Smart Home im Passivhaus

Smart-SARAH

Haussteuerung mit Freier Software und Open Hardware

17/03/14

http://osdomotics.com

Internet of Things

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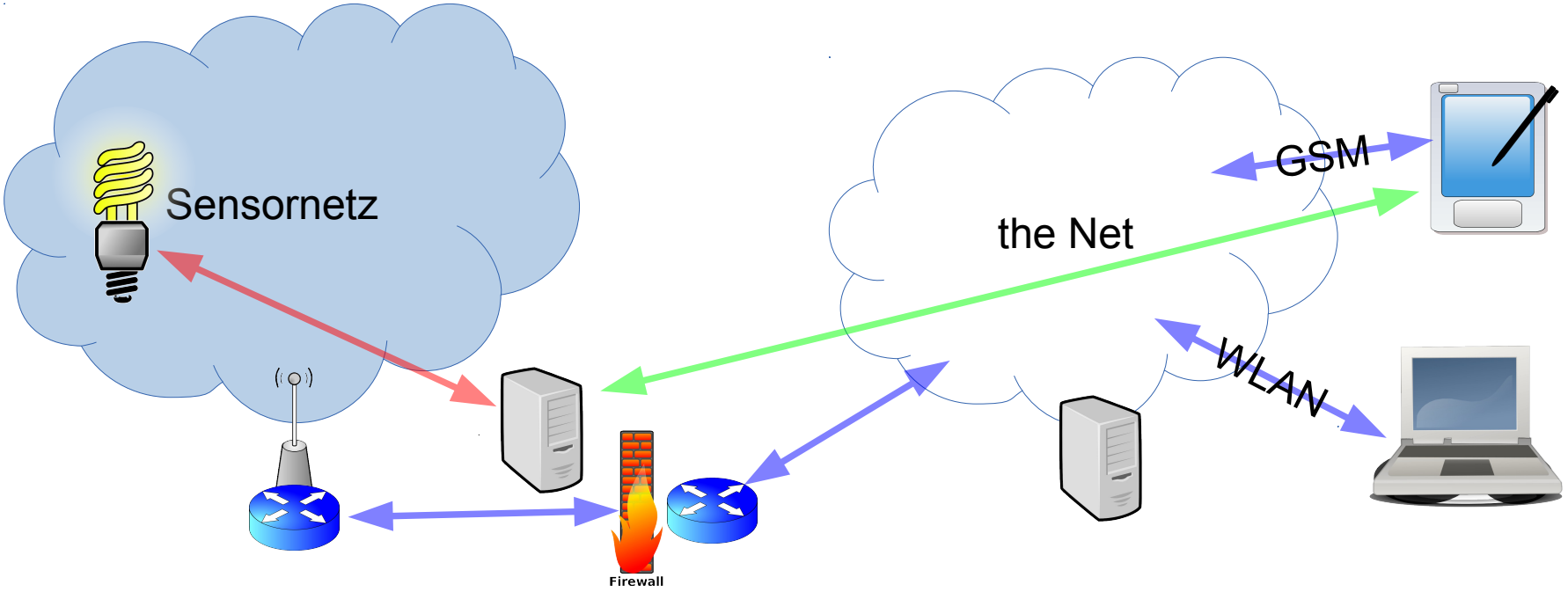

Ein einfaches Beispiel

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Smart Home

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- Sensoren

  Temperatur, Feuchte, Leckage, ...

