Low cost solution to optimize generator running hours in off-grid mobile base stations by analysing load parameters

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Declaration

We declare that this thesis is our own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Abstract

Telecommunication industry has also evolved at a very high rate during the last decade and mobile communication now plays a major role in economic, social and environmental aspects.

Green concept is one of the most dominant topic discussed in the 21st century due to rapid development on technology and adverse impact on the environment caused by the same. There are so many areas still opened to address. Power generation is one of the kay areas that influence most and many researches are being carried out in the power related areas.

Telecom operators are among the highest users of electricity in modern world. They use electricity to power up their base stations. Majority of base stations are used grid power to their operations and still considerable number of base stations are isolated from grid and powered separately from other sources such as generators, solar and wind power, hybrid solutions etc.

This research addresses to develop a software based low cost generator controller to be used at off-grid base stations. This will focus on the off-grid sites running only with generator power and a method to optimize the generator running hours. It is expected to minimize environmental impact caused by the generators running on 24x7 basis as well as provide financial benefit to the mobile operators by reducing the fuel consumption.

Proposed solution will be based on hardware designed with the help of a microcontroller and a software system which analyze the load parameters and control the generator. Web based software system will eliminate the problems associated with standalone generator controllers such as lack of keeping records, difficulty in remote monitoring, minimizing fuel theft and fraud etc.

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List of Acronyms

AC	Alternating Current
CEB	Ceylon Electricity Board
BS	Base Station
ACID	Atomic, Consistent, Isolated, Durable
CO_2	Carbon Dioxide
DC	Direct Current
DG	Diesel Generator
GHG	Green House Gases
GSM	Global System for Mobile
IC	Integrated Circuit
IoT	Internet of Things
KWh	Kilowatt Hour
LECO	Lanka Electric Company
NILM	None Intrusive Load Monitoring
O&M	Operation and Maintenance
PC	Personal Computer
SMS	Short Message Service