Smart meter security: a survey by Ross Anderson
Specialization Course in Distributed Systems

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Agenda

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Introduction
    Smart Meter

Prepayment
    Prepayment

Security Economics
    Smart Meter Fraud

Privacy

Architecture
    Differences in Europe
    Strategic Vulnerabilities
    Opportunities

Possible Solution

Introduction

- ► Overview

- ► Context

- ► Examples

Smart Meter

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- ▶ A device that records electricity, gas or water consumption in a household

South African Example
Prepayment

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- ▶ Why prepayment?
    - ▶ Poor households
    - ▶ Informal accommodation
- ▶ Parties
    - ▶ Eskom - state owned
    - ▶ Local electricity distributors
    - ▶ Token vending agents
    - ▶ Customers vendors
    - ▶ Equipment vendors
- ▶ Issues
    - ▶ Brownout
    - ▶ Token vending machines

South African Example
Security Economics

► Going from credit to prepayment resulted in 10% reduced energy usage
► Same in Northern Ireland, Russia and Brazil
► People care more about their usage because they have to go to the vending station and use their ATM card or cash
► Easy debt management - no court order, no replacement of meter

Smart Meter Fraud
General

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- ▶ Vulnerabilities will get industrialised
- ▶ The South African example shows this
- ▶ Fixing a bug is very expensive
- ▶ Replacing 100 million meters in Europe would take 5 years and cost $20bn

Smart Meter Data
Privacy issues

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- ▶ Smart meter data in Europe is recorded in fine granularity

- ▶ Extract personal information by analysing the meter data
    - ▶ How many live in the house?
    - ▶ When are they asleep?
    - ▶ Are they home at the moment?

- ▶ Home appliance vendors, burglars etc.

- ▶ Customer vs energy company owned data

Smart Meter Data
Who owns it?

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- ▶ Most countries move toward customer owned data

- ▶ The tussle is the granularity one should share

- ▶ Energy company: 48 readings per 24h

- ▶ Customer: Only enough for billing

- ▶ European Convention on Human Rights: European citizens have the right to respect for the privacy of their family life.

Differences in Europe

- ▶ Italy - monopoly
- ▶ Germany - a customer can choose an energy company
    - ▶ Company sets up smart meter
    - ▶ Disliked because fewer smart meters were sold
- ▶ United Kingdom - centralised system by a Data Communication Company
    - ▶ Same smart meter
    - ▶ Easy switch of energy company
    - ▶ Wash now or later - privacy, smart meter support
- ▶ When the wind blows in Germany
- ▶ There needs to be some sort of communication between the market and the smart meter

Centralised Metering System
Pros and cons

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- ► Used in the UK

- ► Avoid rolling out a truck to the customer

- ► When countries are in conflict - energy is a target

- ► Remote computer exploits, vulnerabilities:
  - ► Software upgrade
  - ► Tariff setting
  - ► Billing
  - ► API attacks
  - ► Applets

- ► General problem: Replacing hardware is expensive

Oppurtunities

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- ▶ Air-condition example

- ▶ Customer web-interface

- ▶ Control the data granularity and when devices are used

- ► Open Home Controller
- ► Apache server - A way for the customer to manage appliances
- ► The situation right now:

Questions