AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
Electrical power and Machines Department

Time-Varying Cost-Effective Primary Distribution Network Reconfiguration

M.Sc. Thesis
By

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Submitted in partial fulfillment of the Requirements for the
M.Sc. Degree in Electrical Engineering

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Approval Sheet

For The thesis:

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Statement

This thesis is submitted to Ain Shams University in partial fulfillment of the requirements for M.Sc. degree in Electrical Engineering.

The included work in this thesis has been carried out by the author at the Electrical Power and Machines Department, Faculty of Engineering, Ain Shams University. No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

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Dedication

To my beloved parents and sisters.

ABSTRACT

Distribution Network Reconfiguration (DNR), in principle, appeared in early distribution networks for the sake of reducing the operational power losses. When the smart grid concept emerged, the DNR problem has been formulated in a different form to account for the new smart grid features, namely: the availability of accurate information about loads from smart meters, and the flexibility of changing network topology with remotely-controlled switching devices.

The possibility of applying a time-varying reconfiguration to follow the change of loads has been increased. Unfortunately, the frequently change of network configuration affects the switching devices and thus create an additional cost that should be considered in the operational costs. Therefore, the comparison between fixed and dynamic reconfiguration should be based on the total cost.

The proposed study takes into account the variation of loads with time using Daily Load Curves (DLCs) and studies the possibility of the DNR to follow the continuous change of loads with a dynamic reconfiguration approach that aims at reducing the operational cost. Various scenarios are presented to evaluate the performance of hourly reconfiguration as compared to other fixed configurations.

The obtained results show a relation between the reduction in daily energy loss and the following factors: the distribution of loads on network buses, the behavior of loads, the load factor (LF), and the diversity of loads in case of applying hourly reconfiguration.

Key words:

Hourly reconfiguration – Smart grid – Variation of loads – Load factor – Daily energy loss – Operational cost.

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