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

**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY  
UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
2008**

## **DECLARATION**

I hereby declare that this project report entitled  
**WIRELESS MOBILE COVERAGE ANALYSIS AT UNIVERSITI PENDIDIKAN  
SULTAN IDRIS**

is written by me and is my own effort and that no part has been plagiarized without  
citations.

**STUDENT : NUR SYUHADA BINTI MOHAMAD Date: 17 APRIL 2008**

**SUPERVISOR : NUR AZMAN ABU Date: 17 APRIL 2008**

## **DEDICATION**

To my beloved parents,  
Mr. Mohamad bin Abu Bakar  
Mrs. Noraini bt Abd Kadir  
who have encouraged, guided and inspired me throughout my journey of education

My supportive supervisor,  
Mr Nur Azman Abu  
who guide me to complete my PSM

My friends,  
who always by my side during my hard time

Thank you all your support

## **ACKNOWLEDGEMENTS**

Praise to Allah, the one and only, for giving me an opportunity to complete my Project Sarjana Muda report successfully. I would like to thank Mr. Nur Azman Abu as my supervisor who has guided me during this project. Thanks a lot for the advice and suggestion he has given me along the way of Project Sarjana Muda process.

A million thank to Mr. Mohd Zaimiruddin b. Mohamed as an Assistant IT Officer of ICT Centre, Universiti pendidikan Sultan Idris. Thank you so much for giving me the opportunities to gain knowledge and gave full co-operation and guide me to complete my project.

I would also like to thank my beloved parents who have been giving me full support and motivation throughout my project.

Finally, thanks to all my friends for giving their full co-operation and support until the end of this project.

## ABSTRACT

The wireless mobile allows wireless device to be on the move situation while remaining connected to the wireless network. Most wireless networks are based on the IEEE 802.11 standards. A basic wireless network consists of multiple stations communicating with radios that broadcast in either the 2.4GHz or 5GHz band. Depending on the technology and others factors, a wireless network has a range of 150 to 350 feet from the source of wireless signal. This final project is about Wireless Mobile Coverage Analysis at Universiti Pendidikan Sultan Idris (UPSI). The main focus for this project is to analyze the UPSI-JARING WiFi Service at Sultan Abdul Jalil Campus, UPSI. WiFi stands for Wireless Fidelity and is used to define any of the wireless technology in the IEEE 802.11 specification. UPSI-JARING WiFi service is a WiFi wireless broadband Internet service available in main campus, hostels and surrounding areas within 300 meters radius. Using either a laptop or handheld that is WiFi 802.11 b/g wirelessly-enabled, users can access the Internet or UPSI intranet at speeds up to 50 times faster than dial-up. The UPSI-JARING WiFi Service is using user authentication and each user should registered as member to access into the internet. In this project, the UPSI-JARING WiFi Service will focus to analyze about the throughput, bandwidth, and signal performances. The current performances result for this WiFi service will be tested using three tools. First, the Network Stumbler shall be used detect the signal performance of UPSI-JARING WiFi coverage. Second, the Multi Router Traffic Grapher (MRTG) monitoring shall be used to monitor the incoming and outgoing bandwidth performance. Third, JARING Internet Access Bandwidth Test shall be used to monitor the download and upload of bandwidth performance. Then, the current design of this UPSI-JARING WiFi Service simulated into the OPNET Modeler Software. The performance result of bandwidth and throughput will be collected. Finally, an enhancement design will be proposed and simulated into OPNET Modeler to improve the UPSI-JARING WiFi performances.

