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REMOTELY CONTROLLED POWER MONITORING SYSTEM FOR BASE TRANSCEIVER STATION (BTS)

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ABSTRACT

This solution was developed for the backup power problem that all the mobile service providers are facing currently. This study was mainly focused to protection of the battery bank and remotely controlling the generator by using GSM module at the instance of commercial power interruption. This power issue was mainly occur when the CEB power breakdowns. At this moment power of the battery bank is automatically switched to base transceiver station BTS. Then battery bank was gradually drained while reducing the voltage level according to amount of traffic that handled by BTS at that time. Draining completion time depend on the congestion and amount of traffic going through this site. According to the condition of the BTS site, effect of this issue was fluctuated. Also if the voltage level of the battery bank is drained with exceeding certain voltage level it will directly affect to lifetime of the batteries. This study reports a system developed to monitor the voltage level, load current, status of battery bank and generator through power monitoring unit by using PIC microcontroller. Those data are delivered to relevant site engineer via SMS by using GSM module.

Keywords: *Battery bank, Power level monitoring unit, Base transceiver station*

1. INTRODUCTION

CEB power, backup generator and battery bank are main power sources for the BTS. There exists a power issue when a failure occurs in CEB power, backup generator and battery bank which is used as additional power source. The power of the battery bank is automatically switched to BTS when CEB power is down. Then battery bank start to drain reducing the voltage level. They are always connected to rectifiers to keep 100% charged.

When system is running with battery bank, firstly BTS will be shut down by Network Operation Centre (NOC) in order to keep microwave active. Microwave link will be shut down when the voltage level of the battery bank is reached to 43V. If the voltage level of the

battery bank is lower than 43V it will directly influence to the life time of the batteries. Generally the total value of a one battery bank is approximately Rs 700,000.The solution provided in this study will prevent any kind of effect to the battery bank within outage time. Site engineer cannot exactly predict how much time it will take to drain the battery bank up to critical power level after it was informed by network operation center. Because this time is depend on the congestion of site and amount of traffic going through this site. According to the category of the BTS site, effect of this issue fluctuated. If the BTS site is hub site, most of the microwave links are crossed over through this site. The organization will have economical loss if such an incident cause at BTS site. Site Engineer does not have a system to recognize the power level of the battery bank without visiting to the BTS site. This is a critical situation that site engineers have to face. Proposed system can monitor the voltage level, load current, status of the battery bank and generator by using PIC microcontroller. Those data are delivered to relevant engineer via SMS by using GSM module where by site engineer can decide whether to switch on the generator, via SMS without visiting the site.

2. EXPERIMENTAL

In the proposed system the discrete voltage level of the battery bank is measured using the power monitoring unit (PMU) of the BTS[1]. The observed analogue value is then converted in to digital signal by using ADC module. Finally the data is send to the mobile of the site engineer via a GSM module which is connected to GSM network. The system generates a SMS at every voltage level with the information of load current of battery bank the details of the generator, when battery bank gradually drained.

As a solution to this situation, a device was designed to monitor the voltage of battery bank throughout the day and deliver a SMS to the site engineer at each voltage when CEB power is breakdown. This monitoring system is designed to monitor the voltage level, load current of the battery bank and oil, fuel, heat details of the generator remotely. There are four main parts in this design.

- Measuring voltage, current value of the battery bank and oil, fuel and heat details of the generator using PIC microcontroller[2].
- Checking the main power availability by using optocoupler IC
- Sending the details of the battery bank and generator to site engineer through GSM module.

- Two relay circuit for switch ON\OFF the generator.

Power level of Battery Bank is drained according to capacity of the BTS site. In BTS site which was considered for this study, rectifier modules are assigned to the requirements of the BTS and microwave. In disconnecting microwave link and BTS, microwave is prioritized in order to protect the battery[3].

