Traffic Navigation System Retrieval Via SMS

by

Wan Ruziana Binti Sulaiman

Dissertation submitted in partial fulfillment of
the requirements for the
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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
Information Technology Programme
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(INFORMATION TECHNOLOGY)

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June 2004

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Certification of FYP Final Draft Submission

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Thank you.

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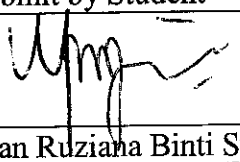
Signature		
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Date	16.04.2004	16.04.2004

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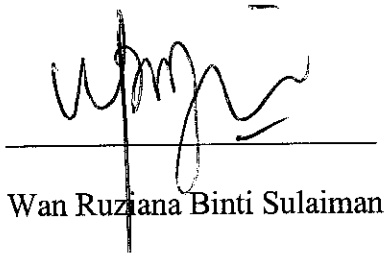

Wan Ruziana Binti Sulaiman

ABSTRACT

Mobile technology nowadays grows very well and most of us likely to use and have handphones. Many systems which are suited with mobile phone features such as Traffic Navigation System (TNS) retrieval via Short Message System (SMS) can be developed. An unplanned journey may cause some unexpected problem such as getting trapped in traffic jam. The objective of this system is to help road users check the traffic condition for certain places via SMS to ensure that their journey runs smoothly. This system was done by implementing four important phases which are: (i) Planning, (ii) Development, (iii) Testing and (iv) Evaluation. In order to get users' opinion, questionnaire distribution had been conducted. The result of the survey showed that 78% or 39 out of 50 respondents preferred to know about the traffic condition before going out to avoid themselves from getting trapped in traffic jam. In conclusion, if implemented in the real mobile environment, the Traffic Navigation System (TNS) retrieval via SMS can help road users plan their journey to ensure that they reach destination as quickly as they could. It also can reduce the possibility of road users just wasting their time getting trapped in heavy traffic jam.

ACKNOWLEDGEMENT

In the name of Allah, the most gracious and the most merciful..

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1. INTRODUCTION

1.1 Background of Study

With the incessant improvement of mobile communications services, Short Message Service (SMS) becomes an important telecom value-added service and revenue resource of GSM network. This kind of services can attract more mobile users to use it in order to ease their daily life. Any information needed such as hotels, restaurants, booking movie ticket from any nearest cinema and downloading favorite ringtones just at your fingertips. What users should do is sending SMS to any service providers that provide these kinds of services to get what you request for.

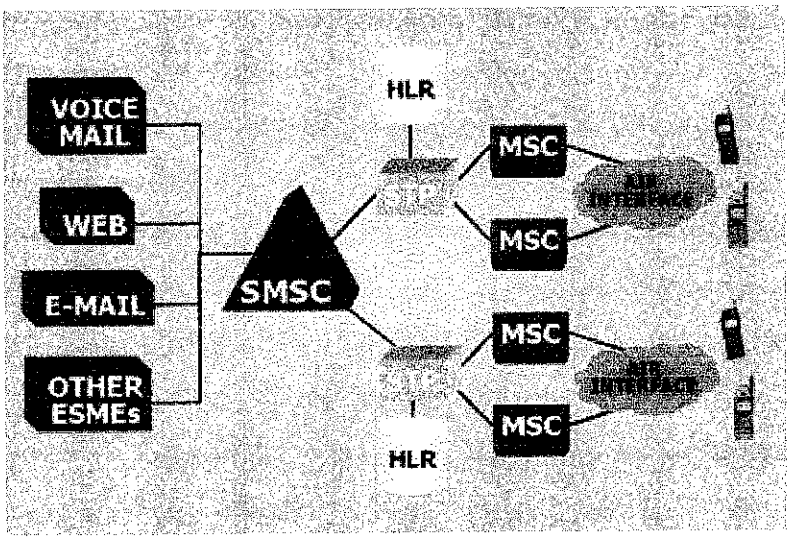


Figure 1: Basic network architecture of Short Message System (SMS)

Basically, SMS is the transmission of short text messages to and from a mobile phone. Currently, messages must be no longer than 160 alpha-numeric characters and contain no images or graphics. Once a message is sent, it will be received by a Short Message Service Center (SMSC). The message is then sent to the intended appropriate mobile device. To do this, the SMSC sends a request to the Home Location Register (HLR) to find the roaming customer. Once the HLR receives the request, it will respond to the SMSC with the subscriber's status:

1) Inactive or active.

2) Where subscriber is roaming.

If the response is 'inactive', then the SMSC will hold onto the message for a period of time. When the subscriber accesses his device, the HLR sends a SMS Notification to the SMSC, and the SMSC will attempt delivery. The SMSC transfers the message in a Short Message Delivery Point to Point format to the serving system. The system pages the device, and if it responds, the message gets delivered. The SMSC receives verification that the message was received by the end user before categorizing the message as 'sent' and will not attempt to send again.

From the SMSC, the request will be sent to the SMS Gateway which is connected to the SMSC and mobile phone. That particular gateway serves as an access point for inbound and outbound SMS messages. It will request authorization permissions from system servers retrieve information from content servers and deliver it to mobile users.

A distinguishing characteristic of the service is that an active mobile handset is able to receive or submit a short message at any time, independent of whether a voice or data call is in progress (in some implementations, this may depend on the MSC or SMSC capabilities). SMS also guarantees delivery of the short message by the network. Temporary failures due to unavailable receiving stations are identified, and the short message is stored in the SMSC until the destination device becomes available.

Traffic navigation system is one type of SMS systems that providing users with such road information as which roads are closed and what selected routes are suggested to ensure that the journey is free from traffic jam. This system can help users plan their journey easily and smoothly. Road users can use this system by requesting any information needed via SMS. Users will SMS the respective number that provides this kind of services in order to gain that particular information.

The features that will be included in the Traffic Navigation System (TNS) are:

- List of main roads for selected district
- Type of information provided or condition of the roads
- Guidelines of using TNS through HELP

1.2 Problem Statement

Sometimes unplanned journey will cause you some unexpected problems. One of the problems might be getting trapped in traffic jam. Since the mobile technology today grows very well and most of us likely to use handphone, we can implement or develop a system that allows mobile phone users to check the traffic condition via SMS. Handphone users are likely to bring their phone wherever they go. In case of emergency or just wanting to get some information about traffic condition, they just send the SMS to the respective number to get that particular information. It will incur some costs. However, the possibility of their trips to run smoothly is slightly higher.

Although the road users can get the information about the traffic jam through radio, the radio does not cover all places or specifically the condition of all roads are being reported. So in this case, it would be difficult and time-consuming for the travelers to trace the traffic condition.

A TNS similar to the system that is going to be developed has already been in the market. However, the existing system does not trace the traffic condition through SMS. Instead of that, it traces the traffic condition through the Wireless Application Protocol (WAP) or blue tooth requiring user to have a handphone that supports WAP application. The drawback is, not all users can afford to buy a WAP-supported handphone.

1.3 Aims and Objectives

1.3.1 Aims

- Studying the implementation of SMS application for various systems.
- Developing a prototype for a Traffic Navigation System using SMS.

1.3.2 Objectives

- Allowing road users to check the traffic condition for certain places via SMS to ensure their journey run smoothly.
- Delivering data on current traffic condition.
- Making our life a little easier without wasting our time getting trapped in traffic jam.

1.4 Scope of Study

As the mobile technology grows very well, any system providing services using SMS becomes more popular nowadays. The to-be-developed system would basically implement the conventional navigation system into the mobile technology using SMS

application. Briefly, TNS was designed to keep track on the traffic condition for certain places requested by the mobile phone users.

During development of this system, some characteristics of compatibility needed to be considered as different handphones might have their own specialties that other handphones do not have. So, the to-be-developed system generally should be compatible with all handphones specifications.

For the database, it comprised of some fields depending on the protocols developed using Microsoft Access. There were 3 protocols that developers needed to develop where these protocols were going to be used by the users. The protocols are:

- Status or condition of selected road.
  This protocol requires a user to type any keyword specified by the developers before sending the SMS to the respective numbers.
  For example, type TRAFFIC<space>(name of road)
  Name of road naming convention: JPUDU, JTELAWI, etc
- Help.
  This protocol is used when user needs any help regarding this system. For example, this protocol will tell the user on how to type the keyword.
  For instance, type HELP.

- List of roads.
  This protocol will tell the user about the road listed in the system and the format of typing the name of road for the first protocol.
  For example, type MAIN<space>ROADS.

CHAPTER 2

LITERATURE REVIEW/THEORY

2. OVERVIEW AND LITERATURE REVIEW

2.1 What is Short Message Service (SMS)?

Short Message Service (SMS) is the transmission of short text messages to and from a mobile phone using a Slow Speed Data Channel. Currently, messages should be no longer than 160 alphanumeric characters without any images or graphics. SMS messages are supported by GSM, Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA) based mobile phone networks currently in use. Nowadays, the usage of SMS is mainly used as a substitute of voice information. The expansion of human needs and creativity has brought various SMS service forms and other services that improve further and later also improve the usability and usage of Handphones. The SMS messages can be sent more than one at the same time but if the phone is out of coverage, is in use or turned off, the service will hold the message until the phone becomes active or available.

SMS delivery is a store and forward system. Once a message is sent, it is received by a Short Message Service Center (SMSC), which must then direct it to the appropriate mobile device. To do this, the SMSC sends a SMS Request to the home location register (HLR) to find the user. Once the HLR receives the request, it will respond to the SMSC either the user is active or inactive. If the response is 'inactive', then the SMSC will hold the message for a period of time. When the user accesses his device, the HLR sends a SMS Notification to the SMSC, and the SMSC will attempt delivery.

Source: http://www.tel-access.com/about.html

The SMSC transfers the message in a Short Message Delivery Point-to-Point format to the serving system. The system pages the device, and if it responds, the message gets delivered. The SMSC receives verification that the message was received by the end user, and then categorizes the message as 'sent'.

According to the article from the California Software Labs (CSWL), basic principle of SMS is that there is only one SMSC (SMS Center) that encodes the messages to be submitted to and from through the GSM network. The basic difficulty in developing SMS based services is the variety of protocols used in SMS Centers. For example in Malaysia, Maxis used SOAP and Celcom used SMPP as protocol in their SMSC. There are several SMS gateways able to interact with some or all of the SMS protocols. However, there is no standard way for service providers to interact with the SMS gateways. Also, only few of the SMS gateways support all the SMSC protocols.

The basic needs in order to use the Short Message Service are:

- A subscription to a mobile telephone network that supports SMS such as Maxis, Celcom, etc.
- A mobile phone that supports SMS.
- The use of SMS must be enabled for the user. (automatic access to the SMS is given by some mobile network operators, others charge a monthly subscription and require a specific opt-in to use the service)
- Knowledge of how to send or read a short message using the specific model of mobile phone.
- A destination to send a short message to, or receive a message from. This is usually another mobile phone but may be a fax machine, PC or Internet address.

Source: http://www.tel-access.com/about.html

2.2 SMS vs. WAP

SMS is the short messaging service for GSM. It is also present on most other digital cellular networks and tends to operate in a similar fashion on each network. SMS enables 2-way short messages to be sent between GSM subscribers. Using gateways, it is also possible to interchange messages with other systems such as Internet email, the web etc. SMS is restricted to a basic functionality of protocols used. It only using a basic command set such as "Send Message" and "Receive Message"

WAP on the other hand is a "protocol set" aboard which various services can be delivered. Like any protocol, it states how devices can be made compatible in order to exchange information. Since SMS is a means for information to be transported, two devices could use SMS to exchange WAP-compliant data. WAP is concerned with sensible data formatting and navigation appropriate to some limitations such as small text-only display, and the restrictive keyboard and navigation keys. Another part of WAP is concerned with efficient protocol transport.

However, SMS still needed because there are many applications that simply do not need WAP. Besides that, many SMS messages are alerts of one another, and it is used to notify the recipient of an event. These types of messages usually require follow-on action other than sending a reply using SMS. In these circumstances, SMS is sufficient and there is no need to use WAP. According to the article from California Software Labs, WAP also is not widely available yet and there are millions of phones that can handle SMS but not WAP.

Source: California Software Labs (CSWL)

2.3 GSM Modem

A GSM modem can be categorized into several types which are:

- An external modem device - by inserting a GSM SIM card into this modem, and connect the modem to an available serial port on your computer.
- PC Card installed in a notebook computer
- Standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer.

However, GSM modem either external or PC Card is usually preferable to a GSM mobile phone. This is because of some compatibility that can exist with any mobile phones. For example, some mobile phones will not allow you to receive SMS text messages longer than 160 bytes. This is because these long messages are actually sent as separate SMS messages, and the phone attempts to reassemble the message before forwarding via the modem interface.

Article published in *Volume 4, Issue 4* of *International Journal of Wireless Information Networks*
Source: http://www.nowsms.com/downloads/smsmmsgateway.htm

2.4 Growth of Mobile Messaging in Malaysia

Malaysia has a phenomenal growth of SMS usage, with the total of SMS traffic hitting 3.61 billion in 2002. With more than 9 million mobile phone subscribers (and a penetration rate of more than 35% of the population) coupled with the proliferation of mobile devices, we see the time is right to introduce SMS as the next generation of business communication

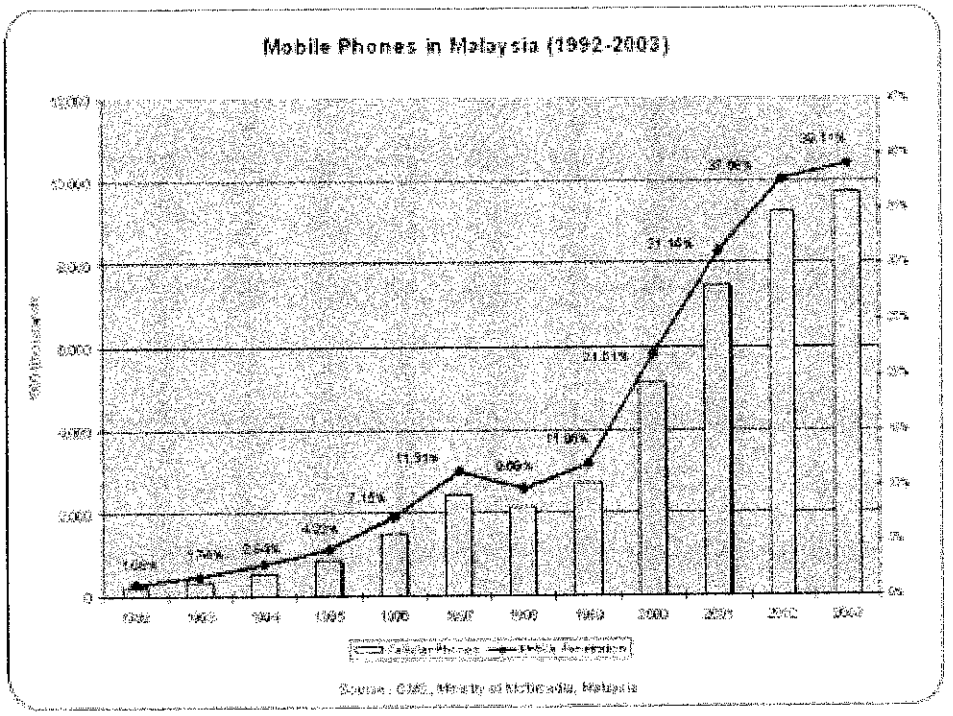


Figure 2: Growth of mobile phones in Malaysia (1992 – 2003)

Source: CMC, Ministry of Multimedia Malaysia

Source: The Star, August 10 2002

Below is the list of Mobile Operator that exists in Malaysia and compete to each others.

Mobile Operator	Subscriber Base	Monthly SMS Vol.	Est. Monthly Revenue
Celcom	2.212 million	135 million	> RM20 million
DiGi	1.400 million	70 million	> RM10 million
Maxis	2.700 million	80 million	> RM12 million
TimeCel	0.600 million	15 million	> RM2 million
TMTOUCH	1.280 million	30 million	> RM4 million
TOTAL	**8.192 million**	**330 million**	**RM48 million**

Table 1: List of mobile operators in Malaysia

(Source: The Star, August 10 2002)

Source: CMC, Ministry of Multimedia Malaysia

Source: The Star, August 10 2002

2.5 Vehicle Navigation System via Mobile Phone by Jentro

2.5.1 Introduction

This is a cellphone-based navigation solution system for automobile drivers and it is a hands free mobile phone system. The driver is guided by spoken output and the cellphone display. The system will be able to automatically detour around traffic jams. According to Jentro, it is as easy to install as a hands-free mobile phone system. Since nowadays, almost everyone has a mobile phone, so Jentro has replaced the conventional solutions that were using expensive PDA or Smart Phone. This system had offered extremely economical system but powerful auto-navigation solution.