## ABSTRAK

Rangkaian tanpa wayar membolehkan peralatan rangkaian tanpa wayar berada dalam situasi berbeza dalam satu masa tanpa memutuskan talian rangkaian. Kebanyakan rangkaian tanpa wayar berpandukan piawaian IEEE 802.11. Asas bagi rangkaian tanpa wayar mangandungi pelbagai stesen komunikasi dengan menyiarkan lingkaran radio antara 2.4GHz atau 5GHz. Berpandukan teknologi dan factor-faktor lain, rangkaian tanpa wayar mempunyai jarak liputan antara 150 hingga 350 kaki dari punca isyarat rangkaian tanpa wayar. Projek tahun akhir ini adalah mengenai analisis liputan rangkaian tanpa wayar secara bergerak di Universiti Pendidikan Sultan Idris (UPSI). Fokus utama bagi projek ini ialah untuk menganalisa perkhidmatan UPSI-JARING WiFi di Kampus Sultan Abdul Jalil, UPSI. WiFi bermaksud Wireless Fidelity ( ketepatan rangkaian tanpa wayar) dan digunakan untuk mengenalpasti pelbagai teknologi tanpa wayar di dalam spesifikasi IEEE 802.11. Perkhidmatan UPSI-JARING adalah perkhidmatan jalur lebar internet untuk rangkaian tanpa wayar di kampus utama, asrama, dan sekitar kawasan dengan 300 meter. Menggunakan computer riba atau sebarang peralatan rangkaian tanpa wayar 802.11 b/g, pengguna boleh melayari internet luaran atau dalaman UPSI dengan kelajuan meningkat sehingga 50 kali cepat berbanding dail-up. Perkhidmatan UPSI-JARING menggunakan system pengesahan pengguna dan setiap pengguna perlu mendaftar sebagai ahli untuk melayari internet. Di dalam projek ini, perkhidmatan UPSI JARING akan fokus kepada analisa mengenai pelaksanaan jumlah data yang diproses, bandwidth and isyarat. Keputusan perlaksanaan sementara untuk perkhidmatan WiFi ini akan diuji menggunakan tiga cara. Pertamanya menggunakan Perisian Network Stumbler dan perisian ini akan mengesan perlaksanaan di dalam isyarat keluasan bagi UPSI-JARING WiFi. Keduanya, untuk mengesan proses masuk dan keluar data bagi bandwidth menggunakan Multi Router Traffic Grapher (MRTG). Akhirnya, menggunakan Internet Access Bandwidth Test untuk mengesan pindaan data bandwidth. Seterusnya, rekabentuk asal bagi Perkhidmatan UPSI-JARING akan direka menyerupai rekabentuk asal ke dalam Perisian OPNET Modeler. Seterusnya keputusan proses masuk dan keluar dan pindaan data akan diambil. Di dalam projek ini, penambahbaikan rekabentuk akan di cadangkan dan akan di lakar ke dalam OPNET Modeler untuk menambahbaikkkan penggunaan Perkhidmatan UPSI-JARING.

## TABLE OF CONTENTS

<b>CHAPTER</b>	<b>SUBJECT</b>	<b>PAGE</b>
	<b>DECLARATION</b>	<b>ii</b>
	<b>DEDICATION</b>	<b>iii</b>
	<b>ACKNOWLEDGEMENTS</b>	<b>iv</b>
	<b>ABSTRACT</b>	<b>v</b>
	<b>ABSTRAK</b>	<b>vi</b>
	<b>TABLE OF CONTENTS</b>	<b>vii</b>
	<b>LIST OF TABLES</b>	<b>xii</b>
	<b>LIST OF FIGURES</b>	<b>xiii</b>
<b>CHAPTER I</b>	<b>INTRODUCTION</b>	
	1.1 Overview	<b>1</b>
	1.2 Problem Statements	<b>3</b>
	1.3 Objectives	<b>5</b>
	1.4 Scopes	<b>5</b>
	1.5 Project Significance	<b>7</b>
	1.6 Expected Output	<b>10</b>
	1.7 Conclusion	<b>11</b>



