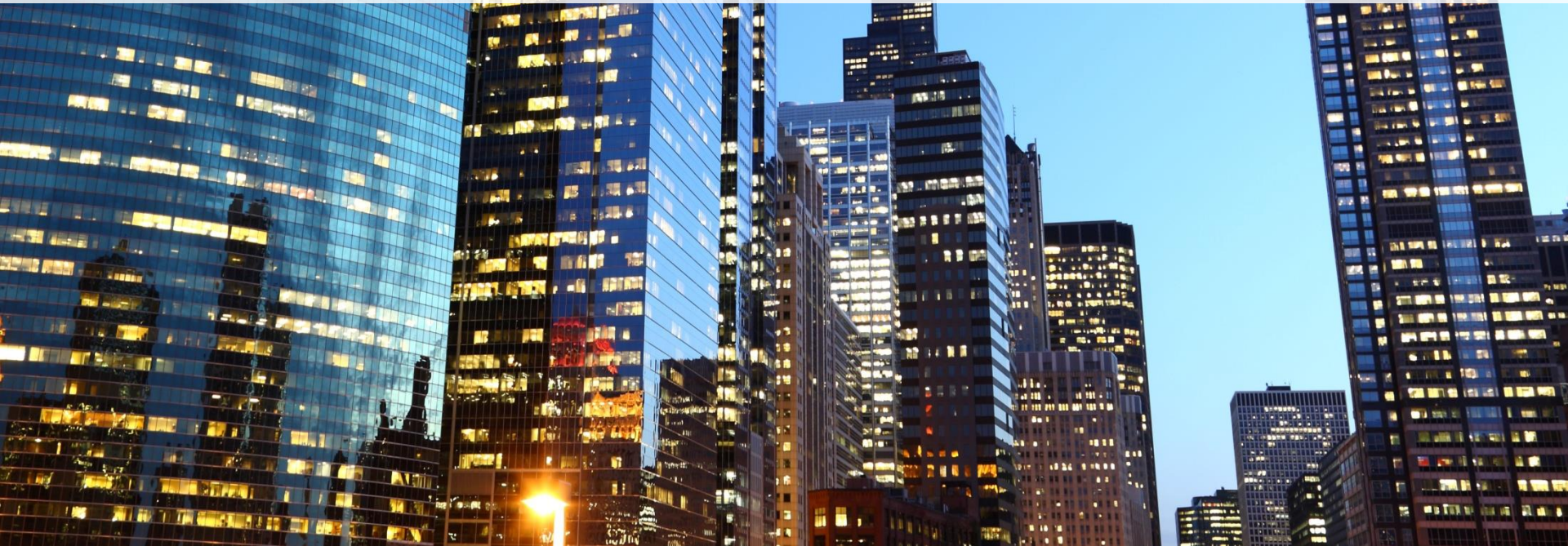
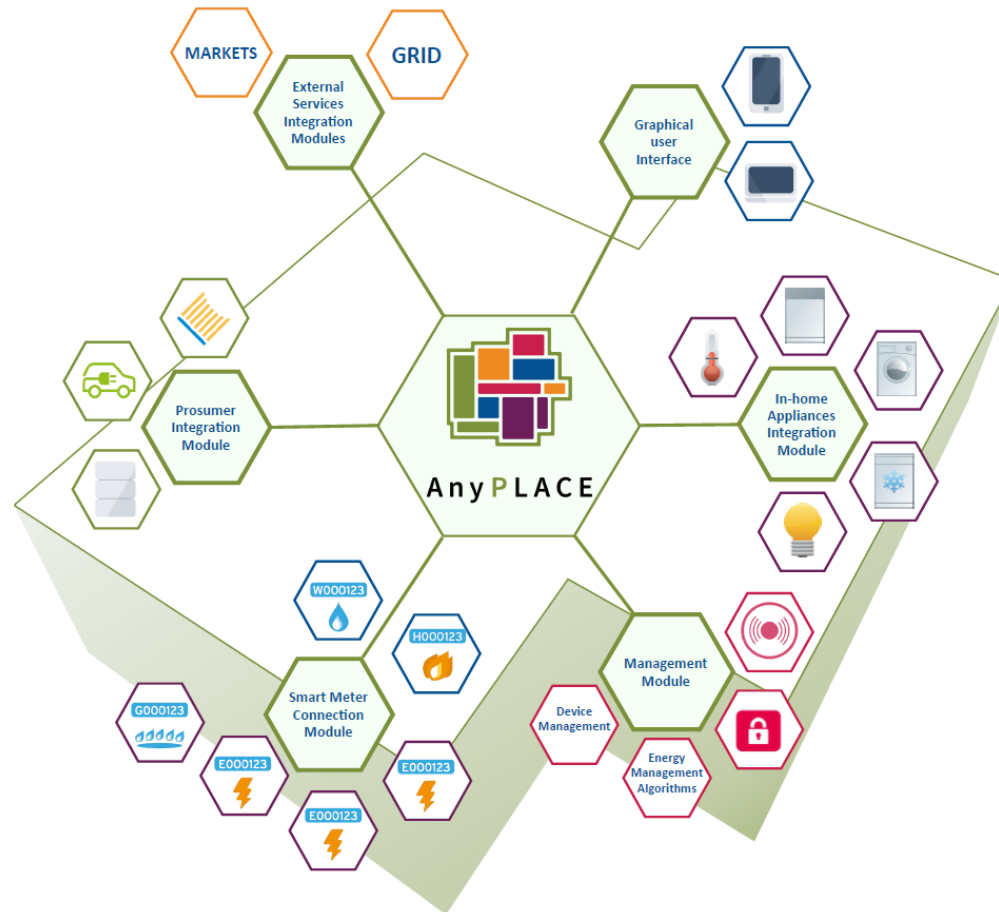


Verwendung der sicheren BSI Smart Metering Infrastruktur für Anwendungen aus der Wohnungswirtschaft und gewerbliche Liegenschaften

Christian Freudenmann, Dominik Henneke
PPC, 09.11.2017, Smart Energy 2017, Dortmund



AnyPLACE Project Overview



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646580.

Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

BSI Smart Metering Infrastructure

HAN: Three logical interfaces

Connecting Smart Home Systems

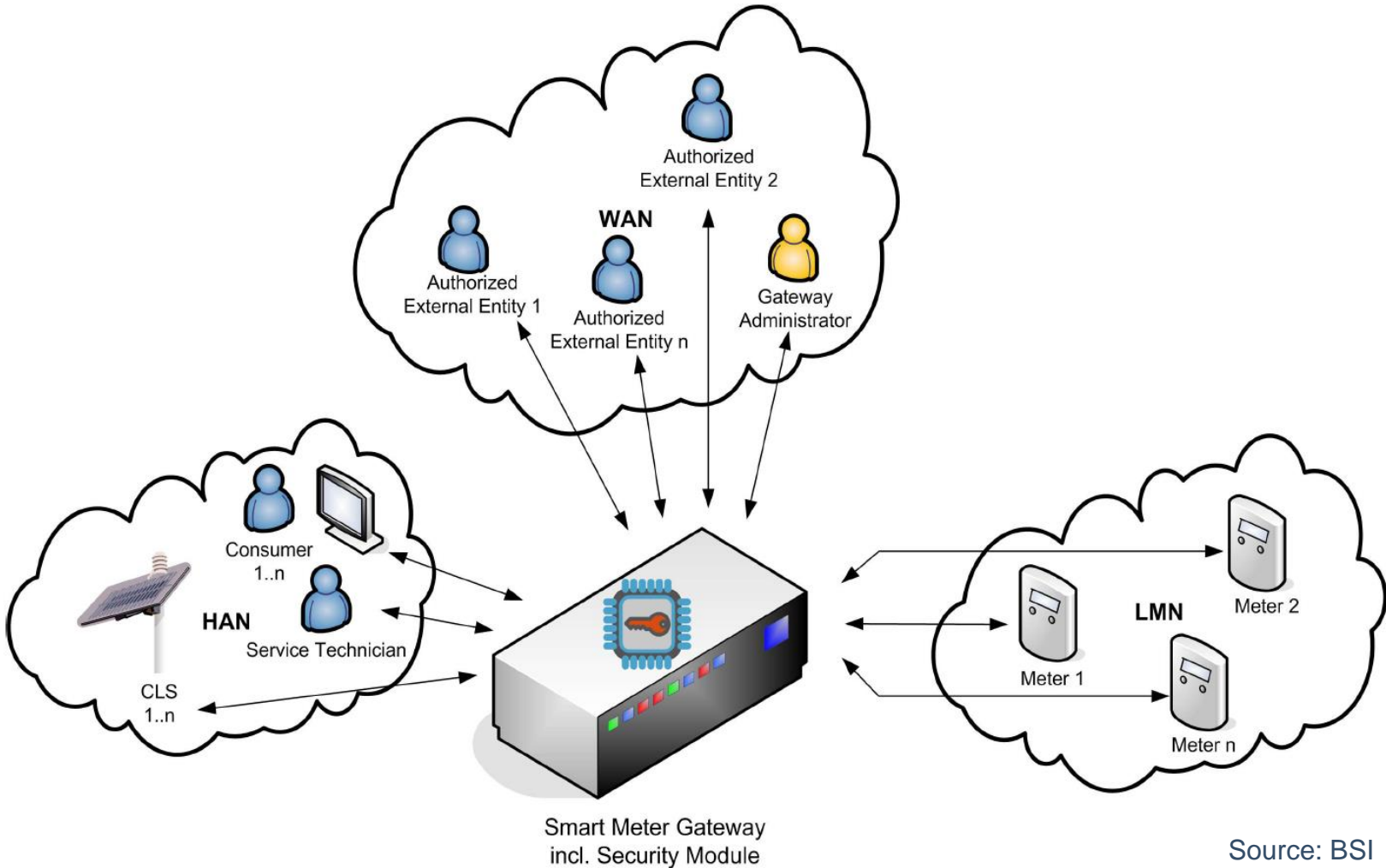
Implementation Example

Consumer Interface Binding

CLS Interface Binding

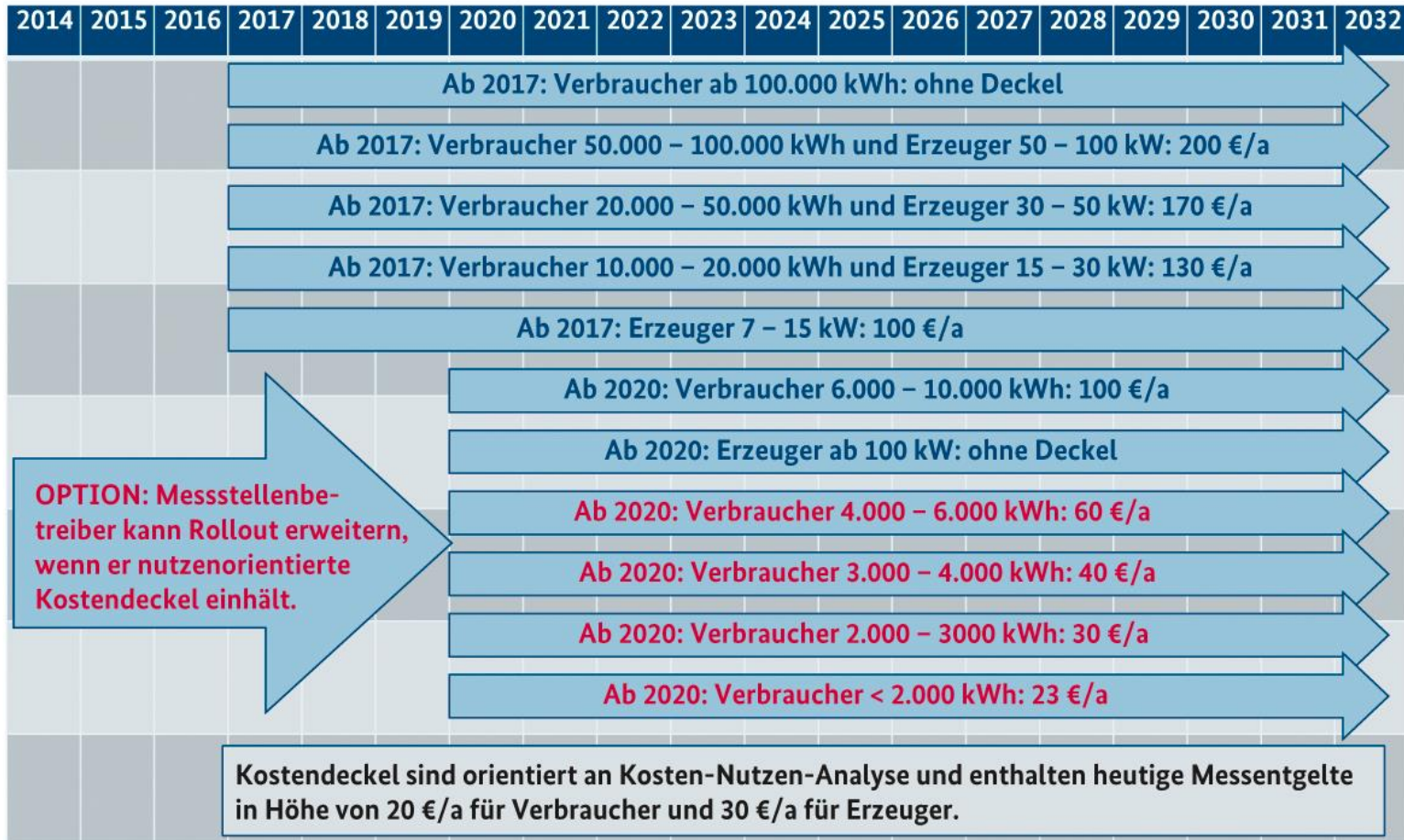
Conclusion & Next Steps

BSI Smart Metering Infrastructure Overview



Source: BSI

BSI Smart Metering Infrastructure Rollout Plan



Source: BMWi

The Smart Meter Gateway is developed to be an external communication gateway for communication between end-user devices, Meters and the Wide Area Network.

Major characteristics:

- Enabled to connect several meters of different energies of different households to the same gateway while ensuring data privacy
- End-User interface to enable access to meter data and device information
- Four tariff schemes implemented
- Proxy functionality implemented for secure connection of external entities and controllable local systems (CLS functionality)
- Modularity in WAN communication technologies
- IPv4/IPv6



BSI Smart Metering Infrastructure

Modularity in WAN communication technologies

ETH
SMGW



CDMA450
SMGW



BPL
SMGW



LTE/GPRS
SMGW



Anwendungen

Ihre smarten Lösungen für Kunden und Liegenschaften



CLS/HAN
Integration & Lösungen

LMN
Integration

Smart Meter Gateways

Ihr SMGW Spezialist für alle Telekommunikationsnetze

GPRS/LTE
CDMA450



IPv4/6
Netzwerk

Kommunikation

Das passende WAN für Ihre Strategie

öffentliche/private
Mobilfunknetze

Hybridnetze
LTE-BPL

privates BPL Netz

Hybridnetze
Festnetz-BPL

öffentliches Festnetz
Fiber, DSL, CATV

BPL

IPv4/6
Meshed
Netzwerk

Ethernet

IPv4/6
Netzwerk

GWA, EMT & Netzwerk Management

Wir integrieren Backend Systeme



BACKEND
Integration

Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

BSI Smart Metering Infrastructure

HAN: Three logical interfaces

Connecting Smart Home Systems

Implementation Example

Consumer Interface Binding

CLS Interface Binding

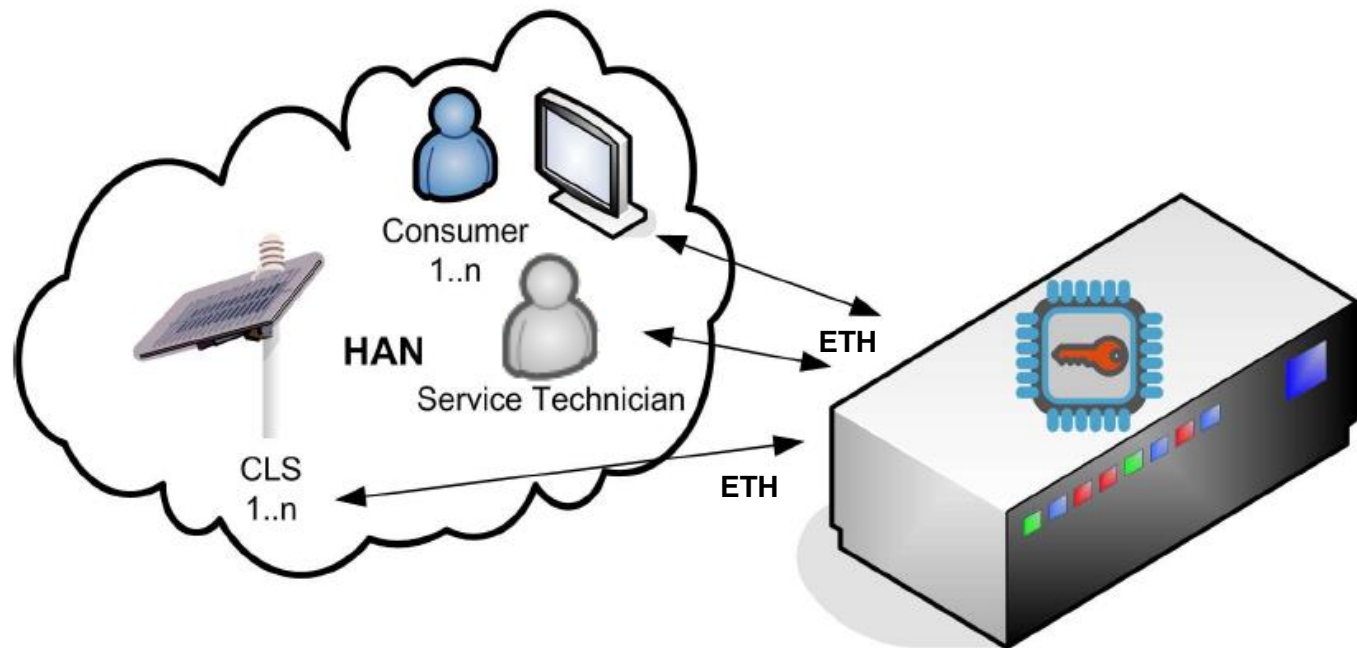
Conclusion & Next Steps

Functionalities of the HAN interface

Overview

HAN - Three logical interfaces:

