UNIVERSITI TEKNIKAL MALAYSIA MELAKA

MINIATURE OF BASE TRANSCEIVER STATION'S POWER SUPPLY BY SOLAR ENERGY

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Electronic Engineering Technology (Telecommunications) (Hons.)

by

EDRISS NAQIYUDDIN BIN MD KHAIR
B071210126
910919-14-5751

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TAJUK: **Miniature of Base Transceiver Station's Power Supply by Solar Energy**

SESI PENGAJIAN: **2015/16 Semester 1**

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Telecommunications) (Hons.). The member of the supervisory is as follow:

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(**Win Adiyansyah Indra**)

ABSTRACT

Nowadays, the usual source of power for the system is the Base Transceiver Station from Tenaga Nasional Berhad (TNB). We can usually see the situation where the park should work together to set up a system of Base Transceiver Station. Maybe with the project "Miniature transceiver of Base Station's Power Supply By Solar Energy" The problems that occur can be overcome. This project will reduce the cost of installation and maintenance. Using a technology known as solar panels, the system only needs a battery charger only. Be aware of each battery in the base transceiver station system should be charged full time. Thus, the solar panel that serves as a battery charger automatically. In terms of chargers available that can track the battery charger. The system output, the battery will generate power to the Base Transceiver Station. Apart from the hardware, the project was done by software simulation to prove that solar energy can be used in the base station in the country, Malaysian transceiver. The result obtained is the power of solar energy with the battery used. The elements of the project can avoid wastage. In fact, this process can be used for a period of time. Overall the project is to use hardware and software entirely. The project aims to reduce costs and use of renewable energy..

ABSTRAK

Pada masa kini, kebiasaannya sumber kuasa bagi sistem Base Transceiver Station adalah daripada Tenaga Nasional Berhad (TNB). Kita biasanya dapat melihat situasi ini dimana TNB perlu bekerjasama untuk mendirikan sebuah sistem Base Transceiver Station. Mungkin dengan adanya projek –Miniature of Base Transciever Station's Power Supply By Solar Energy" ini masalah yang berlaku dapat di atasi. Projek ini dapat mengurangkan kos dari segi pemasangan, dan penyelenggaran. Dengan menggunakan teknologi yang dikenali sebagai solar panel, sistem hanya perlu pengecas bateri sahaja. Sedia maklum setiap bateri di dalam sistem Base Transceiver station hendaklah dicas sepenuh masa. Oleh itu, solar panel yang berfungsi sebagai pengecas bateri secara automatik. Dari segi pengecas terdapat litar yang boleh pengecas bateri tersebut. Dari sistem keluaran, bateri tersebut akan menjanakan kuasa kepada sistem Base Transceiver Station. Selain daripada hardware, projek ini telah dilakukan secara software iaitu simulation untuk membuktikan tenaga solar boleh digunakan di base transciever station di negara malayisa. Keputusan yang diperolehi adalah terhadap tenaga antara tenaga solar dengan bateri yang digunakan. Oleh yang demikian projek ini dapat mengelakkan unsur pembaziran. Malahan proses ini dapat digunakan dengan jangka masa yang lama. Secara keseluruhan projek ini menggunakan perkakasan dan perisian sepenuhnya. Projek ini bertujuan untuk mengurangkan kos dan boleh menggunakan tenaga boleh diperbaharui.

DEDICATIONS

To my beloved parents

MD KHAIR BIN HAJI OTHMAN

AIDAH BINTI HAJI ABDUL RAHMAN

Special dedicated to my supervisor

MR WIN ADIYANSYAH INDRA

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LIST OF SYMBOLS AND ABBREVIATIONS

AC	=	Alternative Current
BS	=	Base Station
BTS	=	Base Transceiver Station
DC	=	Direct Current
GPRS	=	General Packet Radio Service
IP	=	Input
LED	=	Light Emitting Diode
MPPT	=	Maximum Power Point Tracking
MOSFET	=	Metal Oxide Semiconductor Field Effect Transistor
OP	=	Output
PV	=	Photovoltaic

CHAPTER 1
INTRODUCTION

1.0 Introduction

Telecommunications industry is a system of switches that interconnect to provide communications by human kind. Today, the global telecommunications industry is concerned with local telephone service, long distance telephone service, and another service. Every year, there have technologies to increase the service available and the speed of delivery.