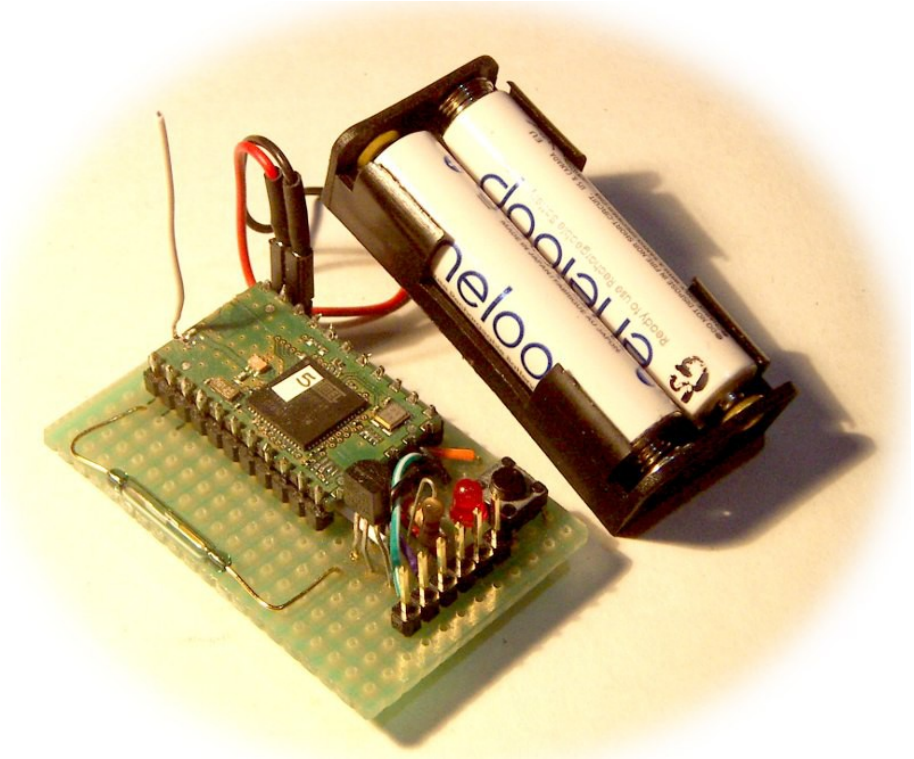
- Aktuatoren

  Licht, Steckdosen, Ventile, Rolläden, ...

- Steuerung

  Zentraleinheit, Fernzugang, Automatisierung, ...

- Sicherheit



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Protokolle

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„The protocol wars are over“* - are they?

- Transport: Zigbee, zWave, FS20, 6LoWPAN
- Application: KNX/Instabus, Modbus, Lonworks, OPC …

- (fast) jeder Hersteller bietet sein eigenes (proprietäres) Protokoll
- “Standards” sind nicht kompatibel
- Manche haben proprietäre, nicht veröffentlichte “Sicherheitsfeatures”

* (Craig Hunt, „TCP/IP Administration“, O´Reilly 1992)

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Smart-SARAH Definition

Smart-SARAH is a proposed reference implementation for home automation systems, defined by the OpenSourceDomotics Group.

It contains all aspects from the user interface down to the low level hardware layout of example devices. The entire design is based on freely available standards:

- OpenSource Software for firmware, low level interfaces, middleware and user interface
- OpenHardware making reference implementations freely available
- Internet standard protocols regulate communication

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Smart-Sarah by Layer

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OSI Layer	Smart-SARAH	Comment
7 - application	KnxWeb	Web based GUI
6 - presentation	Linknx / OpenHAB	
5 - session	CoAP	Restful services
4 - transport	UDP	Low overhead
3 - network	IPv6	End to end communication, including encryprion/authentication
2 - data link	6LoWPAN	Low power radio
1 - physical	IEEE 802.15.4	2.4 GHz wireless communication

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Protokolle: 6LoWPAN

- IPv6 Low power Personal Area Network (RFC 4919)
- Als Nachfolger von Zigbee gestartet (aka “Zigbee 2.0”)
- basiert auf IEEE 802.15.4
- drahtlos (868 MHz, 2.4 GHz) oder über industrial Powerline
- Features: ad hoc Netze, Headercompression, Encryption ...
- End zu End Kommunikation und Verschlüsselung von IPv6 (IPSec)

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Protokolle: CoAP

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Constrained Application Protocol
(IETF Draft http://datatracker.ietf.org/wg/core/)

- REST-full services via UDP
  (GET, PUT, PASTE, DELETE)
- URI ↔ resource matching
  (`coap://node3.6lowpan.smekal.at:5683/sensors/button`)
- Ressources können “observed” werden
- geringe Nachrichtengröße (Header-Felder 1-4 Bit)
- Encryption/Authentication

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Routing

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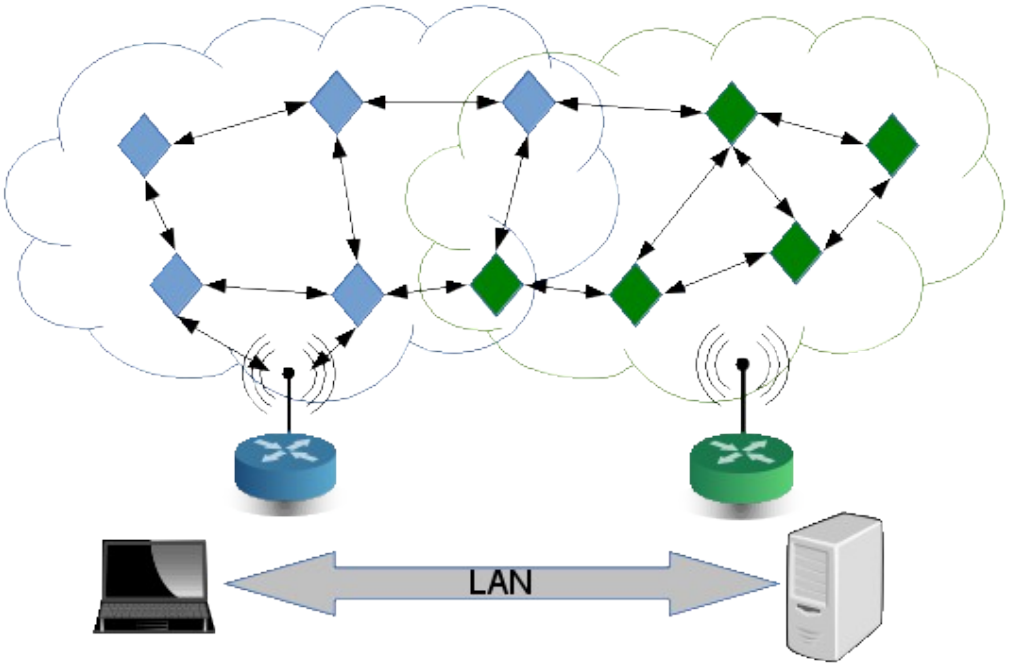
- Mesh Routing
  - Knoten finden einander
  - Reichweiten werden überbrückt
  - mehrere Edge-Knoten möglich
- RIPng
  - Dynamisches Routing zwischen Funknetzen
- Globales Routing möglich dank IPv6



