

**REAL-TIME REMOTE MONITORING SYSTEM
FOR TV3 FLY FM AND HOT FM RADIO STATIONS
(TV3-RMS)**

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**A technical report submitted in partial fulfilment of the
requirements for the award of the degree of Master of Science
(Computer Science – Real-Time Software Engineering)**

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Universiti Teknologi Malaysia**

APRIL 2008

ABSTRACT

A radio, combination of a transmitter and a receiver works by transmitting the radio waves along with the message (voice data or data for radio modem) that have been encoded onto a sine wave. The receiver will then decodes the sine waves and retrieves the message in their original format. Both the transmitter and the receiver use antennas to radiate and capture the radio signals. For radio broadcasting purpose, a radio station usually has a transmitter and an antenna located at the station, while the receivers are usually located at various locations that could be 100 km away from the station. However, a single transmitter is not able to cover a wide area; instead a radio transmission tower is needed that is located at high area such as a mountain peak to transmit the radio signals for larger areas. A technical personnel is needed to monitor and to control this tower station. However, such manual maintenance activities can only be done if the transmission tower is located at local areas. To overcome this situation, a system called Remote Monitoring System has been developed to aid users (in this case, operator) in supervising the transmitter on remote location and on unmanned site. The purpose of this system is to monitor the transmitter's condition and reporting the current status of the transmitter back to the operator at the station. The data of the transmitter are collected by using an electronic device called Remote Terminal/Telemetry Unit (RTU) and is placed on the transmission tower. The RTU communicates with the monitoring system through the GSM network provided by local telecommunication company.

ABSTRAK

Radio, kombinasi sebuah pemancar dan penerima berfungsi dengan memancarkan gelombang radio berserta mesej (data suara atau data untuk modem radio) yang telah dikodkan ke dalam bentuk gelombang sinus. Penerima kemudian menyahkodkan gelombang sinus tersebut dan menerimanya di dalam bentuk asal. Kedua-dua pemancar dan penerima menggunakan antena untuk memancar dan merakam gelombang radio ini. Bagi tujuan penyiaran, sesebuah stesen radio menggunakan sebuah pemancar dan sebuah antena yang terletak disekitar stesen, manakala penerima pula biasanya berada di pelbagai kawasan dalam lingkungan 100 km dari stesen. Bagaimanapun, sebuah pemancar tidak mampu untuk meliputi kawasan yang besar, oleh sebab itu menara pemancar radio diperlukan yang terletak di kawasan yang tinggi seperti di puncak gunung bertujuan untuk memancarkan gelombang radio pada skala yang lebih besar. Juruteknik diperlukan untuk mengawal dan mengawasi stesen pemancar ini. Walaubagaimanapun, kerja-kerja penyelenggaraan ini hanya boleh dilakukan sekiranya stesen pemancar tersebut terletak di kawasan setempat. Untuk mengatasi situasi ini, sebuah sistem yang dinamakan Sistem Pengawasan telah dibangunkan untuk membantu pengguna (dalam hal ini, operator) mengawas pemancar yang terletak di kawasan pedalaman. Tujuan sistem ini dibangunkan adalah untuk mengawas keadaan pemancar dan melaporkan status terkini pemancar kepada operator yang berada di stesen radio. Maklumat pemancar diperolehi dengan menggunakan sebuah perkakasan elektronik yang dikenali sebagai '*Remote Telemetry/Terminal Unit*' (RTU) yang ditempatkan di stesen pemancar. RTU dihubungkan dengan sistem pengawasan melalui rangkaian GSM yang dibekalkan oleh syarikat telekomunikasi tempatan.

