Concept for a "smart meter Customer interface adapter" for standardising the provision of data in the customer system

Status: 5 February 2021

A. Initial situation

This document represents a collection of project requirements and is divided into a presentation of the current situation on the one hand and a collection of the necessary requirements for a generic adapter for the end customer interface of the respective smart meters on the other.

Overview of smart meter device types used in Austria, including the technical characteristics of the customer interface

Network operator	Meter type	P1	MBUS	MEP	W-MBUS	IR
Net Lower Austria	SAGEMCOM T216-D		x			
	Kaifa		x			
Innsbruck Municipal enterprises	Kaifa MA110M		x			
	Kaifa MA309M		x			
Salzburg network	Kaifa MA110M		x			
	Kaifa MA309M		x			
TINETZ Tyrolean networks	Kaifa MA110M		x			
	Kaifa MA309M		x			
Vorarlberg Energy grids	Kaifa MA110M		x			
	Kaifa MA309M		x			
Net Upper Austria	Siemens TD-3510/11					x
	Siemens TD-3512					x
KNG Carinthia grid	Iskra AM550E/AM550T	x				
	Siemens IM150/350	x				
Vienna grids	Siemens IM150/350					x
	Iskra AM550E/AM550T					x
	Landis&Gyr E450s4					x
Network Burgenland	Landis&Gyr E450		x			
Energienetz Steiermark Energienetze Graz Feistritzwerke Energy Services	SAGEMCOM T216-D	x				
	SAGEMCOM S210	x				
	Landis&Gyr E450		x			
Energy Klagenfurt	Landis&Gyr E451		x			
	NES MTR1000/3000			x		
Energy Services	Kamstrup		x			
Linz network	NES MTR1000/3000 Gen 3.1/3.2			x		
	NES MTR1000/3000 Gen 4				x	

B. Current status Summary

In the following sections, the various situations at the individual grid operators are presented as a whole and the different initial situations are summarised. All information comes from the stakeholders involved in the project.

1) Physical interfaces

Physical interface 1:

RJ12 Modular Jack 6P6C; PIN assignment: 1: +5V 2: Data Request 3: Data Ground 4: NC 5: Data 6: Power Ground
The physical layer of the customer interface corresponds to the DSMR P1 specification. The +5V power supply is not available at the customer interface for all meters.

Physical interface 2:

MEP Multipurpose expansion Port: 9600 Baud 8N1 16: MEP POWER +24V 16A: MEP TXD 17: MEP RXD 18: MEP COM ENABLE (5V or 12V) 19: MEP GND
The maximum permissible current consumption of MEP client is 50 mA peak and 40 mA average. The output voltage (MEP_PWR) is nominally +24 VDC for 8XXX1-XXXXXX measuring devices and 8XXX2-XXXX measuring devices manufactured before 2013, or +26 VDC for 8XXX2-XXXX metres manufactured in 2013 and later. The isolated MEP communication interface can be connected directly to a standard RS232 or inverted TTL-RS232 interface. The MEP_COM_ENABLE connection must be supplied with (+12 V or +5 V).

Physical interface 3:

RJ 12 Modular Jack 6P6C Wired M-Bus Master 1-NC 2-NC 3-MBUS1(+) 4-MBUS2(-) 5-NC 6-NC
Power supply via M-Bus 4 M-Bus loads with a total of 6mA and 32V

Physical interface 4:

Infrared connection with optical read head DIN EN 62056-21 9600 baud No parity 1 start bit 1 stop bit

Physical interface 5:

Wireless M-Bus radio module EN 13757-4

Physical interface 6:

CCC module slot (Consumer Communication Channel) 6- pin connector: 1 VCC 2 DATA_IN 3 NC 4 NC 5 DATA_OUT 6 GND

Physical interface 7:

Infrared connection with optical read head DIN EN 62056-21 9600 baud even parity 1 start bit 1 stop bit

2) Different protocol versions

	Protocol
Variant 1	DLMS / COSEM, IDIS CII
Variant 2	Data link layer (fuse) M-Bus (EN 13757-2) or wMBUS (EN 13757-4); Application Layer M-Bus (EN 13757-3) according to OMS 3.0.1
Variant 3	Data Link Layer - MEP protocol application layer - ANSI C12.19

