Smart meter controlling system for dynamic and non dynamic IP environments

Authors:
Pinrolinvic Manembeu
Angreine Kewo
Per Sieverts Nielsen
Xiufeng Liu
Brammy Welang
Aditya Lapu

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Agenda

- Introduction
- Problem statements
- Subscription-based data communication architecture (SCA)
- Evaluation
- Conclusions and future works
Introduction

- Residential customers want to improve their awareness of energy efficiency and have more control on energy usage than before.
- A smart metering system, called IntelligEnSia, has been developed in Indonesia since 2013 by taking into account the local constraints.
- Efficiency aspect.
Problems statement

- Existing work: The first approach is the naive architecture, which is a Local Area Network (LAN)-based
- A new solution is required to support the dynamic IP of residential customers

How to develop an architecture of smart meter controlling function with the dynamic IP addresses?
Subscription-based data communication architecture (SCA)

Figure 1. The naive data communication architecture

Figure 2. The proposed SCA
Subscription-based data communication architecture (SCA)

Figure 3. Data flow for monitoring and controlling
# Evaluation: Naive architecture vs SCA

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Naive architecture</th>
<th>SCA</th>
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<tbody>
<tr>
<td>Data Communication</td>
<td>LAN-based: Clients micro-controller and server are depending on static public IP</td>
<td>Static public IP is used only by IntelligEnSia server via domain, while it is not required anymore on the client side.</td>
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<tr>
<td>The impact to Data Analytics</td>
<td>There is no issue with data monitoring because the speed of data capturing is flexible. It may be adjusted based on needs, but the speed of sending data is influenced by other processes, for example, traffic of Internet connection is different in each area.</td>
<td>Similar</td>
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<tr>
<td>Secure and Safe Operation</td>
<td>The principal operation of the naive architecture and the proposed approach is the same. The naive architecture is limited to the simulation of several rooms with simple installation and it does not comply yet with Indonesian general rule of electricity installation (Peraturan Umum Instalasi Listrik - PUIL).</td>
<td>The installation of proposed approach is developed based on Indonesian general rule of electricity installation (Peraturan Umum Instalasi Listrik - PUIL).</td>
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<td>Current ICT Concept</td>
<td>IoT based and cloud computing concept</td>
<td>Similar</td>
</tr>
<tr>
<td>Integration Aspect</td>
<td>Less flexible</td>
<td>More flexible to be developed and integrated into various platforms because using web service: mobile and desktop platforms.</td>
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<td>Smart-Home Tech</td>
<td>LAN based, Limited to electricity as a final form of energy (Voltage and Current).</td>
<td>Internet based. Temperature as new input to the consumption of an electrical appliance. This addition sensor can be the comparison variable in prediction and online modeling</td>
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SCA current application and development

- Monitoring: Data analytics and modeling
SCA current application and development

- Control function
Conclusions

- Naive architectures usually require static IP addresses to establish the network communications and control as well.
- SCA provides the support for a dynamic IP environment and group controlling.
- SCA is more cost effective and flexible.
- The current SCA-J exchange status process is more efficient than SCA-X.
Future works

More emphasized on IoT concept and application into the system

Apply machine learning concept for predicting and energy saving solution

Support more actions than only ON/OFF for obtaining more usability
Thank you

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Meter Locations