

Background

One of the objectives of EIGEN is to integrate smart charging of electric (logistics) vehicles into the energy management of the energy hub. For this, two routes are possible:

1. The charge points are controlled using the Open Charge Point Protocol from the back office of a Charge Point Operator (CPO) which is then connected to the EIGEN energy management system.
2. Charge points connected behind the meter to a building's local energy management system (Building Energy Management Systems, BEMS) which is then connected to the EIGEN energy management system.

This paper zooms in on the second route and describes which protocols could be used to connect charge points to a BEMS.

The choice between the two routes is related to the choice of location for the pilot: if it is a charging point in the public space with its own grid connection, only route 1 is possible; for a private charging point, both routes are possible.

What is a BEMS?

A BEMS is often software (and possibly hardware) to monitor and control the energy needs of the building. Besides energy management, the system can also control and monitor many other aspects of the building, regardless of whether it is a residential or commercial building. Examples of these functions include heating, ventilation and air conditioning (HVAC), lighting or security measures. BEMS technology can be used in both residential and commercial buildings.

Which BEMSs are common?

Siemens

Bosch

KNX

PRIVA

Which protocols are common in (B)EMSs?

Lonworks

LonWorks or Local Operating Network is an open standard (ISO/IEC 14908) for networking platforms created specifically to meet the needs of control applications. The platform is based on a protocol created by Echelon Corporation for networking devices over media such as twisted pair, power lines, fibre and RF. It is used to automate various functions within buildings such as lighting and HVAC.

Bacnet

BACnet is a data communication protocol for building automation systems and stands for Building Automation and Control Network. It is an ASHRAE, ANSI and ISO standardised protocol. The formal standard is ASHRAE/ANSI Standard 135 or ISO 16484-5. BACnet is, as they say themselves, the only truly open standard for building control systems set up by a consortium of end-users and manufacturers of building control systems.

The more than 500-page protocol specification is a detailed description of how a BACnet system should operate. It describes all the rules needed for systems to exchange data with each other, how this is done, the communication media that can be used, the services available and information on how to interpret the data. In short, it contains the basic rules for different systems to communicate openly with each other, independent of manufacturer.

KNX

KNX is a worldwide standard for home and building automation. It provides energy efficiency by controlling heating/cooling and lighting. KNX is an OSI layer-based communication standard for building automation. The KNX standard is managed, developed and promoted by the KNX Association founded in 1999. The development of KNX is under the responsibility of a technical board that has a number of working groups per topic (extensions to the standard, certification, etc.). KNX used to be mainly intended for the commercial sector, but nowadays it is also used in many homes.

EEBus

The EEBus SPINE (Smart Premises Interoperable Neutral-Message Exchange) protocol was developed by the EEBus Initiative e.V.; a non-profit organisation with manufacturers from the sectors of networked building technology, electromobility and energy. The protocol allows information to be exchanged to coordinate and shift energy between an intelligent power grid and individual components in households and buildings, e.g. photovoltaic system, battery storage, heating and electric vehicles.

ECHONET

The ECHONET Lite protocol was developed by the ECHONET Consortium, which was founded in Japan in 1997. It currently has more than 170 members. Based on its membership list, it seems to be mainly used in Japan. The communication protocol was developed for the "smart homes of the future". It was developed because of a growing demand for controlling devices in the home and for monitoring electricity consumption, for example. It started as a voluntary organisation, but became a general association with legal personality in 2014. The protocol is made up of several documents, containing the architecture, specifications for message format, protocol processing, start-up sequence, etc. specifications and detailed specifications of ECHONET device objects.

Modbus

The Modbus protocol is a message structure developed by Modicon (Schneider Electric) in 1979. It is used to establish master-slave/client-server communication between different devices connected to the same network. It is a request/reply protocol. A device makes services available via Modbus registers and function codes. Function codes are predefined (e.g. 2 bytes read from register 10000). Registers are free to be filled in by the manufacturer.

S2

The S2 protocol (EN50491-12-2) was developed by TNO and is managed and promoted by the Flexible power Alliance Network (FAN), in which about 15 participants with specific knowledge and various market connections work together. With S2, it is possible to control multiple smart appliances (heating, air conditioning, solar panels and EVs).

Which controllable devices?

- EV charging points
- Air conditioners (HVAC)
- Heat pumps
- Climate systems / air treatment
- Storage batteries
- Solar panels
- Etc.