3) Different versions of security standards

	Security
Variant 1	Security Suite: 0 Algorithm AES128 Communication is encrypted (authentication is not required) used)
Variant 2	OMS 3.0.1: AES128 Encryption Mode 5
Variant 3	Security Suite 1, All data is encrypted, Global Unicast Encryption Key
Variant 4	Basic authentication: Read access, limited write access. Advanced authentication: read access, write access Optional RC4 96 bit key encryption
Variant 5	Security layer in accordance with COSEM Security Suite 0, data transfer additionally encrypted, two keys are required. GAK > Global authentication key GUEK > Global unicast encryption key
Variant 6	• Complete encryption of all communication interfaces • Each device contains a series of keys, so-called GPK (General Purpose Keys), which are used for role-based access • Data transport with AES-GCM-128 and key transport AES-128 Key Wrap (DLMS / COSEM Suite 0) • Data transport protection: xDLMS APDU encryption and - Authentication using the "General Glo Ciphering" service (global)

4) Communication direction and interval

	Comm. direction
Variant 1	Push only
Variant 2	Push mode with acknowledgement of the telegrams. 1. Search mode: Transmission of search telegram (SND_NKE to primary address 240) once per minute. After acknowledgement ("0xE5") of the search telegram, transition to data mode takes place. 2. Data mode: Transmission of data telegrams (SND_UD) 1x per second. Data telegrams must also be acknowledged with ("0xE5"). If 10 acknowledgements are not received, the system returns to search mode.
Variant 3	Client / Server principle SM represents the Sever.

	Interval
Variant 1	1 sec
Variant 2	5 sec
Variant 3	Depending on the request rate of the client.
Variant 4	5 sec Standard; Adjustable in 1 second steps
Variant 5	10 sec - 1 hour
Variant 6	10 sec Standard; Adjustable in 1 second steps

In principle, an adjustment to the transmission frequency must be made automatically. The intervals listed correspond to the transmission frequencies currently used.

5) Data provided on the customer interface (meter side)

- The transmitted data is very different.
- From minimal data to a complete data set at all stages.

	Data model
Variant 1	• 0-0:96.1.1 Meter number of the grid operator • 1-0:0.9.1 Time • 1-0:0.9.2 Date • 1-0:1.8.0 Counter reading +P • 1-0:2.8.0 Counter reading -P

	• 1-0:3.8.0 Counter reading +Q • 1-0:4.8.0 Counter reading -Q • 1-0:1.7.0 Current performance +P • 1-0:2.7.0 Current performance -P • 0-0:96.13.0 Customer information text • 0-0:96.13.1 Customer information code
Variant 2	• 0-0:1.0.0.255,1 Clock Attribute 1 - OBIS code • 0-0:1.0.0.255,2 Clock attribute 2 - Date and time • 1 0-0:96.1.0.255 Meter number of the network operator • 0-0:42.0.0.255 COSEM logical device name • 1-0:32.7.0.255 Voltage L1 • 1-0:52.7.0.255 Voltage L2 • 1-0:72.7.0.255 Voltage L3 • 1-0:31.7.0.255 Current L1 • 1-0:51.7.0.255 Current L2 • 1-0:71.7.0.255 Current L3 • 1-0:1.7.0.255 Active power reference +P • 1-0:2.7.0.255 Active power delivery -P • 1-0:1.8.0.255 Active energy reference +A (Wh) • 1-0:2.8.0.255 Active energy supply -A (Wh) • 1-0:3.8.0.255 Reactive energy reference +R (Wh) • 1-0:4.8.0.255 Reactive energy supply -R (Wh)
Variant 3	• Time and date [0-0:1.0.0] • 1-0:1.8.0.255 Active energy +A (Wh) • 1-0:2.8.0.255 Active energy -A (Wh) • 1-0:3.8.0.255 Reactive energy +R (varh) • 1-0:4.8.0.255 Reactive energy -R (varh) • 1-0:1.7.0.255 Instantaneous power +P (W) • 1-0:2.7.0.255 Instantaneous power -P (W) • 1-0:3.7.0.255 Instantaneous power +Q (var) • 1-0:4.7.0.255 Instantaneous power -Q (var)
Variant 4	• 0-0:0.9.2 and 0-0:0.9.1 Date and time [M-Bus CP48] • 1-1:1.8.0 Energy meter reading A+ [Wh] • 1-1:2.8.0 Energy meter reading A- [Wh] • 1-1:3.8.1 Energy meter reading R+ [varh] • 1-1:4.8.1 Energy meter reading R- [varh] • 1-1:1.7.0 Instantaneous active power P+ [W] • 1-1:2.7.0 Instantaneous active power P- [W] • 1-1:3.7.0 Instantaneous reactive power Q+ [var] • 1-1:4.7.0 Instantaneous reactive power Q- [var] • 1-1:1.128.0 Collection totaliser [Wh]
Variant 5	0-0:1.0.0 Date/time, 0.0 96.1.0 Meter number of the grid operator, 1-0:1.8.0 +A: Active energy reference, 1.0 :2.8.0 -A: Active energy supply,

