Module 3: Reducing the energy consumption of a residential building with a smart home system

Information Smart-Home-Systems

Below you will find an overview of the most important components of a smart home system and a short description of how this system works.

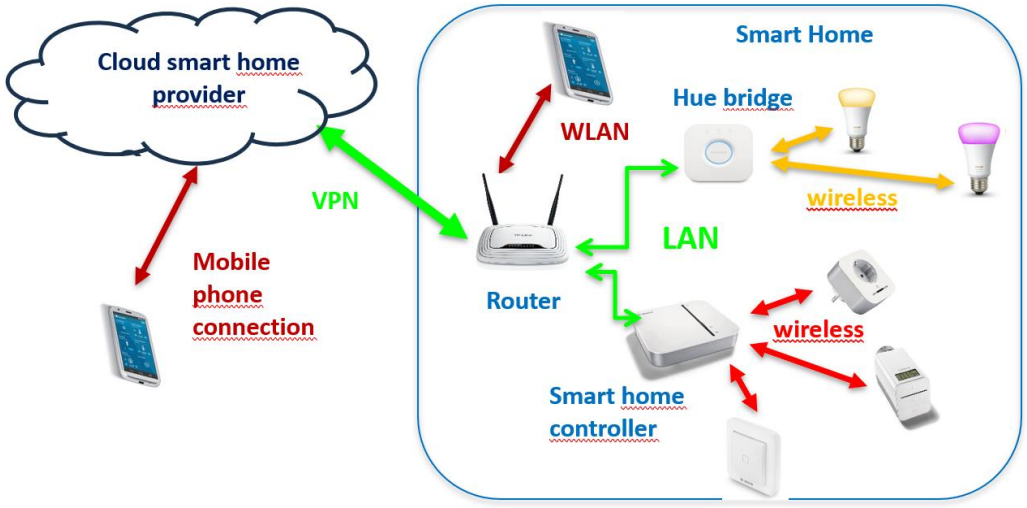
Smart home systems are offered by various providers and can usually be easily retrofitted by replacing existing components in an electrical installation. (e.g. replacing changeover switches then with smart switches or replacing conventional light sources with smart light sources). Operation can be carried out as before via switches or additionally via an app on a mobile device or through previously programmed automation.

In addition to the range of functions and compatibility, the storage location of the data differs between the systems of the various providers. This can be stored either in the smart home controller or in the provider's cloud.

A smart home system always consists of a controller, sensors and actuators and an operating and programming unit. Programming the smart home controller determines which sensor controls which actuator and when. The controller is usually programmed using an app on a smartphone or tablet.

Communication between the controller and smart switches, lights, presence detectors, etc. takes place wirelessly via radio, while communication between the controller and the provider's cloud takes place via the Internet.

Communication between the app on a mobile device and the smart home controller takes place within an apartment or house via Wi-Fi. Access from outside is via the mobile network to a server in the provider's cloud and from there via a VPN internet connection to the customer's router (see graphic).



Communication between Smart Home Components and mobile devices. Drawing: M. Sorger

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Note:

Smart home components from different manufacturers are only partially compatible with each other. This must be considered when planning a smart home system. Some manufacturers enable cross-manufacturer communication via so-called “bridges. The bridge function can be implemented as a separate bridge or as part of the smart home controller.

Cross-manufacturer standards have been developed and are in the introductory phase, e.g. “Matter”.

Further information can be found in the manufacturers' technical specifications.

Components of a Smart-Home-Systems

Basically required are:

- Smart-Home-Controller
- Internet access to the provider`s cloud and Wi-Fi for in-house communication with the apps on mobile devices
- Smartphone or Tablet with manufacturer apps for operation and programming

Optional:

- With some providers: Touch screen permanently installed in the home for programming and operation

Heating controll

Minimum equipment:

- Smart radiator thermostat (replacement for the conventional thermostatic valves on the radiators)
- Door / window contact (reed contact for monitoring a window for opening)

Optional:

- Presence detector
- A wall thermostat or a room thermostat (only offered by some manufacturers)
- Controller for underfloor heating (only offered by some manufacturers)

Light controll

- Smart light sources (dimmable, color and color temperature adjustable)
- Smart switches (switching operations by manual operation on site or via app or via programmed scenarios, e.g. time control or coupling with presence detector)
- Smart dimmers (dimming of lamps by manual operation on site or via app or via programmed scenarios, e.g. time control or coupling with presence detector)
- Presence detectors
- Switchable sockets (e.g. for switching floor lamps with conventional light sources)

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Roller shutter controls and blind controls

- Smart switches (switching operations by manual operation on site or via app or via programmed scenarios, e.g. time control)
- Sensors for wind speed
- Sensors for brightness

Security technology

- Presence detector
- Window and door contacts
- Smoke detectors
- CO_2 detectors
- Sirens (usually integrated into smoke detectors)
- Video cameras (indoor and outdoor)

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