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EFFECTIVE FAULT ISOLATION METHODS TO IMPROVE 33kV NETWORK RELIABILITY

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

S.M.M.S. WEERATUNA

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Supervised by: Prof. H.Y.R. Perera

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Department of Electrical Engineering
University of Moratuwa, Sri Lanka

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DECLARATION

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.M.M.S. Weeratunga

I endorse the declaration by the candidate.

UOM Verified Signature

Prof. H.Y.R. Perera

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ABSTRACT

Improving reliability in power system is very important to the utilities as well as to the country as it is an important attribute of the supply quality and increases the end user satisfaction.

The aim of this study is to investigate the fault identification and isolation techniques to improve reliability. This study focuses on the following;

1. Reliability status of 33kV network of C.E.B.
2. Type of faults in 33kV network and outage reduction methods.
3. Develop a mathematical model for reliability evaluation.
4. Analyze protection scheme of C.E.B 33kV network.
5. Design new protection scheme to reduce outages.

The analyzed reliability indices of C.E.B are far below compared to internationally accepted levels.

In this study reliability status of 33kV network is analyzed using event log data of reclosers and breakdown reports of Consumer Service Centers. The author is working at Region -04, C.E.B and two switching gantries of Region-04 are selected to analyze events one in wet zone and other in coastal zone.

It can be seen that outage time and fault frequency are high during both monsoon periods, 86% of faults are line to earth, 67% of faults are of transient nature and the repair time in case of overcurrent fault is high due to poor workmanship in line connections. With this study predominant causes of faults in the network can be identified by using event log of recloser.

The several methods for outage reduction are identified, installation of fault indicators for remote indication and remote operation of reclosers, using line sectionalize devices.

The protection scheme of 33kV network is analyzed to find techniques to reduce outages. The downstream protective devices (fuse on Spurs) beyond the recloser do not distinguish permanent and transient faults. It can be seen nuisance fuse blowing in spurs as well as nuisance recloser lockout affecting all customers in feeder.

A new protection scheme is designed to overcome the above problems. The developed method isolates unhealthy spurs from healthy sections, improves reliability and reduces maintenance cost and extent of unserved energy.

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