1.1 Background

The need for base transceiver station arose from the introduction of cellular phone technology and growth in cell phone usage, as without base transceiver station it would not be possible to get cell phone reception from the network provider. Cell phone technology has improved dramatically over the years and is often divide into generations (first, second, third and so on) to mark technological improvements and capabilities. Each generation is generally represented by a decade in time with 1G in the 1980s, 2G in the 1990s and so on. The technological development that distinguished the First Generation cell phones from the previous generation was the use of multiple cell sites, and the ability to transfer call from one site to next as the user travelled between cells during a conversation. The ability was aided by the construction of base transceiver station in locations near where people live and work. The growth in base transceiver station construction mirrors the growth in cell phone usage.

Mobile phone service pro-videos have agreed to work with the state authorities on the idea of sharing radio transmission infrastructure nationwide. The five telecommunications companies (telecoms) with cellular services — Celcom (M) Sdn Bhd, DiGi. Com Bhd, Maxis Communications Bhd, Telekom Malaysia Bhd and Time dotcom Bhd will sign an agreement to cooperate on sharing base transceiver stations (BTS).

Cellular communications technologies such as handsets and base stations have become very common technologies throughout the developing and developed world. Roughly three billion users spend large portions of their income on these communication technologies. However, the remaining half of the world currently has limited access, in large part due to lack of network coverage.

Some areas do not have a high enough population density to support a traditional cellular deployment. Other areas are too far from established infrastructure to make a deployment economically possible. This is why there are many rural areas where there is no network coverage at all. Mobile telecom networks require an enormous amount of power. Adding several base-stations for rural users can only multiply this destructive environmental impact, unless these base-stations are supported by a sustainable alternative. Running mobile phone networks is getting more expensive and difficult, due to increasing energy costs in developing countries and as operators increase the number of base-stations in the infrastructure, so that they can offer third generation networks, wireless services at broadband data rates, power consumption is set to continue to rise

1.2 Background Project

Miniature Base Transceiver Station using solar panel is the current scenario of energy availability in typical rural telecom system and processes green energy utilization in rural telecom sector in Malaysia. Other than that, the renewable energy source as the best alternative for rural telecom to supply the required load at any given time. Solar radiations represent the earth's most abundant energy source. The perennial source of solar energy provides unlimited supply and it has no negative impact on the environment. Its suitability for decentralized applications and its environment-friendly nature make it an attractive option to supplement the energy supply from other sources. Solar energy uses photovoltaic system (solar cells) to capture the sun rays and convert the energy into electricity. Such systems allows home owners to generate electricity in a clean, reliable and quiet way that can offset the cost of future electricity costs and decrease their dependence on the energy grid. Solar power depends on energy from the sun, there has to be adequate sunshine for the solar panels to produce sufficient power for use. In cloudy and snowy conditions, it would be impossible to invest in solar power.

1.3 Problem Statement

There have pointed out to the fact that powering Base Transceiver Station sites using existing energy (Powering the Nation) has three problem statements. Firstly, the problem statement is hard installation. This because too difficult to get the equipment for Base Transceiver Station in Malaysia. Next, the problem statement is the high cost. The cost involved in using existing is very high and it is estimated that the Malaysian telecom industry spends over billion ringgit on every year. Lastly, the problem is No dependent grid. This means in this project no using existing energy

1.4 Objectives

The main objective of this project is to designing a telecom base transceiver station system that makes the most effective use of our environment that will be applied in this project. Therefore, designing is also very important to facilitate the project so that it better. Among other objectives is to understand the concept of the use of electronic devices used such as solar panels, and other components used. This is to see if the required voltage. The objective of the latter is the base transceiver station should be able to run in places with no available energy grid. This is an indispensable step for the project. This will generate electrical energy converted from solar energy and it will be applied in the project.

1.5 Scope of Study

Scope of Study in this project is focused on the construction of a device that uses solar energy as a power source for a Miniature Base Transceiver Station. By using solar energy conversion into electrical energy, a new method has been used as an alternative to generate electric power. Moreover, it can be seen from the prospect of using solar energy resources, the country Malaysia is one country that has high intensity sunlight and consistent, because the country is situated above the equator. In addition, the presence of the sun for 12 hours a day allowing optimum use of solar energy without having to think about the presence of the four seasons such as in countries in Europe and other foreign countries. In addition, the equipment used in this project can help to be effective, efficient and manage all of our power processes.

The project is related to the application of solar energy resources based on the present has grown rapidly. Many projects have been carried out before issuing our results are quite encouraging. The results of the studies conducted should be used as quickly as possible because it is a source of alternative energy-saving and highly valued for a long time. Find the location of where that it has very high temperatures and the atmosphere is dry the majority of the time.

1.6 Limitation

This project limitation in this project is the study of the solar cell, battery type and circuit (charge controller) that will be used. The study covers the effectiveness and the problems that may arise when electronic tools are combined together. It should also be built as small as possible so that it is easy to get the data. Selection of the right components also needs to be done so that it can produce a better circuit.