The desired destination address is simply entered via the cellphone's alphanumeric keys or selected from an existing list, and transmitted to the service center via mobile radio. The server, in turn, calculates the route, and sends the route data back to the electronic box in the vehicle via the cellphone. The electronic box displays the route instructions on the mobile phone display and announces it over the loudspeaker, so that the driver can watch traffic without distractions.

One advantage of using this solution is that only one has to call up a new update from the server if one makes a major detour from the planned route. This new corridor-based route calculation system not only considers the main route, but also the surrounding road network along the main route. This provides the driver with the advantage that they are still guided to the destination even if they deviate from a route instruction – without having to request a new route from the service center (and thus without incurring extra costs).

Source: Jentro AG in conjunction with Sun Microsystem -www.jentro.com

2.5.2 System Architecture and Tools

The driver uses the cellphone to obtain all route information from service providers that will guide him/her to the desired destination. The route is calculated on powerful servers with the help of **PTV NaviGuide** software which is already in operation in the A-Class Mercedes-Benz.

At the service center, that software uses the latest maps and up-to-the-minute traffic information for the calculation. One new advantage is that only one has to call up a new update from the server if one makes a major detour from the planned route: this new corridor-based route calculation system not only considers the main route, but also the surrounding road network along the main route. This provides the driver with the advantage that they are still guided to the destination even if they deviate from a route instruction – without having to request a new route from the service center (and thus without incurring extra costs).

Communication between the mobile phone and the service headquarters currently takes place via GPRS and, in future, UMTS. The amount of route data to be transmitted is very small, and thus also inexpensive. Once the device has logged into the GPRS or UMTS network, the route query, its calculation, and the transfer of data to the vehicle is actually carried out quicker than when calculated using conventional on-board systems. In principle, only a single connection need be set up between the server and the automobile in order to transfer the entire route information. If there is no GPRS network available then somewhat slower GSM data connection is used or, as a fallback, communication via SMS can be carried out with only slightly limited functionality.

Source: Jentro AG in conjunction with Sun Microsystem -www.jentro.com

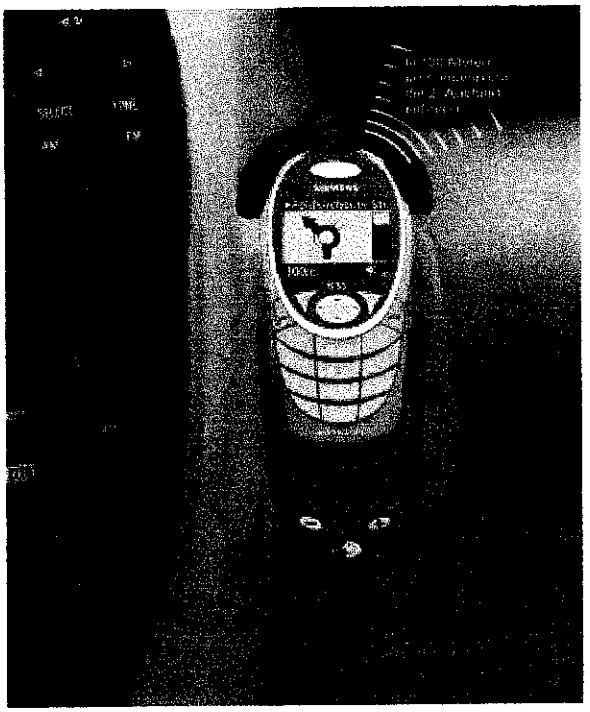


Figure 3: Jentro AG System installed in the mobile phone.

Source: Jentro AG – www.jentro.com

2.6 Oracle Application Server Wireless: Messaging Service for Weather Forecast

2.6.1 Introduction

Oracle Application Server Wireless Messaging Services provide a mechanism to deliver messages to mobile devices. A message can be sent in numerous ways, for instance via SMS to a mobile phone, or as an email to a 2-way pager or handheld computer. For this chapter, the author will study into detail on sending a message via SMS to a mobile phone using Pull Message method. Pull Messages methods are those sent from a mobile phone to an application, where the application responds with a reply.

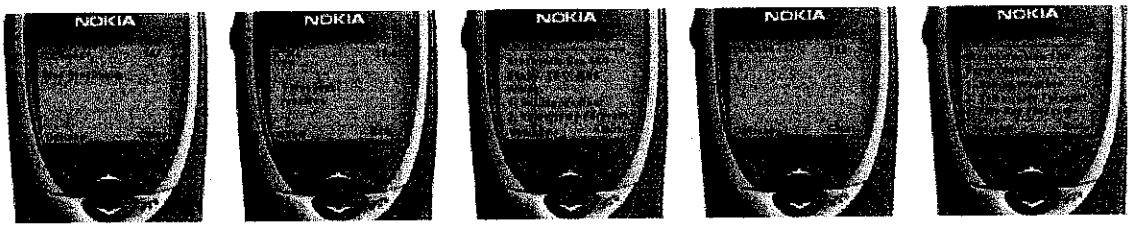


Figure 4: An interactive application for weather that is invoked using SMS

(Source: Ali Shah, August 2003, Oracle Corporation)

Figure 4 above demonstrates an interactive weather forecast application. The user simply sends an SMS message with the text **"Wea"** (an abbreviation) to call the deployed "Weather" service. The result of calling the weather service is returned as an SMS message. This message could have additional menu choices like

1. Sailing Weather
2. Tomorrows Forecast
3. Five day Forecast

Source: Ali Shah, August 2003, Oracle Corporation

By replying to the message with **"2"** would return tomorrows weather. OracleAS wireless has maintained the state of the application and can deliver the appropriate content based on the original menu choices and the user's response.

2.6.2 System Architecture and Tools

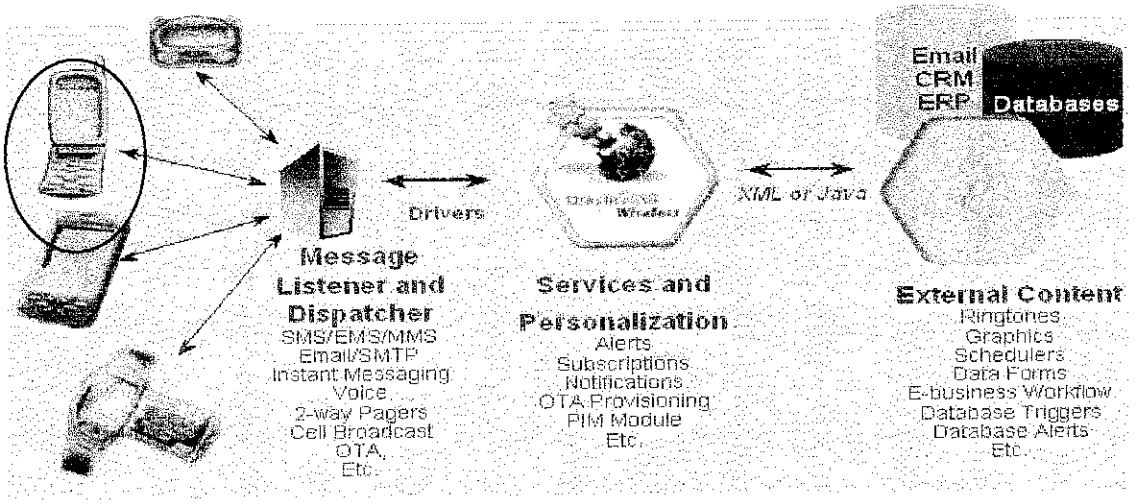


Figure 5: The functional architecture of the messaging services

(Source: Oracle Application Server Wireless White Paper, August 2003)

OracleAS Wireless is designed to allow the sending of notifications to any kind of device. The product uses drivers to adapt the messages for a certain protocol or device. OracleAS Wireless, provides drivers for popular SMS Centers (SMS-C), MMS Centers (MMS-C), Pager Networks, Email servers, Voice Gateways, Fax servers, USSD Servers and IM Gateways. Drivers are based on an open and documented API and customers may write their own drivers if there is such a need.

Source: Ali Shah, August 2003, Oracle Corporation

Source: Oracle Application Server Wireless White Paper, August 2003

SMS drivers for the most popular SMS Centers (SMS-C) that are included in OracleAS Wireless are:

1. CMG (UCP)
2. Logica (SMPP)
3. Comverse (SMPP)
4. Nokia (CIMD2)
5. Sema (OIS)
6. Other SMS Centers are supported through pre-integrated partner solutions.

Source: Ali Shah, August 2003, Oracle Corporation

Source: Oracle Application Server Wireless White Paper, August 2003

2.7 Situation - Aware Mobile Traffic Information System

2.7.1 Introduction

Situation-Aware Mobile Traffic Information System offers advanced personalized route planning, including added services like traffic jam alerting via SMS. This wireless service is essential to provide the necessary information. The intended situation-aware mobile service comprises: route planning, alerting for traffic jams, and suggesting alternative routes. According to the writer, this service can improved route planning and accompany with up-to-date information. However, during long journey, traffic situation may undergo drastic changes either traffic jam may dissolve or evolve, or the weather may change drastically. Thus a wireless service is very important in order to provide that essential information. This system had captured route database from a map of a complex system and getting the internet sources of traffic information from a local radio station, road works from the German ministry, and local weather data. These data sources that were distributed is integrated and used to recommend routes for each specific user according to his or her personal preferences.

The user simply sends an SMS to the respective number by entering the current place and destination, the number of routes to return and preferences as shown in Figure 6 below. For preferences, users can check the choices given according to their preferences of getting the information. By checking a box for the route of choice and submitting the information, the user can also register for another service that alerts on changes in the current traffic situation for the route chosen.

Source: W.-T. Balke, W. Kießling, C. Unbehend, Germany

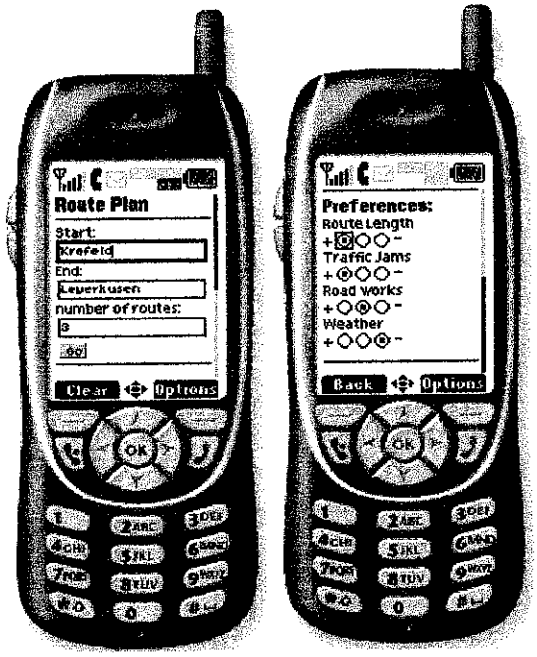


Figure 6: Mobile querying of routes

(Source: W.-T. Balke, W. Kießling, C. Unbehend, Germany)

2.7.2 System Architecture and Tools

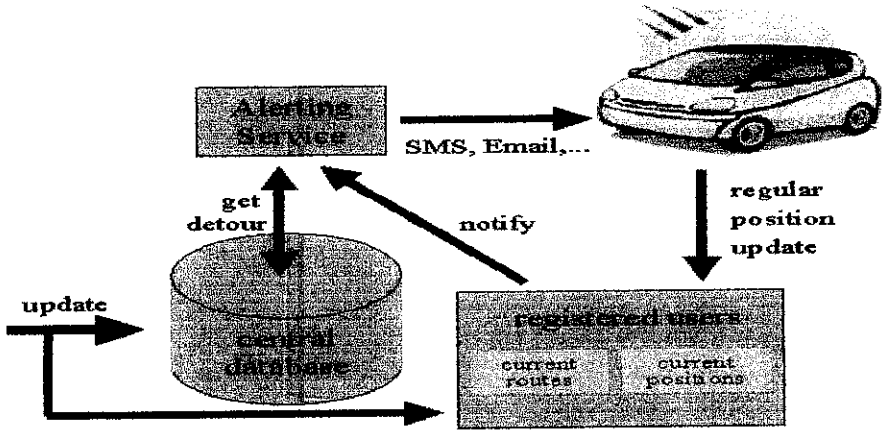


Figure 7: SMS alerting Service for traffic information

(Source: W.-T. Balke, W. Kießling, C. Unbehend, Germany)

The SMS service architecture adds an alerting service to the application server (Figure 7). On each update of the central database, the affects on the routes of all registered users is determined. If a route is affected by a current change, the current position of the car is taken to repose the query with the car's current location and its destination. If a better route is detected an SMS containing the affection and a most suitable rerouting is sent to the user. Since SMS reading in cars may distract the driver's attention and is therefore not recommended, this service is right now not a fixed part of our traffic information system. Using voice output (e.g. VoiceXML, VoxML [XML02]) or getting the rerouting directly to car-bound navigation systems will in future solve this problem. The driver thus is enabled to ask for directions and get an appropriate voice output of suggestions or current changes.

Source: W.-T. Balke, W. Kießling, C. Unbehend, Germany

2.8 M-Cinema

2.8.1 Introduction

M-Cinema is an online movie ticket booking system via SMS developed by Maxis. In order to book the ticket using this system, users need to send request three times and there will be costs of sending and receiving SMS of about 45 cents where 15 cents for each request. This system consists of six steps before sending it to the SMSC. The steps are:

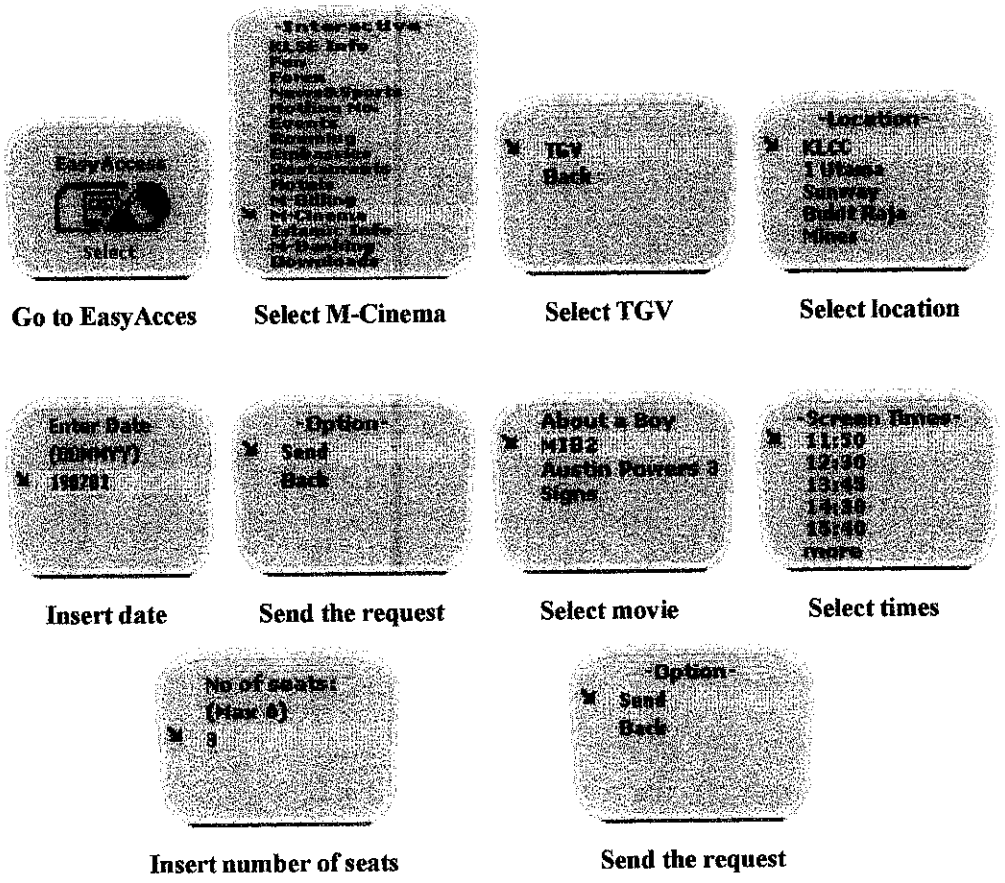


Figure 8: M-Cinema Application on Screen

Source: Maxis Corporation, www.maxis.com.my

2.8.2 System Architecture and Tools

Once a message is sent by the Maxis user, it is received by a Maxis Short Message Service Center (SMSC), which must then get it to the appropriate mobile device. To do this, the SMSC sends a SMS Request to the home location register (HLR) to find the Maxis customer. Once the HLR receives the request, it will respond to the SMSC with the subscriber's status:

1) Inactive or active
2) Where subscriber is roaming.

