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DEVELOPMENT OF HIGH PERFORMANCE AUTOMATIC VOLTAGE STABILIZER FOR TELECOMMUNICATION APPLICATIONS

A dissertation submitted to the
Department of Electrical Engineering, University of Moratuwa
in partial fulfillment of the requirements for the
Degree of Master of Science
by:

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DECLARATION

I certify that the work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

UOM Verified Signature

S.S.K. Ihotagama

22-12-2008

I endorse the declaration by the candidate.

DR J.P. Karunadasa

Supervisor

ABSTRACT

The Telecommunication industry in Sri Lanka is having very fast growing and expanding services to their customers. Also, the increasing number of telecom service providers has entered to the industry during past decades, with much competitive Tariffs. At the same time, a regulatory body called "Telecommunications Regulatory Commission of Sri Lanka" (TRCSL) was legally formed under the Sri Lanka Telecommunication (Amendment) Act No. 27 of 1996 and start benefiting to the nation in terms of quality, choice and value for money by extending the optimum conditions of the telecommunications industry in Sri Lanka.

The main challenge of the service provider is to sustain with the competitive Tariff reductions and advancement of their services to customer door step demanding by the industry. Not like in other industry, the telecom customer is having the freedom to select any service provider by own decision without facing any monopoly or other influence by the industry. This automatically creates the industry to reduce their OPEX & CAPEX continually. The CAPEX is always increasing and the reduction possibility exists only with OPEX in the telecom industry.

Electricity is contributes to the major portion of OPEX of remote telecom site operations. The electricity by means of Diesel Generator (DG) operation or Commercial supply (CEB/ LECO) is always a difficult facility in remotely operated telecommunication base stations. This is due to the nature of the location of the selected site and the quality of the nearest/ rural commercial supply. Due to this, the site needs to run with the DG in most of the time period of the day or face with service outages due to interruptions of the electricity with huge OPEX and unexpected losses in income.

The main objective of this research project is to develop a system for automatic voltage regulation at remote telecommunication sites with customized features. The unit is expected to operate under extreme climate,

environmental & power abnormality conditions to regulate & maintain reliable & accurate sinusoidal voltage profile to the sensitive telecommunication equipments. In addition, the development of the unit should be capable to meet the protection requirements from various environmental & power abnormalities, modular construction for easy customization at initial site installations & maintenance, Increased system efficiency, output power quality, fast voltage correction, long life of operation, noise free regulation, less maintenance attention, automatic monitoring, controlling & operation, relatively small construction with lightweight package at lowest possible cost will also be some of the expected outcomes of this development.

This research paper will present the background review, detail technical analysis, theoretical development & design, financial analysis and possible areas of further improvements. At the same time, sample implementation also carried out in several sites of Lanka Bell Ltd was proved a considerable financial benefit back to the company.

The outcomes of this research will be a remarkable development in the telecom industry. We also supposed to share this knowledge with all the interesting parties to extend the benefits not only to the telecom service providers, but also to the customers by means of lowest tariffs.

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