- Consumer interface (IF_GW_CON)
- Service technician interface (IF_GW_SRV)
- CLS interface (IF_GW_CLS)



Source: BSI

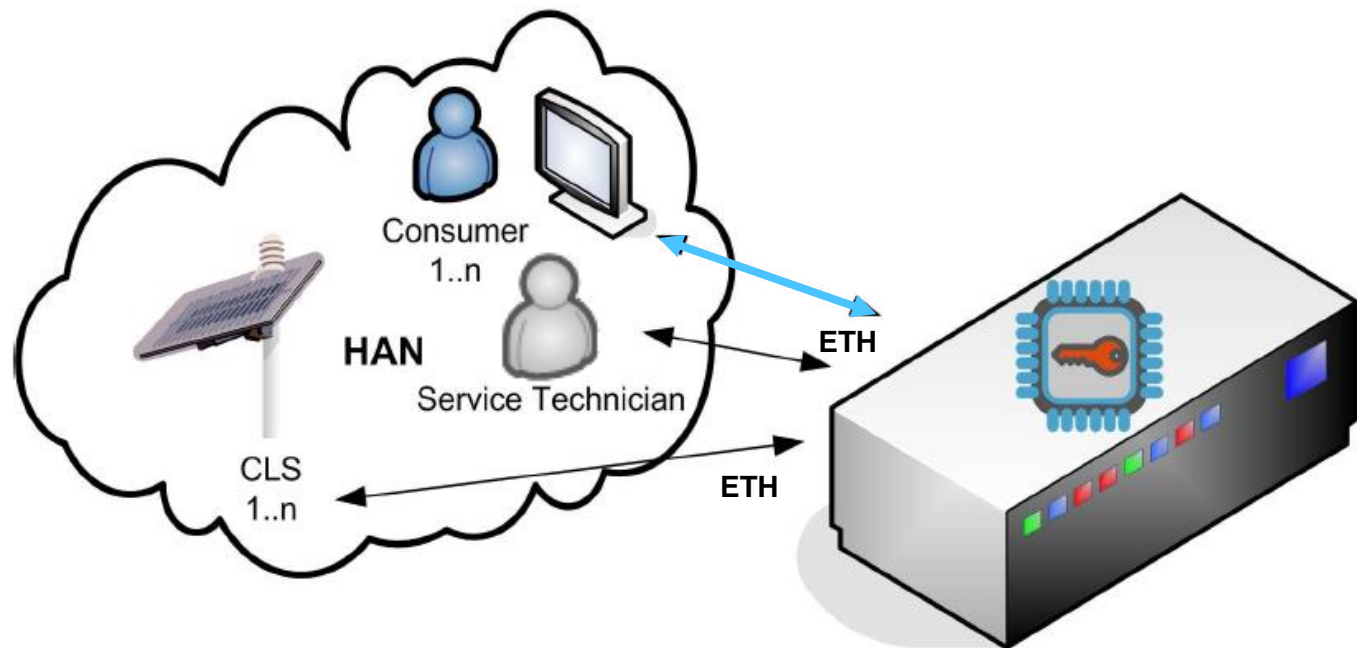
Smart Meter Gateway
incl. Security Module

Functionalities of the HAN interface

Consumer interface

HAN - Three logical interfaces:

- **Consumer interface (IF_GW_CON)**
- Service technician interface (IF_GW_SRV)
- CLS interface (IF_GW_CLS)



Source: BSI

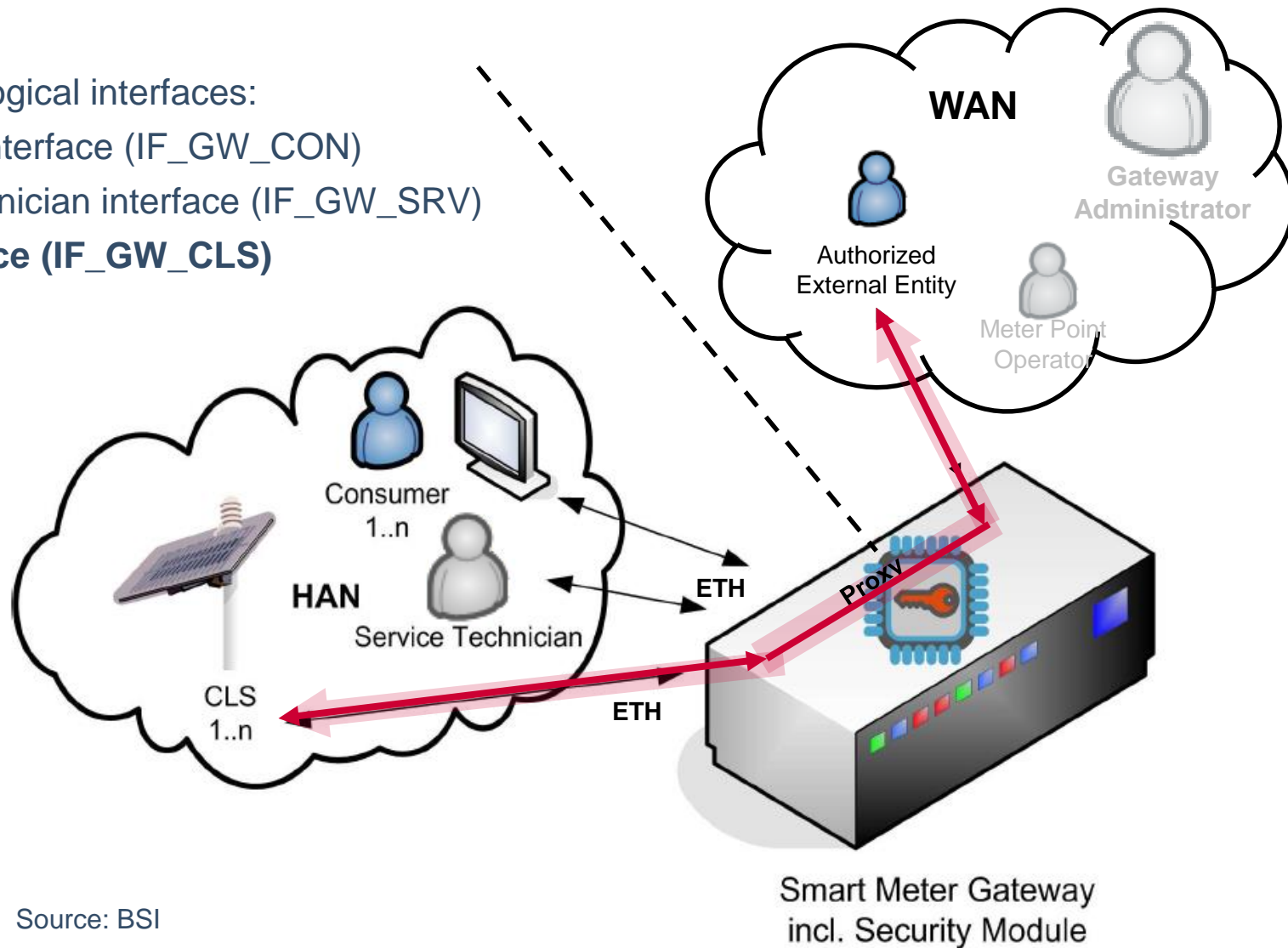
Smart Meter Gateway
incl. Security Module

Functionalities of the HAN interface

CLS Interface

HAN - Three logical interfaces:

- Consumer interface (IF_GW_CON)
- Service technician interface (IF_GW_SRV)
- **CLS interface (IF_GW_CLS)**



