

Understanding active network management in 40 minutes

Damien Ernst (ULg)

May 31, 2013

In Europe, concern on the environmental impact of the electricity industry is currently driving the growth of renewable electricity generation through a class of financial support mechanisms. Such incentives have resulted in the ongoing installation of wind and solar generation resources at the distribution level of the electricity network. This development calls for the evolution of the distribution network planning and operational strategies in order to accommodate the energy inflow from such DG resources. The dominant doctrine for the distribution network planning and operation has been the fit and forget approach. Under this approach, enough investments in network components (i.e., lines, cables, transformers, etc.) must be made in order to always avoid congestion and voltage problems. To that end, network planning is made with respect to a set of critical scenarios consisting of DG production and demand levels. In this manner, sufficient operational margins are always ensured. Nevertheless, with the rapid growth of DG resources, the preservation of such conservative margins comes at continuously increasing network reinforcement costs.

In order to avoid prohibitively high network reinforcement costs, active network management (ANM) strategies have recently been proposed as alternatives to the fit and forget approach. The principle of ANM is to address congestion and voltage issues via short-term decision making policies, developed on the basis of the optimal power flow (OPF) problem formulation.

In this talk, I will describe in a detailed way active management solutions. More specifically:

1. I will show through examples how to state mathematically active network management problems.
2. I will discuss computational and technical challenges for implementing solutions to these problems.
3. I will (briefly) discuss the models of interaction between the different actors of the electrical industry that need to be implemented to accommodate the ANM solutions proposed for these examples.

Webpage: <http://www.montefiore.ulg.ac.be/~ernst/>