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Routing: RPL

IPv6 Routing Protocol for Low-Power and Lossy Networks (RFC 6550)

- optimiert für kleine Knoten und geringen Stromverbrauch
- Kann hohe Verlustraten und häufige Änderungen der Topologie kompensieren
- Distance Vector Routing
- Knoten verteilen Routen über Broadcasts
- lange Schlafzyklen möglich

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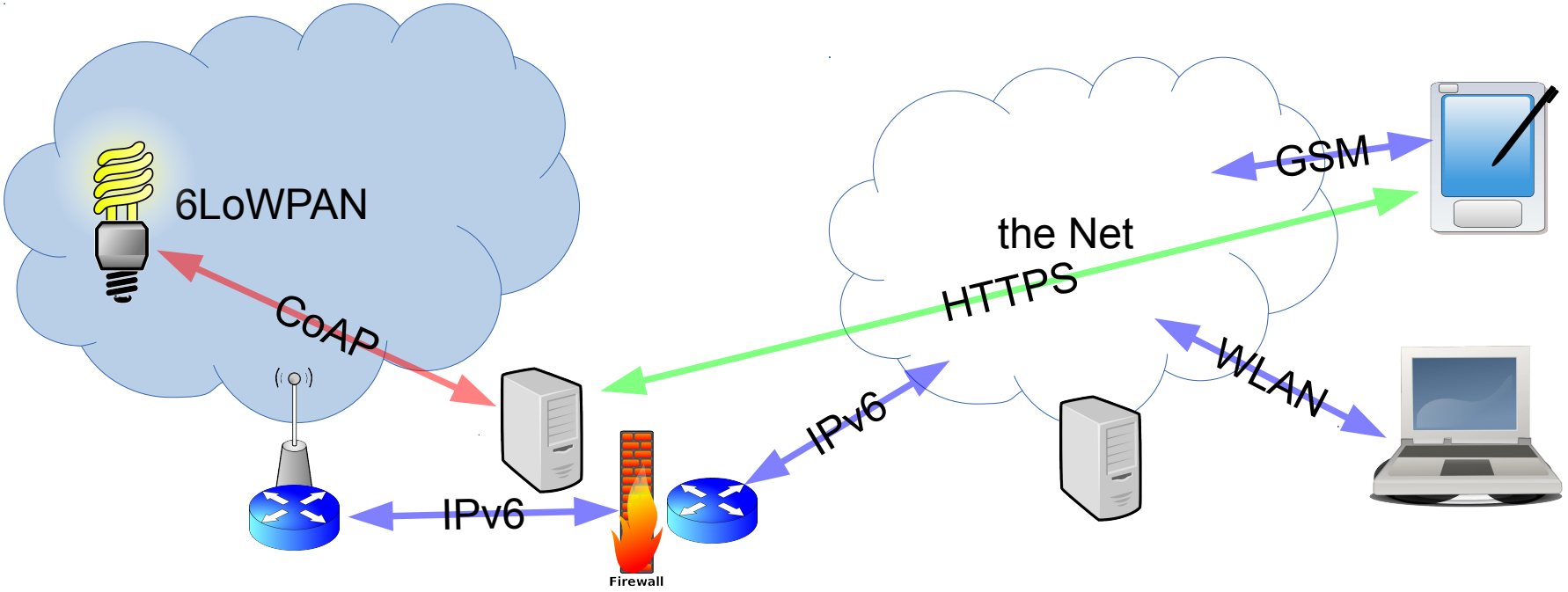
Internet of Things



Ein vertrautes Bild?