Source: BSI

Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

BSI Smart Metering Infrastructure

HAN: Three logical interfaces

Connecting Smart Home Systems

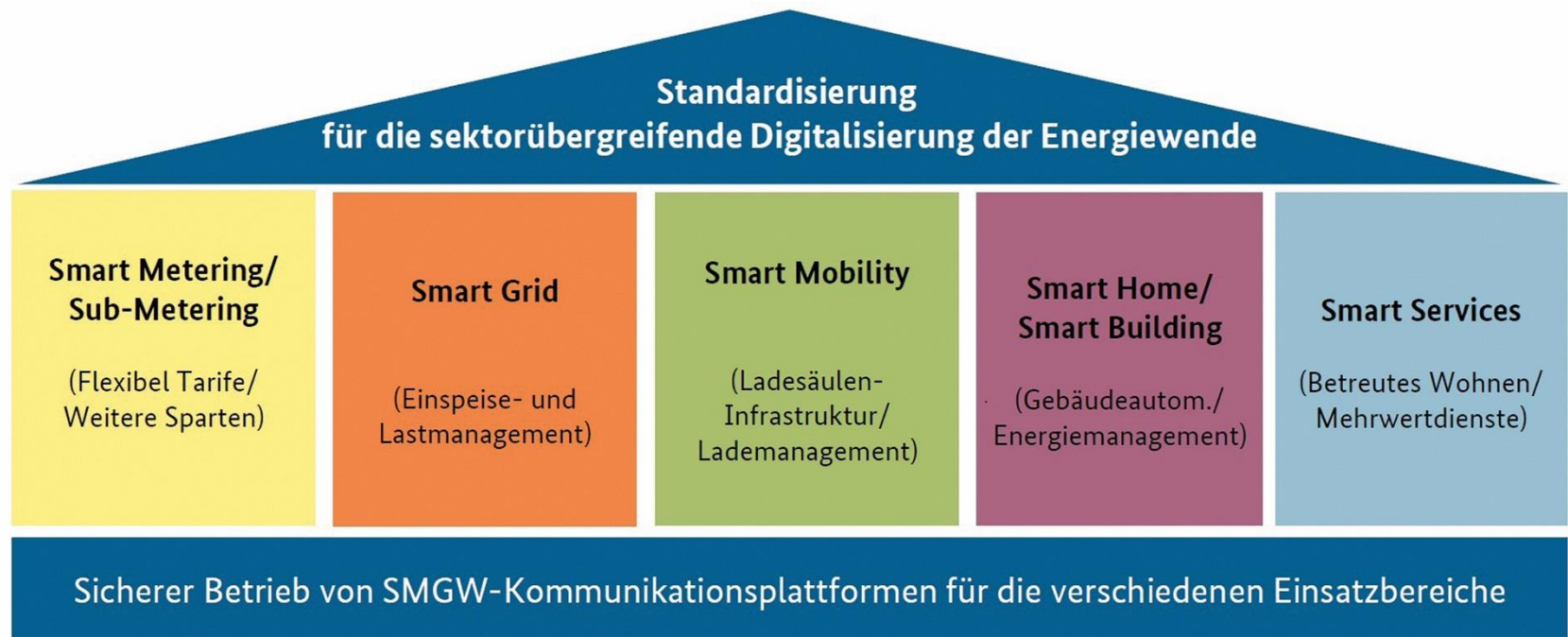
Consumer Interface Binding

CLS Interface Binding

Security Tests

Conclusion & Next Steps

Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

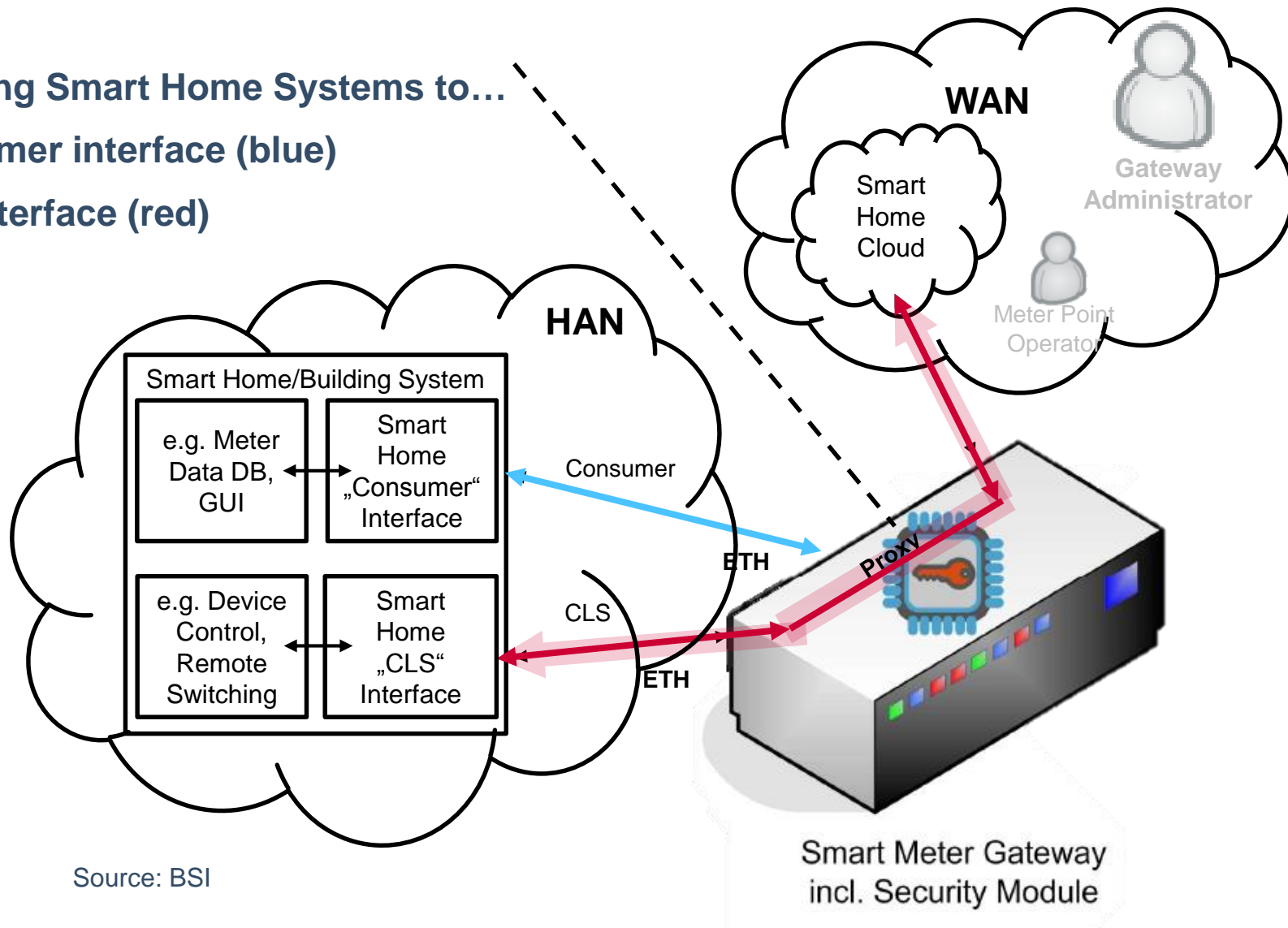


Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

Connecting Smart Home Systems to...

... Consumer interface (blue)

... CLS interface (red)



Source: BSI

Required Elements:

Driver for the Consumer Interface of the Smart Meter Gateway

- to read out meter data (generally supports generation as well as consumption data of electricity, gas, water, and heat meters)

Driver for the CLS interface of the Smart Meter Gateway

- for secure interconnections between external service providers such as the DSO and the energy provider with the Smart Home System.
- This allows the end-user to switch loads and generation units in reaction to price signals or external switch requests. At the same time this switching process is reproducible by the service provider to be accounted for in the billing process.
- Secure proxy connection for any Use case which requires a connection from a household to an external market entity

Concept for backend connection

- Smart Home Service is authorized external market entity

Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

BSI Smart Metering Infrastructure

HAN: Three logical interfaces

Connecting Smart Home Systems

Implementation Example

Consumer Interface Binding

CLS Interface Binding

Conclusion & Next Steps



OpenHAB is a vendor-neutral open source home automation software

- **Connectivity to different smart devices and services through bindings**
- **Different user interfaces**
- **Provides API to third-parties**
- **Will be used as device Gateway in AnyPLACE**

Idea: Include openHAB (and all connected devices) into the BSI infrastructure

OpenHAB provides bindings for many services and devices. Further are expected to be developed in the future.