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LIST OF ABBREVIATIONS

EPC	-	Engine Power Components
GEC	-	General Electric Company
GSM	-	Global System for Mobile communications
IRS	-	Interface Requirement Specification
LAN	-	Local Area Network
MMI	-	Man-Machine Interface
MTU	-	Master terminal Unit
OS	-	Operating System
PC	-	Personel Computer
PLC	-	Programmable Logic Controller
RAD	-	Rapid Development
RTU	-	Remote Telemetry/Terminal Unit
PSTN	-	Public Switched Telephone Network
SCADA	-	Supervisory Control And Data Acquisition
SDD	-	Software Design Document
SRS	-	Software Requirement Specification
STD	-	Software Test Description
VM	-	Virtual Machine

CHAPTER 1

INTRODUCTION

1.1 Organization Background

Today Malaysia has become one of the fastest developed countries in technology and telecommunication in the South East Asia. This is proven by the submergence of foreign labors from other Asian countries into Malaysia. Well-known country in Asian region, stability in politic and economic are the prime factors that attract theses foreign labors and foreign investors to this country. As the technology industries rapidly growing during that time of period, it has become the core of contribution to the economy of Malaysia. As a result, it has created a competitive environment among the technology industries companies in providing the best services and facilities to the consumers.

Forecasting this scenario, Mahkota Technologies Sdn Bhd has decided to emerge from the wings of *General Electric Company (GEC)* in the year of 1997 to become a truly Malaysian company with Malaysian identity. Mahkota Technologies which was formerly known as GEC Malaysia was incorporated in 1960. Since that time, Mahkota has deployed thousand of its products and solution across Malaysia. As the leading engineering company in Malaysia, Mahkota

provides the best engineering and utilities infrastructure towards in building the nation and consumer satisfaction [1].

1.2 Mahkota Research Sdn Bhd

Mahkota Research Sdn Bhd (MRSB) is one of the subsidiary companies of Mahkota Technologies Sdn Bhd. The core activity of the company is development of software solutions for controllers that will be used in utilities such as power plant, waste water plant, traffic and communications.

Mahkota Research has manufactured and deployed products such as MOMS (Mahkota Operation Management System) that was locally developed for SCADA (Supervisory Control and Data Acquisition) Solutions and also Automation Controllers which includes MC-88/Controllers, MC-88/PLC, MC-88/PAC, MC-88/RTU, MC-88/Telemetry, MC-88/ Substation Controllers, and MC-88/Dataloggers. In the year 2004, Mahkota Research was certified with MSC Status Company by the MSC Malaysia.

1.3 Core Business

With over 47 years of experience in engineering and utilities infrastructure, Mahkota has poised itself to be on the leading edge of advances in technology while continuing their tradition of engineering excellent. Today, Mahkota has over than 200 engineers and staff to help the company evolving in the industry.

In the Engine Power Components (EPC) construction, Mahkota is a market leader for extra high voltage substations with full system integration. This integration system covers total project management, procurement, construction and complete in-house engineering and design. This business is the core in the power transmission and distribution sector of Mahkota Technologies.

Furthermore, Mahkota provides turnkey systems solution in the areas of power generation, specializing in standby and baseload power of up to 30 MW capacities. In line with the government's promotion of energy conservation and efficiency, Mahkota provides efficient co-generation systems with combined cooling/heating and power systems packages to meet various requirements.

While in the water infrastructure sector, Mahkota with a reputable international partner have to-date secured and executed a number of water and waste project covering the full M&E scope. Besides, Mahkota has provided an automation & control technologies such as SCADA, integrated maintenance management systems, asset and facilities management which are designed and engineered in-house to meet customer's needs.

1.4 Problem Statement

Since their incorporation in 2005, Hot Fm and Fly Fm radio stations have over than 100, 000 listeners across the nationwide. In order to deliver the best services, both radio stations have increased their capabilities by expanding their frequencies coverage areas especially in the east coast region. To ensure this radio frequency signals can be reached, a transmitter is needed. This transmitter is placed at a mountain peak or a higher area in order to get a wider coverage.

The problem arises when there is fault or error occurred on the transmitter. Since the transmitter is placed on a radio transmission tower, a technician is required to fix the error. This might be a problem since the tower station is located at various remote locations. More time could be spent just to get to the tower rather than to fix the problem. As the result, this situation can cause the radio stations to lose their potential revenue and decreased their reputation as well-established radio stations in Malaysia.

To overcome the problem, a system called Remote Monitoring System has been developed to monitor the transmitter condition and reporting the status of the transmitter back to the radio station automatically. With this system, the radio station could predict the future situation based on the pattern of the current status information. Early precaution measures can be setup and any potential lost to the station can be prevented.

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