

SmartSarah

Mit freien Standards zum Smarthome



opensource**domotics**

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Opensource Domotics



SmartSarah

by Opensource Domotics

- ▶ vollständiges proof-of-concept System
- ▶ standardkonform
- ▶ offen von Hardware bis GUI
- ▶ IP-basiert



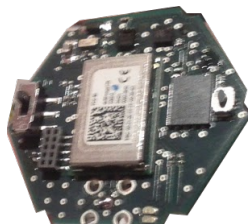
Übersicht

- ▶ Wo, Was und Wieso überhaupt?
- ▶ physische Übertragung
- ▶ IPv6/UDP
- ▶ 6LoWPAN & ROLL
- ▶ CoAP
- ▶ Steuerungsoberflächen
- ▶ Migration
- ▶ Status Quo
- ▶ Demo



Anwendungsfälle

- ▶ Haussteuerung
- ▶ Industriesensorik
- ▶ Bedarfs- und Lagermanagement
- ▶ Agrarbereich
- ▶ Gesundheitsbereich
- ▶ ...



Anforderungen

- ▶ energieeffizient
- ▶ skalierbar
- ▶ erweiterbar
- ▶ robust
- ▶ möglichst einfache Installation



Freie Standards

Definition

EU/FSFE Definition

1. vollständig öffentlichen Bewertung und Nutzung
2. ohne unfreie Erweiterungen
3. frei von einschränkenden Klauseln
4. unabhängig von einzelnen Anbieter
5. verschiedene vollständigen Implementierungen



Freie Standards

Wieso IP, etc

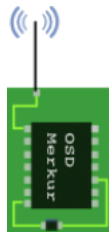
- ▶ langlebig
- ▶ kein Vendor lock-in
- ▶ kurze Einarbeitungszeit
- ▶ direkte Kommunikation
- ▶ ...



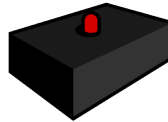
IEEE 802.15.4

physical layer

- ▶ Funk
- ▶ lowpower
- ▶ geringe Bandbreite



- ▶ genügend Adressen
- ▶ automatische Konfiguration
- ▶ Präfix
- ▶ mobility
- ▶ ...



IPv6-Header

großes Problem?

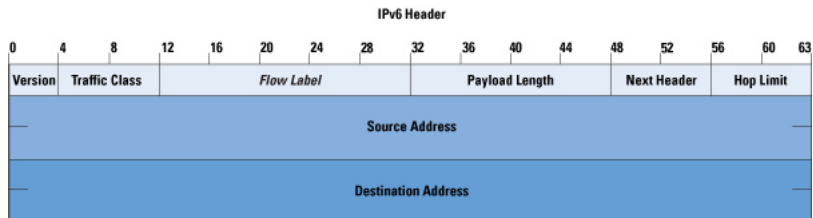
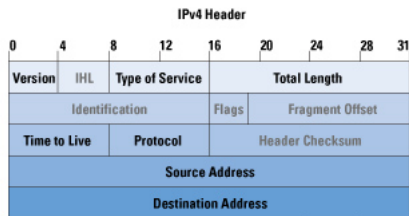


Image source: Bino1000, Mkim (Wikipedia) GFDL

UDP

kompakt genug?

- ▶ kompakt
- ▶ einfach
- ▶ fire-and-forget
- ▶ stateless
- ▶ robust bei "lossy networks"

Aufbau

Quell-Port — Ziel-Port — Länge — Prüfsumme — Daten

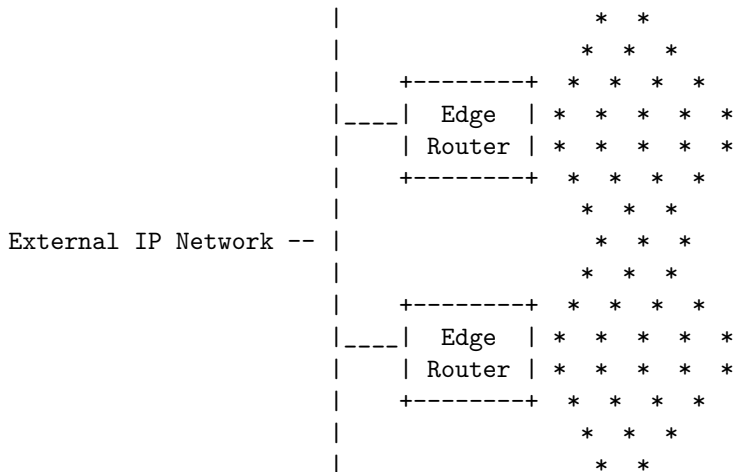
6LoWPAN

Features

- ▶ IPv6 über 802.15.4 (und andere)
- ▶ header compression (120byte payload)
- ▶ minimaler CPU-/Speicherbedarf
- ▶ stateless header compression
- ▶ 16-bit Adresse oder MAC
- ▶ neighbourhood discovery
- ▶ kein always-on notwendig = viel schlafen
- ▶ ZigBee