If the response is 'inactive', then the SMSC will hold onto the message for a period of time. When the subscriber accesses his device, the HLR sends a SMS Notification to the SMSC, and the SMSC will attempt delivery. The SMSC transfers the message in a Short Message Delivery Point to Point format to the serving system. The system pages the device, and if it responds, the message gets delivered. The SMSC receives verification that the message was received by the end user, then categorizes the message as 'sent' and will not attempt to send again.

From the SMSC, the request will be sent to the SMS Gateway which is connected to the SMSC and mobile phone. That particular gateway serves as an access point for inbound and outbound SMS messages. It will request authorization permissions from Traffic Navigation System servers, retrieves information from content servers and delivers it to mobile users.

Source: Maxis Corporation, www.maxis.com.my

CHAPTER 3
METHODOLOGY / PROJECT WORK

3. METHODOLOGY

3.1 Procedure Identification/Introduction

In this section, there were four processes that had been selected in order to complete the overall project. These four processes had been identified after considering at the advantages and disadvantages for each possible process. The allocation of time to complete this project is a determining factor. The four selected processes or phases were:

- Planning
- Development
- Testing
- Result Analysis

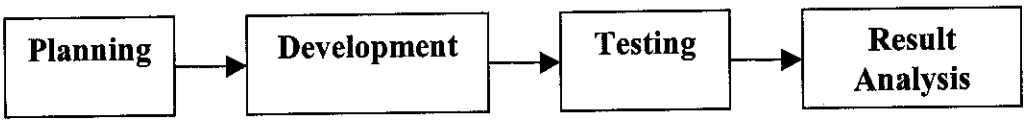


Figure 9: Phases involved in completing Traffic Navigation System via SMS

3.2 Planning Phase

Planning phase was the initial phase that was used to identify and plan all activities needed to be performed. The activities included project title selection, problem statement definition, objectives and scope identification, information gathering and development planning. The purpose of doing this phase is to provide a comprehensive structured planning. The planned activities would be described into detail in the table below.

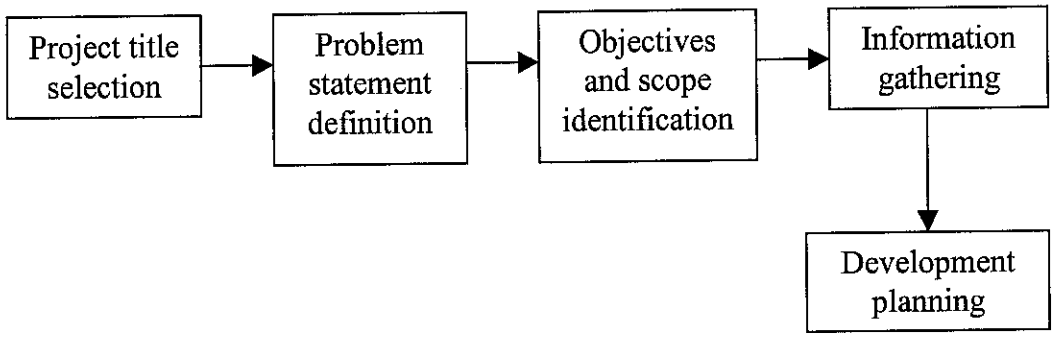


Figure 10: Tasks involved in Planning Phase

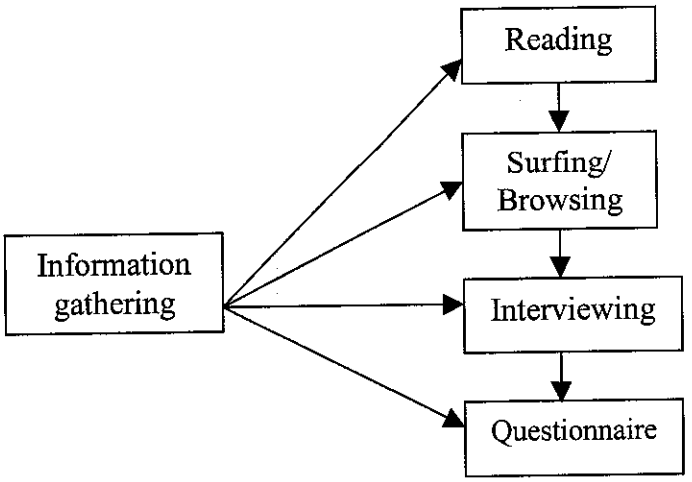


Figure 11: Sub-tasks in Information gathering task

Task/Activities	Description
1. Project title selection	- Brainstormed the ideas to get list of relevant topics for Final Year Project.
2. Problem statement definition	- Made an observation to the selected topic or title in order to produce a problem statement. - Reviewed existing literature on TNS or did a research on selected topic for comparison purposes.
3. Objectives and scope identification	- Defined the aims and objectives of developing the system - Defined the scope of the project which included user requirements and system requirements.
4. Information gathering	- Collected any relevant information that can be used for developing system and documentation. - Gathered information using three methods: • Reading – getting information from books, some articles, journals, magazines etc. • Surfing – browsed some related website that provides information that associated with this project. • Interviewing – Conducted some interviews relevant to the project with experts' people. • Questionnaires – Some questionnaires were distributed to some user in UTP.
5. Development planning	- Planned for the Development phase such as designed database and developed application.

Table 2: Task or activities under Planning Phase

3.3 Development Phase

For the development phase, the tasks or activities that involved were related to the development and implementation of the project such as developing the architecture of the system and database, designing the workflow and protocols of the system and database, developing an application as a prototype and developing the real system by combining the application and the database. The purpose of this phase was to develop a concrete system and to get some feedback from the prototyping task involved before going further to the next phase which is Testing. Concrete system meant that the system was ready to be implemented. Table 3 shows the detailed description of the tasks or activities that would be performed under Development Phase.

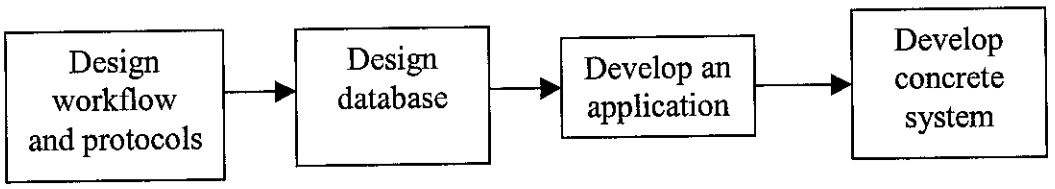


Figure 12: Tasks in Development Phase

Task/Activities	Description
1. Design workflow and protocols involved.	- Designed project workflow and protocols that were going to be developed. - The workflow would show how many protocols involved when user wanted to use this system.
2. Design a database	- Designed a project database comprised of some elements or fields that should be included to ensure that the system will work properly. - Designed the database using Microsoft Access.
3. Develop an application	- Developed an application comprised of user interface with functional buttons based on the designed workflow. - Designed the application of this system using Microsoft Visual Basic 6.0.
4. Develop concrete system	- Integrated the application system and the database to produce a concrete system or real system as planned by using appropriate hardware and software. GSM Modem was needed to provide a connection between them.

Table 3: Task or activities under Development Phase

3.3.1 Project Workflow and Protocols

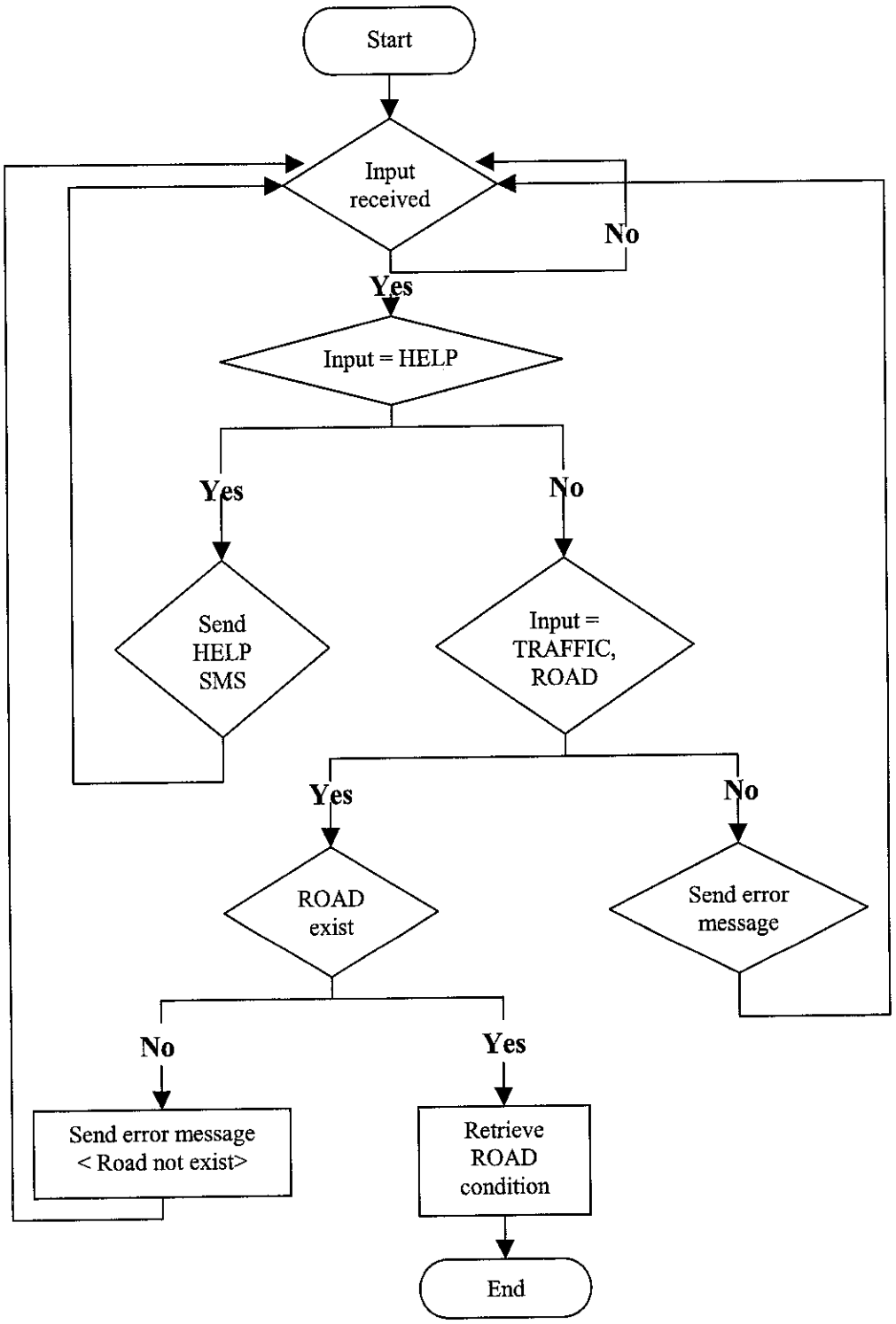


Figure 13: Overall System Workflow

The flowchart shown in Figure 13, described the flow of all protocols involved in TNS retrieval via SMS. As this system was connected using GSM Modem, the system was ready to receive any request from the users. When the input received, which meant that, the user started requesting, the system would check which protocol involved in that request. If the input is HELP, then the protocol of HELP would be used. If the input was valid, the system would send the HELP message but if there was no request for the HELP, then the system would check the other protocols. If it was TRAFFIC protocol, the system would check again whether it was valid or not. If the selected road existed in this system, then system will retrieve the condition of that road, but if the road was unavailable in this system, then the error message would be sent, telling that there was no record for that particular road. Typo-error also could occur when requesting any protocol. So, in this case, this system would send an error message to the users.

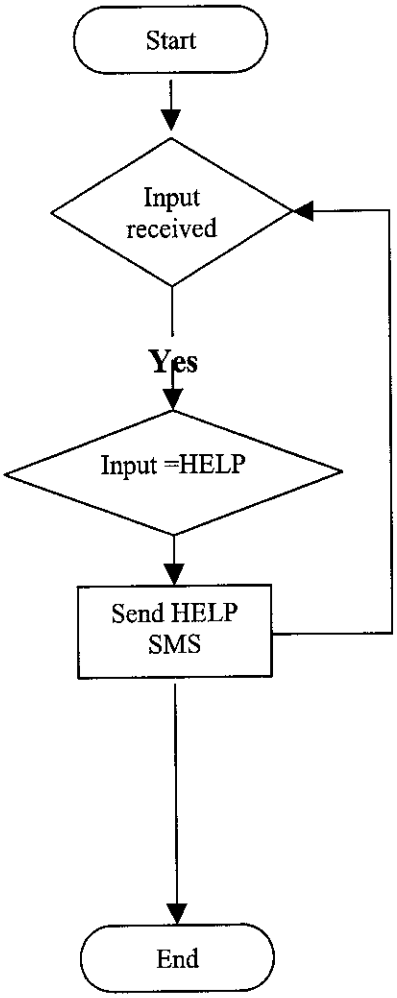


Figure 14: HELP system workflow

Figure 14 showed the detailed of HELP protocol. As mentioned earlier in the above description, if the system detected the use of HELP protocol, then the system would automatically send the message to the users. Inside the HELP message, it would tell the user how to key in the intended keyword for the input TRAFFIC and input MAIN ROADS.

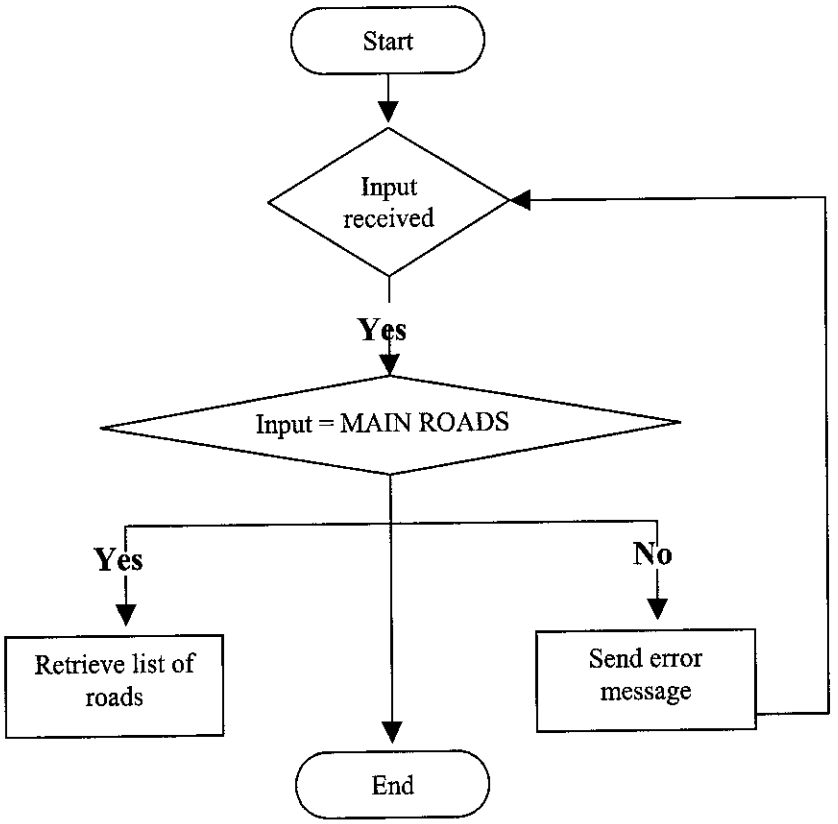


Figure 15: System workflow for HELP subsystem – List of roads

Figure 15 showed the detailed flow of MAIN ROADS protocol. This protocol was used by the users when they wanted to get the list of roads available in this system. As the system received the input that requested the MAIN ROADS, this system will check the validity of the request. If that request was valid, the list of roads would be retrieved, but if there was an error of that request, the error message would be sent.