	1-0:1.7.0 +P: instantaneous active power reference, 1-0:2.7.0 -P: instantaneous active power supply, 1-0:3.8.0 +R reactive energy supply, 1-0:4.8.0 -R Reactive energy supply Phase angle
Variant 6	0.0 :1.0.0 Time 1-0:32.7.0.255 Voltage L1 1-0:52.7.0.255 Voltage L2 1-0:72.7.0.255 Voltage L3 1-0:31.7.0.255 Current L1 1-0:51.7.0.255 Current L2 1-0:71.7.0.255 Current L3 1.0 1.7.0.255 Active power reference +P 1-0:2.7.0.255 Active power supply -P 1- 0:1.8.0.255 Active energy supply +A 1-0:2.8.0.255 Active energy supply -A 0.0 96.1.0.255 Meter number of the network operator 1-0:81.7.40 Phase angle L1 1.0 81.7.51 Phase angle L2 1-0:81.7.62 Phase angle L3
Variant 7	Three-phase meter directly connected (time stamp, A+, A-, P+, P-, U1-3, I1-I3, power factor; meter number) 8,0-0:1.0.0.255,2,0 Zeitstempel 3,1-0:1.8.0.255,1,0 logical name, active energy A+ 3,1-0:1.8.0.255,2,0 value, active energy A+ 3,1-0:1.8.0.255,3,0 scaler_unit, active energy A+ 3,1-0:2.8.0.255,1,0 logical name, active energy A- 3,1-0:2.8.0.255,2,0 value, active energy A- 3,1-0:2.8.0.255,3,0 scaler_unit, active energy A- 3,1-0:1.7.0.255,1,0 logical name, instantaneous power P+ 3,1-0:1.7.0.255,2,0 value, instantaneous power P+ 3,1-0:1.7.0.255,3,0 scaler_unit, instantaneous power P+ 3,1-0:2.7.0.255,1,0 logical name, instantaneous power P- 3,1-0:2.7.0.255,2,0 value, instantaneous power P- 3,1-0:2.7.0.255,3,0 scaler_unit, instantaneous power P- 3,1-0:32.7.0.255,1,0 logical name, voltage L1 3,1-0:32.7.0.255,2,0 value, voltage L1 3,1-0:32.7.0.255,3,0, scaler_unit, voltage L1 3,1-0:52.7.0.255,1,0 logical name, voltage L2 3,1-0:52.7.0.255,2,0 value, voltage L2 3,1-0:52.7.0.255,3,0 scaler_unit, voltage L2 3,1- 0:72.7.0.255,1,0 logical name, voltage L3 3.1-0:72.7.0.255,2.0 value, voltage L3