<b>CHAPTER II</b>	<b>LITERATURE REVIEW AND PROJECT METHODOLOGY</b>	
2.1	Introduction	12
2.2	Fact and Finding	13
2.2.1	Domain	13
2.2.1.1	Wireless Network Performance	13
2.2.2	Existing System	15
2.2.2.1	Background of Current Network Environment at UPSI	15
2.2.2.2	Background of Current Wireless Network at UPSI	16
2.2.3	Technique	16
2.3	Project Methodology	17
2.3.1	Waterfall Methodology	17
2.3.1.1	Planning Phase	18
2.3.1.2	Analysis Phase	18
2.3.1.3	Design Phase	18
2.3.1.4	Testing Phase	19
2.4	Project Requirements	19
2.4.1	Software Requirement	19
2.4.2	Hardware Requirement	20
2.4.3	Network Requirement	20
2.5	Project Schedule and Milestones	21
2.6	Conclusion	23
<b>CHAPTER III</b>	<b>ANALYSIS</b>	
3.1	Introduction	24
3.2	Problem Analysis	25
3.2.1	Problem Statement	27
3.3	Requirement Analysis	27
3.3.1	User Requirements	30

3.3.1.1 Module 1: Steps to Get Booking ID	31
3.3.1.2 Module 2: Steps for UPSI-JARING	34
WiFi Member's Registration after Get an Order ID	
3.3.2 Hardware Requirements	37
3.3.3 Network Requirements	38
3.4 Others Requirement	39
3.5 Quality of Data	40
3.6 Conclusion	41
<b>CHAPTER IV DESIGN</b>	
4.1 Introduction	42
4.2 Network Architecture	43
4.3 Logical Design	44
4.4 Physical Design	47
4.5 Security Requirement	56
4.6 Conclusion	57
<b>CHAPTER V IMPLEMENTATION</b>	
5.1 Introduction	58
5.2 Network Configuration Management	59
5.2.1 Configuration Environment setup	59
5.2.1.1 UPSI-JARING WiFi Design	60
Configuration into OPNET Modeler	
5.2.1.1.1 Object Palette	71
Configuration	
5.2.1.2 Network Stumbler Software	81
5.2.1.3 Multi Router Traffic Grapher (MRTG)	82
Monitoring	
5.2.1.4 JARING Internet Access Bandwidth	82
Test	
5.3 Hardware Configuration Management	83

5.3.1 Hardware Setup	83
5.4 Security	83
5.4.1 Security Policies and Plan	83
5.5 Development Status	84
5.6 Conclusion	85
<b>CHAPTER VI TESTING</b>	
6.1 Introduction	86
6.2 Test Plan	87
6.2.1 Test Organization	87
6.2.1.1 Signal Test Using Network Stumbler Software	87
6.2.1.2 Bandwidth Utilization Test Using Multi Router Traffic Grapher (MRTG) Monitoring	91
6.2.1.3 JARING Internet Access Bandwidth Test	94
6.2.2 Test Environment	99
6.2.3 Test Schedule	100
6.3 Test Strategy	101
6.3.1 Classes of Tests	101
6.3.1.1 Statistical Technique	101
6.3.1.2 Network Emulation	101
6.3.1.3 Descriptive Statistics	102
6.4 Test Design	102
6.4.1 Test Description	103
6.4.2 Test Data	103
6.5 Test Results and Analysis	104
6.5.1 The Result for the Real Simulation Design	104
6.5.1.1 Wireless LAN Throughput Results	104
6.5.1.2 Wireless LAN Throughput Results for	106

	Access Points (APs)	
	6.5.1.3 Wireless LAN Bandwidth Utilization	110
	Results	
	6.5.2 The Enhancement Simulation Design and	112
	Results	
	6.5.2.1 Enhancement Wireless LAN	114
	Throughput Results	
	6.5.2.2 Enhancement Wireless LAN	116
	Throughput Results for Access Points	
	(APs)	
	6.5.2.3 Enhancement Wireless LAN	118
	Bandwidth Utilization Results	
	6.5.3 Comparison Results	120
	6.5.3.1 Bandwidth Utilization Results	120
	6.6 Conclusion	126
<b>CHAPTER VII</b>	<b>CONCLUSION</b>	
	7.1 Project Conclusion	127
	7.2 Observation on Weaknesses Strength	127
	7.2.1 Strength of Project	128
	7.2.2 Weaknesses of Project	129
	7.3 Propositions for Improvement	129
	7.3.1 Coverage	130
	7.3.2 Security	130
	7.4 Contribution	130
	7.5 Conclusion	131
	<b>REFERENCES</b>	
	<b>APPENDICES</b>	

