

Privacy and Security Challenges in the Smart Grid User Domain

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ABSTRACT

The term “smart grids” is used to describe the next-generation intelligent energy systems. Smart grids employ state-of-the-art information and communication technology to control generation, distribution and consumption of energy. With smart grids, the power network organization moves from a hierarchical to a decentralized structure and communication flow moves from largely uni-directional to bi-directional. The degree of information needed on network status is vastly more accurate compared to traditional power networks, and needs to be available in fine granularity in near real-time. The availability of such fine-grained data raises severe privacy concerns in the end-user domain. For example, the application of non-intrusive load monitoring techniques to high-resolution load profiles allows inferring details on user behavior such as presence, sleep-and-wake cycles and the brands of used appliances. Another challenge in the widespread adoption of smart grid technologies lies in the domain of security. Recent reports of smart meters that can easily be hacked and used to remotely control energy availability in the connected household have not helped to increase user trust.

In this talk, the main challenges in the area of smart grid privacy and security from an end-user perspective will be reviewed. At the example of smart metering, selected solutions will be discussed in detail, with a focal point on leveraging insights and methods from multimedia security to provide security and privacy in the smart grid user domain. These include signal processing in the encrypted domain / secure signal processing, homomorphic encryption, conditional access based on multi-resolution analysis, as well as watermarking techniques.

Categories and Subject Descriptors

K.4 [Computers and Society]: Privacy; E.3 [Data]: Data Encryption

Keywords

Smart Grids, Security, Privacy

Short Bio

Dominik Engel is a professor at the Salzburg University of Applied Sciences in Austria, where he heads the Josef Ressel Center for User-Centric Smart Grid Privacy, Security and Control. He holds a PhD degree in Computer Science from the University of Salzburg. Prior to joining Salzburg University of Applied Sciences, Dominik Engel was a researcher at the Universities of Bremen and Salzburg and product manager at Sony DADC, where he was responsible for video content security. His research interests include smart grid security, multimedia security and technological methods for enhancing end-user trust.

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