

PHONE SIGNAL REGEN (PSR)

LAU SIAN LUN



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**BORANG PENYERAHAN TESIS**

Judul: Phone Signal Regenerator (PSR)

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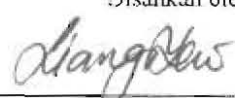
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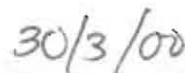
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PHONE SIGNAL REGENERATOR (PSR)

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*Dedicated to*  
**My Parents,**  
**and the Internet**

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## ABSTRACT

Phone Signal Regenerator is a concept that will provide solution to line problems faced by home Internet user. It aimed to reveal factors that every home Internet user should know, in order to avoid and overcome these factors. Studies were made to learn and understand further about analog phone network, Internet data transmission over public switched telephone network (PSTN) and modem (short for modulator-demodulator). Based on information available, possible problems were pointed out and studied. This then led to suggested solutions.

## **ABSTRAK**

Phone Signal Regenerator ialah suatu konsep yang bertujuan membekalkan penyelesaian kepada masalah-masalah talian yang dihadapi oleh pengguna Internet di rumah. Projek ini juga akan mendedahkan factor-faktor yang perlu diketahui oleh pengguna Internet di rumah, supaya langkah-langkah sewajarnya boleh diambil untuk mengelakkan atau mengatasi masalah yang dijangka. Kajian dilakukan untuk mempelajari and memahami dengan lebih mendalam tentang jaringan telefon analog, penghantaran maklumat Internet melalui jaringan telefon analog, dan modem. Berdasarkan maklumat yang dikumpul, masalah-masalah yang mungkin dikenalpasti dan dikaji. Susulan ini cadangan dikemukakan.

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## Chapter 1

### INTRODUCTION

#### 1.1 Background

Today, the Internet can be considered one of the fastest growing technologies. The numerous kinds of services that it offers have convenience into the world of communications. Internet has change the way mankind communicates with each other. The distance between each individual is brought closer and closer with the development of Internet.

However despite all these growth and advancement of technology, end-users are still facing very minor yet crucial problems that take place frequently. In Malaysia the situation is no any different than other places around the globe. These problems are such as:

#### **Unstable Connections**

Many end-users often experience frequent disconnection in their daily dialup to the Internet. In an unofficial survey done in local newsgroup, many users actually faced rather frequent disconnection in their experience of getting

connected to the Internet. Connections usually sustained from 5 minutes to 10 minutes before disconnection took place.

This problem has caused inconvenience among users with similar problem because any ongoing online activity will be discontinued during disconnection, and certain tasks have to be restarted from the beginning (for example downloading a large file from an Internet site).

### **Lower than Expected Connection Speed**

Some users face this problem where they do not get connected at the expected speed their modem promises. For example these users often connect at 31.2kbps<sup>1</sup> with their 33.6kbps capable modems. While the 56kbps modem owners hardly get anything beyond 51.2kbps throughout their attempts to connect to the Internet.

These users usually get frustrated and unsatisfied for they are not getting what they have paid for and been promised of.

### **Slow Transmission Speed**

Sometimes good connection speed is achieved but yet the actual transfer rate is lower than it seemed to have. User will only get average 1-2kbps of data transfer even when they are connected at good speed such as 33.6kbps where an average transfer rate of 3-4kbps should be meet.

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<sup>1</sup> Kbps : Kilo bit per second, common unit used in data transmission.

In this scenario users tend to spend more time that they actually need to get online. Slow download not only increase download or decrease transfer speed, but sometimes it also resulted in time-outs<sup>2</sup>. Online task efficiency can be badly affected by this situation.

Possible causes of these problems need to be identified. It is for solving these problems the idea of **Phone Signal Regen (PSR)** come into thought.

## 1.2 Project Overview

As suggested by its name, the **Phone Signal Regen (PSR)** is basically a device that is capable of regenerating phone signals, specifically data signals carried by phone lines. Besides amplifying weak signals, the device should also filter unwanted signals such as noise in order to help users achieved much stable and expected connection speed.

This project will also look into the different causes for problems faced by Internet users in Malaysia. This will help the process of construction of the **PSR**, since by identifying the problems appropriate solution can be proposed.