## LIST OF TABLES

<b>TABLE</b>	<b>TITLE</b>	<b>PAGE</b>
<b>1.1</b>	<b>Overall coverage of UPSI-JARING WiFi Service</b>	<b>3</b>
<b>2.1</b>	<b>Milestones of PSM I Activities</b>	<b>21</b>
<b>5.1</b>	<b>Profile Configuration</b>	<b>73</b>
<b>5.2</b>	<b>Attributes for each Workstation/Mobile Node</b>	<b>80</b>
<b>5.3</b>	<b>The Implementation Status</b>	<b>84</b>
<b>6.1</b>	<b>Summary for the Daily Graph (5 Minutes Average)</b>	<b>92</b>
<b>6.2</b>	<b>Summary for the Weekly Graph (30 Minutes Average)</b>	<b>92</b>
<b>6.3</b>	<b>Summary for the Monthly Graph (2 Hours Average)</b>	<b>93</b>
<b>6.4</b>	<b>Summary for the Yearly Graph (1 Day Average)</b>	<b>93</b>
<b>6.5</b>	<b>Test Schedule Specification</b>	<b>100</b>

## LIST OF FIGURES

DIAGRAM	TITLE	PAGE
1.1	Mobile IP Scenario	8
1.2	Overall Layout for UPSI-JARING WiFi Coverage	9
2.1	Waterfall Methodology	17
3.1	The Process Model for Requirement Analysis	28
3.2	Access the SelfCare System	31
3.3	Service Agreement	31
3.4	Flite(WiFi) PreBooking	32
3.5	User's Contact Profile	32
3.6	Get the Order ID	33
3.7	Login for Admin	34
3.8	Insert the Order ID	34
3.9	Click on the User Order ID	35
3.10	Insert New User Information	35
3.11	Package Information	36
3.12	Insert the Fee of Registration	37
4.1	Network Architecture of UPSI-JARING WiFi Service at Sultan Abdul Jalil Campus	43
4.2	Mobile IP	44
4.3	Overall Logical Layout for UPSI-JARING WiFi Service	46

4.4	<b>Physical Layout for at Open Void Area in Chancellery Building</b>	<b>48</b>
4.5	<b>Physical Layout for 1<sup>st</sup> and 2<sup>nd</sup> Floor in the Library Library</b>	<b>49</b>
4.6	<b>Physical Layout for Lobby Area at Bitara Siswa with Indoor Coverage</b>	<b>50</b>
4.7	<b>Physical Layout in the Lecture Hall</b>	<b>52</b>
4.8	<b>Physical Layout in the SITC Hall</b>	<b>53</b>
4.9	<b>Physical Layout in the T-Building</b>	<b>54</b>
4.10	<b>Physical Layout in the Computer Centre</b>	<b>55</b>
5.1	<b>Overall Logical design for UPSI-JARING WiFi into OPNET Modeler</b>	<b>61</b>
5.2	<b>Logical Design for the Chancellery building</b>	<b>63</b>
5.3	<b>Logical Design for the 1<sup>st</sup> Floor in the Library building</b>	<b>64</b>
5.4	<b>Logical Design for the 2<sup>nt</sup> Floor in the Library building</b>	<b>65</b>
5.5	<b>Logical Design for SITC Hall</b>	<b>66</b>
5.6	<b>Logical Design for T-building</b>	<b>67</b>
5.7	<b>Logical Design for Music Auditorium Building</b>	<b>68</b>
5.8	<b>Logical Design for Lecture Hall</b>	<b>69</b>
5.9	<b>Logical Design for Bitara Siswa Building</b>	<b>70</b>
5.10	<b>Object Palette</b>	<b>71</b>
5.11	<b>Profiles Configuration and its Attributes</b>	<b>72</b>
5.12	<b>Application Configuration and its Attributes</b>	<b>74</b>
5.13	<b>Access Point Attributes</b>	<b>75</b>
5.14	<b>LAN Attributes</b>	<b>76</b>
5.15	<b>Workstation/Mobile Node for Administrator</b>	<b>77</b>
5.16	<b>Workstation/Mobile Node for Staff</b>	<b>78</b>
5.17	<b>Workstation/Mobile Node for Student</b>	<b>79</b>
5.18	<b>NetStumbler 0.4.0 Interface</b>	<b>81</b>
6.1	<b>Wireless Channel Detected in the Chancellery</b>	<b>88</b>
6.2	<b>Wireless Signal/Noise Testing</b>	<b>88</b>