	3,1-0:72.7.0.255,3,0 scaler_unit, voltage L3 3,1-0:31.7.0.255,1,0 logical name, current L1 3,1-0:31.7.0.255,2,0 value, current L1 3,1-0:31.7.0.255,3,0 scaler_unit, stream L1 3,1-0:51.7.0.255,1,0 logical name, stream L2 3,1-0:51.7.0.255,2,0 value, stream L2 3,1-0:51.7.0.255,3,0 scaler_unit, stream L2 3,1-0:71.7.0.255,1,0 logical name, stream L3 3,1-0:71.7.0.255,2,0 value, stream L3 3,1-0:71.7.0.255,3,0 scaler_unit, current L3 3,1-0:13.7.0.255,1,0 logical name, power factor 3,1-0:13.7.0.255,2,0 value, power factor 3.1-0:13.7.0.255,3.0 scaler_unit, power factor 1,0-0:96.1.0.255,2,0 value, meter number of the network operator Measuring transformer meter = data as for three-phase meter incl. R+ and R- (time stamp, index A+, index A-, P+, P-, R+, R-, U1-3, I1-I3, power factor; meter number) 8,0-0:1.0.0.255,2,0 Zeitstempel 3,1-0:3.7.0.255,1,0 logical name, instantaneous power Q+ 3,1-0:3.7.0.255,2,0 value, instantaneous power Q+ 3,1-0:3.7.0.255,3,0 scaler_unit, instantaneous power Q+ 3,1-0:4.7.0.255,1,0 logical name, instantaneous power Q- 3,1-0:4.7.0.255,2,0 value, instantaneous power Q- 3,1-0:4.7.0.255,3,0 scaler_unit, instantaneous power Q- 1,0-0:96.1.0.255,2,0 value, device ID Single-phase meter (time stamp, index A+, index A-, P+, P-, U1, I1, power factor; meter number) 8,0-0:1.0.0.255,2,0 Zeitstempel 3,1-0:1.8.0.255,1,0 logical name, active energy A+ 3,1-0:1.8.0.255,2,0 value, active energy A+ 3,1-0:1.8.0.255,3,0 scaler_unit, active energy A+ 3,1-0:2.8.0.255,1,0 logical name, active energy A- 3,1-0:2.8.0.255,2,0 value, active energy A- 3,1-0:2.8.0.255,3,0 scaler_unit, active energy A- 3,1-0:1.7.0.255,1,0 logical name, instantaneous power P+ 3,1-0:1.7.0.255,2,0 value, instantaneous power P+ 3,1-0:1.7.0.255,3,0 scaler_unit, instantaneous power P+ 3,1-0:2.7.0.255,1,0 logical name, instantaneous power P- 3,1-0:2.7.0.255,2,0 value, instantaneous power P- 3,1-0:2.7.0.255,3,0 scaler_unit, instantaneous power P- 3,1-0:32.7.0.255,1,0 logical name, voltage L1 3,1-0:32.7.0.255,2,0 value, voltage L1

