

Master Thesis Proposal

Enhanced Service Restoration Algorithm for Active Distribution Grids

In case of fault on electrical distribution network, the protection system has to act in the minimum time possible to isolate the faulted area and allow the management of the grid according to safe operating conditions. Once the fault has been isolated, the next step is called “service restoration” and consists in reconnecting the customers and loads that are in de-energized state, by closing the normally open switches to reconnect them to the alive portion of the grid.

When critical situations occur, as multiple faults or continuous changes of the grid conditions over time, the Distribution Management System (DMS) has to apply sophisticated techniques to perform a reliable, efficient and quick service restoration.

Among many possibilities to restore a load, the choice of a specific restoration scheme depends on objective functions related to different criteria (e.g. the minimization of power losses or switching operations, the reduction of line utilization, etc.) that could conflict each other. The application of multiple-criteria decision making (MCDM) methods allow to solve this issue and to carry out the service restoration with the global optimal solution.

Objective of this thesis is the development of a service restoration algorithm that makes use of MCDM method in the computation process, the implementation and test with real time simulations considering different scenarios.

Your tasks:

- Review of existing approaches for service restoration and MCDM methods.
- Revise the existing service restoration algorithm, developed in our institute, to include the MCDM approach and additional features.
- Implement the algorithm in Python code.
- Test the algorithm with the Real Time Digital Simulator (RTDS), present in the institute laboratory, in different grid conditions.

Your profile:

- Student of electrical engineering at RWTH Aachen University.
- Basic knowledge of Python is beneficial or should be willing to learn it quickly.
- Fundamental knowledge about distribution power system.
- Experience with modelling and simulations is beneficial.

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