Call for Papers – IEEE Transactions on Smart Grid
Special section on
Distributed Control and Efficient Optimization Methods for Smart Grid

Smart grid proactively uses the state-of-the-art technologies in communications, computing, and control to improve efficiency, reliability, sustainability, and stability of the electrical grid. In particular, distribution networks are expected to undergo dramatic changes by incorporating a large number of sensors and thousands of controllable devices such as distributed generators, batteries and flexible loads. To be able to efficiently operate such complex large-scale systems, new sets of control and optimization tools should be developed. On a slow time scale, optimization theory plays a major role in solving various large-scale decision-making problems for future power transmission and distribution systems. Two main questions to be addressed are as follows: (i) how to design computational methods to handle fairly detailed power system models that often include continuous and discrete nonlinearities? (ii) how to design distributed computation techniques to shift the computation from a centralized platform to many computing devices? On a fast time scale, control theory aims to provide stability and robustness margins for the entire system in presence of uncertainty and stochasticity, and offer some optimality guarantee on the real-time behavior. Since centralized controllers often suffer from serious computation, communication and robustness issues for power systems with many controllable devices, distributed control is perhaps the only viable strategy for such systems. Four main questions to be addressed are as follows: (i) how to systematically design stabilizing, robust and high-performance distributed controllers for different parts of the grid? (ii) what underlying communication network of the designed distributed controller should be to achieve certain performance guarantees? (iii) how to coordinate among different distributed controllers used in the system (such as frequency and voltage controls in transmission networks and load controls in distribution networks), including the consideration of controllers for legacy equipment? (iv) how to replace time-consuming offline optimization algorithms with real-time distributed controllers in order to accelerate computation and improve robustness of the closed loop (e.g., solving a dynamic energy management problem via a dynamic online controller as opposed to an offline numerical algorithm)? We plan this special section to address the critical areas of distributed control and high-performance optimization techniques for smart grid. Survey papers are also welcome.

Submitted papers should study distributed control and/or optimization techniques for a major problem for smart grid (such as design, planning, operation, dynamic energy management, or incorporation of renewable energy). Topics of interest include, but are not limited to:

- Distributed control and computation
- Nonlinear optimization
- Large-scale optimization
- Design of communication networks to support distributed control/optimization

This special section solicits original work that is not under consideration for publication in other venues. Extended abstracts of up to two pages are requested for the first round of reviews. Authors of selected extended abstracts will be invited to submit full papers, of up to eight pages, in a second round of reviews. Prospective authors should refer to http://www.ieee-pes.org/publications/information-for-authors for guidelines on content and formatting of submissions. Please submit a PDF version of the extended abstract, including a cover letter with the authors' contact information, via e-mail to lavaei@berkeley.edu. Full papers should be submitted to: https://mc.manuscriptcentral.com/tsg-pes

Important Dates
- August 1st, 2016: Deadline for extended abstract submission
- September 1st, 2016: Decision notification for inviting full paper submissions
- November 1st, 2016: Deadline for full paper submission
- June 1st, 2017: Notification of final decisions
- July 1st, 2017: Publication materials due

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