3.3.2 System Database

Database for TNS retrieval via SMS comprised of one table with two (2) important fields: (i) Road and (ii) Condition. These two fields were going to be used depending on the request from the user. SQL statement that was going to be used in order to retrieve the result from the database was: *Select Condition from traffic where Road='" & strRoad & "'".* This meant that, the system would select the condition of the road requested based on the *Road*='" where inside the string "" was any road name.

traffic : Table

	Road	Condition
▶	JAMPANG	traffic jam
	JBUKITBINTANG	heavy traffic jam
	JDAMANSARA	smooth traffic flow
	JIMBI	traffic is under control
	JPUDU	heavy traffic jam
	JRAJACHULAN	traffic jam
	JSULTANISMAIL	traffic is under control
	JTELAWI	smooth traffic flow
	JTUANKUABDULRAHMAN	heavy traffic jam
	JTUNRAZAK	traffic jam
	JTUNSAMBANTHAN	traffic is under control
	JTUNTANCHENGLOCK	traffic is under control
*		

Record: 1 of 12

Figure 16: Traffic Navigation System (TNS)'s Database

3.3.3 System Application

The application for TNS retrieval via SMS as shown on Figure 17 and Figure 18 were used as a prototype. This interface basically would show how this TNS actually worked in real SMS technology. For the first left frame which was named as SMS Simulator would allow the user to key in the keyword for requesting the condition of certain road listed in the database. User just typed the keyword on the text box, for example TRAFFIC<space>JTELAWI as shown on Figure 16 and pressed the SMS IN button. The requesting result would be displayed on the text box named SMS OUT.

Second left frame, named as GSM Modem Connection was designed to select the appropriate connection that was applicable with the GSM Modem used. The elements that should be considered to be set were Communication Port, Bits per Second, Data Bits, Parity and Stop Bits. These five (5) elements in the GSM Modem Connection should be set before pressing the Connect button.

Once the GSM Modem connection was being set, the user could type any AT Command on the intended text box provided or just selected from the text box named Example AT command to direct the GSM Modem to perform its function as per requested. Then, if the GSM Modem worked and could understand the command provided by the user, any respond from the GSM Modem would be displayed on the Reply Status from Modem text box.

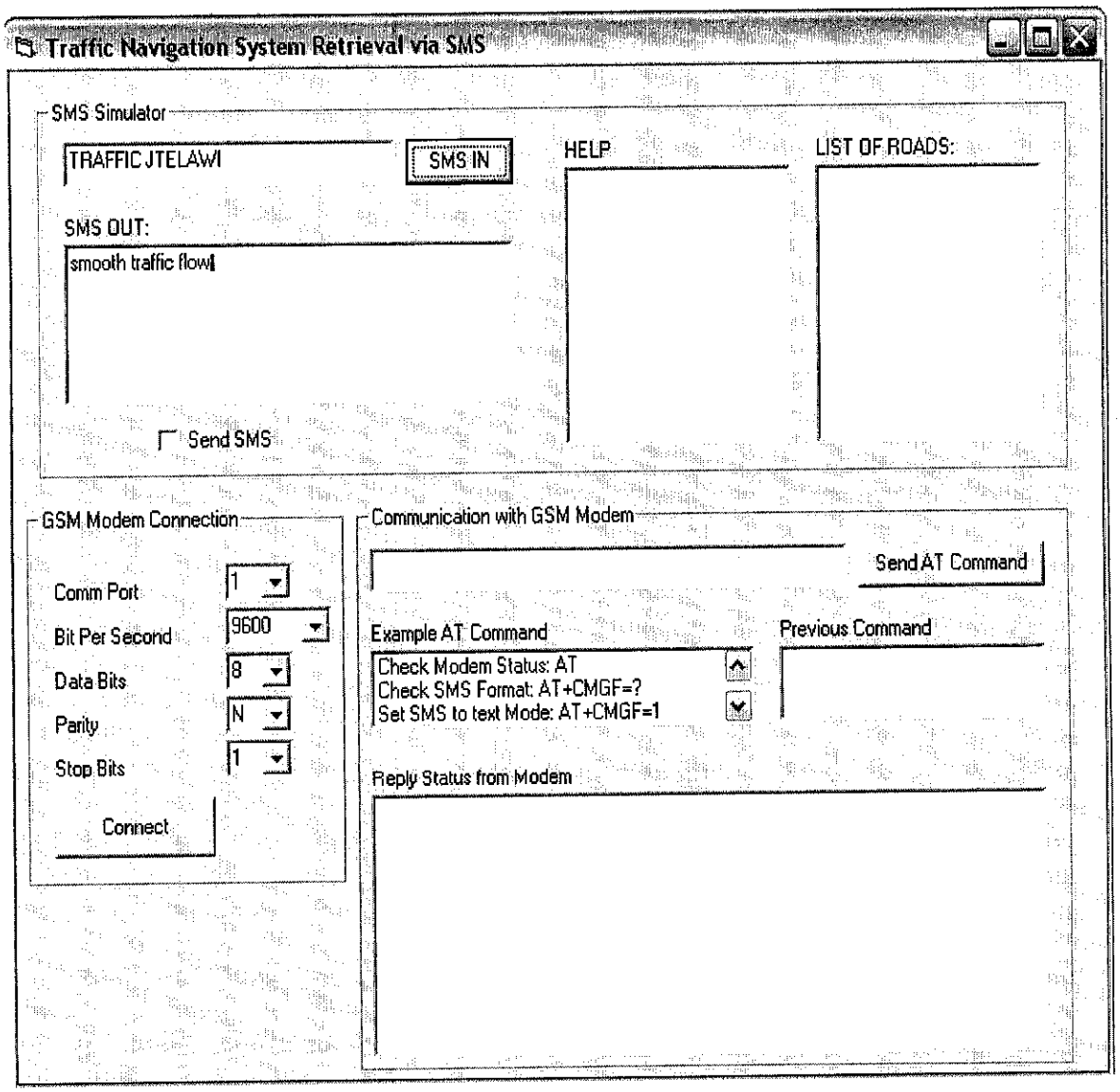


Figure 17: First Draft: Traffic Navigation System (TNS)'s application

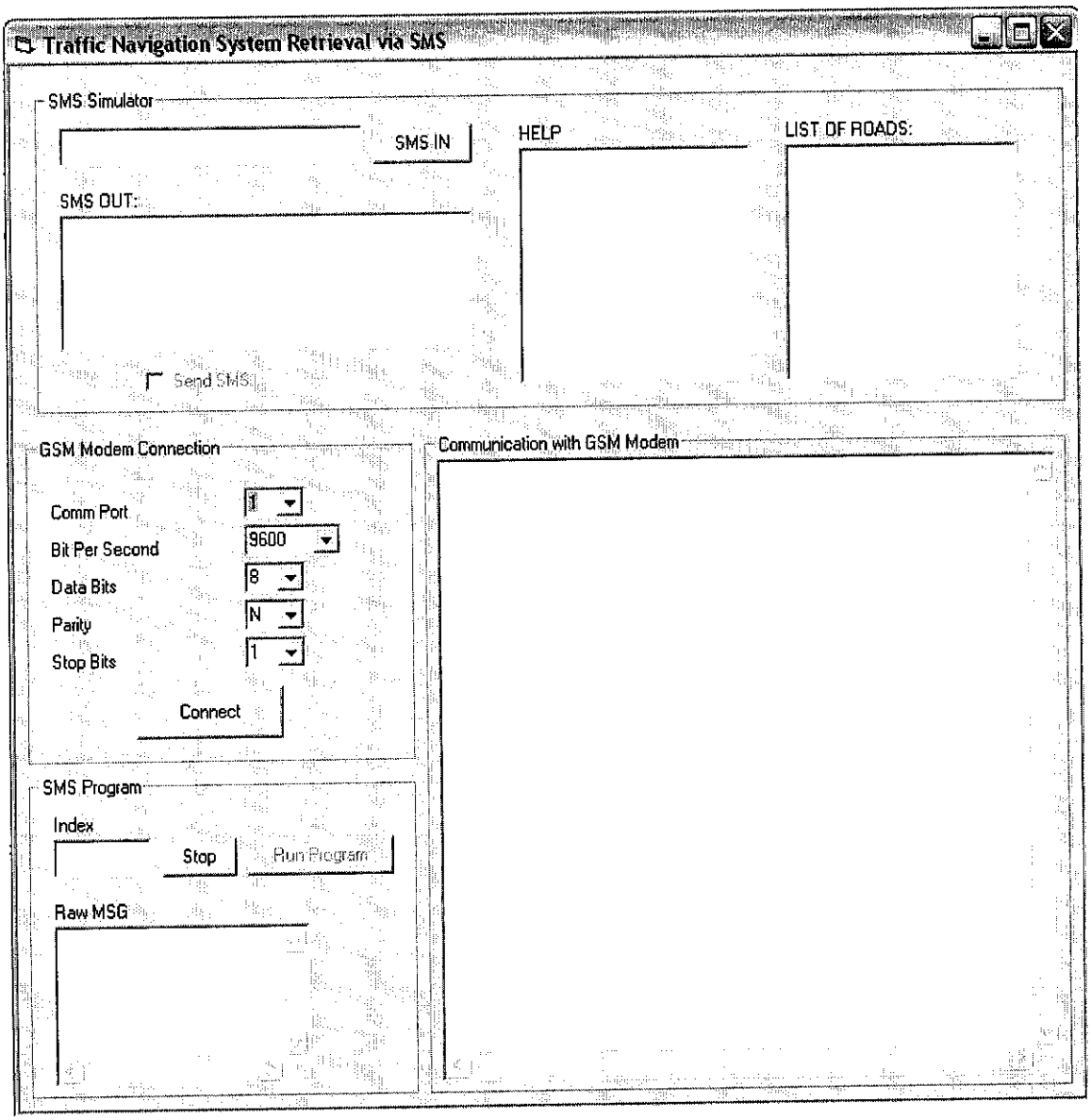


Figure 18: Final Draft: Traffic Navigation System (TNS)'s application

3.3.4 Development of a Concrete System / Prototype

The last task under Development Phase was developing a concrete system. In order to develop a concrete system for the TNS retrieval via SMS, the application and the database of this system needed to be integrated with the GSM Modem. GSM Modem must have been connected to the server (PC) along with the Sim Card inserted inside that modem. GSM Modem would interact with the application and database of this system using AT Command that was set in the provided space in the application layout. In order for the GSM Modem to understand the AT Command inserted to the application, the original source code of the application had been modified. Then the testing can be done right away by sending the SMS, requesting the traffic condition for certain places and waiting for the response from the server that would inform the condition for the selected road.

3.4 Testing Phase

Once the system was completed, it would be tested in order to make sure that the system worked properly as proposed. This testing part was done after completing development phase, but during development of the system, minor testing was also being done. This phase would ensure that there would be no major errors occur. Table 4 describes the details of the task performed during Testing Phase.

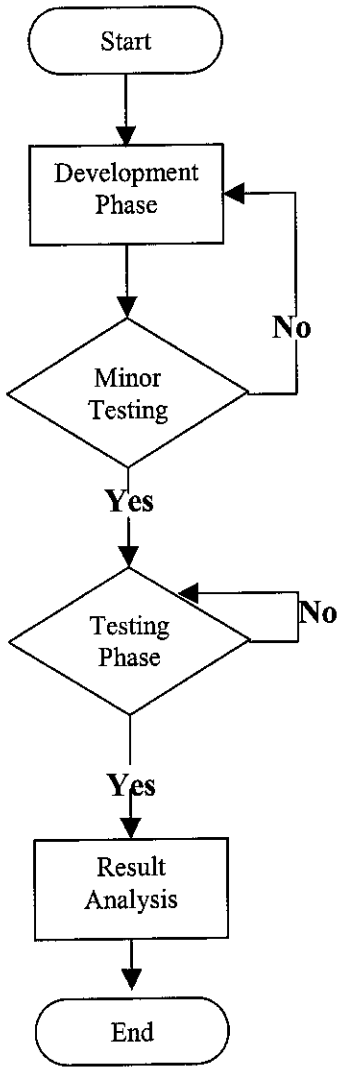


Figure 19: Flowchart of Testing Phase

Task/Activities	Description
1. Testing during development phase	- This testing was done to ensure the compatibility between hardware and software. - The objective of doing this testing was to ensure that there were no major errors that would occur once the system was fully completed.
2. Major testing	- This testing would be done once the project was fully completed and ready to be presented. - If the errors still occurred, hopefully it would not be too impact on the system and could be improved without making any major changes.

Table 4: Task or activities under Testing Phase

3.5 Evaluation Phase

This phase was very important in methodology because it would analyze any result that came out from the previous phases. This phase was done by analyzing all tasks carried out from each phase. For the Planning phase, the evaluation would cover the information gathering part: Questionnaire.

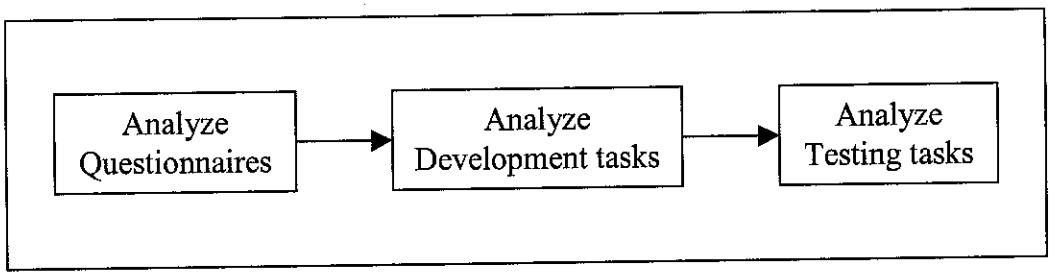


Figure 20: Tasks or activities in Testing Phase

3.5.1 Questionnaires Analyzing

Through this phase, some questionnaires had been done and distributed to the respective users in UTP. About fifty (50) sets of Questionnaires had been distributed to the fifty respondents. The target respondents for this Questionnaire were the UTP students since almost everyone in UTP could afford to have a handphone and they used SMS as one of the communication ways instead of making a call. Basically, all the users that responded to the distributed questions were very familiar with SMS system or services available in the market. Most of them also preferred to use SMS. As being asked about any traffic navigation system retrieval via SMS that they ever heard, most of them gave negative responses which meant that, either they never heard about it or were not too familiar with or not being exposed yet with such kind of system. Besides that, this system also did not exist yet in Malaysia.

3.5.2 Data Analyzing

Data gathered from any phases would be used as a reference in designing the prototype of this system. For example, in Questionnaire task, there was a question asking about the existing SMS-based system that was very familiar with them. From the feedback giving by them, it showed that, they were familiar with those particular systems. From that, a prototype could be designed based on those systems in terms of architecture, interface and so on.

3.5.3 Development Tasks Analyzing

From the development phase, some important things had been noticed as important which were the protocols and the database that were being developed. For the protocols, it comprised of three types of protocols: (i) HELP, (ii) MAIN ROAD (list of roads) and (iii) TRAFFIC (main input). These three protocols actually were interrelated to each others. In order for the user to use these protocols, they should know the keyword to be typed. If they mistyped the keyword, then the error message would be sending back to the user by telling them to use HELP protocol. Inside the HELP protocol, it would tell the user how to type the keyword for the main input (TRAFFIC) and the MAIN ROADS.

3.5.4 Testing Phase Result Analysis

From testing part, the main points that would be considered were the errors or bugs that occurred during minor and major testing. Some of the errors that had been discovered were the buttons did not functioning as expected, the developed application could not be run because of miss communication between sub functions created or did not match to

each other, and the database incomplete or failed to be connected with the application. Besides that, the hardware faults also one of the causes for the errors or bugs to occur.

3.6 TOOLS REQUIRED

3.6.1 Hardware

- A GSM Modem – model of GSM Modem used is Siemens TC3Fi

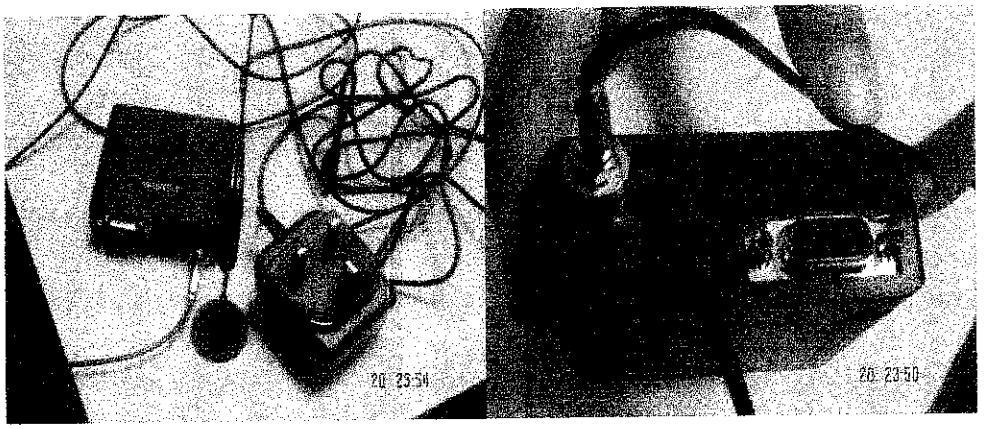


Figure 21: GSM Modem – Siemens TC3Fi

Size: 65x74x33 mm

Power: 8-30V, 0.5A

Data: 300-14400 bps, Data, SMS, Fax

Dual Band GSM 900/1800

Antenna connector: FME male

- GSM Modem Sim Card – Sim Card that was being used is 64K Hotlink Sim Card. This sim card capable of storing up to 20 SMS at a time and have no limit of sending SMS unless it has no credit at all.

