

I0000004033

**SIMULATION AND MODELING OF MOBILE NETWORK  
CASE: ATUR 450 TM CENTRAL REGION**

Thesis is presented to fulfil the requirement of Advanced Diploma in Electrical  
Engineering of MARA Institute of Technology

MOHD. YUSOF B. AHMAD

NOVEMBER 1994

**Department of Electrical Engineering  
School of Engineering  
MARA Institute of Technology  
40450 Shah Alam  
Selangor  
MALAYSIA**

## **ACKNOWLEDGMENT**

In the name of Allah, the Most Beneficent and the Most Merciful. It is with the deepest sense of gratitude to the Almighty Allah s.w.t. that this thesis could be written. If it was without His help and guidance this report would not have been completed.

In developing this project, the author would like to convey his special thanks to Dr. Keyvan Farhangian (Alta Group US), Puan Faridah Maarof (Manager, R&D), En. Mat Isa Wahab Ali (AGM, Mobile Div.), En. Mohd. Noah Mohd. Salleh (R&D), En. Wan Azmi Wan Othman (R&D), En. Azman Salleh (R&D), En. Azren Ahmad (R&D), Pn. Noraini (MTX), all the personnel of the OR group (R&D) and all the personnel of “Per. Bergerak” (TMB) for outstanding cooperations in making this project a success.

The author also wish to express his sincere gratitude and appreciation to Puan Rusnani Ariffin (project advisor, ITM), for her invaluable assistance and care shown in taking up this project.

## **ABSTRACT**

Mobile communication service in Malaysia began its operation in late eighties. Its technology has grown very fast and the mobile service operators have also grown from one operator to three at the moment.

This Mobile Network Simulation project studies the problem of network congestion in ATUR 450 system. Although cell traffic statistic is the major problem faced by the ATUR 450 system, we believe that network congestion problem is very much related to this.

ATUR 450 Systems work on frequency band of 452MHz to 466.5MHz which gives 180 channels throughout at 25kHz frequency separation. The system uses FSK modulation technique and their switching system uses the AXE exchange system (an Ericsson product).

After knowing the ATUR 450 system a model buildup of the system was studied. From this model we proceeded with the building up of parameters and attributes necessary for use in a simulation package.

We have decided to use Block Oriented Network Simulator (BONeS) Simulation Package for this project in which we are aware of the following factors in solving the above problem :

1. The right alternative routes from MTX to PSTN.

## CONTENTS

---

ACKNOWLEDGMENT	iii
LETTER OF APPROVAL	iv
LIST OF ABBREVIATIONS	v
ABSTRACT	vi
CHAPTER ONE: GENERAL INTRODUCTION	
1.0 Introduction	1
1.1 Telecommunication Technology Advancement	1
1.2 Scope of Project	3
CHAPTER TWO: AUTOMATIC TELEPHONE USING RADIO	
2.0 Automatic Telephone Using Radio (ATUR)	5
2.1 Introduction: ATUR 450 System	5
2.2 Concept of Cellular Radio	8
2.3 Description of Mobile Radio Environment	13
2.4 Field Strength Representation	15
2.5 Mobile Radio Signal Representation	16

## **1.0 INTRODUCTION**

### **1.1 Telecommunication Technology Advancement**

The STM Network is evolving rapidly according to market demands and technological breakthroughs. Current developments indicate that demand for services are also changing from Plain Ordinary Telephone (POT) service to a more personalised system called the Virtual, Intelligent, Personalised (VIP) telephone system. Advances in VLSI technology, digital technology, optical technology and the convergence of communications and computers are the technological drivers for introducing new technologies such as CCS#7, ATM, SDH, SMDS resulting in new networks and services like the ISDN, IN, GSM, PCN, TPON and etc. The trend is towards a global telecommunications network giving interconnectability with a wide range of services.

Studies are being conducted on optical networks (also called photonics technology) using Wavelength Division Multiplexing (WDM) namely Broadband Passive Optical Network (BPON) and Telephone Passive Optical Network (TPON). Future devices will be capable of performing signal processing at the level of the optical signal itself without the need for an optical to electrical conversion. The TPON structure may be evolved to carry broadband services such as CATV, HDTV, ISDN services as well as telephony services.

It is also anticipated that the future system will produce a single telephone which will be able to give the customer a full mobility using only a single personal number. This may involve complex radio transmission network utilising even higher and previously unused frequencies. It thus requires a sophisticated Telecommunication Management network