Source: <http://www.kaikreuzer.de/2017/01/23/openhab2/>

Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

BSI Smart Metering Infrastructure

HAN: Three logical interfaces

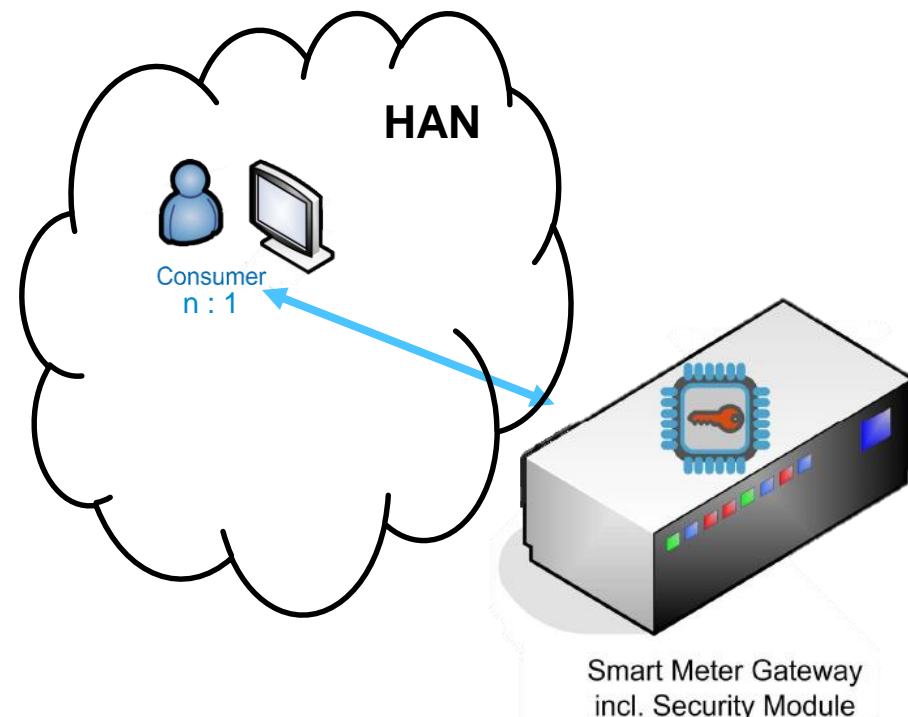
Connecting Smart Home Systems

Implementation Example

Consumer Interface Binding

CLS Interface Binding

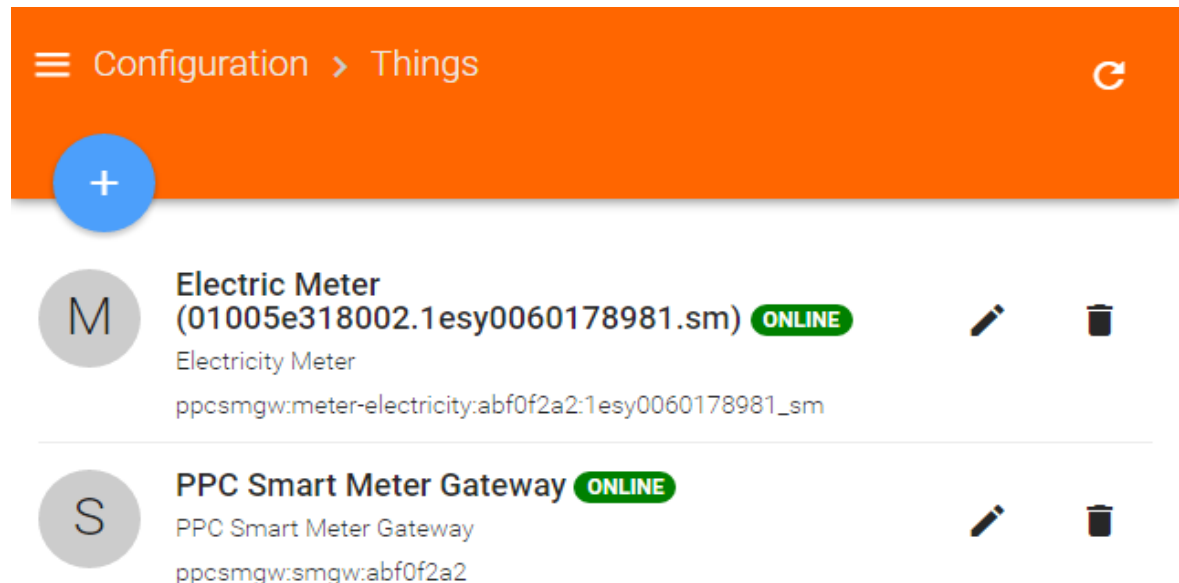
Conclusion & Next Steps



Implementation HAN Consumer Interface in Smart Home Systems – Example OpenHAB

OpenHAB HAN Consumer Interface binding characteristics:

- **SMGW abstracted as openHAB gateway**
- **Abstraction of meters connected to the SMGW as openHAB things**
- **Auto-configuration: Automatic detection of all meters connected to the SMGW**
- **Two Authentication Procedures realized:**
 - Username & Password
 - Certificate-based



The screenshot shows the OpenHAB Configuration > Things page. The page has an orange header with a hamburger menu icon, the text "Configuration > Things", and a refresh icon. Below the header is a blue circular button with a white plus sign. The main content area lists two things:

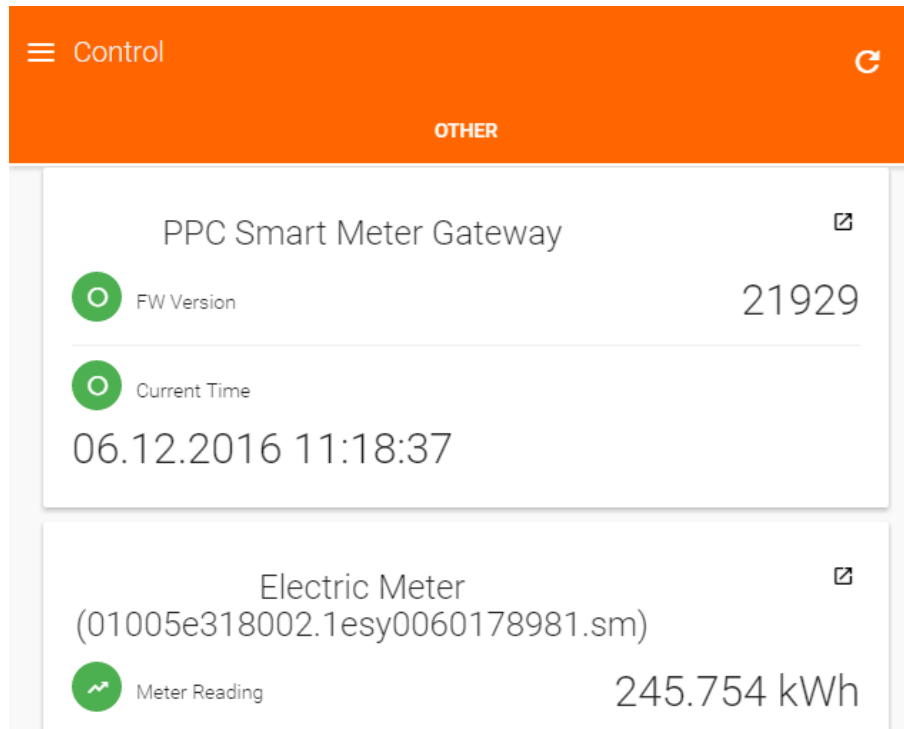
- Electric Meter** (01005e318002.1esy0060178981.sm) **ONLINE**
Electricity Meter
ppcsmgw:meter-electricity:abf0f2a2:1esy0060178981_sm
- PPC Smart Meter Gateway** **ONLINE**
PPC Smart Meter Gateway
ppcsmgw:smgw:abf0f2a2

Each item has a circular icon (M for Electric Meter, S for PPC Smart Meter Gateway) and two action icons (edit and delete).