	3,1-0:32.7.0.255,3,0, scaler_unit, voltage L1

	3,1-0:31.7.0.255,1,0 logical name, stream L1 3,1-0:31.7.0.255,2,0 value, stream L1 3,1-0:31.7.0.255,3,0 scaler_unit, current L1 3,1-0:13.7.0.255,1,0 logical name, power factor 3,1-0:13.7.0.255,2,0 value, power factor 3.1-0:13.7.0.255,3.0 scaler_unit, power factor 1,0-0:96.1.0.255,2,0 value, meter number of the network operator
Variant 8	Alternating current meter: 0-0:1.0.0.255,2 Clock 1-0:1.8.0.255,1 Active energy import (+A) - code 1-0:1.8.0.255,2 Active energy import (+A) - value 1-0:1.8.1.255,1 Active energy import (+A) rate 1 - code 1-0:1.8.1.255,2 Active energy import (+A) rate 1 - value 1-0:1.8.2.255,1 Active energy import (+A) rate 2 - code 1-0:1.8.2.255,2 Active energy import (+A) rate 2 - value 1-0:1.7.0.255,1 Instantaneous active import power (+A) - code 1-0:1.7.0.255,2 Instantaneous active import power (+A) - value 1-0:2.8.0.255,1 Active energy export (-A) - code 1-0:2.8.0.255,2 Active energy export (-A) - value 1-0:2.8.1.255,1 Active energy export (-A) rate 1 - code 1-0:2.8.1.255,2 Active energy export (-A) rate 1 - value 1-0:2.8.2.255,1 Active energy export (-A) rate 2 - code 1-0:2.8.2.255,2 Active energy export (-A) rate 2 - value 1-0:2.7.0.255,1 Instantaneous active export power (-A) - code 1-0:2.7.0.255,2 Instantaneous active export power (-A) - value Three-phase meter and transformer meter: 0-0:1.0.0.255,2 Clock 1-0:1.8.0.255,1 Active energy import (+A) - code 1-0:1.8.0.255,2 Active energy import (+A) - value 1-0:1.8.1.255,1 Active energy import (+A) rate 1 - code 1-0:1.8.1.255,2 Active energy import (+A) rate 1 - value 1-0:1.8.2.255,1 Active energy import (+A) rate 2 - code 1-0:1.8.2.255,2 Active energy import (+A) rate 2 - value 1-0:1.7.0.255,1 Instantaneous active import power (+A) - code 1-0:1.7.0.255,2 Instantaneous active import power (+A) - value 1-0:2.8.0.255,1 Active energy export (-A) - code 1-0:2.8.0.255,2 Active energy export (-A) - value 1-0:2.8.1.255,1 Active energy export (-A) rate 1 - code 1-0:2.8.1.255,2 Active energy export (-A) rate 1 - value 1-0:2.8.2.255,1 Active energy export (-A) rate 2 - code 1-0:2.8.2.255,2 Active energy export (-A) rate 2 - value 1-0:2.7.0.255,1 Instantaneous active export power (-A) - code 1-0:2.7.0.255,2 Instantaneous active export power (-A) - value 1-0:3.8.0.255,1 Reactive energy import (+R) - code

	1-0:3.8.0.255,2 Reactive energy import (+R) - value 1-0:3.8.1.255,1 Reactive energy import (+R) rate 1 - code 1-0:3.8.1.255,2 Reactive energy import (+R) rate 1 - value 1-0:3.8.2.255,1 Reactive energy import (+R) rate 2 - code 1-0:3.8.2.255,2 Reactive energy import (+R) rate 2 - value 1-0:3.7.0.255,1 Instantaneous reactive import power (+R) - code 1-0:3.7.0.255,2 Instantaneous reactive import power (+R) - value 1-0:4.8.0.255,1 Reactive energy export (-R) - code 1-0:4.8.0.255,2 Reactive energy export (-R) - value 1-0:4.8.1.255,1 Reactive energy export (-R) rate 1 - code 1-0:4.8.1.255,2 Reactive energy export (-R) rate 1 - value 1-0:4.8.2.255,1 Reactive energy export (-R) rate 2 - code 1-0:4.8.2.255,2 Reactive energy export (-R) rate 2 - value 1-0:4.7.0.255,1 Instantaneous reactive export power (-R) - code 1-0:4.7.0.255,2 Instantaneous reactive export power (-R) - value
Variant 9	0.0:1.0.0.255 Date and time 0.0:C.1.0.255 Meter serial number 1.0:1.8.0.255 Forward active energy Sum 1.0:1.8.1.255 Forward active energy T1 1.0:1.8.2.255 Forward active energy T2 1.0:1.8.3.255 Forward active energy T3 1.0:1.8.4.255 Forward active energy T4 1.0:2.8.0.255 Reverse active energy Sum 1.0:2.8.1.255 Reverse active energy T1 1.0:2.8.2.255 Reverse active energy T2 1.0:2.8.3.255 Reverse active energy T3 1.0:2.8.4.255 Reverse active energy T4 1.0:3.8.0.255 Import reactive energy Sum 1.0:3.8.1.255 Import reactive energy T1 1.0:3.8.2.255 Import reactive energy T2 1.0:3.8.3.255 Import reactive energy T3 1.0:3.8.4.255 Import reactive energy T4 1.0:4.8.0.255 Export reactive energy Sum 1.0:4.8.1.255 Export reactive energy T1 1.0:4.8.2.255 Export reactive energy T2 1.0:4.8.3.255 Export reactive energy T3 1.0:4.8.4.255 Export reactive energy T4 1.0:15.8.0.255 Forward + Reverse active energy Sum 1.0:15.8.1.255 Forward + Reverse active energy T1 1.0:15.8.2.255 Forward + Reverse active energy T2 1.0:15.8.3.255 Forward + Reverse active energy T3 1.0:15.8.4.255 Forward + Reverse active energy T4 1.0:1.7.0.255 Instantaneous forward active power 1.0:2.7.0.255 Instantaneous reverse active power

