Conclusion and Future Work

Conclusion:
- Service-oriented architecture constructed in compliance to challenges and assumptions
- Meter data are stored in the HEMS at the residential consumer’s premise
- Data authorisation to ESCOs are controlled in the cloud using an extended version of the OAuth 2.0 protocol

Future Work:
- Design and implementation of algorithm in HEMS for extracting user behavior from meter data to present to the residential consumer
- Implementation and evaluation of negotiation protocol between the home agent and grid agent
- Implementation of authentication and authorisation service to comply to the smart grid ecosystem

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Motivation & Overview

- Residential sector in EU: 26.6% of the global energy consumption
- Internet-based companies sees an opportunity in being Energy Service Companies (ESCOs)
- Energy-aware services can generate a profitable market for stakeholders

Problem:
- Personal information can be extracted from the electric meter data
- Energy-aware services can generate a profitable market for stakeholders
- Residential sector in EU: 26.6% of the global energy consumption

Contribution:
- Service-oriented architecture that combines software agents and recent Internet-based technology with a privacy defense-in-depth approach

Assumptions & Adversary Model

- Home Energy Management System (HEMS) manufactures are benign
- Meter data obtained are legitimate and securely sent
- The authentication and authorisation service authorises only given the consumers’ consent
- DSO and ESCOs are considered honest-but-curious adversaries
- DSO gives the “best” price to the consumer based on the available information

System Model

Negotiation Protocol

Purpose:
- To exchange near real-time data from electric meters installed at the consumer’s premise through a negotiation protocol that protects the residential consumer’s privacy

Authentication & Authorisation

Overview:
- An extension to the OAuth 2.0 protocol that allows residential consumers, ESCOs and DSOs to authorise specific access to each other’s data through web tokens

Goals

Overarching goals:
- Minimising energy usage and cost for the residential consumer
- Optimising operation of the grid for the Distribution System Operator (DSO)

Consumer centricity means:
- Portability: The liberty for the consumers to choose their energy service provider for handling data storage and processing
- Privacy: The decision to choose the desired level of privacy and the control of the physical location where their data are stored
- Adaptability: The possibility to participate voluntarily in adapting their energy usage to more preferable times
- Opt-out: An easy way for opting out of the contract to the DSO and ESCO, if they do not want to participate
- Autonomy: A system that requires minimal of effort for participating

Conclusion and Future Work

Conclusion:
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