Challenges and Approaches for a Cyber-Physical Energy Infrastructure

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Abstract

The vision for a modernized energy delivery infrastructure involves the use of an advanced computing, communication and control cyber infrastructure for enhancing current grid operations by enabling timely interactions among a range of entities. The coupling between the energy system (e.g., power grid) and its cyber infrastructure is inherent, and the extent to which the entire system can be made resilient depends upon the functionality and robustness of the cyber infrastructure itself and its interaction with the physical parts of the system. This presentation describes the major challenges in achieving a resilient cyber-physical energy infrastructure, and illustrates progress made on these challenges by describing some of the research underway at the DOE- and DHS-funded Trustworthy Cyber Infrastructure for the Power Grid (TCIPG; www.tcipg.org) Center.

The goal of TCIPG is to provide resilience in the nation's electric grid cyber infrastructure such that it continues to deliver electricity and maintain critical operations even in the presence of cyber attacks. Achieving this goal will involve the extension, integration, design, and development of IT technologies imbibed with key properties of real-time availability, integrity, authentication and confidentiality. These results are being evaluated evaluated in a large-scale testbed with unique capabilities comprising real power system hardware and software as well as advanced simulation and emulation capabilities.

Biography

William H. Sanders is a Donald Biggar Willett Professor of Engineering, the Interim Head of the Department of Electrical and Computer Engineering, and the Director of the **Coordinated Science Laboratory** at the University of Illinois at Urbana-Champaign. He is a professor in the Department of Electrical and Computer Engineering and Affiliate Professor in the Department of Computer Science. He is a Fellow of the IEEE and the ACM, a past Chair of the IEEE Technical Committee on Fault-Tolerant Computing, and past Vice-Chair of the IFIP Working Group 10.4 on Dependable Computing. He was the founding Director of the **Information Trust Institute** at Illinois.

Dr. Sanders's research interests include secure and dependable computing and security and dependability metrics and evaluation, with a focus on critical infrastructures. He has published more than 200 technical papers in those areas. He is currently the Director and PI of the DOE/DHS Trustworthy Cyber Infrastructure for the Power Grid (**TCIPG**) Center, which is at the forefront of national efforts to make the U.S. power grid smart and resilient.