6.3	<b>Wireless Channel Detected Area Library</b>	89
6.4	<b>Wireless Signal/Noise Testing</b>	89
6.5	<b>Daily Graph (5 Minutes Average)</b>	91
6.6	<b>Weekly graph (30 Minutes Average)</b>	92
6.7	<b>Monthly graph (2 Hours Average)</b>	92
6.8	<b>Yearly graph (1 Day Average)</b>	93
6.9	<b>Bandwith's Speed for AP 3 (Library Building)</b>	94
6.10	<b>Connection Summary for AP 3 (Library Building)</b>	94
6.11	<b>Bandwith's Speed for AP 3 (Library Building)</b>	95
6.12	<b>Connection Summary for AP 3 (Library Building)</b>	96
6.13	<b>Bandwith's Speed for AP 3 (Library Building)</b>	96
6.14	<b>Connection Summary for AP 3 (Library Building)</b>	97
6.15	<b>Bandwith's Speed for AP 3 (Library Building)</b>	98
6.16	<b>Connection Summary for AP 3 (Library Building)</b>	98
6.17	<b>The Simulation Speed for Throughput Test</b>	104
6.18	<b>The Memory Usage for Throughput Test</b>	105
6.19	<b>Wireless LAN Throughput for AP 1</b>	106
6.20	<b>Wireless LAN Throughput for AP 2</b>	107
6.21	<b>Wireless LAN Throughput for AP 3</b>	108
6.22	<b>Wireless LAN Throughput for AP 9</b>	109
6.23	<b>The Simulation Speed for Bandwidth Utilization Test</b>	110
6.24	<b>The Memory Usage for Bandwidth Utilization Test</b>	111
6.25	<b>Enhancement Logical Design for UPSI-JARING WiFi Service</b>	112
6.26	<b>The Simulation Speed for Throughput Test</b>	114
6.27	<b>The Memory Usage for Throughput Test</b>	115
6.28	<b>Wireless LAN Throughput for AP 2</b>	116
6.29	<b>Wireless LAN Throughput for AP 12</b>	117
6.30	<b>The Simulation Speed for Bandwidth Utilization Test</b>	118
6.31	<b>The Memory Usage for Bandwidth Utilization Test</b>	119
6.32	<b>Incoming Bandwidth Utilization for AP 2</b>	120



<b>6.33</b>	<b>Outgoing Bandwidth Utilization for AP 2</b>	<b>121</b>
<b>6.34</b>	<b>Incoming Bandwidth Utilization for AP 4</b>	<b>122</b>
<b>6.35</b>	<b>Outgoing Bandwidth Utilization for AP 4</b>	<b>123</b>
<b>6.36</b>	<b>Incoming Bandwidth Utilization for AP 8</b>	<b>124</b>
<b>6.37</b>	<b>Outgoing Bandwidth Utilization for AP 8</b>	<b>125</b>

# CHAPTER I

## INTRODUCTION

### 1.1 Overview

Wireless mobile allows user to be on the move situation using laptop computers and other wireless-enabled devices while remaining connected to the network. Depending on the technology and other factors, a wireless network has a range of 150 to 350 feet from each of access point or source of signal. In addition, as a laptop computer user, we can connect to other wireless network while traveling.

