DESIGN OF AN OPTIMUM POWER SOLUTION FOR TELECOM BASE STATION SITES

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Degree of Master of Science In Electrical Engineering.

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree Master of Science in Electrical Engineering.

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Dr. Asanka S. Rodrigo

ABSTRACT

The amount of power required to operate the telecom network is getting much higher depending on the size of the system deployed at the base stations. This may exceed a couple of kilowatts, occurring a high electrical and diesel cost. Considering the high operational and environmental cost of diesel generators and back-up batteries, major issues of power supplies such as cost effectiveness, energy efficiency etc. need to be addressed in optimum manner. This report is a comprehensive effort to identify the optimum way of providing grid power and the backup power for the telecom base stations. A user simulation model is proposed which result in the optimum power integration model with the best combination of battery backup, solar PV and diesel generator, that determines the optimal capital and operational cost for an on-grid site to give load, type and environmental factors. The techno economical feasibility is done for 6 nos of configurations and yields detailed graphical dashboard which enables the user to correlate the state of load, the power source combination and their conditions.

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LIST OF ABBREVIATIONS

Abbreviation	Description
RBS	Radio Base Station
GP1	General Purpose 1
DAP	Dialog Axiata PLC
PV	Photovoltaic
Li Ion	Lithium Ion
UPS	Uninterrupted Power Supply
CO2	Carbon Dioxide
Ni-Cd	Nickel Cadmium
VRLA	Valve Regulated Lead Acid
BTS	Base Transceiver Station
ATS	Automatic Transfer Switch
DG	Diesel Generator
AC	Alternative Current
DC	Direct Current
AGM	Absorbent Glass Mat
EC	Ethylene Carbonate
DMC	Dimethyl Carbonate
FCB	Free Cooling Box
DoD	Depth of Discharge
ID	Indoor
OD	Outdoor

CPH	Consumption Per Hour
CEB	Ceylon Electricity Board
O & M	Operation & Maintenance
TCO	Total Cost of Ownership
NPV	Net Present Value
RMS	Remote Monitoring System