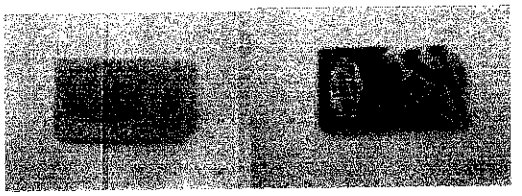


Figure 22: 64K Hotlink Sim Card

- Serial Data cable that are compatible with the GSM Modem model -
  Serial cable is a cable that was used as a connector between GSM Modem and PC.

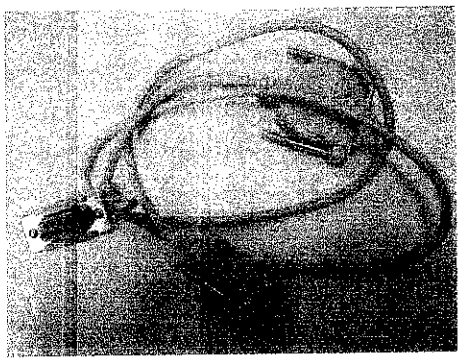


Figure 23: Serial Data Cable

- RS232 Serial Port - RS-232 was used to interface between Data Terminal Equipment (DTE) and Data Communications Equipment (DCE) employing serial binary data interchange. So as stated the DTE is the terminal or computer and the DCE is the modem or other communications device.

- Personal Computer

3.6.2 Software

- Microsoft Visual Basic 6.0 – this software is used to design the interface for the system's application.
- Microsoft Access – Microsoft Access was used to design and develop a database for Traffic Navigation System (TNS).
- Windows 98 or Windows 2000 or Windows NT or Windows XP.
- Microsoft Office – this Microsoft office was used for documentation.

CHAPTER 4
RESULT AND DISCUSSION

4. RESULT AND DISCUSSION

4.1 Data Analysis

As went through all phases or processes in methodology part, some data had been analyzed in order to get immediate feedback about the TNS retrieval via SMS. For the Planning phase, the findings would go through on detailed for the information gathering part which is Questionnaire. While for the Development and Testing phases, it would cover generally for all tasks or activities that had been done and implemented.

4.1.1 Planning - Questionnaire

Through this phase, some questionnaires had been distributed to the respective users in UTP. About fifty (50) sets of Questionnaires had been distributed to the fifty respondents. The target respondents for this Questionnaire were the UTP students since almost everyone in UTP could afford to have a handphone and they used SMS as one of the communication ways instead of making a call. Basically, all the users that responded to the distributed questions were very familiar with SMS system or services available in the market. Most of them also preferred to use SMS because it was cheaper. About 78% or 39 out of fifty (50) respondents agreed that it was important for them to know about the traffic condition for certain road before going out. As being asked about any traffic navigation system retrieval via SMS that they ever heard, about 86% of respondents had given negative feedbacks which meant that, either they never heard about that or not too familiar or not being exposed with such kind of system. Besides

that, this system did not exist yet in Malaysia. Tables and charts below had summarized the number of respondents that gave their feedback to the distributed questionnaires.

Q6: Did you ever hear about any related traffic navigation system retrieval via SMS?

Response	Number of Respondents	Percentage
YES	7	14%
NO	43	86%

Table 5: Number of respondents and its percentage for the familiarization of any related Traffic navigation System.

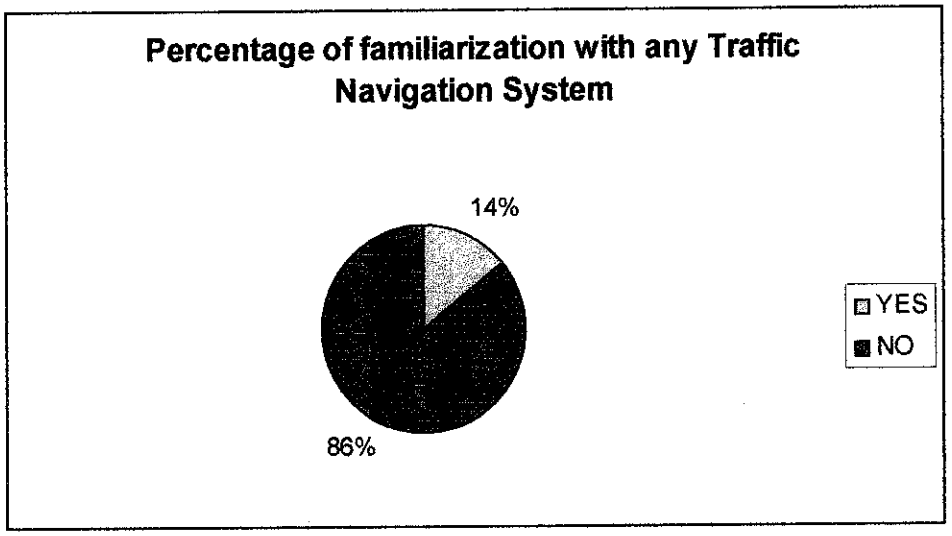


Figure 24: The Chart showed the percentage of familiarization with any Traffic Navigation System.

Q7: Do you prefer to know about the traffic condition before going out to anywhere?

Response	Number of Respondents	Percentage
YES	39	78%
NO	11	22%

Table 6: Number of respondents and its percentage for Question 7

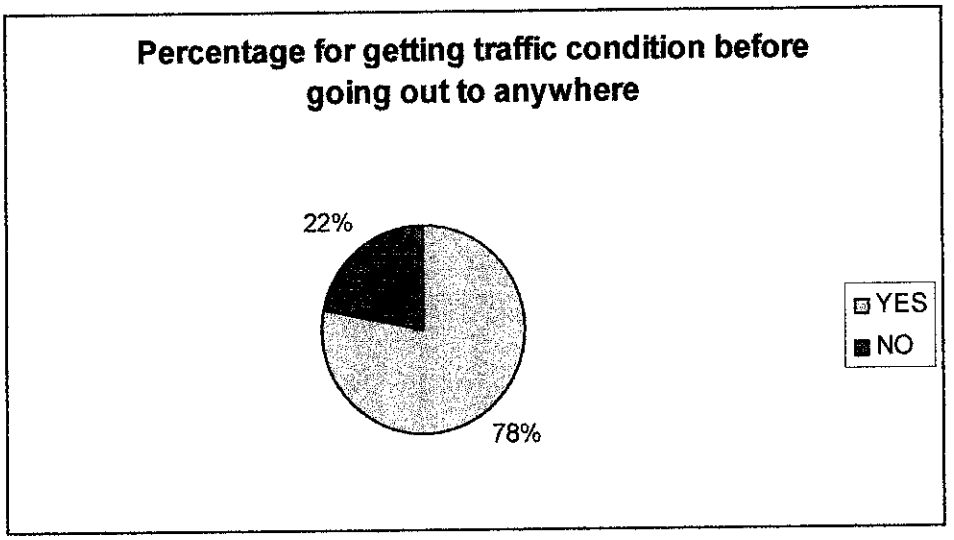


Figure 25: The Chart showed the percentage for the important of getting any traffic condition before going out to anywhere

4.2 System Evaluation

When designing workflow and protocols for this system, some important things should be taken into consideration such as the possibility of errors to occur because of mistyping by the users, when this error occurred, what the system would do in order to assist the user to use this system and the protocols involved. For the protocols, it comprised of three types of protocols: (i) HELP, (ii) MAIN ROAD (list of roads) and (iii) TRAFFIC (main input). These three protocols actually interrelated to each others. In order to use these protocols, the user should know the keyword to be typed in. For instance, if the user wanted to know the traffic condition for Jalan Pudu, then what he/she should do was just typing TRAFFIC<space>JPUDU on the write message space, and then sent it to the respective number that was being used as a GSM Modem Sim Card. If they mistyped that keyword, then the error message would be sending back to the users by telling them to use HELP protocol by typing HELP. Inside the HELP protocol, it would tell the user how to type the keyword for the TRAFFIC (main input) protocol and the MAIN ROADS protocol. In order to get list of roads, the user just typed MAIN ROADS and sent it to that respective number.

For application development task, buttons had been arranged accordingly to where they should appropriate to be placed. When designing the interface for this application, the ease of using this system should be taken into consideration where it must be user friendly. Even though the users of this system did not involved with this application but the developer or administrator of this system would use it when they wanted to test the functionality of the system and monitored the SMS requested by the users.

4.2.1 Users' perception of using Traffic Navigation System retrieval via SMS.

For this evaluation, five (5) people had been chosen as the users to use the prototype of this system. These five people were UTP students. They had been asked to request the traffic condition for selected road. From the prototype given, some evaluations had been made. About 40% or only two (2) people out of five (5) successfully used this system without any HELP guidance, while the other 60% still successfully used this system but after getting HELP guidance. The reasons that these 60% people gave were they mistyped the protocols for requesting traffic condition either using small letter or mixed up both capital and small letter and also they did not know the protocols that were going to be typed, so that they asked for the HELP.

4.2.2 System developer's perception of using Traffic Navigation System's Application

For the TNS's Application, it just needed to be monitored when this system was connected with the GSM Modem. This is because, this system was running automatically once it had been connected. System developer just needed to know how to connect the system with the GSM Modem and once these connections were set up, he or she just pressed the "CONNECT" button and "RUN PROGRAM" button. This system application was quite user-friendly because all elements inside the application were clearly stated with the name and functions.

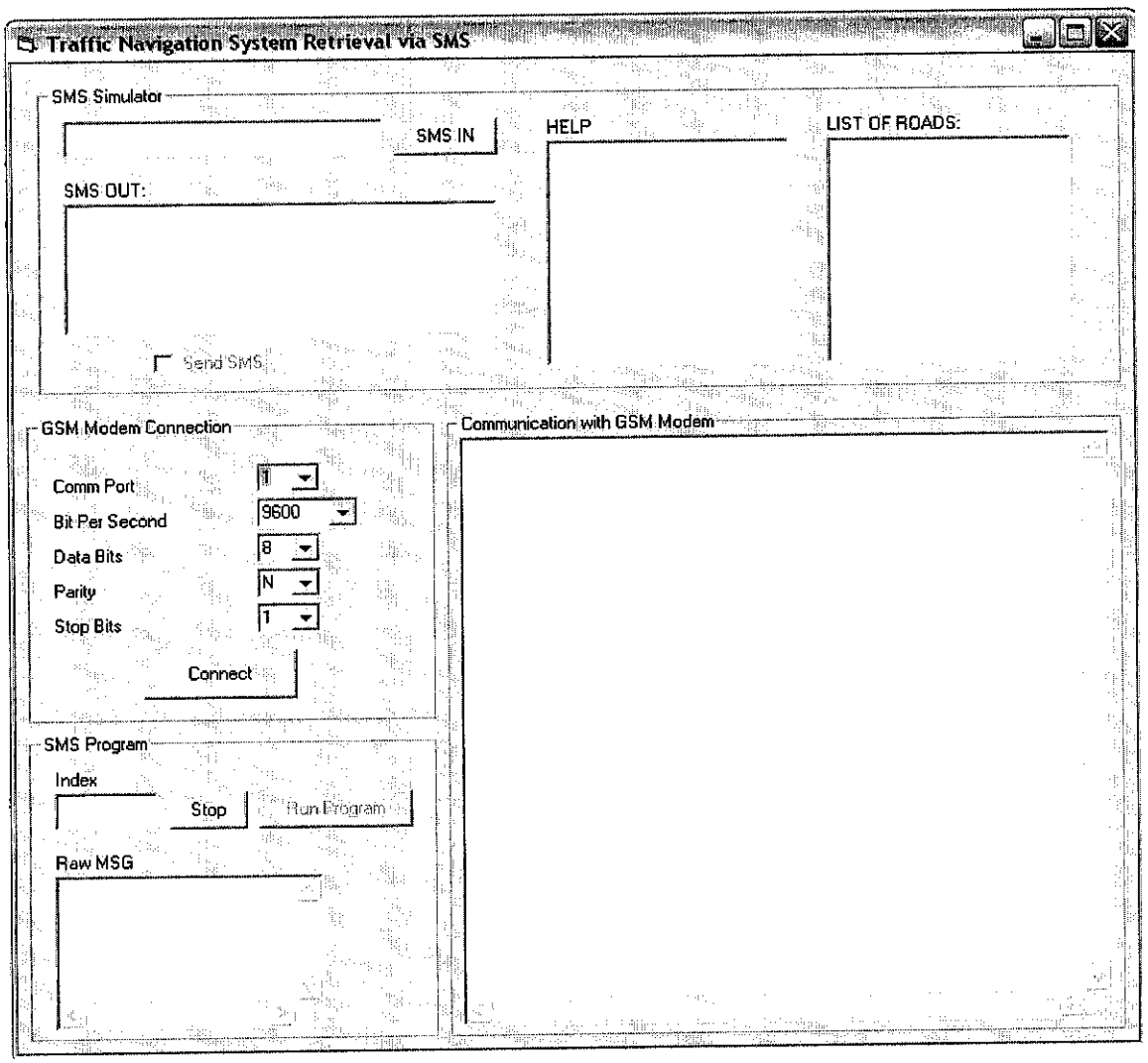


Figure 26: Traffic Navigation System's Application

4.2.3 The usage of all application elements.

As shown in Figure 26, there were some elements inside this system application. The first element which was on the top-left-side was the SMS Simulator. This simulator was used to test the functionality of the program without connecting it with the GSM Modem. The system administrator could key in any keyword inside the text box on the left side of the button SMS IN. The text box of the SMS OUT would display any result

based on the keyword inserted after pressing the SMS IN button. The text box of HELP and List of Roads supposedly display the result of the intended protocol that was keyed in.

For the GSM Modem Connection element, it just showed the setting of the GSM Modem that needed to be set. Communication with GSM Modem element would display how actually this system would communicate with the GSM Modem after the user made a request. It would show the information of the SMS that had been sent by the user requesting any protocol from this system as well as the SMS that would be sent back by the system to the intended user.

4.3 Discussion

As went through all the phases in the methodology part especially when designing the system protocols and the real system, some discussions could be made. For the questionnaire task, it showed that, about 78% respondents preferred to know about the traffic condition before going out. This is one of the factors for the TNS retrieval via SMS being developed.

For the database development, new structured of database had been designed because this system was not yet available in Malaysia. Supposedly, the database came from *Polis Traffic Diraja Malaysia* in collaboration with *Majlis Perbandaran* but since this is the first such kind of Traffic Navigation System, then the new fresh structured database had been created as it owned.

For the prototype task, only 40 % or two (2) people out of five (5) successfully used this system without any HELP guidance. It showed that, this system was not fully user-

friendly because it was a case sensitive system. For future enhancements, it should not be a case sensitive system.

For the testing phase, there were two tasks that had been done throughout the process development till the end which were minor testing and major testing. Minor testing was conducted after each development task was completed. This testing was done to reduce major errors occurred after conducting major testing and also to ensure the compatibility between hardware and software. Major testing was conducted, once this system was fully completed and ready to be presented. From testing part, the main points that were taken into account were the errors or bugs that occurred during minor and major testing. Some of the errors that were discovered:

- The buttons did not functioning as expected.
- The application could not be run because of miss communication between sub functions created or did not match to each other.
- The database incomplete or failed to be connected with the application.
- Besides that, the hardware faults also one of the causes for the errors or bugs to occur.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 RELEVANCY TO THE OBJECTIVES

The conventional traffic navigation in Malaysia sometimes did not serve any satisfaction to the road users. This is because road users just got the information about the traffic condition through radio or television. Besides that, the announcement made by that particular channel only for certain roads that were very popular with bad traffic condition.

In Malaysia, there was not yet available such kind of this system. Maybe it was considered in terms of large database needed, coverage that subscribers might provide, too many resources involved, cost per SMS that users should pay if they used this system accordingly and regular maintenance for this system especially the database because the traffic condition should be monitored every time in a single minute. The related party should always monitor the traffic for all main roads that were listed in this system in order to give clear, precise and useful information to the users.