The project background that I wish to develop is about Wireless Mobile Coverage Analysis. The organization for my analysis project is at Universiti Pendidikan Sultan Idris, Tanjung Malim, Perak. The main target for my analysis project is using UPSI-JARING WiFi service at Sultan Abdul Jalil Campus. This WiFi service is cooperation between UPSI and JARING's company.

WiFi stands for Wireless Fidelity and is used to define any of the wireless technology in the IEEE 802.11 specification. UPSI-JARING WiFi service is a WiFi wireless broadband Internet service available in main campuses, hostels and surrounding areas within 300 meters radius. Using either a laptop or handheld that is WiFi 802.11 b/g wirelessly-enabled, we can access the Internet or UPSI intranet at speeds up to 50 times faster than dial-up.

In this project, I am only focuses on the UPSI-JARING WiFi Service at Sultan Abdul Jalil Campus, Universiti Pendidikan Sultan Idris. The UPSI-JARING WiFi should be analysis to test the Wireless Mobile through this WiFi service. This WiFi service analysis looks inside the wireless design, signal, bandwidth, throughput, requirements, how many users involve in this service and the main part is about coverage covered. Besides that, I should refer to the vendor from JARING also to know more about this service.

The wide of estimation area for the Sultan Abdul Jalil Campus at Universiti Pendidikan Sulatan Idris is around 1.26 kilometre multiply of 0.9 kilometre. There are 8 buildings already install with the UPSI-JARING WiFi devices to covered this campus for the wireless network connection.

This project will analyze all the data to be tested using OPNET Modeler Simulation. This analysis will be done through the UPSI-JARING WiFi diagram from the UPSI. The complete wireless network diagram must be detail to implement it into the simulation software. Besides that this project will analyze the UPSI-JARING WiFi performance in the organization environment and find all the solution to improve this WiFi performance.

Table 1 shows the overall access point coverage area covered for the UPSI-JARING WiFi service at Sultan Abdul Jalil Campus at UPSI. There are 8 buildings covered with the UPSI-JARING WiFi service. First at the library's area, the access point will cover the surrounding student area and lobby area at library with indoor coverage. Second at the Music Auditorium's area, the access point covered within cafeteria area and outside the cafeteria area. The third one at Lecture Hall's area, the access point situated at one major side of Lecture Hall with indoor coverage. Fourth, at the Bitara Siswa Building's area, the access point covers the surrounding indoor coverage. Fifth, at the Chancellor Building's area, the access point coverage covers at open void area and also at the chancellor office walkway. Sixth, at the Computer Centre's area, the access point covered indoor area of this Computer Centre. Seventh, at the T-Building's area, the

access point coverage covers at the ground floor open void. The last one at the SITC Hall's area which is the access point situated at the indoor and cover surrounding area of this hall.

**Table 1.1: Overall Coverage of UPSI-JARING WiFi Service**

<b>Location</b>	<b>Coverage</b>
Library	- Within library student area at 1 <sup>st</sup> and 2 <sup>nd</sup> floor - Lobby area with indoor coverage
Music Auditorium	- Within cafeteria area - Outside Cafeteria
Lecture Hall	- One major side at hall with indoor coverage
Bitara Siswa Building	- Lobby area with indoor coverage
Chancellor Building	- Open void area - Chancellor office walkway
Computer Centre	- indoor area of Computer Centre
T-building	- T-building ground floor open void
SITC Hall	- Indoor of the hall

## 1.2 Problem Statement

### i) Signal problem

The first problem I want to state here is about the UPSI-JARING WiFi signal is too low. One of the sources of this problem is because the numbers of user in one time.

**ii) Wireless connection down**

Sometimes this WiFi connection down and users do not get any signal. This problem also more complicated after office hours because no body more expert to solve it.

**iii) User ID problem**

For some students who already registered as members for this WiFi service, but they cannot access the network because of their user ID.

**iv) Interference**

Wireless networks use radio signals to transmit information, unfortunately, there are many types of devices that use radio waves to operate. These other devices can interface with the signals that wireless network uses. Tracking down eliminating interface source can be difficult.