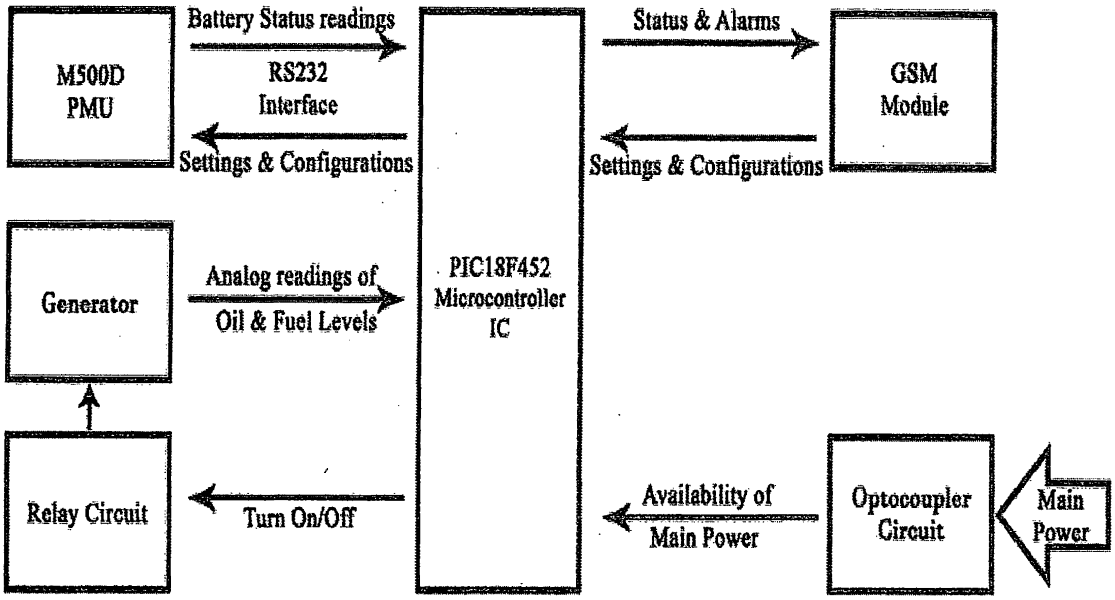

Figure 1: Schematic diagram of system design

Table 1: Low voltage disconnecting (LVD) status According to voltage of battery bank

Naming System	Range of voltage	Status	
LVD1	54V - 48V	Non-critical	Disconnect BTS
LVD2	48V - 43V	Critical	Disconnect Microwave

3. RESULTS AND DISCUSSION

The major task to achieve during the development of this system was to reduce the cost since it has to be implemented to thousands of BTS sites belong to the mobile service provider. In the other hand, the company was not willing to spend huge amount of money on the system. Because this product is not an income generator but only an expenditure for the mobile company. But it will reduce the cost of the company because site Engineer can switch ON/OFF the generator without visiting the site. Failure of the CEB power is to be critical reason when the stability of the mobile network is considered. The breakdowns of CEB power are very frequent. So that mobile service provider should adopt solutions to any incident that will affect to the consistency of the service.

Strength and weaknesses of the proposed solution are,

- It will help to provide a continuous service to the customers, Quality of services will increase.
- From this system, site engineer get updates about status of battery bank and generator except the alarm of failure of CEB power by NOC.
- Remoteness of the system is a very important factor of this solution. Hence site engineer can easily determine what should do next.
- Site engineer can remotely (switch on or off) control the generator by using mobile phone.
- In this system the brake down SMS is send to a one responsible person. If he couldn't attend to it there will be a problem. So if the message can be send to many responsible people it will be more helpful.
- Quantity of this system should be increased according to the gravity of the issue.

Developed system was not tested by fixing to the operation because permission from Network Operating Centre (NOC) is required to do it. Therefore two PRE SETs were used instead of power monitoring unit to get voltage values and load current. It worked successfully. Especially the voltage value was monitored by the PIC microcontroller accurately and that value was passed to the mobile phone as quickly as possible.

4. CONCLUSION

In this study a system was developed to monitor the situation of power supply at a BTS and inform the relevant engineer when there is a breakdown. This system is more useful device to

keep the site active continuously. This solution provides optimum solution for the above described issue with most appropriate and cost effective manner.

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