The (TNS), if implemented in the real mobile environment could help travelers to plan their journey in order to ensure that everything ran smoothly. It also could reduce the possibility of road users just wasting their time getting trapped in heavy traffic jam.

As a conclusion, this TNS retrieval via SMS had achieved its objectives as stated earlier in this document. All tasks that had been carried out through developing this system exposed the author on the real world of developing SMS-based system in terms of architecture and implementation of SMS application for various systems.

5.2 RECOMMENDATIONS

For future enhancements, there were a lot of things needed to be taken into consideration in order to build a more precise and systematic SMS-based system. Since there was no database structured for this system because of the unavailability of this system in the Malaysia market, so any related parties such as *Polis Traffic Diraja Malaysia* or *Majlis Perbandaran* should developed a structured database that could be used by any developer of the SMS system, so that the developer could develop a system that links to the very clear, more precise database. This could generate the confidentiality among the users because they knew where the source came from and the validity of the source. The database for this system also should be updated accordingly by monitoring the condition for each road listed in the list all the time. This is because, the condition of the traffic sometimes unpredictable for certain roads at certain times.

Instead of using the GSM Modem, this system should use the gateway if it needed to be implemented in the real environment. This is because, GSM Modem could not support too many users or requests at a time. It could cause the system or database or the modem itself to get crashed. In order to avoid this crashed thing to occur, a gateway should be used even though it could incur some cost on developer's side and also users' side.

For the list of main roads in the database of this system, it just covered the main roads around Kuala Lumpur only. So for future enhancements, it should cover the other main roads for other states. It meant that, in the database should have additional fields for the states.

For designing the protocols involved, the keyword that needed to be typed should be as short as possible in order to minimize the word that needed to be keyed in by the users.

For example, MAIN ROADS could be ROADS. The keyword TRAFFIC also could simply be omitted. Instead of that, the users just keyed in directly the name of particular road that its condition needed to be retrieved.

REFERENCES

[1] Ian Sommerville, Software Engineering, Addison Wesley, 6th Edition, 2001.

[2] Peter Rob Carlos Coronel, Database System – Design, Implementation and Management, Thomson Learning, 4th Edition, 2000.

[3] Kathy Schwalbe, Information Technology Project Management, Thomson Learning, 2nd Edition, 2001.

[4] Uma Sekaran, Research Methods For Business – A Skill-Building Approach, 4th Edition, 2003.

[5] Gwenael Le Bodic, Mobile Messaging Technologies and Services: SMS, EMS and MMS, John Wiley & Sons, 15 January, 2003

[6] Scott Guthery and Mary Cronin, Mobile Application Development with SMS and the SIM Toolkit, McGraw-Hill Professional, 15 November, 2001.

[7] Yi-Bing Lin, Volume 4, Issue 4 of International Journal of Wireless Information Networks, October 1997