**v) Inconsistent Connections**

With cable networks, computers are ensured a direct, stable connection to the network. However, moving a computer to another location (wireless mobile) or items blocking the path of transmission can interrupt wireless network connections. While many applications, such as Web browser applications, are adversely affected by temporary connection loss, other applications, such as database-based applications, may result in information loss.

**vi) Using the OPNET Modeler**

The current and enhance design need to be simulate into OPNET Modeler as to know any problem occur for the WiFi performance that need to analysis. This is not an

easy task because the proper calculation, analyzing, bandwidth and signal testing and many things need to be done. If not, there will be a greater problem in the future.

### **1.3 Objectives**

The objective of this project is to make sure that this analysis will reach the goals and the objectives are stated as below:

- i) Objective for my project is to analysis Wireless Mobile Coverage at Sultan Abdul Jalil Campus, UPSI using UPSI-JARING WiFi service.
- ii) Analysis the UPSI-JARING WiFi service performance which is about the WiFi design, bandwidth utilization and signal at Sultan Abdul Jalil Campus.
- iii) Simulate the existing UPSI-JARING WiFi design using OPNET Modeler from the analysis project and get the throughput and bandwidth utilization performances result from this simulation.
- iv) Enhance the UPSI-JARING WiFi design to improve the bandwidth utilization performance from the existing design and simulates it into OPNET Modeler.

### **1.4 Scopes**

This wireless mobile coverage analysis will be done use the UPSI-JARING WiFi service at Sultan Abdul Jalil Campus, UPSI.

**i) UPSI-JARING WiFi Service**

UPSI-JARING WiFi Service is using to implement the wireless mobile coverage analysis project.

**ii) The platform of OS**

The Operating System is using Microsoft XP Professional because this platform is suitable to implement the Network Stumbler Software for signal testing and OPNET Modeler for simulation. Another Operating System is using Linux Fedora for Multi Router Traffic Grapher (MRTG) Monitoring Software to capture the bandwidth data.

**iii) Network Stumbler Software**

Network Stumbler is a tool for Windows that allows to detect Wireless Local Area Networks (WLANs) using 802.11b, 802.11a and 802.11g. It has many uses:

- Find locations with poor coverage in the WLAN.
- Detect other networks that may be causing interference on the wireless network.
- Detect unauthorized access points in the workplace.
- Help aim and place antennae for maximum wireless coverage.

**iv) Multi Router Traffic Grapher (MRTG) Monitoring Software**

The Multi Router Traffic Grapher or just simply MRTG is free software for monitoring and measuring the traffic load on network links. It allows the user to see traffic load on a network over time in graphical form. It was originally developed by Tobias Oetiker and Dave Rand to monitor router traffic, but has developed into a tool that can create graphs and statistics for almost anything.

**v) JARING Internet Access Bandwidth Test**

The backup data for bandwidth testing also may use JARING Internet Access Bandwidth Test already provide by JARING Communications Sdn. Bhd using this link website [www.speed.jaring.my](http://www.speed.jaring.my). This testing is to capture the bandwidth utilization data from UPSI-JARING WiFi service.

**vi) OPNET Modeler Simulation Software Tool version 9.1**

The prototype for this project will be map into the OPNET Modeler version 9.1 and all the data would be generate from the simulation software.

**vii) Target user**

This analysis project is focus on UPSI-JARING WiFi performance at the Sultan Abdul Jalil campus, and the target users for this project are students and lecturers who already registered as members for this service.

## **1.5 Project Significance**

Mobile IP was developed to enable computers to maintain Internet connectivity while moving from one internet attachment point to another. With IP nodes moving around different IP networks rapidly becoming popularized, mobility support of IP mobile nodes is an essential technology and there need to be mechanisms to ensure that the mobile nodes have a relevant address for the network subnet. Mobile IP proposed by IETF is a mechanism for maintaining transparent network connectivity to mobile node.