## 1.3 Project Objective

The main objective of this project is to identify and suggest solutions for common problems faced by local Internet users in the area of connection

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<sup>2</sup> Time-Out: Sometimes when the local modem waits too long for remote modems, it will discontinue

speed and efficiency. The suggestion of solution should satisfy two main criteria: practicality and affordability. With this follows the second objective, which is to look into the possibilities of designing and developing a device that is able to rectify Internet connection problem mentioned above. With the **PSR**, users can achieve better connection speed, hence increase productivity and at the same time save money relatively.

#### 1.4 Why PSR?

Wonder why this idea? In daily life many people tend to simplify procedures and applications in every activity. Often we would ignore or overlook little tiny details that look trivial, but in reality they might be equally crucial to be known.

In the scenario of Internet connection, many do faced connection problem, and few would really know what actually happened. Being able to solve one problem is important, but being able to know what is the problem is not less important than the formal.

The current Internet connection tools have increased tremendously, but to the public, analog PSTN connection with a modem is still most common equipment that will not be replaced in at least 5-10 years. Higher speed devices such as Integrated Services Digital Network (ISDN) or Digital Subscriber Line (DSL) variants are still expensive. Therefore studies in the area of PSTN

Internet connection problems would be able to help understand and improve or rectify problems.

**PSR** is an answer to the concept above. If we would take time to look into some seemingly tiny details in our daily activity, we might find out more interesting things that help us to carry out our daily tasks. This will further help us to maximise our output, which still will benefit us in the end.

## 1.5 Chapter Outline of this Thesis

Chapter 1 gives a brief introduction to reader to provide them ideas on birth of the idea on PSR. It will be followed by chapter 2, which is literature review, that will talk mainly on three areas: Internet, Public Switched Telephone Network (PSTN) and modulator-demodulator (MODEM). Chapter 2 is aimed to give reader better understanding on the essential component in Internet connection via PSTN.

The next chapter deals with problems and caused studied. This chapter analyses factors that is possible in giving connection impairment. Chapter 4 continues by elaborating the scenario of v.90 modems. With these two chapters comes chapter 5 that provides suggestions and solutions to the problems we have in chapter 3 and 4.

Finally conclusion and recommendations are drawn in the final chapter.

## Chapter 2

### LITERATURE REVIEW

#### 2.1 The Internet

The Internet is formed by a big number of interconnected computers worldwide. These computers use packet switching method to exchange information among each other with the help of Internet Protocol (IP). Different individuals provide information on their own machine or computers, which they call servers, and link these computers to the Internet backbone. The Internet backbone is similar to a highway that connects all the destinations along way, in order to provide connectivity for everyone that is connected to it.

The Internet started in the 1960s when the cold war between United States of America and USSR was on. There came the idea of setting up a network to interlink computers in US in times of emergency. This brought forth the birth of ARPANET, short for Advance Research Projects Administration Network. Different technologies were invented throughout the years, which includes Transfer Protocol/Internet Protocol (TCP/IP), World Wide Web (WWW), Email and File Transfer Protocol (FTP).

Internet had its services provided to people in varsities and researches initially. Then slowly it was introduced to the public. The growth of Internet users since 70s up to date is rapid. Today millions of people are connected to the cyber world and meeting each other regardless of location and origin, with the ease of Internet. Today there are many means to get online: dial-up, leased line, varsity, cyber cafes and many more.

For home users who dialup for connection, the world of Internet can be explained with the few components below:

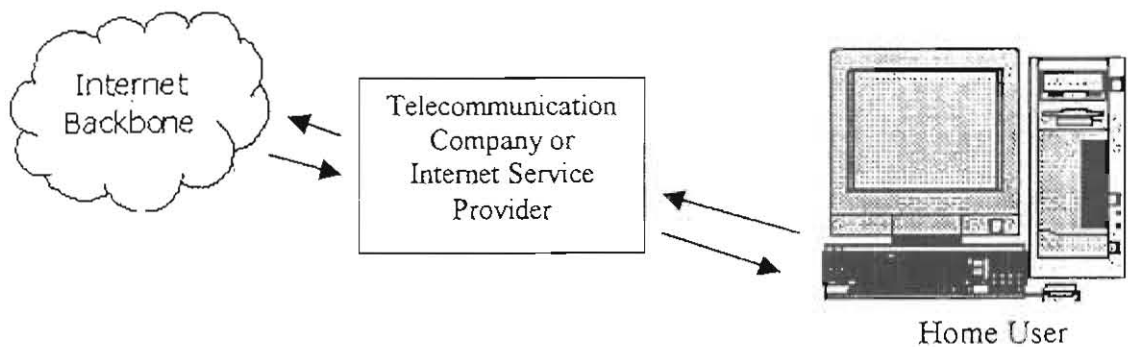


Figure 2.1 : Few Components in Internet

Home users will connect to the Net by dialling up via modem to equipment and facilities provided by the Internet Service Provider (ISP) and Telecommunication Company (Telco) where their data calls will be further connected to the Internet.