[8] http://www.zte.com.cn/english

[9] http://www.trafficmaster.co.uk/shownews.cfm=78

[10] http://www.tel-access.com/sms.html

[11] http://www.celcom.com.my/xtras/019/index.html

[12] http://www.celcom.com.my/xtras/013/weather/index.html

[13] http://www.maxis.com.my

[14] http://www.digi.com.my/enhanced/news/jpj_service

[15] http://www.clickatell.com/brochure/products/developer_solutions.php

[16] http://www.zellco.co.zw/sms.htm

[17] www.davisnet.com/product_documents/ weather/app_notes/apnote_19.pdf

[18] http://www.mcselec.com/gsm_modem.htm

[19] http://networking.webopedia.com/TERM/S/short_message_service.html

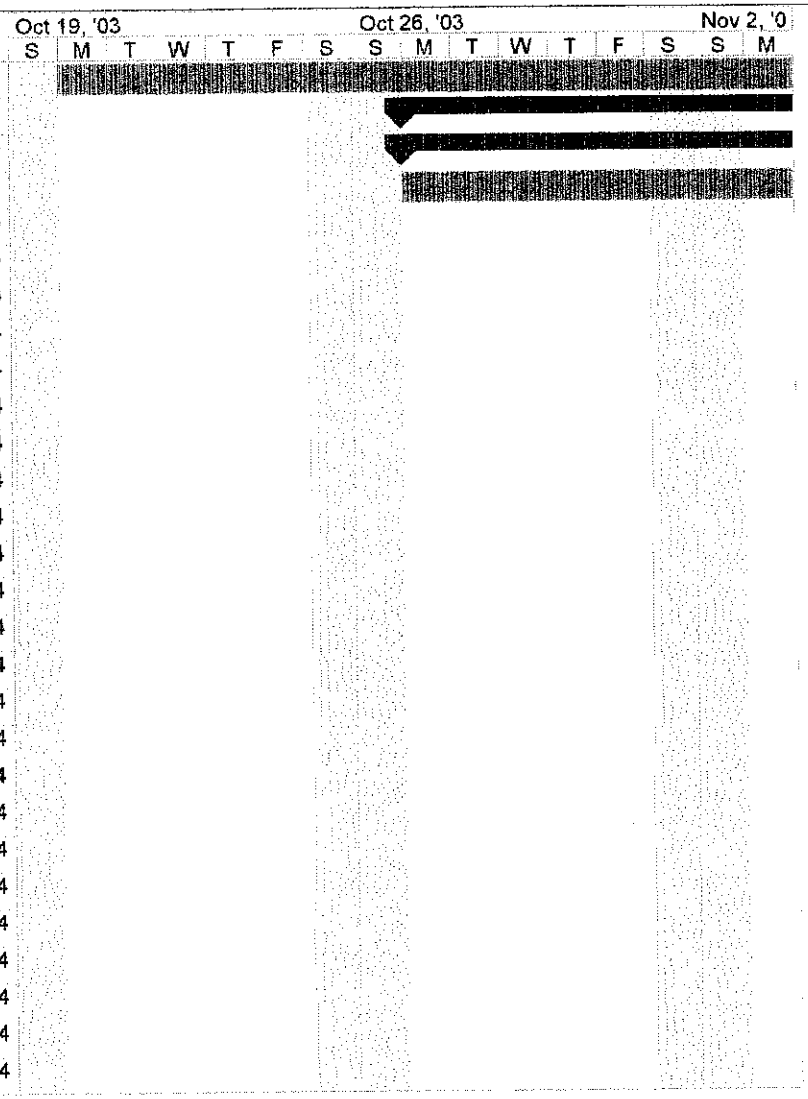
APPENDICES

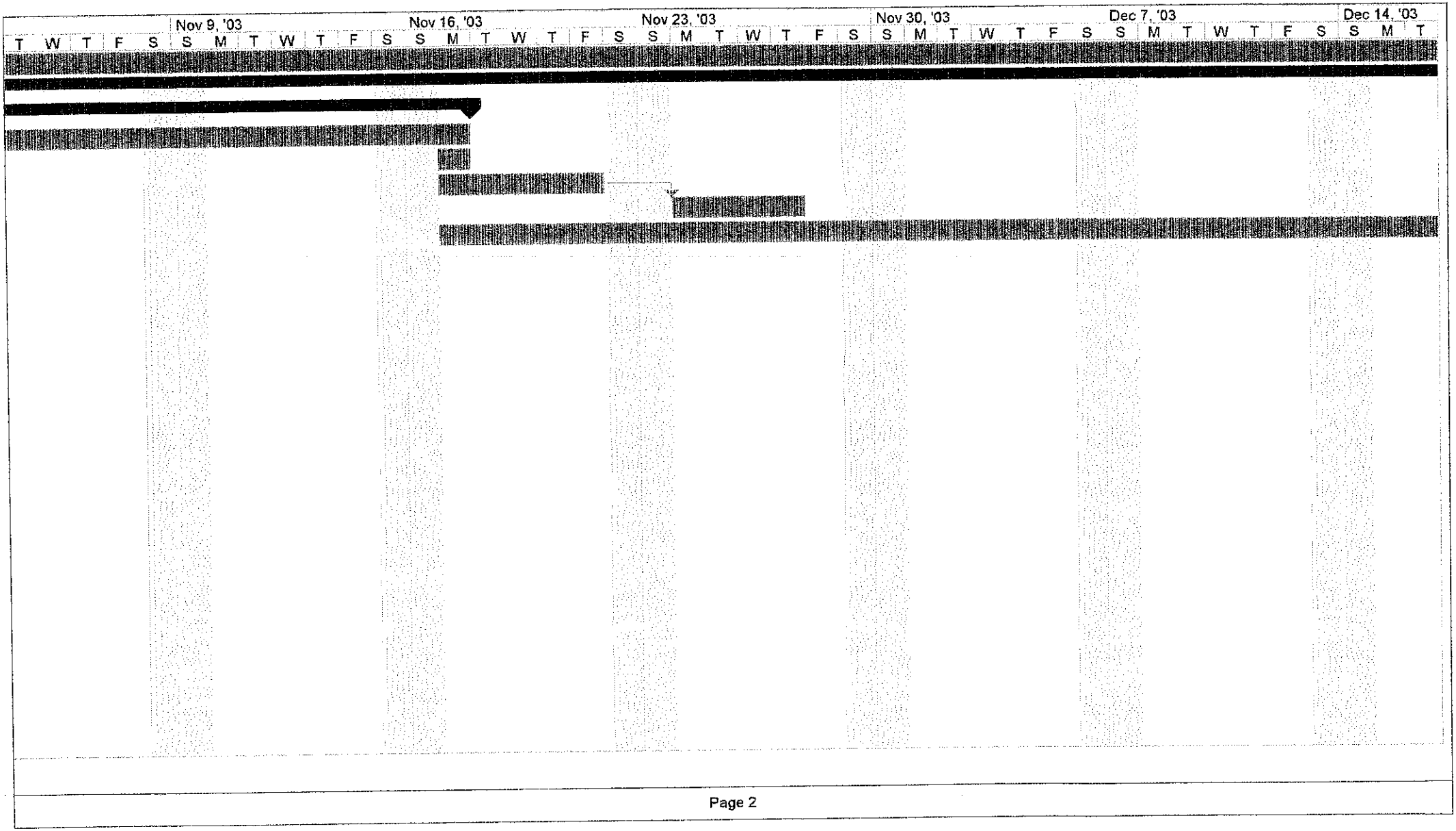
Appendix I: Gantt Chart

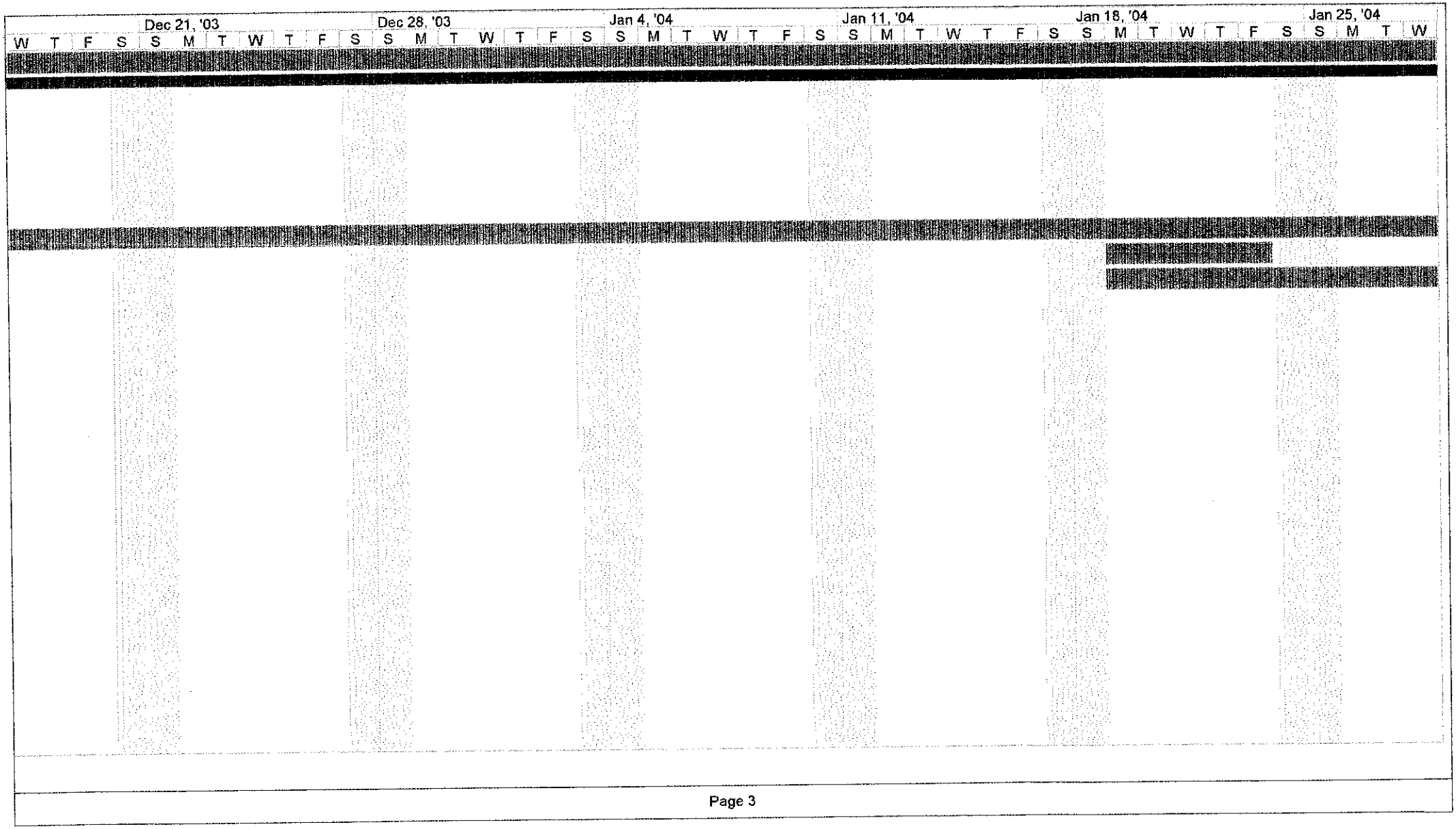
Appendix II: Questionnaires

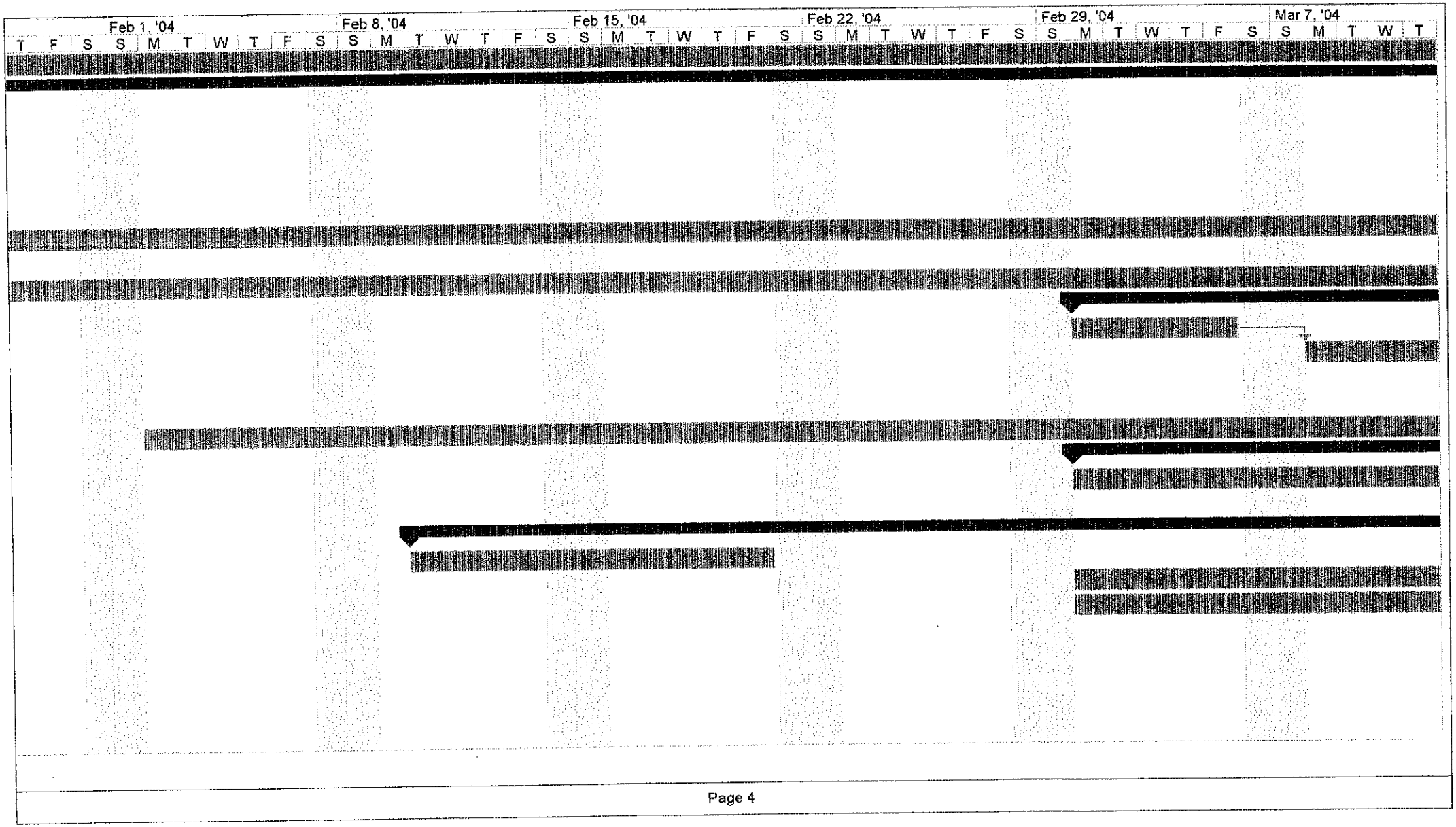
Appendix III: Complete System Interface

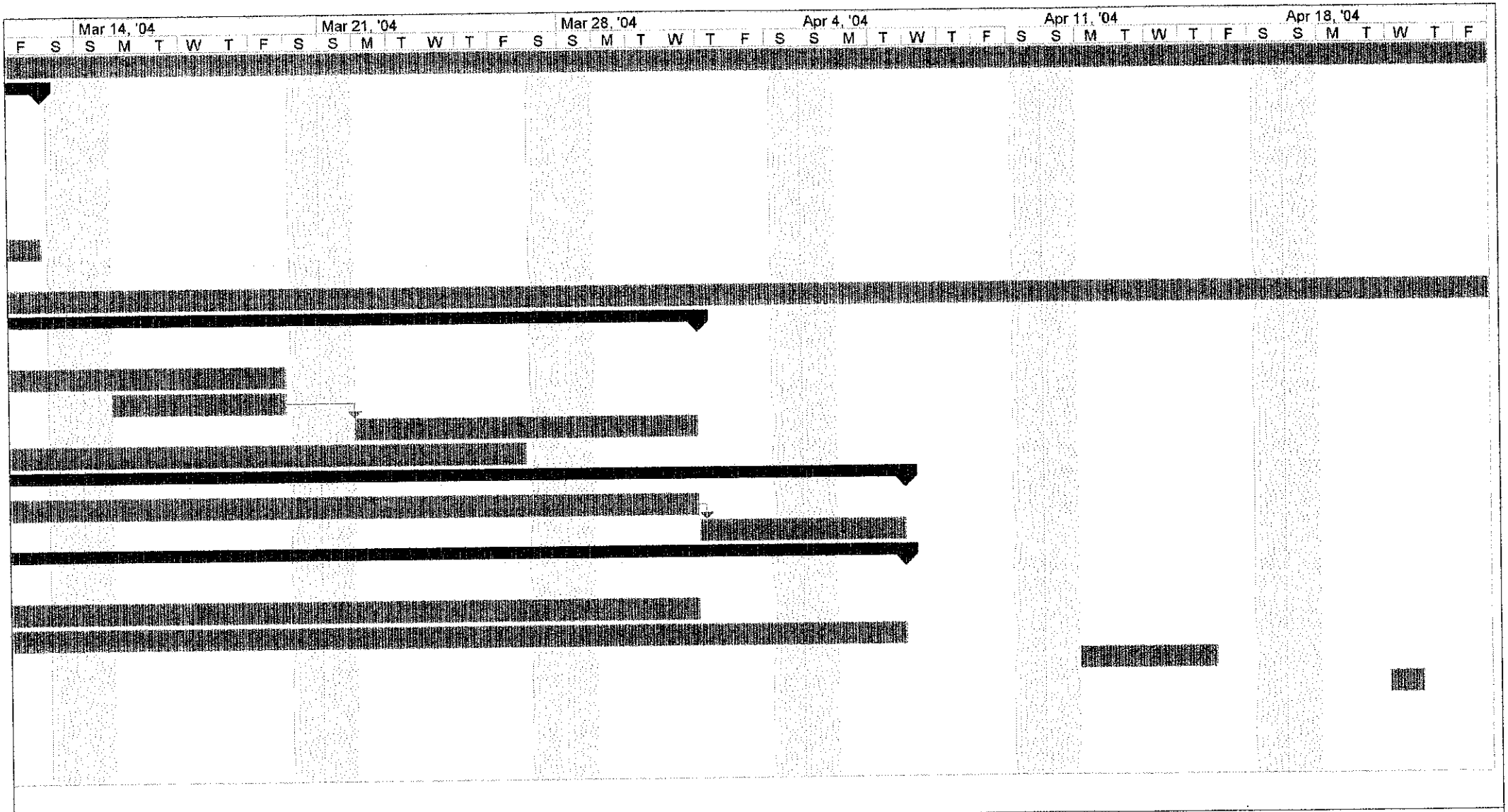
ID	Task Name	Duration	Start	Finish
1	**TRAFFIC NAVIGATION SYSTEM RETRIEVAL VIA SMS**	165 days	Mon 10/20/03	Fri 6/4/04
2	**PLANNING**	**100 days**	**Mon 10/27/03**	**Fri 3/12/04**
3	Project Title Selection	**16 days**	**Mon 10/27/03**	**Mon 11/17/03**
4	Propose Topic	16 days	Mon 10/27/03	Mon 11/17/03
5	Topic Approval	1 day	Mon 11/17/03	Mon 11/17/03
6	Define problem statement	5 days	Mon 11/17/03	Fri 11/21/03
7	Objective and scope identification	4 days	Mon 11/24/03	Thu 11/27/03
8	Information Gathering	85 days	Mon 11/17/03	Fri 3/12/04
9	**Preliminary Report Submission**	5 days	Mon 1/19/04	Fri 1/23/04
10	**Log Book Submission**	70 days	Mon 1/19/04	Fri 4/23/04
11	**Development**	**23 days**	**Mon 3/1/04**	**Wed 3/31/04**
12	Design Workflow and Protocols	5 days	Mon 3/1/04	Fri 3/5/04
13	Develop an Application	10 days	Mon 3/8/04	Fri 3/19/04
14	Design Database	5 days	Mon 3/15/04	Fri 3/19/04
15	Integrate Application with Database	8 days	Mon 3/22/04	Wed 3/31/04
16	**Progress Report Submission**	40 days	Mon 2/2/04	Fri 3/26/04
17	**Testing**	**27 days**	**Mon 3/1/04**	**Tue 4/6/04**
18	Minor testing	23 days	Mon 3/1/04	Wed 3/31/04
19	Major Testing	4 days	Thu 4/1/04	Tue 4/6/04
20	**Result Analysis**	**41 days**	**Tue 2/10/04**	**Tue 4/6/04**
21	Analyze Questionnaires	9 days	Tue 2/10/04	Fri 2/20/04
22	Analyze Development Tasks	23 days	Mon 3/1/04	Wed 3/31/04
23	Analyze Testing Tasks	27 days	Mon 3/1/04	Tue 4/6/04
24	**Final Draft Submission**	4 days	Mon 4/12/04	Thu 4/15/04
25	**IT/IS Exhibition**	1 day	Wed 4/21/04	Wed 4/21/04
26	**EDX Exhibition**	1 day	Thu 4/29/04	Thu 4/29/04
27	**Oral Presentation**	3 days	Wed 5/5/04	Fri 5/7/04
28	**Project Dissertion Submission**	23 days	Wed 5/5/04	Fri 6/4/04

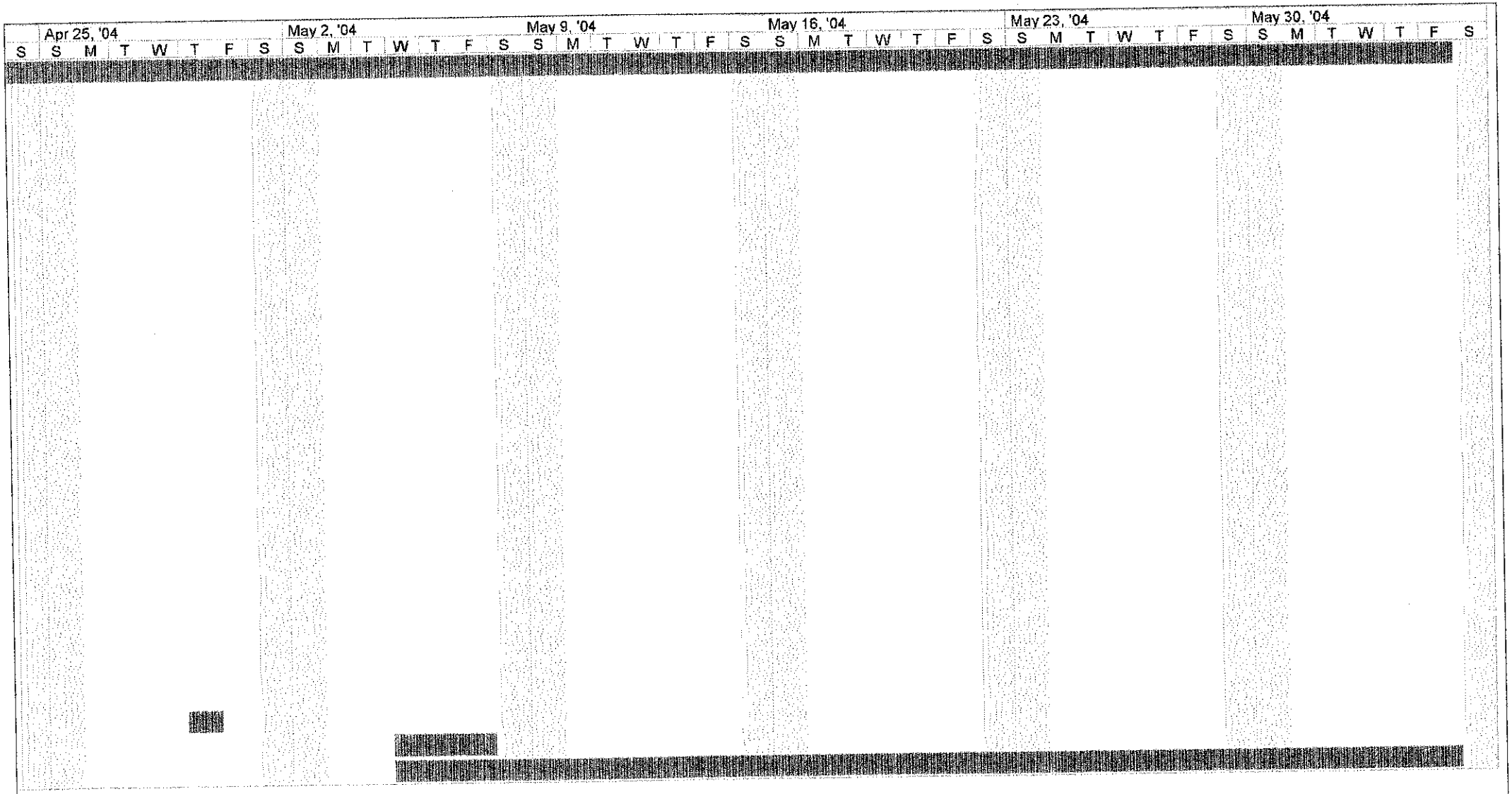



Nov 9, '03
Nov 16, '03
Nov 23, '03
Nov 30, '03
Dec 7, '03
Dec 14, '03
T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T


Dec 21, '03
Dec 28, '03
Jan 4, '04
Jan 11, '04
Jan 18, '04
Jan 25, '04
W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W


Feb 1, '04
Feb 8, '04
Feb 15, '04
Feb 22, '04
Feb 29, '04
Mar 7, '04
T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T


Mar 14, '04
Mar 21, '04
Mar 28, '04
Apr 4, '04
Apr 11, '04
Apr 18, '04
F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F


Apr 25, '04
May 2, '04
May 9, '04
May 16, '04
May 23, '04
May 30, '04
S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S

Final Year Project Questionnaires:
Survey on the SMS Services and Traffic Navigation System retrieval via SMS

I am a final year IT student from University Technology PETRONAS doing my final year project. These questionnaires will help me to gather response from the general users about the current SMS Service. Please take a few moments to complete these questions. Thank you.

Gender: F/M

1. Phone subscriber currently used

☐ Maxis/ Adam ☐ Digi ☐ Celcom/ TM Touch ☐ Others .....

2. Which one you preferred most?

☐ Call ☐ SMS

3. How often do you use SMS per day

1 = No at all 3 = Moderately 5 = frequently

1		2		3		4		5	

4. Are you familiar with the SMS Service? (e.g: M-Cinema)

☐ Yes ☐ No

5. What kind of SMS Service did you frequently used?

☐ M-Cinema

☐ Celcom In-Play

☐ Downloading ringtones, pictures, etc

☐ JPJ Service

☐ AFUNDI

☐ Others .....

