Smart Grids as an Opportunity for Establishing Privacy Mechanisms

Dr. Jens Strüker, M.A.

Albert-Ludwig University Freiburg, Germany
Smart grids mean hundreds of millions of new internet endpoints
- Electricity Meters
- Appliances, thermostats etc. (home automation)
- E-vehicles

Roll-out of smart meter infrastructures:
- Accurate readings at requested time intervals and interaction
- Political motivation: climate goals and job creation

Fine granular consumption data is necessary and desirable
- Load Management of the grid & integration of renewables
- Detailed energy bills and ‘flexible’ tariffs
- Competition between electricity suppliers
- Ecosystem of new energy services
„Big Data“ as Business Model for the Power Industry

- Billing service provider
- Meter operator
- Meter data management provider
- Demand respond aggregators
- Supplier as provider of additional value added services

Cloud-based management system

AMI, MDM

Utility or Smart Meter Operator, DNO, Retailer, Generator etc.

OPower

Teradata

IBM

SAP

Verizon

Centrica

Oracle

IBM

Toshiba

Siemens

Ecologic

E-Meter

Itron
Novel Data-based Business Models for Third Parties

- Rooftop solar panels
- Wind turbines
- Security console
- Home automation console or gateway
- E-Vehicle
- Appliances
- Thermostats

Broadband Internet Access
Privacy is the Achilles’ Heel of Smart Grids

- **Smart meter data = personal or person relatable data**
  - Detailed energy usage data reveals a wealth of personal information
  - Advanced Metering Infrastructure (AMI) facilitates the analysis of consumption data on an industrial scale
  - Numerous information extraction possibilities

- **Privacy threat:**
  - Energy use information can and will be repurposed by interested parties
  - EU: deregulated electricity markets mean many authorized actors and open markets
  - Financial incentive for mining and exploiting data
  - Law enforcement, government agencies, corporations from the IT and Telco sector and startups already are eyeing all that data

- **Information deficit in deregulated smart grids**
  - Consumers cannot control the use of their data
  - Stopped smart meter introduction in the Netherlands
# Smart Grid Privacy: Technological Solutions

## Privacy Approach | Selected References

|                | Distributed storage |
|                | Federal Office for Information Security, Protection Profile for the Gateway of a Smart Metering System, v01.01.01(final draft), http://goo.gl/ow5rL |
|                | Data minimization |
|                | Anonymization |
|                | Homomorphism |
|                | Obfuscation |
|                | Negotiation |

## Overview of privacy-technology approaches for the smart grid

- **All approaches**
  - reduce performance or
  - are ineffective in deregulated smart grids or
  - not future proof
- **Decision makers favor** *minimization, anonymization and aggregation* approaches:
  - smart meter protection profile in Germany
  - debate on the DCC in the UK
- **Wanted:** Usage control in a dynamic environment
Smart grids are an extension of the Internet

Because they are a critical infrastructure, some privacy mechanisms will be integrated

All EU member states will roll-out smart meter infrastructures

This is a big opportunity for establishing privacy mechanisms on a very large scale!

In deregulated electricity markets, communication intermediaries can play an important role