## Secret-sharing in distributed power system optimization

The increasing development of the smart grid makes multi-party cooperative computation between several entities become a typical characteristic of modern energy systems, which brings in the concern of private information disclosure. Secure multi-party computation (SMPC) is a promising paradigm to tackle privacy issues in the collaborative optimization problem but suffers from the computational burden. In view of the pros and cons of SMPC, Nianfeng Tian et al. propose an SMPC-based distributed optimization framework for multi-party collaborative optimization problems in the power system. With Lagrangian relaxation algorithms and coordination layer, the proposed framework is essentially decentralized and maintains completely equal relationships among agents.
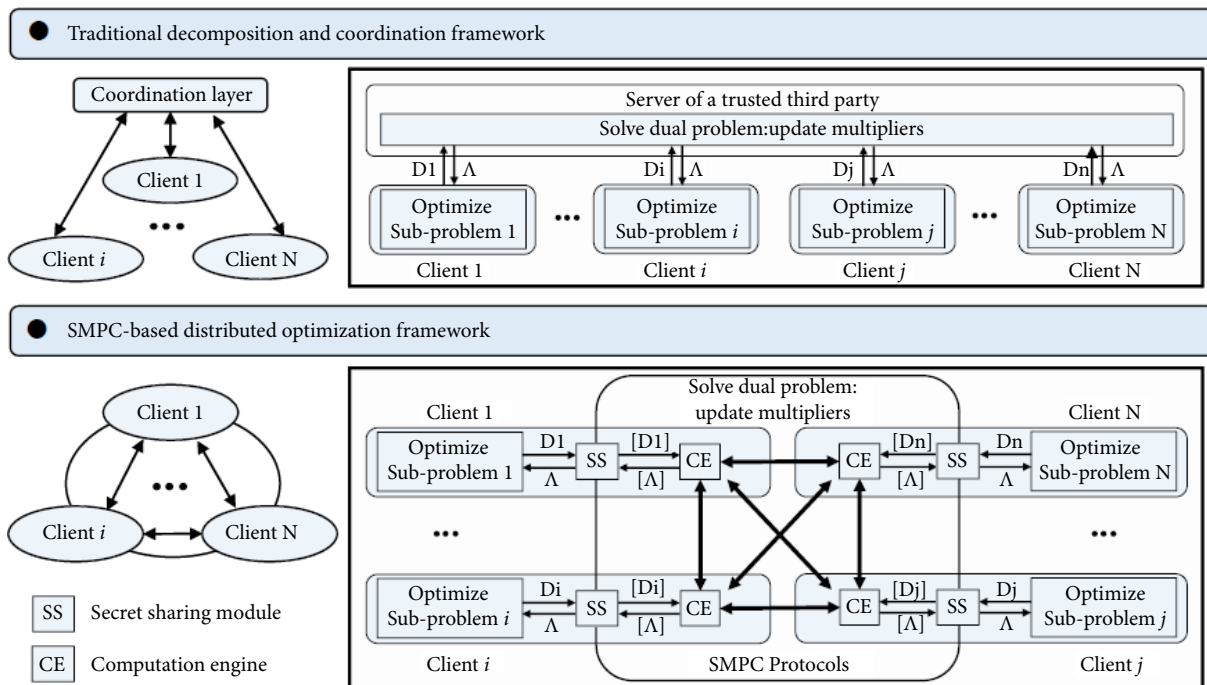
Fig. 1 Comparison on traditional hierarchical D&C framework and SMPC-based distributed optimization framework.

The multiarea economic dispatch (MADE) of the power system is an important collaborative optimization problem in the real world, which needs to be executed in a distributed manner while preserving the private information of subgrids. To this end, a case study based on MAED with test systems on small and large scales is conducted to verify the effectiveness and efficiency of the proposed framework. The results illustrated that the proposed framework can not only provide global optimal solutions, but also assure no disclosure of the private information of any agent and an acceptable increase in computational burden.

Haoyuan Deng[1] and Ershun Du[2✉]

[1]*Department of Electrical Engineering, Tsinghua University, Beijing, China;*
[2]*Low-Carbon Enegy Laboratory, Tsinghua University, Beijing, China*

✉*e-mail: duershun@tsinghua.edu.cn*