	1.0:3.7.0.255 Instantaneous import reactive power 1.0:4.7.0.255 Instantaneous export reactive power 1.0:32.7.0.255 Instantaneous voltage L1 1.0:52.7.0.255 Instantaneous voltage L2 1.0:72.7.0.255 Instantaneous voltage L3 1.0:31.7.0.255 Instantaneous current L1 1.0:51.7.0.255 Instantaneous current L2 1.0:71.7.0.255 Instantaneous current L3 1.0:1.6.0.255 Maximum forward active power value 1.0:15.35.0.255 Power over limit threshold
Variant 10	possible values (up to 32): Typical values: 0.0.1 Meter number 96.1.0 Serial number 1.8.0 Total energy A+ 2.8.0 Total energy A- 3.8.0 Total reactive energy R+ 4.8.0 Total reactive energy R- 1.0.0 RTC 1.7.0 Current active power P+ 2.7.0 Current active power P- 3.7.0 Current reactive power Q+ 4.7.0 Current reactive power Q- 32.7.0 Current voltage L1 52.7.0 Current voltage L2 72.7.0 Current voltage L3 31.7.0 Current current L1 51.7.0 Current current L2 71.7.0 Current current L3

C. Elicitation of requirements

This chapter summarises the collected requirements for a universal adapter solution (hardware and firmware) and for the simple application for visualisation (software).

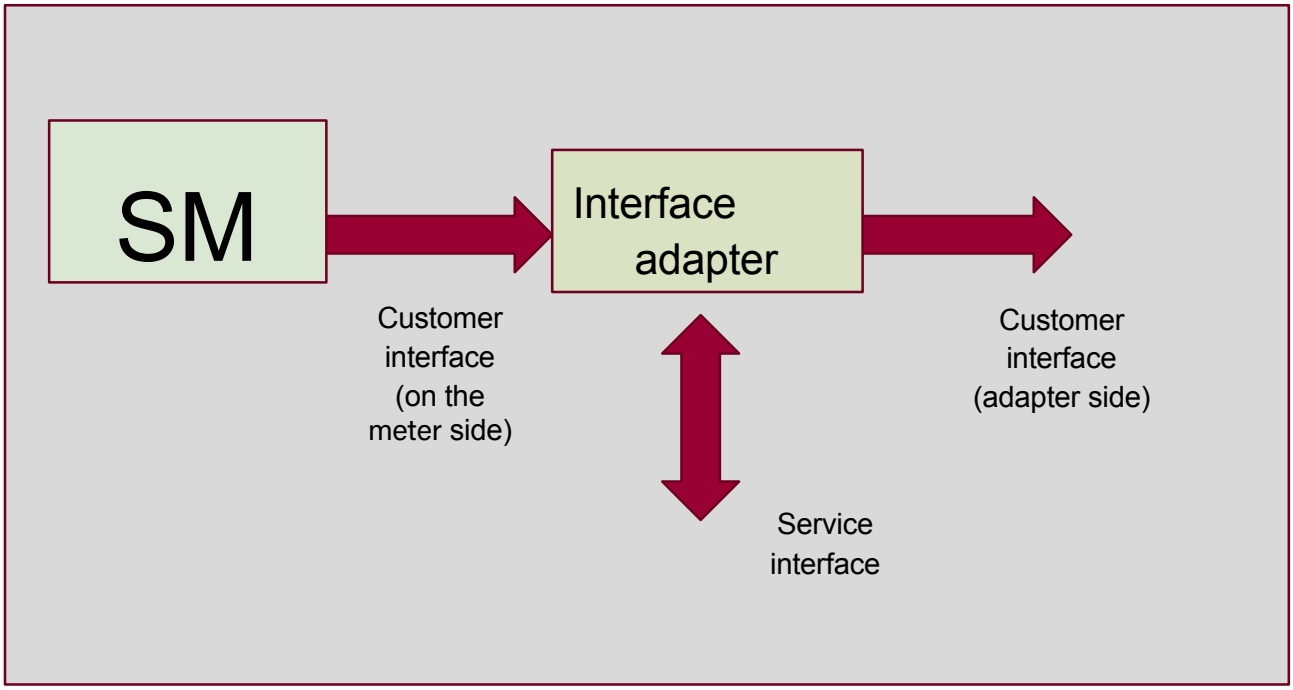

Figure 1: Hardware and interface overview

1. Security

- No historisation of the data on the HW adapter (storage of data beyond the current value)
- Data storage for interim storage for a short period (maximum rolling time window of 60 seconds) is permitted.
- It must be possible to store a meter-specific key.
- It must be possible to exchange keys at any time using either a procedure from the old key or a hybrid procedure.
- Compliance with current security standards (e.g. user authentication for data output, password protection for configuration, no key in plain text), in particular the device must not be able to be used to hack the smart meter.
- It must be easy for end customers to enter the key material on the adapter.
- Encrypted data output on the adapter with an open standard or data forwarding via an encrypted channel.

2. Assembly and commissioning

- The system (hardware and software application) must be able to be put into operation by laypersons, provided that a power socket is available or a passive power supply is possible via the adapter interface.
- The use of the adapter must not require any changes to the base (smart meter) currently being rolled out or installed.
- Such small dimensions that the meter box can be closed in accordance with TAEV and the network operator's implementation regulations. The meters used have different dimensions. It should be noted that it must still be possible to mount the meter in the meter box. Top-hat rail mounting must be possible.

3. Realisation of internal/external power supply

- If an external power supply is required on the adapter, a standardised interface, e.g. micro USB, must be used. Power supply from a battery is also permitted.
- If the smart meter has an internal power supply for the customer interface, this must be used.

4. Interfaces

- The data received from the smart meter (receiving interface) must be able to be accepted by third-party providers (e.g. smart home applications) in a standardised data format (Annex G Data Format Specification). The data set of the data to be output on the customer-facing interface (sending interface) must be standardised. Non-existent data fields remain empty or are not filled.
- Only a standardised interface in the direction of the customer system is required and this must not be adjustable for the customer.
- The system should be easily customisable for future smart meter generations

  Note: JSON-REST and MQTT are implemented

5. Compatibility with third-party systems

- The adapter must be able to be integrated into third-party systems (e.g. USB, LAN, WLAN, ...) via a standard interface (customer-side data interface) while ensuring upward compatibility.

6. Configurability of the hardware (incl. firmware) or the software application

- The system must be configurable. (customer-side service interface) (hardware & software)
- It must be possible to configure the interface on the meter side (e.g. baud, start bit, stop bit, parity, radio channel, encryption, etc.).

7. Software application

- Simple visualisation of the available data in numerical form (tabular) must be possible.
- Simple live display of the active power (difference between 1.7.0 P+ and 2.7.0 P-) in graphical form in a rolling time window of up to 5 minutes must be possible.
- Missing consumption and performance data may not be calculated or interpolated for the display.
- The system must be updatable (e.g. version updates)
- The visualisation must be automatically optimised for different display sizes (e.g. laptop, tablet, smartphone).
- The application must be able to run on the standard market platforms (e.g. Android, iOS, Windows, OSX)
- The application must be easily adaptable to new adapter versions.