Implementation HAN Consumer Interface in Smart Home Systems – Example OpenHAB

OpenHAB HAN Consumer Interface binding characteristics:

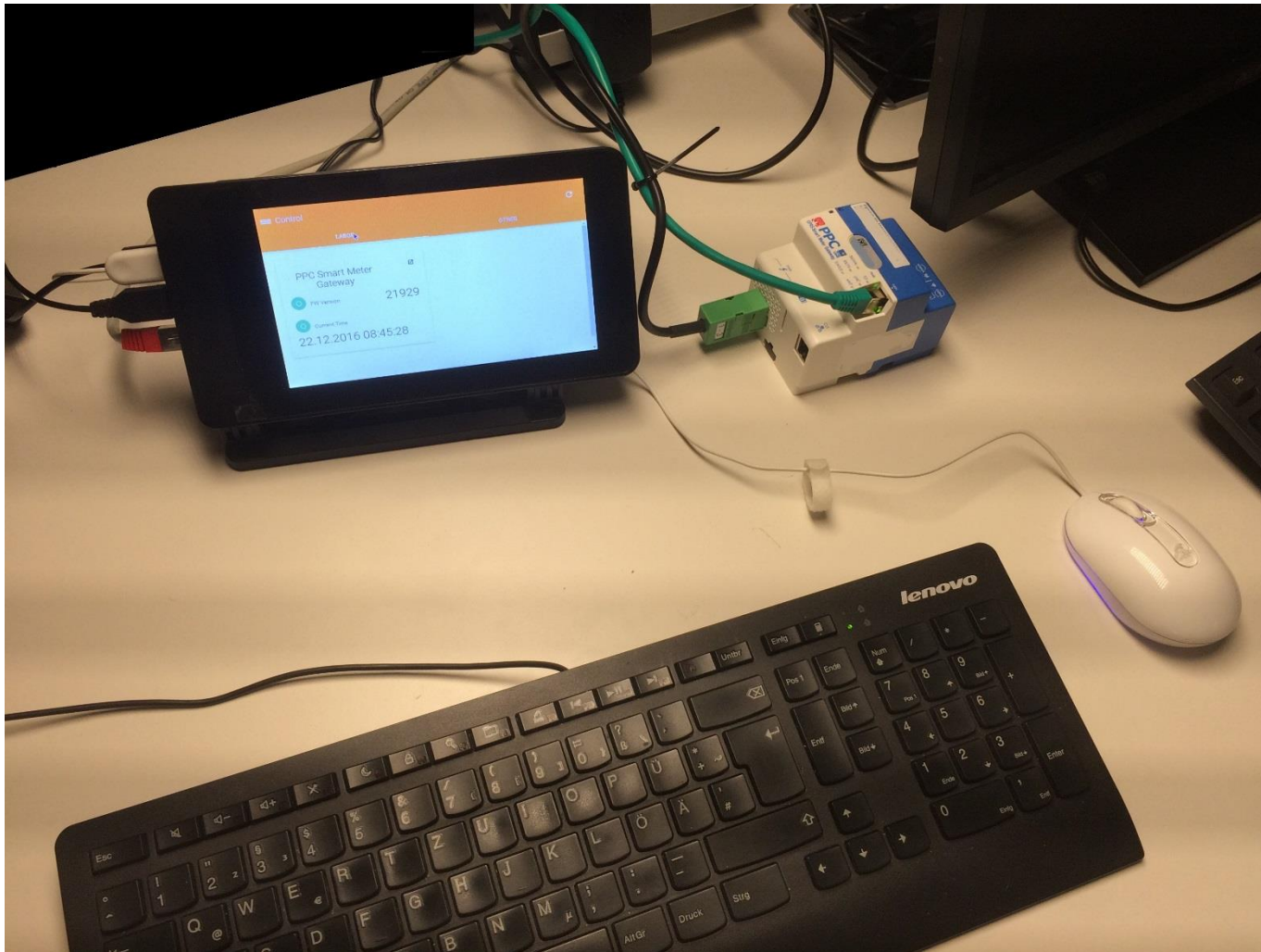
- Time and FW status available
- Meter readings (consumption) available with time-stamp
- Reading interval can be specified



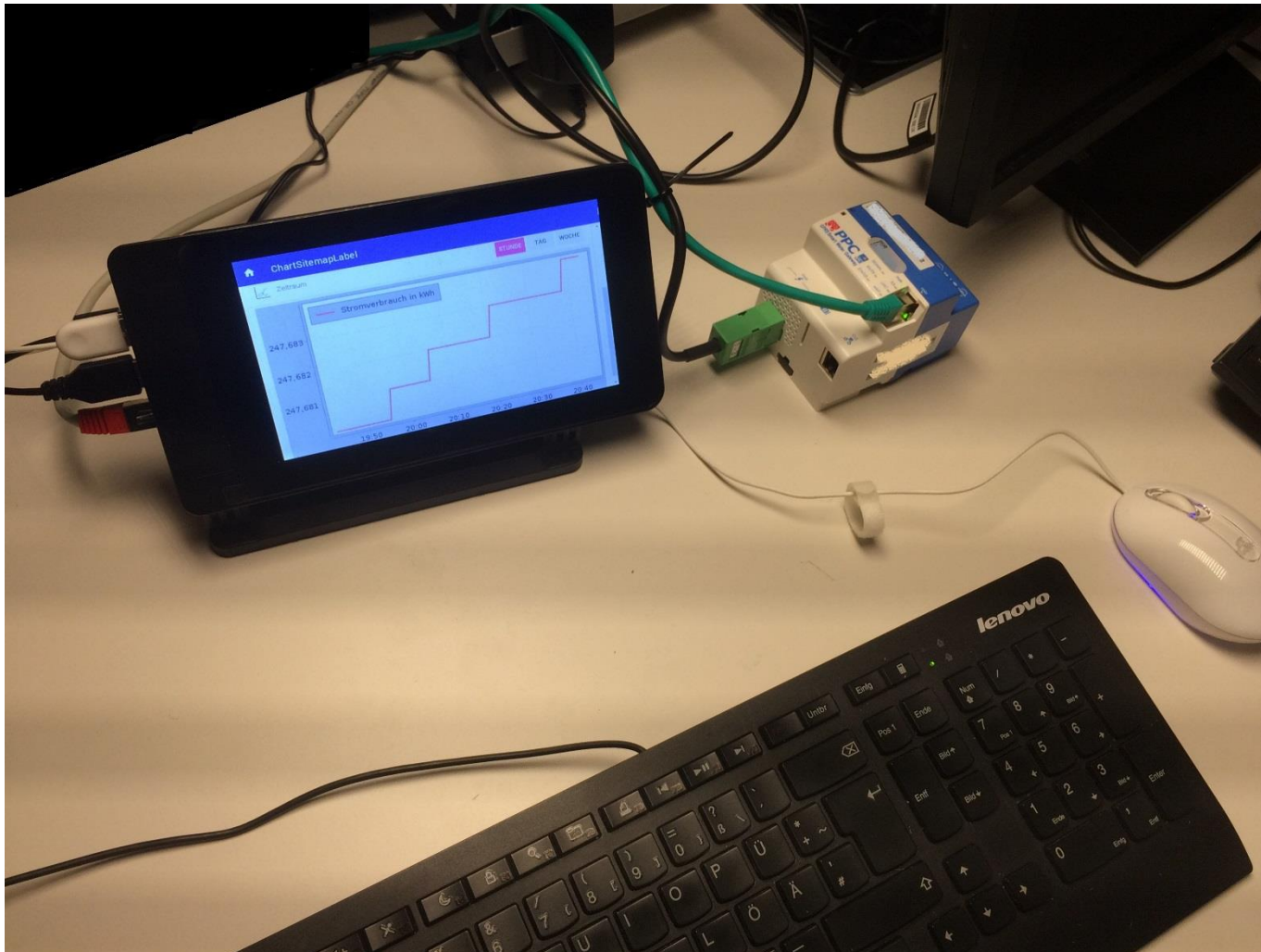
The screenshot displays a mobile control interface with an orange header bar labeled 'Control' and a refresh icon. Below the header, the word 'OTHER' is centered. The interface shows two device cards. The first card is for 'PPC Smart Meter Gateway' and includes a green status indicator, 'FW Version' (21929), and 'Current Time' (06.12.2016 11:18:37). The second card is for 'Electric Meter (01005e318002.1esy0060178981.sm)' and includes a green status indicator and 'Meter Reading' (245.754 kWh).

Device Name	Property	Value
PPC Smart Meter Gateway	FW Version	21929
	Current Time	06.12.2016 11:18:37
Electric Meter (01005e318002.1esy0060178981.sm)	Meter Reading	245.754 kWh