For personal dial-up users, data transferred out from their personal computer (PC) will be converted from digital signal into analog signal by the modulator/demodulator (modem) before being sent to the nearest telecommunication company exchange which is called as a node. Node provided by the ISP usually consists of data communication equipment that will interconnect home users to the Internet backbone.

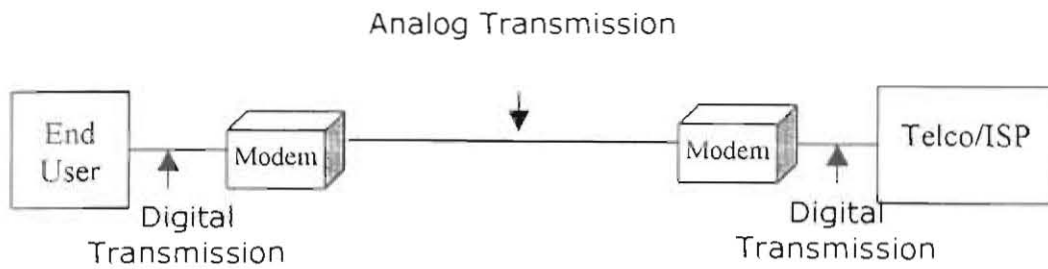


Figure 2.2: Data Transmission from End Users to Exchange

Usually the analog link that connects the two modems between telecommunication company and end user is the same link used for telephone voice calls.

## 2.2 The Telephone Network

In order to identify possible causes of problem that affects Internet connection, we first have to study telephone network that provides the physical link. This network is given name as the Public Switched Telephone Network (PSTN). It is commonly found in most places in the world. In Malaysia many phone users still have their phone connect via PSTN. PSTN provides analog voice transmission over copper cable from individual homes to the local exchange. Alternative to PSTN is the Integrated Services Digital Network (ISDN) which digital network is used for voice and data transmission, which provide higher capacity, but not forgetting higher cost too.

The word analog carries the meaning of varying amplitude of transmitted signal over a continuous range (Martin, J., 1990). Analog signal normally transmits in oscillation and its frequency also varies over a continuous range. Examples of analog signals would include sound that we hear and light that we see.

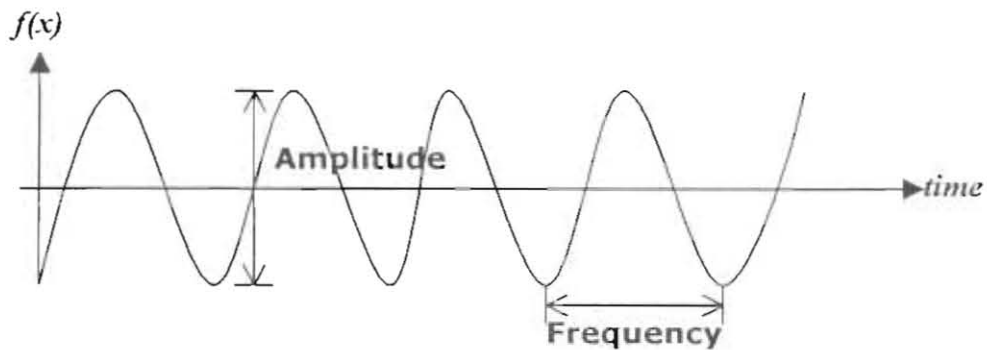


Figure 2.3: Amplitude and Frequency

In daily life many things have relation with analog signals. In speeches voice is transmitted in analog sinusoidal wave. Electricity is also commonly found in analog form. In a telephone, the microphone in the handset receives human voices and converts voice signal into electrical energy, which the latter will be transmitted over wire to the designated destination. There will certainly be a telephone at the destination to convert these electrical signals back to analog voice signal via speaker.

The analog PSTN system has the following main parts: