Multi-Agent Based Control Scheme for Electrical Distribution System Restoration

Walid Atef Hafez ElMetwally Omran ,Abdel Hafez and, Yasser G. Hegazy

Abstract

Continuity of the electric supply is considered one of the main power quality indices, and thus, it is essential to perform fast and efficient restoration of electricity following outages. However, this might not be always an easy task, especially in large distribution networks. In this paper, an efficient multi-agent based control scheme is introduced to restore the maximum possible out of service loads without violating any of the technical constraints of the electric network. The proposed scheme utilizes a number of agents distributed along the feeder to gather the necessary information and communicate it to the decision making agent at the faulted feeder head. The decision making agent first attempts to restore all the out of service loads through group restoration. However, if this is not possible due to violating any of the technical constrains, then the agent attempts to restore as much loads as possible through a zone restoration process. To validate the effectiveness of the proposed control scheme, two case studies are presented to show the group and zone restorations. The distribution system is simulated in the MATLAB environment to perform the required power flow calculations and provide the necessary information to the agents. On the other hand, the agents are implemented in JADE environment where the communication and decision making process occurs.

10th International Conference on Deregulated Electricity Market Issues in South Eastern Europe (DEMSEE 2015) 24-25 September 2015, Budapest, Hungary. 2015, September