Implementation HAN Consumer Interface in Smart Home Systems – Example OpenHAB



Implementation HAN Consumer Interface in Smart Home Systems – Example OpenHAB



Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

BSI Smart Metering Infrastructure

HAN: Three logical interfaces

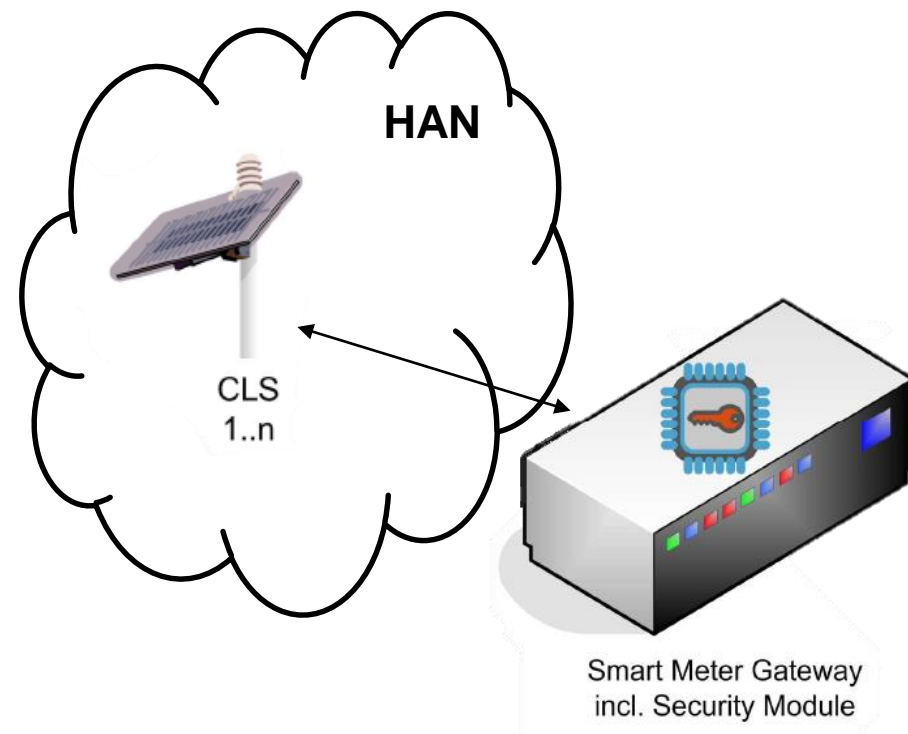
Connecting Smart Home Systems

Implementation Example

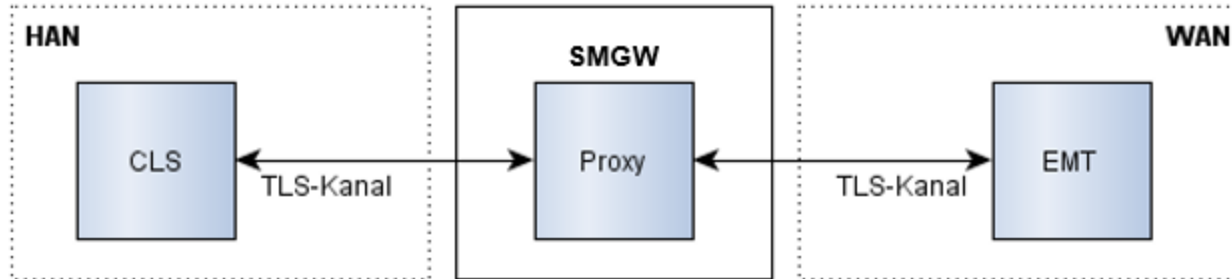
Consumer Interface Binding

CLS Interface Binding

Conclusion & Next Steps



Implementation HAN CLS interface in Smart Home Systems

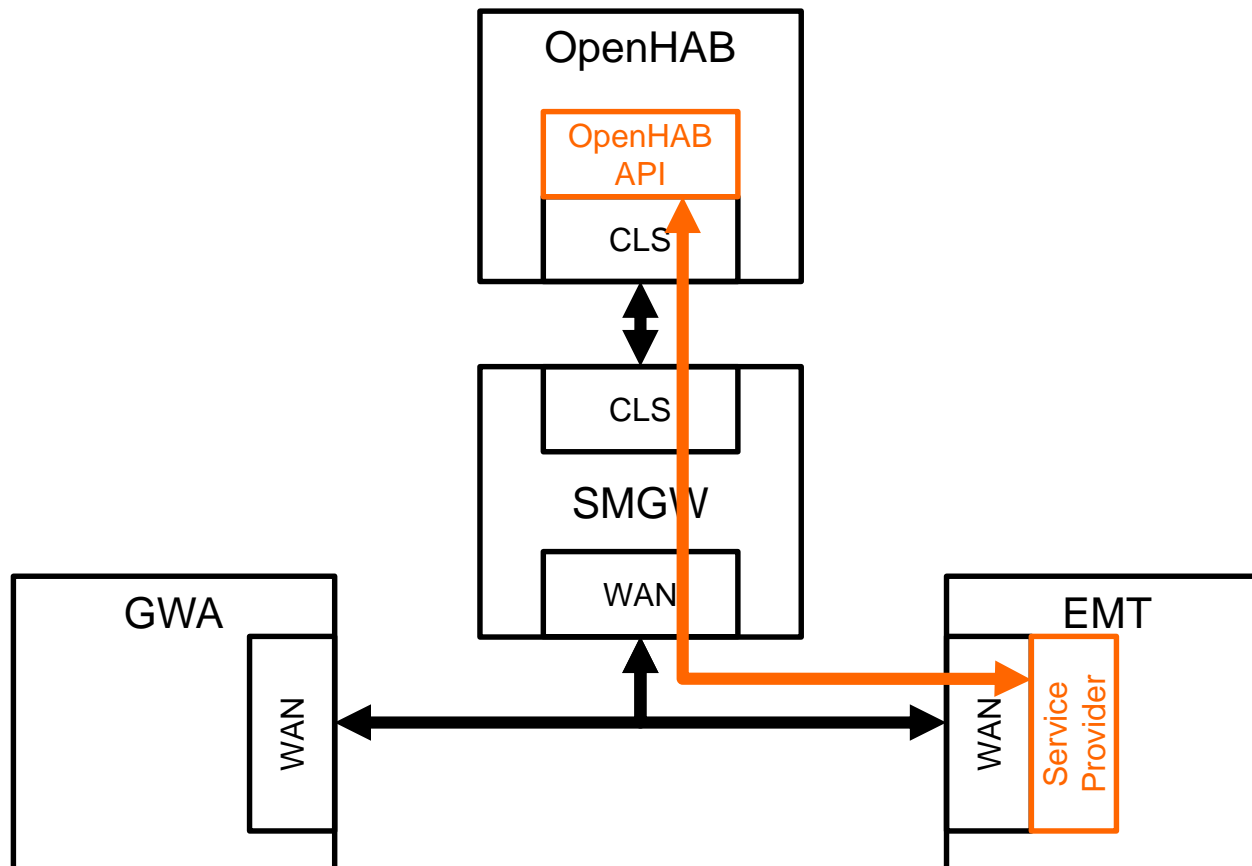


Source: BSI

Implementation HAN CLS interface in Smart Home Systems

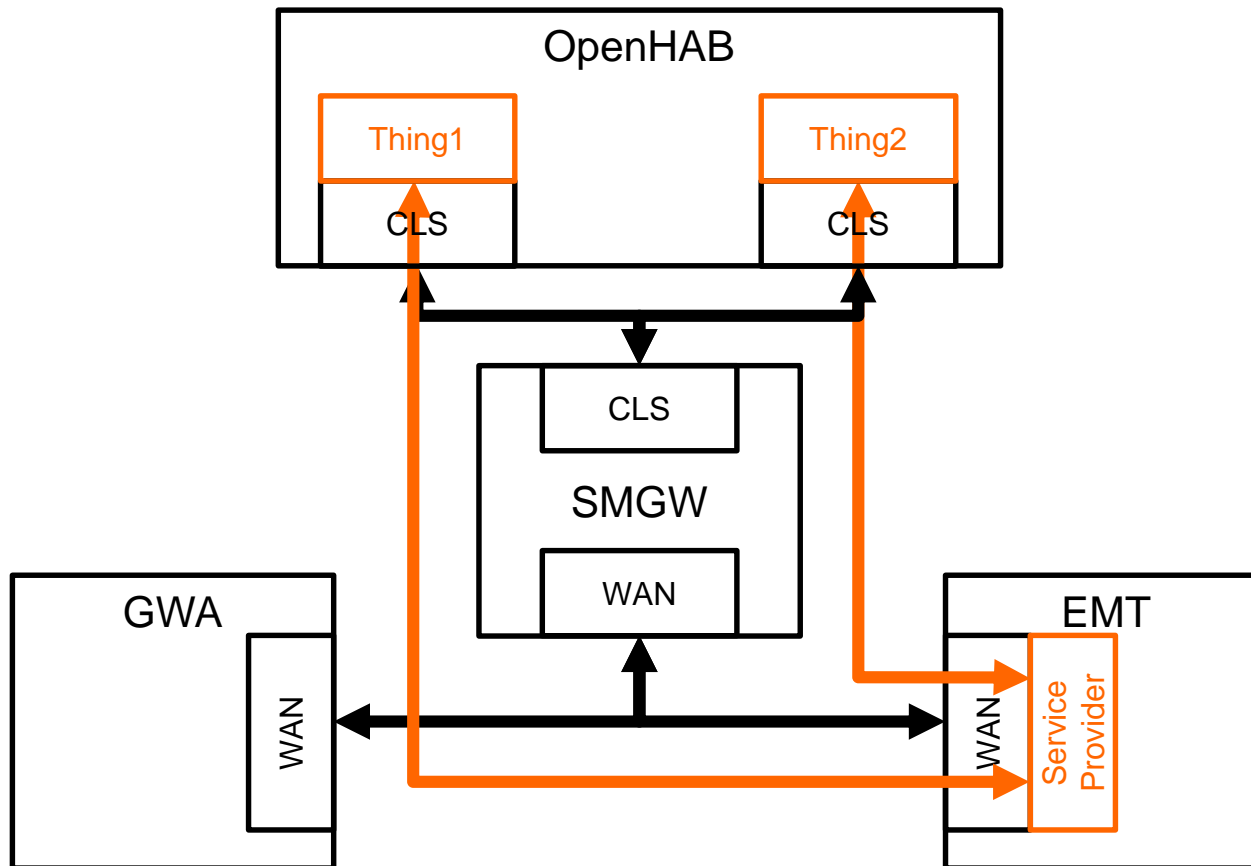
1st approach: RESTful API

Used to access and control all connected devices to External Market Entities



2nd approach: Single Items

Provision of single items (i.e. channels of a thing) to be accessed and controlled by an external market entity