6LoWPAN

Network: RFC



*: LoWPAN Node



6LoWPAN

Network

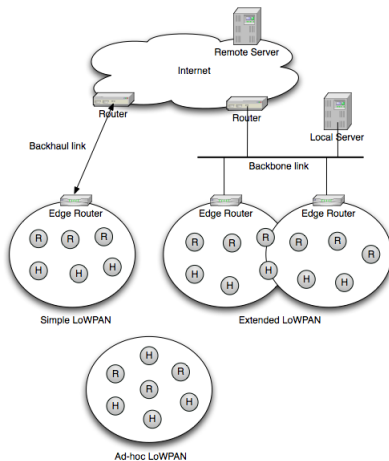


Image: Shelby & Bormann (CC by-nc-sa)
6LoWPAN: The Wireless Embedded Internet

ROLL

Find your way

- ▶ Routing Over Low power and Lossy networks
- ▶ Meshing
- ▶ ...



Application Layer

Don't bother me with lowlevel stuff



- ▶ schlank
- ▶ restful
- ▶ Confirmable (CON)
- ▶ Non-confirmable (NON)

Beispiel

CON [0xbc90] — GET /temp — (Token 0x71)

ACK [0xbc90] — 2.05 Content — (Token 0x71) — "22.5 C"

SenML

Media Types for Sensor Markup Language

- ▶ unter 80byte
- ▶ Mehrfachmessungen
- ▶ draft expired?

Beispiel

```
{"e": [ "n": "urn:dev:ow:10e2073a01080063", "v": 22.5, "u": "Cel" ] }
```

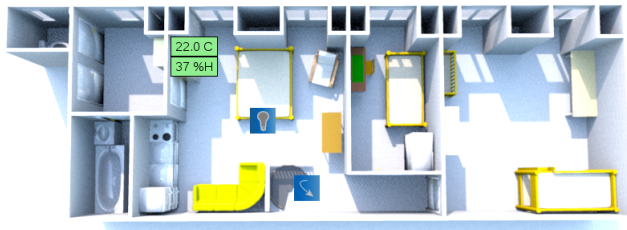
Security

- ▶ 802.15.4 AES link encryption
- ▶ IPsec
- ▶ Application layer



GUI

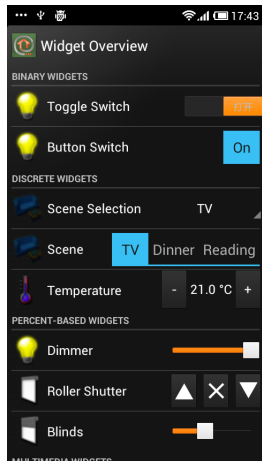
LinKNX/WebKNX



GUI

OpenHAB

- ▶ Java
- ▶ viele Backends
- ▶ Smartphonetauglich



Kontinuierliche Migration

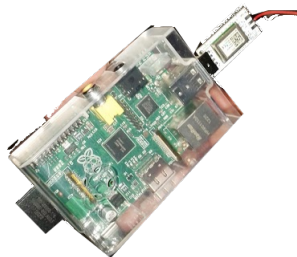
Zusammenarbeit unterschiedlicher Systeme

- ▶ Sofortiges komplettes Ablösen bestehender Systeme selten möglich
- ▶ Schritt-zu-Schritt Umstellung
- ▶ OpenHAB, LinKNX, ...
- ▶ erhöhte Latenz etc berücksichtigen

Status Quo

Hardware

- ▶ Arduino-kompatibel
- ▶ Edge-Router/USB-Dongle
- ▶ Merkur Board,
Experimentierboard
- ▶ Steckdosen
- ▶ Lichtaktor
- ▶ Temperatursensor
- ▶ Lern-Roboter
- ▶ ...



Status Quo

Software

- ▶ Contiki
- ▶ Copper (Firefox)
- ▶ libcoap/cli
- ▶ OpenHAB Anbindung [Peter Schleinzer / smarter-home.at]
- ▶ EmbedVM [clifford.at]

Status Quo

EmbedVM

- ▶ Mini-VM für Microcontroller
- ▶ embedded Code in C-like/Python
- ▶ over-the-air update möglich

Live-Demo

Showtime



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opensource**domotics**

<http://www.osdomotics.com>

Danke für ihre Aufmerksamkeit