6. Did you ever hear about any related traffic navigation system retrieval via SMS?

☐ Yes ☐ No

7. Do you prefer to know about the traffic condition before going out to anywhere?

☐ Yes ☐ No

8. Do you think traffic report through radio or TV adequate enough?

☐ Yes ☐ No

THANK YOU

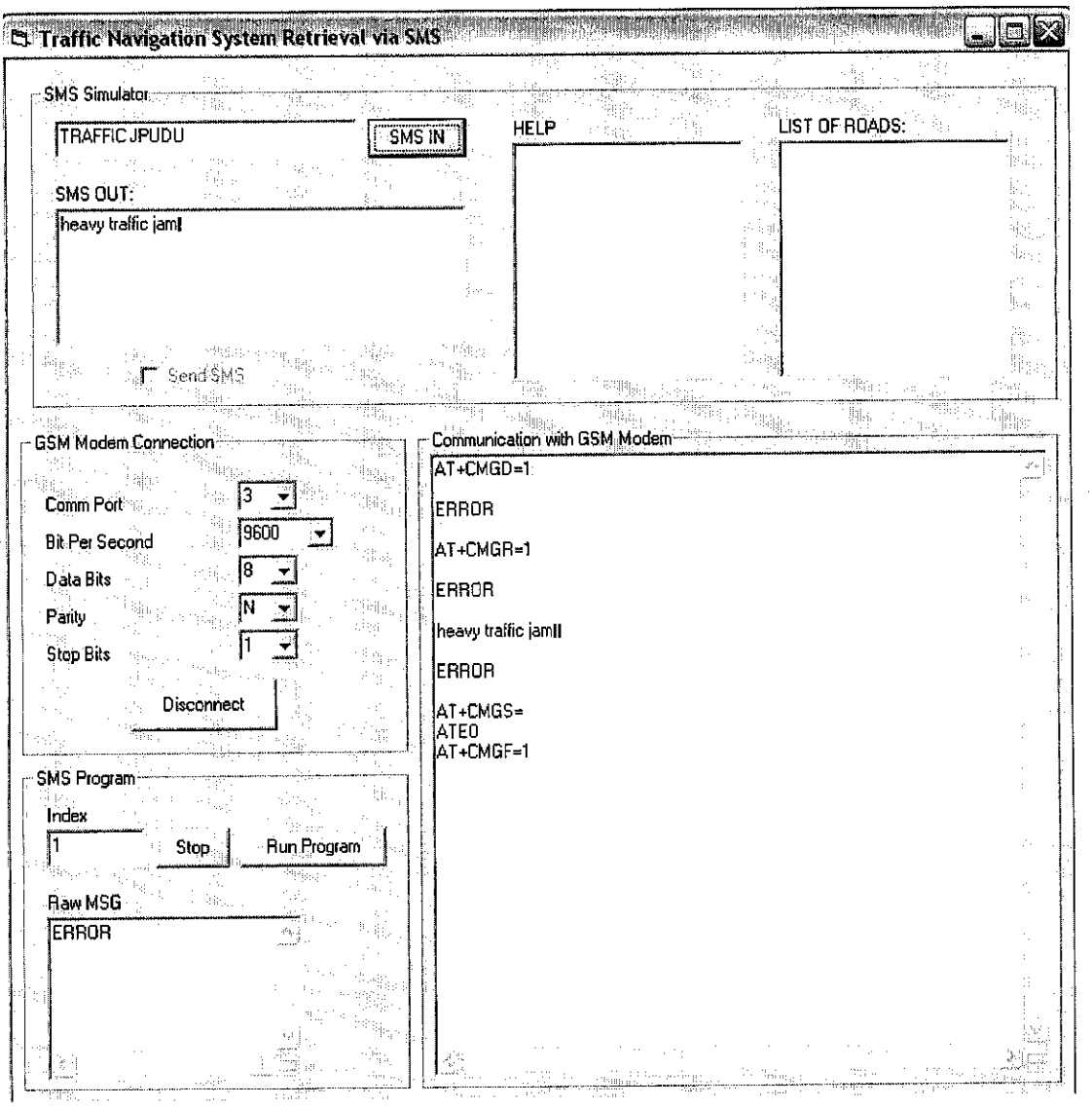


Figure 27: Complete System Interface for TRAFFIC Protocols

TRAFFIC<space>JPUDU

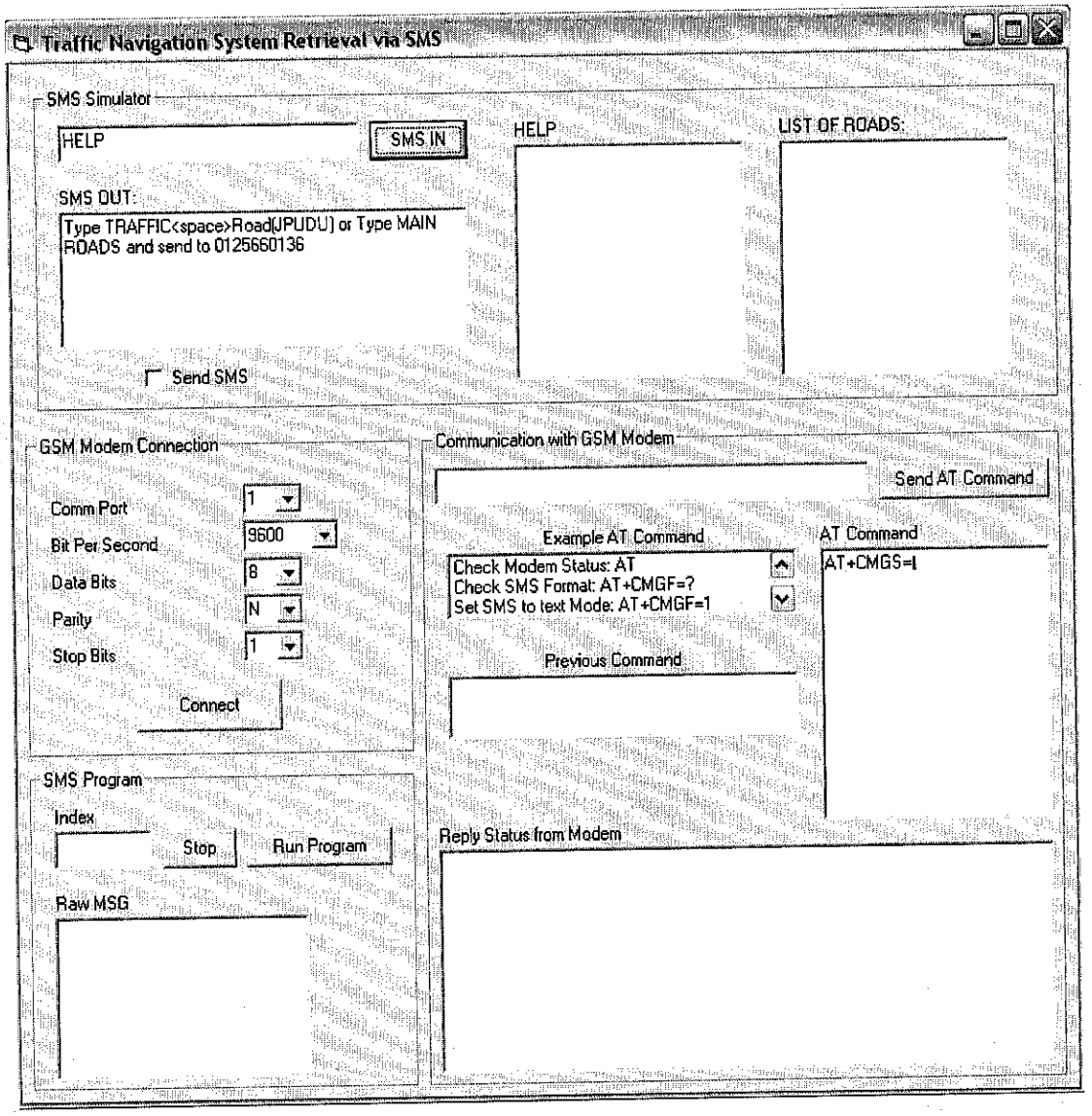


Figure 28: Complete System Interface for HELP Protocols

Type HELP

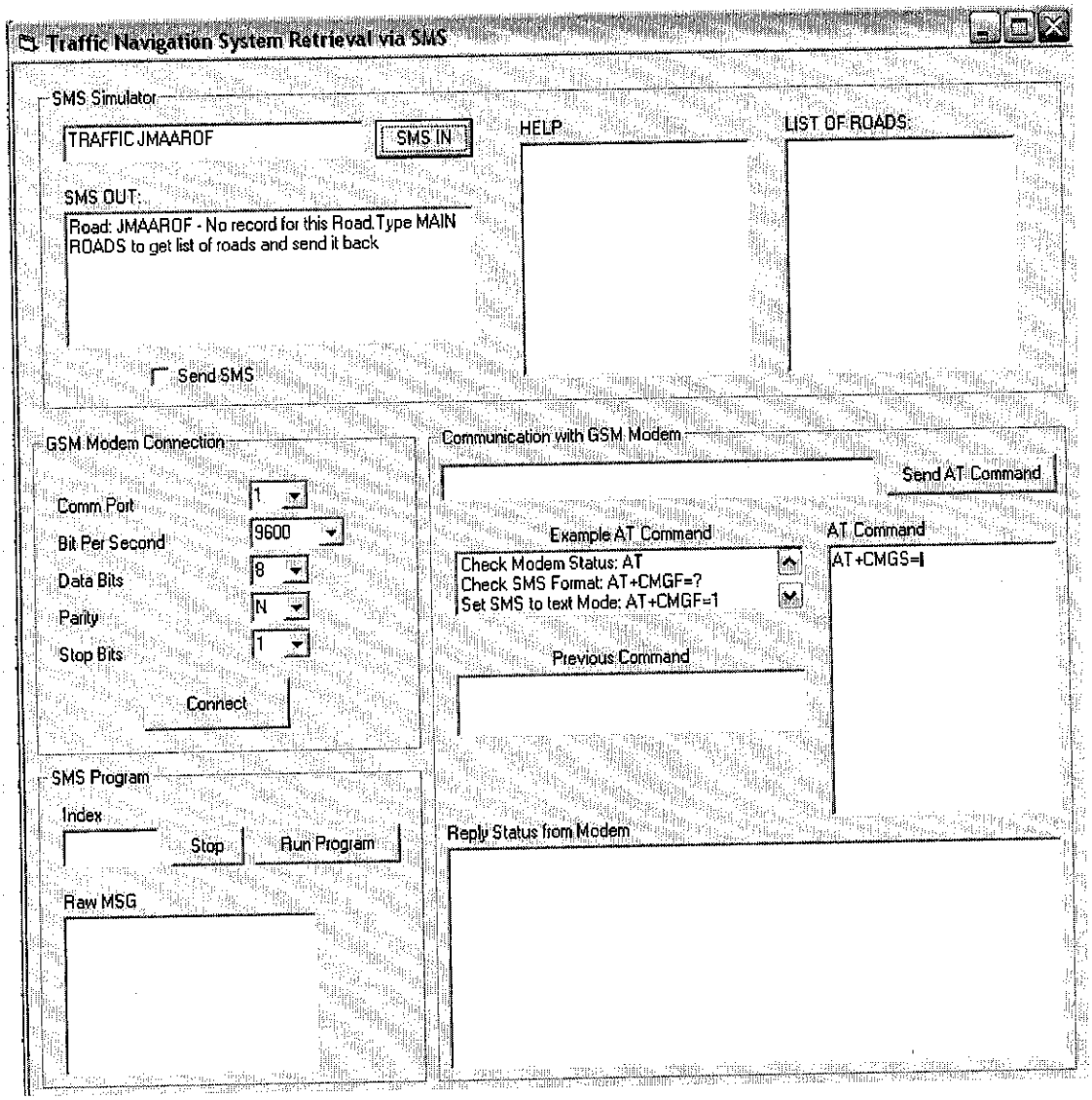


Figure 29: Complete System Interface for Unavailable Roads

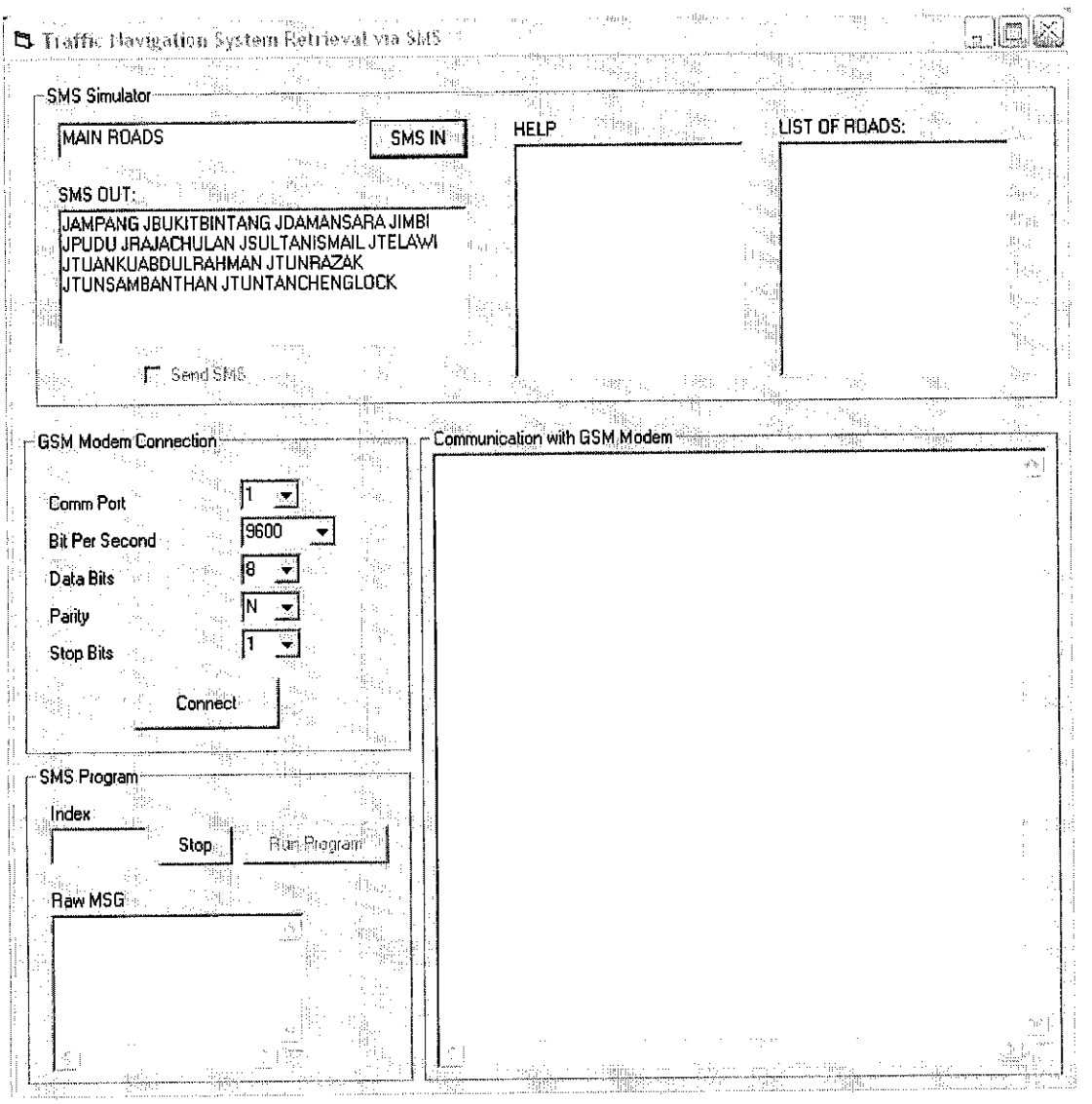


Figure 30: Complete System Interface for Main Roads

Type MAIN<space>ROADS

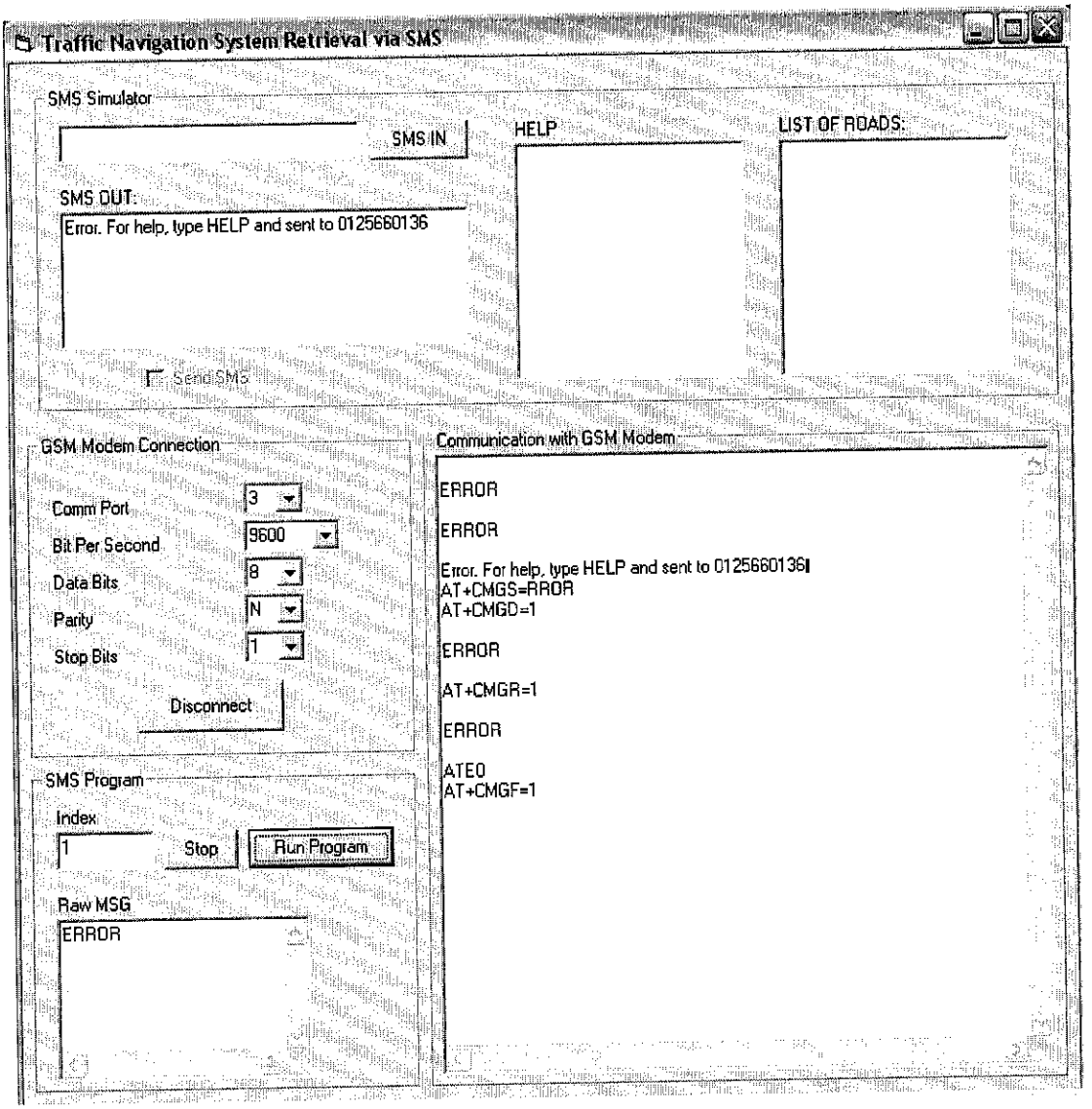


Figure 31: Complete System Interface for Typing Error