Amending the BSI Smart Metering Infrastructure to Smart Home Applications via the SMGW

BSI Smart Metering Infrastructure

HAN: Three logical interfaces

Connecting Smart Home Systems

Implementation Example

Consumer Interface Binding

CLS Interface Binding

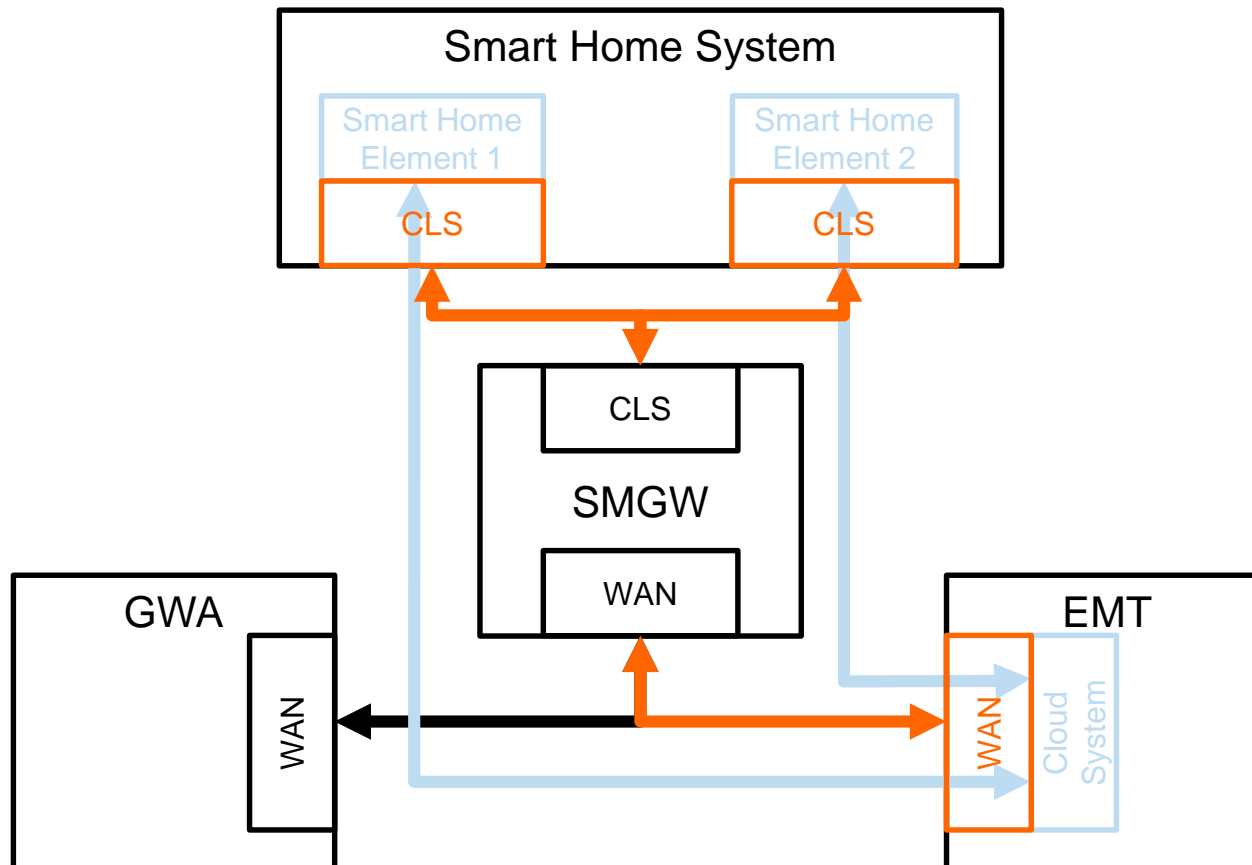
Conclusion & Next Steps

Conclusion & Next Steps

Add your Use-Case as CLS-Device

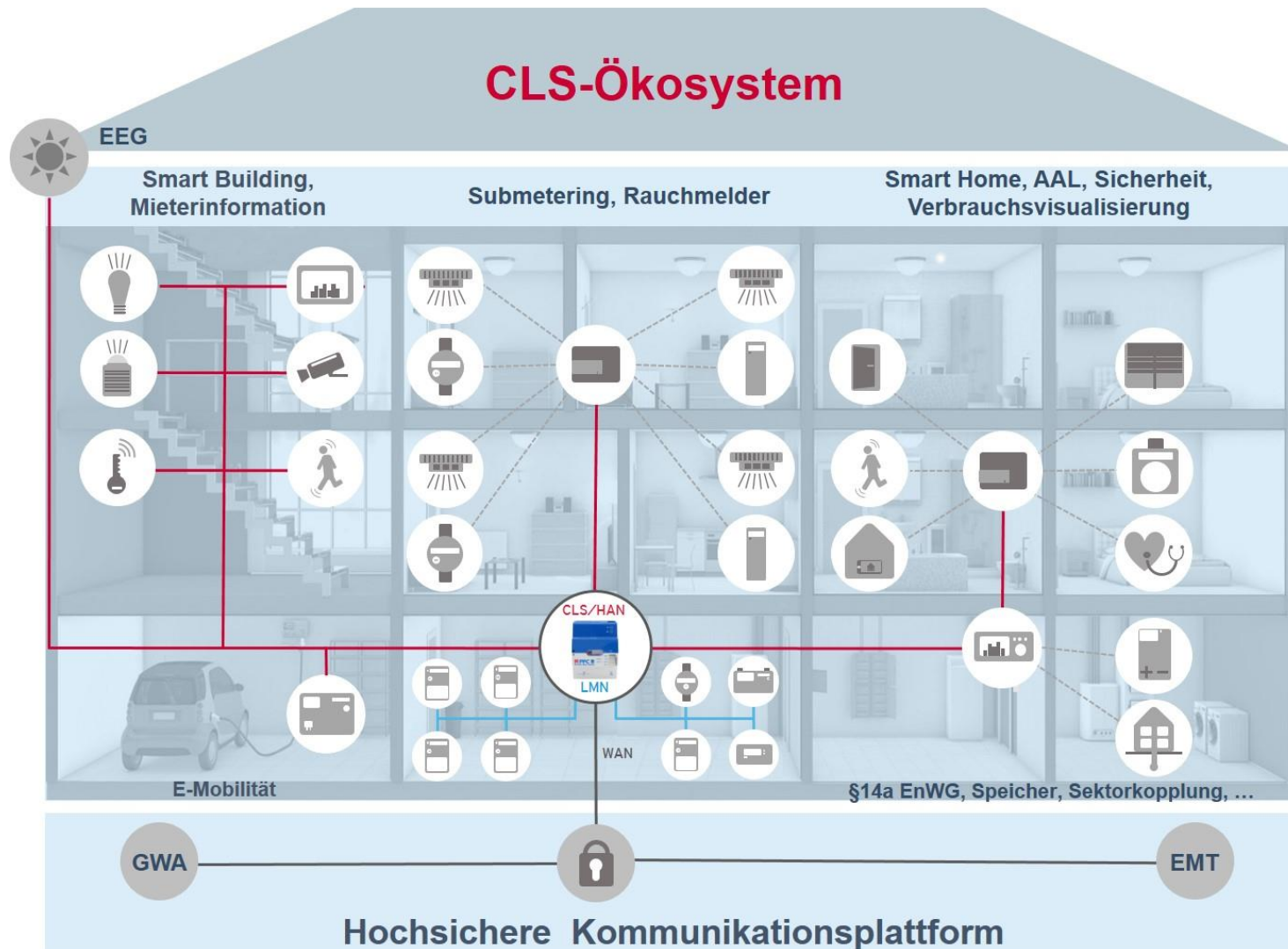
Generic approach for any Use Case:

- Implement CLS-Connection in Smart Home System
- Implement EMT in Backend-System



Conclusion & Next Steps

Add your Use-Case as CLS-Device





Questions?

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Thank you!

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