1.7 Conclusion

Chapter 1 is roughly described about this project which is ―Miniature of Base Transceiver Station's Power Supply by Solar Energy". In this chapter, it consists of background of project, objectives and also scope of this project. This chapter is a basic guideline of this project. Next chapter is Literature Review which is provided the review from previous research that is related to this project.

1.8 Report Organization

Chapter 1: Introduction

This chapter contains project background, problem statement, and objectives of project, scope of study, limitation and conclusion for this chapter.

Chapter 2: Literature Review

This chapter covered the literature review and citation about any information that related to this project from any references. In this chapter, the citation about analysis of equipment also is included.

Chapter 3: Methodology

This chapter covered about method used of this project. In addition, this chapter gives information of process flow in this project. Flow chart and table of data in this chapter.

Chapter 4: Result and Discussion

This chapter discuss about the result of this project.

Chapter 5: Conclusion

These chapters discuss the project result. Any error or information from the result is discussed in this chapter.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This Chapter is literature review will be continuously carried to study past and current research work. Some very important issues and data have to be studied, reviewed, determined and applied for the project which is "Miniature Base Transceiver Station Using Solar Panel". There are previous researches on Base Transceiver Station using different power supply, method, and material and experiment design to obtain the surface roughness model. In addition, in this chapter it will be include about the theory of Base Transceiver Station, type of power supply and charger controller used in previous research

2.1 Base Transceiver Station

Base Transceiver Station (BTS) as shown in Figure 2.1 below is an apparatus that facilitates wireless communication between user equipment and a network that requires a 48V dc power supply input. BTS shall be in a telecommunication towers as shown in Figure 2.2. Antenna is a device such as a mobile phone, a computer with wireless internet connection and more. This network can be applied to any wireless communication technology as an example of GSM, CDMA, wireless local loop, WAN, Wi-Fi, WiMAX and others. Base Transceiver Station and is also the recipient acts as an interface between the mobile station to the network. (P.A. Dahono, MF Salam, F.M. Falah, G. Yudha, Y. Marketatmo & S. Budiwibowo, 2009).

Figure 2.1: Base Transciever Station

Figure 2.2: Base Transciver Station Tower

Base Transceiver Station is a conventional power system is shown in Figure 2.3. Base Transceiver Station operated by power lines by utility. Sources familiar diesel generator, it is used as a back-up due to air conditioning and lighting systems are powered from the AC bus. Using a router, the AC power must be converted into a 48V dc power. Next, the battery and telecommunication equipment connected directly to 48V dc bus. So, these batteries are used should be designed to provide at least 6 hours of back-up. However even in rural areas, diesel generators are the main source. For small Base Transceiver Station, about 2000 liters of diesel fuel needed each month. There are rural areas or small islands that have a major problem of how to deliver fuel. In just a few years, the cost of fuel higher than its Base Transceiver Station. (P.A. Dahono, MF Salam, F.M. Falah, G. Yudha, Y. Marketatmo & S. Budiwibowo, 2009).

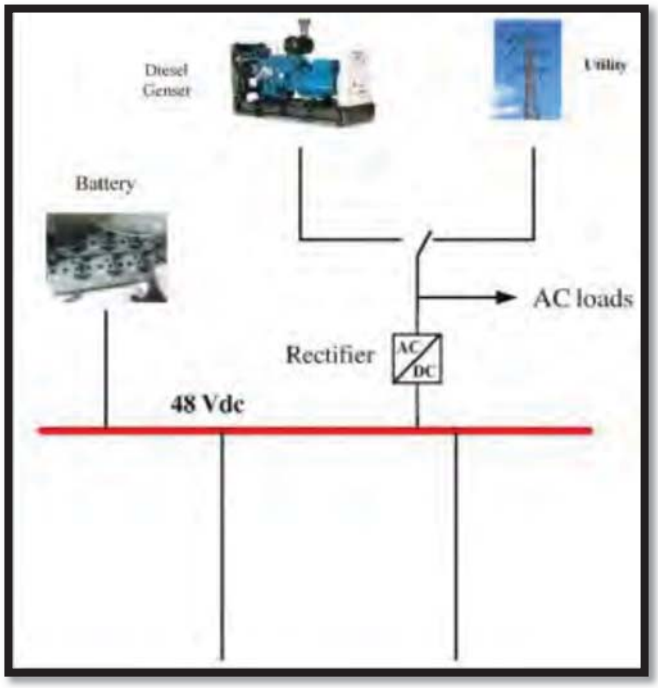

Figure 2.3: Scheme of Coventional Base Transceiver Station