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Privacy-Preserving Power Usage and Supply Control in Smart Grid

Chun Hu, Kui Ren, and Wei Jiang*

Paper Highlights

This manuscript focuses on developing privacy-preserving technologies in a smart grid. In particular, the developed protocols enable power companies to intelligently control power usage and supply without leaking their customers and suppliers' private data. A preliminary version of this manuscript was published in DBsec 2015.

- Huchun, Kui Ren, and Wei Jiang. Outsourceable privacy-preserving power usage control in a smart grid. In Proceedings of 29th Annual WG 11.3 Conference on Data and Applications Security and Privacy (DBSec11), Fairfax, Virginia, USA, July 13-15 2015

In the current version, we revised the abstract and introduction, and developed a new privacy-preserving power supply control protocol that complements our early work. We also revised the empirical study section and added new experimental results to show the practicality of newly developed protocol.

Abstract

In a cyber-physical system, the control component plays an essential role to make the cyber and physical components work harmoniously together. When information collected from the physical space contains private or sensitive data that cannot be passed onto the cyber space, properly controlling the cyber-physical system becomes a very challenging task. For instance, the smart grid systems, a replacement for the traditional power grid systems, have been widely used in the industries. To prevent power shortage, threshold based power usage control (PUC) in a smart grid considers a situation where the utility company sets a threshold to control the total power usage or supply of a neighborhood. If the total power usage exceeds the threshold, either certain households need to reduce their power consumption or the utility company needs to buy

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