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Brun, Adam; Detlefsen, Nina; Hansen, Christian Holmstedt; Boes, Alexander Boye; Nielsen, Per Sieverts

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Methodology for simple exchange of data between energy operators

By ADAM BRUN¹, NINA DETLEFSEN², CHRISTIAN HOLMSTEDT HANSEN², ALEXANDER BOYE BOES² and PER SIEVERTS NIELSEN³

¹ Aarhus School of Marine and Technical Engineering; ² Grøn Energi, Denmark;

³ Technical University of Denmark, Denmark.

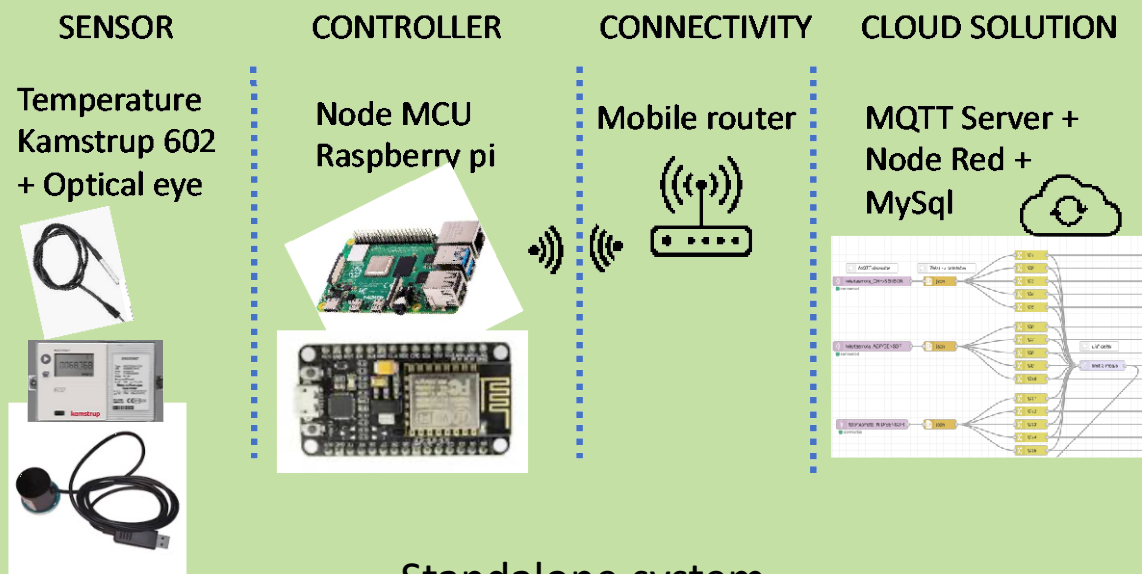
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Introduction

The energy sector is in the process of opening its vast databases for research and development purposes. This builds on top of more specific decentralized data exchange between a few specific operators, such as a district heating company and an energy trader/broker. The connection is typically based on a secured full two way “normal” internet connection. Such a connection can be challenging for smaller projects since the initial investment and operation cost demands a corresponding higher value creation. Furthermore, the thought of an “open” connection to the internet can challenge many decision-making processes. Better safe than sorry seems to dominate the decision making-process. This project suggests a simple way to share data between a district heating company and potential users of the data.

Autonomous data exchange

The flow and temperature sensors which are integrated into the existing energy meter in the house are used plus some additional temperature sensors. The data are read by a mini-computer. Data from the sensors are transmitted through a standard WiFi and 3G connection every 5 seconds. At the district heating company, two different connection options are used. Option One is totally decoupled from the existing system, with sensors and connectivity similar to the house system as shown in Figure 1. A simple MQTT-data exchange server with Node-Red editor serves as a data hub in the cloud. A simple MySQL database is used as storage.



Secure SCADA

Unsecure Internet

Integrated system



Modbus two-wire network

A



Standalone Modbus-MQTT converter

B



IoT PLC Modbus-MQTT

Secure data exchange - directly from SCADA

A second option is to use an old simple analog two-wire bus system (Modbus RTU) in the process. No virus can be transported by decoupling the devices that communicate through the internet from the devices on the SCADA system. The decoupling is using an old two-wire protocol that only communicates numerical values. This offers the advantage of transporting values into the SCADA system – enabling two-way communication. The disadvantage of using Modbus is slower data transmission - too slow for some applications. In the above, two different solutions are shown – a schneider plc to IoT-plc solution and a system with a dedicated modbus-to-mqtt converter from Adfweb.

Pricing	Cost
Temperature sensor	10 EUR
Optical eye	20-300 EUR*
Controller	20-40 EUR
Cloud	10 EUR / month
Connectivity	20 EUR / month
IoT-PLC + modem	500 EUR
Modbus-MQTT 3G converter	450 EUR

*The ir-eye is simple but highly specialized therefore priced very different by different suppliers

Discussion

With simple solutions, the price tag can be kept at a minimum. At the same time by using technologies that already are in use in the sector a scepticism towards an unknown Internet can be avoided. The idea is to make it almost cost and risk-free to start sharing data. In this way we initiate a movement towards a better understanding of the true value of data exchange.

The suggested technologies can be used as a first step towards a more sophisticated data exchange system based on faster and GDPR compliant systems.

Contact

Adam Brun (abr@aams.dk), Business developer, Aarhus School of Marine and Technical Engineering

Nina Detlefsen (NID@danskfjernvarme.dk), Chief Analyst, Grøn Energi

Christian Holmstedt Hansen (CHH@danskfjernvarme.dk), Analyst, Grøn Energi

Alexander Boye Boes (ABP@danskfjernvarme.dk), Technical Consultant, Grøn Energi

Per Sieverts Nielsen (pernn@dtu.dk), Senior Researcher, Department of Management at DTU, Technical University of Denmark

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