ANALYSIS OF FACTORS AFFECTING THE ERLANG-B TRAFFIC FOR A TYPICAL MOBILE RADIO

This thesis is presented in partial fulfillment for the award of the Bachelor of Electrical

Engineering (Honors)

UNIVERSITI TEKNOLOGI MARA



ANWAR BIN MOHD ABD MAHI Faculty of Electrical Engineering UNIVERSITI TEKNOLOGI MARA 40450 Shah Alam Selangor Darul Ehsan

ACKNOWLEDGEMENT

All praises be to Mighty Allah S.W.T, the Merciful and Beneficent for the strength and blessing me through out the entire research and completion of this thesis. Peace is upon our prophet Muhammad S.A.W; whose has given light to mankind.

I wish to express my sincere appreciation and gratitude to my supervisor, Puan Norhayati Bt. Ahmad for her guidance, comments, encouragement and constant support during the period of this thesis. Also thanks to Pn. Nor'Aim* Bt. Abd. Jalil for 'her valuable sources (reference book) in helping me to complete my thesis. To all lectures and lab assistants from Faculty of Electrical Engineering who had given me knowledge, advises and valuable information throughout my study period in UiTM.

I am also greatly indebted to all my panels, Ir. Muhammad Bin Ibrahim, En. Mohd Nor and Pn. Ruhani Abd. Rahman for their time and effort in proofing this thesis, also on their valuable suggestion and criticism.

I am also would like to thank to En. Ibadallah, Cik Mastura and all the staff from Regional Network Operation Centre (RNOC) of Celcom (M) Sdn. Bhd. Unforgettable thanks to En. Nizam, En. Azhar and Che Mat from Cell Planning Department, En. Hashim and En. Mutalib from MHS of Celcom (M) Sdn. Bhd. for assistance during preparation of this thesis.

Finally, my deepest appreciation goes to my parent and family, for their love, understanding and encouragement and for being source of my inspiration. I dedicate this piece of work to all of them.

ABSTRACT

This paper is about the analysis of Erlang-B traffic for a Global System for Mobile communication (GSM) network. Traffic analysis is very important to network operators for cell planning purposes. The results obtained from traffic analysis can be used to improve the grade of service (GoS). Analysis is done based on several parameters such as the area and antenna direction.

This paper indicates the steps and countermeasures taken to provide enough traffic to subscribers at different areas. Data analysis is done using MATLAB. A software is developed using Visual Basic 6 to assist traffic personnel to monitor traffic utilization and hence to help solve traffic problems.

TABLE OF CONTENTS

1

3

3

3

5

6

6

7

7

8

8 9

14

17

19

19

20

24

24

25

26

26

26

26

PAGE CHAPTER DESCRIPTION **INTRODUCTION** I. 1.1. Introduction 1.2. Project Background 1.3. **Project Objectives** 1.4. **Project Overview** H. TRAFFIC THEORY 2 < YIntroduction 2.2. Radio Network 2.2.1 **Dimensioning Cells** c2<3. Basic Theory of Teletraffic Engineering 2.3.1 The Traffic Concept 2.3.2 General Concept of Traffic Engineering Functions / Roles of Traffic 233 Engineering Lost Calls 2.5 Theory On Erlang - B 2.6 Erlang-B Analysis APPLICATION SOFTWARE AND DATABASE Ш 3.1 Introduction To Programming 3.2 Programming with Visual Basic 3.2.1 Logic Structure of Visual Basic 3.3 Introduction the MATLAB to language 3.3.1 Application Development in MATLAB 3.3.2 Data analysis and Exploration 3.3.3 A Flexible Analysis Language 3.3.4 Straightforward data I/O 3.3.5 Descriptive Graphics to Explore and Present Data

Data manipulation and Reduction

3.3.6

	3.3.7	3.3.7 Reliable, Fast and Accurate Data Analysis3.3.8 Toolboxes for System Modelling and Data				
	3.3.8					
		Analysis				28
3.4	Database Design					
	3.4.1	Purpose	of	а	Database	29
	3.4.2	Designing a Database				30
	3.4.3	Creating a Database				
	3.4.4	Creating a Table				
	3.4.5	Creating a I	Relationship			34

RESULTS AND DISCUSSION

4.1	Introd	oduction 3				
4.2	Analys	sis Based on Different Area and Antenna Direction	37			
	4.2.1	SHAH ALAMSEK.9(G1515) Base Station	37			
	4.2.2	ITM SHAH ALAM (G1222) Base Station	38			
	4.2.3	USJ 12 (G1933) Base Station	39			
4.3	Analysis At Adjacent Base Station					
	4.3.1	TMN INDUSTRI UEP (G1786) Base Station	40			
	4.3.2	TMN INDUSTRI SUBANG (G1939) Base Station	41			
4.4	Analysis Based on Busy Hour					
	4.4.1	ITM SHAH ALAM Base Station	42			
	4.4.2	SHAH ALAM SEK 9 Base Station	43			
	4.4.3	USJ 12 Base Station	44			
	4.4.4	TMN INDUSTRI UEP Base Station	45			
	4.4.5	TMN INDUSTRI SUBANG Base Station	46			
4.5	Softwa	are Development	47			
	4.5.1	Introduction	47			
	4.5.2	Connection from Visual Basic to Database	48			
	4.5.3	Connection from MSChart to Database	49			
	4.5.4	The Main Menu	51			
	4.5.5	The Utilization Option	52			
	4.5.6	The Traffic By Day Option	54			
4.6	Future	Development	55			