8. Hardware maintenance and operation (incl. firmware)

- The system must be updatable. (Firmware update of the adapter, customer service interface)
- Automatic adaptation to the push interval of the meter. This means that as soon as data is received, it is processed and forwarded promptly. (input-process-output cycle)
- It must be possible to analyse the status of the adapter via 1 or more LEDs on the housing (e.g. power supply, successful decoding of telegrams, problems with the communication connection)
- The system must be able to automatically synchronise the reception speed with the transmission speed of the Smart Meter.
- In normal operation, the system must process the consumption data output by the smart meter in near real time and send it on without any noticeable delay (i.e. with less than 50% of the push interval time of the smart meter, but no more than 0.5 seconds).
- The data sent by the adapter should be able to be transmitted from the meter location to the respective customer installation (e.g. meter room in the basement and flat in a block of flats, detached house).
- Installation in the meter box may impair the use of radio protocols. It must be possible to connect an optional external antenna when using radio protocols.
- The system must support the same environmental impact standards as the smart meter (Annex H)
- The adapter must not interfere with the smart meter and its communication.

Installation in the meter box may impair the use of radio protocols. It must be possible to connect an optional external antenna when using radio protocols.

9. Reliability and SLA

The system (hardware and software application) must guarantee stable 24/7 operation

D. Data format specification (adapter customer side):

OBIS code	Description of the
0-0:1.0.0.255	Date and time
0-0:C.1.0.255	Meter serial number
1-0:1.8.0.255	Forward active energy +A
1-0:1.8.1.255	
1-0:1.8.2.255	
1-0:1.8.3.255	
1-0:1.8.4.255	
1-0:2.8.0.255	Reverse active energy -A
1-0:2.8.1.255	
1-0:2.8.2.255	
1-0:2.8.3.255	
1-0:2.8.4.255	
1-0:3.8.0.255	Import reactive energy +R
1-0:3.8.1.255	
1-0:3.8.2.255	
1-0:3.8.3.255	
1-0:3.8.4.255	
1-0:4.8.0.255	Export reactive energy -R
1-0:4.8.1.255	
1-0:4.8.2.255	
1-0:4.8.3.255	
1-0:4.8.4.255	
1-0:15.8.0.255	Forward + Reverse active energy
1-0:15.8.1.255	
1-0:15.8.2.255	
1-0:15.8.3.255	
1-0:15.8.4.255	
1-0:1.7.0.255	Instantaneous forward active power +P
1-0:2.7.0.255	Instantaneous reverse active power -P
1-0:3.7.0.255	Instantaneous import reactive power +Q
1-0:4.7.0.255	Instantaneous export reactive power -Q
1-0:32.7.0.255	Instantaneous voltage L1
1-0:52.7.0.255	Instantaneous voltage L2
1-0:72.7.0.255	Instantaneous voltage L3

1-0:31.7.0.255	Instantaneous current L1
1-0:51.7.0.255	Instantaneous current L2
1-0:71.7.0.255	Instantaneous current L3
1-0:1.6.0.255	Maximum forward active power value
1-0:15.35.0.255	Power over limit threshold
1-0:33.7.0	Ch. 0; L1 Power factor; Inst. value
1-0:53.7.0	Ch. 0; L2 Power factor; Inst. value
1-0:73.7.0	Ch. 0; L3 Power factor; Inst. value
1-0:13.7.0.255	Power Factor
0-0:96.1.0.255	Meter number of the network operator
0-0:42.0.0.255	COSEM logical device name
0-0:0.9.2 and 0-0:0.9.1	Date and time
1-1:1.8.0	Meter reading energy A+ [Wh]
1-1:2.8.0	Meter reading energy A- [Wh]
1-1:3.8.1	Meter reading energy R+ [varh]
1-1:4.8.1	Meter reading energy R- [varh]
1-1:1.7.0	instantaneous active power P+ [W]
1-1:2.7.0	instantaneous active power P- [W]
1-1:3.7.0	Instantaneous reactive power Q+ [var]
1-1:4.7.0	Instantaneous reactive power Q- [var]
0-0:96.1.1.255	Meter number of the network operator
0-0:96.1.1.255	Time
0-0:96.1.2.255	date
0-0:96.13.0.255	Customer information text
0-0:96.13.1.255	Customer information code
0.0.1	Meter number
1-0:81.7.40	Angle U(L1) to I(L1)
1-0:81.7.51	Angle U(L2) to I(L2)
1-0:81.7.62	Angle U(L3) to I(L3)
1-3:0.2.8.255,2	P1 port DSMR version